

Catalogue & Technical Manual

Suppliers to
Refrigeration
Airconditioning
and Allied
Industries

www.actrol.com.au



Your best solution...

\$70.00



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38 B Autumn Street, Geelong West 3218	(03) 5223 1088	(03) 5223 2949
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7 Enterprise Court, Mulgrave 3170	(03) 9560 3800	(03) 9560 3822
2 Reserve Street, Preston 3072	(03) 9480 6355	(03) 9416 8358
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U6/80 Reserve Road, Artarmon 2064	(02) 9906 6011	(02) 9906 5588
81-83 Broadmeadow Road, Broadmeadow 2292	(02) 4961 1441	(02) 4961 4362
24 Cobbora Road, Dubbo 2830	(02) 6882 4666	(02) 6882 0411
U4/305 Manns Road, Gosford 2250	(02) 4324 5768	(02) 4324 9130
U5/12 Robertson Place, Penrith 2750	(02) 4721 1850	(02) 4721 1849
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2/28 Skinner Avenue, Riverwood 2210	(02) 9584 9111	(02) 9584 9177
U3/17-25 Lake Albert Road, Wagga Wagga 2650	(02) 6921 9272	(02) 6921 9269
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81 Wises Road, Maroochydore 4558	(07) 5479 1110	(07) 5479 1112
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193 Ingham Road, Townsville 4810	(07) 4771 4131	(07) 4721 1358
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South Australia		
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51 Frobisher Street, Osborne Park 6017	(08) 9444 0088	(08) 9444 2743

Actrol Parts Catalogue and Technical Manual No. 9

The Ninth Edition of Actrol's Catalogue and Technical Manual illustrates an even wider range of quality products available through our expanding Nationwide Sales Network.

The entire material from our previous edition has been reviewed and updated with many new products added along with selection charts, wiring diagrams, spare parts listings, etc.

The Technical Section has been further expanded to include even more detail relating to the wide range of Refrigerants now in use. The emergence of Sound & Noise as an issue relating to Refrigeration and Air Conditioning has been addressed with the inclusion of Sound & Noise technical papers.

Actrol would like to thank our customers for their continued patronage. If this is our first opportunity to serve you, we assure you that we will strive to handle any order entrusted to us to your complete satisfaction.

All product lines cannot be shown in complete detail so if further information is required please contact your nearest Actrol Branch.

How to use this Catalogue to your Advantage

Quick Reference Index

This enables you to quickly 'flip' to the section required by means of the colour coding or the 'tabbed' section numbers throughout the catalogue. Then refer to that Section Index.

or

Consult the Comprehensive Main Index

or

The Trade / Brand Name Index following the Main Index

Actrol Website

For the very latest updates on products, pricing, technical information, events and promotions the Actrol website is constantly being revised.

Information on our products includes an electronic version of this catalogue plus information on new products. Brochures are also online for you to use and print.

A comprehensive technical section has also been built to include installation instructions, wiring diagrams, technical papers and software.

Notification on industry events and news keeps you up to date. This includes local, national and international happenings.

Of course we incorporate much information on Actrol which gives detail on branch locations, key people, history and ownership as well as the ability for you to easily contact us.

Order Online

In our endeavour to deliver the highest levels of service and convenience to our valued customers, we have developed the Online Catalogue Facility. This will allow Actrol's current account customers to log in, check their pricing and place orders on a 24 hours a day, 7 days a week basis.

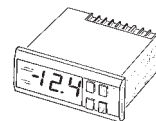
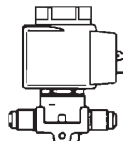
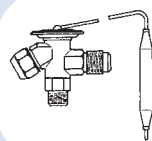
To access the Online Catalogue, enter your User ID and Password or alternatively if you are not an account customer click on the public user login. Passwords are available on request.

No party should rely upon the contents of this publication as to the fitness of any particular product for any particular use or application. Goods are offered with the benefit of any warranty given by the manufacturer but Actrol Parts shall not be liable for any loss or damage either direct or consequential arising out of any defects.

All goods are sold on Actrol Parts' standard Terms and Conditions of Sale as attached and as may be modified from time to time prior to any particular sale.

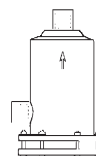
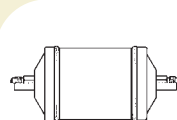
Quick Reference Index

- Controls: Air and Liquid Flow, Electronic, Humidity, Liquid Level, Oil Protection, Pressure, Pump, Temperature, Time
- Valves: Float Control, Hot Gas, Regulating, Reversing, Solenoid, Thermostatic Expansion (TX)
- Thermostats: A/C, Domestic, Commercial, Electronic



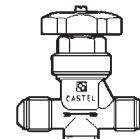
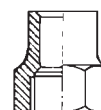
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- Filter-Driers: Liquid, Suction, Bi-Flow, Oil
- Service Aids: Cleaners • Drying Agents
- Liquid Leak Detectors • Solvents
- Oil: Mineral, Synthetic, Vacuum
- Refrigerants, Flushing Agents
- Water Treatment / Cooling Tower Products



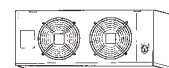
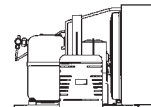
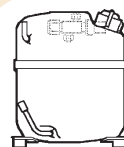
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- Brass and Copper Fittings • Copper Tube
- Insulation: Pipe, Sheet and Tape
- Liquid and Moisture Indicators • Pipe Ducts
- Pipe Supports • Sight Glasses • Valves: Ball, Check, Line, Angle, Relief, Rotalock, Schrader/Access
- Vibration Eliminators



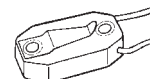
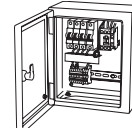
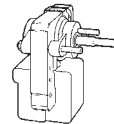
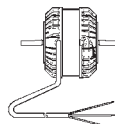
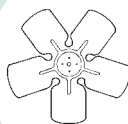
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- Air Curtains • Beverage Cooler Parts
- Cabinet Accessories and Hardware
- Compressors • Condensers • Condensing Units
- Door Gaskets • Drop-In Units • Foam Insulation
- Induced Draught / Unit Coolers • Pressure Vessels
- Sealants • Tapes • V-Belts



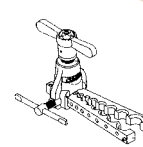
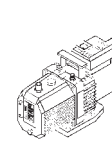
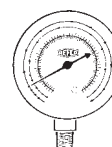
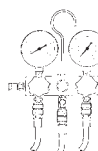
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- Batteries • Books • Capacitors
- Electrical Products • Fan Blades and Motors
- Fuses • Heater Cable
- Motor Starters / Contactors • Overloads and Relays
- Switchboards



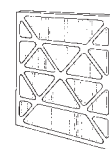
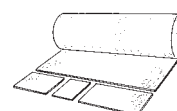
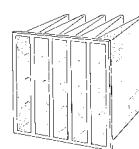
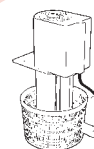
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- Charging/Recovery Equipment
- Cylinders • Gauges • Leak Detectors
- Solder and Brazing Equipment
- Test Instruments • Thermometers
- Tools • Tubing Tools • Vacuum Pumps



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- Air Filters and Filter Media
- Hydronic System Accessories
- Noise and Vibration Control Products
- Pumps: Condensate, Evaporative Cooler, Submersible
- Quick Connect Couplings



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- Engineering and Technical Data

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Main Index and Trade / Brand Name Index on Following Pages

GENERAL TERMS AND CONDITIONS OF SALE/HIRE

In these terms and conditions Actrol means GSA Industries (Aust.) Pty. Ltd., trading as Actrol Parts and Buyer (Customer) means the buyer/hirer whose order for the purchase/hire of goods is accepted by Actrol.

1. ACCEPTANCE OF BUYER'S ORDER

These terms and conditions shall apply to every sales/hire contract and sale/hire of goods between Actrol and Buyer; any terms and conditions of Buyer's order deviating from or inconsistent with these terms and conditions are expressly rejected by Actrol. This rejection also extends to any statement by Buyer that Buyer's terms and conditions shall prevail and to any stipulation by Buyer as to the manner of declaring such rejection. A contract shall only be or be deemed to have been entered into between Actrol and Buyer for the supply of goods when upon an order having been placed upon Actrol for goods, that order has been accepted by Actrol (such acceptance of order may be made and communicated by Actrol in writing or by overt act of acceptance). The provisions of this Clause 1. shall apply to every quotation or offer by Actrol for the supply/hire of goods.

2. PRICES

All prices shall be ex warehouse and shall not include insurance or delivery charges. Actrol may invoice the goods sold at its prices ruling on the date of each delivery.

3. PROPERTY RISK & INSURANCE

Subject to Clause 4 below Buyer shall, at its cost, insure the goods, in Actrol's name, against such risks other than transit as a prudent owner of the goods would insure for at their full insurable value. The risk in the goods sold shall pass to Buyer when the goods are loaded for consignment at Actrol's warehouse, whether by Carrier employed or engaged by Actrol or Buyer. This shall also apply to any partial delivery of goods. If delivery of goods is delayed due to any circumstances beyond the control of Actrol the risk passes to Buyer on the day when the goods were first ready for consignment from Actrol's warehouse. Notwithstanding anything herein contained, property in and legal title to the goods shall not pass to Buyer until payment for all debts owing to Actrol by Buyer has been received by Actrol. Until such payment has been received by Actrol, Buyer will store the goods separately and apart from its own goods and those of any other person or company. Actrol shall be entitled to re-take possession of all goods delivered until all debts owing to Actrol by Buyer have been paid in full. Actrol shall not exercise such right unless any such payment is overdue. Buyer may re-sell any of the goods on normal commercial terms before Actrol is paid in full provided that:

- Buyer re-sells as principal. Buyer has no right to commit Actrol to any contractual relationship or liability to the third party to whom such sale is made, or any other third party.
 - As between Actrol and Buyer, Buyer re-sells as fiduciary agent and bailee of Actrol.
 - Buyer holds all rights in respect of the re-sale price on behalf of Actrol and shall on request of Actrol assign any claim against any such third party for unpaid debt. Buyer hereby irrevocably appoints the Directors of Actrol for the time being, as joint and several attorneys for Buyer to sign any documents to give effect to such assignment.
 - Buyer holds the proceeds of any re-sale or insurance claim on trust for Actrol until Actrol has been paid in full for those goods which are the subject of re-sale or insured loss.
- Until payment of all debts owing to Actrol by Buyer, Actrol may, at its discretion, without further notice and without prejudice to any other of its rights, either:
- re-take possession of the goods and re-sell the same, or any of them, and may enter upon Buyer's premises, by its servants or agents, for that purpose, without any liability on the part of Actrol for any loss or damage suffered as a consequence of such entry or re-taking of possession; or
 - recover the purchase price of the goods by action, and may file an application for the appointment of a liquidator to Buyer notwithstanding that property in the goods has not passed to Buyer.

If:

- payment of the purchase price or debt due to Actrol is overdue in whole or in part; or
- there is a breach of any term of contract between Actrol and Buyer; or
- Buyer commences to be wound up or is placed under official management, or a receiver, or a receiver and manager or voluntary administrator is appointed in respect of Buyer, its undertaking or property or any part thereof, or an encumbrancer, by itself or by an agent, takes or purports to take possession of Buyer's undertaking or property or any part thereof; or
- Buyer parts with possession of the goods or any of them otherwise than by way of sale to its customer(s) in the ordinary course of its business.

These provisions apply notwithstanding any arrangement under which Actrol provides credit to Buyer and to the extent of any inconsistency, these provision prevail.

4. TRANSIT INSURANCE

Actrol will insure goods in transit and the premium will be to Buyer's account unless otherwise instructed in writing by Buyer.

5. PAYMENT

Buyer shall pay cash on delivery for all goods delivered. If Actrol shall extend trading terms to Buyer, payment for all goods sold will be within Thirty (30) days from the last day of the month in which each delivery was made. Interest shall be payable by Buyer, on demand by Actrol on all amounts overdue to Actrol at the rate of Eighteen (18) per centum per annum.

6. CONFIRMATION ORDERS

Confirmation orders must be marked as such by Buyer; if not Actrol will consider Buyer's order as original.

7. CANCELLATION

Cancellation of contract of sale between Buyer and Actrol requires approval in writing from Actrol otherwise the goods will be delivered to Buyer and Actrol will be entitled to payment from Buyer.

8. ACCEPTANCE AND CLAIMS

Acceptance of the goods delivered shall be deemed for all purposes to have taken place at the expiration of Seven (7) days from the date of each delivery. No goods will be accepted for return unless agreed in writing by Actrol prior to such return and then only upon conditions acceptable to Actrol and at Buyer's entire risk as to loss or damage. Where Actrol agrees to accept goods for return a restocking charge of 10% of the price of the goods returned shall be paid by Buyer. Actrol's liability for a breach of any conditions or warranty implied by Division 2 of Part V of the Trade Practices Act 1974 (other than a condition or warranty implied by Section 69 of the Act) is limited to such one or more of the following as Actrol decides:

- The replacement of the goods or the supply of equivalent goods.
- The repair of the goods
- The payment of the cost of replacing the goods or of acquiring equivalent goods.
- The payment of the cost of having the goods repaired.

9. FORCE MAJEURE

If delivery is prevented or delayed, in part or all, by reason of Acts of God, or the consequences thereof including, but not limited to fire, flood, typhoon, earthquakes, or by reason of riots, wars, hostilities, government restrictions, trade embargoes, strikes, lockouts, labour disputes, boycotting of goods, ship shortage, manufacturer's bankruptcy, delays or damage in transportation or any other causes beyond Actrol's control, Actrol may, at its option, perform the contract of unfulfilled portion thereof within a reasonable time from the removal of the cause preventing or delaying performance, or rescind unconditionally and without liability, this contract or the unfulfilled portion thereof.

10. CONSUMER AND OTHER RIGHTS

These terms and conditions do not and shall not be taken as applying to exclude, restrict or modify in any manner whatsoever any rights or mandatory condition or warranty implied by any law of the Commonwealth of Australia, State or Territory thereof in favour of a consumer which cannot be lawfully excluded by contract between the parties to the sale of goods. All provisions of these terms and conditions shall be and be read as being subject to all such rights and remedies of a consumer and not in derogation thereof and no part of this Clause can be waived by a consumer. Further, wherever any part of these terms and conditions would otherwise be inconsistent with the mandatory requirements of any such law, these terms and conditions shall, as far as possible, be construed so as to be consistent with such law and for that purpose to the extent necessary shall be of no force or effect (but without prejudice to and reserving the full force and effect of the remaining provisions hereof). The attention of consumers is drawn to their rights and remedies under all such laws.

11. SPECIAL ORDERS

Buyer will place order in writing on Actrol for non stock items. Actrol will not accept return of non stock items unless Manufacturer agrees to accept return from Actrol. Actrol may deduct transport, insurance handling and restocking charges from the credit due to Buyer.

12. SUBSTITUTION

Actrol reserves the right to substitute some other make or brand with similar specification if item ordered by Buyer is not available. If Buyer is not satisfied goods may be returned to Actrol for credit.

13. DELIVERY TIME

Actrol may deliver the goods by instalments or partial shipment and Buyer will accept each such delivery. Requirements of Buyer shall not be a condition or of the essence of the contract. Actrol shall be under no liability for either direct or consequential loss or damage to Buyer arising from delay or postponement in delivery.

14. WARRANTY

Goods sold shall have the benefit of any warranty given by the Manufacturer but Actrol shall not be liable for any loss or damage either direct or consequential arising out of any defects or application of goods.

15. REPAIRS

Goods returned by Buyer to Actrol for repair will be free of all charges to Actrol and at Buyer's risk.

16. CLERICAL ERRORS

Clerical errors, typing or otherwise in computations, Catalogue, quotation, acceptance, offer, invoice, delivery docket, credit note or specification of Actrol shall be subject to correction.

17. MODIFICATION

All modifications and amendments to these terms and conditions or approvals hereunder shall be in writing by a duly authorised signatory and if otherwise shall not be binding upon Actrol.

18. HIRE OF CYLINDERS

Actrol Cylinders remain the sole property of Actrol and are supplied for the Customer's sole use in the Commonwealth of Australia only unless Actrol specifically agrees in writing to use elsewhere.

Actrol hires Actrol Cylinders to the Customer to facilitate the regular supply of refrigerant to the Customer. The Customer shall return all hired Actrol Cylinders to any Actrol Branch or Depot (freight prepaid) within the State or Territory of delivery as soon as they are empty. (No allowance will be made for residual refrigerant in Actrol Cylinders.)

For the purpose of Clause 18.2 an Actrol Cylinder shall be deemed not to have been returned to Actrol until –

- it has been received by Actrol; and
- an Actrol Rental Cylinder return docket or similar document has been duly issued.

Actrol Cylinders are not transferable to any other person and must not be used for any other purpose other than containers for refrigerant (in whatever form) sold by Actrol and must not be recharged other than by Actrol or be delivered or sent for recharging to any other place other than an Actrol Branch or Depot.

The Customer shall be responsible for an Actrol Cylinder from receipt (whether at the delivery point or at Actrol's premises) until it is returned to Actrol as set out in Clause 18.3. Any loss or damage particularly by fire shall be reported to Actrol promptly. The Customer shall hold Actrol indemnified against the cost of replacing an Actrol Cylinder or the cost of repairing same upon any loss, destruction or damage occurring to an Actrol Cylinder from any cause or reason whatsoever. The Customer is advised to cover Actrol Cylinders by insurance. Actrol may, in its sole discretion in the case of Actrol Cylinders damaged by fire and reported and returned promptly, suitably identified, waive any claim for damages.

Payment of an invoice for hire of Actrol Cylinders shall be conclusive evidence (subject to transactions prior to the date of invoice which have not been included in the invoice and to Clause 18.7) of the Customers holding at the date of such invoice of the number and type of Actrol Cylinders on hire from Actrol as shown on such invoice.

If an Actrol Cylinder transaction or notification by the Customer indicates an Actrol Cylinder holding different to that recorded, Actrol reserves the right to amend its records and charge the Customer rental accordingly.

Unless otherwise agreed, cylinder rental is due in advance at the beginning of each rental period (i.e.: a period of one month, a quarter, six months, or a year, or part thereof, at the discretion of Actrol) on the Customers Actrol Cylinder holding as shown in Actrol's records at the beginning of the rental period. If a cylinder holding is increased during a rental period rental will be charged on the extra cylinders at the rates then current for that Customer.

The Customer shall use Actrol Cylinders only in a skillful and proper manner so that they remain in good repair and condition, reasonable wear and tear excepted.

The Customer shall be responsible for any loss, damage or injury to property or to persons caused by the Actrol Cylinder for any reason whatsoever, during the period of hire (except loss, damage or injury directly arising out of the negligence of Actrol, its agents or employees) and the Customer shall indemnify Actrol in respect of all such claims, damages and expenses in relation thereto.

If for any reason, Actrol Cylinders need to be repaired, the Customer shall forthwith return them to Actrol premises and under no circumstances repair or attempt to repair them itself.

If, upon return of Actrol Cylinders to Actrol, it is necessary for Actrol to clean them, Actrol may charge and the Customer shall pay the cost of such cleaning on demand.

The hire of Actrol Cylinders by the Customer shall be determined and Actrol shall be entitled immediately to charge and the Customer shall pay by way of liquidated damages, the value of Actrol Cylinders if the Customer fails to return them on demand or Actrol shall be entitled to enter upon the premises where the Actrol Cylinders are thought to be and repossess the Actrol Cylinders, if

- The Customer breaches any of the terms and conditions of hire.
- The Actrol Cylinders are refilled other than by Actrol or the Customer ceases to accept refills from Actrol.
- The Customer being a company, suffers a receiver or receiver and manager to be appointed in respect of any of its assets.
- The Customer being a company, is wound up or suffers the appointment of an official manager, provisional liquidator or petition to be presented, or an order made or resolution passed for its winding up.
- An inspector is appointed, under the law relating to companies to all or any part of the affairs of the Customer.
- The Customer being a company, seeks to make any arrangement with its creditors or enters into a scheme of arrangement or composition with its creditors or any class of them.
- The Customer being a person, is convicted of an indictable offense or is sentenced to imprisonment, or commits an act of bankruptcy.
- Judgement is entered against the Customer for an amount in excess of \$250 and is not satisfied within seven days.

Upon any repossession of Actrol Cylinders the Customer shall be required to pay on demand to Actrol a fee for the cost of collection and repossession of those cylinders.

For the purpose of condition (18.14) the Customer shall allow Actrol full and free access to the Actrol Cylinders without any liability on the part of Actrol for any loss or damage suffered as a consequence of retaking possession of same and the Customer shall be responsible for and indemnify Actrol against all such loss and damage and/or claims relating to same.

Where Buyer requests Actrol to top up a cylinder with refrigerant gas matching the identification of such gas on the cylinder brought in by Buyer, then Buyer shall hold harmless Actrol, indemnify Actrol and keep Actrol indemnified in respect of all claims which may flow from the handling, storage or use of such topped up cylinder of refrigerant gas. Actrol does not accept any responsibility for the quality or identification of any residual gas which may be in a cylinder presented by Buyer for top up.

JUNE 2005

MAIN INDEX

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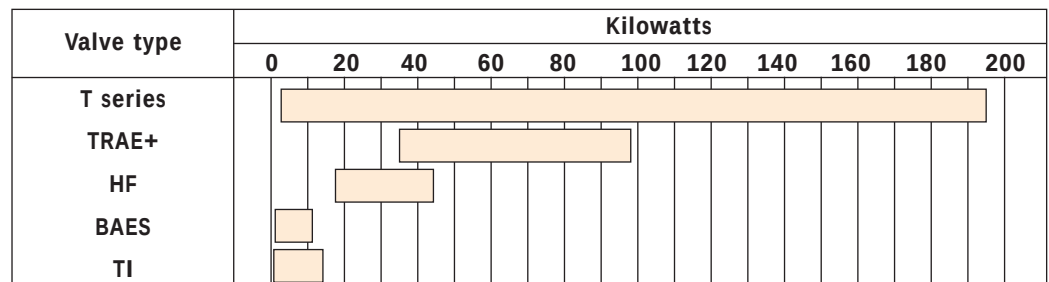
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Thermostatic Expansion Valves

Flow Controls

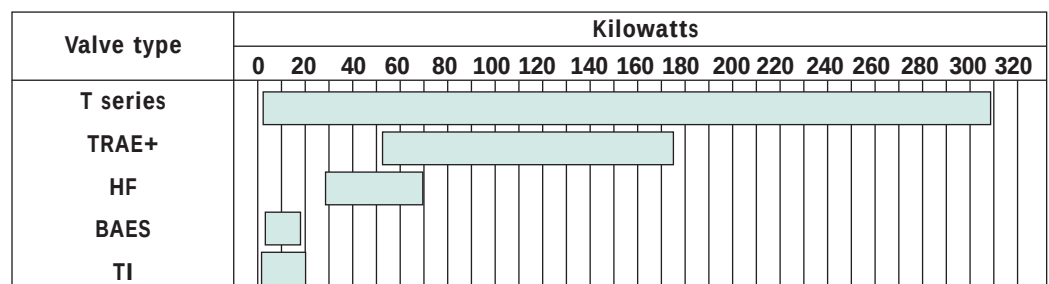
(Alco) TX Valve Capacity Selection Chart

Flow Controls TX Valves Family for R404A



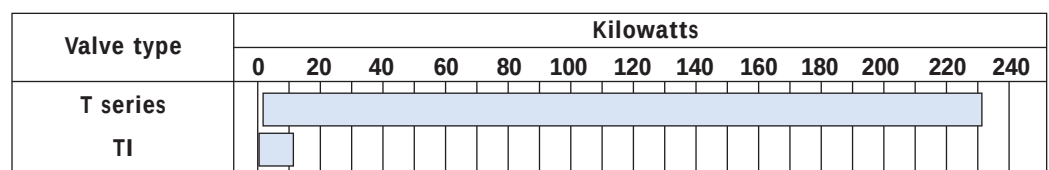
Valve Series	TI	BAES	HF	TRAE+	T SERIES
Start Range	0.3	0.5	17.5	34.3	1.2
Max Range	13.3	12.2	45	98.7	195.8

Flow Controls TX Valves Family for R22



Valve Series	TI	BAES	HF	TRAE+	T SERIES
Start Range	0.4	1.7	28	51.8	1.4
Max Range	19.9	17.5	70	175.9	308.8

Flow Controls TX Valves Family for R134a



Valve Series	TI	T SERIES
Start Range	0.2	1.1
Max Range	11	222.3

* Nominal Capacities based on: Australian Conditions

M/T at 46°C condensing temperature, -4°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

L/T at 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

Air Conditioning 46°C condensing temperature, 7°C evaporating and 1K liquid subcooling at the inlet of the expansion valve.

The above is to be used as a guide only showing the available range by refrigerant that Actrol commonly stock other ranges are available on request.

Thermostatic Expansion Valves

Flow Controls (Alco) Thermostatic Expansion Valve Charge Selector

Applications	Operating Temperature Range										
	-45	-40	-34	-29	-23	-18	-12	-7	-1	4	10
R502/R404A/R507 Low temperature freezers & display cases IceMakers Commercial air conditioners Soft ice cream machines Environmental chambers											
R22 Residential air conditioners & heat pumps Commercial and industrial chillers Medium temperature supermarket equipment Commercial air handlers											
R12/R134a Domestic refrigerators and freezers IceMakers Dehumidifiers Transport refrigeration Medium temperature supermarket equipment Medium temperature commercial equipment											

Power Element Replacement Charge Cross Reference Old Bulb Charges vs. Replacement Bulb Charge

Air Conditioning		Commercial Refrigeration		Low Temperature	
Old Charge	Replacement	Old Charge	Replacement	Old Charge	Replacement
R502/R404A/R507					
	RC/SC/PC	RL	RC/SC/PC	—	—
RW		RW		RWZ	RZ
RW110		RW65		RW35	RW45/SW45
RWS	RWS	RWS	RWS	RWS	RWS
				RZ	RZ/SZ/PZ
R22					
	HC	H OR HL	HC	—	—
		HC		—	—
HW	HCA	HW	HW65	HWZ	HZ
HG100	HC	HG65		—	—
HW100		HW65		HW35	HW35
HQ100		HQ65		HQ35	
HGA		—	—	—	—
HLA	HW85	—	—	—	—
HW85		—	—	—	—
HGS	HWS	HGS65	HGS65	—	—
		—	—	—	—
HWS		HWS	HWS	HWS	HWS
		—	—	HZ	HZ
				HX	HX
R12/R134a					
	FC	F OR FL	FC	—	—
		FC		—	FZ
FW		FW		FWZ	—
FG55		FG35		—	—
FW55	FWS	FW35	FW35	FW15	FW15/MW15
FQ55		FQ35		FW15	
FGA		—	—	—	—
FLA		—	—	—	—
FGS	FWS	FGS35	FGS35	—	—
		—	—	—	—
FWS		FWS	FWS	FWS	FWS
		—	—	FZ/MZ	FZ/MZ
				FX	FX

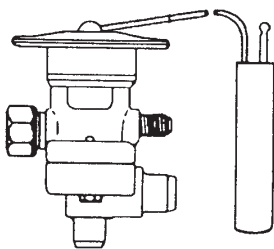
All other charge symbols must be replaced with an identical model or at the option of the Flow Controls Technical Service Department who make engineering authorised substitution of equivalent type to provide equivalent operation and performance. **Note:** for field replacement purposes, HC can be used to replace HCA.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) T Series Take-A-Part

1



Flow Controls T Series Take-A-Part Thermostatic Expansion Valves, with adjustable superheat and replaceable, interchangeable components are ideal for original equipment and field replacements in air conditioning, heat pump, and refrigeration applications.

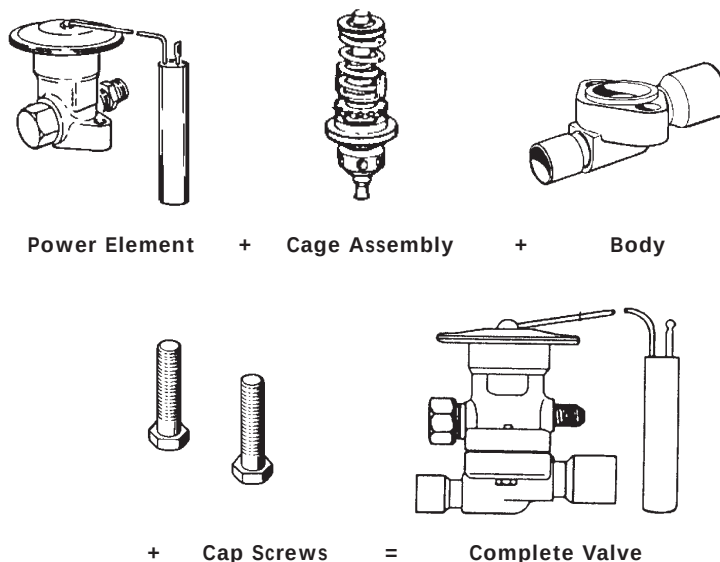
The 'T' Series has unlimited versatility with thousands of valve combinations to fit all applications (from heat pumps and air conditioners to commercial refrigeration). If service is required, the removal of the two cap screws disassembles the valve without requiring that the line connections to the body be broken.

Field-proven for over 50 years, Flow Controls Take-A-Part valves provide dependable, economical service. The 'T' Series is an excellent 'reverse flow' heat pump valve when fitted with the HCA charged power element.

Features

- Modular design for economical logistics and easy assembly and servicing
- Interchangeable, replaceable cages for T.X. valve versatility (1 to 350 kW capacity)
- External superheat adjustment
- Interchangeable bodies for any connection required
- Interchangeable power elements for various fluorinated refrigerants
- Charges for all applications
- Very good stability is attained because of the large forces generated by the large diameter diaphragm
- Superior partial load performance due to double ported cage design for TJRE, TER, TIR and THR models
- Bi-flow capability for applications in heat pumps by using heat pump charge (HCA)
- Safe working pressure: 3100 kPa (450 psi)

Flow Controls 'T' Series Valves are supplied in component form:



Bolt Torque

The cap screws on all Take-A-Part TEVs require 34 Nm bolt torque

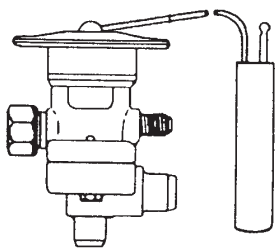
Components are listed on Pages 5 to 8.

Extended Capacities are listed on Pages 9 to 11.

All Flow Control products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) T Series



Selection

To select a T.X. Valve from Capacity Tables, first determine:

- Required refrigeration load in kW.
- Liquid inlet temperature
- Evaporating temperature
- Pressure drop across valve (kPa), taking into consideration pressure drop through piping, accessories, heat exchangers, distributor, etc.

For selection Tables refer Pages 9 to 11.

- If liquid temperature entering the valve is some temperature other than 35°C select the correction factor for the refrigerant and temperature to correct the required load.
- Using required or corrected load, enter the Capacity Table for the proper refrigerant at the system evaporating temperature.
- Using the nominated pressure drop column select the valve capacity that most closely matches the refrigeration load.
- Having selected the valve series required, choose from the following options:
- You may order a valve from Pages 4/5. With Angle Body Solder Connections, 'C' charge Power Element, 5 ft. Capillary (TCLE/TJLE/TJRE), 10 ft. Capillary (TER/TIR/THR), Externally Equalised. Alternatively from Pages 6/7 - order the components to suit your requirements as per the following: –
- Body Style: Flare or Solder Connections, Angle or Straight Through.
- Cage Assembly: Externally Adjustable Cage Assembly for TCLE/TJLE for normal load conditions. Externally Adjustable, Balanced, Double Port Cage Assembly for TJRE/TER/TIR/THR for low load conditions.
- Power Element: Select Bulb Charge (including MOP if required) and Capillary Length.
- Refer Selection Chart on Page 2 and Page 7.**
- Cap Screws.

Other Options available on application include: Rapid Response (small) Bulb Power Element for TER, THR and TIR Valves, Internal Bleed Port.

Note: All 'T' Series Valves are Externally Equalised.

Valve Nomenclature

TER Valve Series	22 Nominal Capacity in Tons	H System Refrigerant F = R12 H = R22 R = R502 M = R134a S = R404A P = R507	W Charge and Bulb S - Rapid Response	65 MOP (Optional)
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Example above: TER 22 HW 65

Maximum Operating Pressure (MOP)

As it pertains to Thermostatic Expansion Valve Bulb Charges.

Maximum Operating Pressure or (Motor Overload Protection) is the ability of the T.X. Valve to close down, starve, or completely shut off if the suction pressure should approach a dangerously high predetermined limit condition. A condition such as to cause overheating a suction cooled compressor, or loading the crankcase with too dense a vapour pressure.

With the T.X. Valve in a closed state due to MOP, the compressor has a chance to gain on the excess low side pressure and pull the suction pressure back down to satisfactory operating conditions. At this point (Below the MOP) the Valve will re-open and feed in a standard manner or until such time as there is an overload again.

Caution:

Any bulb charge with MOP will be affected by extreme cross ambient conditions. If this condition should exist, install an electric strip heater around the top part of the T.X. Valve to maintain a 'hand warm' condition.

Superheat Adjustment

1. Remove seal cap on side of valve.
2. Turn the Adjusting Stem clockwise to increase the superheat and counter clockwise to decrease the superheat. (Approximately 0.3 K per turn).
3. Reinstall Seal Cap.

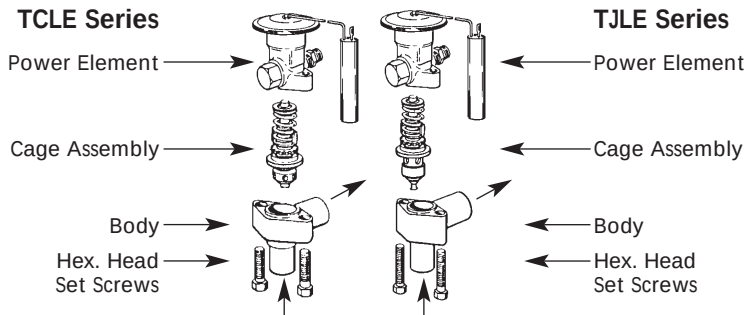
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Thermostatic Expansion Valves

Flow Controls

(Alco) T Series – Component Schedule

Models TCLE and TJLE



Features

- Angle Type.
- Externally Equalised.
- Single Ported for Normal Load Conditions.
- Solder Connections.

Refrig.	Valve Series	Power Element		Cage Assembly		Body - Angle Type		Set Screws (2)	
		Cat. No.	Part No.	Cat. No.	Part No.	Cat. No.	Part No.	Cat. No.	Part No.
R134a	TCLE $\frac{1}{4}$ MC	102179	XB1019–MC1B	102117	X22440-B1B	102201	C501-5 $\frac{3}{8}$ "x $\frac{5}{8}$ "ODF	102222	PS286-5
	TCLE $\frac{3}{4}$ MC			102118	X22440-B2B				
	TCLE $\frac{1}{2}$ MC			102119	X22440-B3B				
	TCLE $\frac{2}{2}$ MC			102120	X22440-B4B				
	TCLE $\frac{3}{2}$ MC			102122	X22440-B5B	102202	C501-7 $\frac{1}{2}$ "x $\frac{5}{8}$ "ODF	102221	PS168-5
	TCLE $\frac{5}{2}$ MC			102123	X22440-B6B				
	TCLE $\frac{7}{2}$ MC			102125	X22440-B7B	102203	A576- $\frac{5}{8}$ "x $\frac{7}{8}$ "ODF ($\frac{7}{8}$ "x $1\frac{1}{8}$ "ODM)		
	TCLE9MC			102126	X22440-B8B				
R22	TCLE $\frac{1}{2}$ HC	102149	XB1019–HC1B	102117	X22440-B1B	102201	C501-5 $\frac{3}{8}$ "x $\frac{5}{8}$ "ODF	102222	PS286-5
	TCLE1HC			102118	X22440-B2B				
	TCLE2HC			102119	X22440-B3B				
	TCLE3HC			102120	X22440-B4B				
	TCLE5HC			102122	X22440-B5B	102202	C501-7 $\frac{1}{2}$ "x $\frac{5}{8}$ "ODF	102221	PS168-5
	TCLE $\frac{7}{2}$ HC			102123	X22440-B6B				
	TCLE10HC			102125	X22440-B7B	102203	A576- $\frac{5}{8}$ "x $\frac{7}{8}$ "ODF ($\frac{7}{8}$ "x $1\frac{1}{8}$ "ODM)		
	TCLE12HC			102126	X22440-B8B				
R404A	TCLE $\frac{1}{4}$ SC	102189	XB1019–SC1B	102117	X22440-B1B	102201	C501-5 $\frac{3}{8}$ "x $\frac{5}{8}$ "ODF	102222	PS286-5
	TCLE $\frac{1}{2}$ SC			102118	X22440-B2B				
	TCLE1SC			102119	X22440-B3B				
	TCLE2SC			102120	X22440-B4B				
	TCLE3SC			102122	X22440-B5B	102202	C501-7 $\frac{1}{2}$ "x $\frac{5}{8}$ "ODF	102221	PS168-5
	TCLE5SC			102123	X22440-B6B				
	TCLE $\frac{6}{2}$ SC			102125	X22440-B7B	102203	A576- $\frac{5}{8}$ "x $\frac{7}{8}$ "ODF ($\frac{7}{8}$ "x $1\frac{1}{8}$ "ODM)		
	TCLE8SC			102126	X22440-B8B				
R507	TCLE $\frac{1}{4}$ PC	102194	XB1019–PC1B	102117	X22440-B1B	102201	C501-5 $\frac{3}{8}$ "x $\frac{5}{8}$ "ODF	102222	PS286-5
	TCLE $\frac{1}{2}$ PC			102118	X22440-B2B				
	TCLE1PC			102119	X22440-B3B				
	TCLE2PC			102120	X22440-B4B				
	TCLE3PC			102122	X22440-B5B	102202	C501-7 $\frac{1}{2}$ "x $\frac{5}{8}$ "ODF	102221	PS168-5
	TCLE5PC			102123	X22440-B6B				
	TCLE $\frac{6}{2}$ PC			102125	X22440-B7B	102203	A576- $\frac{5}{8}$ "x $\frac{7}{8}$ "ODF ($\frac{7}{8}$ "x $1\frac{1}{8}$ "ODM)		
	TCLE8PC			102126	X22440-B8B				
R134a	TJLE9MC	102179	XB1019-MC1B	102127	XC724-B4B	102210	B504 $\frac{5}{8}$ "x $\frac{7}{8}$ "ODF ($\frac{7}{8}$ "x $1\frac{1}{8}$ "ODM)	102223	PS514-5
	TJLE11MC			102128	XC724-B5B				
R22	TJLE11HC	102149	XB1019-HC1B	102127	XC724-B4B				
	TJLE14HC			102128	XC724-B5B				
R404A	TJLE7SC	102189	XB1019-SC1B	102127	XC724-B4B				
	TJLE9SC			102128	XC724-B5B				
R507	TJLE7PC	102194	XB1019-PC1B	102127	XC724-B4B				
	TJLE9PC			102128	XC724-B5B				

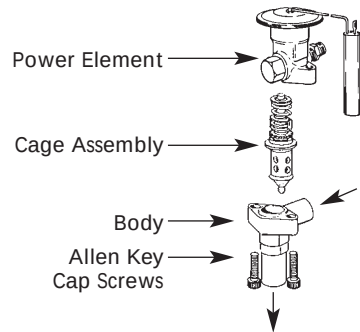
Power elements listed are 'C' charge: Range -30 to 10°C, with 1.5m long capillary. Power elements with 'Z' charge: Range -45 to -10°C and 'W' charge: MOP are also available. For alternative components refer Pages 6 and 7.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Flow Controls

(Alco) T Series – Component Schedule

Models TJRE, TER, TIR, THR



Features

- Angle Type.
- Externally Equalised.
- Balanced Double Port for Low Load Conditions if needed.
- Solder Connections.

Refrig.	Valve Series	Power Element ▼		Cage Assembly		Body - Angle Type		Cap Screws (2)	
		Cat. No.	Part No.	Cat. No.	Part No.	Cat. No.	Part No.	Cat. No.	Part No.
R134a	TJRE 11MC	102179	XB1019-MC1B	102114	X11873-B4B	102199	10331 7/8" ODF-1 1/8" ODM x 7/8" ODF-1 1/8" ODM	102224	PS259
	TJRE 13MC			102115	X11873-B5B				
R22	TJRE 14HC	102149	XB1019-HC1B	102114	X11873-B4B				
	TJRE 18HC			102115	X11873-B5B				
R404A	TJRE 9SC	102189	XB1019-SC1B	102114	X11873-B4B				
	TJRE 11SC			102115	X11873-B5B				
R507	TJRE 9PC	102194	XB1019-PC1B	102114	X11873-B4B				
	TJRE 11PC			102115	X11873-B5B				

R134a	TER 16MC	102184	XC726-MC2B	102129	X9117-B6B	102212	9153 7/8" ODF-1 1/8" ODM x 7/8" ODFx1 1/8" ODM	102224	PS259
	TER 19MC			102116	X9117-B7B				
	TER 25MC			102130	X9117-B8B				
	TER 31MC			102131	X9117-B9B				
R22	TER 22HC	102185	XC726-HC2B	102129	X9117-B6B				
	TER 26HC			102116	X9117-B7B				
	TER 35HC			102130	X9117-B8B				
	TER 45HC			102131	X9117-B9B				
R404A	TER 14SC	102161	XC726-SC2B	102129	X9117-B6B				
	TER 16SC			102116	X9117-B7B				
	TER 22SC			102130	X9117-B8B				
	TER 28SC			102131	X9117-B9B				
R507	TER 14PC	102183	XC726-PC2B	102129	X9117-B6B				
	TER 16PC			102116	X9117-B7B				
	TER 22PC			102130	X9117-B8B				
	TER 28PC			102131	X9117-B9B				

R134a	TIR 45MC	102184	XC726-MC2B	102132	X9166-B10B	102214	9151 7/8" ODF-1 1/8" ODM x 7/8" ODF-1 1/8" ODM	102225	PS370
R22	TIR 65HC	102185	XC726-HC2B						
R404A	TIR 39SC	102161	XC726-SC2B						
R507	TIR 39PC	102183	XC726-PC2B						

R134a	THR 55MC	102184	XC726-MC2B	102133	X9144-B11B	102216	9149 1 1/8" ODMx1 1/8" ODM	102225	PS370
	THR 68MC			102134	X9144-B13B				
R22	THR 75HC	102185	XC726-HC2B	102133	X9144-B11B				
	THR 100HC			102134	X9144-B13B				
R404A	THR 50SC	102161	XC726-SC2B	102133	X9144-B11B				
	THR 60SC			102134	X9144-B13B				
R507	THR 50PC	102183	XC726-PC2B	102133	X9144-B11B				
	THR 60PC			102134	X9144-B13B				

Power elements listed are 'C' charge: Range -30 to 10°C with 1.5m capillary for TJRE and 3m capillary for TER, TIR, THR.
Power elements with 'Z' charge: Range -45 to -10°C and 'W' charge: M.O.P. are also available.

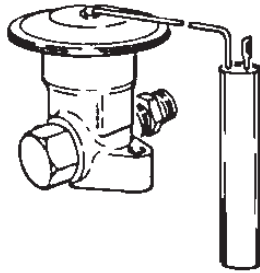
For alternative components refer Pages 6 and 7.

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Thermostatic Expansion Valves

Flow Controls (Alco) T Series Components

Power Elements include gaskets and bulb clamps



Power Element with External Superheat Adjustment

1

For TCLE - TJLE - TJRE			
Cat. No.	Part No.	Refrig.	Cap Length: m
102170	XB1019-FC1B	R12	1.5
102162	XB1019-FW351B		1.5
102149	XB1019-HC1B	R22	1.5
102147	XB1019-HC2B		3
102171	XB1019-HZ1B		1.5
102181	XB1019-HW651B		1.5
102158	XB1019-HCA1B		1.5
102154	XB1019-HA1B*		1.5
102179	XB1019-MC1B	R134a	1.5
102165	XB1019-MC2B		3
102186	XB1019-MZ1B		1.5
102187	XB1019-MZ2B		3
102189	XB1019-SC1B	R404A	1.5
102191	XB1019-SC2B		3
102192	XB1019-SZ1B		1.5
102193	XB1019-SZ2B		3
102168	XB1019-SW401B		1.5
102194	XB1019-PC1B		1.5
102195	XB1019-PC2B	R507	3
102196	XB1019-PZ1B		1.5
102197	XB1019-PZ2B		3

For TER - TIR - THR			
Cat. No.	Part No.	Refrig.	Cap Length: m
102139	XC726-FC1B	R12	1.5
102167	XC726-FC2B		3
102145	XC726-HC1B	R22	1.5
102185	XC726-HC2B		3
102146	XC726-HZ1B		1.5
102184	XC726-MC2B	R134a	3
102161	XC726-SC2B	R404A	3
102140	XC726-SZ2B		1.5
102141	XC726-SW451B	R507	1.5
102183	XC726-PC2B		3

For TLE			
Cat. No.	Part No.	Refrig.	Cap Length: m
102172	XB1033-HCA1B	R22	1.5

The TLE Power Element does not have an external superheat adjustment.

Accessories

Cat. No.	Part No.	Description
102243	XA-1728-4	TCL Bulb Strap Set
102220	X13455-1	Gasket Kit
102219	E642	Packing Nut Wrench

*Zero static superheat charge allows a close operating superheat of approx. 3 to 4K.

Note: Power Elements are also available with Capillary Lengths of 4.5m and 6m.
The "HCA" charge suits Heat Pump and Air Conditioning applications.

Superheat Adjustment table

Valve Series	Refrigerant	Pressure change per Turn bar	Evaporation Temperature °C					
			+10	0	-10	-20	-30	-40
			Change of Superheat per Turn, Kelvin					
TCLE	R134a	0.05	0.4	0.5	0.6	0.9		
	R22	0.05	0.3	0.3	0.4	0.5	0.7	1.0
	R404A	0.05	0.2	0.3	0.3	0.4	0.6	0.8
	R407C	0.05	0.2	0.3	0.3	0.4	0.5	0.7
	R507	0.05	0.2	0.3	0.3	0.4	0.5	0.7

Valve Series	Refrigerant	Pressure change per Turn bar	Evaporation Temperature °C					
			+10	0	-10	-20	-30	-40
			Change of Superheat per Turn, Kelvin					
TJRE, TERE, TIRE, THRE	R134a	0.038	0.3	0.4	0.5	0.7		
	R22	0.038	0.2	0.3	0.3	0.4	0.5	0.7
	R404A	0.038	0.2	0.2	0.3	0.3	0.5	0.6
	R407C	0.038	0.2	0.2	0.3	0.4		
	R507	0.038	0.2	0.2	0.2	0.3	0.4	0.5

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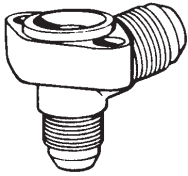


Your best Solution...

Thermostatic Expansion Valves

Flow Controls (Alco) T Series Components

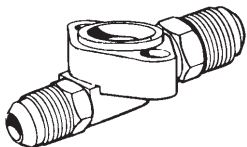
Bodies and Screws



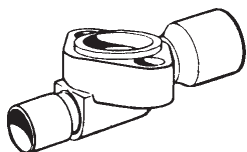
Angle, Flare



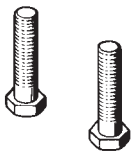
Angle, Solder



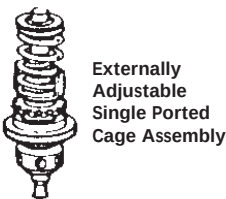
Straight-Through, Flare



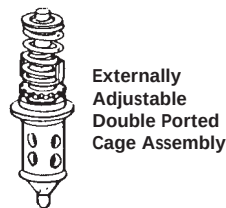
Straight-Through, Solder



Setscrews / Capscrews



Externally Adjustable Single Ported Cage Assembly



Externally Adjustable Double Ported Cage Assembly

Valve Type	Size and Type of Connections		Body		Screws (2)	
	Inlet - Inches	Outlet - Inches	Cat. No.	Part No.	Cat. No.	Part No.
Angle Type Body						
TCLE	3/8 ODF	1/2 ODF	102200	C501-4	102222	PS286-5
	3/8 ODF	5/8 ODF	102201	C501-5		
	1/2 ODF	5/8 ODF	102202	C501-7		
	5/8 ODF-7/8 ODM	7/8 ODF-1 1/8 ODM	102203	A576	102221	PS168-5
TJLE	5/8 ODF-7/8 ODM	7/8 ODF-1 1/8 ODM	102210	B504	102223	PS514-5
TJRE	7/8 ODF-1 1/8 ODM	7/8 ODF-1 1/8 ODM	102199	10331	102224*	PS259
TER	7/8 ODF-1 1/8 ODM	7/8 ODF-1 1/8 ODM	102212	9153		
TIR	7/8 ODF-1 1/8 ODM	7/8 ODF-1 1/8 ODM	102214	9151	102225*	PS370
THR	1 1/8 ODM	1 1/8 ODM	102216	9149		
Straight Through Type Body						
TCLE	3/8 Flare	1/2 Flare	102176	X6669-4	102222	PS286-5
	3/8 ODF	5/8 ODF	102206	9761-3		
	1/2 ODF	5/8 ODF	102207	9761-4		
	5/8 ODF	7/8 ODF	102208	X6346-17		
TJRE	7/8 ODF-1 1/8 ODM	7/8 ODF-1 1/8 ODM	102198	10332	102224*	PS259
TER	7/8 ODF-1 1/8 ODM	7/8 ODF-1 1/8 ODM	102213	9152		

*CAT. Nos. 102224 and 102225 are Allen Key Capscrews.

Cage Assemblies complete with gaskets

+ Series Nominal Capacity Table

Valve Type	Cage Assembly		Nominal Capacity: kW*						
	Cat. No.	Part No.	R134a		R22			R404A/R507	
			M/T	L/T	AC	M/T	L/T	M/T	L/T
TCLE	102117	X22440-B1B	1.4	1	1.8	1.9	1.4	1.2	0.9
	102118	X22440-B2B	2.7	1.9	3.6	3.8	2.6	2.4	1.7
	102119	X22440-B3B	5.7	3.9	7.6	8.1	5.6	5.2	3.7
	102120	X22440-B4B	12.7	8.6	16.6	17.7	12.3	11.4	8.1
	102122	X22440-B5B	16.3	11.1	21.3	22.7	15.8	14.7	10.4
	102123	X22440-B6B	22.2	15.1	29.2	31.1	21.7	20.1	14.3
	102125	X22440-B7B	30.1	20.5	39.5	42	29.3	27.2	19.2
	102126	X22440-B8B	35	23.8	45.9	48.9	34.1	31.7	22.4
TJLE	102127	XC724-B4B	29.1	20.9	38.6	41.7	33.8	26.9	21.7
	102128	XC724-B5B	38.1	26.6	49.2	53.2	43.1	34.3	27.7
TJRE	102114	X11873-B4B	42.4	28.8	55.7	59.3	41.4	37.5	26.6
	102115	X11873-B5B	53.7	36.5	71.1	75.7	52.8	47.8	33.9
TER	102129	X9117-B6B	66.9	45.4	87.4	93.1	64.9	59	41.8
	102116	X9117-B7B	76.3	51.8	99.9	106.3	74.2	67.4	47.8
	102130	X9117-B8B	105.5	71.6	137.4	146.2	102	92.7	65.7
	102131	X9117-B9B	127.2	86.3	167.2	177.9	124.1	112.4	79.7
TIR	102132	X9166-B10B	163.9	111.3	214.2	228	159	144.2	102.2
THR	102133	X9144-B11B	185.6	126	243.1	258.7	180.4	163	115.5
	102134	X9144-B13B	222.3	150.9	290.1	308.8	215.3	195.8	138.7

*Nominal Capacities based on:

M/T at 46°C condensing temperature, -4°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve. L/T at 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve. A/C 46°C condensing temperature, 7°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) T Series Capacity Tables: kW

R404A / R507

Valve Series R404A R507	Nominal Capacities Tons Refrig.	R404A / R507 Capacity: kW - Evaporating Temperature: °C																	
		10						0						-10					
		Pressure Drop Across Valve: kPa																	
		500	700	900	1000	1200	1400	500	700	900	1000	1200	1400	500	700	900	1000	1200	1400
TCLE 1/4*	0.3	0.96	1.14	1.29	1.36	1.49	1.61	0.92	1.09	1.23	1.3	1.43	1.54	0.87	1.03	1.17	1.23	1.35	1.46
TCLE 1/2	0.6	1.9	2.3	2.6	2.7	3	3.2	1.8	2.2	2.5	2.6	2.9	3.1	1.7	2.1	2.3	2.5	2.7	2.9
TCLE 1	1.3	4.1	4.9	5.5	5.8	6.4	6.9	3.9	4.6	5.3	5.6	6.1	6.6	3.7	4.4	5	5.3	5.8	6.2
TCLE 2	2.8	9	10.6	12.1	12.7	13.9	15	8.6	10.2	11.5	12.1	13.3	14.4	8.1	9.6	10.9	11.5	12.6	13.6
TCLE 3	3.6	11.6	13.7	15.5	16.3	17.9	19.3	11	13.1	14.8	15.6	17.1	18.5	10.5	12.4	14	14.8	16.2	17.5
TCLE 5	4.9	15.8	18.7	21.2	22.3	24.5	26.4	15.1	17.8	20.2	21.3	23.4	25.2	14.3	16.9	19.2	20.2	22.2	24
TCLE 6½	6.6	21.3	25.2	28.6	30.1	33	35.6	20.3	24	27.3	28.7	31.5	34	19.3	22.8	25.9	27.3	29.9	32.3
TCLE 8	7.7	24.8	29.4	33.3	35.1	38.4	41.5	23.7	28	31.8	33.5	36.7	39.7	22.5	26.6	30.2	31.8	34.8	37.6
TJR 9	9.8	32	37	42	45	49	53	30	36	40	43	47	50	29	34	38	40	44	48
TJR 11	11.7	38	44	50	53	58	63	36	42	48	51	56	60	34	40	46	48	53	57
TER 14	13.9	45	53	60	63	69	75	43	50	57	60	66	71	40	48	54	57	63	68
TER 16	15.9	51	60	68	72	79	85	49	58	65	69	75	81	46	55	62	65	72	77
TER 22	20.8	67	79	90	95	104	112	64	76	86	90	99	107	61	72	81	86	94	101
TER 28	26.8	86	102	115	122	133	144	82	97	110	116	127	137	78	92	104	110	121	130
TIR 39	36.7	118	139	158	167	182	197	112	133	151	159	174	188	107	126	143	151	165	179
THR 50	47.6	153	181	205	216	237	256	146	173	196	206	226	244	138	164	186	196	214	232
THR 60	59.5	191	226	256	270	296	320	182	216	245	258	283	305	173	205	232	245	268	290

Valve Series R404A R507	Nominal Capacities Tons Refrig.	R404A / R507 Capacity: kW - Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		700	900	1000	1200	1400	1600	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700
TCLE 1/4*	0.3	0.87	0.99	1.04	1.14	1.23	1.32	0.69	0.73	0.8	0.86	0.92	0.95	0.47	0.5	0.54	0.59	0.63	0.65
TCLE 1/2	0.6	1.7	2	2.1	2.3	2.5	2.6	1.4	1.5	1.6	1.7	1.8	1.9	0.9	1	1.1	1.2	1.3	1.3
TCLE 1	1.3	3.7	4.2	4.4	4.9	5.3	5.6	2.9	3.1	3.4	3.7	3.9	4.1	2	2.1	2.3	2.5	2.7	2.8
TCLE 2	2.8	8.1	9.2	9.7	10.6	11.5	12.3	6.4	6.8	7.4	8	8.6	8.9	4.4	4.6	5.1	5.5	5.9	6
TCLE 3	3.6	10.4	11.8	12.5	13.7	14.8	15.8	8.3	8.7	9.6	10.3	11.1	11.4	5.6	6	6.5	7	7.5	7.8
TCLE 5	4.9	14.3	16.2	17.1	18.7	20.2	21.6	11.3	11.9	13.1	14.1	15.1	15.6	7.7	8.1	8.9	9.6	10.3	10.6
TCLE 6½	6.6	19.2	21.8	23	25.2	27.2	29.1	15.3	16.1	17.6	19	20.4	21	10.4	11	12	13	13.9	14.3
TCLE 8	7.7	22.4	25.4	26.8	29.4	31.7	33.9	17.8	18.8	20.6	22.2	23.7	24.5	12.1	12.8	14	15.1	16.2	16.7
TJR 9	9.8	29	32	34	37	40	43	23	24	26	28	30	31	15	16	18	19	21	21
TJR 11	11.7	34	39	41	45	48	51	27	28	31	34	36	37	18	19	21	23	25	25
TER 14	13.9	40	46	48	53	57	61	32	34	37	40	43	44	22	23	25	27	29	30
TER 16	15.9	46	52	55	60	65	70	37	39	42	46	49	50	25	26	29	31	33	34
TER 22	20.8	60	69	72	79	86	91	48	51	55	60	64	66	33	34	38	41	44	45
TER 28	26.8	78	88	93	102	110	118	62	65	71	77	82	85	42	44	49	52	56	58
TIR 39	36.7	107	121	127	139	151	161	85	89	98	105	113	116	58	61	66	72	77	79
THR 50	47.6	138	157	165	181	195	209	110	116	127	137	146	151	75	79	86	93	100	103
THR 60	59.5	173	196	206	226	244	261	137	144	158	171	183	188	93	98	108	116	124	128

*For R404A add suffix 'S', for R507 add 'P'.

Liquid Temperature Correction Factor

Refrigerant	Liquid Temperature °C																
	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
R404A R507	0.5	0.61	0.71	0.81	0.91	1	1.09	1.18	1.26	1.34	1.43	1.51	1.59	1.66	1.74	1.82	1.89

Valve capacities are based on 35°C vapour free refrigerant liquid entering the valve. To select a valve for other liquid temperatures determine the corrected capacity requirement by dividing the evaporator load by the liquid correction factor.

Selection Procedure – Refer Page 4

Conversion Kw x 0.284 = Tons. Tons x 3.517 = Kw

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) T Series Capacity Tables: kW

R134a

Valve Series R134a	Nominal Capacities Tons Refrig.	R134a Capacity: kW - Evaporating Temperature: °C																	
		10						0						-10					
		Pressure Drop Across Valve: kPa																	
		300	400	600	700	800	1000	400	600	700	800	1000	1100	400	600	700	800	1000	1100
TCLE ¼ M	0.34	1.1	1.2	1.5	1.6	1.8	2	1.2	1.5	1.6	1.7	1.9	2	1.1	1.4	1.5	1.6	1.8	1.9
TCLE ¾ M	0.65	2.1	2.4	2.9	3.1	3.4	3.7	2.3	2.8	3	3.2	3.6	3.8	2.2	2.7	2.9	3.1	3.5	3.6
TCLE 1½ M	1.4	4.4	5.1	6.3	6.8	7.2	8.1	4.9	6	6.5	6.9	7.8	8.1	4.7	5.8	6.3	6.7	7.5	7.8
TCLE 2½ M	3.1	9.8	11.3	13.8	15	16	17.9	10.9	13.3	14.4	15.4	17.2	18	10.5	12.8	13.8	14.8	16.5	17.3
TCLE 3½ M	4	12.6	14.6	17.9	19.3	20.6	23.1	14	17.2	18.6	19.8	22.2	23.3	13.5	16.5	17.9	19.1	21.3	22.4
TCLE 5½ M	5.5	17.4	20.1	24.6	26.5	28.4	31.7	19.3	23.6	25.5	27.3	30.5	32	18.6	22.7	24.6	26.2	29.4	30.8
TCLE 7½ M	7.4	23.4	27	33.1	35.7	38.2	42.7	26	31.8	34.4	36.7	41.1	43.1	25	30.6	33	35.3	39.5	41.4
TCLE 9 M	8.7	27.5	31.7	38.9	42	44.9	50.2	30.5	37.4	40.4	43.2	48.3	50.6	29.4	35.9	38.8	41.5	46.4	48.7
TJR 11 M	11	33	38	47	51	54	61	37	45	49	52	58	61	35	43	47	50	56	59
TJR 13 M	13	40	46	56	61	65	73	44	54	59	63	70	73	43	52	56	60	67	71
TER 16 M	16	49	57	70	75	80	90	55	67	72	77	87	91	53	65	70	74	83	87
TER 19 M	18	57	66	80	87	93	104	63	77	84	89	100	105	61	74	80	86	96	101
TER 25 M	24	76	87	107	115	123	138	84	103	111	119	133	139	81	99	107	114	128	134
TER 31 M	30	94	109	133	144	154	172	105	128	138	148	165	173	101	123	133	142	159	167
TIR 45 M	42	132	152	187	202	216	241	147	180	194	207	232	243	141	173	187	199	223	234
THR 55 M	54	170	196	240	259	277	310	188	231	249	266	298	312	181	222	240	256	287	300
THR 68 M	65	206	238	292	315	337	377	229	281	303	324	362	380	220	270	292	312	349	365

Valve Series R134a	Nominal Capacities Tons Refrig.	R134a Capacity: kW - Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		600	700	800	1000	1100	1200	600	700	800	1000	1100	1200	600	700	800	1000	1100	1200
TCLE ¼ M	0.34	1.08	1.16	1.24	1.39	1.46	1.52	0.72	0.78	0.84	0.94	0.98	1.03	0.47	0.5	0.54	0.6	0.63	0.66
TCLE ¾ M	0.65	2.1	2.2	2.4	2.7	2.8	2.9	1.4	1.5	1.6	1.8	1.9	2	0.89	0.96	1.03	1.15	1.21	1.26
TCLE 1½ M	1.4	4.4	4.8	5.1	5.7	6	6.3	3	3.2	3.4	3.9	4	4.2	1.9	2.1	2.2	2.5	2.6	2.7
TCLE 2½ M	3.1	9.8	10.6	11.3	12.7	13.3	13.9	6.6	7.1	7.6	8.5	8.9	9.3	4.3	4.6	4.9	5.5	5.8	6
TCLE 3½ M	4	12.7	13.7	14.6	16.4	17.2	17.9	8.5	9.2	9.8	11	11.5	12.1	5.5	5.9	6.3	7.1	7.4	7.8
TCLE 5½ M	5.5	17.4	18.8	20.1	22.5	23.6	24.7	11.7	12.7	13.5	15.1	15.9	16.6	7.6	8.2	8.7	9.8	10.2	10.7
TCLE 7½ M	7.4	23.5	25.3	27.1	30.3	31.8	33.2	15.8	17	18.2	20.4	21.4	22.3	10.2	11	11.7	13.1	13.8	14.4
TCLE 9 M	8.7	27.6	29.8	31.8	35.6	37.3	39	18.5	20	21.4	24	25.1	26.2	11.9	12.9	13.8	15.4	16.2	16.9
TJR 11 M	11	33	36	38	43	45	47	22	24	26	29	30	32	14	16	17	19	20	20
TJR 13 M	13	40	43	46	52	54	57	27	29	31	35	36	38	17	19	20	22	23	25
TER 16 M	16	50	53	57	64	67	70	33	36	38	43	45	47	21	23	25	28	29	30
TER 19 M	18	57	62	66	74	77	81	38	42	44	50	52	54	25	27	29	32	34	35
TER 25 M	24	76	82	88	98	103	107	51	55	59	66	69	72	33	36	38	42	44	46
TER 31 M	30	95	102	109	122	128	134	64	69	73	82	86	90	41	44	47	53	55	58
TIR 45 M	42	133	143	153	171	179	187	89	96	103	115	121	126	57	62	66	74	78	81
THR 55 M	54	170	184	197	220	231	241	115	124	132	148	155	162	74	80	85	95	100	104
THR 68 M	65	207	224	239	267	280	293	139	150	161	180	189	197	90	97	104	116	121	127

Liquid Temperature Correction Factor

Refrigerant	Liquid Temperature °C																
	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
R134a	0.71	0.77	0.83	0.89	0.94	1	1.06	1.11	1.17	1.23	1.28	1.34	1.39	1.45	1.5	1.56	1.61

Valve capacities are based on 35°C vapour free refrigerant liquid entering the valve. To select a valve for other liquid temperatures determine the corrected capacity requirement by dividing the evaporator load by the liquid correction factor.

Selection Procedure – Refer Page 4

Conversion Kw x 0.284 = Tons. Tons x 3.517 = Kw

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) T Series Capacity Tables: kW

R22

Valve Series R22	Nominal Capacities Tons Refrig.	R22 Capacity: kW - Evaporating Temperature: °C																	
		10						0						-10					
		Pressure Drop Across Valve: kPa																	
		500	700	900	1000	1200	1400	500	700	900	1000	1200	1400	700	900	1000	1200	1400	1600
TCLE ½ H	0.5	1.6	1.8	2.1	2.2	2.4	2.6	1.53	1.81	2.05	2.16	2.37	2.56	1.76	2	2.11	2.31	2.5	2.67
TCLE 1 H	0.94	2.9	3.5	3.9	4.1	4.5	4.9	2.9	3.4	3.8	4.1	4.4	4.8	3.3	3.8	4	4.3	4.7	5
TCLE 2 H	1.9	5.9	7	8	8.4	9.2	9.9	5.8	6.9	7.8	8.2	9	9.7	6.7	7.6	8	8.8	9.5	10.1
TCLE 3 H	3.5	10.9	12.9	14.6	15.4	16.9	18.3	10.7	12.6	14.3	15.1	16.6	17.9	12.3	14	14.8	16.2	17.5	18.7
TCLE 5 H	5.1	15.9	18.8	21.3	22.5	24.6	26.6	15.6	18.4	20.9	22	24.1	26.1	18	20.4	21.5	23.6	25.4	27.2
TCLE 7½ H	7.4	23.1	27.3	31	32.6	35.8	38.6	22.6	26.7	30.3	32	35	37.8	26.1	29.6	31.2	34.2	36.9	39.5
TCLE 10 H	10.2	31.8	37.6	42.7	45	49.3	53.3	31.1	36.8	41.8	44	48.3	52.1	36	40.8	43	47.1	50.9	54.4
TCLE 12 H	12.3	38.4	45.4	51.5	54.3	59.4	64.2	37.5	44.4	50.4	53.1	58.2	62.9	43.4	49.2	51.9	56.8	61.4	65.6
TJR 14 H	14.7	46	54	62	65	71	77	45	53	60	64	70	75	52	59	62	68	73	78
TJR 18 H	17.6	55	65	74	78	85	92	54	64	72	76	83	90	62	70	74	81	88	94
TER 22 H	22	69	81	92	97	106	115	67	80	90	95	104	112	78	88	93	102	110	117
TER 26 H	26	81	96	109	115	126	136	79	94	107	112	123	133	92	104	110	120	130	139
TER 35 H	35	109	129	147	154	169	183	107	126	143	151	166	179	123	140	148	162	175	187
TER 45 H	45	140	166	188	199	218	235	137	163	184	194	213	230	159	180	190	208	225	240
TIR 55 H	55	172	203	230	243	266	287	168	199	225	238	260	281	194	220	232	254	275	293
THR 75 H	75	234	277	314	331	363	392	229	271	307	324	355	383	265	300	316	347	374	400
THR 100 H	100	332	369	419	441	483	522	305	361	410	432	473	511	353	400	422	462	499	533

Valve Series R22	Nominal Capacities Tons Refrig.	R22 Capacity: kW - Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700
TCLE ½ H	0.5	1.7	1.8	2	2.1	2.3	2.3	1.2	1.3	1.4	1.5	1.6	1.7	0.8	0.9	1	1	1.1	1.2
TCLE 1 H	0.94	3.2	3.4	3.7	4	4.3	4.4	2.3	2.4	2.6	2.9	3.1	3.1	1.6	1.7	1.8	2	2.1	2.2
TCLE 2 H	1.9	6.5	6.8	7.5	8.1	8.6	8.9	4.6	4.9	5.3	5.8	6.2	6.4	3.2	3.4	3.7	4	4.3	4.4
TCLE 3 H	3.5	11.9	12.5	13.7	14.9	15.9	16.4	8.5	9	9.8	10.6	11.4	11.7	5.9	6.2	6.8	7.3	7.8	8.1
TCLE 5 H	5.1	17.3	18.3	20	21.6	23.1	23.8	12.4	13.1	14.3	15.5	16.6	17.1	8.6	9	9.9	10.7	11.4	11.8
TCLE 7½ H	7.4	25.2	26.5	29.1	31.4	33.6	34.6	18	19	20.8	22.5	24	24.8	12.4	13.1	14.4	15.5	16.6	17.1
TCLE 10 H	10.2	34.7	36.6	40.1	43.3	46.3	47.7	24.8	26.2	28.7	31	33.1	34.2	17.1	18.1	19.8	21.4	22.9	23.6
TCLE 12 H	12.3	41.8	44.1	48.3	52.2	55.8	57.5	30	31.6	34.6	37.4	40	41.2	20.7	21.8	23.9	25.8	27.6	28.4
TJR 14 H	14.7	50	53	58	62	67	69	36	38	41	45	48	49	25	26	29	31	33	34
TJR 18 H	17.6	60	63	69	75	80	82	43	45	50	54	57	59	30	31	34	37	39	41
TER 22 H	22	75	79	86	93	100	103	54	57	62	67	72	74	37	39	43	46	49	51
TER 26 H	26	88	93	102	110	118	122	63	67	73	79	85	87	44	46	51	55	58	60
TER 35 H	35	119	126	138	149	159	164	85	90	99	106	114	117	59	62	68	73	78	81
TER 45 H	45	153	161	177	191	204	210	110	116	127	137	146	151	76	80	87	94	101	104
TIR 55 H	55	187	197	216	233	249	257	134	141	155	167	179	184	92	97	107	115	123	127
THR 75 H	75	255	269	295	318	340	351	183	193	211	228	244	251	126	133	146	157	168	173
THR 100 H	100	340	359	393	424	454	468	244	257	281	304	325	335	168	177	194	210	224	231

Liquid Temperature Correction Factor

Refrigerant	Liquid Temperature °C																
	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
R22	0.75	0.8	0.85	0.9	0.95	1	1.05	1.1	1.14	1.19	1.24	1.29	1.33	1.38	1.42	1.47	1.51

Valve capacities are based on 35°C vapour free refrigerant liquid entering the valve. To select a valve for other liquid temperatures determine the corrected capacity requirement by dividing the evaporator load by the liquid correction factor.

Selection Procedure – Refer Page 4

Conversion Kw x 0.284 = Tons. Tons x 3.517 = Kw

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) TI Series with Interchangeable Orifice Assembly

TI Series Valves with Interchangeable orifices provide the capability of changing capacity with only the change of an orifice.

Features

- Stainless steel metering pin in orifice
- Stainless steel power element
- External superheat adjustment
- Safe Working Pressure: 3100 kPa (450 psig)
- Refrigerants: R22, R134a, R404A, R12, R502
- Replaceable inlet strainer assembly

Adjustment

TI Thermo expansion valves are factory set. This factory setting meets the installation requirements of most applications. The valves should be installed without altering the setting. If readjustment proves necessary the setting can be changed by turning the adjustment stem:

- Turning the adjustment stem clockwise increases superheat by reducing the refrigerant flow rate.
 - Turning the adjustment stem counter-clockwise decreases superheat by increasing the refrigerant flow rate.
- After adjusting, wait until the refrigeration system is operating to near setpoint conditions and check superheat again.

Installation

- TI valves may be installed in any position and at any ambient temperature condition.
- Be sure that flow direction corresponds to the arrow stamped on the valve body.
- The remote bulb should be attached to a straight and preferably horizontal part of the suction line.
- The bulb should be protected against heat input from outside.
- When a refrigerant distributor is fitted to the evaporator, use only externally equalised valves.

Valve Body (Less Orifice)

Flare Inlet and Outlet

Cat. No.	Type	Refrig.	Equal.	MOP	Connections	
					Inlet	Outlet
106003	TI-HW	R22	Int.		3/8" Flare	1/2" Flare
106023	TI-MW	R134a				
106025	TI-SW	R404A				
106029	TI-SW75	R404A		Y		
106004	TIE-HW	R22	Ext. 1/4" Flare		3/8" Flare	1/2" Flare
106024	TIE-MW	134a				
106026	TIE-SW	R404A				
106030	TIE-SW75	R404A				

Superheat Adjustment Table

Refrigerant	Pressure change per Turn bar	Evaporation Temperature °C					
		+10	0	-10	-20	-30	-40
		Change of Superheat per Turn, Kelvin					
R134a	0.58	4.0	5.1	6.6	8.7		
R22	0.58	2.8	3.5	4.4	5.6	7.4	9.9
R404A	0.58	2.3	2.9	3.7	4.8	6.3	8.3

Flare Inlet and Solder Outlet

Cat. No.	Type	Refrig.	Equal.	MOP	Connections	
					Inlet	Outlet
106017	TIS-HW	R22	Int.		3/8" Flare	1/2" Solder.
106021	TIS-MW	R134a				
106027	TIS-SW	R404A				
106031	TIS-SW75	R404A		Y		
106018	TISE-HW	R22	Ext. 1/4" Solder.		3/8" Flare	1/2" Solder.
106022	TISE-MW	R134a				
106028	TISE-SW	R404A				
106032	TISE-SW75	R404A		Y		

Note: Capillary Tube Length 1.5m

Connection Adaptor

Cat. No.	Type	Description
106035	X99983	3/8 FM to 3/8 ODF Adaptor

Orifice Assembly (Including Strainer)

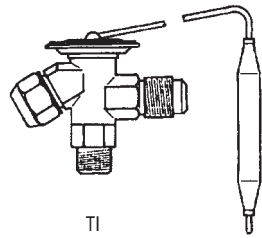
Cat. No.	Orifice No.	Nominal Capacity: kW*					
		R22		R134a		R404A/R507	
		M/T	L/T	M/T	L/T	M/T	L/T
106014	00	0.51	0.40	0.28	0.20	0.37	0.30
106007	0	1.33	0.90	0.75	0.50	0.94	0.70
106008	1	3.3	2.3	1.79	1.2	2.2	1.5
106009	2	5.4	3.8	2.9	2.0	3.7	2.6
106010	3	8.7	6.1	4.7	3.2	5.8	4.1
106011	4	14.2	9.9	7.8	5.3	9.5	6.7
106012	5	17.3	12.0	9.5	6.5	11.5	8.2
106013	6	19.9	13.9	11.0	7.5	13.3	9.4

*Nominal Capacities based on:

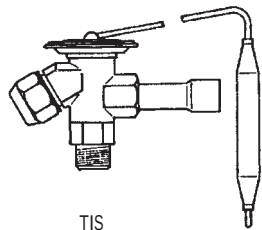
M/T at 46°C condensing temperature, -4°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve. L/T at 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Extended capacity tables are listed on following page.



TI



TIS



Thermostatic Expansion Valves

Flow Controls (Alco) TI Series Capacity Tables: kW

Refrig.	Valve Cage No.	R22 Capacity: kW - Evaporating Temperature: °C																	
		10						0						-10					
		Pressure Drop Across Valve: kPa																	
		500	700	900	1000	1200	1400	500	700	900	1000	1200	1400	700	900	1000	1200	1400	1600
R22	00	0.4	0.5	0.5	0.6	0.6	0.7	0.4	0.5	0.5	0.5	0.6	0.6	0.4	0.5	0.5	0.6	0.6	0.7
	0	1	1.2	1.3	1.4	1.5	1.7	1	1.2	1.3	1.4	1.5	1.6	1.1	1.3	1.3	1.5	1.6	1.7
	1	2.5	3	3.3	3.5	3.9	4.2	2.4	2.9	3.3	3.5	3.8	4.1	2.8	3.2	3.4	3.7	4	4.3
	2	4.1	4.8	5.4	5.7	6.3	6.8	4	4.7	5.3	5.6	6.2	6.6	4.6	5.2	5.5	6	6.5	6.9
	3	6.5	7.7	8.8	9.3	10.1	11	6.4	7.6	8.6	9.1	9.9	10.7	7.4	8.4	8.9	9.7	10.5	11.2
	4	10.9	12.9	14.6	15.4	16.9	18.3	10.7	12.6	14.3	15.1	16.6	17.9	12.3	14	14.8	16.2	17.5	18.7
	5	13.1	15.5	17.6	18.5	20.3	21.9	12.8	15.2	17.2	18.1	19.9	21.5	14.8	16.8	17.7	19.4	21	22.4
	6	15.3	18.1	20.5	21.6	23.7	25.6	15	17.7	20.1	21.2	23.2	25	17.3	19.6	20.7	22.6	24.5	26.1
	Valve Cage No.	R22 Capacity: kW - Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700
	00	0.4	0.5	0.5	0.5	0.6	0.6	0.3	0.3	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.3	0.3	0.3
	0	1.1	1.1	1.3	1.4	1.5	1.5	0.8	0.8	0.9	1	1	1.1	0.5	0.6	0.6	0.7	0.7	0.7
	1	2.7	2.9	3.1	3.4	3.6	3.7	1.9	2.1	2.3	2.4	2.6	2.7	1.3	1.4	1.6	1.7	1.8	1.8
	2	4.4	4.7	5.1	5.5	5.9	6.1	3.2	3.3	3.7	4	4.2	4.4	2.2	2.3	2.5	2.7	2.9	3
	3	7.1	7.5	8.2	8.9	9.5	9.8	5.1	5.4	5.9	6.4	6.8	7	3.5	3.7	4.1	4.4	4.7	4.9
	4	11.9	12.5	13.7	14.9	15.9	16.4	8.5	9	9.8	10.6	11.4	11.7	5.9	6.2	6.8	7.3	7.8	8.1
	5	14.3	15.1	16.5	17.8	19	19.6	10.2	10.8	11.8	12.8	13.6	14.1	7.1	7.4	8.2	8.8	9.4	9.7
	6	16.7	17.6	19.2	20.8	22.2	22.9	11.9	12.6	13.8	14.9	15.9	16.4	8.2	8.7	9.5	10.3	11	11.3

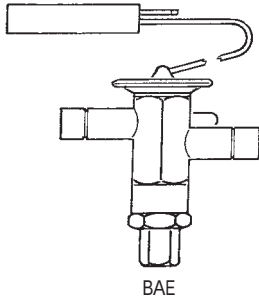
Refrig.	Valve Cage No.	R134a Capacity: kW - Evaporating Temperature: °C																	
		10						0						-10					
		Pressure Drop Across Valve: kPa																	
		300	400	600	700	800	1000	400	600	700	800	1000	1100	400	600	700	800	1000	1100
R134a	00	0.2	0.3	0.3	0.3	0.4	0.4	0.2	0.3	0.3	0.3	0.4	0.4	0.2	0.3	0.3	0.3	0.4	0.4
	0	0.6	0.7	0.8	0.9	1	1.1	0.7	0.8	0.9	0.9	1.1	1.1	0.6	0.8	0.8	0.9	1	1.1
	1	1.4	1.6	1.9	2.1	2.2	2.5	1.5	1.8	2	2.1	2.4	2.5	1.5	1.8	1.9	2.1	2.3	2.4
	2	2.3	2.7	3.3	3.5	3.8	4.2	2.6	3.1	3.4	3.6	4.1	4.2	2.5	3	3.3	3.5	3.9	4.1
	3	3.8	4.4	5.4	5.8	6.2	6.9	4.2	5.2	5.6	6	6.7	7	4	5	5.4	5.7	6.4	6.7
	4	6	6.9	8.5	9.2	9.8	11	6.7	8.2	8.8	9.4	10.5	11.1	6.4	7.9	8.5	9.1	10.1	10.6
	5	7.6	8.8	10.7	11.6	12.4	13.8	8.4	10.3	11.1	11.9	13.3	14	8.1	9.9	10.7	11.4	12.8	13.4
	6	9.8	11.3	13.8	15	16	17.9	10.9	13.3	14.4	15.4	17.2	18	10.5	12.8	13.8	14.8	16.5	17.3
	Valve Cage No.	R134a Capacity: kW - Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		600	700	800	1000	1100	1200	600	700	800	1000	1100	1200	600	700	800	1000	1100	1200
	00	0.22	0.24	0.26	0.29	0.3	0.31	0.15	0.16	0.17	0.19	0.2	0.21	0.1	0.1	0.11	0.12	0.12	0.14
	0	0.6	0.65	0.7	0.78	0.82	0.85	0.41	0.44	0.47	0.52	0.55	0.57	0.26	0.28	0.3	0.34	0.35	0.37
	1	1.4	1.5	1.6	1.8	1.8	1.9	0.9	1	1.1	1.2	1.2	1.3	0.59	0.64	0.68	0.76	0.8	0.84
	2	2.3	2.5	2.7	3	3.1	3.3	1.6	1.7	1.8	2	2.1	2.2	1	1.1	1.2	1.3	1.4	1.4
	3	3.8	4.1	4.4	4.9	5.2	5.4	2.6	2.8	3	3.3	3.5	3.6	1.6	1.8	1.9	2.1	2.2	2.3
	4	6	6.5	7	7.8	8.2	8.5	4.1	4.4	4.7	5.2	5.5	5.7	2.6	2.8	3	3.4	3.5	3.7
	5	7.6	8.2	8.8	9.8	10.3	10.8	5.1	5.5	5.9	6.6	6.9	7.2	3.3	3.6	3.8	4.3	4.5	4.7
	6	9.8	10.6	11.3	12.7	13.3	13.9	6.6	7.1	7.6	8.5	8.9	9.3	4.3	4.6	4.9	5.5	5.8	6

Refrig.	Valve Cage No.	R404A/R507 Capacity: kW - Evaporating Temperature: °C																	
		10						0						-10					
		Pressure Drop Across Valve: kPa																	
		500	700	900	1000	1200	1400	500	700	900	1000	1200	1400	500	700	900	1000	1200	1400
R404A R507	00	0.3	0.35	0.4	0.42	0.46	0.49	0.28	0.33	0.38	0.4	0.44	0.47	0.27	0.32	0.36	0.38	0.41	0.45
	0	0.74	0.87	0.99	1.04	1.14	1.24	0.7	0.83	0.95	1	1.09	1.18	0.67	0.79	0.9	0.95	1.04	1.12
	1	1.7	2	2.3	2.4	2.6	2.8	1.6	1.9	2.2	2.3	2.5	2.7	1.5	1.8	2.1	2.2	2.4	2.6
	2	2.9	3.4	3.9	4.1	4.5	4.8	2.8	3.3	3.7	3.9	4.3	4.6	2.6	3.1	3.5	3.7	4.1	4.4
	3	4.6	5.4	6.2	6.5	7.1	7.7	4.4	5.2	5.9	6.2	6.8	7.3	4.2	4.9	5.6	5.9	6.4	7
	4	7.5	8.8	10	10.6	11.6	12.5	7.1	8.4	9.6	10.1	11.1	12	6.8	8	9.1	9.6	10.5	11.3
	5	9.1	10.8	12.2	12.9	14.1	15.3	8.7	10.3	11.7	12.3	13.5	14.6	8.3	9.8	11.1	11.7	12.8	13.8
	6	10.5	12.5	14.1	14.9	16.3	17.6	10.1	11.9	13.5	14.2	15.6	16.8	9.5	11.3	12.8	13.5	14.8	16
	Valve Cage No.	R404A/R507 Capacity: kW - Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		700	900	1000	1200	1400	1600	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700
	00	0.27	0.3	0.32	0.35	0.38	0.4	0.21	0.22	0.24	0.26	0.28	0.29	0.14	0.15	0.17	0.18	0.19	0.2
	0	0.67	0.76	0.8	0.87	0.94	1.01	0.53	0.56	0.61	0.66	0.71	0.73	0.36	0.38	0.42	0.45	0.48	0.5
	1	1.5	1.7	1.8	2	2.2	2.3	1.2	1.3	1.4	1.5	1.6	1.7	0.8	0.9	1	1	1.1	1.1
	2	2.6	3	3.1	3.4	3.7	4	2.1	2.2	2.4	2.6	2.8	2.8	1.4	1.5	1.6	1.8	1.9	1.9
	3	4.2	4.7	5	5.4	5.9	6.3	3.3	3.5	3.8	4.1	4.4	4.5	2.2	2.4	2.6	2.8	3	3.1
	4	6.8	7.7	8.1	8.9	9.6	10.2	5.4	5.7	6.2	6.7	7.2	7.4	3.7	3.9	4.2	4.6	4.9	5
5	8.2	9.3	9.9	10.8	11.7	12.5	6.5	6.9	7.6	8.2	8.7	9	4.5	4.7	5.1	5.6	5.9	6.1	
6	9.5	10.8	11.4	12.5	13.5	14.4	7.6	8	8.7	9.4	10.1	10.4	5.1	5.4	5.9	6.4	6.9	7.1	

Thermostatic Expansion Valves

Flow Controls (Alco) BA Series

BA Series thermostatic expansion valves feature a balanced port construction which provides stable and accurate control over a wide range of operating conditions. The BAE Valves are suitable for Bi-Flow applications.



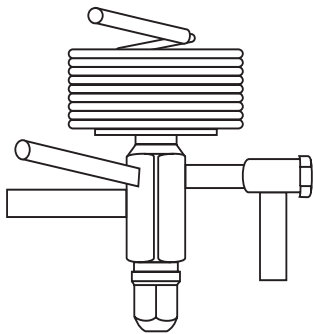
BAE

Features

- External superheat adjustment
- Bi-Flow capability ideal for packaged heat pump applications (external equaliser required).
- Balanced port construction compensates for changes in operating pressures due to varying ambients, gas defrost, heat reclaim, or widely varying evaporator loads.
- Hermetic construction eliminates external leakage.
- Stainless steel power element eliminates corrosion and prevents valve failure.
- Straight-thru configuration designed to fit most common applications.

Nomenclature - Example: BAESB 1/2 HC 5FT 3/8 x 1/2 ODF

B	A	E	S	B	1/2	H	C	5 FT	3/8 x 1/2	ODF
Valve Series Economy, Hermetic Balanced Port Design	Superheat Adjustment A=Adjustable N=Non-Adjustable	Equalizer E=External (Omit for Internal)	Strainer Removable Inlet Screen	Bleed Hole (Optional) Omit for No Bleed Hole	Capacity Nominal Rating in Tons. See Nominal Capacity Table Below	Refrigerant Code F=R12 H=22 M=R134a N= R407C P=R507 R=R502 S=R404A	Charge Code C=Medium Temp CA=Heat Pump W(MOP)=Press Limiting Z=Low Temp	Capillary Tube Length 30 IN and 5FT are standard	Inlet & Outlet Connection Sizes 1 0 1/4 3/8 3/8 1/2 1/2 5/8 5/8 7/8	Connection Type ODF-Solder



BAES

R22 Airconditioning		Nominal Capacity*		Inlet & Outlet Conns. ODF Solder	Equaliser Conn.	Capillary Length mm
Cat. No.	Part No.	kW	Tons			
106059	BAE 1 HCA	1.7	5.9	3/8" x 1/2"	External 1/4" ODF Solder	1500
106060	BAE 1 1/2 HCA	3.3	11.6	3/8" x 1/2"		
106062	BAE 2 HCA	5.2	18.2	1/2" x 1/2"		
106061	BAE 2 1/2 HCA	7.0	24.6	1/2" x 5/8"		
106063	BAE 3 HCA	8.8	30.9	1/2" x 5/8"		
106064	BAE 4 HCA	10.7	37.6	5/8" x 5/8"		
106065	BAE 5 HCA	13.8	48.5	1/2" x 5/8"		
106066	BAE 6 HCA	17.5	61.5	1/2" x 5/8"		

*Nominal Capacities based on: R22
46°C condensing temperature, 7°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

R404A Medium Temp.		Nominal Capacity*	Inlet & Outlet Conns. ODF Solder	Equaliser Conn.	Capillary Length mm	R404A Low Temp.		Nominal Capacity*
Cat. No.	Part No.					Cat. No.	Part No.	
106190	BAES 1/4 SC	0.6	1/4"	External 1/4" ODF Solder	1500	106200	BAES 1/4 SZ	0.5
106191	BAES 1/2 SC	1.2				106201	BAES 1/2 SZ	1
106192	BAES 1 SC	2.3				106202	BAES 1 SZ	1.9
106193	BAES 1 1/4 SC	3.6				106203	BAES 1 1/4 SZ	2.9
106194	BAES 1 1/2 SC	4.9				106204	BAES 1 1/2 SZ	3.9
106195	BAES 2 SC	6.1				106205	BAES 2 SZ	5
106196	BAES 2 1/2 SC	7.5				106206	BAES 2 1/2 SZ	6
106197	BAES 3 SC	9.7				106207	BAES 3 SZ	7.8
106198	BAES 4 SC	12.2				106208	BAES 4 SZ	10

*Nominal Capacities based on: R404A

M/T 46°C condensing temperature, -4°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

L/T 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

Superheat Adjustment

One complete 360° turn changes the superheat approximately 1.7 to 2.2K depending on the refrigerant type. There are 10 turns on the adjustment stem. Do not force the adjustment past the stop, as attempted further turning will damage the valve.

Thermostatic Expansion Valves

Flow Controls (Alco) BA Series Capacity Tables: kW

R22

Valve Series	R22 Capacity: kW - Evaporating Temperature: °C																	
	10						0						-10					
	Pressure Drop Across Valve: kPa																	
R22	500	700	900	1000	1200	1400	500	700	900	1000	1200	1400	700	900	1000	1200	1400	1600
BA ½ H	1.60	1.80	2.10	2.20	2.40	2.60	1.53	1.81	2.05	2.16	2.37	2.56	1.76	2.00	2.11	2.31	2.5	2.67
BA 1 H	3.00	3.50	4.00	4.20	4.60	5.00	2.90	3.43	3.89	4.10	4.49	4.86	3.35	3.80	4.01	4.39	4.74	5.07
BA 1½ H	4.60	5.50	6.20	6.50	7.20	7.70	4.52	5.35	6.06	6.39	7.00	7.56	5.22	5.92	6.24	6.84	7.39	7.89
BA 2 H	6.20	7.30	8.30	8.70	9.60	10.3	6.04	7.15	8.11	8.55	9.37	10.1	6.98	7.92	8.35	9.15	9.88	10.6
BA 2½ H	7.80	9.20	10.5	11.0	12.1	13.1	7.63	9.03	10.2	10.8	11.8	12.8	8.82	10.0	10.5	11.6	12.5	13.3
BA 3 H	9.40	11.2	12.7	13.4	14.6	15.8	9.25	10.9	12.4	13.1	14.3	15.5	10.7	12.1	12.8	14.0	15.1	16.2
BA 4 H	12.2	14.5	16.4	17.3	18.9	20.5	12.0	14.2	16.1	16.9	18.6	20.0	13.8	15.7	16.5	18.1	19.6	20.9
BA 5 H	15.5	18.3	20.8	21.9	24.0	25.9	15.1	17.9	20.3	21.4	23.5	25.3	17.5	19.8	20.9	22.9	24.8	26.5
BA 6 H	19.2	22.8	25.8	27.2	29.8	32.2	18.8	22.3	25.3	26.7	29.2	31.5	21.8	24.7	26.0	28.5	30.8	32.9
Valve Series	R22 Capacity: kW - Evaporating Temperature: °C																	
	-20						-30						-40					
	Pressure Drop Across Valve: kPa																	
R22	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700
BA ½ H	1.70	1.80	2.00	2.10	2.30	2.30	1.20	1.30	1.40	1.50	1.60	1.70	0.84	0.89	0.97	1.05	1.12	1.16
BA 1 H	3.20	3.40	3.70	4.00	4.30	4.40	2.30	2.40	2.70	2.90	3.10	3.20	1.60	1.70	1.80	2.00	2.10	2.20
BA 1½ H	5.00	5.30	5.80	6.30	6.70	6.90	3.60	3.80	4.20	4.50	4.80	5.00	2.50	2.60	2.90	3.10	3.30	3.40
BA 2 H	6.70	7.10	7.80	8.40	9.00	9.30	4.80	5.10	5.60	6.00	6.40	6.60	3.30	3.50	3.80	4.20	4.40	4.60
BA 2½ H	8.50	9.00	9.80	10.6	11.3	11.7	6.10	6.40	7.00	7.60	8.10	8.40	4.20	4.40	4.90	5.20	5.60	5.80
BA 3 H	10.3	10.9	11.9	12.9	13.7	14.2	7.40	7.80	8.50	9.20	9.80	10.1	5.10	5.40	5.90	6.40	6.80	7.00
BA 4 H	13.3	14.1	15.4	16.6	17.8	18.3	9.50	10.1	11.0	11.9	12.7	13.1	6.60	6.90	7.60	8.20	8.80	9.10
BA 5 H	16.9	17.8	19.5	21.0	22.5	23.2	12.1	12.7	14.0	15.1	16.1	16.6	8.30	8.80	9.60	10.4	11.1	11.5
BA 6 H	21.0	22.1	24.2	26.2	28.0	28.8	15.0	15.8	17.4	18.8	20.0	20.7	10.4	10.9	12.0	12.9	13.8	14.3

Note: Flow capacities are the same for reverse flow applications.

R404A

Valve Series	R404A Capacity: kW - Evaporating Temperature: °C																	
	10						0						-10					
	Pressure Drop Across Valve: kPa																	
R404A	500	700	900	1000	1200	1400	500	700	900	1000	1200	1400	500	700	900	1000	1200	1400
BA ¼ S	1.10	1.30	1.40	1.50	1.60	1.80	1.00	1.20	1.40	1.40	1.60	1.70	1.00	1.10	1.30	1.40	1.50	1.60
BA ½ S	2.00	2.40	2.70	2.90	3.10	3.40	1.90	2.30	2.60	2.70	3.00	3.20	1.80	2.20	2.50	2.60	2.80	3.10
BA 1 S	3.10	3.70	4.20	4.40	4.90	5.30	3.00	3.60	4.00	4.20	4.70	5.00	2.80	3.40	3.80	4.00	4.40	4.80
BA 1¼ S	4.20	5.00	5.60	5.90	6.50	7.00	4.00	4.80	5.40	5.70	6.20	6.70	3.80	4.50	5.10	5.40	5.90	6.40
BA 1½ S	5.30	6.30	7.10	7.50	8.20	8.90	5.10	6.00	6.80	7.20	7.80	8.50	4.80	5.70	6.40	6.80	7.40	8.00
BA 2 S	6.40	7.60	8.60	9.10	9.90	10.7	6.10	7.30	8.20	8.70	9.50	10.3	5.80	6.90	7.80	8.20	9.00	9.70
BA 2½ S	8.30	9.80	11.1	11.7	12.8	13.9	7.90	9.40	10.6	11.2	12.3	13.2	7.50	8.90	10.1	10.6	11.6	12.6
BA 3 S	10.5	12.4	14.1	14.8	16.3	17.6	10.0	11.9	13.4	14.2	15.5	16.8	9.50	11.3	12.8	13.5	14.7	15.9
BA 4 S	13.1	15.5	17.5	18.5	20.2	21.9	12.5	14.8	16.7	17.6	19.3	20.9	11.8	14.0	15.9	16.7	18.3	19.8

Valve Series	R404A Capacity: kW - Evaporating Temperature: °C																	
	-20						-30						-40					
	Pressure Drop Across Valve: kPa																	
R404A	700	900	1000	1200	1400	1600	900	1000	1200	1400	1600	1700	900	1000	1200	1400	1600	1700
BA ¼ S	0.96	1.09	1.15	1.25	1.36	1.45	0.76	0.80	0.88	0.95	1.01	1.04	0.52	0.55	0.60	0.65	0.69	0.71
BA ½ S	1.80	2.10	2.20	2.40	2.60	2.80	1.50	1.50	1.70	1.80	1.90	2.00	1.00	1.00	1.10	1.20	1.30	1.40
BA 1 S	2.80	3.20	3.40	3.70	4.00	4.30	2.30	2.40	2.60	2.80	3.00	3.10	1.50	1.60	1.80	1.90	2.00	2.10
BA 1¼ S	3.80	4.30	4.50	5.00	5.40	5.80	3.00	3.20	3.50	3.80	4.00	4.10	2.10	2.20	2.40	2.60	2.70	2.80
BA 1½ S	4.80	5.40	5.70	6.30	6.80	7.20	3.80	4.00	4.40	4.70	5.10	5.20	2.60	2.70	3.00	3.20	3.50	3.60
BA 2 S	5.80	6.60	6.90	7.60	8.20	8.80	4.60	4.90	5.30	5.70	6.10	6.30	3.10	3.30	3.60	3.90	4.20	4.30
BA 2½ S	7.50	8.50	9.00	9.80	10.6	11.3	5.90	6.30	6.90	7.40	7.90	8.20	4.00	4.30	4.70	5.00	5.40	5.60
BA 3 S	9.50	10.8	11.3	12.4	13.4	14.4	7.50	7.90	8.70	9.40	10.0	10.4	5.10	5.40	5.90	6.40	6.80	7.00
BA 4 S	11.8	13.4	14.1	15.5	16.7	17.9	9.40	9.90	10.8	11.7	12.5	12.9	6.40	6.70	7.40	8.00	8.50	8.80

Liquid Temperature Correction Factor

Refrigerant	Liquid Temperature °C																
	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
R22	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.14	1.19	1.24	1.29	1.33	1.38	1.42	1.47	1.51
R134a	0.71	0.77	0.83	0.89	0.94	1.00	1.06	1.11	1.17	1.23	1.28	1.34	1.39	1.45	1.50	1.56	1.61
R404A	0.50	0.61	0.71	0.81	0.91	1.00	1.09	1.18	1.26	1.34	1.43	1.51	1.59	1.66	1.74	1.82	1.89

Valve capacities are based on 35°C vapour free refrigerant liquid entering the valve. To select a valve for other liquid temperatures determine the corrected capacity requirement by dividing the evaporator load by the liquid correction factor.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) HF Series

HF Series thermostatic expansion valves feature a balanced port construction which provides stable and accurate superheat control over a wide range of operating conditions.

Any refrigeration system which experiences changes in operating pressures due to varying ambient temperature, gas defrost, heat reclaim, or swings in evaporator load will benefit from using the HF balanced port thermostatic expansion valve.

Features

Compared to conventional T.X. valves, under varying system conditions with wide pressure drops, the balanced port HF valve improves superheat control, system operation and valve stability.

- External superheat adjustment
- Replaceable power element for added flexibility
- Internal or external equaliser
- The HFESC Series has a removable 100 mesh strainer that can be cleaned and/or replaced without removing the valve from the line
- Field-proven internal seal construction
- Tailored bulb charges for specific applications
- Interchangeable with conventional T.X. valves
- Suitable for all common refrigerants
- Externally equalised valves have Bi-Flow capability
- Maximum working Pressure 300kPa

Application

The HF valve is currently replacing conventional Thermostatic Expansion Valves on air conditioning and refrigeration systems with any combination of the following system operating conditions:

1. Widely varying evaporator loads
2. Widely varying head pressures
3. Widely varying pressure drop available across the thermostatic expansion valve and refrigerant distributor
4. Fluctuating or extremely low liquid temperatures

Nomenclature - Example: HFNESC2 HC 5FT 3/8 x 1/2 ODF S/T

HF	N	E	S	C	B	2	H	C	5 FT	3/8 x 1/2	ODF	S/T
Valve Series	Superheat Adjustment N=Non-Adjustable Omit for Adjustable	Equalizer E=External (Omit for Internal)	Connection Type S=Solder (Omit for SAE Flare)	Removable Inlet Strainer (optional) C-Inlet Strainer (ODF only)	Bleed Hole (optional) Omit for no bleed Thole	Capacity Nominal Rating in Tons See nominal capacity table (on page 17)	Refrigerant Code F=R12 H=R22 M=R134a *P=R507 *R=R502 *S=R404A	Charge Code Tube Length C=Medium Temp CA=Heat Pump W(MOP)=press. limiting Z=low temp	Capillary Tube Length 5FT (std) other lengths are available	Inlet & Outlet Connection Sizes 1 0 1/4 3/8 3/8 1/2 1/2 5/8 5/8 7/8	Connection Type SAE=flare ODF=solder	Configuration S/T=straight-thru ANG=90° angle

Cat. No.	Part No.	*R22 Nominal Capacity: kW Air Conditioning @ 7°C SST	Valve Conn: ODF Solder	Equaliser Connection
106040	HFES8HCA	28.94	5/8" x 7/8"	External 1/4" ODF Solder
106041	HFES10HCA	36.63	7/8" x 1/8"	
106042	HFES12HCA	45.16	5/8" x 7/8"	
106043	HFES15HCA	54.34	7/8" x 1/8"	
106044	HFES20HCA	71.52		

Cat. No.	Part No.	*R404A Nominal Capacity: kW Refrigeration		Valve Conn: ODF Solder	Equaliser Connection
		@ -4°C SST	@ -23.3°C SST		
106087	HFESC5SC	20.17	16.31	5/8" x 7/8"	External 1/4"
106088	HFESC7SC	25.53	20.64		
106089	HFESC10SC	38.87	30.62	7/8" x 1/8"	ODF Solder
106090	HFESC13SC	49.84	40.31		

*Nominal Capacities based on:

Air Conditioning and medium temperature refrigeration at 46°C condensing temperature

Low temperature Refrigeration at 42°C condensing temperature

Both at 1K liquid subcooling at the inlet of the expansion Valve

Superheat Adjustment

One complete 360° turn changes the superheat approximately 1.7 to 2.2K regardless of the refrigerant type. There are 10 turns on the adjustment stem. Do not force the adjustment past the stop, as attempted further turning will damage the valve.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) HF Series Capacity Tables: kW

R22

Valve Series	R22 Capacity: kW - Evaporating Temperature: °C																	
	+10						0						-10					
	Pressure Drop Across Valve: kPa																	
R22	300	400	600	700	800	1000	400	600	700	800	1000	1100	400	600	700	800	1000	1100
HF ¼ H	0.9	1	1.2	1.2	1.4	1.5	0.85	1.01	1.15	1.21	1.32	1.43	.99	1.12	1.18	1.29	1.4	1.49
HF ½ H	1.7	2	2.2	2.3	2.6	2.8	1.62	1.91	2.17	2.29	2.51	2.71	1.87	2.12	2.23	2.45	2.65	2.83
HF 1 H	3	3.5	4	4.2	4.6	5	2.9	3.4	3.9	4.1	4.5	4.9	3.4	3.8	4	4.4	4.7	5.1
HF 1 ½ H	4.5	5.4	6.1	6.4	7	7.6	4.4	5.2	5.9	6.3	6.9	7.4	5.1	5.8	6.1	6.7	7.2	7.7
HF 2 H	6.1	7.2	8.2	8.6	9.4	10.2	6	7	8	8.4	9.2	10	6.9	7.8	8.2	9	9.7	10.4
HF 2 ½ H	7.8	9.2	10.5	11	12.1	13.1	7.6	9	10.2	10.8	11.8	12.8	8.8	10	10.5	11.5	12.5	13.3
HF 3 H	10.3	12.2	13.8	14.6	15.9	17.2	10.1	11.9	13.5	14.3	15.6	16.9	11.6	13.2	13.9	15.2	16.5	17.6
HF 5 ½ H	18.3	21.7	24.6	25.9	28.4	30.7	17.9	21.2	24	25.4	27.8	30	20.7	23.5	24.8	27.1	29.3	31.3
HF 8 H	25.5	30.1	34.2	36	39.5	42.7	24.9	29.5	33.5	35.3	38.7	41.8	28.8	32.7	34.5	37.7	40.8	43.6
HF 10 H	32.2	38.2	43.3	45.6	50	54	31.6	37.3	42.4	44.7	48.9	52.9	36.5	41.4	43.6	47.8	51.6	55.2
HF 15 H	47.8	56.6	64.2	67.7	74.1	80.1	46.8	55.4	62.8	66.2	72.6	78.4	54.1	61.4	64.7	70.9	76.6	81.8
HF 20 H	62.4	73.8	83.7	88.2	96.7	104.4	61	72.2	81.9	86.4	94.6	102.2	70.5	80	84.3	92.4	99.8	106.7

R404A

Valve Series	R404A Capacity: kW - Evaporating Temperature: °C																	
	+10						0						-10					
	Pressure Drop Across Valve: kPa																	
R404A	300	400	600	700	800	1000	400	600	700	800	1000	1100	400	600	700	800	1000	1100
HF 1/8 S	0.57	0.68	0.77	0.81	0.89	0.96	0.55	0.65	0.73	0.77	0.85	0.92	0.52	0.61	0.7	0.73	0.8	0.87
HF 1/4 S	1.11	1.32	1.49	1.58	1.73	1.86	1.06	1.26	1.43	1.5	1.65	1.78	1.01	1.19	1.35	1.43	1.56	1.69
HF 1/2 S	2	2.3	2.6	2.8	3.1	3.3	1.9	2.2	2.5	2.7	2.9	3.2	1.8	2.1	2.4	2.5	2.8	3
HF 1 S	3	3.5	4	4.2	4.6	5	2.9	3.4	3.8	4	4.4	4.8	2.7	3.2	3.6	3.8	4.2	4.5
HF 1 1/4 S	4	4.8	5.4	5.7	6.3	6.8	3.9	4.6	5.2	5.5	6	6.5	3.7	4.3	4.9	5.2	5.7	6.1
HF 1 1/2 S	5.2	6.1	6.9	7.3	8	8.6	4.9	5.8	6.6	7	7.6	8.2	4.7	5.5	6.3	6.6	7.2	7.8
HF 2 S	6.8	8.1	9.1	10.6	11.4	6.5	7.7	8.7	9.2	10.1	10.9	10.9	6.2	7.3	8.3	8.7	9.6	10.3
HF 3 1/2 S	12.1	14.3	16.3	17.1	18.8	20.3	11.6	13.7	15.5	16.4	17.9	19.4	11	13	14.7	15.5	17	18.4
HF 5 S	16.9	20	22.7	23.9	26.2	28.3	16.1	19.1	21.6	22.8	25	27	15.3	18.1	20.5	21.7	23.7	25.6
HF 7 S	21.3	25.3	28.6	30.2	33.1	35.7	20.4	24.1	27.4	28.8	31.6	34.1	19.3	22.9	26	27.4	30	32.4
HF 10 S	31.7	37.5	42.5	44.8	49.1	53.1	30.3	35.8	40.6	42.8	46.9	50.7	28.7	34	38.5	40.6	44.5	48.1

Valve Series	R404A Capacity: kW - Evaporating Temperature: °C																	
	-20						-30						-40					
	Pressure Drop Across Valve: kPa																	
R404A	600	700	800	1000	1100	1200	600	700	800	1000	1100	1200	600	700	800	1000	1100	1200
HF 1/8 S	0.52	0.59	0.62	0.68	0.73	0.78	0.41	0.43	0.47	0.51	0.55	0.56	0.28	0.3	0.32	0.35	0.37	0.38
HF 1/4 S	1.01	1.14	1.2	1.32	1.42	1.52	0.8	0.84	0.92	1	1.07	1.1	0.54	0.57	0.63	0.68	0.73	0.75
HF 1/2 S	1.8	2	2.1	2.3	2.5	2.7	1.4	1.5	1.6	1.8	1.9	1.9	1	1	1.1	1.2	1.3	1.3
HF 1 S	2.7	3.1	3.2	3.5	3.8	4.1	2.1	2.3	2.5	2.7	2.9	2.9	1.5	1.5	1.7	1.8	1.9	2
HF 1 1/4 S	3.7	4.1	4.4	4.8	5.2	5.5	2.9	3.1	3.3	3.6	3.9	4	2	2.1	2.3	2.5	2.6	2.7
HF 1 1/2 S	4.7	5.3	5.6	6.1	6.6	7	3.7	3.9	4.3	4.6	4.9	5.1	2.5	2.7	2.9	3.1	3.4	3.5
HF 2 S	6.2	7	7.4	8.1	8.7	9.3	4.9	5.1	5.6	6.1	6.5	6.7	3.3	3.5	3.8	4.2	4.4	4.6
HF 3 1/2 S	11	12.4	13.1	14.4	15.5	16.6	8.7	9.2	10	10.9	11.3	12	5.9	6.2	6.8	7.4	7.9	8.1
HF 5 S	15.3	17.3	18.3	20	21.6	23.1	12.1	12.8	14	15.1	16.2	16.7	8.3	8.7	9.5	10.3	11	11.3
HF 7 S	19.3	21.9	23.1	25.3	27.3	29.2	15.3	16.1	17.7	19.1	20.4	21.1	10.4	11	12	13	13.9	14.3
HF 10 S	28.7	32.5	34.3	37.5	40.6	43.3	22.7	24	26.3	28.4	30.3	31.3	15.5	16.3	17.9	19.3	20.6	21.3

Liquid Temperature Correction Factor

Refrigerant	Liquid Temperature °C																
	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
R22	0.75	0.8	0.85	0.9	0.95	1	1.05	1.1	1.14	1.19	1.24	1.29	1.33	1.38	1.42	1.47	1.51
R134a	0.71	0.77	0.83	0.89	0.94	1	1.06	1.11	1.17	1.23	1.28	1.34	1.39	1.45	1.5	1.56	1.61
R404A	0.5	0.61	0.71	0.81	0.91	1	1.09	1.18	1.26	1.34	1.43	1.51	1.59	1.66	1.74	1.82	1.89

Valve capacities are based on 35°C vapour free refrigerant liquid entering the valve. To select a valve for other liquid temperatures determine the corrected capacity requirement by dividing the evaporator load by the liquid correction factor.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

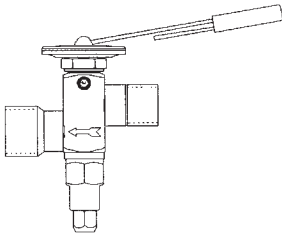


Your best Solution...

Thermostatic Expansion Valves

Flow Controls (Alco) TRAE Series

TRAE+ Series thermostatic expansion valves are designed for large capacity refrigeration, air conditioning and Bi-Flow applications.



Features

- Double balanced port design improving operating and stability under low load conditions
- Solid copper solder straight thru connections
- External superheat adjustment
- Stainless steel Power element
- All TRAE (+) have removeable power element and cage assemblies
- Maximum working pressure 3100kPa

Cat. No.	Model No.	Description	Refrigerant	Connections	
				Inlet	Outlet
105014	TRAE+10HC/062718	TX Valve	R22	5/8"	7/8"
105015	TRAE+15HC/062721			7/8"	1 7/8"
105016	TRAE+20HC/062724			7/8"	1 1/8"
105017	TRAE+30HC/062727			1 1/8"	1 3/8"
105018	TRAE+40HC/062733			7/8"	1 1/8"
105023	TRAE+12SC/064196		R404A	1 1/8"	1 1/8"
105024	TRAE+14SC/064407			7/8"	1 1/8"
105025	TRAE+20SC/063927			7/8"	1 1/8"
105026	TRAE+30SC/064435			7/8"	1 1/8"

Nomenclature - Example: TRAE+30HC 10FT 7/8 x 1 1/8 ODF S/T

TRA	E	+	30	H
Valve Series	Equaliser E = External 1/4 SAE	Replaceable Components Cage & Power Assembly	Capacity Nominal Rating in Tons.	Refrigerant Code F=R12 H=R22 M=R134a N=R407C R=R502 S=R404C

C	10 FT	7/8 x 1 1/8	ODF	S/T
Charge Code C=Medium Temp CA=Heat Pump W(MOP)= Press. Limiting Z=Low Temp	Capillary Tube Length 10FT (Standard)	Inlet x Outlet Connection Sizes 1 0 5/8 7/8 7/8 1 1/8 1 1/8 1 3/8	Connection Type ODF=Solder (only)	Configuration S/T=Straight Thru (only)

TRAE+ Series - Nominal Capacity Table in kWatts

Air Conditioning

MODEL	R22
TRAE+10	51.8
TRAE+15	75.6
TRAE+20	84.4
TRAE+30	128
TRAE+40	175.9

Nominal Capacities based on: R22 @ 46°C condensing temperature, 7°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

Refrigeration

MODEL	R404A, R507	
	M/T	L/T
TRAE+12	42.4	34.3
TRAE+14	47.4	38.3
TRAE+20	71.8	58.1
TRAE+30	98.7	79.8

Nominal Capacities based on: M/T at 46°C condensing temperature, -4°C evaporating temperature and 1 K liquid subcooling at the inlet of the expansion valve. L/T at 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

Superheat Adjustment

One complete 360° turn changes the superheat approximately 1.7 to 2.2K regardless of the refrigerant type. There are 10 turns on the adjustment stem. Do not force the adjustment past the stop, as attempted further turning will damage the valve.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Thermostatic Expansion Valves

Flow Controls (Alco) TRAE Series Capacity Tables: kW

R22 Balanced Ported Valves (kWatts)

Valve Type	Nom. Rating	Evaporating Temperature: °C																	
		+10						0						-10					
		Pressure Drop Across Valve: kPa																	
		400	600	700	800	1000	1100	400	600	700	800	1000	1100	400	600	700	800	1000	1100
TRAE+	10	32.82	40.19	43.41	46.41	51.89	54.42	32.44	39.73	42.91	45.88	51.29	53.79	31.61	38.72	41.82	44.71	49.98	52.42
TRAE+	15	47.86	58.62	63.31	67.69	75.67	79.37	47.30	57.93	62.57	66.89	74.79	78.44	46.09	56.45	60.97	65.18	72.88	76.43
TRAE+	20	53.42	65.42	70.67	75.55	84.46	88.58	52.78	64.65	69.83	74.65	83.46	87.53	51.44	63.00	68.04	72.74	81.33	85.30
TRAE+	30	80.96	99.16	107.10	114.49	128.01	134.26	80.01	98.00	105.85	113.16	126.51	132.69	77.95	95.47	103.12	110.24	123.25	129.27
TRAE+	40	111.26	136.27	147.19	157.35	175.92	184.51	109.98	134.70	145.50	155.54	173.90	182.39	107.16	131.24	141.75	151.54	169.43	177.70
TRAE+	50	150.20	183.96	198.70	212.42	237.49	249.08	148.46	181.82	196.39	209.39	234.73	246.19	144.68	177.20	191.39	204.61	228.76	239.92
TRAE+	60	163.83	200.65	216.73	231.69	259.04	271.68	161.95	198.95	214.24	229.03	250.06	268.56	157.81	193.28	208.77	223.18	249.52	261.70
TRAE+	70	195.02	238.85	257.99	275.80	308.35	323.40	192.74	236.06	254.97	272.58	304.75	319.62	187.83	230.05	248.48	265.64	296.99	311.48
Valve Type	Nom. Rating	Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		400	600	700	800	1000	1100	500	700	800	1000	1100	1200	600	700	800	1000	1100	1200
TRAE+	10	28.67	35.12	37.93	40.55	45.34	47.55	22.90	24.74	26.45	29.57	31.01	32.39	15.08	16.29	17.41	19.47	20.42	21.33
TRAE+	15	41.77	51.16	55.26	59.07	66.05	69.27	33.35	36.02	38.51	43.05	45.15	47.16	21.98	23.74	25.38	28.38	29.77	31.09
TRAE+	20	46.66	57.14	61.72	65.98	73.77	77.37	37.24	40.22	43.00	48.08	50.42	52.67	24.53	26.50	28.33	31.67	33.22	34.69
TRAE+	30	70.69	86.58	93.52	99.98	111.78	117.23	56.43	60.95	65.16	72.85	76.40	79.80	37.17	40.15	42.92	47.99	50.33	52.57
TRAE+	40	97.17	119.01	158.55	137.42	153.64	161.14	77.60	83.81	89.60	100.18	105.07	109.74	51.08	55.18	58.98	65.95	69.17	72.24
TRAE+	50	131.19	160.68	173.55	185.53	207.43	217.56	104.75	113.14	120.95	135.23	141.83	148.14	68.96	74.48	79.63	89.03	93.37	97.52
TRAE+	60	143.09	175.24	189.29	202.36	226.24	237.28	114.24	123.39	131.91	147.48	154.68	161.55	75.23	81.25	86.86	97.12	101.86	106.38
TRAE+	70	170.31	208.59	225.59	240.85	269.28	282.43	135.97	146.87	157.01	175.54	184.11	192.29	89.53	96.70	103.38	115.58	121.22	126.61

R404A/R507 Balanced Ported Valves (kWatts)

Valve Type	Nom. Rating	Evaporating Temperature: °C																	
		+10						0						-10					
		Pressure Drop Across Valve: kPa																	
		400	600	700	800	1000	1100	400	600	700	800	1000	1100	400	600	700	800	1000	1100
TRAE+	9	24.04	29.44	31.80	33.99	38.01	39.86	23.47	28.75	31.05	33.19	37.11	38.92	22.30	27.31	29.50	31.54	35.26	36.98
TRAE+	13	35.05	42.92	46.36	49.56	55.41	58.12	34.23	41.93	45.28	48.41	54.13	56.77	32.53	39.84	43.04	46.01	51.44	53.95
TRAE+	14	39.12	47.91	51.75	55.32	61.85	64.87	38.20	46.78	50.53	54.02	60.39	63.34	36.29	44.44	48.00	51.31	57.37	60.17
TRAE+	22	59.30	72.62	78.44	83.86	93.75	98.33	57.91	70.93	76.61	81.90	91.57	96.04	55.01	67.38	72.77	77.80	86.98	91.23
TRAE+	30	81.49	99.81	107.80	115.25	128.85	135.14	79.61	97.51	105.32	112.59	125.88	132.03	75.61	92.61	100.03	106.93	119.56	125.39
TRAE+	40	110.02	134.75	145.55	155.60	173.96	182.45	107.47	131.63	142.18	151.99	169.93	178.23	102.09	125.04	135.06	144.38	161.42	169.30
TRAE+	45	120.01	146.98	158.75	169.71	189.75	199.01	117.21	143.55	155.05	165.76	185.32	194.37	111.33	136.35	147.28	157.45	176.03	184.62
TRAE+	50	142.80	174.90	188.91	201.95	225.79	236.81	139.51	170.87	184.56	197.30	220.59	231.35	132.54	162.32	175.33	187.44	209.56	219.79

Valve Type	Nom. Rating	Evaporating Temperature: °C																	
		-20						-30						-40					
		Pressure Drop Across Valve: kPa																	
		400	600	700	800	1000	1100	500	700	800	1000	1100	1200	600	700	800	1000	1100	1200
TRAE+	9	19.89	22.97	25.68	28.72	31.46	33.98	15.61	16.86	18.03	20.15	21.14	22.08	10.20	11.01	11.77	13.16	13.80	14.42
TRAE+	13	29.03	33.52	37.47	41.90	45.90	49.57	22.76	24.59	26.28	29.39	30.82	32.19	14.87	16.06	17.17	19.19	20.13	21.03
TRAE+	14	32.39	37.40	41.82	46.75	51.21	55.32	25.42	27.45	29.35	32.81	34.42	35.95	16.60	17.93	19.17	21.43	22.48	23.48
TRAE+	22	49.10	56.70	63.39	70.87	77.63	83.82	38.52	41.60	44.47	49.72	52.15	54.47	25.17	27.19	29.06	32.49	34.08	35.59
TRAE+	30	67.47	77.91	87.11	97.39	106.68	115.23	52.92	57.16	61.11	68.32	71.66	74.84	34.59	37.36	39.94	44.65	46.83	48.91
TRAE+	40	91.08	105.17	117.59	131.47	144.02	155.56	71.47	77.20	82.53	92.27	96.77	101.08	46.69	50.43	53.92	60.28	63.22	66.03
TRAE+	45	99.37	114.74	128.28	143.43	157.11	169.70	77.95	84.20	90.01	100.63	105.55	110.24	50.94	55.02	58.82	65.76	68.97	72.04
TRAE+	50	118.27	136.57	152.69	170.71	187.00	201.99	92.75	100.18	107.10	119.74	125.58	131.17	60.64	65.50	70.02	78.29	82.11	85.76

Electronic Expansion Valves

Flow Controls (Alco) Electronic Expansion Valve

The electronic control valves EX5, EX6, EX7 and EX8 from Flow Controls (Alco) are optimised for control of liquid or gaseous mass flow in refrigeration systems. The stepper motor drive, which produces exact valve opening, is energised directly from the electrical power and therefore operates independent from differential pressure.

Application:

The EX Series electronic Control Valve can be used in different control tasks, Expansion valve for superheat control, suction pressure control for capacity control, liquid injection for desuperheating of compressor, condensing pressure control and hot gas bypass control to compensate excess compressor capacity and to ensure evaporating pressure does not go below a setpoint. Ideal mounting position of control valves is with motor downward.

Reliability

Valve seat and slider are made out of solid ceramic. Positive shut off function eliminate the need for an additional solenoid valve. The special form of the valve slide provides for proper floating through the valve and highly linear capacity characteristic between 10% and 100% of maximal capacity. Recommend valve be mounted with motor facing downward to allow refrigerant to cool motor.

Features

- Fully hermetic design
- Stepper motor driven
- Short opening and closing time
- Positive shut-off function to eliminate use of additional solenoid valve
- High linear flow capacity
- Wide capacity range
- Ceramic slide and port for highly accurate flow and minimal wear
- Compatibility for all CFC's, HCFCs, HFCs, mineral and POE lubricants
- Maximum working pressure 3500kPa

Cat No.	Model No.	Inlet Conn: Size	Outlet Conn: Size	*Maximum Nominal Capacity: kW						
				R134a	R22		R404A		R410A	
				M/T	A/C	M/T	M/T	L/T	A/C	M/T
107000	EX5-U21	5/8 ODF	7/8 ODF	37	48	51	33	33	56	59
107001	EX6-U21	7/8 ODF	1 1/8 ODF	89	115	122	80	80	134	143
107002	EX7-U21	1 3/8 ODF	1 3/8 ODF	243	316	336	219	220	369	395
107003	EX8-U21	1 3/8 ODF	1 3/8 ODF	649	842	897	585	585	985	1053

Nominal Capacities based on:

M/T at 46°C condensing temperature, -4°C evaporating temperature and 1 K liquid subcooling at the inlet of the expansion valve. L/T at 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve. A/C at 46°C condensing temperature, 7°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve. With a 2.11 bar pressure drop through the liquid line.

Accessories

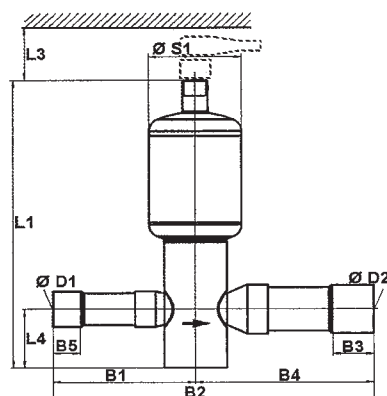
Cat No.	Part No.	Description
107005	EX5 N30	3 Metre lead to suit EX5, EX6 Valves

*Note the EX5,6 requires a lead from the valve to a controller the EX7,8 has a din plug supplied.

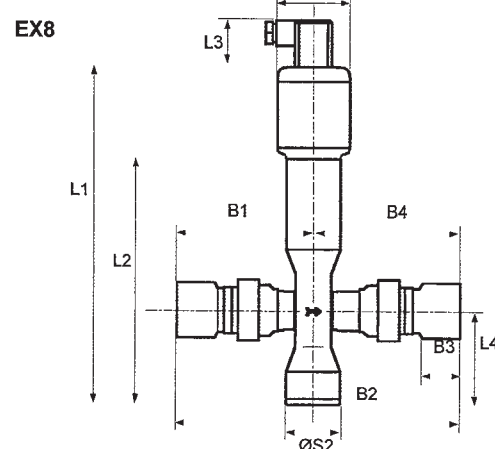
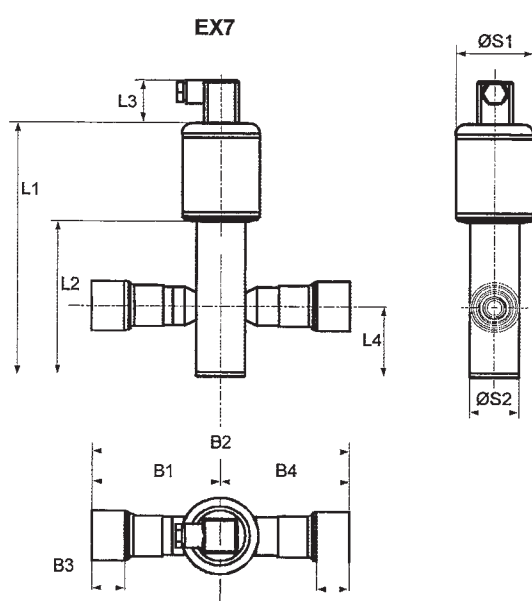
All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Electronic Expansion Valves

Dimensions:mm



Dimension	EX5	EX6
L1	149	149
L3	35	35
L4	30	30
B1	68	81
B2	153	170
B3	19	23
B4	85	89
B5	13	19
Ø D1 (ODF)	5/8	7/8
Ø D2 (ODF)	7/8	1 1/8
Ø S1	44.5	44.5



	EX7	EX8
B1	88	117
B2	182	236
B3	23	25
B4	91	119

	EX7	EX8
Ø S2	38	44
L1	202	280
L2	123	205
L3	35	35
L4	56	78

EX Valve Control Configuration:

Please consult your local Actrol Engineer on the correct control configuration and list of available components required to suit your application.

Note: Valve must be mounted with stepper motor and lead at bottom.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Electronic Expansion Valves

Maximum capacity selction charts for EX5, 6 series

The following tables provide the capacity of valves at different conditions considering 1.5 bar pressure drop through liquid line:

Condensing temperature °C	Maximum capacity kW R134a Evaporating temperature °C													Valve Type
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	38	39	39	39	39	38	38	37	36	35				EX5
	92	93	94	93	93	92	90	88	87	84				EX6
55	38	38	39	39	39	39	38	38	37	36				EX5
	90	92	93	93	93	93	92	90	89	87				EX6
50	36	37	38	38	39	38	38	38	37	37				EX5
	87	89	91	92	92	92	92	91	89	88				EX6
45	34	35	36	37	38	38	38	37	37	37				EX5
	81	85	88	89	90	91	91	90	89	88				EX6
40	31	33	34	36	36	37	37	37	37	36				EX5
	73	79	83	85	87	88	88	88	88	87				EX6
35	26	29	32	33	34	35	35	36	36	35				EX5
	63	70	76	80	82	84	85	85	85	85				EX6
30	20	25	58	30	32	33	34	34	34	34				EX5
	48	60	67	72	76	79	81	82	82	82				EX6
25	10	18	23	26	28	30	31	32	32	32				EX5
	23	44	55	63	68	72	75	76	78	78				EX6
20		5	16	21	24	27	28	29	30	30				EX5
		12	38	50	58	64	67	70	72	73				EX6
15				13	19	22	24	26	27	28				EX5
				32	45	53	58	62	65	67				EX6
10							25	27	28	29				EX5
							61	65	68	70				EX6

Condensing temperature °C	R22				Maximum capacity kW Evaporating temperature °C								R22				Valve Type
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45				
60	52	53	54	54	55	55	55	55	54	54	53	52	51	EX5			
	124	127	129	131	131	132	132	131	120	129	127	125	123	EX6			
55	50	52	53	54	54	55	55	55	54	54	53	53	52	EX5			
	120	124	127	129	130	131	131	131	131	120	128	127	125	EX6			
50	48	50	51	52	53	54	54	54	54	54	53	53	52	EX5			
	115	119	123	126	128	129	130	130	130	129	128	127	125	EX6			
45	45	47	49	51	52	53	53	53	53	53	53	53	52	EX5			
	107	113	118	122	124	126	128	128	128	128	127	126	125	EX6			
40	41	44	46	48	50	51	52	52	52	52	52	52	51	EX5			
	98	106	111	116	119	122	124	125	125	126	125	124	123	EX6			
35	36	40	43	45	47	49	50	50	51	51	51	51	50	EX5			
	86	96	103	109	113	117	119	121	122	122	122	122	121	EX6			
30	29	35	39	42	44	46	47	48	49	49	49	49	49	EX5			
	70	83	93	100	106	110	113	116	117	118	118	118	118	EX6			
25	20	28	33	37	40	43	44	46	46	47	47	47	47	EX5			
	47	67	80	89	97	102	106	109	111	113	114	114	114	EX6			
20		18	26	32	36	38	41	42	44	44	45	45	45	EX5			
		42	63	76	85	92	98	102	105	107	108	109	109	EX6			
15				24	30	35	37	39	40	42	42	43	43	EX5			
				58	71	81	88	93	97	100	102	103	103	EX6			
10							38	40	42	43	44	45	45	EX5			
							91	97	101	104	106	107	108	EX6			

Electronic Expansion Valves

Maximum capacity selction charts for EX5, 6 series

The following tables provide the capacity of valves at different conditions considering 1.5 bar pressure drop through liquid line:

Condensing temperature °C	Maximum capacity kW Evaporating temperature °C													Valve Type
	R404A/R507									R404A/R507				
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	34	34	35	34	34	34	33	33	32	31	31	30	29	EX5
	81	82	83	83	82	81	79	78	77	75	74	73	70	EX6
55	33	34	35	35	35	34	34	33	33	33	32	32	31	EX5
	80	82	83	84	83	83	82	80	79	78	77	76	74	EX6
50	33	34	35	35	35	34	33	33	33	33	32	32	31	EX5
	80	82	83	84	83	83	82	80	79	78	77	76	74	EX6
45	31	33	34	34	35	35	35	35	34	34	34	33	33	EX5
	75	79	81	83	83	84	83	83	82	82	81	80	78	EX6
40	29	31	33	34	34	34	35	35	34	34	34	34	33	EX5
	70	75	78	81	82	83	83	83	83	82	82	81	80	EX6
35	21	31	33	35	36	37	37	37	37	38	38	37	37	EX5
	68	75	80	84	86	88	89	90	90	90	90	90	88	EX6
30	22	26	29	30	32	33	33	34	34	34	34	34	33	EX5
	54	62	68	73	76	78	79	80	81	81	82	81	80	EX6
25	16	22	25	28	30	31	32	32	33	33	33	33	33	EX5
	39	52	61	68	71	74	76	78	79	80	80	80	79	EX6
20		15	21	24	27	29	30	31	32	32	32	33	32	EX5
		37	50	59	64	69	72	74	76	77	78	78	78	EX6
15				20	23	26	28	29	30	31	31	31	31	EX5
				47	56	62	66	69	71	73	75	75	75	EX6
10							24	26	28	29	29	30	30	EX5
							59	63	66	69	70	72	72	EX6

Condensing temperature °C	Maximum capacity kW Evaporating temperature °C													Valve Type
	R410A									R410A				
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	50	51	52	52	53	53	52	52	51	51	50	49	48	EX5
	120	123	125	126	126	126	126	125	124	122	120	117	115	EX6
55	52	54	55	56	57	57	57	57	56	56	55	54	53	EX5
	126	130	133	135	136	136	136	136	135	134	132	130	127	EX6
50	53	55	57	58	59	59	60	60	59	59	58	58	57	EX5
	127	132	136	139	141	142	143	143	142	141	140	138	136	EX6
45	52	55	57	58	60	60	61	61	61	61	61	60	59	EX5
	124	131	136	140	143	145	146	147	147	146	145	144	142	EX6
40	49	53	56	58	59	60	61	62	62	62	62	61	61	EX5
	118	127	133	138	142	145	147	148	149	149	148	147	146	EX6
35	45	49	53	56	58	59	61	61	62	62	62	62	61	EX5
	109	119	127	135	139	142	145	147	148	149	149	148	147	EX6
30	39	45	49	53	55	58	59	60	61	61	62	61	61	EX5
	93	107	118	128	133	138	142	144	146	147	148	147	147	EX6
25	30	38	44	49	52	55	57	58	59	60	60	61	60	EX5
	71	91	105	117	125	131	136	140	142	144	145	145	145	EX6
20		28	37	43	47	51	53	55	57	58	59	59	59	EX5
		68	89	103	114	122	128	133	137	139	141	141	142	EX6
15				36	42	46	49	52	54	55	56	57	57	EX5
				85	100	111	119	125	129	132	135	136	137	EX6
10							52	55	57	58	59	60	60	EX5
							125	131	136	139	142	143	144	EX6

Electronic Expansion Valves

Maximum capacity selction charts for EX7, 8 series

The following tables provide the capacity of valves at different conditions considering 1.5 bar pressure drop through liquid line:

Condensing temperature °C	Maximum capacity kW Evaporating temperature °C													Valve Type
	R134a									R134a				
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
60	254	256	257	257	255	252	248	243	238	232				EX7
	676	684	686	685	680	671	662	649	635	619				EX8
55	248	253	256	257	256	255	252	248	243	238				EX7
	661	675	682	685	683	679	671	661	649	635				EX8
50	238	245	250	253	254	254	252	249	246	241				EX7
	634	654	667	675	678	677	672	665	655	644				EX8
45	223	233	241	246	248	250	249	247	245	241				EX7
	594	622	642	655	663	666	664	660	653	644				EX8
40	202	216	227	235	239	242	243	243	241	239				EX7
	538	577	606	626	638	646	648	647	644	637				EX8
35	173	194	209	219	226	231	234	235	235	233				EX7
	461	517	556	584	604	617	624	627	626	622				EX8
30	133	164	184	199	210	217	222	224	226	225				EX7
	355	436	492	531	559	579	591	598	602	601				EX8
25	63	121	152	173	188	198	206	210	213	214				EX7
	169	322	406	462	501	529	548	561	568	571				EX8
20		33	105	138	160	175	185	192	197	200				EX7
		89	280	369	426	467	494	513	526	534				EX8
15				87	123	145	160	171	178	183				EX7
				231	327	387	427	455	476	488				EX8
10							168	179	187	192				EX7
							448	477	499	512				EX8

Condensing temperature °C	R22		Maximum capacity kW Evaporating temperature °C											R22	Valve Type
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45		
60	341	349	355	359	362	353	352	351	358	354	350	345	339	EX7	
	908	930	946	958	964	967	966	962	955	945	934	920	905	EX8	
55	330	341	349	355	359	361	362	361	359	356	353	348	343	EX7	
	881	909	930	946	956	962	964	963	958	951	941	929	916	EX8	
50	315	328	339	346	352	356	358	358	357	355	353	349	344	EX7	
	840	876	903	924	938	948	954	955	953	948	940	930	918	EX8	
45	295	312	325	335	342	347	351	352	353	352	350	347	343	EX7	
	787	831	866	892	912	926	935	940	940	938	933	925	915	EX8	
40	269	290	306	319	329	336	341	344	345	345	344	342	339	EX7	
	718	774	817	851	876	895	908	917	920	920	918	912	904	EX8	
35	236	263	283	299	311	321	328	332	335	336	336	335	332	EX7	
	629	701	755	798	831	855	874	886	893	896	896	893	886	EX8	
30	193	228	255	275	291	303	311	318	322	324	325	325	324	EX7	
	514	609	680	734	775	807	831	848	858	865	868	867	863	EX8	
25	129	183	219	246	265	281	292	301	306	310	313	313	313	EX7	
	345	489	584	655	708	748	779	802	817	828	834	836	835	EX8	
20		116	172	208	235	254	269	280	288	294	297	299	300	EX7	
		310	459	556	625	677	717	747	768	783	793	798	799	EX8	
15				159	196	222	241	256	266	274	279	283	284	EX7	
				425	523	592	644	682	710	731	745	754	758	EX8	
10							252	267	277	286	291	295	297	EX7	
							671	711	740	762	777	787	792	EX8	

Electronic Expansion Valves

Maximum capacity selection charts for EX7, 8 series

The following tables provide the capacity of valves at different conditions considering 1.5 bar pressure drop through liquid line:

Condensing temperature °C	R404A				Maximum capacity kW Evaporating temperature °C										R404A	Valve Type
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45			
60	222	226	228	227	225	222	218	215	211	207	204	200	194	EX7		
	592	602	607	606	601	592	582	572	562	553	544	533	516	EX8		
55	220	226	229	230	229	227	224	221	218	215	212	209	203	EX7		
	587	602	611	613	611	605	597	589	581	573	566	556	540	EX8		
50	220	226	229	230	229	227	224	221	218	215	212	209	203	EX7		
	587	602	611	613	611	605	597	589	581	573	566	556	540	EX8		
45	206	216	223	227	229	230	229	228	226	225	223	220	216	EX7		
	549	576	595	606	612	613	611	607	603	599	594	588	575	EX8		
40	193	206	216	222	226	228	228	228	227	227	226	224	219	EX7		
	513	549	574	591	602	607	608	608	606	604	601	596	585	EX8		
35	187	207	221	231	237	242	245	246	247	248	248	246	243	EX7		
	500	551	588	615	633	645	652	656	658	660	660	657	648	EX8		
30	147	171	188	200	209	215	219	221	223	224	224	224	221	EX7		
	393	456	502	534	557	573	583	589	593	596	598	596	589	EX8		
25	108	143	167	184	195	204	210	214	217	219	220	221	219	EX7		
	289	382	445	489	521	543	559	570	578	583	587	588	583	EX8		
20		102	138	161	177	189	197	204	208	211	214	215	214	EX7		
		272	367	429	473	504	526	543	554	564	570	573	570	EX8		
15				130	154	170	182	190	196	201	205	207	207	EX7		
				347	409	453	484	507	524	537	547	552	552	EX8		
10							161	173	182	189	194	197	198	EX7		
							430	461	485	503	516	525	528	EX8		

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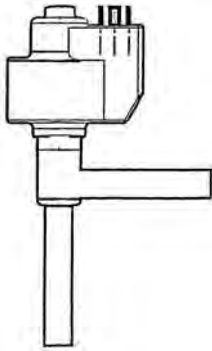
Electronic Expansion Valves

Carel E2V Electronic Expansion Valve

The next generation design proportional modulation E²V Electronic Expansion Valve has the latest energy and precision design features on the market today, thanks to its unique 14mm nozzle and 500 steps stepper motor.

Features

- Calibrated springs with ball bearings internal design
- Laser welded construction
- Optimum gasket seal for positive valve shut-off
- Bi-directional flow (for reverse-cycle applications)
- Precision flow control (lowers energy costs)
- The Carel driver is compatible with Alco EX5, EX6, EX7 and EX8 Valves



Cat No.	Part No.	Description
107100	E2VASF0009	1/2" Electronic Expansion Valve
107101	E2VASF0011	
107102	E2VASF0014	
107103	E2VASF0018	
107104	E2VASF0024	
107105	E2VASM0030	3/8" Electronic Expansion Valve
107106	E2VASM0035	

Required Accessories		
107107	E2VCAB0300	E2V Connector Cable 3m
107108	EVD0000420	Driver for E2V (RS485)
107109	0907930AXX	EVD Net Filter
	EVDKEY0001	Programming key for EVD-4

E2V - Cooling Capacity kW @ 80%

Part No	Air Conditioning				MT Refrigeration				LT Refrigeration			
	R22	R134a	R404a	R410a	R22	R134a	R404a	R410a	R22	R134a	R404a	R410a
E2V-09	3.4	2.7	2.2	3.9	3.4	2.6	2.3	4.1	3.4	-	2.1	4.1
E2V-11	4.9	3.8	3.2	5.7	4.9	3.7	3.3	5.9	4.8	-	3.0	5.8
E2V-14	7.6	6.0	4.9	8.8	7.6	5.7	5.1	9.2	7.6	-	4.7	9.1
E2V-18	12.4	9.7	8.0	14.4	12.3	9.3	8.3	15.0	12.3	-	7.6	14.8
E2V-24	21.6	16.9	14.0	25.0	21.4	16.3	14.5	26.1	21.4	-	13.2	25.8
E2V-30	33.2	26.0	21.4	38.5	32.9	25.0	22.2	40.0	32.9	-	20.3	39.6
E2V-35	44.7	35.0	28.9	51.8	44.4	33.6	30.0	54.0	44.3	-	27.4	53.4

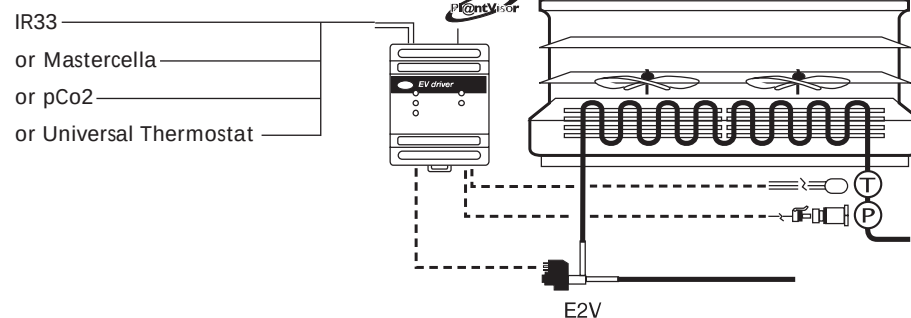
Nominal Capacities based on:

A/C at 50°C condensing temperature, 5°C evaporating temperature

M/T at 40°C condensing temperature, -15°C evaporating temperature

L/T at 40°C condensing temperature, -40°C evaporating temperature

Inputs



Refer to Page 85 for selection of Pressure Transmitter and NTC Temperature Probes

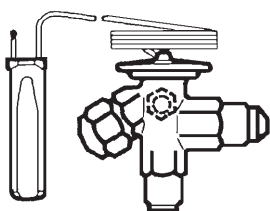
Thermostatic Expansion Valves

Danfoss Type T2, TE2

with Interchangeable Orifice Assembly

For R22, R134a, R404A, R507

1



T2 / TE2

Thermostatic expansion valves regulate the injection of refrigerant liquid into evaporators. Injection is controlled by the refrigerant superheat.

Therefore the valves are especially suitable for liquid injection in 'dry' evaporators where the superheat at the evaporator outlet is proportional to the evaporator load.

The T2/TE2 valve comprises of a power element – as an integral part of the valve body and an orifice.

Features

- Large evaporating range: -60 to 10°C.
 - Equally applicable to freezing, refrigeration and air conditioning plant.
- Interchangeable orifice assembly.
 - Easier stocking.
 - Easy capacity matching.
 - Better service.
- Rated capacities from 0.5 to 22.3 kW (for R22).
- Can be supplied with MOP (Maximum Operating Pressure).
 - Protects the compressor motor against excessive evaporating pressure.
- Patented double contact bulb.
 - Reliable and fast installation
 - Good heat transfer from pipe to bulb.
- Flare or solder connections.

Technical Data

- Maximum temperature - bulb, when valve is installed: 100°C.
- Complete, valve not installed: 60°C.
- Minimum temperature: -60°C.
- Maximum test pressure T2, TE2: 3600 kPa.
- Permissible working pressure T2, TE2: 2800 kPa.
- Capillary tube length T2, TE2: 1.5m.

MOP Points

Refrigerant	Range N -40 to 10°C	Range NM -40 to -5°C	Range NL -40 to -15°C	Range B -60 to -25°C
	MOP - point in evaporating temperature and evaporating pressure			
	15°C	0°C	-10°C	-20°C
R22	100psig / 690 kPa	60 psig / 414 kPa	35 psig / 240 kPa	20 psig / 138 kPa
R134a	55 psig / 380 kPa	30 psig / 207 kPa	15 psig / 103 kPa	
R404A, R507	120 psig / 830 kPa	75 psig / 517 kPa	50 psig / 345 kPa	30 psig / 207 kPa

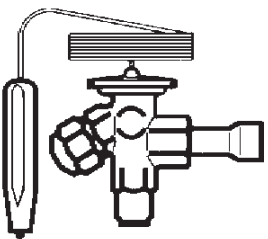
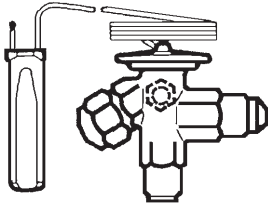
MOP = Maximum Operating Pressure

MOP is the evaporating pressure at which the expansion valve will shut off liquid injection in the evaporator and thus prevent the evaporating pressure from rising. Rising bulb temperature will not open the expansion valve when MOP is reached.

If the superheat factory setting of the expansion valve is changed, the MOP point changes. If the superheat setting increases, the MOP point is reduced and vice versa, if the MOP point increases, the superheat setting is reduced.

Thermostatic Expansion Valves

Danfoss Type T2, TE2 (Less Orifice)



Refrig.	Type	Pressure Equal.	Without M.O.P.		With M.O.P.				Connections
			Range N -40°C to 10°C		Range NM -40°C to -5°C		Range NL -40°C to -15°C		Inlet x Outlet
			Cat. No.	Part No.	Cat. No.	Part No.	Cat. No.	Part No.	
With Flare x Flare Connections									
R22	TX2	Internal	108050	68Z3206		68Z3224		68Z3226	3/8" Flare x 1/2" Flare
R134a	TN2		108046	68Z3346		68Z3393		68Z3369	
R404A, R507	TS2		108054	68Z3400		68Z3406	108085	68Z3408	
R22	TEX2	External 1/4" Flare	108051	68Z3209		68Z3225		68Z3227	
R134a	TEN2		108047	68Z3348		68Z3392		68Z3370	
R404A, R507	TES2		108055	68Z3403		68Z3407	108086	68Z3409	
With Flare x Solder Connections									
R134a	TN2	Internal	108044	68Z3383					3/8" Flare x 1/2" ODF Solder
R404A, R507	TS2		108058	68Z3414				68Z3429	
R22	TEX2	External 1/4" ODF Solder	108057	68Z3284					
R134a	TEN2		108045	68Z3385					
R404A, R507	TES2		108056	68Z3415			108087	68Z3430	

Orifice Assembly (Including Strainer)

Nominal Capacity: kW*									
Orifice No.	0X		00		01		02		
Cat. No.	108020		108027		108021		108022		
Part No.	68-200200		068-200300		068-20100		068-201500		
Temp Range.	M/T	L/T	M/T	L/T	M/T	L/T	M/T	L/T	
R22	0.6	0.4	1.3	0.9	3.1	1.4	4.6	2	
R134a	0.4	0.3	0.7	0.5	1.2	0.7	1.6	1	
R404A, R507	0.4	0.3	0.8	0.6	1.5	1	2.2	1.3	
Orifice No.	0X		00		01		02		
Cat. No.	108020		108027		108021		108022		
Part No.	68-200200		068-200300		068-20100		068-201500		
Temp Range.	M/T	L/T	M/T	L/T	M/T	L/T	M/T	L/T	
R22	8.2	3.5	12.2	5.2	15.5	6.6	18.9	8.1	
R134a	3	1.8	4.3	2.7	5.5	3.4	6.7	4.2	
R404A, R507	3.9	2.4	5.7	3.5	7.3	4.4	8.9	5.4	

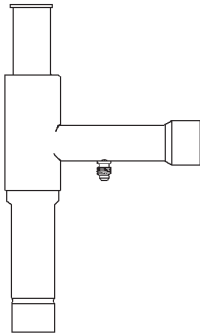
*Nominal Capacity is based on: M/T at 46°C condensing temperature, -4°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve. L/T at 42°C condensing temperature, -23.3°C evaporating temperature and 1K liquid subcooling at the inlet of the expansion valve.

Refrigerant	Orifice No.	Capacity: kW - Evaporating Temperature: °C (Range N: -40°C to 10°C)															
		-40				-20				0				10			
		Pressure Drop Across Valve: kPa															
		400	600	800	1000	400	600	800	1000	400	600	800	1000	400	600	800	1000
R22	0X		0.42	0.45	0.48	0.44	0.5	0.54	0.57	0.48	0.55	0.59	0.63	0.48	0.55	0.6	0.63
	00		0.8	0.86	0.92	0.88	1	1.1	1.1	1	1.2	1.3	1.3	1.1	1.2	1.3	1.4
	01		1.3	1.4	1.4	1.7	1.9	2	2.2	2.4	2.7	3	3.1	2.8	3.2	3.4	3.6
	02		1.7	1.9	2	2.4	2.7	2.9	3.1	3.4	4	4.3	4.6	4	4.7	5.1	5.4
	03		3.1	3.4	3.5	4.2	4.8	5.2	5.5	6.1	7.1	7.8	8.2	7.2	8.3	9.1	9.7
	04		4.6	4.9	5.2	6.2	7.1	7.7	8.2	9.1	10.5	11.5	12.2	10.8	12.5	13.8	14.5
	05		5.8	6.3	6.6	7.9	9	9.8	10.3	11.6	13.3	14.6	15.5	13.6	15.7	17.2	18.3
	06		7.1	7.7	8.1	9.6	11	11.9	12.6	14.2	16.3	17.8	18.9	16.7	19.3	21	22.3
R134a	0X	0.28	0.32	0.33	0.34	0.35	0.39	0.41	0.42	0.42	0.46	0.47	0.49	0.43	0.47	0.5	0.51
	00	0.5	0.54	0.56	0.57	0.62	0.69	0.72	0.73	0.78	0.86	0.89	0.91	0.86	0.93	0.97	0.98
	01	0.65	0.72	0.76	0.77	1	1.11	1.17	1.19	1.55	1.71	1.8	1.83	1.86	2.05	2.15	2.19
	02	0.89	0.98	1.02	1.04	1.39	1.54	1.62	1.65	2.17	2.43	2.58	2.64	2.63	2.96	3.14	3.23
	03	1.6	1.75	1.84	1.86	2.48	2.75	2.9	2.96	3.89	4.36	4.61	4.73	4.71	5.29	5.61	5.77
	04	2.31	2.55	2.68	2.74	3.62	4.02	4.25	4.35	5.72	6.42	6.8	6.97	6.98	7.84	8.32	8.55
	05	2.94	3.24	3.42	3.49	4.6	5.11	5.4	5.53	7.27	8.14	8.62	8.83	8.85	9.93	10.8	10.9
	06	3.59	3.96	4.18	4.28	5.62	6.24	6.6	6.76	8.89	9.95	10.5	10.8	10.8	12.1	12.8	13.2
R404A R507	0X		0.32	0.33	0.33	0.35	0.38	0.4	0.39	0.37	0.41	0.42	0.43	0.35	0.4	0.42	0.43
	00		0.6	0.61	0.62	0.7	0.75	0.77	0.79	0.8	0.87	0.9	0.92	0.82	0.9	0.94	0.96
	01		0.92	0.96	0.97	1.34	1.45	1.5	1.52	1.86	2.04	2.13	2.18	2.1	2.3	2.42	2.48
	02		1.27	1.32	1.33	1.85	2.04	2.14	2.17	2.64	2.95	3.13	3.22	3	3.39	3.61	3.73
	03		2.28	2.36	2.38	3.32	3.66	3.83	3.89	4.72	5.27	5.59	5.75	5.36	6.03	6.43	6.63
	04		3.34	3.47	3.5	4.88	5.4	5.64	5.75	7.05	7.86	8.33	8.58	8.06	9.06	9.66	9.95
	05		4.25	4.41	4.45	6.2	6.86	7.17	7.29	8.92	9.95	10.52	10.83	10.17	11.43	12.16	12.53
	06		5.19	5.39	5.45	7.6	8.39	8.75	8.91	10.93	12.16	12.85	13.21	12.47	13.98	14.86	15.29

Extended capacities based on 4K subcooling ahead of valve.

Crankcase Pressure Regulators

Flow Controls (Alco) Type OPR



Type OPR is mounted in the suction line ahead of the compressor. Its purpose is to protect the compressor motor against overload during start-up after long stand-still periods and after defrost periods (high pressure in evaporator).

Type OPR makes it possible to use a small motor on low temperature plant. A smaller motor will operate with improved efficiency during normal operation since the motor size is better suited to the load. At the same time the improved efficiency means that the motor does not overheat. This is important in the case of suction gas cooled hermetic and semi-hermetic compressors.

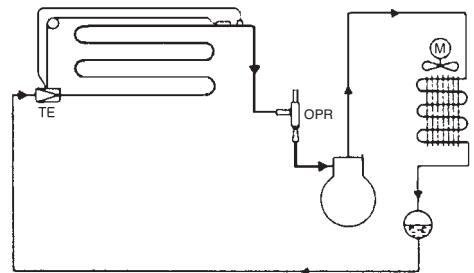
The Type OPR opens on falling pressure on the outlet side, i.e. when the suction pressure ahead of the compressor drops below the set value.

Type OPR regulates only in dependence on the outlet pressure. Pressure variations on the inlet side of the regulator do not affect the degree of opening since the OPR is equipped with an equalisation bellows. This bellows has an effective area corresponding to that of the valve seat.

Features

- A Direct Acting Crankcase Pressure Regulator designed to prevent overloading of the compressor motor
- Limits outlet pressure to a maximum predetermined pressure
- Schraeder Valve on inlet connection
- Strainer supplied in inlet connection
- May be installed in either horizontal or vertical refrigeration line
- Compact design requires minimal space requirements

The OPR Regulator is mounted in the suction line close to the compressor.



Cat. No.	Part No.	Product Code	Connections Inches	Set Point Range kPa (psig)	Max. Operating Press. kPa (psig)
118010	OPR-6	049241	1/2 ODF	0 to 415 (0 to 60)	2760 (400)
118019		047312	5/8 ODF		
118020		047313	7/8 ODF		
118021		047314	1 1/8 ODF		
118022	OPR-10	047315	7/8 ODF		
118023		047316	1 1/8 ODF		
118024		047318	1 3/8 ODF		

Nomenclature - Example: OPR-6 5/8 ODF 0-60 PSIG

OPR	6	5/8	ODF	0-60 psig
Valve Series	Port Size (in 1/8")	Connection size	Connection type SAE or ODF	Adjustment Range

Crankcase Pressure Regulators

Flow Controls (Alco) Type OPR

Refrigerant Capacity Selection Table

Refrigerant	Model	Setting		Nominal Capacity: kW												
		Max. Suction Pressure kPa	Max. Saturation Temperature °C	Evaporating Temperature: °C												
				-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	
R134a	OPR 6	400	16				5.1	5.7	6.4	7.2	8	8.5	8.9	8.8	7	
		300	9				4.8	5.6	6.2	6.8	7.1	7.1	6.4	3.4		
		200	1				4.6	5.2	5.4	5.2	4.2	2.4				
		100	-10				3.4	3	2.1	0.9						
	OPR 10	400	16				10.4	11.6	12.8	14.3	16	17.9	20.5	22.9	15.8	
		300	9				10.4	11.6	12.8	14.3	16	17.9	14.4	7.2		
		200	1				10.4	11.6	12.8	12.4	10.3	5.4				
		100	-10				7.1	6	3.9	1.6						
R22	OPR 6	400	0		5.2	5.9	6.6	7.4	8.7	8.4	7.7	5.8				
		300	-6		5	5.7	6.3	7	7.1	6.3	3.2					
		200	-14		4.7	5	5.1	4.7	2.9							
		100	-25		3.5	3	1.8									
	OPR 10	400	0		10.9	11.8	13	14.7	16.2	18.3	20.5	14.3				
		300	-6		10.9	11.8	13	14.7	16.2	14.9	8.6					
		200	-14		10.9	11.8	13	11	7.6							
		100	-25		8.5	7.8	4.5									
R404A R507	OPR 6	400	-5	3.5	4.1	4.7	5.4	6	6.4	6.3	4.8					
		300	-12	3.3	3.9	4.5	4.9	5	4.4	2.6						
		200	-20	3.1	3.6	3.7	3.4	2.3								
		100	-30	2.4	2.1	1.2										
	OPR 10	400	-5	7.2	8.1	9.4	10.7	12.1	13.6	15.2	11.2					
		300	-12	7.2	8.1	9.4	10.7	12	11.1	6.6						
		200	-20	7.2	8.1	9.4	8	5.8								
		100	-30	5.7	5.2	3.1										

Nominal capacities at 15kPa pressure drop between valve inlet and outlet. For other conditions the required cooling capacity has to be multiplied by correction factor $K_{\Delta p}$.

$$Q_o \times K_{\Delta p} = Q_n$$

Q_o : Required cooling capacity

$K_{\Delta p}$: Correction factor for pressure drop at valve

Q_n : Nominal valve capacity

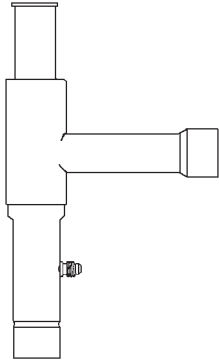
Correction Factor $K_{\Delta p}$							
Pressure Drop across Valve: kPa	35	30	25	20	15	10	5
$K_{\Delta p}$	0.65	0.71	0.77	0.87	1	1.22	1.73

Conversion: kW x 0.284=Tons Tons x 3.517=kW

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Evaporator Pressure Regulators

Flow Controls (Alco) Type IPR



Features

- A direct acting Evaporator Pressure Regulator designed to maintain a predetermined minimum evaporator pressure regardless of load or suction line changes
- Operates from an inlet pressure signal, opening on a rise in pressure above the valve set point and closing at any inlet pressure below the set point
- Available with an option of Adjustment ranges of 0 to 345 kPa (0 to 50 psig) or 200 to 700kPa (30 to 100 psig)
- Supplied with Schraeder Valve on inlet connection
- Strainer supplied in inlet connection as standard
- May be installed in either a horizontal or vertical refrigeration line
- Safe Working Pressure of 2760 kPa (400 psig)
- Compact design permits minimal space requirements

For CFC, HCFC and HFC Refrigerants

Type IPR is mounted in the suction line after the evaporator and is used to:

- Maintain a constant evaporating pressure and thus a constant surface temperature on the evaporator. Regulation is modulating. By throttling in the suction line, the amount of refrigerant gas is matched to the evaporator load.
- Protect against too low an evaporating pressure (e.g. as protection against freezing in a water chiller). The regulator closes when the pressure in the evaporator drops below the set value.

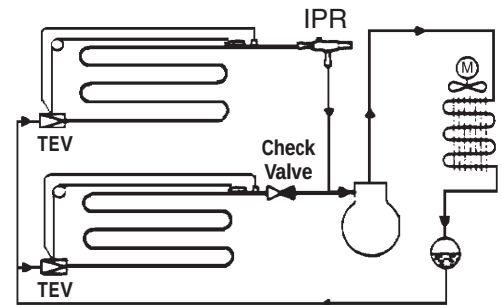
The IPR is highly suited to fulfil these functions since it has a relatively small P band. This means that the regulator is fully open in the cooling down period which is thus short. Moreover, it means that the regulation accuracy is satisfactory when cooling down has taken place, even with large load variations on the evaporator.

The IPR regulates only in dependence on the inlet pressure. Pressure variations on the outlet side of the regulator do not affect the degree of opening since IPR is equipped with an equalisation bellows. This bellows has an effective area corresponding to that of the valve seat.

A 1/4" schrader valve is fitted for pressure testing.

In the diagram, the regulator is mounted in the suction line on a plant having two evaporators. On plants where more than one evaporator is connected to the same compressor, type IPR is mounted in the suction line from the evaporator in which the pressure is to be kept higher than the suction pressure.

The regulator will then throttle the suction gas from the required higher evaporating pressure to the suction pressure.



Cat. No.	Model No.	Product Code	Connection Inches	Range kPa (psi)	Nominal Capacity: kW				Max Operating Pressure kPa (psi)
					R134a	R22	R407C	R507/R404a	
119215	IPR-6	47902	1/2 Fl.	0-345 (0-50)	3.2	4.1	4.7	3.8	2760 (400)
119218		47903	5/8 Fl.	206-690 (30-100)					
119219		49239	1/2 Sol.	0-345 (0-50)					
119220		47300	5/8 Sol.	0-345 (0-50)					
119221		47303		206-690 (30-100)					
119222		47301	7/8 Sol.	0-345 (0-50)					
119223		47304		206-690 (30-100)					
119224		47302	1 1/8 Sol.	0-345 (0-50)					
119225		47305		206-690 (30-100)					
119226	IPR-10	47306	7/8 Sol.	0-345 (0-50)	7.8	10.6	11.3	8.9	
119227		47309		206-690 (30-100)					
119228		47307	1 1/8 Sol.	0-345 (0-50)					
119229		47310		206-690 (30-100)					
119230		47308	1 3/8 Sol.	0-345 (0-50)					
119231		47311		206-690 (30-100)					

Nominal capacities at 4.5°C evaporator temperature and 14 kPa pressure drop across the valve

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Pressure Regulators

Parker A4 Series

Application Guide

The A4 Series of Regulators includes valves which control inlet, outlet or differential pressure. Each regulator is available with an assortment of additional variations which enable one regulator to perform several functions. The most common are listed in this Application Guide.

The A4A type is available with 20 to 100mm ($\frac{3}{4}$ " to 4") ports. The A4W type is available with 125 to 200mm (5" to 8" ports).

The A4AZ valve incorporates the 'modudaptor' to which various modules may be added to provide most of the A4 series variations. The A4AZ may also be used as a basic inlet pressure regulator.

There are many possible combinations of A4 regulator variations. The electric shut-off (S), electric wide-opening (B), and dual pressure (D) variations are often combined with each other. Or they may be used in combination with the compensated (M, P and T), outlet pressure (O) or differential pressure (L) regulators.

Also any type of regulator is available with the main regulator (A4AR) separated from its pilot control valve.

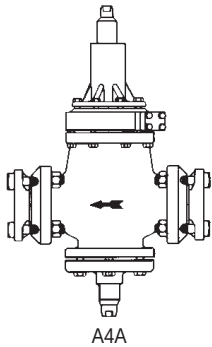
Variation	Type	Function	Operation	Typical Applications ▼
Basic Regulator	A4A A4W A4AZ	Control inlet pressure.	Regulates at preset inlet pressure. Can be field adjusted. Opens on rising inlet pressure.	• Evaporator pressure control • Condenser pressure control • Any inlet pressure control
Electric shut-off	A4AS A4WS	Control inlet pressure or shut off regulator.	Regulates when electrically energised; closed when not energised.	• Open for temperature control • Closed for defrosting
Electric wide opening	A4AB A4WB	Control inlet pressure or wide open regulator.	Regulates when not electrically energised; wide open when energised.	• Wide open for maximum cooling • Regulating for defrost • Regulating for temperature control
Dual pressure regulator	A4AD A4WD	Dual pressure control.	Regulates at lower pressure when electrically energised; at a higher pressure when not energised.	• Higher pressure for defrost • Higher pressure for temperature control • Internal pressure relief
Reseating relief regulator	A4AK	Reseating relief regulator.	Opens wide above set point. Repeatedly reseats after operation.	• Defrost relief • Non-atmospheric relief • High to low relief
Outlet pressure regulator	A4AO A4WOE	Control outlet pressure.	Regulates at preset outlet pressure. Can be field adjusted. Opens on a drop in outlet pressure.	• Crankcase pressure regulation • Hot Gas bypass; booster loading • Receiver pressure control
Differential pressure regulator	A4AL	Control pressure difference across regulator.	Regulates pressure difference at or below a pre-set amount.	• Liquid pump relief regulator • Reduce liquid or vapour line pressure
Electrically compensated	A4AM A4WM	Motor changes pressure set-point.	Potentiometer or solid state type thermostat readjusts set-point to match evaporator temperature to a varying load.	• Precise control of process cooling • Liquid chillers • For load change compensation
Pneumatically compensated	A4AP A4WP A4A3P A4W3P	Air pressure changes set-point (1:1 ratio). Also available A4A3P for 3:1 ratio.	Pneumatic thermostat readjusts set-point to match evaporator temperature to a varying load.	• Precise control of process cooling • Liquid chillers • For load change compensation
Temperature operated	A4AT A4WT A4AOT A4WOET	Temperature bulb controls regulator opening.	Increase in temperature opens regulator; decrease in temperature closes regulator. Also reverse acting with 'O' variation.	• Process cooling systems • Liquid chillers • Systems with load change • Heat reclaim
Externally equalised	A4AE A4AOE etc.	Control at external pressure sensed remote from valve.	Same as standard regulator except controlled pressure is sensed away from regulator.	• Low pressure drop (A4AE) • Hot gas bypass (A4AOE)
Main regulator for remote pilot	A4AR A4WR	Main regulator is controlled by separate pilots.	Main regulator modulates, closes or opens in response to remote pilots.	• Simple inventory of regulator and pilots • Convenient placement of pilots • Unusual pilots or circuits

Refer to the next 3 pages for details of Regulators mentioned above.

Evaporator Pressure Regulators

Parker A4 Adaptomode Series

Component selection guide using A4AZ Basic Regulators



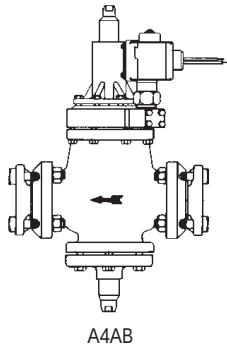
Valve Type	Components Required
A4A	A4AZ Plus Flange Kit
A4AS	A4AZ Plus S6A (Pod No.1) Plus Flange Kit
A4AB	A4AZ Plus S6A (Pod No.2) Plus Flange Kit
A4ABS	A4AZ Plus 2 x S6A (Pod Nos.1 and 2) Plus Flange Kit
A4AD	A4AZ Plus S6A (Pod No.1) Plus A2D2 (Pod No.2) Plus Flange Kit
A4AOE	A4AZ Plus OR50 Plus Flange Kit

LPD (Low Pressure Drop) feature, available on request: When added, will allow operation with 3.4 kPa (0.5 psi) pressure drop which can frequently result in considerable power savings, especially below -20°C.

Strainer: If required refer to Page 37.

A4AZ Basic Regulator (Less Flanges)

Cat. No.	119600	119601	119602	119603	119604	119605	119606	119607
Port mm	20	25	32	40	50	65	75	100
Flange Kits - Socket Weld								
Cat. No.	129544		129547	129549		129551	129552	129553
Size	FK25 3/4"		FK32 1 1/4"	FK50 1 1/2"		FK65 2 1/2"	FK75 3"	FK100 4"
Cat. No.	129545		129548	129550				
Size	FK25 1"		FK32 1 1/2"	FK50 2"				
Cat. No.	129546							
Size	FK25 1 1/4"							



Pilot Valve Modules to suit A4AZ Regulators

Cat. No.	Model	Suits Reg. Sizes mm	Description
121160	S6A	20 to 200	Pilot Solenoid Valve - 240V. 50 Hz. Quick Connect
121161	A2D2	20 to 50	Pilot Regulator
121159	OR50	20 to 50	Outlet Regulator

A4AL Differential Pressure Regulator (Less Flanges)

Cat. No.	119620	119621	119622
Port mm	20	25	32

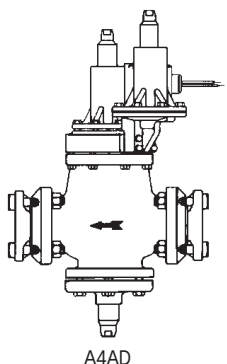
A4AK Reseating Relief Regulator (Less Flanges)

Cat. No.	119610	119611	119612
Port mm	20	25	32

A4AL and A4AK Flange Kits as per A4AZ Regulator Flange Kits, listed above.

Solenoid Coil

Cat. No.	Part No.	Description
121102	205226	240 V 50 Hz Coil (DIN Plug)



Evaporator Pressure Regulators

Parker A4 Adaptomode Series

A4A Suction Capacities: kW

Port Size: mm	20	25	32	40	50	65	75	100
R22	15	20	36	68	100	140	200	270
R717	39	54	94	180	270	380	540	720
Flow Coefficient: Kv	6.2	8.6	15	28.6	42.4	60	86	116

20mm Port Size Regulator is available with Capacity Plugs equivalent to approx. 50% and 17% of above ratings. Capacity based on Liquid Temperature for R22: 40°C, R717: 30°C, Superheat 5°C, Evaporating Temperature for R22: 0°C, R717: -5°C and 14 kPa Pressure drop.

Liquid Capacities Typical Application: A4AL as Pump Relief Regulator

Refrigerant	Port Size mm	4°C Liquid*			
		70 kPa P.D.		140 kPa P.D.	
		kg/min	m³/hr	kg/min	m³/hr
R22	20	43	4.5	63	6.6
	25	63	6.3	86	9.1
	32	110	11	150	16
	40	200	21	290	29
	50	310	32	440	45
	65	440	45	590	64
	75	590	64	860	91
Refrigerant	Port Size mm	4°C Liquid*			
		70 kPa P.D.		140 kPa P.D.	
		kg/min	m³/hr	kg/min	m³/hr
	20	64	6.6	95	9.5
	25	91	9.3	130	13
	32	160	16	230	23
	40	320	32	430	44
	50	450	45	640	65
	65	640	66	910	92
	75	910	93	1300	130

*Correction factors for temperatures between -40°C and 30°C are negligible.

A4AO(E) Hot Gas Bypass Capacities: kW

Port Size mm	R22	R717	
	40°C Liquid and Condensing Temperature	Inlet Pressure kPa (psig)	
		200 (29)	1100 (160)
	80°C Discharge Temperature	Outlet Pressure Range kPa (psig)	
		0 to -60 (0 to 17.7")	300 to -60 (43.5 to 17.7")
20	140	120	380
25	240	160	530
32	400	290	930
40	660	550	1800
50	1200	810	2600
65	1600	1100	3700
75	2200	1600	5300

20mm Port Size Regulator is available with Capacity Plugs - See Note above.

R22 Capacities based on 5°C Evaporating Temperature or less.

Use at other reasonable conditions normally requires no capacity correction.

R717 Capacity based on near saturated inlet gas and 1100 kPa for 30°C condensing, 200 kPa ratings for -7°C condensing.

Oil Capacities: m³/h

Typical Application:

Screw Compressor Oil Feed Control

Port Size mm	For 30° to 50°C Oil (300 SSU Viscosity)		
	Pressure Drop: kPa		
	30	70	300
20	3.9	5.4	12
25	5.4	7.5	17
32	9.3	13	30
40	18	25	57
50	27	36	84
65	39	52	120
75	54	75	170

Based on no foaming of oil through regulator.

Evaporator Pressure Regulators

Parker A4 Adaptomode Series

Hot Gas Defrost Capacities: kW

1

R22						
Hot Gas Supply Valve Port Size and Valve Type	Defrost Relief Valve Port Size and Valve Type	Evaporating Temperature: °C				
		-10	-20	-30	-40	-50
13mm S8F, SV2	20mm 50% A4AK	16	13	11	9.5	8.3
20mm 50% A4AOS	A4AK					
20mm SV2, S4A, A4AOS	20mm A4AK	32	29	25	22	19
25mm SV2, S4A, A4AOS	25mm A4AK	41	36	35	33	27
32mm SV2, S4A, A4AOS	32mm A4AK	81	73	60	56	47
40mm S4A, A4AOS	40mm A4AK	200	160	140	120	97
50mm S4A, A4AOS	50mm A4AK	250	210	180	150	120
R717						
Hot Gas Supply Valve Port Size and Valve Type	Defrost Relief Valve Port Size and Valve Type	Evaporating Temperature: °C				
		-10	-20	-30	-40	-50
13mm S8F, SV2	20mm 50% A4AK	41	33	28	24	19
20mm 50% A4AOS	A4AK					
20mm SV2, S4A, A4AOS	20mm A4AK	78	73	63	56	47
25mm SV2, S4A, A4AOS	25mm A4AK	110	89	91	85	72
32mm SV2, S4A, A4AOS	32mm A4AK	210	190	160	140	120
40mm S4A, A4AOS	40mm A4AK	500	430	390	320	260
50mm S4A, A4AOS	50mm A4AK	640	570	460	390	330

Notes:

Nominal capacities listed are based on: normal defrost times; saturated hot gas inlet to valve no less than 30°C; a 5K difference between evaporator temperature and air entering evaporator; and a 8°C defrost pressure. For other temperature differences, and/or hot gas pressures, correct the evaporator capacity to be defrosted, using the appropriate correction factor BEFORE selecting port size and valve.

Example:

70 kW R717 at -30°C evaporator temperature, 7.5 K temperature difference and 750 kPa minimum inlet pressure.

70 x 1.1 = 77 kW. Select valve group from capacity table for 77 kW and -30°C evaporator temperature; use a 25mm S4A, SV2 or A4AOS hot gas supply valve and a 25mm A4AK defrost relief regulator.

Correction Factors for effective evaporator capacities at alternate conditions

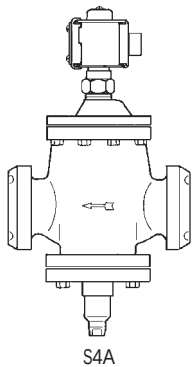
Evaporator Temperature Difference: K	R22				R717			
	Min. Inlet Pressure kPa				Min. Inlet Pressure kPa			
	830	1100	1400	1500	700	830	1000	1200
2.5	2.6	2	1.6	1.6	3.2	2.4	2	1.7
5	1.3	1	.83	.8	1.6	1.2	1	.87
7.5	.9	.64	.57	.55	1.1	.83	.64	.6
10	.68	.47	.43	.42	.83	.63	.47	.45

Note: Above factors based on saturation temperature of 18°C or greater.

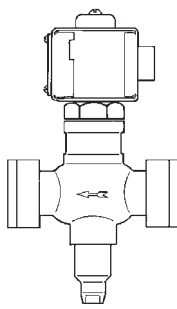
Solenoid Valves

Parker Type S (Less Flanges)

For Ammonia, R22 and other common Refrigerants



S4A



S7A

Features

- S6N:** Direct operated, electrically held open, no minimum pressure drop, compact, heavy duty.
- S8F:** Pilot operated, all purpose solenoid, low or high temperatures, low pressure drop.
- SV2:** Pilot operated, spring closing, low pressure drop, excellent for hot gas and low temperature liquid.
- S4A:** Pilot operated, positive spring closing, excellent for hot gas or low temperature liquid.
- S7A:** Pilot operated, electrically held open, no minimum pressure drop, excellent for medium temperature liquid or suction.
- S5A:** Pilot operated, low pressure drop, excellent for medium temperature liquid or suction, not for hot gas.

Specifications

- Max. opening pressure differential: 2070 kPa (300 psi)
- Max. fluid temp: 105°C
- Design Pressure: 2070 kPa (300 psig) except SV2, 3100 kPa (450 psig)
- Manual opening stem
- Seat: Teflon for SV2, S4A (20-32), S5A (32), S6N, S7A, S8F. Metal for: S4A (40-100), S5A (40-75)

Strainer: If required refer to following page

Capacities: Refer following page

Selection Guide

Application	Refrigerant Temperature Range °C	Valve Recommended – Listed by Port Size: mm												
		5	13	20	25	32	40	50	65	75	100	125	150	200
Liquid	Conventional warm high pressure	S6N	S8F SV-2	S4A SV-2	S4A SV-2	S4A SV-2	S4A	S4A	S4A	S4A	S4A	S4W	S4W	S4W
	Above -50	S6N	S8F				S4A	S4A	S4A	S4A	S4A	S4W	S4W	S4W
	Above -45	S6N	S8F SV2	S4A SV2	S4A SV2	S4A SV2	S4A	S4A	S4A	S4A	S4A	S4W	S4W	S4W
Suction	Above -30	S6N	S8F	S7A	S7A	S5A	S5A	S5A	S5A	S5A	S4A	S4W	S4W	S4W
Hot Gas Defrost	Below 105	S6N	S8F SV2	S4A SV2	S4A SV2	S4A SV2	S4A	S4A	S4A	S4A	S4A	S4W	S4W	S4W
Hot Gas Bypass Comp. Unloading	Below 105	S6N	S8F	S7A	S7A	S4AE	S4AE	S4AE	S4AE	S4AE	S4AE			

Recommendations assume no highly viscous oil, dirt, moisture or foreign substance in refrigerant; also no abnormal shock impact below -30°C.

Cat. No.	Type	Port Size mm	Flange Kits to suit		Min. P.D. to wide open		Min. Fluid Temp. °C	Flow Coeff. kv
			Cat. No.	Flanges	kPa	psi		
121700	S6N	5	129540	FK13 1¼"FPT	0	0	-50	0.5
121701	S8F	13	129541	FK13 ¾"FPT	7	1		2.3
121720	SV2		129539	FK13 ½"FPT	24	3.5	-45	2.6
			129542	FK13 ½"SW				
			129543	FK13 ¾"SW				
121710	S4A	20	129544 129545 129546	FK25 ¾"SW FK25 1"SW FK25 1¼"SW	28	4		6.2
121702	S7A				0	0	-30	6.8
121721	SV2				24	3.5	-45	6
121711	S4A	28			4	8.6		
121703	S7A	25			0		0	-30
121722	SV2				24	3.5	-45	10.3
121712	S4A	32	129547 129548	FK32 1¼"SW FK32 1½"SW	28	4		15
121704	S5A				7	1	-30	16.3
121723	SV2				24	3.5	-45	
121713	S4A	40	129549 129550	FK50 1½"SW FK50 2"SW	14	2	-50	28.6
121705	S5A	50			7	1	-30	31.7
121714	S4A				14	2	-50	42.4
121706	S5A				7	1	-30	43.7

Valves are supplied with 240V. 50Hz coils (Quick Connect Type) as standard. Other coils available as an option.

Solenoid Coils

Cat. No.	Part No.	Description	To Suit
121103	203734	240V. 50Hz. Quick Connect Type (DIN Plug)	SV2
121102	204108	240V. 50Hz. Quick Connect Type (DIN Plug)	S4, 5, 6, 7, 8
121104	205208	240V. 50Hz. Encapsulated (Wire Lead)	
121098	201423	24V. 50Hz.	

Solenoid Valves

Parker Type S Capacity Tables: kW

1

Port Size mm	Type	Liquid Capacities: kW				Suction Capacities: kW							
		R22		R717		R22				R717			
						7 kPa P.D.		14 kPa P.D.		7 kPa P.D.		14 kPa P.D.	
		Pressure Drop: kPa				Evaporator Temperature: °C							
		14	27	14	27	-10	-20	-10	-20	-10	-20	-10	-20
5	S6N	9	13	52	80	0.71	0.57	1	0.81	-	-	-	-
13	S8F	40	57	230	340	3.2	2.6	4.5	3.6	9.8	7.7	14	11
	SV2	-	65	-	380	-	-	-	-	-	-	-	-
20	S4A	-	150	-	880	-	-	-	-	-	-	-	-
	S7A	120	170	700	1000	9.5	7.6	13	11	29	23	42	32
	SV2	-	150	-	800	-	-	-	-	-	-	-	-
25	S4A	-	210	-	1220	-	-	-	-	-	-	-	-
	S7A	150	210	870	1220	12	9.6	17	13	35	29	52	42
	SV2	-	260	-	1500	-	-	-	-	-	-	-	-
32	S4A	-	370	-	2160	-	-	-	-	-	-	-	-
	S5A	280	400	1600	2340	23	18	32	26	70	56	98	77
	SV2	-	420	-	2400	-	-	-	-	-	-	-	-
40	S4A	500	710	2900	4100	-	-	56	45	-	-	170	130
	S5A	550	780	3200	4700	44	35	62	50	140	110	190	150
50	S4A	740	1100	4200	6200	-	-	82	66	-	-	260	200
	S5A	760	1100	4200	6200	60	49	85	69	190	150	270	210

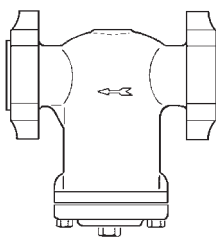
- Liquid capacities for R22, are based on 40°C condensing and 5°C evaporator temperatures with no flashing through the valve. For each 5°C liquid is below 40°C, INCREASE values by 5%. R717 Capacities are based on -7°C liquid with no flashing, -15°C evaporator temperature and no liquid overfeed. For liquid overfeed, multiply evaporator kW by recirculating rate and size valve to the kW result. Use of -7°C liquid for capacities in this table is sufficiently accurate for most liquid overfeed systems. To convert to 30°C condensing and liquid, multiply values in the table by 0.9.
- Suction capacities for R22 are based on 40°C liquid and 5°C superheat entering the valve. For each 5°C liquid is below 40°C, INCREASE values by 5%. R717 capacities are based on 30°C condensing temperature.

All capacities are maximum for the conditions listed and have no reserve for excess loads.

Refrigerant Strainers

Parker Type RSF

For Ammonia, R22 and other common Refrigerants



Features

- Suitable for Liquid, Suction or Hot Gas
- Stainless Steel (60 mesh) Screen of Ample Area
- Low Pressure Drop
- Can be close coupled to inlet of any Parker valve with the same port size
- 3/8" F.P.T. Drain Connection 20-50 mm enabling the removal of possibly trapped refrigerant in strainer prior to cleaning or replacement of the strainer screen

Design Pressure (MRP): 2070 kPa (300 psig). Maximum Refrigerant Temperature: 105°C.
Minimum Refrigerant Temperature: -50°C.

Strainer		Used on Port Sizes mm	Conns. Available	Flange Kit	
Cat. No.	Part No.		S.W.	Cat. No.	Part No.
121800	RSF13	5 & 13	1/2"	129542	FK13
			3/4"	129543	
121801	RSF25	20 & 25	3/4"	129544	FK25
			1"	129545	
			1 1/4"	129546	
121802	RSF32	32	1 1/4"	129547	FK32
			1 1/2"	129548	
121803	RSF50	40 & 50	1 1/2"	129549	FK50
			2"	129550	

If Strainer is not being close-coupled to a Parker Valve, ie. used separately – A Flange Kit and Female Adaptor Ring will be required.

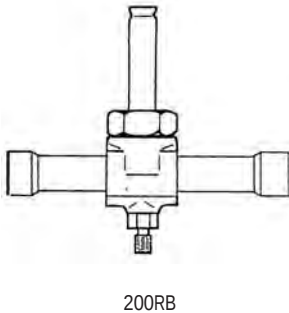
Solenoid Valves

Flow Controls (Alco) 200RB Series (Less Coil)

Normally Closed Pilot-Operated – For Liquid and Discharge or Suction Gas Service

Features

- Extended Copper Tails for easy installation
- Low pressure differential required for full opening
- One coil fits all valve sizes
- Maximum fluid temperature 121°C
- Maximum working pressure 3450 kPa



200RB

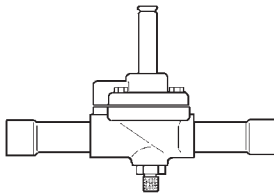
Cat. No.	Part No.	Connections ODF Inches	Port Size mm	Liquid Capacity: kW						Opening Diff. Pressure kPa (psi)
				R134a		R22		R404A / R507		
				Pressure Drop Across Valve: kPa						
				136	272	136	272	136	272	
123320	200RB3T3T	3/8	4.7	12.7	18	13.9	19.6	9.2	13.1	Min. 14 Max. 2070
123321	200RB4T3T	3/8	6	15.2	21.5	16.2	22.9	10.7	15.1	
123322	200RB4T4T	1/2	6	15.2	21.5	16.2	22.9	10.7	15.1	
123323	200RB6T4T	1/2	9.5	27.3	38.5	28.9	40.9	18.8	26.6	
123324	200RB7T5T	5/8	11	42.8	60.6	45.1	63.8	29.8	42.1	

Flow Controls (Alco) 240RA Series (Less Coil and Manual Stem)

Normally Closed Diaphragm Type – For Liquid and Discharge or Suction Gas Service

Features

- Extended Copper Tails for easy installation
- Reinforced teflon diaphragm with woven fiberglass
- Stainless enclosing tube
- Low pressure differential required for full opening
- Maximum fluid temperature 121°C
- Maximum working pressure 3450 kPa



240RA

Cat. No.	Part No.	Connections ODF Inches	Port Size mm	Nominal Liquid Capacity: kW		
				R22	R134a	R404A / R507
123106	240RA-8T5-T	5/8	12.5	46.3	43.8	30.2
123107	204RZ-8T7-T	7/8				
123108	240RA-9T5-T	5/8	15	69.1	65.1	45.6
123109	240RA-9T7-T	7/8		90	85	59.4
123110	240RA-9T9-T	1 1/8				
123111	240RA-12T7-T	7/8	20	103.5	98.1	68.2
123112	240RA-12T9-T	1 1/8				
123113	240RA-16T9-T	1 1/8	25	172	162.7	113.2
123114	240RA-16T11-T	1 3/8				
123115	240RA-20T11-T	1 3/8	32	285.6	255.6	188
123116	240RA-20T13-T	1 5/8				

Refer to page 40 for extended capacity tables

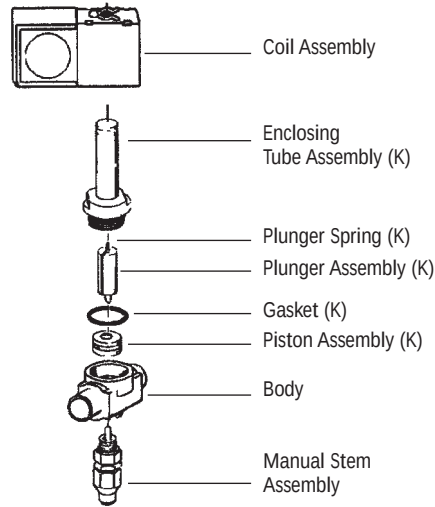
All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Solenoid Valves

Flow Controls

(Alco) Solenoid Valve kits

200RB Exploded View & Parts Kit Data



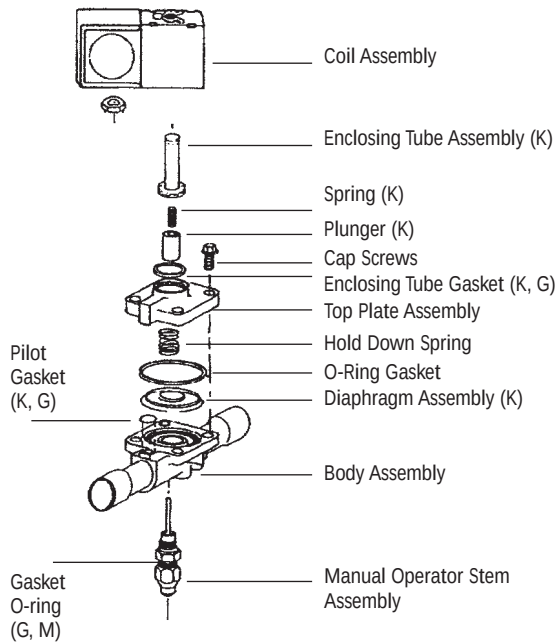
200RB Series Repair Kits

Cat. No.	Part No.	Suits Valve Type
123335	KS30115	200RB3
		200RB4
		200RB6
123336	KS30354	200RB7

200RB Series Manual Opening Stem Kits

Cat. No.	Part No.	Suits Valve Type
	KS30377	200RB3
123330	KS30117	200RB4
		200RB6
123331	KS30361	200RB7

240RA Exploded View & Parts Kit Data



240RA Series Repair Kits

Cat. No.	Part No.	Suits Valve Type
123306	KS30321	240RA8
123307	KS30322	240RA9
123308	KS30323	240RA12
123309	KS30324	240RA16
123310	KS30325	240RA20

240RA Series Manual Opening Stem Kits

Cat. No.	Part No.	Suits Valve Type
123311	KS30068	240RA8
123312	KS30067	240RA9, 240RA12
123313	KS30068	240RA16
123314	KS30098	240RA20

240RA Series Gasket Kit

Cat. No.	Part No.	Suits Valve Type
123120	KG10028	Suits all 240RA Valves

Nomenclature

K indicates part is supplied in complete valve repair kit

M indicates part is supplied in manual opener kit

G indicates gasket is supplied in gasket kit

Note: Spanner wrench (X11981-1 service tool) included in complete valve kit

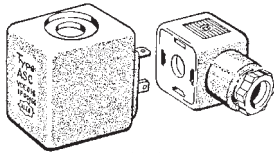
All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Solenoid Valves

Flow Controls

(Alco) Solenoid Coils

For 200RB, 240RA, 702RA Valves



ASC 2

Cat. No.	Type	Voltage & Frequency
123286	ASC2	24VAC 50/60Hz
123285		240VAC 50/60Hz
123287		120VAC 50/60Hz

Type ASC2 have PG9 plug-in junction box

Flow Controls

(Alco) 200RB and 240RA Series Capacity Tables

For Discharge and Suction Gas

Valve Series	▼ Discharge Gas Capacity: kW																	
	R134a						R22						R404A / R507					
	Pressure Drop Across Valve: kPa																	
	14	34	69	170	345	690	14	34	69	170	345	690	14	34	69	170	345	690
200RB-4	2.5	3.9	5.4	8.1	10.4	11.6	3	4.7	6.5	9.7	12.3	13.3	2.5	4.7	6.5	9.8	12.7	14.4
200RB-6	5.6	8.8	12.2	18.2	23.4	26.2	6.7	10.6	14.7	21.8	27.6	29.9	5.7	10.6	14.7	22.1	28.5	32.3

Capacity based on 38°C liquid and 4°C saturated evaporator for ARI standard 760.

Valve Series	Suction Gas Capacity: kW														
	R134a					R22					R404A / R507				
	Evaporating Temperature: °C														
	4	-7	-18	-29	-40	4	-7	-18	-29	-40	4	-7	-18	-29	-40
240RA-8	4.2	3.2	2.5	1.8	1.4	5.3	4.2	3.5	2.8	2.1	4.2	3.5	2.5	2.1	1.4
240RA-9(5/8")	5.3	4.2	3.2	2.5	1.8	7	5.6	4.6	3.5	2.8	5.6	4.6	3.5	2.5	1.8
240RA-9(7/8")	6.3	4.9	3.9	2.8	2.1	8.4	7	5.6	4.2	3.5	7	5.6	4.2	3.2	2.5
240RA-12	7.7	6	4.6	3.5	2.5	10.2	8.4	6.7	5.3	4.2	8.4	6.7	5.3	3.9	2.8
240RA-16	15.8	12.3	9.5	7.4	5.3	20.4	16.5	13.4	10.6	8.1	16.9	13.4	10.6	7.7	5.6
240RA-20	22.2	17.6	13.4	10.2	7.4	28.8	23.5	19	14.8	11.6	23.5	18.6	14.4	10.9	8.1

Suction Capacity based on 7 kPa pressure drop across valve.

Evaporator Temperature Correction Factors

Evaporator Temperature and Multiplier									
Evaporator Temperature °C	4	-1	-7	-12	-18	-23	-29	-34	-40
Liquid	1	0.96	0.92	0.88	0.84	0.8	0.77	0.74	0.71
Discharge Gas	1	0.96	0.93	0.9	0.87	0.84	0.81	0.78	0.75
Suction Gas	1	0.87	0.78	0.7	0.6	0.52	0.46	0.40	0.34

All capacities and factors shown are based on normal condensing temperatures (38°C) isentropic compression plus 28 K, 4°C evaporator. 18°C suction gas and saturated liquid entering an expansion device per ARI Standard 760.

For capacities at other operating conditions, use the appropriate correction factor given in above table.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

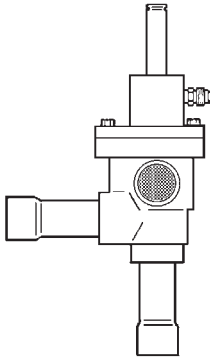


Your best Solution...

Solenoid Valves

Flow Controls

(Alco) 3-Way Solenoid Valves M36 Series



Features

- For heat reclaim application
- Pilot connection to suction line required, no minimum pressure drop
- Compact size
- Snap-on clip for attaching solenoid coils
- No disassembly necessary for brazing
- Max. working pressure 3500kPa

For Heat Reclaim Applications

Solenoid Operated 3-Way Valves, designed especially to meet the requirements of the high temperatures and pressures existing in compressor discharge gas applications. Specifically designed to divert discharge gas to an auxiliary condenser for heat reclaim applications.

Cat. No.	Part No.	Connections ODF Inches	Nominal Capacity: kW*		
			R134a	R22	R404A/R507
123210	3031RC-12S7	7/8	28.9	35.1	31.3
123211	3031RC-12S9	1 1/8			

*Nominal Capacities at 38°C condensing temperature and 4°C evaporating temperature with a 15kPa Pressure Drop between Valve inlet and outlet

Note:

- Valves and Coils are supplied as separate items
- When Ordering: Specify Coil Type and Voltage (a.c. or d.c.)
- For Solenoid Coils - Refer to page 40

Repair Kit

Cat. No.	Part No.	Description
123209	M36-Kit	Replacement Pilot and o-ring

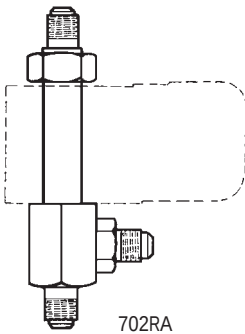
Flow Controls

(Alco) 702RA Series (Less Coil)

Used for Discharge Gas Compressor unloading or Hot Gas Defrost Applications

Features

- 3 Way pilot
- Rugged internal construction with bar stock brass body
- Tight-setting rulon seat disc
- Operates in any position
- Maximum working pressure 3450 kPa



3-Way Normally Open Direct Acting – For Liquid or Suction Gas Service

Cat. No.	Part No.	Connections Inches	Port Size mm	MOPD kPa (psi)	Max. Work. Pressure kPa (psig)	Max. Fluid Temperature °C
123200	702RA-001	1/4 Flare	1.6	2070 (300)	3450 (500)	140

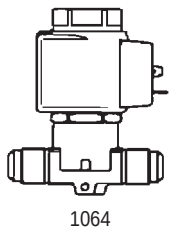
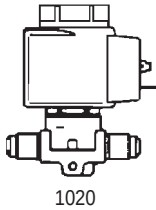
For Solenoid Coils refer to page 40

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Solenoid Valves

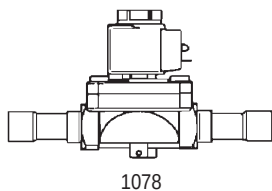
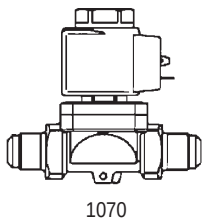
Castel 102, 106, 107 and 109 Series (with Coil)

For Fluorinated Refrigerants



Cat. No.	Part No.	Conns.	Port Diam. mm	Opening Differential Pressure kPa (psi)		Fluid Temp. °C	Max. Work Press. kPa (psig)	Kv** Factor m³/hr	
				Min.	Max. (MOPD)				
Normally Closed – Direct Operated – for Liquid and Hot Gas									
123032	1020/2	¼” Flare	2.5	0 (0)	2100 (305)	-35 to 110	4500 (652)	0.175	
123034	1028/2	¼” ODS	2.2					0.15	
Normally Closed – Servo Operated – for Liquid, Suction and Hot Gas									
123036	1064/3	⅜” Flare	7	5 (0.7)	2100 (305)	-35 to 110	4500 (652)	0.8	
123040	1068/3	⅜” ODS							
123037	1070/4	½” Flare	12.5					2.2	
123041	1078/4	½” ODS							
123038	1070/5	⅝” Flare							2.61
123042	1078/5	⅝” ODS							
123043	1090/6	¾” Flare	16.5					5.7	
123045	1098/6	¾” ODS							
123044	1098/7	7/8” ODS							
123052	1099/9	1⅛” ODS							
123054	1078/11	1⅜” ODS	27	7 (1)	16				
123056	1079/13	1⅝” ODS							

Supplied with 240V 50Hz Coil and Bracket (Less Junction Box – Cat. No. 123050)



Part No.	Nominal Capacity: kW											
	Liquid				Suction Vapour				Hot Gas			
	R134a	R22	R404A	R410A	R134a	R22	R404A	R410A	R134a	R22	R404A	R410A
1020/2	2.95	3.15	2.08	3.33	–	–	–	–	1.5	2.05	1.75	2.28
1028/2	2.55	2.7	1.8	2.86	–	–	–	–	1.3	1.75	1.5	1.95
1064/3	13.5	14.5	9.5	15.2	1.75	2.15	1.8	2.88	6.8	9.35	8	10.4
1068/3												
1070/4	37.1	39.6	26.2	41.9	4.75	5.95	4.95	7.92	18.7	25.75	22	28.6
1078/4												
1070/5	44	47	31	49.7	5.65	7	5.9	9.44	22.2	30.4	26	33.9
1078/5												
1090/6	80	86.4	57.1	91.4	10.4	13	10.8	17.3	40.8	56.2	48	62.4
1098/6												
1098/7	96	102	67.8	108.5	12.3	15	12.8	20.5	48.4	66.6	57	74.1
1099/9												
1078/11	269.6	288	190.4	304.6	34.6	43.2	36.2	57.6	136	187.2	160	208
1079/13												

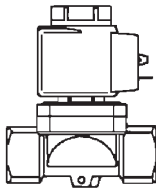
Nominal Capacity based on 4°C Evaporating Temperature, 38°C Condensing Temperature and 15 kPa Pressure Drop across valve. Hot Gas: 18°C Intake Temperature and 100 kPa Pressure Drop.

Solenoid Valves

Castel

1132 Series

For Water, Air, Light Oils and Brine (glycol-water solution)



1132

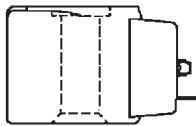
Cat. No.	Part No.	Conns. FPT	Port Diam. mm	Opening Differential Pressure kPa (psi)		Fluid Temp. °C	Max. Work Press. kPa (psig)	Kv** Factor m³/hr
				Min.	Max. (MOPD)			
Normally Closed – Servo Operated								
123022	1132/03	3/8"	12.5	10 (1.5)	1700 (247)	-15 to 110	3000 (435)	2.1
123023	1132-04	1/2"		(2.2)	(174)		2.2	
123024	1132/06	3/4"	20	15 (2.2)	1200 (174)		1500 (218)	5.5
123025	1132/08	1"		(2.2)	(174)		6	
Supplied with Coil (Less Junction Box – Cat. No. 123050)								

When the valve is used with oils, the viscosity of the oil must be checked to ensure that the valve will 'Open'.

**Kv Factor: Capacity of valve in m³/hr of water at 100 kPa pressure drop across valve.

Castel

Solenoid Coils

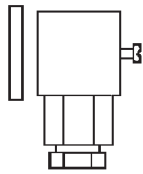


HM2

Cat. No.	Part No.	Power Supply	Suits MODELS
123046	HM2/40 42 40	240V, 50/60 HZ	1020, 1028, 1064, 1068, 1070, 1078, 1132, 1099, 1079
123048	HM2/40 40 24	24V, 50/60 HZ	
123050	PG11	Junction Box	
123047	HM3/9120/RD1	12VDC	
123049	HM3/9120/R22	24VDC	

Castel

Solenoid Valve Repair Kits



PG11

Cat. No.	Part No.	Contents	Suits valve types		
			Diaphragm Kit	Diaphragm Pilot Kit	Main Piston Kit
123060	9150/R07	Plunger Plunger Spring Nut/Body O Ring	1020/2 1028/2		
123062	9150/R08	Plunger Plunger Spring Diaphragm Nut/Body O Ring	1064/3 1068/3	1078/11 1078/13	
123064	9150/R09	Plunger Plunger spring Diaphragm Cover/Body O Ring Cover/Body Screws	1070/4 1070/5 1078/4 1078/5		
123066	9150/R48	Plunger Plunger Spring Diaphragm Cover/Body O Ring Cover/Body Screws	1090/6 1098/6 1098/7 1099/9		
123068	9150/R39	Piston Piston Ring Piston Spring Body Cover O Ring Pilot O Ring Cover/Body Screws			1078/11 1079/13

Water Regulating Valves

Penn Series V46-V48

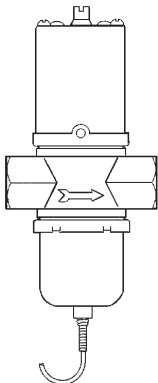
Pressure Actuated Water Regulating Valves

Penn pressure actuated water regulating valves are modulating type valves. Series V46 direct acting valves OPEN on pressure increase. They are typically used for regulating refrigerant head pressure in water cooled condensers. Series V48 are designed specifically for condensing units cooled by cooling towers. They are used on single or multiple condenser hookups to the tower to provide the most economical and efficient use of the tower.

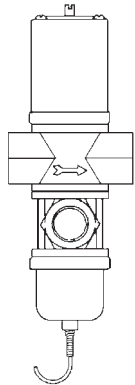
Maximum Water Pressure: 1030 kPa (150 psig)

Maximum Water Supply Temperature: 77°C

Maximum Refrigerant Pressure: 2200 kPa (320 psig)



V46



V48

Refrig.	Cat. No.	Part. No.*	Conns. Ins.	Opening Point Range kPa	Pressure Element Conn.
Series V46 – 2 Way					
R12, R134a R22, R502 R404a, R507	124030	V46AA-9600	3/8 BSP	480 to 1170	760 mm Length with 1/4" Flare Nut
	124031	V46AB-9600	1/2 BSP		
	124032	V46AC-9600	3/8 BSP		
	124033	V46AD-9600	1 BSP		
	124034	V46AE-9600	3/8 BSP		
	124035	V46AR-1	3/8 Flange*		
R12, R134a	124036	V46AS-1	2 Flange*	480 to 1170	1/4" Flare Male
R22, R502	124038	V46AS-2		1100 to 1790	
R404A, R507	124039	V46AT-2		3/8 Flange*	
* Flange kits are available					
Series V48 – 3 Way					
R22	124052	V48AC-2	3/8 NPT	1000 to 1310	760 mm Length with 1/4" Flare Nut Conn. 1/4" Flare Male Conn
	124053	V48AD-2	1 NPT		
	124054	V48AE-2	3/8 NPT		
	124056	V48AF-2	3/8 NPT		

Replacement Power Elements, Repair Kits and Flange Kits are available.

* Alternative part No's may be supplied due to variations in overseas source.

Type	Refrig.	Base*		Water P.D. Across Valve		Typical Flow Ratings: litres/sec							
		Rating Pressure				Valve Size							
		kPa	psig	kPa	psi	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
V46 2 Way	R12 R134a	172	25	34.5	5	0.25	0.34	0.58	0.95	1.26	1.51	2.52	3.03
				69	10	0.33	0.41	0.73	1.1	1.51	1.83	3.03	3.66
	R22 R502	276	40	34.5	5	0.35	0.44	0.73	1.14	1.61	1.92	2.62	3.15
				69	10	0.47	0.59	1.01	1.45	2.05	2.4	3.6	4.29
V48 3 Way	R22	310	45	48	7	-	0.44	0.96	1.6	2.22	2.97	-	-
				69	10	-	0.54	1.1	1.86	2.52	3.56	-	-

*Base Rating Pressure is the pressure above opening valve pressure. Refer Pages 46 (V46) and 47 (V48) for Valve Selection Data.

Water Regulating Valves

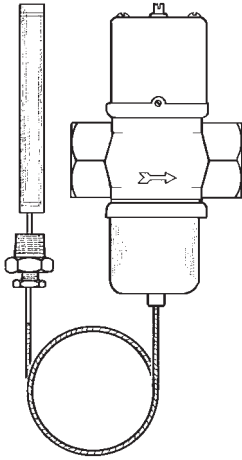
Penn Series V47

Temperature Actuated Water Regulating Valves

Temperature actuated valves regulate the flow of water, or other liquids not harmful to the valve, to maintain a desired temperature. They are widely used on industrial applications. Easy manual flushing. Valves are furnished with 1.8m of armoured capillary and a temperature bulb (1/2" N.P.T. closed tank immersion).

An internal by-pass hole is drilled and tapped in the regulator body. A solid plug is installed in this hole for 100% shut off. A drilled plug is supplied with each valve for field installation, if continuous minimum flow is required. Valves open on temperature rise.

Maximum Water Pressure: 1030 kPa (150 psig)
Maximum Water Temperature: 71°C
Capillary Length: 1.8m with cross-ambient bulb



Cat. No.	Part No.	Pipe Size N.P.T.	Range (Opening Point) °C	Maximum Bulb Temperature °C	Bulb Size mm	Std. By-Pass Orifice Dia. mm (inches)
124103	V47AA-3	3/8"	24 to 57	68	17.5 x 152	1.58 (0.062)
124105	V47AB-5	1/2"			17.5 x 254	
124109	V47AC-6	3/4"			17.5 x 413	
124110	V47AD-1	1"				2.36 (0.093)
124111	V47AE-1	1 1/4"				

Note:

Other temperature ranges are available. Bulb Wells to suit available on application.

Temperature Rise Above Valve Opening Point °C	Water P.D. Across Valve		Typical Flow Ratings: litres / sec			
			Valve Size			
			3/8"	1/2"	3/4"	1"
°C	kPa	psi				
8	34.5	5	0.26	0.34	0.58	1.07
	69	10	0.32	0.41	0.73	1.26
	138	20	0.41	0.51	0.88	1.45
13	34.5	5	0.35	0.44	0.78	1.32
	69	10	0.46	0.59	1.01	1.64
	138	20	0.6	0.8	1.26	2.05
17	34.5	5	0.38	0.46	0.82	1.39
	69	10	0.51	0.63	1.07	1.74
	138	20	0.66	0.88	1.42	2.27

Refer Page 48 for complete Valve Selection Data.

Water Regulating Valves

Penn Series V46 – 2 Way

Selection Chart

Selecting the valve size can be done by means of the diagram. The valve size is indicated at the right side of the upper part of the diagram.

The valve size is determined by three data:

1. The required waterflow (Scale A).
2. The increase of the condensing pressure (Scale B).
3. Available pressure drop across the valve (Scale C).

Re. A. The required waterflow can be indicated on scale A of the diagram. For example: 65 l/min. Draw a horizontal line through the 65 point of scale A.

Re. B. By this increase is meant the head pressure rise of the refrigerant above the opening point of the valve. This value is indicated on scale B. For example: 170 kPa. Draw a horizontal line through the 170 point on scale B.

Re. C. Determine in the system the pressure actually available to force water through the valve. For example: 300 kPa. Determine intersection of the horizontal line mentioned at B and the 300 curve. (See striped-dotted line in the diagram). Draw from this intersection point a line vertically upward. Determine intersection point of this vertical with the horizontal one mentioned at A.

If this point falls on a size curve, this is the valve size. Intersection between two curves: the valve size is the larger of the two. In the example $\frac{3}{4}$ " valve required. When the above mentioned three data are not known, use can be made of the following:

Re. A. Determine maximum water flow required. The manufacturer of the condensing unit will usually provide tables, or calculations can be made from the following:

1. Maximum Watts to be removed. (Be sure to add heat gains in refrigeration equipment and heat of compression). If figures are not available, it is customary to add 25% to the load for these heat gains.
2. Incoming water temperature at time of maximum load.
3. Outlet water temperature; this must be lower than the condensing temperature of the refrigerant – use condensing unit manufacturer's data, or assume 6°K TD.
4.
$$\text{Flow (l/min)} = \frac{\text{Capacity of Condenser (W)}}{70 (\text{outlet temp. } ^\circ\text{C} - \text{inlet temp. } ^\circ\text{C})}$$

Re. B. Determine refrigerant head pressure rise above valve opening point.

1. Valve closing point (to assure closure under all conditions) must be the refrigerant head pressure equivalent to the highest ambient air temperature expected at time of load. Read this in kPa from 'Saturated Vapour Table' for refrigerant selected.
2. Read from same table the operating head pressure corresponding to selected condensing temperature.
3. Valve opening point will be about 50 kPa above closing point.
4. Subtract opening pressure from operating pressure. This gives the head pressure rise.

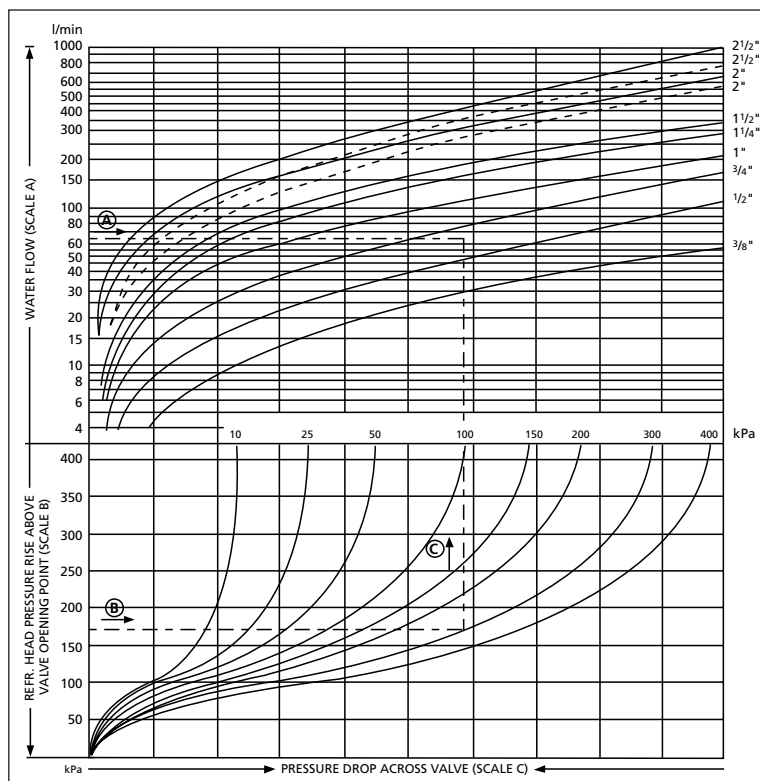
Re. C. Determine water pressure drop through valve – this is the pressure actually available to force water through the valve.

1. Determine minimum water pressure available from city mains or other source.
2. From condensing unit manufacturer's tables read pressure drop through condenser corresponding to required flow.
3. Add to this estimated or calculated drop through piping, etc., between water valve and condenser, and from condenser to drain (or sump of cooling tower).
4. Subtract total condenser and piping drop from available pressure drop through valve.

Note:

1 l/min. = 0.06 m³/h = 0.264 U.S. gal./min. = 0.317 U.K. gal./min. 1 bar = 100 kPa = 0.1 MPa = 14.5 psi.

Valve Size	Refrigerant	Remarks
$\frac{3}{8}$ " thr. $1\frac{1}{2}$ "	R22, R134a, R404A, R507	
2", $2\frac{1}{2}$ "	R22, R404A, R507	Use Dotted Curves



Water Regulating Valves

Penn Series V48 – 3 Way

Selection Chart

Selecting the valve size can be done by means of the diagram. The valve size is determined by three data:

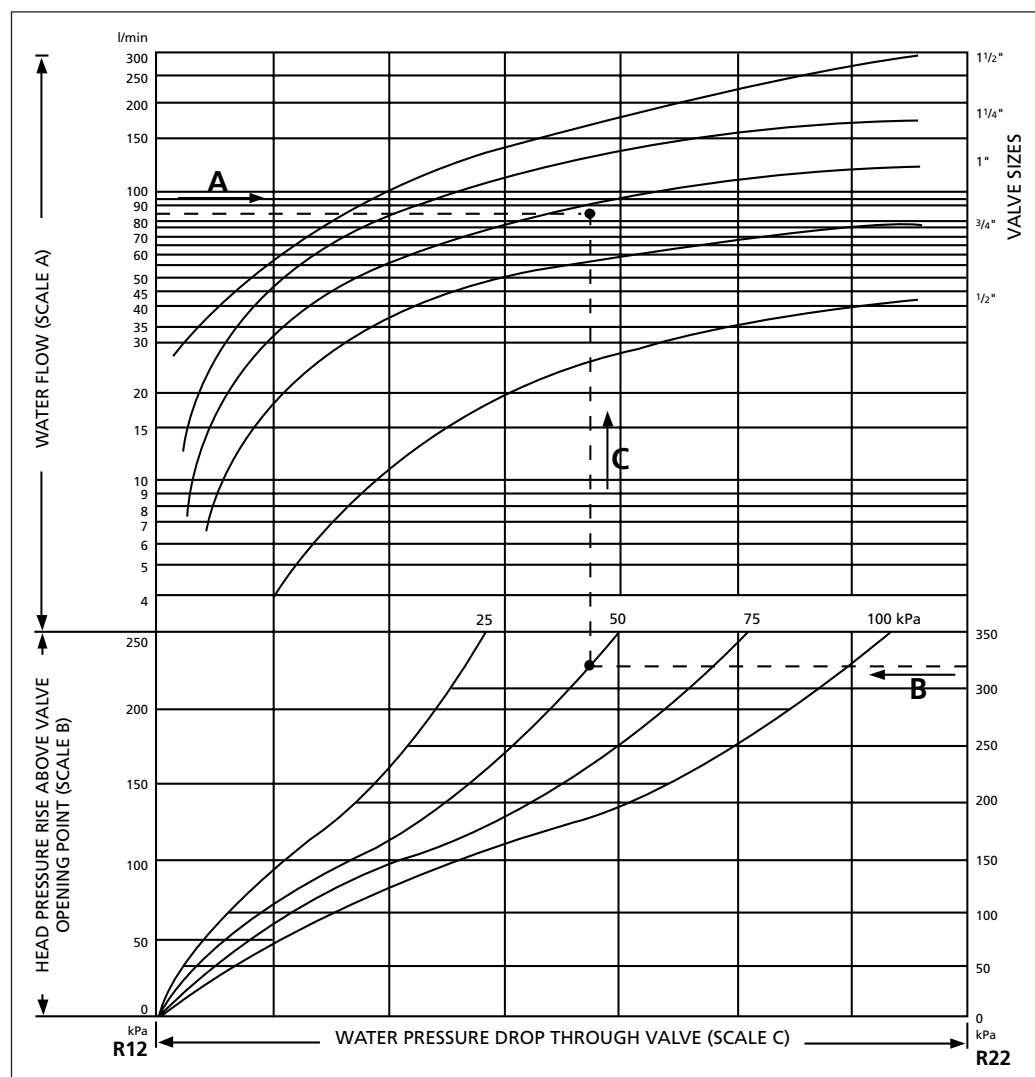
1. The required waterflow (Scale A).
2. The increase of the condensing pressure (Scale B).
3. Available pressure drop across the valve (Scale C).

Re. A. The required waterflow can be indicated on scale A (upper diagram). For example: 85 l/min. Draw a horizontal line through the 85 point of scale A.

Re. B. By the increase is meant the head pressure rise above the opening point of the valve. The value is indicated on scale B, for R12 or for R22. For example: 320 kPa on R22. Draw a horizontal line through the 320 point on scale B (R22 part).

Re. C. Determine allowable water pressure drop through valve. The pumping head should include the pressure drop through the valve. For example: 50 kPa. Determine intersection of the horizontal line mentioned at B and the 50 curve.

Draw from this intersection point a line vertically upward. Determine intersection point of this vertical line with the horizontal one mentioned at A. If this point falls on a size curve, this is the valve size, if the intersection is between two curves the required valve size is the larger one. In the example a 1" valve is required. ▼



Note:

1 l/min. = 0.06 m³/h = 0.264 U.S. gal./min. = 0.317 U.K. gal./min. 1 bar = 100 kPa = 0.1 MPa = 14.5 psi.

Water Regulating Valves

Penn Series V47 – Temperature Actuated

Selection Chart

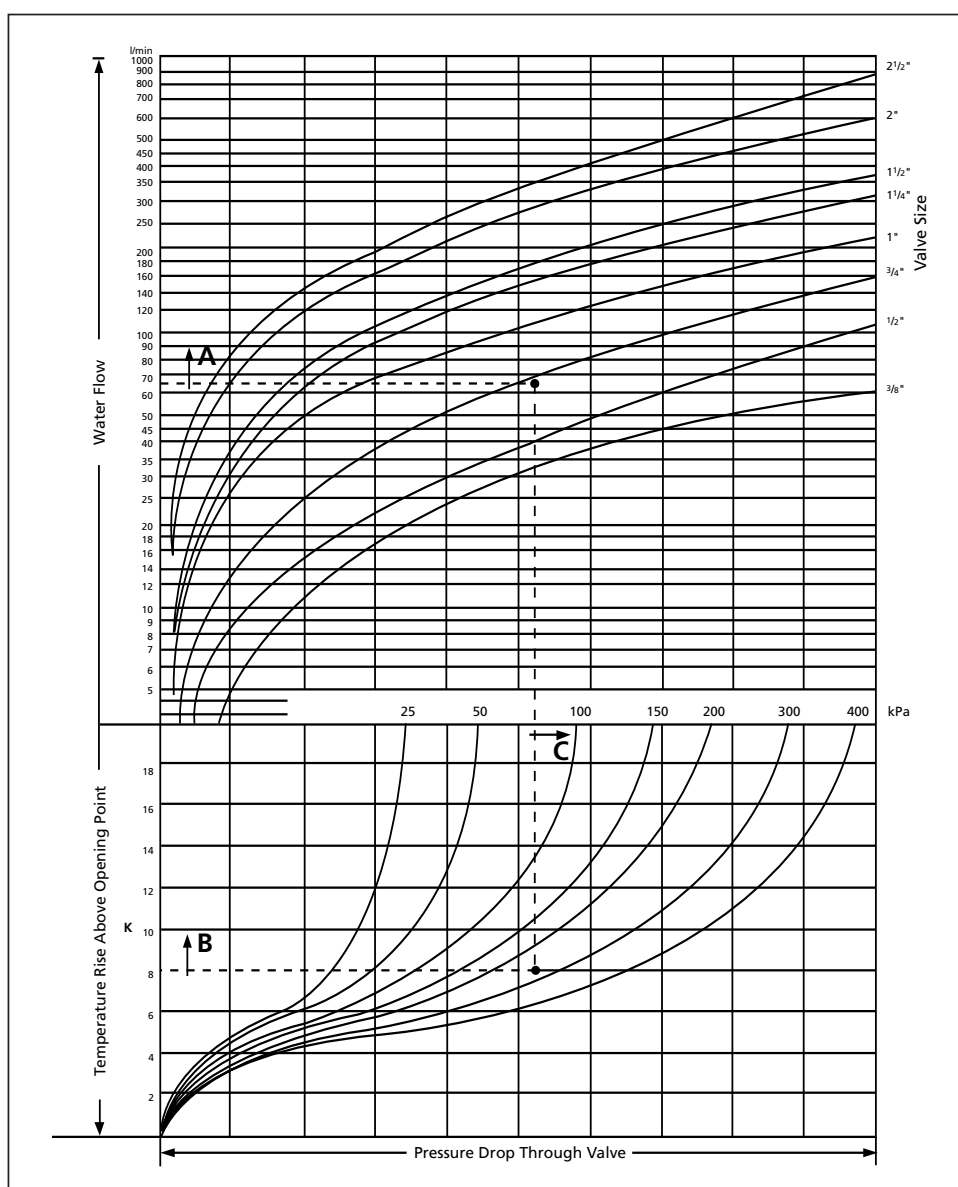
Selecting the valve size can be done by means of the diagram. The valve size is indicated at the right side of the upper part of the diagram. The valve size is determined by three data:

1. The required waterflow (Scale A).
2. The selected proportional band (Scale B).
3. Available pressure drop through the valve (Scale C).

Re. A. The required waterflow can be indicated on scale A of the diagram. For example: 65 l/min. Draw a horizontal line through the 65 point of scale A.

Re. B. The value is indicated on scale B. For example: 8K. Draw a horizontal line through the 8 point on scale B.

Re. C. Determine in the system the pressure actually available to force the water through the valve. For example: 280 kPa. Determine intersection of the horizontal line mentioned at B and the 280 curve. (See dotted line in the diagram). Draw from this intersection point a line vertically upward. Determine intersection point of this vertical with the horizontal one mentioned at A. If this point falls on a size-curve, then this is the valve size. Intersection between two curves: the valve size is the larger of the two. In the example: $\frac{3}{4}$ " valve required.



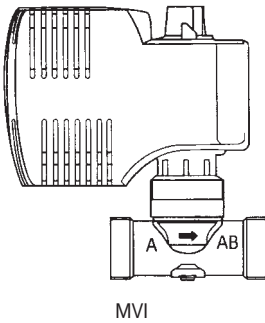
Note:

1 l/min. = 0.06 m³/h = 0.264 U.S. gal./min. = 0.317 U.K. gal./min. 1 bar = 100 kPa = 0.1 MPa = 14.5 psi.

Zone Water Valves

SIEMENS MVI Series

MVI is a complete valve and actuator assembly ideal for air handling unit applications. Flow of chilled/heating water is controlled by a simple on/off motion.

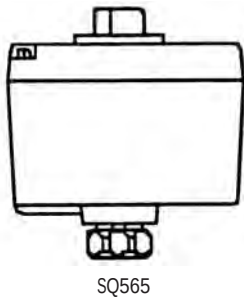


Cat. No.	Model No.	Conn Size	Voltage
124120	MVI 421.15	1/2"	230 VAC
124121	MVI4 21.20	3/4"	

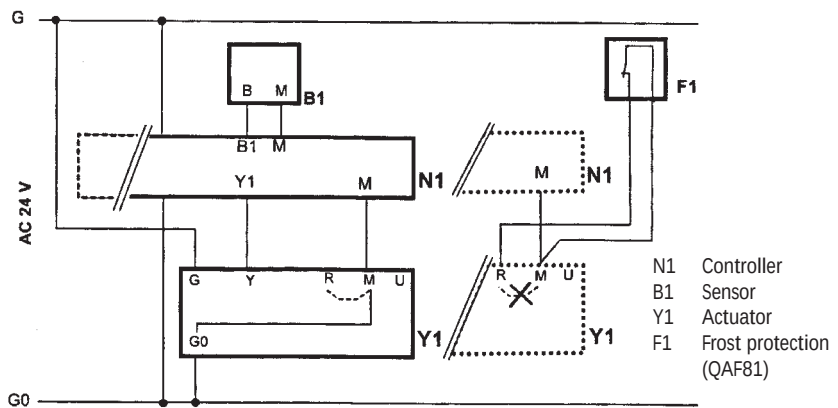
1

SIEMENS SG565 Series Actuator

SQ565 Actuator fits a range of Siemens Valves for modulating the flow of chilled/heating water and is ideal for air handling units



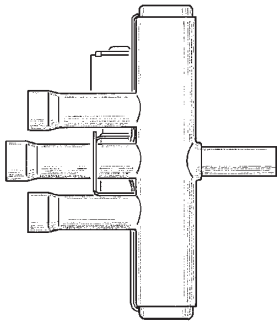
Cat. No.	Model No.	Voltage	Signal Voltage	Stroke
124130	SQ565	24VAC	0-10V	5.5mm



Wiring Diagram for SQ565

Reversing Valves

Flow Controls (Alco) RV Series Reversing Valves For Heat Pump Applications



RV Series 4-Way Reversing Valves are designed for use on energy-conserving, reverse-cycle air conditioning systems.

Features: RV Series

- Brass body with stainless steel internals - corrosion resistant
- High strength slide carrier
- Fewer parts
- High capacity pilot - greater tolerance to contaminants
- Greater wear resistance of seals
- Stainless steel pilot bracket

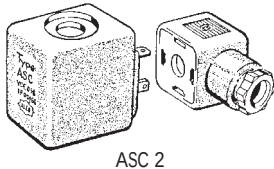
Specifications

- Maximum working pressure: 4680 kPa
- Maximum operating pressure differential: 2760 kPa
- Minimum operating pressure differential: 70 kPa (RV Series)
- Maximum operating temperature: 120°C (RV Series)

Cat. No.	Part No.	Connections: ODF		Nominal Capacity: kW	
		Discharge	Suction and Coils	R22	R410A
125032	RVS2-F34 RMF	3/8"	1/2"	8.3	10.6
125033	RVS3-F45 RMF	1/2"	5/8"	11	14.3
125036	RVA6-F46	1/2"	3/4"	22.4	29
125037	RVA6-F47	1/2"	7/8"		
125039	RVA6-F67	3/4"	7/8"		

Nominal Capacity based on 38°C Condensing Temperature, 4°C Evaporating Temperature and 14kPa P.D. across suction port.

- Alco Reversing Valves are supplied without Coils



Flow Controls (Alco) Solenoid Coils

Cat. No.	Type	Voltage & Frequency	
123286	ASC2	24VAC 50/60Hz	Suit old style reversing valves with coil retaining clip
123285		240VAC 50/60Hz	
123287		120VAC 50/60Hz	
123288	RMF	240VAC 50/60Hz	Suit new style reversing valves with coil retaining screw
123289		24VAC 50/60Hz	

Trouble Shooting an inoperative valve

Before replacing a suspect reversing valve the following procedures should be carried out.

1. Check the voltage to coil.
2. Check the neutral wire has a completed circuit, it maybe that the defrost thermostat has interrupted the circuit stopping the coil energising.
3. Isolate power supply to coil and remove the coil from the valve and place a screwdriver inside the coil then apply power to feel the magnetic force of the coil.
4. With power applied to coil remove it from the valve then replace it and listen and feel for plunger movement.
5. Check refrigerant charge as low flow maybe causing a low pressure differential across the valve causing it not to seat correctly.
6. Valve not seating in its correct position will indicate a high back pressure sometimes misleading a technician into thinking the compressor is faulty, this can be ruled out by closing the suction service valve and performing a pump down test on the compressor.

Once the suction pressure reaches 10kPa turn off the compressor and wait 2 minutes, if the pressure does not rise the compressor would appear to be alright and the reversing valve is probably the cause of the high back pressure.

Also check the temperature between the refrigeration lines around the reversing valve, this can quickly indicate to you by temperature in which direction the refrigerant is travelling if the valve is on heating and the temperature to the indoor coil is cool then the valve hasn't changed over to its heating mode.

Refer to section 8 for more Trouble Shooting Hints

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Reversing and Hot Gas Defrost Valves

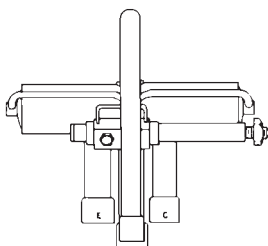
126

Ranco Reversing Valves – 4 Way

For Heat Pump Air Conditioning Systems - R22

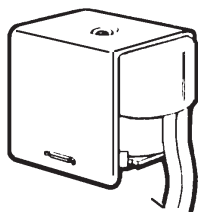
Ranco Reversing Valves are slide-type 4-way valves which operate under full pressure of a Heat Pump system. They are hermetically constructed and operation is controlled by a Solenoid Coil on a single Pilot Valve, which is an integral part of the main valve.

1



Cat. No.	Part No.	Old Part No.	Nominal Port Size mm	Connections ODS		R22 Capacity kW	M.O.P.D. kPa	Min. Operating Pressure kPa
				Disch.	Suct. & Coils			
Reversing Valve - with Coil								
126020	V2-408064-2IL	V26-100B	11	3/8"	1/2"	8.8	2590	100
126019	V3-410084-7IL	V38-1003	14	1/2"	5/8"	9.5		
126022	V6-312084-1IL	V30-101	15	1/2"	3/4"	17.6		
126023	V6-414084-1IL	V30-103		1/2"	7/8"			
126024	V10-414084-2IL	V25-500	20	1/2"	7/8"	29.9		
126025	V10-414124-2IL	V25-750		3/4"	7/8"			
126026	V10-318144-2IL	V25-762		7/8"	1 1/8"			
Reversing Valve - Less Coil								
126021	V12-4220T4-1IL	V39-C321	23	1 1/8"	1 3/8"	45.4	2590	100

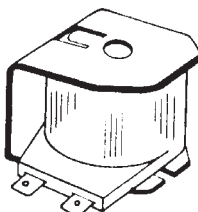
Capacity values are based on a 14 kPa pressure drop across the suction path of the valve at pumping rates occurring at 49°C condensing temperature (14K superheat) and 4°C evaporating temperature (5.6 K superheat). The pressure differential across the valve may momentarily drop below the minimum 100 kPa value during reversal. However if the system can produce a pressure differential of 100 kPa (or higher) across the valve, then the reversal will be satisfactory.



Ranco Reversing Valve Solenoid Coils

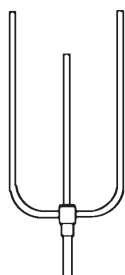
Cat. No.	Part No.	Voltage ▼	Description
126028	L30-420000-57	240V 50Hz	Suits V2, V3, V6, V10 and V12-3220T0-157 Valves.
126100	L30-120000	24V 50Hz	
126104	L30-734801-57	12V DC	
126102	LB6	240V 50Hz	Suits V26-110B only.
126027	EC-1210	240V 50Hz	Suits Old Series V25, V26, V30, V38 and V39-C321 Valves.
126030	L27-2003	24V 50Hz	
126099	7748-1	—	Accessory Pack: Consists of two flag connectors and one insulator which snaps over the two terminals on the coil and locks onto the coil moulding.
126033	LDK-41	240V 50Hz	Suits New Series 4 V2, V3, V6, V10 and V12 Valves
126034	LDK-11	24V 50Hz	

Reversing Valve Coils are designed to operate valves at 10% over and 15% under the rated coil voltage at a 27°C ambient temperature, with 0.15 m/s air movement over them.



Ranco Domestic Hot Gas Defrost Valve Solenoid Coils

Cat. No.	Part No.	Voltage	Application
126101	EC-2370A	240V 50Hz	Suits 100 and 200 Series V16 Valves
126103	EC-2380A		Suits 500 Series V16 Valves
126108	EC-2390C		Suits Chatleff Valves



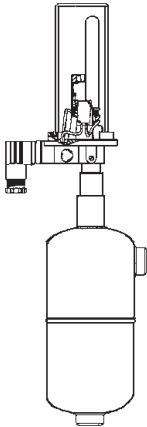
Chatleff Domestic Hot Gas Defrost Valves (Less Coil)

Cat. No.	Part No.	Ports		Nominal Orifice
		Number	O.D.	
126032	HG-LK2B	3	¼"	1.6mm
126035	HG-ASB	2	¼"	
126062	S24OHD/T	Solenoid Coil to suit above valves		
126054	HG-046	Retainer Clip for S24OHD Coil		

Liquid Level Float Switch

Parker LL Series

For Ammonia, R22, R134a and other common Refrigerants



LL with QC plug

Features

- Moving parts and switch hermetically sealed. Isolated from moisture, dust and tampering
- Visual observation of switching action
- Non-mercury, snap-acting switch, fuse protected
- Switch assembly can be replaced without opening to refrigerant pressure
- Suitable for all common refrigerants and similar liquids
- Can be externally actuated with permanent magnet to check electrical circuits
- Switch assembly fully rotatable to suit installation position
- Large available differential minimises short cycling or actuation of switch by liquid surges
- LL, LLC, LLS, LLSC are UL listed
- Quick connect electrical plug

Description

This float controlled, magnetically actuated, mechanically operated HERMETICALLY SEALED switch assembly can maintain close control of the liquid level. The rugged construction makes it relatively insensitive to disturbances of the refrigeration system or vibration of the attached pipe lines. The electrical switch and operating mechanism are encapsulated within a transparent housing which hermetically seals the moving parts and switch from ambient conditions and yet allows observations of the switching motion for determination of the liquid level. Types LLC and LLSC are suitable for outdoor service.

Purpose

The function of the Refrigerant Float Switch is to provide electrical switching action in response to a change in refrigerant liquid level.

This device can be used with all common refrigerant liquids with specific gravity of 0.57 to 1.7 in a temperature range of -45 to 65°C.

It is used to control and monitor the liquid level in flooded surge drums, flooded shell and tube chillers, high and low pressure receivers, intercoolers, transfer vessels and various kinds of accumulators including liquid recirculating types.

In order to accomplish the above operation, the Float Switch is used to open and close solenoid valves, to activate or deactivate electrical controls, to energise or de-energise magnetic starters for starting and stopping refrigerant liquid pumps and compressors and, as a safety device to sound alarms and turn on lights when there is danger of high or low liquid level.

Specifications

Standard Chamber Material: Steel.

Float Ball Material: Stainless Steel.

Design Pressure: 2070 kPa (300 psig).

Standard Fluid Temperature Range: -45 to 65°C.

Ambient Temperature Range: -45 to 50°C.

Switch Details: SPDT, snap acting, non-mercury.

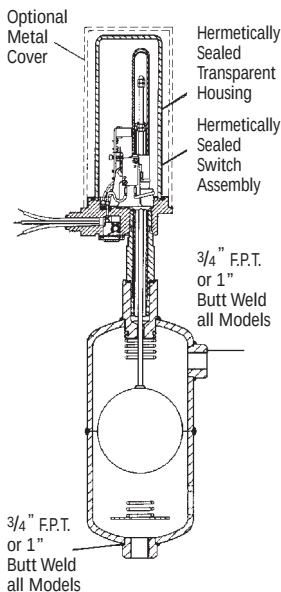
Rating: 120/240 VAC 10 Amp 240 VA Pilot Duty.

Fluid Specific Gravity Range: 0.57 to 1.7.

Differential: Adjustable 13 to 50mm Factory set at 50mm.

Chamber Connections: Combination fitting: 3/4" FPT or 1" Butt Weld.

Replaceable Fuse, 7 Amp 240 VAC.



Cat. No.	Part No.	Description
127043	LL	Standard Hermetic
127042	LLC	Standard Hermetic with metal cover

All models are supplied with Quick Connect Feature.

Switch Assemblies

Cat. No.	Part No.	Description
129530	050100	Switch Assembly for LL, LLC, LLS, LLSC
129533	050421	As above to suit Quick Connect Plug

Explosion Proof LLXS and Low Temperature -75°C. Types LLA, LLAC and LLAX available on request.

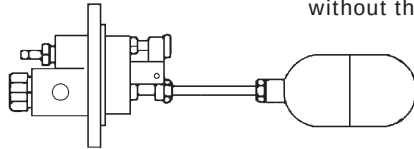
Float Valves

Phillips Series 300H and 300A, Low Side Float Valves

Insert Mounting – Direct Feed – Fixed Level

These Low Side Float Valves insert into a surge drum or pump accumulator to modulate flow of liquid refrigerant for control of level. External level adjustment is usually not needed for this application.

Designed for ammonia systems, these cartridge type valves mount on flange (welded or threaded) to a three-inch pipe. Baffles protect float from liquid movement within tank. If positive shut-off is required, a solenoid valve must be added to liquid line. A secondary seat shut-off arrangement allows cartridge replacement without pumping down. For use in R22 systems, these valves are supplied without the secondary seat shut-off arrangement and with heavier floats.

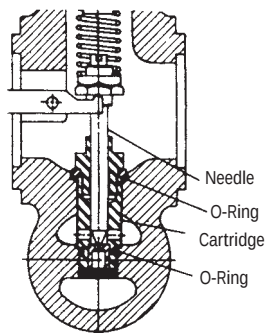


▼ Cat. No.	Type	Orifice Size	Conns.	Cv	Valve Capacities: kW									
					R717					R22				
					Inlet Pressure: kPa									
					550	690	860	1100	1380	550	690	860	1100	1380
135335	300H	3/32"	1/2" FPT	.098	16.8	17.9	20.7	22.1	25	4.2	4.2	4.9	5.2	5.6
135336		7/64"		.16	27.4	29.5	33.4	35.1	42.2	6.6	7	7.7	8.4	8.7
135337		1/8"		.22	38.6	42.2	45.7	49.2	56.2	9.1	9.8	10.5	11.6	12.3
135338		9/64"		.26	45.7	49.2	52.7	59.7	66.8	10.9	11.6	12.6	13.7	1.4
135339	300A	5/32"		.35	56.2	63.3	73.8	80.8	87.9	14.7	15.4	16.8	18.2	19.6

Calculated for operation with saturated liquid at the valve inlet. To develop these capacities the pressure drop across the valve must be greater than one-half the inlet absolute pressure. When liquid is subcooled, valve capacity will increase. To calculate increase see Liquid Subcooling Factor table.

Liquid Sub-Cooling Factors

Sub Cooling	3 K	5.5 K	11 K	17 K	28 K
Factor	1.25	1.47	1.75	1.9	2.2



Cartridge Type 101 and 101A Valve Construction

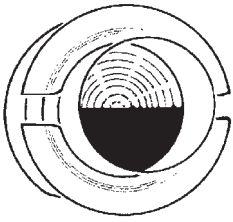
Phillips Cartridge Kits

These Kits contain parts most frequently required for replacement. Each Kit is individually packaged, with the Kit Number and orifice size indicated on the label.

Cat. No.	Kit No.	Suits Float Valve	Orifice Size
135432	K152K	101	3/16"
135439	K152L	101A	1/4"
135471	K310	300H, 300HM, 301E	3/32"
135472			7/64"
135473			1/8"
135474			9/64"
135475	K310A	300A 300AM, 301G	5/32"
135476			3/16"

Thermostatic Expansion Valves

Phillips Level Eye



The Phillips Level Eye® is an economical bulls-eye sight glass. The unique reflex lens indicates the true level of liquid without requiring a second lens. Due to its configuration the lens appears dark in the presence of liquid, and appears clear if no liquid is present. The Level Eye shows 38mm of liquid. A clear lens is also available when it is desirable to look into a vessel, and can be used in pairs by shining a light into one and looking into the other. A pair can also be used in construction of a liquid line indicator.

For clear vision with refrigerant temperatures down to -29°C the standard length frost shield is usually frost free. For refrigerant temperatures below -29°C a 25mm longer frost shield is available.

Application

The Level Eye is particularly suitable for refrigerant vessels such as receivers, intercoolers, suction accumulators, oil separators, surge drums, columns and liquid indicators.

Specifications

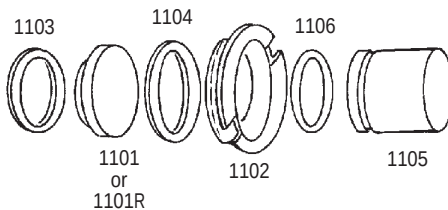
The weld type housings for the Level Eye are machined from low carbon steel cold drawn bars, suitable for welding. The welding neck is dimensioned to nominal 1½" Schedule 80 pipe.

Maximum temperature differential for all the glass is 265°C.

Maximum temperature for the gaskets are: Neoprene or Buna-N 121°C.

Maximum service pressure: 6900 kPa.

Cat. No.	Part No.	Description	Housing Length
Weld Type – Reflex Lens			
136030	1100-R	Level Eye	50mm
136031	1100-RN	With Frost Field	
136032	1100-RNX	With Long Frost Shield	
136033	1100L-R	Level Eye	100mm
136034	1100L-RN	With Frost Shield	



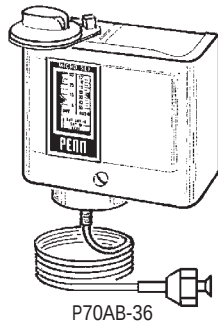
Cat. No.	Part No.	Description
Components		
136002	1101	Clear Lens Glass
136003	1101R	Reflex Lens Glass
136004	1102	Retainer, Steel
136005	1103	Neoprene Gasket
136006	1104	Fibre Gasket
136007	1105	Frost Shield
136009	1106	O-Ring, Buna-N

Pressure Controls

Penn P70 Series

Series P70 single pole controls are supplied for a variety of pressure applications. The controls for “non-corrosive refrigerants” can be used with refrigerants operating within the specified pressure range. Controls are also supplied for ammonia refrigerant.

1

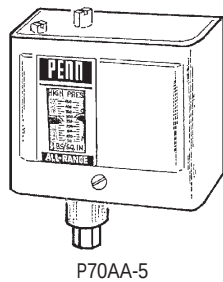


P70AB-36

Cat. No.	Part No. ▼	Switch Action	Range kPa (psig)	Differential		Pressure Connector	Limited Knob Adjust.	Max. Bellows Pressure	
				kPa	psi			kPa	psig
Single Pole Low Pressure for Non-Corrosive Refrigerants									
143007	P70AB-36	Close High Open Low	-68 to 690 (20" to 100)	Min. 40 Max. 345	Min. 6 Max. 50	900mm Cap. with ¼" Fl. Nut	Cut-out	2240	325
143010	P70CA-86	Open High Close Low	345 to 3100 (50 to 450)	Min. 414 Max. 1030	Min. 60 Max. 150	900mm Cap. with ¼" Fl. Nut	None	3275	475
Head Pressure – Fan Cycling for Non-Corrosive Refrigerants									
143002	P70AA-129	Open Low Close High	700 to 2800 (100 to 400)	Min. 250 Max. 1350	Min. 35 Max. 200	900mm Cap. with ¼" Fl. Nut	None	3447	500

Electrical Ratings - Refer Page 70

Conversion: 1 bar = 100 kPa = 14.5 psi

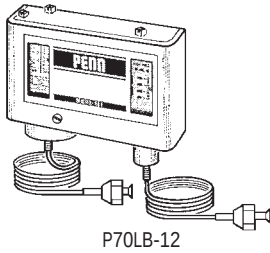


P70AA-5

Cat. No.	Part No.	Switch Action	Range kPa (psig)	Differential		Pressure Connector	Limited Knob Adjust.	Max. Bellows Pressure	
				kPa	psi			kPa	psig
Single Pole Low Pressure for Ammonia									
143004	P70AA-5	Close High Open Low	-68 to 690 (20" to 100)	Min. 40 Max. 345	Min. 6 Max. 50	1/4" FNPT	None	2240	325
143011	P70CA-87	Open High Close Low	-68 to 690 (20" to 100)	Min. 40 Max. 345	Min. 6 Max. 50	1/4" FNPT	None	2240	325
Single Pole High Pressure for Ammonia									
143003	P70AA-119	Close High Open Low	345 to 2065 (50 to 300)	Min. 140 Max. 700	Min. 20 Max. 100	1/4" FNPT	None	2758	400
143014	P70DA-2	Open High Close Low	345 to 3100 (50 to 450)	Lockout (Requires Manual Reset)				3275	475

Electrical Ratings - Refer Page 70

Conversion: 1 bar = 100 kPa = 14.5 psi



Cat. No.	Part No.	Switch Action	Low Pressure				High Pressure				Pressure Connector	Limit Knob Adj.	Max. Bellows Pressure		
			Range		Differential		Range		Differential Non-Adjust				kPa	psig	
			kPa	psig	kPa	psi	kPa	psig	kPa	psi					
Single Pole Dual Pressure for Non-Corrosive Refrigerants															
143016	P70LB-12	S.P.S.T.	-68 to 690	20" to 100	Min. 40 Max. 345	Min. 6 Max. 50	690 to 2930	100 to 425	Under 2070, 380 Over 2070, 450	Under 300, 55, Over 300, 65	900mm Cap. with 1/4" Fl. Nut	Cut-out	Low 2240	Low 325	
143017	P70MA-46								Lockout (Requires Manual Reset)			None			
Single Pole Dual Pressure for Ammonia															
143018	P70MA-2	S.P.S.T.	-68 to 690	20" to 100	Min. 40 Max. 345	Min. 6 Max. 50	690 to 2930	100 to 425	Lockout (Requires Manual Reset)		1/4" FNPT	None			

Electrical Ratings - Refer Page 70

Conversion: 1 bar = 100 kPa = 14.5 psi

Guide to setting a pressure control

All adjustable pressure switches have a controlling range, which can be adjusted to the desired set point and a differential setting.

All pressure switches should be calibrated manually via use of a pressure gauge to ensure the correct pressure points are achieved and proven.

All low-pressure controls have cut in range (control range) and a cut out range (differential). Where as some high pressure controls only have a cut out range with a fixed differential that cannot be adjusted.

Before fitting the pressure control to the system the control set points should be set on the controllers scale, starting with the cut in range and followed by the cut out range (differential). Subtracting the differential from the cut in will set the cut out pressure. Then verify the settings with a pressure gauge and calibrate as necessary.

Example: cut in at 400kpa

Minus the Differential at 200kpa

400 minus 200 = 200kpa cut out setting.

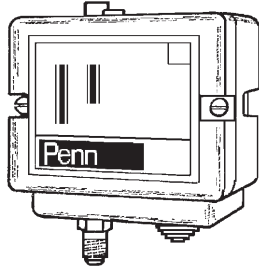
A common misconception to setting a pressure control is to set the cut in (controlling range) and then set the differential setting without taking into account that the differential setting has to be subtracted by the cut in (controlling range).

Pressure Controls

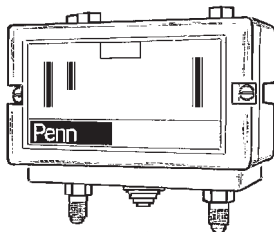
Features

- All models have IP-54 enclosure
 - Case and Cover: Aluminium diecast
- S.P.D.T. contacts standard on all P77 pressure controls
- All dual pressure controls have two alarm circuits for separate low pressure and high pressure cut-out indication (except P78ALA-9351)
- Ease of wiring and adjustment
- Stable switching points
- Leakproof bellows
- Ambient Temperature Limits:
 - 50°C to 55°C (70°C Max. 2 hours)

1



P77



P78

Penn P77 Series Single Pressure

Cat. No.	Part No.	Contact Function	Range		Differential		Press. Conn.	Max. Bellows Press.
			kPa	psig	kPa	psi		
Low Pressure Controls for Non-Corrosive Refrigerants								
143081	P77AAA-9300	Diag. 1	-50 to	15" to	50 to 300	7 to 44	1/4"	2200 kPa 320 psig
143082	P77BCA-9300		700	102	Manual Reset			
Low Pressure Controls for Ammonia and Non-Corrosive Refrigerants								
143083	P77AAA-9700	Diag. 1	-50 to	15" to	50 to 300	7 to 44	1/4"	1400 kPa 203 psig
143084	P77BCA-9700		700	102	Manual Reset			
High Pressure Controls for Non-Corrosive Refrigerants								
143087	P77AAA-9350	Diag. 2	300 to	44 to	300 to 1200	44 to 174	1/4"	3300 kPa 479 psig
143088	P77BEA-9350	Diag. 3	3000	435	Manual Reset			
Fan Cycling Control for Air Cooled Condensers for Non-Corrosive Refrigerants								
143086	P77AAA-9351	Diag. 2	350 to 2100	51 to 305	210 to 550	26 to 80	1/4" M. Flare	3000 kPa 435 psig
High Pressure Controls for Ammonia and Non-Corrosive Refrigerants								
143089	P77AAA-9750	Diag. 2	300 to	44 to	300 to 1200	44 to 174	1/4" FNPT	3300 kPa 479 psig
143090	P77BEA-9750	Diag. 3	3000	435	Manual Reset			

Penn P78 Series Dual Pressure

Cat. No.	Part No.	Contact Function	Low Pressure				High Pressure				Press. Conn.	Max. Bellows Pressure	
			Range		Differential		Range		Differential			kPa	psig
			kPa	psig	kPa	psi	kPa	psig	kPa	psi		kPa	psig
Dual Pressure Controls for Non-Corrosive Refrigerants													
143095	P78LCA-9300	Diag. 4	-50 to 700	15" to 102	50 to 300	7 to 74	300 to 3000	44 to 435	300 fixed	44 fixed	1/4" M. Flare	2200 L 3300 H	320 L 479 H
143097	P78MCA-9300				Manual Reset				Manual Reset				
143099	P78PGA-9300												
Dual Pressure Controls for Ammonia and Non-Corrosive Refrigerants													
143096	P78LCA-9700	Diag. 4	-50 to 700	15" to 102	50 to 300	7 to 74	300 to 3000	44 to 435	300 fixed	44 fixed	1/4" FNPT	1400 L 3300 H	203 L 479 H
143098	P78MCA-9700								Manual Reset				
Dual Fan Cycling Control for Air Cooled Condensers for Non-Corrosive Refrigerants													
143100	P78ALA-9351	Diag. 5	350 to 2100	51 to 305	180 fixed	26 fixed	350 to 2100	51 to 305	180 fixed	26 fixed	1/4" M. Flare	3000 L 3000 H	435 L 435 H

Note: Models with 1/4" Solder Pressure Connections are available.

Accessories

147050	14870	Capillary Adaptor, 1 Metre
147051	31696-1	Mounting Bracket

Contact Functions

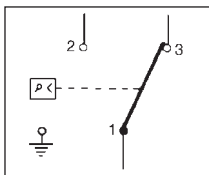


Diagram 1:
1-3 open on pressure decrease

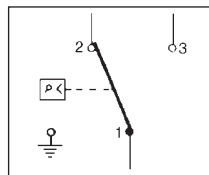


Diagram 2:
1-2 open on pressure increase

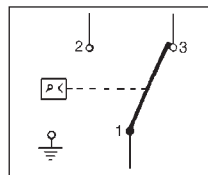


Diagram 3:
1-3 open on pressure increase

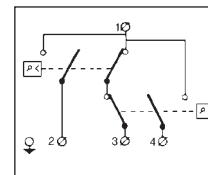


Diagram 4:
LP: 1-3 open on press. decrease
1-2 close simultaneously
HP: 1-3 open on press. increase
1-4 close simultaneously

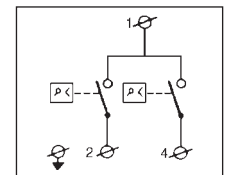
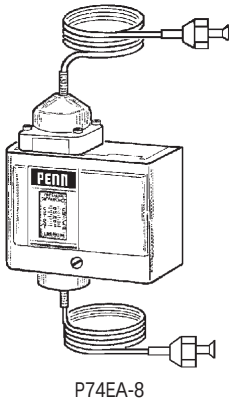


Diagram 5:
No. 1 Fan:
1-2 closes on pressure rise
No. 2 fan:
1-4 closes on pressure rise

Electrical Rating 10 FLA @ 240V. 50Hz.

Pressure Controls

Penn P74 Series Differential Pressure Controls



These differential pressure controls are for use as operating controls and/or indicating system functions through display lights or panels. They measure the difference in pressure exerted upon its two sensing elements.

The controls are available for applications sensing air, oil or liquid. Typical applications are proof of flow across a chiller or water cooled condenser, proof of flow in a heating or cooling coil and lube oil pressure sensing on refrigeration compressors. On a proof of flow application the control measures pressure drop across two different points in either a closed water circulating system or a city water supply system.

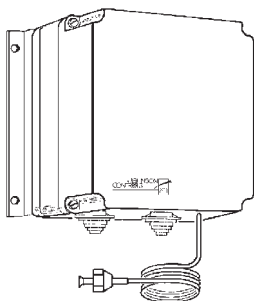
On a proof of flow application in a water chiller system the control activates a light or signal to indicate a loss of water.

Cat. No.	Part No.	Switch Action	Range		Press. Conn.	Max. Bellows Press. (Momentary) kPa (psig)
			kPa	psig		
For Non-Corrosive Refrigerants						
143076	P74EA-8	SPDT	15 to 210	2 to 30	900mm Cap. with 1/4" Fl. Nut	1240 (180)
143072	P74FA-9	SPDT	50 to 400	8 to 70	1/4" M. Flare	
For Ammonia						
143073	P74BA-8	SPST Opens on Decrease in Press. Diff.	50 to 450	8 to 70	1/4" FNPT	1240 (180)

Electrical Ratings - Refer Page 70

Penn P215DP Electronic Fan Speed Controller

For Single Phase Motors



The P215DP Controller is designed for speed variation of single phase motors, especially for fan speed control on air cooled condensers. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

Using a pressure transducer as the input device to the fan speed controller, gives the most direct and fastest response to pressure variations in the refrigeration system. The controller varies the supply voltage to the motor from 45% to at least 95% over the proportional band using the phase cutting principle.

If the pressure drops below the adjusted setpoint minus the proportional band, the output to the motor is zero volt or the adjusted minute speed setting. This provides speed variation of permanent split capacitor or shaded pole motors which do not draw more than 8 A (rms) full load current.

The motor manufacturer should also have approved their product for this speed control principle.

Features

- Condenser pressure control by fan speed variation
- Pressure input
- Dual input possibility
- Adjustable minimum speed or cut-off selection
- Field proven adjustable range pressure transducer(s)
- Built-in suppression filter

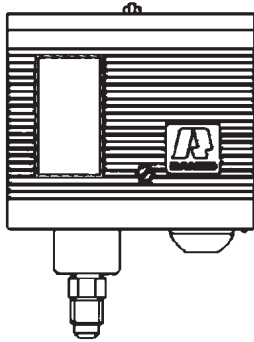
For Non-Corrosive Refrigerants

Cat. No.	Model	Range kPa (psig)	Proportional Band kPa (psi)	Maximum Overrun Press. kPa (psig)	Electrical Rating	Pressure Connection	Operating Ambient Temp. °C
143068	P215DP-9100	1400 to 2400 (203 to 348)	400* (58)	4000 (580)	8A 230V 50 Hz	1/4" Flare Nut 900mm Cap.	-20 to 55

* At the minimum speed adjustment of 45% of line voltage.

Pressure Controls

Ranco Type 016



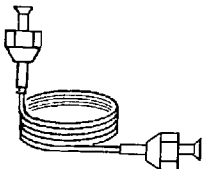
Type 016

Ranco 'O' Series commercial refrigeration and air conditioning controls are available for low pressure, high pressure and dual pressure applications. All controls have SPDT electrical contacts.

Variations include fixed and adjustable differential, operation on rise and fall of pressure, automatic cycling or manual reset. Accessories include mounting brackets and capillary adaptors.

Cat. No.	Part No.	Former Part No.s	Adjust. Range kPa (psig)	Differential kPa (psi)	Pressure Conn.
Low Pressure Controls					
147001	016-8706	016-1401 Replaces: 010-1401, 1831, 6003 011-1754, 1799, 016-107, 120	-30 to 700 (9" to 100)	60 to 400 (9 to 57)	1/4" Male Flare
147002	016-8713	016-1402 Replaces: 010-1402, 1483, 1842, 6006	-30 to 700 (9" to 100)	60 to 400 (9 to 57)	910mm Cap. 1/4" Fl. Nut
Low Pressure Control with Manual Reset					
147003	016-8705	016-6807 Replaces: 010, 1867, 1925	-30 to 700 (9" to 100)	60 Fixed (9 Fixed)	1/4" Male Flare
High Pressure Control					
147004	016-8750	016-6809 Replaces: 010-1894 011-1711, 1713, 016-108*	700 to 3000 (100 to 435)	250 to 800 (35 to 115)	1/4" Male Flare
High Pressure Control with Manual Reset					
147005	016-8751	016-6806 Replaces: 010-1895 011-1712*, 1714, 016-200*	700 to 3000 (100 to 435)	320 Fixed (45 Fixed)	1/4" Male Flare

Accessories

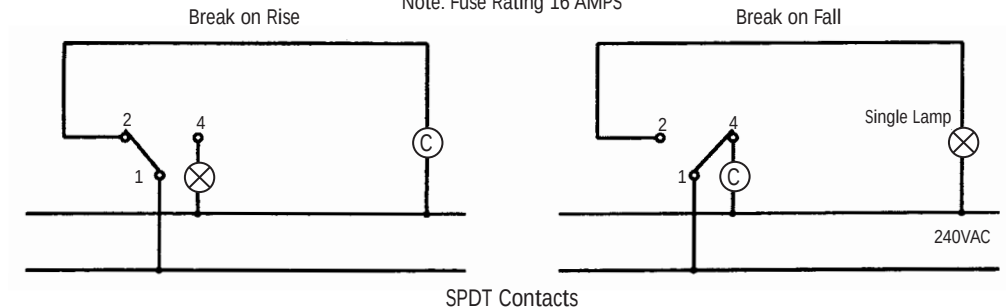


Cat. No.	Part No.	Description
147050	14870	Capillary Adaptor, 1 Metre
147051	31696-1	Pressure Control Mounting Bracket

Electrical Ratings:
Types: 016 – 240 Vac, 12A FLA, 72A LRA, with SPDT contacts

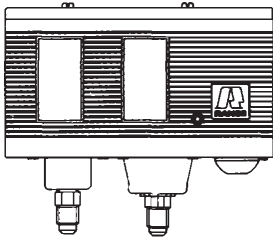
Wiring Diagrams for 016 Series

Note: Fuse Rating 16 AMPS



Pressure Controls

Ranco Type 017



Type 017

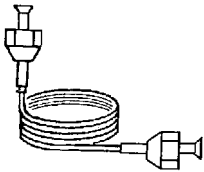
Ranco 'O' Series commercial refrigeration and air conditioning controls are available for low pressure, high pressure and dual pressure applications. All controls have SPDT electrical contacts.

Variations include fixed and adjustable differential, operation on rise and fall of pressure, automatic cycling or manual reset. Accessories include mounting brackets and capillary adaptors.

Cat. No.	Part No.	Former Part No.s	Low Pressure		High Pressure		Pressure Conn.
			Adjust. Range kPa (psig)	Adjust. Differential kPa (psi)	Adjust. Range kPa (psig)	Fixed Differential kPa (psi)	
Dual Pressure Controls							
147027	017-8711	017-6711 Replaces: 012-1508, 1549, 4105, 4106, 4107 012-4109, 1554, 1609, 1637	-30 to 700 (9" to 100)	60 to 400 (9 to 57)	700 to 3000 (100 to 435)	345 (50)	910mm Cap. 1/4" Fl. Nut
147028	017-8701	017-1550 Replaces: 012-4108, 1505, 4066, 1550	-30 to 700 (9" to 100)	60 to 400 (9 to 57)	700 to 3000 (100 to 435)	345 (50)	1/4" Male Flare
Dual Pressure Control with Manual Reset on High Pressure Side							
147030	017-8705	017-320 Replaces: 012-1551, 1552, 1605, 1546	-30 to 700 (9" to 100)	60 to 400 (9 to 57)	700 to 3000 (100 to 435)	345 (50)	1/4" Male Flare
Dual Pressure Control with Manual Reset on High and Low Pressure Sides							
147032	017-8703	017-321 Replaces: 012-1530*, 1594*, 1617*, 1595* 017-322	-30 to 700 (9" to 100)	fixed 60 (9)	700 to 3000 (100 to 435)	345 (50)	1/4" Male Flare

1. If Pressure Controls shown on chart fitted with 1/4" Male Flare Pressure Connection are used as replacements for controls with asterisk (*), then Capillary Adaptors Cat. No. 147050 should be used.
2. Where old series part numbers are listed showing the new replacement part numbers, exact replacement of old control may not be possible in every case. Specifications should be carefully checked for suitability.

Accessories



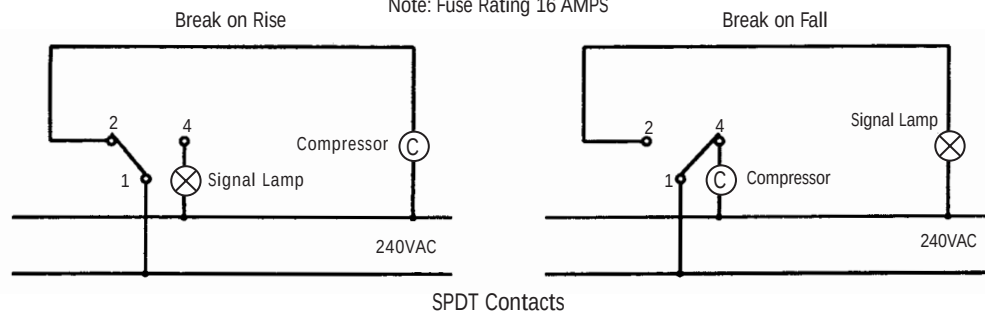
Cat. No.	Part No.	Description
147050	14870	Capillary Adaptor, 1 Metre
147051	31696-1	Pressure Control Mounting Bracket

Electrical Ratings:

Types: 017 – 240 Vac, 12A FLA, 72A LRA, with SPDT contacts

Wiring Diagrams for 017 Series

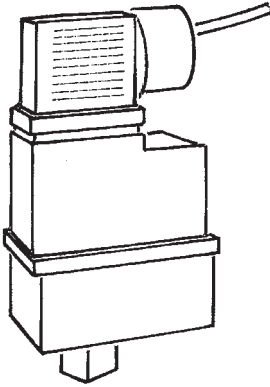
Note: Fuse Rating 16 AMPS



Pressure Controls

Flow Controls

(Alco) FSM Series Electronic Fan Speed Controls



The FSM controls the head pressure in air-cooled condensers by reducing the fan speed to maintain head pressure as the outside temperatures/condenser pressure drops. As the motor speed drops under lower ambient/load condition fan noise is also reduced.

The FSM is designed for use with permanent split capacitor and shaded pole fan motors, approved for use by motor/equipment manufacturers for variable voltage, phase angle (triac) speed control.

The FSM connects to the top of the receiver or liquid line after the condenser, where it will sense the high side pressure. It should ideally be mounted in a location where there is moving outside air. The 1/4" female flare connection includes a valve depressor for ease of installation.

Features

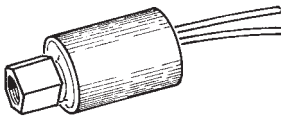
- Pressure Operated Fan Speed Control to maintain Head Pressure
- Compact size: 50 x 50 x 40mm
- State-of-the-Art Electronics
- Direct mount – Easily retrofit to suitable motor
- Adjustable Pressure Setting
- Multiple FSM's can be used in parallel on multi-circuit condensers

Cat. No.	Part No.	Pressure Range kPa (psig)	Modulating Band kPa (psi)	Factory Setting @ Max. Speed kPa (psig)	Max. Proof Test kPa (psig)	Max. Cont. Current Amps	Supply Voltage
143059	FSM-41S	655 to 1517 (95 to 220)	241 (35)	1100 (160)	3100 (450)	3	230 Vac.
143060	FSM-42S	1310 to 2480 (190 to 360)	379 (55)	1620 (235)	3585 (520)		

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Penn P100 Series Encapsulated Pressure Switches

P100 Series switches are encapsulated, non-adjustable, SPST, direct mount switches for use with non-corrosive refrigerants. The switches are available in both open low and open high configurations.



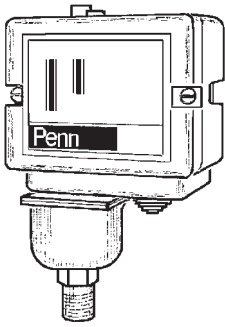
Features

- Compact size and light weight allow for direct mounting
- Use with all non-corrosive refrigerants
- 1/4" female flare fitting with built-in Schrader type depressor is standard
- Encapsulated switch, dust tight
- Electrical connections are made to 1200mm leads

Cat. No.	Part No.	Switch Action	Application	Pressure Settings: kPa (psig)	
				Opens	Closes
143101	P100AA-2D	Open on Fall	Low Cutout	241 (35)	414 (60)
143102	P100CA-2D	Open on Rise	High Cutout	2930 (425)	2240 (325)
143103	P100AP-201D	Open on Fall	Low Cutout	(69) (10)	220 (32)
143104	P100AA-3D	Open on Fall	Low Cutout	1034 (150)	1551 (225)
143106	P100CP-1D	Open on Rise	High Cutout	2758 (400)	2068 (300)
143107	P100DA-1D	Open in Rise	High Cutout	2827 (410)	Manual Reset

Pressure Controls

Penn P48 Series for Steam, Air or Hot Water



The P48 Pressure Controls are designed as operating or high/low cut-out control on steam, air or hot water applications. Also for non-combustible gases which are not harmful to the phosphor bronze bellows. On steam applications the use of a steam trap is recommended.

Features

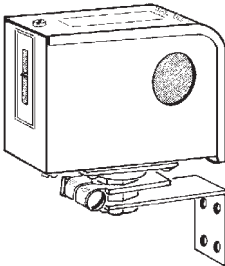
- Splash proof IP54 enclosure
- SPDT contacts standard
- 3/8" M.BSP Connection

Range Scale: Indicates high switch point (contacts 1-2 open, 1-3 closed). Deduct differential to obtain low switch point (contacts 1-2 closed, 1-3 open).

Cat. No.	Part No.	Range		Differential		Max. Ambient Temp. °C	Max. Bellows Press. kPa
		kPa	psig	kPa	psi		
143200	P48AAA-9110	0 to 100	0 to 14.5	16 to 55	2.3 to 8	-55 to 55 (70 Max. 2 hours)	350
143201	P48AAA-9120	20 to 400	2.9 to 58	25 to 80	3.6 to 11.6		800
143202	P48AAA-9130	100 to 1000	14.5 to 145	100 to 300	14.5 to 43.5		1500
143203	P48AAA-9140	400 to 1600	58 to 232	130 to 250	19 to 36.3		2500
143204	P48AAA-9150	300 to 3000	43.5 to 435	300 to 1200	43.5 to 174		3300

Electrical Rating: 10 Amp. 380V. AC. 220V. DC, 12W (pilot duty only).

Penn P10 Series – Low Pressure Range



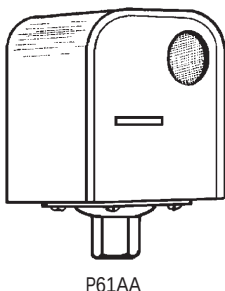
The P10 Series low pressure controls are for applications in which a pneumatic air signal is used to operate an electric or electronic device. Typical applications include: pressure-electric switches in pneumatic systems, control of pumps or small air compressors, and pressure-electric interlock of fluid flow systems.

Cat. No.	Part No.	Switch Action	Range kPa (psig)	Differential kPa (psi)	Pressure Connector
143275	P10BC-28	SPDT	20 to 140 (3 to 20)	14 (2)	1/8" NPT

Penn P61 Series Pump and Air Compressor Switches

Universal Replacement

Compact, NEMA 1 case with earthing screw and cover screw. Two pole, single throw contacts open on pressure rise. Pressure switch for domestic water systems, air compressors (not requiring mechanical release valves) and where pressure does not exceed 483 kPa (70 psig). Also for miscellaneous applications which are not harmful to the Buna-N diaphragm or the plated steel diaphragm housing.



P61AA

Cat. No.	Part No.	Range Min. Cut-in to Max. Cut-out kPa (psig)	Differential Adjustment kPa (psi)		Factory Setting kPa (psig)		Switch Action	Pressure Connector
			Min. at Low End	Max. at High End	Open	Close		
143269	P61AA-6	100 to 480 (15 to 70)	100 (15)	205 (30)	275 (40)	138 (20)	D.P.S.T. Open High	1/4" FNPT
143265	P61NA-2	270 to 700 (40 to 100)	110 (16)	260 (38)	585 (85)	414 (60)		
143190	P61NA-4	600 to 1000 (90 to 150)	170 (25)	275 (40)	860 (125)	655 (95)		

Electrical Ratings: 0.75 Kw at 120/240V. AC. 1,2 phase
0.18 Kw at 32V. DC

Air Flow Controls

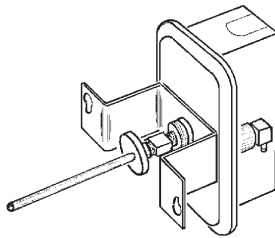
Penn P32 Series Differential Pressure Switch

Senses Air Flow in Ducts

Applications

Air proving with electric duct heaters, humidifiers etc.
Maximum air flow controller for variable volume systems.
Reheat duct powered systems. Clogged filter detection.
Detection of icing of air conditioning coils and initiation of defrost cycle.

- Ambient Temperature: Minimum -40°C Maximum 75°C.
- Connector: HP Metal 1/8" FNPT inside x 1/2" NPSM outside. LP moulded FNPT.
- Maximum Pressure: 7 kPa.
- Mounting: Direct or with 'L' or 'U' bracket supplied.

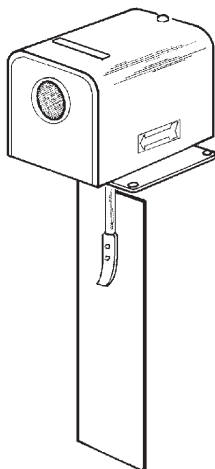


P32AC-2

Cat. No.	Part No.	Switch Action	Range Pa	Sensitivity at Minimum Set Point Pa	Set Point	Scale Plate	Bracket Type
143074	P32AC-1	SPDT	37 to 2990	17	Adjust.	Yes	L
143075	P32AC-2*		12 to 1240	10			U
143077	P32AF-2*		12 to 1240	6			U

*Supplied with 1/4" compression fitting. 100mm extension tube, 2 mounting screws, 'O' gasket, angle barb fitting installed.

Electrical Ratings	Type P32AC (Standard Differential, 0.37 Kw)	Type P32AF (Close Differential, 0.18 Kw)
Motor Rating	240V AC	240V AC
AC Full Load Amps	4.9	2.9
AC Locked Rotor Amps	29.4	17.4
Non-Inductive or Resistive Load	15 Amps, 24 to 277V. AC	10 Amps. 24 to 277V. AC
Pilot Duty	125VA, 24V. AC. 360VA. 120 to 277V. AC	



Penn F62 Series Air Flow Switch

This control detects air flow or the absence of air flow in ducts, responding only to velocity of air movement. One piece stainless steel paddle may be trimmed, if needed. Control supplied with mounting plate gasket.

Range adjusting screw permits field adjustment of flow rate setting.

Cat. No.	Part No.	Paddle Size mm	Max. Ambient Temp. °C	Max. Air Velocity m/s	Dimensions mm (Including Paddle)
143295	F62AA-8	54 x 175	40	10	265 High x 100 Wide x 70 Deep
143296	F62AA-9	79 x 175			

Paddle Width mm	Switch Actuation on Flow	*Minimum Air Velocity in m/s Required to Actuate Control			
		Horizontal Flow		Vertical Flow (Upward)	
		323 cm² or Larger Duct Area	Less than 323 cm² Duct Area	323 cm² or Larger Duct Area	Less than 323 cm² Duct Area
54	Increase (R to Y Closes)	3.2	2.9	4.8	3.8
	Decrease (R to B Closes)	1.7	1.1	4.3	2.9
79	Increase (R to Y Closes)	2.5	1.8	3.8	2.5
	Decrease (R to B Closes)	1.3	0.5	3.3	1.8

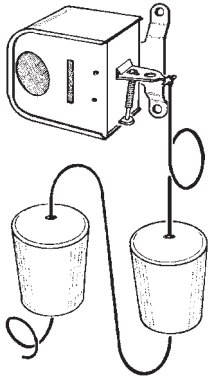
* These are approximations only. Actual trip points are affected by air turbulence, humidity, air density, air temperature, etc.

Electrical Ratings	
Motor Rating	240V AC
Nominal Motor Kw	0.75
AC Full Load Amps	8
AC Locked Rotor Amps	48
Non-Inductive or Resistive Load	22*
Pilot Duty - 125VA. 120 to 277V AC	

*SPST normally closed or normally open rating.
SPDT rating is 16 Amps.

Sump Pump Switches

Penn F59 Series – Weight Operated

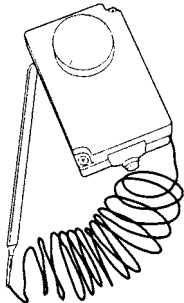


F59H

Switch to start electric motor on liquid level rise, stop motor on liquid level drop. Cuts in when upper weight is submerged approximately halfway. Cuts out when lower weight is approximately half-exposed. Each switch includes 1m polyethylene cable and two weights.

Electrical Ratings: 1HP at 120/240 VAC, 1/4 HP at 32 VDC.

Cat. No.	Part No.	Contact Action	Mounting	Wiring
143310	F59A-1	DPST Close on Rise (Reversible)	Fixed Mounting Bracket	Two holes with grommets in case for Drop Cord Wiring
143311	F59A-2		Universal Mounting Bracket and 600mm strap for mounting on the motor, on the pedestal or on the discharge pipe	
143312	F59H-1		Fixed Mounting Bracket	Conduit Wiring, 22mm Conduit openings in case
143313	WGT11A-601R		Replacement Weight Kit	

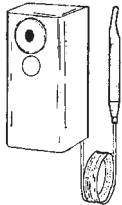


TSC-093

Refco Wide Range Thermostat

Ideal for coolroom installations and other varied controls applications

Cat. No.	Model No.	Range °C	FLA 240VAC	Bulb and Capacity
144195	TSC-093	-30 to 30	15	1.5 Metres



7DI.FR331.OOA

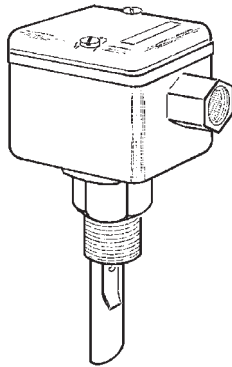
Eurotec Remote Bulb Thermostats

Cat. No.	Part No.	Switch Action	Range °C	FLA 240VAC	Differential k	Bulb and Capacity
144002	7DI.FR331.OOA	SPDT Open High or Low	-35 to +35	16A	2°C	1.5 Metres

Liquid Flow Switches

Penn

F61 Series – Standard Flow Rate



F61MB

This flow switch may be used in liquid flow lines carrying water, ethylene glycol or any liquid not harmful to brass or phosphor bronze and not classified as a hazardous fluid. Switch contacts are SPDT.

Note:

The control is designed for interlock purposes or 'no flow' protection. Where critical or high value products are to be protected, a separate back-up control should be used.

Adjustment

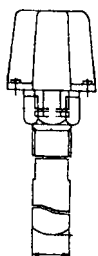
Control is factory set at approx. minimum flow rate, field adjustable by means of range screw under cover.

Cat. No.	Part No.	Conns.	Enclosure	Max. Liquid Pressure kPa (psig)	Max. Liquid Temp. °C	Min. Liquid Temp. °C	Min. Ambient Temp. °C	Electrical Rating
143290	F61SB-9100	1" MBSP	IP43 Splash Proof	1034 (150)	120	4	-40	8 Amp 240V AC
143289	F61KB-11	1" MNPT	IP30 General Purpose				-34	
143297	F61MB-1		IP66 Raintight			-29		
143298	PLT52A-600R	3 Piece Set Replacement Stainless Steel Paddle and 6" Paddle						

		Typical Flow Rates Required to Actuate Switch									
		Line Pipe Size									
		1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"*	5"*	6"*	8"*
Min. Adj.	Flow Increase R to Y Closes I/s	0.26	0.37	0.47	0.86	1.14	1.74	4.1 2.33†	7.89 3.6†	12 4.67†	23.66 12.93†
	Flow Decrease R to B Closes I/s	0.16	0.23	0.32	0.6	0.79	1.2	3.15 1.7†	6.37 2.59†	10 3.41†	20.19 10.73†
Max. Adj.	Flow Increase R to Y Closes I/s	0.56	0.84	1.21	1.83	2.18	3.34	8.08 5.11†	15.45 7.44†	23.66 9.09†	47.95 26.18†
	Flow Decrease R to B Closes I/s	0.54	0.79	1.14	1.7	2.02	3.15	7.7 4.8†	14.83 7†	22.71 8.52†	46.06 25.24†

* Flow rates for these sizes are calculated.

† These figures are for switch with 6" paddle. For 4" and 5" line pipe the paddle is trimmed.

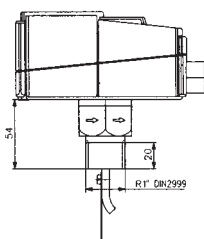


JSF-1E

ALRE

Liquid Flow Switch

Cat. No.	Model No.	Conns.	Enclosure	Max Liquid Temp °C	Min Liquid Temp °C	FLA 240VAC
143285	JSF-1E	1" BSP	IP65	120	-50	8



QVE81.13

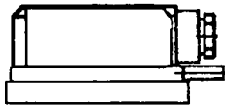
Siemens

Liquid Flow Switch

Cat. No.	Model No.	Conns.	Enclosure	Max Liquid Temp °C	Min Liquid Temp °C	FLA 240VAC
143299	QVE81.13	1" BSP	IP65	120	-40	8

Air Flow Controls

Carel Differential Pressure Switch Kit



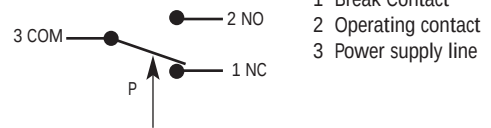
930-80

Applications

Adjustable differential pressure switch for monitoring overpressure, vacuum and differential pressure of air or other non-combustible, non-aggressive gases. Possible fields of application include:

- Monitoring air filters and ventilators
- Monitoring industrial cooling-air circuits
- Overheating protection for fan heaters
- Monitoring flows in ventilation ducts
- Controlling air and fire-protection flaps
- Frost protection for heat exchangers

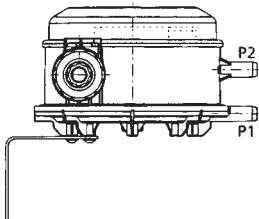
Arrangement of contacts: 1Amp Max



Cat. No.	Part No.	Switch Action	Range Pa	FLA 240VAC	Differential ΔP	Pressure Conn.
*143078	DCPD011100	SPST	20-200	1	Adjustable	1/8" Nipple

*Complete with installation hoses, terminals and nipples

Siemens QBM81 Series - Differential Pressure Switch



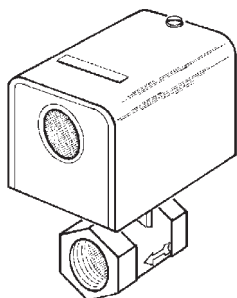
QBM81

The QBM81 differential pressure detectors are used to monitor differential pressure, under- and overpressure in ventilation and air conditioning plants. By measuring differential pressure, they monitor the state of air filters, prevailing air flows, damaged fanbelts and overpressure in clean rooms, kitchens etc.

Cat. No.	Part No.	Switch Action	Range Pa	FLA 240VAC	Differential ΔP	Pressure Conn.
143053	QBM81.3	SPST	20-300	1	Adjustable	6.2mm

Liquid Flow Switches

Penn F61 Series – Low Flow Rate



F61KD

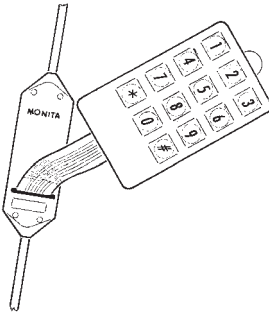
For use on liquid lines using water, ethylene glycol solutions or other liquids not injurious to the brass and phosphor bronze parts.

SPDT contact switch is activated by a low flow rate; however, it has a large flow capacity with minimum pressure drop. Ambient Temperature: 0°C to 82°C.

Cat. No.	Part No.	Conns.	Enclosure	Adjustment Range l/s		Liquid Temp. Range °C	Max. Liquid Press. kPa (psig)	Electrical Rating
				R to Y Closes Flow Increase	R to Y Opens Flow Decrease			
143291	F61KD-3	1/2" FNPT	General Purpose	Min. 0.038	Min. 0.019	0 to 120	1030 (150)	8 amp 240V AC
143292	F61KD-4	3/4" FNPT		Max. 0.069	Max. 0.057			

Auto Dialler / Monitoring Device

Monita Auto Dialler



The Monita event monitoring device provides a low cost solution for remote event monitoring of a complete range of sensors on an endless range of equipment. On the detection of a closed sensor, the Monita will make a telephone call and provide either an audible alarm or a data string that can be decoded by either our Centra Software or by your own SCADA system.

Operates on any analogue telephone system and is certified for operation with the ACA on the Australian Telephone Network.

Features

- Audible alarm or data mode
- Call acknowledgement
- Programmable via a removable keypad
- Housed in a solid epoxy resin casing
- Telephone line powered with memory
- Will call up to 5 numbers in rotation
- Simple installation
- Will share a telephone line with other telephones
- Line occupied detection and call retry
- Call progress detection
- Compatible with any dry contact sensor
- Optional Centra Software

Typical Applications

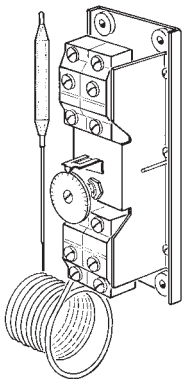
- Refrigeration temperature monitoring
- Power outage notification
- Computers / building management systems
- Pumps and equipment
- Alarms and security systems

Cat. No.	Description	Temperature Operating Range	Monita Dimensions	Isolation
144091	Auto Dialler & Keypad	0 to 70°C	90 x 23 x 10mm	3.00 kV RMS AC

Temperature Controls

Penn A36 Series – 4 Stage

Remote Bulb

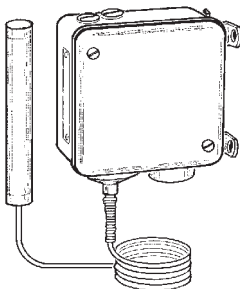


This 4-stage thermostat controls a multiple refrigeration compressor or unloading type compressor in an air conditioning or chiller installation. Case compensation provides uniform performance at ambient temperatures from -18 to 60°C. Screwdriver slot adjuster with calibrated dial enables movement of entire staging band within the range.

Cat. No.	Part No.	Switch Action	Range °C	Differential Fixed K	Bulb and Cap.	Elect. Rating 240V 50Hz	Max. Bulb Temp. °C
144164	A36AHB-29	4 x SPDT	-10 to 30	1.1 Ea. Stage 2 Int. Stage	9.5mm x 102mm 4.6m Cap.	3 Amp.	50

Penn A72 Series – for Cooling Towers

Single Stage – Weatherproof

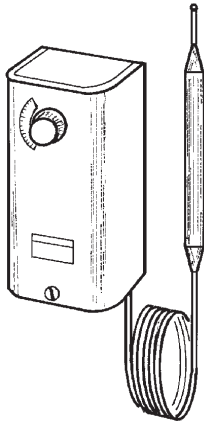


Cat. No.	Part No.	Switch Action	Range °C	Differential K	Bulb and Cap.	Range Adjuster	Max. Bulb Temp. °C
144075	A72AE-10	DPST Open Low	-5 to 30	2.2 to 14	19mm x 172mm Neoprene Coated 1.8m Cap.	Internal Screwdriver Slot	77

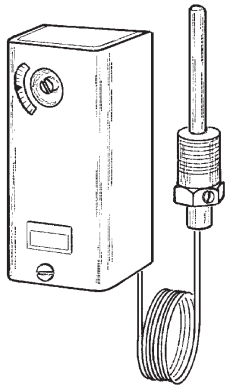
Ambient Temperature Limits: -54 to 66°C

Temperature Controls

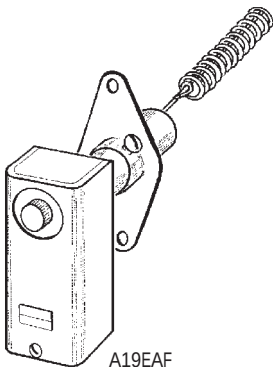
Penn Series A19



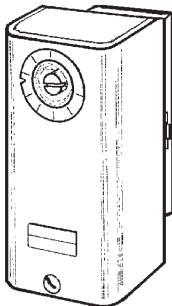
A19ABC-41



A19ABC-27



A19EAF



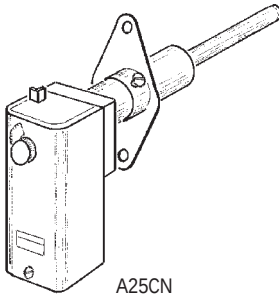
A19DAC

Cat. No.	Part No.	Switch Action	Range °C	Differential K	Bulb and Capillary	Range Adjuster	Max. Bulb Temp. °C
Adjustable Differential							
144070	A19ABC-66	SPDT	0 to 43	2 to 8	9.5mm x 127mm 1.8m Cap.	Knob	60
144064	A19ABB-7	SPST Open High	10 to 94	3 to 13	7.5mm x 64mm 3m Cap.		116
144004	A19ABC-5	SPDT	10 to 55	2 to 8	9.5mm x 127mm 2.4m Cap.		77
144094	A19ABC-41		-35 to 40	1.7 to 6.7	9.5mm x 102mm 2.4m Cap.	Convertible	60
144056	A19ABC-57				9.5mm x 102mm 3m Cap.	Screwdriver Slot	
144057	A19ABC-67				9.5mm x 102mm 6m Cap.	Convertible	
144093	A19ABC-26	Open High & Low (Operating and Circulator) SPDT	38 to 121	3 to 13	Well Conn. 1/2" NPT		143
144092	A19ABC-27	Remote Mtd. (Operating and Circulator) SPDT			1/2" NPT 2.4m Cap.		
Fixed Differential							
144063	A19AAF-49	SPDT	-4 to 107	1.9	9.5mm x 76mm 3m Cap.	Screwdriver Slot	135
144050	A19AAD-5	SPST Open Low	-1 to 10	1.1	9.5mm x 67mm 1.8m Cap.	Screwdriver Slot	88
144041	A19AAC-13	SPDT	40 to 120	3	9.5mm x 102mm 1.8m Cap.		143
144069	A19AAF-44		5 to 30	0.8	9.5mm x 146mm 1.8m Cap.		60
144046	A19AAB-42	SPST Open High	100 to 290	5.6	4.8mm x 152mm copper 2.4m Cap.	Convertible	327
Manual Reset							
144059	A19ACA-28	SPST Open Low	-35 to 40	Manual Reset	9.5mm x 102mm 1.8m Cap.	Screwdriver Slot	60
144026	A19ACA-31				9.5mm x 102mm 3m Cap.		
144096	A19ACA-17				9.5mm x 102mm 6m Cap.		
144071	A19ADB-26	SPST Open High	40 to 120		9.5mm x 89mm 1.8m Cap.	Knob	143
144089	A19ADB-27	SPST Open High		Manual Reset (Locks out High)	1/2" NPT		
144065	A19ADB-11	SPST Open High	100 to 290	Manual Reset	7.5mm x 38mm 1.8m Cap.		
Weatherproof							
144036	A19ANC-13	SPDT	-15 to 65	3 Fixed	7.5mm x 64mm 3m Cap.	Screwdriver Slot	88
For Cooling Towers							
144037	A19ARC-9105	SPDT	5 to 50	2.5 to 11	10.5mm x 110mm 2m Cap. Neoprene Coated	Concealed	100
Coiled Bulb							
144054	A19BAC-3	SPDT	0 to 43	1.9 Fixed	35mm x 57mm Coiled	Convertible	60
144030	A19BAF-3			0.8 Fixed		Knob	
144029	A19BBC-4	SPDT	-35 to 40	1.7 to 7	35mm x 57mm Coiled	Convertible	60
Duct Thermostat – Flange Mount							
144019	A19EAF-7	SPDT	15 to 55	1.1 Fixed	Coiled	Knob	93
144020	A19EAF-6		0 to 43				60
Hot Water – Strap On							
144072	A19DAC-9	SPDT	40 to 120	6	Clamp on Strap supplied		143

Temperature Controls

Penn A25 Series – Manual Reset Limit Control

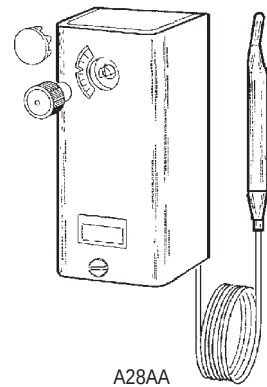
Flange Mount



A25CN

Normally located in return air duct system and wired to shut down air conditioning or ventilating fans when temperature of air becomes excessive, as from a fire. The reset is a 'trip-free' type device and will not permit restart until the reset lever is released. Rod and tube type sensing element assures positive control action. Duct mounting flange is included.

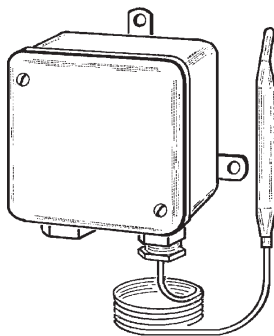
Cat. No.	Part No.	Switch Action	Range °C	Range Adjuster	Dial Stop °C	Max. Element Temp. °C
144049	A25CN-4	SPDT	-4 to 101	Knob	Set at 52	150



A28AA

Penn A28 Series – 2 Stage

Cat. No.	Part No.	Switch Action	Range °C	Differential K	Bulb and Capillary	Range Adjuster	Max. Bulb Temp. °C
Coiled Bulb – Fixed Differential							
144040	A28AA-74	2 x SPDT	0 to 43	1.9 Ea. Stage 1.7 Fixed Int. Stage	35mm x 57mm Coiled	Convertible	60
Adjustable Interstage Differential							
144066	A28AA-28	2 x SPDT	0 to 43	1.9 Ea. Stage 1 to 4 Int. Stage	3.6 Averg. Bulb 1.8m Cap.	Screwdriver Slot	60
144031	A28AA-65		-35 to 40	2.8 Ea. Stage 1 to 4 Int. Stage	9.5mm x 102mm 2.4m Cap.*	Convertible	
144067	A28AA-70		5 to 32	1.7 Ea. Stage 1 to 4 Int. Stage	9.5mm x 152mm 1.8m Cap.*	Knob	110
144068	A28AA-71		15 to 60	2.8 Ea. Stage 1 to 4 Int. Stage	9.5mm x 102mm 1.8m Cap.		
*Packing nut assembly available for direct immersion applications (P/N FTG13A-60 OR)							
For Cooling Towers – Rainproof							
144047	A28MA-4	2 x SPDT	5 to 50	Factory Set 2.8 Ea. Stage 4.4 Int. Stage	9.5mm x 102mm Neoprene Coated 1.8 Cap.	Screwdriver Slot	99



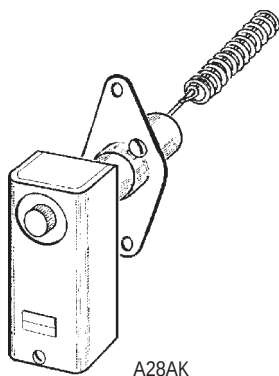
A28MA

Penn A28 Series – 2 Stage Duct Thermostats

Flange Mount

These duct thermostats are used on roof top units, make-up heaters, duct heaters and air handling systems of all types. They have SPDT snap-acting contact units and are unaffected by barometric pressure or cross ambient temperatures.

Flat flange mounting with special coil element permits positioning of the sensing bulb in appropriate location in the air stream.



A28AK

Cat. No.	Part No.	Switch Action	Range °C	Differential K	Bulb and Capillary	Range Adjuster	Max. Bulb Temp. °C
144073	A28AK-1	2 x SPDT	0 to 43	1.1 Ea. Stage	Coiled	Knob	60
144074	A28AK-2		15 to 55	1.7 Int. Stage			93

Electrical Ratings: Refer Page 56

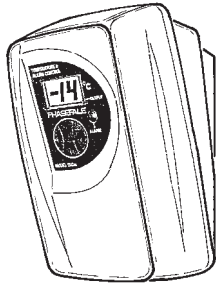
Pressure and Temperature Controls

Penn Electrical Ratings

Selection Column		Motor Ratings	AC Full Load Amps	AC Locked Rotor Amps	Non Inductive Amps
Alpha/Numerical Order		TABLE 1			
Temperature Controls	Table No.	240V	8	48	8*
A19AAB	2	*or resistance Load Amps (Not Lamp Amps). A19, A28 Pilot Duty - 125VA. 24 to 277V. AC. A19ACA Pilot Duty - 125VA. 24 to 600V. AC.			
A19AAD	3	Note: When used as a 2 circuit control the total connected load must not exceed 2000VA.			
A19AAF	3	TABLE 2			
A19ABB-7	2	240V	8	48	*
A19ABC	2	*Non-Inductive or Resistance Load Amps** (Not Lamp Amps) 22A, 120 to 277V. AC. Pilot Duty - 125VA. 24 to 600V. AC.			
A19ABC-26	4	**SPST and only one side of S.P.D.T. control			
A19ABC-27	4	TABLE 3			
A19ACA	1	240V	3	18	*
A19ADB	4	*Non-Inductive or Resistance Load Amps. (Not Lamp Amps) 10A, 120 to 277V. AC. Pilot Duty - 125VA. 24 to 277V. AC.			
A19ANC	2	TABLE 4			
A19ARC	1	240V	6	36	
A19BAC	2	Pilot Duty - 125VA, 24 to 600V. AC.			
A19BAF	3	TABLE 5			
A19BBC	2	240V	3	18	10*
A19DAC	4	*120 to 277V. AC. Pilot Duty - 125VA, 120 to 277V. AC.			
A19EAF	5	TABLE 6			
A25	6	240V	8	48	16*
A28AA	1	*at 120 to 277V. AC. Pilot Duty - 125VA, 120 to 600V. AC.			
A28AK	7	TABLE 7			
A28MA	1	240V	3	18	8*
A72	9	*or Resistance Load Amps (Not Lamp Amps). Pilot Duty -125VA, 24 to 277V. AC.			
Pressure Controls	Table No.	Note: When used as a 2 circuit control the total connected load must not exceed 2000VA.			
P70AA	8	TABLE 8			
P70AB	8	240V*	17	102	22
P70CA	8	Pilot Duty -125VA, 120 to 600V. AC. 57.5 VA, 120 to 300V. DC.			
P70DA	8	*These full load and locked rotor amps (not horsepower) ratings apply to hermetic compressors only.			
P70LB	8	TABLE 9			
P70MA	8	240V* 1 Phase HP = 3	24	144	24
P74BA	8	DC Non-Inductive Amps 0.5			
P74EA	6	Pilot Duty - 125VA, 120 to 600V. AC. 57.5VA, 120 to 300V. DC.			
P74FA	5	*These full load and locked rotor amps (not horsepower) ratings apply to hermetic compressors only.			

Electronic Controls

Phasefale TACm Temperature and Alarm Control



The TACm continually monitors the conditions of the refrigeration system and provides Control, Defrost, Alarm and Logging. The TACm brings new precision to the control of all types of cool rooms. The temperature is maintained within 0.5°C so stock is always at optimum temperature and running costs reduced. The enclosure offers 2 mounting angles simply by how the base is mounted. The tilt mount is specifically designed for high mounting in traffic areas where forklifts may damage the control.

Features

- Digital display of temperature
- Straight or tilt mount
- Precision temperature control
- Comprehensive defrost control
- Sophisticated alarm function
- Hourly logging of temperatures
- Touch programming with permanent memory
- Compressor anti-short cycle timer

Specifications

Supply voltage:	240 Vac	Accuracy:	0.3°C (-35 to 30°C)
Control output:	240V 10A resistive	Dimensions:	200 x 150 x 82mm
Defrost outputs (2):	240V 20A resistive	Sensor:	6m lead immersion proof. May be extended up to 100m from unit.
Temperature range:	-40°C to 60°C		

Options

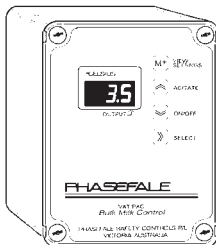
- The TACm-PCB option for freezer rooms allows coil fans and heaters to be switched for defrost
- Second sensor for defrost termination
- Battery backup allows operation and logging to continue during mains power failure
- Complog allows a computer to monitor and log the operation of the TACm
- Warning light and buzzer

Cat. No.	Part No.	Description
144211	TACm - 2000	Temperature and Alarm Control including 6m sensor
144204	TACm - 12 Vdc	Temperature and Alarm Control with 12 Vdc Warning Buzzer
144202	TACm - PCB	Freezer Room Defrost Kit - Fans and Heater Control
144201	TACm - MPROBE	Freezer Room Defrost Termination Sensor, NTC, 6m lead
144207	TACm - L240V	Warning Light, 240 Vac
144208	TACm - B12V	Warning Buzzer, 12 Vdc

Phasefale Complog Data Logging System

Complog is a new concept in data-logging of temperatures. Using TACm cool room controls and a transceiver unit, up to 255 temperature points can be monitored on a single data cable connected to a PC (required). Where a TACm is not used or required, the transceiver can be fitted with a sensor and log temperature. A single PC interface is required for each system. Complog software can be downloaded from www.phasefale.com.au

Cat. No.	Part No.	Description
144209	TACm - CLGPCI	PC Interface
144210	TACm - CLGTx	Transceiver



Phasefale Vat Pac Milk Vat Control

The Vat Pac is specifically designed to efficiently control the temperature and agitation of milk in bulk vats. The Vat Pac continually monitors the temperature of the vats contents and also operates the agitator to ensure even distribution of both temperature and butter fat content throughout the milk. Supplied with 6m immersion proof Sensor. Vat Pac design conforms to AS1189 for bulk milk vats.

Cat. No.	Model	Supply Voltage	Control Output	Agitator Output	Temp Range: °C	Accuracy °C
144203	Vat Pac	240 Vac	240V 10A res.	240V 20A res.	-10 to 45	0.3

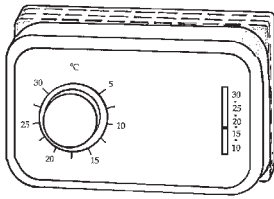
Phasefale TA-1 Alarm Thermostat

Designed specifically for MiniTemp alarm systems in smaller supermarkets, the TA-1 is an alarm thermostat with selectable pre-set temperatures for frozen food, meat or dairy.

Cat. No.	Part No.	Description
144205	TA-1	Alarm Thermostat including 6m sensor
144201	TACm - MPROBE	Sensor for TA-1

Room Thermostats

Penn T26 Series

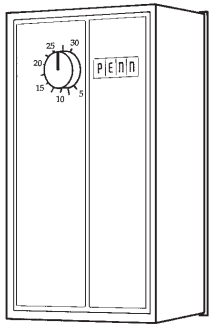


T26

T26 Series with thermometer are universal models for heating, cooling or heating and cooling and include horizontal mounting faceplate kit. Converts to key adjustment by removing and retaining knob for the key.

Cat. No.	Part No.	Type of Adjustment	Application	Range °C	Differential Approx. K	
					Heating	Cooling
Heating and Cooling – Line or Low Voltage						
145130	T26S-22	Knob	SPDT	5 to 30	1	1.3

Penn T25 Series



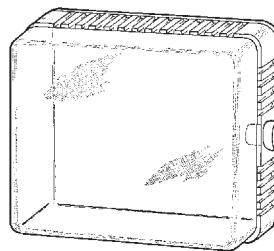
T25

Cat. No.	Part No.	Type of Adjustment	Application	Range °C	Differential Approx. K	
					Heating	Cooling
Two Stage – Line or Low Voltage						
145125	T25B-9101	Knob	2 x SPDT 2 Stage Heat/Cool, Heat/Cool with dead band and auto changeover	5 to 32	1 per Stage 1 to 3 adjust between stages	
145126	T25B-9102	Concealed				

Penn T36 Series

Cat. No.	Part No.	Type of Adjustment	Application	Range °C	Differential Approx. K	
					Heating	Cooling
Four Stage – Line or Low Voltage						
145133	T36ABB-9250	Concealed/ Lockable Cover	4 x SPDT multi-stage heating and/or cooling control with Neutral Zone	0 to 43	1 (fixed) per Stage 1 (fixed) between Stages 2 (fixed) Heat 'on' to cool 'on' (on heat/cool applications)	

Honeywell TG Series Lockable Thermostat Guards



TG guards are for use in commercial, public and industrial buildings such as schools, warehouses, churches, hospitals, offices, etc. to protect thermostats and humidistats from damage, vandalism, tampering and unauthorised adjustment.

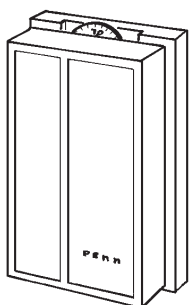
Features

- Tough, durable, thick clear plastic to withstand bumps and abuse
- Full ventilation, both vertically and horizontally, for accurate control operation
- Sizes fit most common thermostats and humidistats
- Built-in tumbler type lock with one key supplied with each guard. Replacement keys are available

Cat. No.	Part No.	Dimensions mm	Description – Fits Penn Thermostats/Humidistats
145091	TG511A1000	191 x 165 x 75	Clear Plastic Guard (Small)
154092	TG512A009	248 x 184 x 86	Clear Plastic Guard (Large)

Humidistats

Penn W42 Humidistat



W42

The W42AA humidistat controls humidifying or dehumidifying equipment or both. The humidistat is a 3-wire device with single-pole, double-throw, snap-acting contacts. The W42 features a human hair sensing element and has a concealed dial lock screw.

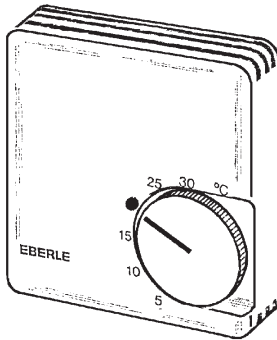
Cat. No.	Part No.	Switch Action	Range % RH	Diff. % RH	Voltage
145140	W42AA-1	SPDT	10 to 90	4	Line or Low

Electrical Rating: Pilot Duty only - 125 VA at 120/240 V.A.C
Maximum Operating Ambient: 38°C

Room Thermostats

Eberle

RTR Series (Bimetal Sensor System)

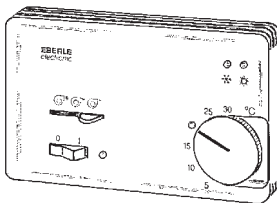


RTR 6722

Cat. No.	Part No.	Operating Voltage	Contact Config.	Range °C	Amps @ 240 VAC Res. (Ind.)	Switches	Lamps (LEDs)
The RTR 3546 has a 'Tamperproof' housing and operates in cooling mode only.							
145309	RTR 3546	240	SPST Make-on-Rise	0 to 30	3 (3)	—	—
The RTR 6722 can be used in both heating or cooling mode.							
145305	RTR 6722	24 or 240	SPDT	5 to 30	10 (4) heat 5 (2) cool	—	—
The RTR 7007 is for 4-pipe Fan Coil systems and A/C units without reversing valve.							
145303	RTR 7007	24 or 240	SPDT	5 to 30	6 (3)	On/Off-Heat/Fan/Cool (fan) Cont./Auto	—
The RTR 7203 can control 4-pipe Fan Coil Systems and A/C units without reversing valves by means of the automatic changeover contact - Manual Heat/Cool switch is not required.							
145302	RTR 7203	240	SPDT with Dead Zone	5 to 30	6 (3)	On/Off - (fan) 3 speeds	—
Both the RTR 7603/7611 have a dead zone and an intermediate contact between heat and cool terminals that enables the control of A/C units with reversing valve (Heat Pumps). Manual Heat/Cool switch is not required.							
145307	RTR 7603	24 or 240	SPDT sequential	5 to 30	6 (3)	—	—
145310	RTR 7611					On/Off	—

Eberle

KLRe Series (Electronic Sensor System)



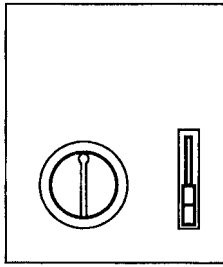
KLRe 52552

Cat. No.	Part No.	Operating Voltage	Contact Config.	Range °C	Amps @ 240 VAC Res. (Ind.)	Switches	Lamps (LEDs)
The KLRe 52552 has automatic heat/cool changeover with dead zone and can control 4-pipe Fan Coil and A/C units with or without reversing valves.							
145301	KLRe 52552	240	SPDT with adjust Dead Zone	5 to 30	16 (4) heat 10 (4) cool	On/Off - (fan) 3 speeds	On Heat Cool
The KLRe 52561 is a 4 stage thermostat for control of central A/C systems and has provision for 2 stage heating and 2 stage cooling.							
145300	KLRe 52561	240	4 x SPDT with adjust Dead Zones	5 to 30	7 (2)	—	4 x Stage Indicators

Room Thermostats

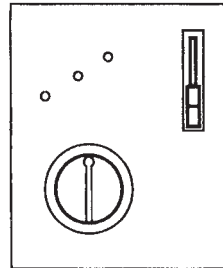
Siemens RAA Series Mechanical Room Thermostat

The RAA Series thermostats used in heating and cooling systems to maintain the selected room temperature, ideal for controlling zone valves, fans and pumps



RAA30

Cat. No.	Model No.	Description	Voltage	Contacts Amps	Switches	Setpoint Range °C	Differential. K	Applications
145196	RAA10	Heat or Cool Only	24V or 240V	2A SPDT	Tamperproof	8 to 30	1	Heating or Cooling
145197	RAA20				Adj. Setpoint			
145198	RAA30				Off/On			
145201	RAA40.2				Off/H/C			

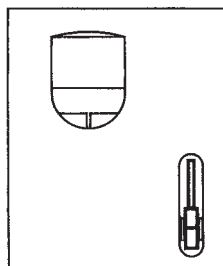


RCC30

Siemens RCC Series Electronic Room Thermostat

The RCC Series thermostats used in heating and cooling systems to maintain the selected room temperature, has outputs for speed fan with LED's indicating heating mode, cooling mode and fan operation. Operating modes: Normal, Energy Svaing and Frost Protection or Off

Cat. No.	Model No.	Description	Voltage	Contacts Amps	Switches	Setpoint Range °C	Differential. K	Applications
145199	RCC30	T/Stat Elec. S/Stage On/Off Switch	230V	0.7	On/Off 3 Speed Fan	8 to 30	0.5 to 4	Heating + Cooling



RDF30

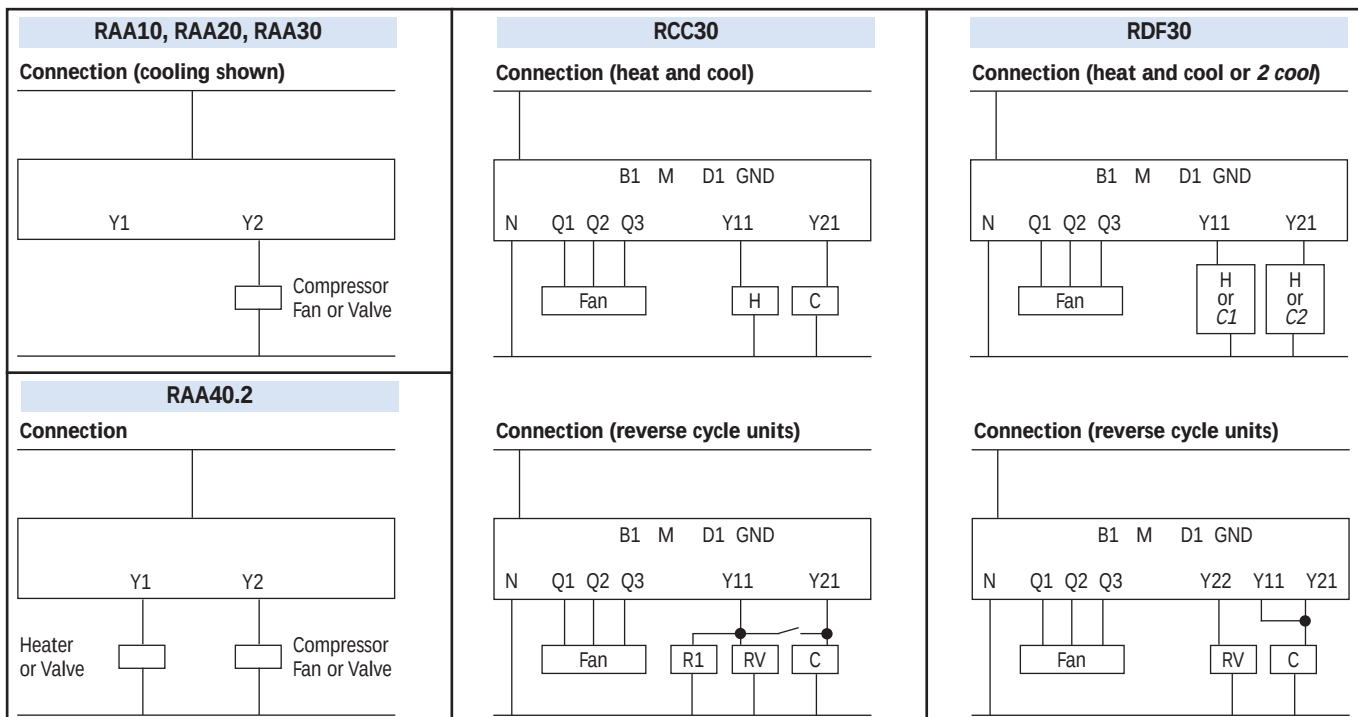
Siemens RDF Series Electronic Room Thermostat

The RDF Series thermostats used in heating and cooling systems to maintain the selected room temperature, has outputs for three speed fan, LCD display for room temperature and mode functions. Operating modes: Normal, Energy Saving and Standby

Cat. No.	Model No.	Description	Voltage	Contacts Amps	Switches	Setpoint Range °C	Differential. K	Applications
145200	RDF30	Digital T/Stat S/Stage On/Off Switch	230V	0.7	On/Off 3 Speed Fan	5 to 35	1 to 2	Heating + Cooling

Remote Sensors

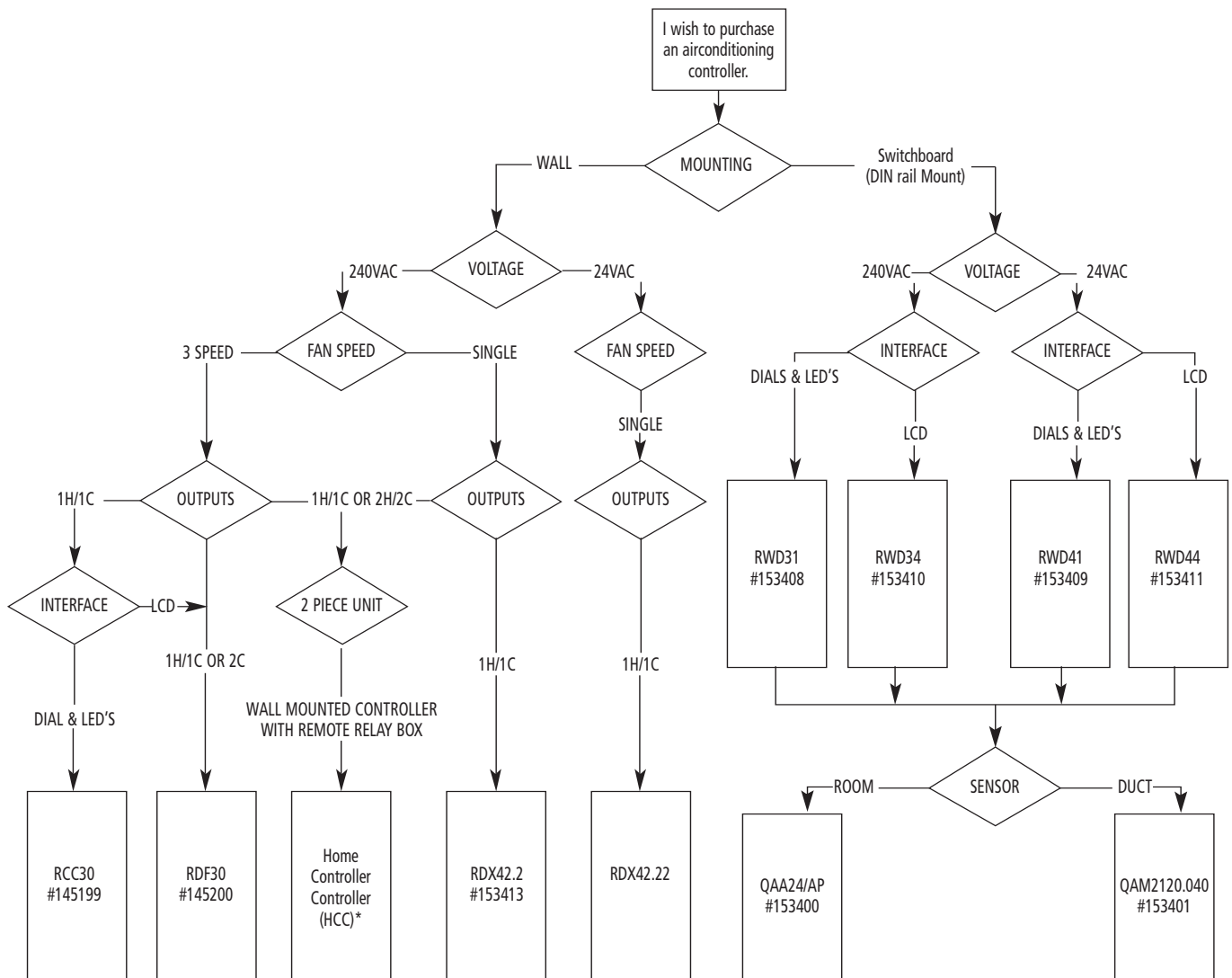
Cat. No.	Model No.	Description
153414	QAH11	Remote Sensor suit RCC/RDF/RDY Controller



Air Conditioning Controls

Siemens Quick Select

1

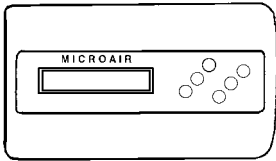


All wall mounted units switch the fan and incorporate an on/off switch on the controller. The RDF30, HCC and RDX42 are suitable for electric heat and reverse cycle, 2 Stage reverse cycle is only possible on the HCC if connections are RV, C1, C2, RDX has manual H/C changeover, the others are automatic. QAH11 remote sensor suits all models.

All switchboard units are suitable for 1H/1C or 2H/2C (with reverse cycle or electric heat) and they do not switch the fan. An external on/off switch or timelock is utilised to switch the fan

Electronic Controls

Micro Air MIG - Series



Controllers – (available in 2 or 4 channel, both with 2 analog outputs)

They are able to monitor and control one of the following units; °C, °F, %RH, %kPa, psi, Pa, °W, BAR, l/s, CFM, GPM, PPM, mA, V. They can accept a resistive (thermistor), 0-10v, 4-20mA or 0-20mA input, have a temperature range between -30°C and +110°C, a combination of normally open and normally closed contacts, remote offset control, time proportional heating and have outside air or economy cycle.

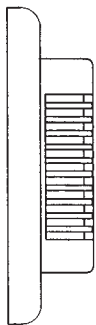
The display status continually scrolls, showing the actual setpoint, remote offset, differential shift adjustment, relay status and analog outputs. It also logs the highest and lowest temperatures.

Memory is backed up via non-volatile EEPROM memory, while the security access feature prevents unauthorised program changes. They also feature a programmable relay start-up delay and are pre-programmed for a typical air conditioning program if configured to use a resistive input.

All 3 models use a Supply Voltage of 240VAC and a relay Voltage of up to 240V 10 Amp

Cat. No.	Model No.	Description	Relay Output	Control Inputs	Analogue Outputs
145050	MIG-C2	2 Stage Programmable Controller	1 X NO/NC	Resistive	2 X 0-10V @ 100mA
145052	MIG-C4	4 Stage Programmable Controller	2 X NO/NC	0-10v, 4-	
145059	MIG-CT5	4 Stage Programmable Controller with Time Switch	2 X NO/NC & 3 NO	20mA, 0-20mA	

MIG-CT5 Features 365 Day programmable time clock, Daylight savings, 12 single holidays, 12 block holidays and up to 8 switching times per day per channel



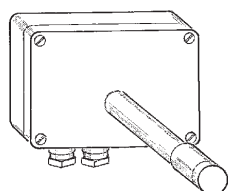
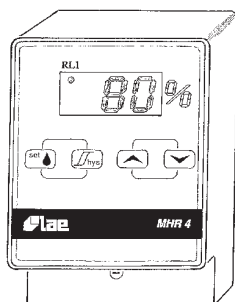
Cat. No.	Model No.	Description
145086	MIG-PS	Plain faced sensor
145082	MIG-RO	Sensor with remote offset
145085	MIG-DS	Duct Sensor
145083	MIG-WS	Well Sensor
145071	MIG-2WM	Averaging Sensor 2 way Master
145072	MIG-2WS	Averaging Sensor 2 way Slave
145073	MIG-3WM	Averaging Sensor 3 way Master

Electronic Controls

Lae Humidistats

- Single output, single set On / Off humidity controllers with hysteresis. The setpoint value represents the output Off switching humidity; the On switching humidity value is achieved by adding the hysteresis to the setpoint.
- Configurable parameters; dehumidification function by respectively assigning positive or negative sign to the hysteresis; minimum and maximum setpoint limits; On or Off output status in case of probe failure; output minimum Off time; probe offset.

The same controllers are available in the MTR version for temperature control.



Type MHR4 Wall Mount

Cat. No.	Part No.	Switch Action	Range: RH	Resolution: RH	Dimensions mm W x H x D	Supply Voltage
145175	MHR4A7RE	SPDT	0 to 100%	1%	79 x 115 x 42	230 Vac
Supplied Less Sensor						

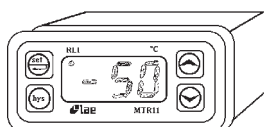
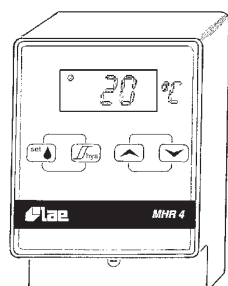
Specifications

- Relay Power Rating: 5 Amp. 240 Vac
- Operating Temperature: -10° to 50°C
- Accuracy: ±1% RH
- Input: 0 to 1V proportional
- Consumption: 3 VA
- Front Panel Protection: IP45

Humidity Probe

Cat. No.	Part No.	Range: RH	Description	Suit Model
145177	HT2WAD	10 to 90%	Relative Humidity Probe	MHR4

Lae Single Output Thermostats



Type MTR4: Wall Mount

Cat. No.	Part No.	Range: °C	Sensor (Included)	SPDT Relay	Dimensions mm W x H x D	Supply Voltage
146028	MTR4T1RE	-50 to 130	SA100	One Output 5 Amp. 240 Vac. • Off / Diff.	79 x 115 x 42	230 Vac. 50 / 60 Hz

Type MTR6 and MTR122: Panel Mount

Cat. No.	Part No.	Range: °C	Sensor (Included)	SPDT Relay	Dimensions mm W x H x D	Supply Voltage
146020	MTR6 TIRD	-50 to 130	SA100	One Output 5 Amp. 240 Vac. • Off / Diff.	64 x 32 x 81	12 Vac. / dc
146032	LTR 15 CIRE*			One Output 8 Amp. 240 Vac. • Off / Diff.	77 x 35 x 77	230 Vac.

*Front Panel Protection: IP 54

Transformer (Cat. No. 146100) is additional for 12 Vac/dc models.

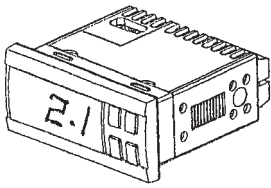
Accessories

Cat. No.	Part No.	Range: °C	Description
146100	TR24VDEOO		240 V / 12 Vac. Transformer 3VA
146079	RLY2402HP		Relay: 30A (Ind.)
146033	STIK20PI	-50 to 130	Temp. Probe with PTC1000 Sensor: 2 Wires & Shield, Nylon

It is recommended that a Relay (Cat. No. 146079) be used in conjunction with all the above controls.

Electronic Controls

Carel IR33 Series Refrigeration Controllers



The IR33 Series Controllers all come standard with defrost control, alarm buzzer and are serial compatible for networking. Using the optional infra red remote, programming is made even easier.

Specifications

- Display Green LED 2.5 digits with automatic decimal point (between -19.9 and +19.9)
- Dimensions 75W x 33H x 64D mm (Panel mounted Controls)
- Index of protection: IP65 (front panel, with gasket) (Panel mounted Controls)
- Operating temperature (ambient for the controller) -10 to +65 Degrees C

Features

- Green LED display
- High Performance microprocessor
- Ergonomic keypad
- Infra Red Compatible
- Operating information & output status display
- Buzzer Standard on all models
- Possibility to connect high temp 150deg probe
- Real time clock & HACCP functions on selected models
- Pump down management
- Condenser management
- Keypad lock
- Available in panel mount or dinrail mount
- Second Compressor management (with rotation option)

Panel Mount

Medium Temperature Controllers IR33 Panel Mount Thermostats with Passive Defrost Option

Cat. No.	Model No.	Description
146300	IR33SOLROO	M/T Defrost/Buzzer 12/24AC/DC 16A Comp
146301	IR33S0EROO	M/T Time/Time Defrost, Buzzer 240AC 8A Comp

Low Temperature Controllers IR33 Panel Mount Thermostats with Defrost Option

Cat. No.	Model No.	Description
146310	IR33C0LROO	L/T Defrost, Fan, Alarm, Buzzer 12/24AC, DC 16A Comp
146311	IR33C0LBOO	L/T Defrost, Fan, Alarm, Buzzer, RTC, HACCP 12/24AC/DC, 16A Comp
146312	IR33C0HROO	L/T Defrost, Fan, Alarm, Buzzer, 240AC, 16A Comp
146313	IR33C7HROO	L/T Defrost, Fan, Alarm, Buzzer, 240AC, 16A Comp, NTC/PTC
146314	IR330HBOO	L/T Defrost, Fan, Alarm, Buzzer, RTC, HACCP, 240AC, 16A Comp

DIN Rail Mount

Medium Temperature Controllers IR33 Din Rail Mount Thermostats with Passive Defrost Option

Cat. No.	Model No.	Description
146304	DN330ENOO	M/T 240V, 16A COMP, (NO IR)
146305	DN330HAOO	M/T 240V, 2HP COMP, 1 AUX Relay

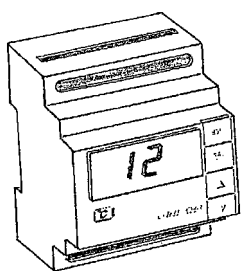
Low Temperature Controllers IR33 Din Rail Mount Thermostats with Defrost Control

Cat. No.	Model No.	Description
146306	DN33C0LROO	L/T 24V, 16A Comp, 16A Defrost/8A Fan Aux
146307	DN33C0HROO	L/T 240V/12HP COMP 2 AUX Relays, 8A Defrost, 8A Fan
146308	DN33H0HBOO	L/T 240V, 2HP Comp, RTC, HACCP, 2 Aux Relays, 8A Defrost, 8A Fan

IR33 Accessories

Cat. No.	Model No.	Description
146320	IRTRREDOOOO	IR Remote Control
146318	PSOPZPRGOO	Programming Tool C/W Software for 'PSOPZKEY'
146323	IR00RGOOO	Remote IR33 Display (Requires 146322)
146322	IROPZSER30	RS485 Serial Card/Display IR33
146330	IROPZ48500	Serial Card for IR33
146079	RLY2402HP	Relay 240V 2HP
	IROPZKEYOO	IR33 Platform programming key

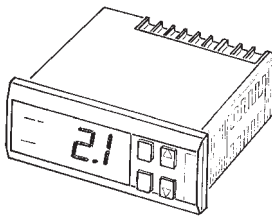
For more accessories look on the Carel accessories page no. 85



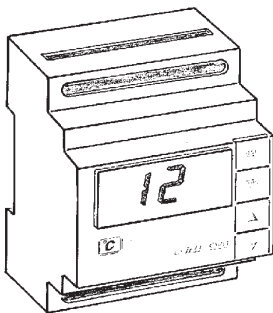
Electronic Controls

Carel IR Series Universal Controllers

The Universal Infrared series of innovative controllers was specifically designed for the control of air conditioning, refrigeration and heating systems; managing either temperature, humidity or even pressure (model specific).



IR32S



IRDR

Features:

- Each controller comes complete with nine different configured programmes, allowing a regulation programme for a particular application to be easily and quickly set
- All IR models have 1 or 2 digital inputs permitting easy alarm management, set-point variation (per external clock or switch), remote on-off, cooling/heating switching, etc
- All thermostats equipped with NTC probe (thermistor) can be connected to a second optional probe to provide additional functions
- Display: 3 digits with automatic decimal point and sign
- Remote control unit for remote programming of the IR controllers
- Buzzer
- Plantwatch/Plantvisor compatible

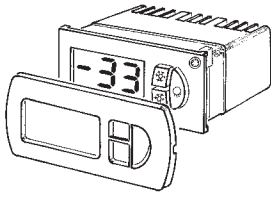
Cat. No.	Part No.	Output 240 Vac/5A	Range °C	Index of Protection	Sensor (Not Included)
Temperature Controller – Single Stage – Panel Mount – 12/24 Vac/dc					
146083	IR32VOL000	1 x SPDT Relay	-50 to 90°C	IP65	NTC
Temperature Controller – Single Stage – DIN Rail Mount – 12/240 Vac					
146169	IRDRV00000	1 x SPDT Relay	-50 to 90°	IP40	NTC
Temperature Controller – Two Stage – Panel Mount – 12/24 Vac/dc					
146086	IR32W00000	2 x SPDT Relays	-50 to 90°	IP65	NTC
Temperature Controller – Two Stage – DIN Rail Mount – 12/240 Vac					
146108	IRDRW00000	2 x SPDT Relays	-50 to 90°	IP40	NTC
Temperature Controller – Four Stage – Panel Mount – 12/24 Vac/dc					
146087	IR32Z00000	4 x SPDT Relay	-50 to 90°C	IP65	NTC
Temperature Controller – Four Stage – DIN Rail Mount – 12/240 Vac					
146088	IRDRZ00000	2 x SPDT Relay 2 x SPST Relays	-50 to 90°C	IP40	NTC
Humidity or Pressure Controller – Single Stage – Panel Mount – 12/24 Vac/dc					
146085	IR32V3L000	1 x SPST Relay	To suit range of Sensor Limits -100 to 999	IP65	4/20 mA Input
Humidity or Pressure Controller – Single Stage – DIN Rail Mount – 12/240 Vac					
146112	IRDRV30000	1 x SPDT Relay	To suit range of Sensor Limits -100 to 999	IP40	4/20 mA Input
Humidity or Pressure Controller – Two Stage – Panel Mount – 12/24 Vac/dc					
146126	IR32W30000	1 x SPDT 1 x SPST Relay	To suit range of Sensor Limits -100 to 999	IP65	4/20 mA Input
Humidity or Pressure Controller – Two Stage – DIN Rail Mount – 12/24 Vac/dc					
146168	IRDRW30000	2 x SPDT Relay	To suit range of Sensor Limits -100 to 999	IP40	4/20 mA Input
Humidity or Pressure Controller – Four Stage – Panel Mount – 12/24 Vac/dc					
1460851	IR32Z30000	3 x SPDT 1 x SPST Relays	To suit range of Sensor Limits -100 to 999	IP65	4/20 mA Input
Humidity or Pressure Controller – Four Stage – Panel Mount – 12/24 Vac/dc					
146080	IRDRZ30000*	2 x SPDT 1 x SPST Relays	To suit range of Sensor Limits -100 to 999	IP40	4/20 mA Input

*IRDRZ3 requires TRA004 transformer 4VA (Cat. No. 146117)

Four Stage pressure controllers are ideal for Condenser Fan Management

Electronic Controls

Carel 'Plug-In' Series Refrigeration Controllers



The 'Plug-In' Series uses advanced electronic technology to provide excellent performance in the control of medium and low temperature refrigeration units. An efficient display and keypad with status indicators offer simple operation and information on the operating status of the unit being controlled. A programming key allows the control to be programmed quickly and without the need to be powered, while providing error free setting.

*Some models have option to display product temperature.

Features

- Programming Key without power
- Quick Mounting
- Back-lit Keypad
- Removable Terminals
- Internal Transformer
- Optional colours for front face

Cat. No.	Part No.	Output Relays	Power Supply	Sensor (Not Included)
Medium Temperature Controllers with Time/Time Defrost				
146130	PJ32S00000	• Compressor: 8A res	230 Vac	1 x NTC
146132	PJ32S20000	• Compressor: 8A res • Alarm Signal: 8A res		
146170	PJ32SOP00	• Compressor: 16A res		
146183	PJ32SOH000	• Compressor: 2HP		
Low Temperature Controller with Active Defrost				
146133	PJ32C00000*	• Compressor: 8A res • Defrost: 5A res • Fans: 5A res	230 Vac	1 or 2 NTC

Accessories

Cat. No.	Part No.	Description
146134	PJOPZKEY00	Hardware programming key for Plug-In
146135	PJOPZ48500	RS485 Module, DIN rail mount
146136	PJOPZ HACPO	HACCP Module, DIN rail mount
146173	PJOPZSW000	Cabinet Light Switch
146174	PJOPZSG000	Cabinet On/Off Switch
146175	PJOPZFGORO	Frame for Switch

Carel 'Plug-In' Series for OEM users

The Carel range of PJ32 for OEM manufacturers have a vast range of frames in 30 different colours for different requirements with the logo and/or name of manufacturer and even the layout including, for example, an on/off switch, light switch, fuses, etc. Carel has special 10 pack boxes of your customised PJ32 plug-in controls complete with sensing probe.

Cat. No.	Part No.	Description
146070	PK320R2236	PJ32SOH Control c/w Probe OEM 10 Pack
146141	PK320A2018	PJ32S Control c/w Probe OEM 10 Pack
146142	PK320R2057	PJ32S Control c/w Probe OEM 10 Pack

Carel 'PowerLine' Series for OEM users

Cat. No.	Part No.	Description
146171	PJ32COV000	Low Temp. 3 Relay – Comp 2HP, Defrost and Fan
146180	PJCABO3000	3m Cable for PJ32C

For Accessories and Sensors refer to page 85

Electronic Controls

Carel IR Series Universal Controllers

Solid State Output

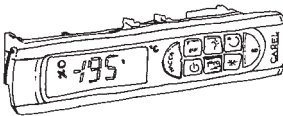
This series of controllers provides control of solid state relays.

Cat. No.	Part No.	Outputs	Range	Index of Protection (Front Panel)	Sensor (Not Included)
Temperature Controller – One Output – Panel Mount – 12/24 Vac/dc					
146140	IR32DOL000*	1 x 10 Vdc	-50 to 90°C	IP 65	NTC

*Requires TRA2400001 Transformers 3VA (Cat No. 146118).

Carel Power Compact Small Controllers

A powerful complete solution for standalone cabinets with only 40mm depth required.



Features:

- On off, light, auxiliary and HACCP buttons
- Compact dimensions, 167mm x 36mm x 45mm
- 30Amp compressor output
- 2 x NTC probes (not included)
- 2 x Digital inputs (can be used for additional sensors)
- Programming key (without power)
- Built in alarm buzzer

Cat. No.	Part No.	Description	Output Relays
146188	PB00S0SA50	Powercompact 2 Relay	Compressor 30A Aux 8A
	PB00C0SB50	Powercompact 4 Relay, Real Time Clock, Infra Red Comp.	Compressor 30A, Def 8A Fan 5A, Aux 5A

Carel 'Plug-In' Series Universal Heating/Cooling Controllers

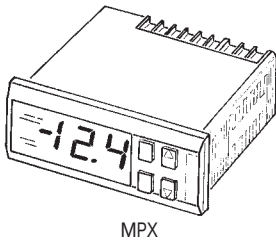
Features:

- All models feature either heating or cooling control
- Double set point with control from two independent probes; (W or Z models)
- Alarm relay management
- Dead zone with two independent set points (W or Z models)
- Set point selection from digital input
- Choice of which probe to be displayed through the parameters
- Simple parameter setting of the instrument
- Single output top versions fitted with buzzer

Cat. No.	Part No.	Range °C	Output	Sensor not included	Power Supply	Features
146172	PJ32W10000	-50 to 90	2 x 8A SPDT	1 x NTC+ (1 x dig. in)	240VAC	Digital input
146192	PJ32V6P000	-50 to 90	1 x 16A SPST	2 x PTC		Buzzer
146194	PJ32Z0000	-50 to 90	1x 8A, 2 x 5A SPST	2 x NTC		Alarm

Electronic Controls

Carel MPX Modular Supermarket Case Controllers



MPX

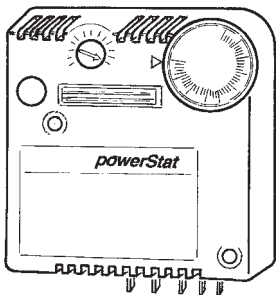
The Carel Infrared-MPX series of compact and powerful controls are capable of maximising the operation of multiplexed cabinets. The innovation of these controls lies in the creation of a local system, in which all the cabinet controls work together in a group, optimising the defrost operations and producing significant savings in energy consumption. The multiplexed cabinet is controlled by a "master", housed in the first section; the other sections, up to a maximum of 5, house the controls known as "slaves", which are simpler and more economical than the "master" and with which they are in constant communication. The controls are connected in series. In addition, thanks to their internal clock, the Infrared-MPX range allows real-time defrost management and separate night-day management. Another innovation is the alarm management system, with alarm event and time being stored in the memory. The Infrared-MPX series controls can also be connected to the Carel MasterPlant supervisory and telemaintenance system.

Features

- Alarm Log: the MPX saves any alarm events internally (with corresponding time in models with RTC)
- Day/night Operation
- Auxiliary or alarm relay
- Fan relay which can be used as auxiliary
- Third multifunction probe
- 2 multifunction inputs
- Self-diagnostic function
- Command sharing via MPXLAN
- Accessories Available: Pair of female plug-in connectors (MCHSMLCONM) & set of 24 1m cables (MCHSMLCABO)

Cat. No.	Part No.	Description
Master Controller		
146145	IRMPXMM000	MPX with 4 relays, real time clock and RS 485
Basic/Master Controller		
146146	IRMPX1A000	MPX with 4 relays and buzzer
Option: The instruments in the MPX series can all be connected to a display repeater allowing dual display of the unit's operating temperature and other auxiliary signals. Refer to Powerstat Remote Temperature Display. Cat. No. 146122		

Carel Powerstat Controller



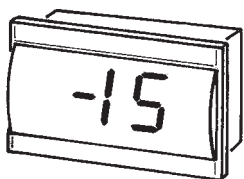
TTC

The PowerStat range is dedicated to the management of refrigerated display cases/cabinets, combining the precision of electronics with the simplicity and low cost typical, until recently, of electromechanical regulation. Regulation is completely managed using microprocessor control and dip switch programming. The use of NTC probes, as well as allowing remote installation of the probes at distances of up to 50 metres, also eliminates the problems involving the insertion of the capillary into the regulated environment. The control can be panel, surface or DIN rail mounted. An optional Remote Temperature Display is available.

Cat. No.	Part No.	Output Relays 250 Vac	Range °C	Power Supply	Sensor (Not Included)
Medium Temperature Controller					
146121	TTC1D00000	1 x SPST 2HP. 1 Ph. Compressor	-10 to 20	240 Vac 50/60 Hz	1 x NTC030HPOT
Low Temperature Controller					
146123	TTC4D00000	1 x SPST 2HP. 1 Ph. Compressor 1 x SPDT Defrost/Fans 16A (4 kW Heaters)	-35 to 10	240 Vac 50/60 Hz	1 or 2 x NTC030HPOT

NTC030HPOT Sensor Cat. No. 1460981

Carel PowerStat & MPX Remote Temperature Display



TTD

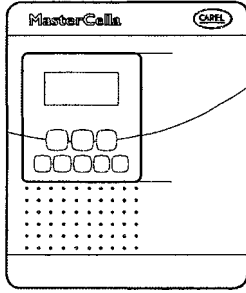
Cat. No.	Part No.	Power Supply	Dimensions: mm W x H x D	Cable (Included)
146122	TTDISPLR30	Directly to PowerStat	50 x 29 x 16	3m Long

For Accessories and Sensors to suit all controls on this page, refer to page 85

Electronic Controls

Carel MD Series MasterCella Refrigeration Controllers

Panel or Wall Mount



The MD is a multi function controller using the IR33 programming platform designed to suit refrigeration systems with or without evaporator fans. It controls all components, ie, compressor, defrost, fans, alarm and light. An alarm buzzer is also incorporated in the control.

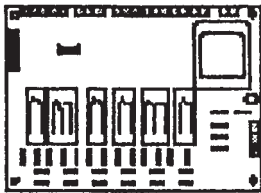
Specifications

- Power Supply: 240 Vac 50/60 Hz
- Display: 2 1/2 digits
- Inputs: 1 x room probe, NTC Carel, 10K Ω @ 25°C
1 x defrost probe, NTC Carel, 10K Ω @ 25°C
3 x digital programmable, by external dry contact (can be used for additional sensors)
- Dimensions: 200 W x 240 H x 88 D
- Index of Protection: IP65
- Range: -50 to 150°C
- Sensors: 2 x NTC (Not Included)
- Infrared Programming (same remote as IR33)

Cat. No.	Part No.	Output Relays 250 Vac				
		Compressor	Defrost	Fans	Light/Aux.	Alarm Signal
Medium Temperature Controller with off cycle defrost						
146334	MD33A5ER00	30A, SPST	—	—	16A, SPST	8A, SPST
Low Temperature Controllers with active defrost						
*146336	MD33D5EB00	30A, SPST	16A, SPST	8A, SPST	16A, SPST	8A, SPST

*146336 Complete with HACCP functions and real time clock

Carel MasterCella Split



MasterCella Split has similar features as Mastercella MD series, but uses remote power relay board which can be located up to 100 metres from the terminal board in or near to a remote condensing unit.

Features

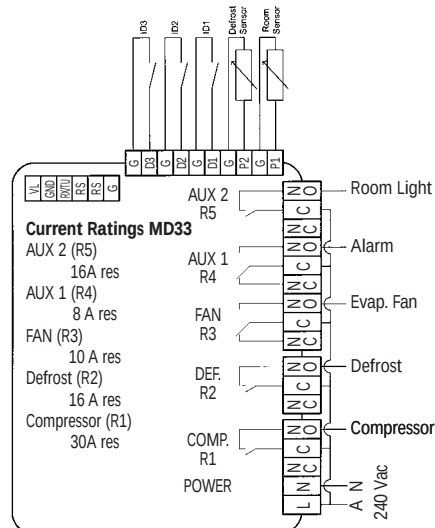
- Remote power board has 6 switching relays up to 2HP to control compressors, defrost heaters, fans, etc.
- Real time clock option
- RS485 serial card option to connect to Carel supervisory remote management system
- Panel or wall mount
- HACCP functions

Cat. No.	Part No.	Description
146076*	MTSC00V100	Split User Terminal Board
146077*	MTSB000010	Split Power Board

*Requires TRA0050000 Transformer 240/24 VAC 4 VA Cat No. 146127

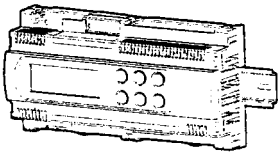
For Accessories and Sensors to suit all controls on this page, refer to page 85

MD Series
Wiring Diagram



Electronic Controls

Carel pCO² Universal Controller for Compressor Packs



This versatile standard programme, specifically designed for the pCO², manages multi-compressor packs. The pCO² outputs can be easily configured depending on the number of compressors (capacity-controlled or different capacity compressors) and condenser fans your system includes. Built in user interface with a 4 x 20 LCD, 6 button and 4 led's.

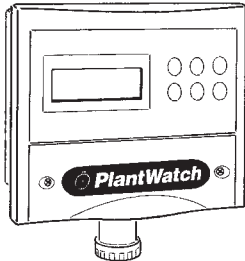
Controlled Device

- ON-OFF outputs to be configured according to the number of compressors and condenser fans
- Output for any alarm condition detection, control and regulation of a compressor with continuous capacity variation (selectable), control of an external device to adjust the condenser fan speed remote ON/OFF (with software protection)

Cat. No.	Part No.	Components	Max Digital Output
146143	PC02CF0BSO	pCO ² Programmable Controller (Small)	8
146144	PC02CF031K	pCO ² Programmable Controller (Large)	18
146159	PC02004850	pCO ² Serial Card RS485	

Transformers required: 2 x 24VAC -50 VA (Cat. No. 146116)

Carel PlantWatch Remote Management System



PlantWatch is a stand alone monitor which can be connected via RS485 serial line to up to 32 Carel Serial compatible controllers. PlantWatch will record variables such as temperature, humidity and pressure (depending on the controller connected).

Alarms are also monitored where the output action is programmed by the user. PlantWatch can fax, print or SMS the alarm information as well as dialing a remote supervisory computer.

All alarms and logged values can be printed directly from PlantWatch (using the printer module accessory) without the need for a computer.

Cat. No.	Part No.	Description
146150	PLWO0B0000	PlantWatch : 230V
146151	PLWOPMD000	Adaptor & Cable for External Modem for SMS / FAX
146152	PLWOPPC000	PlantWatch Manager Kit : Software & Adaptor & Cable
146153	PLWOPPRT00	Printer Module (Desk Top Version)
146177	FSM026PW	Mobile GSM Modem
146178	FSMPCCONOO	PC-Modem Connector (Suit FSM modem)
146148	MODENPW	RS232 Modem for Plantwatch (requires Software)

Carel 'Plantvisor' Remote Management and Monitoring Software

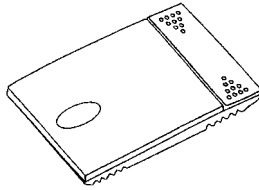
Plantvisor, a PC Solution for refrigeration and Air conditioning systems with a maximum of 200 utilities to be controlled or monitored via a local network (LAN) or via a modem (WAN)

Cat. No.	Part No.	Description
146149	PVSTDEBLOO	Plantvisor Enhanced - Local includes serial converter
146176	MODEMPV	USB Modem for Plantvisor

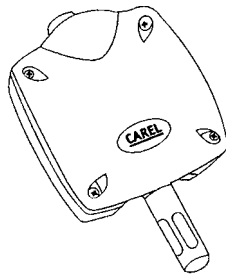
For Accessories and Sensors to suit all controls on this page, refer to page 85

Electronic Controls

Accessories and Sensors



ASWC 111000



ASPC230000



Cat. No.	Part No.	Description	
146101	IRTRRE0000	Infrared Remote Control for IR32 Series Refrigeration Controllers	
146320	IRTRRES0000	Infrared Remote Control for IR33 Series Refrigeration Controllers	
146072	IRBOX20000	Large Mounting Box for IR32, S90 Controllers	
146118	TRA2400001	Transformer 240/24 VAC 3 VA	
146116	TX60	Transformer 240/24 VAC 60 VA	
146100	TRA 12VDE00	Transformer 240/12 Vac 3 VAC (VDE)	
146127	TRA 0050000	Transformer 240/24 Vac 4VA	
146117	TRA 0040000	Transformer 240/12 Vac 4VA	
146124	IR32SEROOE	IR32 Serial Card RS485	
146154	IRDRSEROOE	IRDR Serial Card RS485	
146330	IROPZ48500	IR33 Serial Card RS485	
146128	MTCSER0000	Serial Board to Carel 485 Supervisory System	
146181	PC485KITNO	Serial Converter RS485/RS232 with PC Cable	
146182	IOMOO23000	I/O Module for RS485 Line	
146158	MCHSMLCABO	Set of 24-1 metre Cables	
146129	MCHSMLCONM	Pair Female Plug-in Connectors	
146190	8760-1000	Beldon Control Cable	
146318	PSOPZKEY00	Programming Key for IR33	
146319	PSOPZPRGOO	Programming Tool C/W Software for PSOPZKEY	
NTC Sensors - Temperature			
146090	NTCO15HP00	Plastic Probe, 10 k Ω @ 25°C IP67, -50 to 50°C Range	1.5m Long
146092	NTCO30HP00		3m Long
146098	NTCO60HP00		6m Long
146111	NTCO15WPOO	Inox Steel Probe, 10 Ω @25°C, IP68, -50 to 90°C Range	1.5m Long
146094	NTCO30WPOO		3m Long
146095	NTCO60WPOO		6m Long
146131	PT1000000A1	Inox Steel Probe, 10 k Ω @ 25°C, IP68, -70 to 250°C Range	3m Long
146093	ASWTO11000	NTC Wall Mount Sensor, -10 to 70°C Range	
Sensor – Humidity			
146091	ASWH100000	Commercial Wall Mount rH Sensor 10 to 90% rH Range, 4/20 mA output	
Temperature and Humidity Sensors			Range
146104	ASWC111000	Humidity/Temperature Wall Mount Sensor	0.50°C
146119	ASPC230000	Humidity/Temperature Wall Mount Sensor	10-90% RH
Sensor – Pressure (Transmitters)			
146138	SPWT0021CO	Range: -50 to 700 kPa (LP). 4/20mA output 1/4” FI. Conn.	
146137	SPWT0031CO	Range: 0 to 3000 kPa (HP). 4/20 mA output 1/4” FI. Conn.	
146147	SPKC002310	Pressure Transducer Cable 2m Long IP65	
Relays			
146079	RLY240V2HP	Relay: 30A (2HP) 240V Coil	
PTC Sensors – Temperature			
146193	PTC0150000	Bulb Sensor (not waterproof) -50 to +130°C	1.5m Long

Carel IR33 Operating Parameters

Code	Block	Parameter	Model	Unit	Type	Min.	Max.	Default	New
/2	Pro	Measurement stability	MSC	-	C	1	15	4	
/3	Pro	Probe display speed	MSC	-	C	0	15	0	
/4	Pro	Virtual probe (averaging on room & evap) 0 = not active	MSC	-	C	0	100	0	
/5	Pro	Select °C or °F (0 = °C)	MSC	flag	C	0	1	0	
/6	Pro	Decimal point (0 = decimal point between -19.9 & +19.9)	MSC	flag	-	C	0	1	
/tI	Pro	Sensor displayed on controller (1 or 2 = Control sensor)	MSC	-	C	1	7	1	
/tE	Pro	Sensor shown on remote display	MSC	-	C	0	6	0	
/P	Pro	Type of probe (0=standard Carel NTC, 1 =High Temp NTC)	MSC	-	C	0	2	0	
/A2	Pro	Probe 2 configuration (eg 2=evap,3=cond, 4=low T cut out)	MSC	-	C	0	4	2	
			-S-	-	C	0	4	0	
/A3	Pro	Probe 3 configuration (eg 0 = absent 2=evap,3=cond)	MSC	-	C	0	4	0	
/A4	Pro	Probe 4 configuration (eg 0=absent, 2=evap,3=cond)	MSC	-	C	0	4	0	
/c1	Pro	Calibration of probe 1	MSC	°C/°F	C	-20	20	0.0	
/c2-4	Pro	Calibration of probe 2-3.4 /c2=probe 2, /c3=probe 3	MSC	°C/°F	C	-20	20	0.0	
St	Ctl	Temperature set point	MSC	°C/°F	F	r1	r2	0.0	
rd	Ctl	Controller differential	-SC	°C/°F	F	0.1	20	2.0	
rn	Ctl	Dead Zone (when used in 1 Heat 1 Cool mode)	-SC	°C/°F	C	0	60	4	
rr	Ctl	Reverse (heat) diff in dead zone control	-SC	°C/°F	C	0.1	20	2	
r1	Ctl	Minimum Set Point allowed	MSC	°C/°F	C	-50	r2	-50	
r2	Ctl	Maximum Set Point allowed	MSC	°C/°F	C	r1	200	60	
r3	Ctl	Mode 0 = cool with defrost, 1 = cool only, 2 = heating	-SC	flag	C	0	2	0	
r4	Ctl	Value to increase Set Point by from Digital Input (see A4..)	MSC	°C/°F	C	-20	20	3.0	
r5	Ctl	Enable temperature monitoring	MSC	flag	C	0	1	0	
rt	Ctl	Temperature monitoring interval (display only parameter)	MSC	hours	F	0	999	-	
rH	Ctl	Max temperature recorded during period rt (display only)	MSC	°C/°F	F	-	-	-	
rL	Ctl	Min temperature recorded during period rt (display only)	MSC	°C/°F	F	-	-	-	
c0	CnP	Compressor and fan start delay at power up	-SC	min	C	0	15	0	
c1	CnP	Minimum time between 2 compressor starts	-SC	min	C	0	15	0	
c2	CnP	Minimum compressor OFF time	-SC	rain	C	0	15		
c3	CnP	Minimum compressor ON time	-SC	rain	C	0	15	0	
c4	CnP	Duty setting (in case of control probe failure)	-SC	rain	C	0	100	0	
cc	CnP	Duration of continuous cycle (manual activation)	-SC	hours	C	0	15	0	
c6	CnP	Alarm bypass after continuous cycle	-SC	hours	C	0	15	2	
c7	CnP	Maximum Pump-Down (PD) time	-SC	sec	C	0	900	0	
c8	CnP	Compressor start delay after opening Pump Down valve	-SC	sec	C	0	60	5	
c9	CnP	Enable autostart with Pump Down operation	-SC	flag	C	0	1	0	
c10	CnP	Select Pump-Down by time or pressure switch	-SC	flag	C	0	1	0	
c11	CnP	Second compressor start delay	-SC	s	C	0	250	4	
d0	dEF	Defrost type (0= elec / temp term, 1= H.Gas / temp term 2 = elec / time term, 3 = hot gas / time term 4 = pulse)	-SO	flag	C	0	4	0	
dI	dEF	Interval between defrosts (if not using real time)	-SC	hours	F	0	250	8	
dt1	dEF	End defrost temperature, (if d0 = 0 or 1)	-SC	°C/°F	F	-50	200	4.0	
dt2	dEF	End defrost temperature, 2nd evaporator (if selected)	-SC	°C/°F	F	-50	200	4.0	
dP1	dEF	Maximum defrost duration	-SC	min	F	1	250	30	
dP2	dEF	Maximum defrost duration, 2nd evap (if selected)	-SC	min	F	1	250	30	
d3	dEF	Delay starting defrost after stopping comp	-SC	min	C	0	250	0	
d4	dEF	Defrost at power up (0 = no, 1 = yes)	-SC	flag	C	0	1	0	
d5	dEF	Defrost delay at power up (if d4=1)	-SC	min	C	0	250	0	
d6	dEF	Display during def.(0=dF(flash),1 =locked,2=dEF)	-SC		C	0	2	1	
dd	dEF	Dripping time after defrost	-SC	rain	F	0	15	2	
d8	dEF	Bypass alarms after defrost	-SC	hours	F	0	15	1	
d9	dEF	Defrost priority over compressor protection	-SC	flag	C	0	1	0	
d1/d2	dEF	Display defrost probe temp d/1 =der P1 ,d/2=def P2)	MSC	°C/°F	F				
dC	dEF	Time basis for defrost (0 = hr/min, 1 = min/sec)	-SC	fiag	C	0	1	0	
d10	dEF	Compressor run time for demand defrost	-SC	min	C	0	250	0	
d11	dEF	Compressor run time temp set for demand defrost	-SC	°C/°F	C	-20	20	1.0	
d12	dEF	Advanced defrost enable	-SC		C	0	3	0	
dn	dEF	Nominal defrost duration (smart defrost)	-SC		C	1	100	65	
dH	dEF	Proportional factor for variation in 'dI' (smart DF)	-SC		C	0	100	50	
AO	ALn	Alarm and fan differential	MSC	°C/°F	C	0.1	20	2.0	
A1	ALn	Type of alarm for AL and AH (0=relative 1 =absolute)	MSC	flag	C	0	1	0	
AL	ALn	Low alarm temp (see A1 for absol. or relative)	MSC	°C/°F	F	-50	200	0.0	
AH	ALn	High alarm temp (see A1 for absol. or relative)	MSC	°C/°F	F	-50	200	0.0	
Ad	ALn	Low and high temperature alarm delay	MSC	min	F	0	250	120	

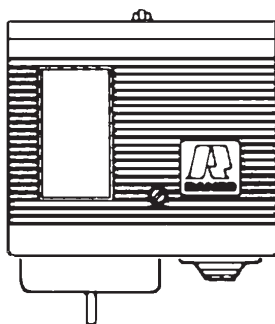
Carel IR33 Operating Parameters

1

Code	Block	Parameter	Model	Unit	Type	Min.	Max.	Default	New
A4	ALn	Configuration of digital input 1	-SC	-	C	0	15	0	
A5	ALn	Configuration of digital input2	MSC	-	C	0	15	0	
A6	ALn	Duty setting for comp from digital in alarm	-SC	min	C	0	100	0	
A7	ALn	External alarm delay if using digital input	-SC	min	C	0	250	0	
A8	ALn	Enable alarms 'Ed1' and 'Ed2' (defrost end on time)	-SC	flag	C	0	1	0	
Ado	ALn	Door switch light management mode	MSC	flag	C	0	1	0	
Ac	ALn	High condenser temperature alarm set point	-SC	°C/°F	C	0.0	200	70.0	
AE	ALn	High condenser temp. alarm differential	-SC	°C/°F	C	0.1	20	10.0	
Acd	ALn	High condenser temp. alarm delay	-SC	rain	C	0	250	0	
AF	ALn	Light sensor off time	-SC	s	C	0	250	0	
ALF	ALn	Antifreeze alarm set point	MSC	°C/°F	C	-50	200	-5	
AdF	ALn	Antifreeze alarm delay	MSC	rain	C	0	15	1	
FO	Fan	Fan management (0=according to F2,F3,Fd 1 = room - evap, 2 = evap temp (St + F1)	---C	flag	C	0	2	0	
F1	Fan	Fan start temperature	---C	°C/°F	F	-50	200	5.0	
F2	Fan	Fans cycle with comp (0 = no, 1 = yes)	---C	flag	C	0	1	1	
F3	Fan	Fans in defrost (0 = on, 1 = off)	---C	flag	C	0	1	1	
F4	Fan	Condenser fan off temperature (on aux relay if enabled)	MSC	°C/°F	C	-50	200	40.0	
F5	Fan	Condenser fan differential	MSC	°C/°F	C	0.1	20	5.0	
Fd	Fan	Fans delay after dripping	---C	rain	F	0	15	1	
HO	CnF	Serial address	MSC		C	0	207	1	
H1	CnF	Function of relay 4 (0,1=alarm,2=aux,3=light,6=cond fan)	MSC	flag	C	0	11	1	
H2	CnF	Keypad and IR locking	MSC	flag	C	1	6	1	
H3	CnF	Remote control enabling code	MSC		C	0	255	0	
H4	CnF	Disable buzzer (0=enabled, 1 = disabled)	MSC	flag	C	0	1	0	
H5	CnF	Function of relay 5 - Model specific (refer H 1)	MSC	Flag	C	0	11	0	
H6	CnF	Buttons to lock when keypad locked	MSC		C	0	255	0	
H8	CnF	Select output to activate with time band	MSC	flag	C	0	1	0	
HPr	CnF	Print profile	MSC		C	0	15	0	
H9	CnF	Enable set point change with time	MSC	flag	C	0	1	0	
Hdn	CnF	Number of default parameter sets	MSC	flag	C	0	6	0	
Hdh	CnF	Anti-sweat heater control offset	MSC	°C/°F	C	-50	200	0	
HrL	CnF	Enable remote ind. of light status	MSC	flag	C	0	1	0	
HrA	CnF	Enable remote ind. of aux status	MSC	flag	C	0	1	0	
HsA	CnF	Enable alarms on network devices	MSC	flag	C	0	1	0	
In	CnF	Standard control or master or slave	MSC	flag	C	0	6	0	
HAn/HFn	HcP	Number of events HA/HF occurred	MSC	-	C	0	15	-	
HA/HF	HcP	Date/time of most recent HA/HF	MSC	-	C	-	-	-	
y	HcP	Year	****	years	*	0	99	-	
M	HcP	Month	****	months	*	1	12	-	
d	HcP	Day	****	days	*	1	7	-	
h	HcP	Hour	****	hours	*	0	23	-	
n	HcP	Minute	****	min	*	0	59	-	
t	HcP	Duration	****	hours	*	0	99	-	
Htd	HcP	HACCP alarm delay	MSC	min	C	0	250	0	
td1-td8	rtc	Defrost time band 1/8	-SC	-	C	-	-	-	
d	rtc	Day	****	days	*	0	11	0	
h	rtc	Hour	****	hours	*	0	23	0	
n	rtc	Minute	****	min	*	0	59	0	
ton	rtc	Light/aux ON time setting	-SC	-	C	-	-	-	
d	rtc	Day	****	days	*	0	11	0	
h	rtc	Hour	****	hours	*	0	23	0	
n	rtc	Minute	****	min,	*	0	59	0	
tof	rtc	Light/aux OFF time setting	-SC	-	C	-	-	-	
d	rtc	Day	****	days	*	0	11	0	
h	rtc	Hour	****	hours	*	0	23	0	
n	rtc	Minute	****	min.	*	0	59	0	
tc	rtc	RTC date/time setting	MSC	-	C	-	-	-	
y	rtc	Years	****	years	0	0	99	00	
M	rtc	Month	****	months	1	1	12	1	
d	rtc	Day of the month	****	days	1	1	31	1	
u	rtc	Day of the week	****	days	6	1	7	6	
h	rtc	Hour	****	hours	0	0	23	0	
n	rtc	Minute	****	min	0	0	59	0	

Temperature Controls

Ranco Type 016 and 018



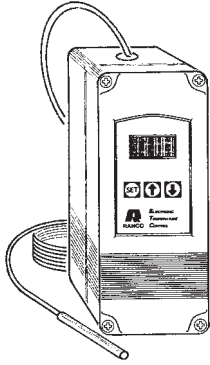
Cat. No.	Part No.	Former Part No.s	Adjust. Range °C	Diff. (High & Low Scale Limits Adj. or Fixed) K	Capillary and Bulb
148001	016-6950	016-1408 Replaces: 010-1408, 1417, 1419, 1433 016-103, 6801	-35 to -7	1.7 to 12	2m with 9.5mm dia. Coiled Bulb
148002	016-6951	016-1409 Replaces: 010-1409, 1415, 1416, 1418 016-104, 111, 011-3019	-18 to 13		
148003	016-6954	016-1410 Replaces: 010-1410, 1491, 1802, 1840 010-1903, 011-1758	-5 to 25		
148005	016-6980	016-6803 Replaces: 010-1414, 1477, 2020, 6004 011-3071	-18 to 13		2m with 14.5mm dia. Cross Ambient Bulb*
148006	016-6981	016-6804 Replaces: 010-2021, 6005	-5 to 25		
148008	016-6983	016-102 Replaces: 016-105, 112, 011-1758	10 to 40		
148016	016-8900	Replaces: 010-1473	-18 to 13	4 to 31	2m with 4.5mm dia. Bulb
148020	016-6930		-34 to 32	4 to 25	1.52m with 9.5mm Cross Amb. Bulb*
148011	018-100-080	Ice Bank Control 018-1100 Replaces: 018-100	No Adjustment	Phase Change at 0°C	1.83m with Special Bulb
148071	48129-1	Temperature Control Mounting Bracket			

* Cross Ambient Thermostats have a capillary and remote bulb. Unlike the straight or coiled capillary models, these controls sense only at the bulb. They should be used on all applications where it is possible that the control head or capillary can be at a lower temperature than the sensing bulb, e.g. external applications where the bulb senses a defrosting coil.

Where old series part numbers are listed showing the new replacement part numbers, exact replacement of old control may not be possible in every case. Specifications should be carefully checked for suitability.

Electrical Ratings: Types: 018 – 240 Vac, 17A FLA, 102A LRA with SPST contacts
Types: 016 – 240 Vac, 12A FLA, 72A LRA with SPDT contacts

Electronic Controls



Ranco Type ETC Electronic Temperature Control

The Ranco ETC is a single stage electronic temperature control designed to provide On/Off control for commercial heating, cooling, air conditioning and refrigeration. The ETC is equipped with a liquid crystal display (LCD) that provides a constant readout of the sensed temperature and a touch keypad that allows the user to select the set point temperature, differential and heating/cooling mode of the operation.

Features

- LCD readout of sensor temperature, control settings, relay status and onboard diagnostics
- Remote temperature sensing up to 120 metres
- Lockout switch to prevent tampering by unauthorised personnel
- A 0 to 10 volt analog output for remote temperature indication

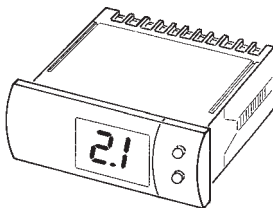
Applications

With its wide temperature setpoint range and selectable heating or cooling modes, the ETC can be used for a wide variety of applications including refrigerated display cases, walk-in and reach-in refrigerators, milk coolers, refrigerated warehouses, chillers, tank heating, space and return air temperature control and condenser fan cycling.

Cat. No.	Part No.	Switch Action	Range °C	Differential K	Supply Voltage	Sensor (Included)
148042	ETC-111100-000	SPDT	-34 to 100	0.6 to 16	208/240 V	2.4m Long

Relay Electrical Ratings N.O./N.C.
 VAC 208/240
 LRA 48/17.4
 FLA 8/2.9
 Res. A 8/2.9
 Pilot Duty 125 VA

1

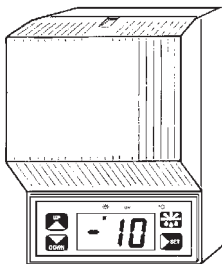


AKO Electronic Temperature Controls

The AKO Series are used to display and control the temperature of heating or cooling systems. Temperature indication is in 1°C increments and is displayed on 14mm high red digits.

Features

- Easy to use
- SET POINT temperatures can be set to maximum and minimum limits
- Adjustable differential from 1 K to 20 K
- Adjustable time delay, up to 99 minutes
- Adjustable defrost time duration, up to 99 minutes
- Adjustable defrost frequency, from 1 to 99 hours
- In case of probe failure the unit displays the anomaly and the relay operates the sequence of the previous 24 hours
- Manual defrost

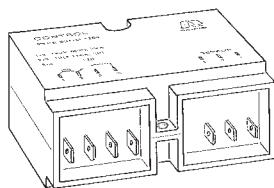


Cat. No.	Part No.	Range °C	Sensor (Included)	Relay Output	Face Dimensions: mm	Supply Voltage
Panel Mount						
148040	AKO-14123	-50 to 99	NTC AKO-14901 1.5m Long	SPST 8(3)A 230 V.	75 W x 33 H	230 V.
Surface Mount						
148041	AKO-1560	-50 to 99	PTC AKO-155801 1.5m Long	SPST 16A 230 V.	80 W x 120 H	230 V.

It is recommended that a Relay (Cat. No. 146079) be used in conjunction with the above AKO controls.

Ice Bank and Liquid Level Control

Ranco Type E37 Electronic Control



Features

- Compact, robust housing
- Quick and easy to install
- Ice Bank Differential or Liquid Level versions available
- Remote sensing up to 100m distance
- Immunity to mains fluctuations and ambient temperature variations

Ranco E37 senses the electrical conductivity between a set of electrodes and changes the state of the output switch in sympathy with a change in conductivity.

Stainless steel electrodes are used and Ranco L56 sensors have been specifically designed to be compatible with E37 controls. The electrodes can be used to measure the thickness of ice or control the level of liquids.

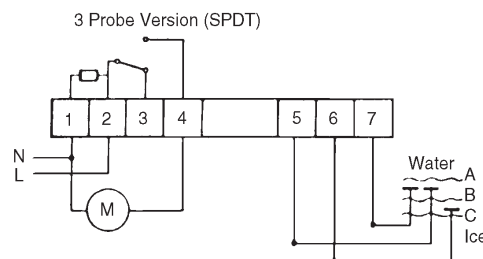
Ice Bank Application

The E37 Ice Differential Control uses three electrodes to determine the amount of change in ice thickness.

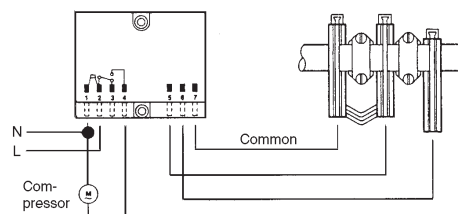
The build-up of ice proceeds until the ice has reached the two electrodes that are located in the same plane (Double Electrode). After the compressor has been switched off, the melting of ice must continue until the third electrode too, is in contact with water. Another cooling cycle is then started.

The adjustable distance between the Double Electrode and the Single Electrode provides the required difference between maximum and minimum ice thickness.

This arrangement permits better utilisation of a refrigeration system and the achievement of a favourable On/Off time ratio in the case of larger installations.



Sequence	Level	Relay
1	A	Off
2	B	Off
3	C	On
4	B	On
5	A	Off



Liquid Differential – Filling and Draining Application

The E37-M1201 series with its SPDT output relay and three sensor inputs can be used for both filling and draining. When these three sensor inputs are used, the active sensor pair changes, depending upon the condition of the internal relay.

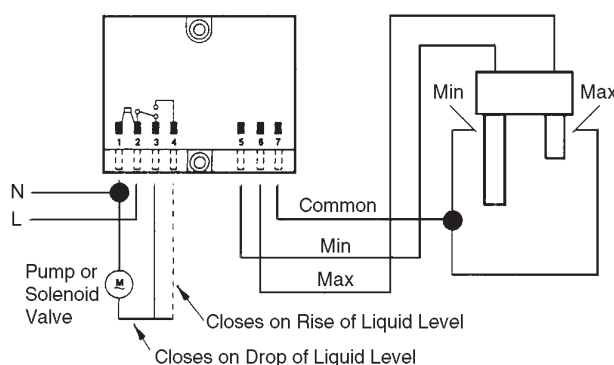
The relay is de-energised (pump or solenoid valve closes on drop of liquid level) when a resistance greater than 85K Ω is detected across the sensor - in this mode, the active sensor pair is between probes 6 (maximum) and 7 (common). Likewise, when the relay is energised (pump or solenoid valve closes on rise of liquid level) when a resistance less than 45K Ω is detected across the sensor - in this mode, the active sensor pair is between probes 5 (minimum) and 7 (common).

Note:

There is virtually no time delay built into the E37-M1201 Series.

Specification

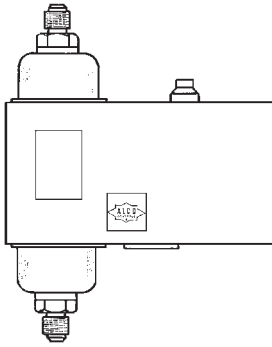
Supply Voltage Range: 240V, 50Hz.
Power Consumption: Less than 3VA.
Relay Rating: 4A (Ind.) 10A (Res)
Ambient Temperature: 0°C to 60°C



Cat. No.	Part No.	Description
148080	E37-M1201	Ice Differential or Liquid Level Control
148081	L56-M3001	Sensor Assembly with 3m Leads

Oil Pressure Protection Controls

Flow Controls (Alco) Differential Pressure Control

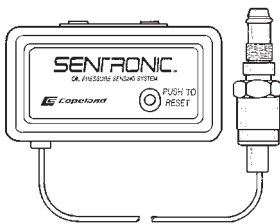


Cat. No.	Part No.	Differential Pressure kPa (psi)			Max. Operating Pressure kPa (psig)	Max. Test Pressure kPa (psig)	Pressure Connection
		Adjustable Cut-out	Factory Setting	Fixed Cut-in Above Cut-out			
150060	FD113-ZU	30 to 450 (4 to 65)	70 (10)	20 (3) Over Off	80 to 1200 (12 to 174)	-10 & 2300 (3" & 334)	1/4" M. Flare

Features

- Adjustable Time Delay: 20 to 150 seconds
- Operating Voltage: 24 to 240V dc/ac
- Inductive Amps: 3A/230 Vac
- Ambient Temperature Range: -20°C to 70°C
- Electrical Contacts: 2 x S.P.D.T.

DWM Copeland Sentronic, Electronic



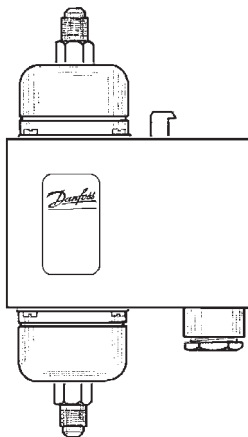
The Sentronic oil pressure control can be used with all compressors equipped with the Sentronic oil pump. The oil pressure, i.e. the differential between the pressures of both oil pump and compressor crankcase, is transferred into an electronic signal by a sensor, especially designed for Copeland, which is screwed directly into the Sentronic oil pump. If the pressure continuously falls below the cut-off point of 55 kPa, the compressor operation will be shut down after a time delay of 2 min ± 15 secs.

Features

- Precise measurement of pressure and time
- Omission of capillaries and their potential for refrigerant leakages
- Alarm connection
- Maximum control load: 720 VA; 120/240V

Cat. No.	Part No.	Time Delay Seconds	Type of Reset	Cut-off Press kPa	Cut-in Press kPa	Max. Ambient Temp °C
150061	2952221	120	Manual	55	90	66

Danfoss Type MP55 Differential Pressure Controls



Cat. No.	Type	Part No.	Time Delay Seconds	Range LP Side kPa (psig)	Differential kPa (psi)	Switch Diff. kPa (psi)	Pressure Connection
For Fluorinated Refrigerants							
150067	MP55	60B0171	60	-100 to 1200 (30" to 174)	30 to 450 (4.3 TO 65)	20 (2.9)	1/4" M. Flare
150068	MP55	60B0172	90				
For Ammonia (R717) and Fluorinated Refrigerants							
150069	MP55A	60B0175	60	-100 to 1200 (30" to 174)	30 to 450 (4.3 to 65)	20 (2.9)	6.5/10mm Weld Nipple
150070	MP55A	60B0176	90				

Maximum Bellows Temperature: 100°C
Maximum Test Pressure: 2200 kPa

Maximum Operating Pressure: 1700 kPa
Electrical Rating: 2A, 250V, ac.

Penn P445 Series, Electronic

This Electronic Oil Protection Control is designed for use on refrigeration compressors equipped with either a bearing head or oil pump that accepts a single point differential pressure transducer. The P445 senses net oil pressure and de-energises the compressor if pressure falls below the setpoint. It has a front-mount LED display to indicate the status of the lubrication system.

Features

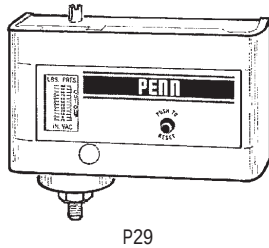
- Copeland Approved Model
- Relay Contacts for Alarm Circuit
- Single point sensing eliminates the use of capillary tube connections
- The unique sensor design minimises the possibility of non-operation due to contamination
- Sensor is compatible with all non-corrosive refrigerants and is designed to allow quick and easy installation
- Built-in Test Circuit
- Multiple Timing Selection on Loss of Power

Cat. No.	Part No.	Time Delay Seconds	Type of Reset	Fixed Setpoint Pressure kPa (psi)	Sensor Cable Length	Electrical	
						Control Input	Max. Rating at 250 Vac.
150012	P445 NCB-21	120	Manual	62 (9)	1.2m	120/240 Vac. 50/60 Hz	625 VA Pilot Duty

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Oil Pressure Protection Controls

Penn P29 Series, Low Pressure



P29

(With Mounting Bracket)

P29NC has a time delay device and lockout requiring manual reset wired as an integral part of the switch. For pressure lubricated machinery. Provides protection of machinery against failure of lubrication system. Time delay prevents nuisance shut downs due to momentary fluctuations in oil pressure.

Electrical Ratings:

Pilot duty rating of 750 VA., 120/240V, AC or 57.5 VA. 24V. DC. An external step down transformer for 440V. AC applications must be of sufficient capacity to supply 26VA at 240V for time delay.

Cat. No.	Part No.	Time Delay Seconds	Switch Action	Min. to Max. Press. to Open Contacts kPa (psig)	Press. Drop to Close Contacts kPa (psi)	Max. Bellows Press. kPa (psig)	Pressure Connection
150009	P29NC-43	60	SPST	-70 to 700 (20" to 100)	7 to 21 (1 to 3)	2240 (325)	1/4" Male Flare

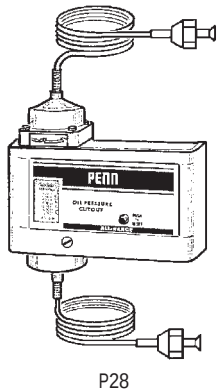
Penn P28 Series

(With Mounting Bracket)

Provides dependable protection against major breakdowns on pressure lubricated refrigeration compressors by guarding against low lube oil pressure.

A built-in time delay switch, compensated for ambient temperature, allows for pressure pick up on start and avoids nuisance shut downs on pressure drops of short duration during the running cycle.

The time delay assembly (timer and terminal board) may be easily removed and replaced in the field. Time delay switch is a 'trip-free' expansion rod device actuated by a resistance heater.



P28

Cat. No.	Part No.	Time Delay Seconds	Heater Circuit Volts	Type of Reset	Range* kPa (psig)	Refrig.	Pressure Connection
150006	P28AA-41	90	120/240 AC	Manual	55 to 483 (8 to 70)	Non-Corrosive	900mm Cap. with 1/4" Fl. Nut
150004	P28AA-42	60					
150051	P28AA-43	120				Ammonia	1/4" FNPT
150055	P28AA-44	45					
150008	P28AN-22	90				Non-Corrosive	900mm Cap. with 1/4" Fl. Nut
150053	P28NA-5	120	24V. AC or DC	Manual			

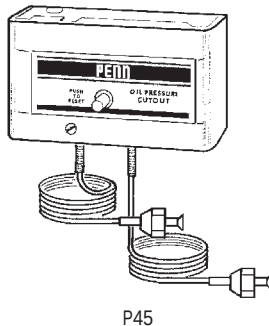
* Switch differential approx. 34 kPa (5 psi)

Electrical Ratings – Pilot Duty

Timer Delay Heater Circuit	Pilot Circuit	Alarm Circuit* (Optional)	Contact Rating** 2 to 1:2 to 3
240V. AC	750VA. 120/240V. AC	125VA. 120/240V. AC	10 Amps. 120V. AC 5 Amps. 240V. AC
12V. AC or DC	125VA. 24V. AC. 57.5VA. 24V. DC	125VA. 24V. AC. 57.5VA. 24V. DC	10 Amps. 24V. AC 10 Amps. 24V. DC
24V. AC or DC			

* Must be same voltage as pilot circuit

** Must be same voltage as time delay circuit



P45

Penn P45 Series

For Copeland Application

Cat. No.	Part No.	Time Delay Seconds	Heater Circuit Volts AC	Type of Reset	Factory Setting* kPa (psig)	Refrig.	Pressure Connection
150015	P45NCA-12	120	120/240	Manual	62 (9)	Non-Corrosive	900mm Cap. with 1/4" Fl. Nut

* Switch differential approx. 35 kPa (5 psi). Time delay relay energises at 62 kPa (9 psi) pressure difference, de-energised at 96.5 kPa (14 psi) difference. Time Delay Relay is not field replaceable.

(Less Mounting Bracket)

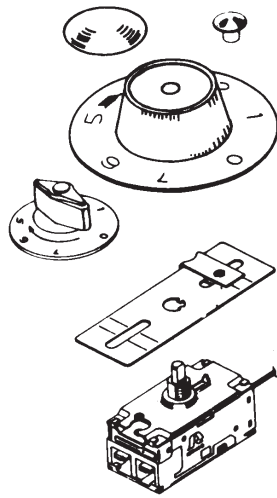
Max. Bellows Pressure: 2930 kPa (425 psig)

Electrical Rating – Pilot Duty

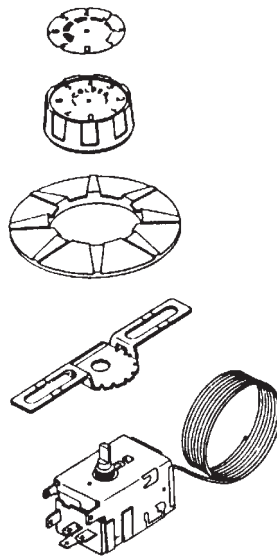
Time Delay Heater Circuit	Pilot Duty
120/240V. AC	750VA 120/240V. AC

Temperature Controls

Ranco VaRifix Service Thermostats



Cat. No.	Part No.	Application	Cold Out °C	Cold In °C	Warm Out °C	Warm In °C	Defrost Term. °C	Signal Op. °C	Cap. Length mm
151051	VC 1	Compressor Refrig.	-23	-14.5		2			1200
151052	VA 2	Electric Absorption Refrigerator	-18	-14.5		3.5			2000
151053	VF 3	Freezer and Ice Cream Cabinet	-34		-16.5	-12			2000
151054	VP 4	Push Button Compressor Refrig.	-25		-10.4	-4	5.5		1200
151055	VS 5	Freezer with Standard Signal	-34		-16.5	-12		Cut-In 5 Above Cut-In	2000
151056	VR 6	Freezer with Reverse Signal	-34		-16.5	-12		Cut-Out 5 Above Cut-In	2000
151057	VB 7	Bottle or Beverage Cooler	-3	2		12.5			1200
151058	VW 8	Window Air Conditioner	15	18		34			1200
151059	VT 9	Two Temperature Refrigerator	-26		-11		3.5 Con. Cut-In		1200



Danfoss Service Thermostats

Cat. No.	Part No.	Kit. No.	Application	Cold		Warm		Defrost Term. °C	Signal Pos. Warm °C	Cap. Length mm
				Cut-Out °C	Cut-In °C	Cut-Out °C	Cut-In °C			
151002	77B7001	1	Refrigerators	-25	-13.5	-5.5	2			1300
151003	77B7002	2	Refrigerators Push Button Defrost	-21	-11	-7.5	0	6		1300
151004	77B7003	3	Refrigerators Automatic Defrost	-27.5	3.5	-11	3.5			1600
151005	77B7004	4	Absorption Refrig.	-11	-5	-1	3.5			1500
151006	77B7005	5	Ice Cream Cabinets & Freezers without Signal	-32.5	-21	-15	-7.5			2300
151007	77B7006	6	Freezers with Active Sig.	-34.5	-24	-17	-10		-6	2300
151008	77B7007	7	Freezers with Passive Sig.	-34.5	-24	-17	-10		-6	2300
151009	77B7008	8	Bottle and Liquid Coolers	-8.5	-1	6	11.5			2000

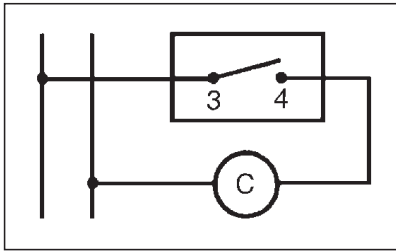
Temperature Controls

Ranco VaRifix Service Thermostats – Wiring Diagrams

C = Compressor

L = Signal Light

D = Defrost Heater

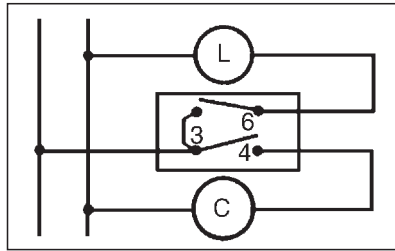


VC1, VA2, VF3, VP4, VB7, VW8

VC1, VA2, VF3, VB7 –
Normal Cycling Function – Contacts make on rise in temperature.
Electrical Rating: 6A inductive 250VAC.

VP4 –
Normal Cycling Function - Plus a push button to initiate defrost. Automatic defrost termination. Not suitable for hot gas defrost.
Electrical Rating: 6A inductive 250VAC.

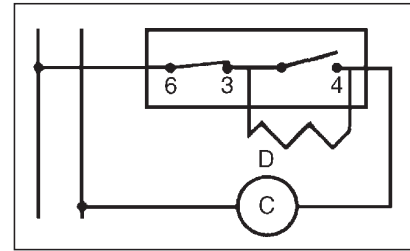
VW8 –
Normal Cycling Function - Not suitable for reverse cycle.
Electrical Rating: 16A inductive 250VAC.



VS5, VR6

VS5 –
Normal Cycling Function – Plus a standard signal operation switch. Signal circuit makes on rise in temperature.
Electrical Rating: Terminals 1 and 2-6A inductive 250VAC. Signal switch terminals 3 and 6 - 1A inductive 250VAC

VR6 –
Normal Cycling Function - Plus a reverse signal operation switch, signal circuit normally made, opens on rise in temperature.
Electrical Contacts – Same as for VS5.

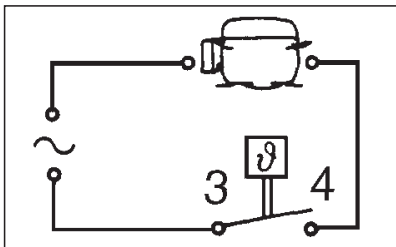


VT9

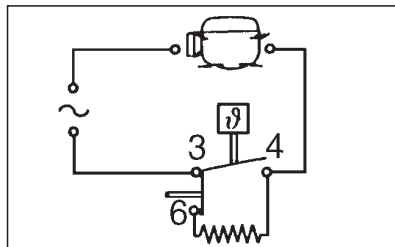
VT9 –
Normal Cycling Function – Plus a constant cut-in contact for automatic defrost (irrespective of control set point, a defrost may take place during the off cycle, terminated at the constant cut-in temperature of the evaporator).

In practice this is usually only found on two-door fridge/freezers. Also fitted with an electrical 'Off' position.
Electrical Rating: 6A inductive 250VAC.

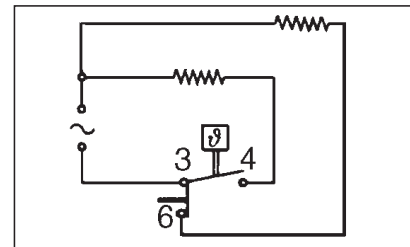
Danfoss Service Thermostats – Wiring Diagrams



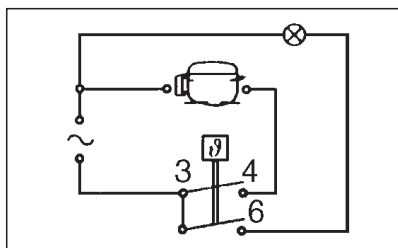
KIT No.s: 1, 2, 5, 8 –
1 – Normal Cycling Function.
2 – Normal Cycling Function and semi-automatic defrost function which is started manually and stops automatically after defrost.
5 – Normal Cycling Function. Can also be used for ice cream cabinets.
8 – Normal Cycling Function. Can also be used in refrigerated vending machines.



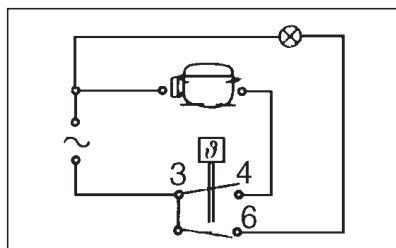
KIT No. 3 –
Thermostat with constant cut-in temperature (+3.5°C) for automatic defrost. The thermostat is equipped with an auxiliary switch which can, for example, cut-out a defrost heating element when the knob is turned to the 'O' position.



KIT No. 4 –
Normal Cycling Function and auxiliary switch which is cut-out when the knob is turned to the 'O' position.



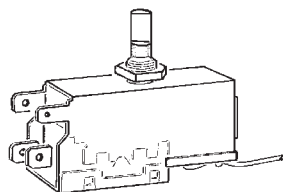
KIT No. 6 –
Normal Cycling Function and signal switch which cuts in at a rise in temperature.



KIT No. 7 –
Normal Cycling Function and signal switch which cuts out at a rise in temperature.

Temperature Controls

Ranco Type K59 Thermostat



Constant cut-in control with variable cut-out. Main switch (SPST) closes on rise of temperature.

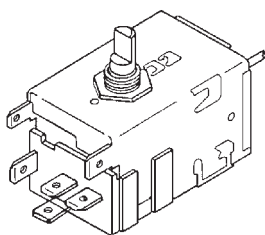
Applications

- 2 door Refrigerators/Freezers
- 2 door Freezers
- Ice Makers

Cat. No.	Part No.	Email Part No.	Cut-out °C			Constant Cut-in °C	Cap. Length mm
			Cold	Normal	Warm		
151080	K59-P4914	1409448	-30	-23	-16	3.4	1100

1

Danfoss Type 77B Thermostats

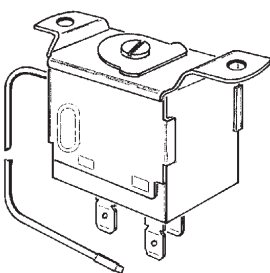


These thermostats have a constant cut-in temperature for automatic defrost with an SPST switch closing on rising temperature.

Cat. No.	Part No.	Email Part No.	Kelv. Part No.	Cut-out: °C		Constant Cut-in °C
				Cold	Warm	
151011	77B6138			-12	-5.2	5
151012	77B6043	5371269		-29.7	-16.4	3.5
151013	77B6075*	PJ1042	KA59882	-28.5	-19	4

* Fitted with mounting and adjustable brackets

Ranco Type A22 Thermostats



The function of the A22 Control is to cycle an SPDT switch in response to changes of temperature. The power element of the control consists of a vapour fill type bellows and capillary tube which provides accurate temperature control.

The SPDT switch is operated by the expansion and contraction of the bellows in response to temperature change. Switch terminals No.2 and No.1 CLOSE on DROP and terminals No.2 and No.3 CLOSE on RISE of temperature. Terminal No.2 is common.

Range adjustment is not available, except for limited altitude correction.

A22 – 2217

Applications

- Harvest control for ice-making machines
- Cycling control for Heat Pumps with manual selection of heating and cooling

Cat. No.	Part No.	Coldest Permissible Cut-out °C	Warmest Permissible Cut-in °C	Range °C	Diff. K	Electrical Rating 240 VAC	Capillary Length mm
152149	A22-2217	15.6	33.3	11.1	2.2	One Side FLA 20, LRA 80 Opp. Side FLA 10, LRA 40	760

A22 – 1129

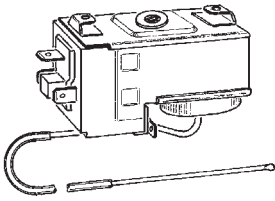
Applications

- Ice bin level control on ice-making machines

Cat. No.	Part No.	Range: °C	Differential: K	Capillary Length mm
152151	A22-1129	1.6 to 10.5	3.4	1200

Temperature Controls

Ranco Type RCR De-Ice Control



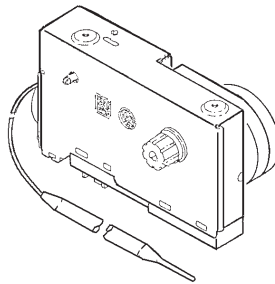
A basic cycling control with SPDT snap action switch.

Applications

- Air Conditioners
- Heat Pumps
- Ice Makers

Cat. No.	Part No.	Temperature °C		Contacts	Elect. Rating 240 VAC	Capillary Length mm
		Cut-in	Cut-out			
152080	RCR-4852-2	3.9	-6.1	2-3 Close on Temp. Rise 2-1 Close on Temp. Fall	FLA 20 LRA 80	1220

* Replaces Ranco Model K22-L5006



Ranco Type E15 Time/Temperature Defrost Control

The E15 Defrost Control is designed to control the removal of frost from the outdoor coil of central system and window unit heat pumps. The E15 has a temperature sensing capillary, a timer motor and a switch mechanism.

The remote cross-ambient filled bulb senses the temperature of the outdoor coil. The timer allows for a defrost cycle only at specified intervals. The switch controls system defrost functions.

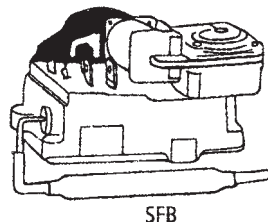
Features

- Defrost Cycle Initiation – Temperature permissive, time defrost cycle initiation
- Defrost Initiation Lockout – Only one defrost cycle per time period
- Defrost Cycle Termination – Temperature termination with backup time termination
- Defrost Cycle Frequency – Selectable defrost cycle frequency

Electrical Ratings:

240V, ac, SPDT, 10 Amp Full Load, 40 Amp Locked Rotor, 25 Amp/240 Vac non-inductive.

Cat. No.	Part No.	Defrost Initiation		Defrost Termination		Timer Motor Voltage VAC
		Selectable Freq. Min.	Temperature °C	Temperature °C	Backup Time Min.	
152082	E15-2217-257	30, 45 or 90	-2.2 or below	13	10	240

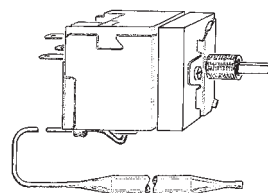


SFB

Saginomiya Timed/Temperature Defrost Control

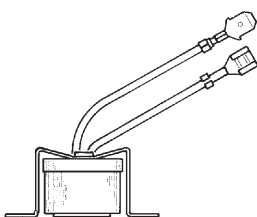
Cat. No.	Part No.	Voltage	Defrost Temp °C Initiation	Defrost Temp °C Termination	Cycle Temp Mins	Capillary Length mm
152079	SFB-X356	240 Vac	-5	10	33	1200

Ranco Type C28 Thermostat



The Type C28 Thermostat is used for the control of cooling and heating loads for air conditioners. The control provides a switch changeover on rise and fall of temperature.

Cat. No.	Part No.	Switch Action	Bulb Size mm	Capillary Length mm	Electrical Rating
152084	C28-P1316	SPDT	9.5 dia. x 135 long	508	16A 250 Vac



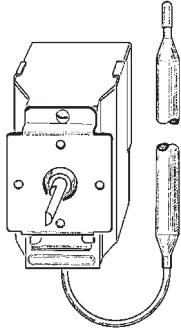
Stokes Type 6035 Thermostat

The 6035 is a safety termination thermostat of the enclosed disc type.

Cat. No.	Part No.	Kelvinator Part No.	Temperature Range °C	
			Open	Close
152001	6035	KA55041	10	-4

Air Conditioner Controls

Ranco Type C17 Thermostats



For Heat Pumps or Two Stage Operation. The C17-177 Thermostat is a standard cycling control with two electrically separate switches for automatic changeover on heat pumps.

This control completes two electrical circuits in response to temperature changes for either automatic change-over on heat-cool cycling or on two-stage operations.

The C17-334 Thermostat is the same as the C17-177, except one switch is adjusted to cycle within the 'cut-out' and 'cut-in' events of the other (differential within a differential).

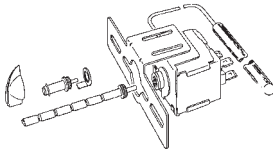
Field adjustment is not generally recommended for any of the Series C17 Controls. Cross ambient sensing bulb 9.5mm x 230mm.

Electrical Ratings: 240 VAC. FLA 20. LRA 78.

Cat. No.	Part No.	Range °C	Diff. K	Cap. Length mm	Shaft Length mm	Switching Sequence					
						Switch 'A'			Switch 'B'		
						Terms	Cut-out °C	Cut-in °C	Terms	Cut-in °C	Cut-out °C
152085	C17-334	9.4	3.6	915	Varifix	2 & 1	18.3	20.3	4 & 5	21.1	17.5
152177	C17-177	16.7	2	660	16	2 & 3	19.7	17.8	4 & 5	21.7	19.7

Replacements: C17-334 replaces C17-308, 316, 503, 506
C17-177 replaces C17-140

Ranco Type A22 Adaptable RAC Thermostat



The function of the A22-2453 Adaptable Control is to cycle an SPDT switch in response to changes of temperature.

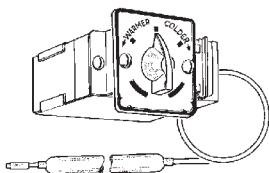
Switch is operated by the expansion and contraction of the bellows in response to temperature sensing by a cross ambient fill bulb and capillary.

Range adjustments are limited to the rotation of the dial for the required temperature set point. Differential screw adjustment in the insulator block is for factory calibration use only and is NOT to be adjusted in the field.

Cat. No.	Part No.	Switch Action	Temperature °C			Differential K	Bulb and Capillary	Application
			Cold Out	Cold In	Warm In			
152150	A22-2453	SPDT	15	17.8	33.3	2.2 Fixed	9.5mm x 100mm 990mm Cap. Cross Ambient	Air Conditioner

Electrical Rating: 240 VAC. FLA 20. LRA 80.

Ranco Type C12 Thermostat



The C12-5010 Cross Ambient Thermostat will perform one of two functions – Cooling Only or Heating Only. (For Heating-Cooling operation, a manual selector switch is necessary for heat pump applications since the C12 alone will not automatically perform this function). The switch is basically an SPDT snap-acting type. Normally closed contacts open on a drop in temperature.

Field adjustment is not recommended on the Range and Differential screws. However, there is a dial adjustment for a wide temperature range. The bulb of the liquid filled power element is the controlling point regardless of the temperature at the bellows and capillary tubing.

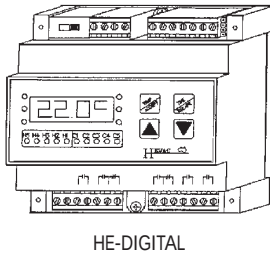
Ambient temperatures have an effect on the switch operation of the C12 control. A temperature of 27°C is the selected ambient point used by the factory on control calibration. A change in ambient temperatures above or below 27°C will shift the setting slightly lower or higher respectively.

Cat. No.	Part No.	Range °C	Diff. K	Contacts	Bulb and Capillary	Electrical Rating 240 VAC
152081	C12-5010	15.6 to 36.7	1.7 Fixed	Close on Temp Rise	9.5mm x 230mm 660mm Cap. Liquid Filled	FLA 20 LRA 78

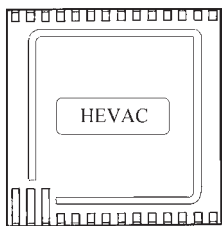
Air Conditioner Controls

Hevac Digital Series

Programmable Temperature Controllers (Electronic)



HE-DIGITAL



SRT

The HE-DIGITAL is a fully programmable microprocessor based temperature controller. This controller is intended for use in air conditioning applications where the control of On/Off stages of heating and cooling and/or sequencing of modulating actuators is required.

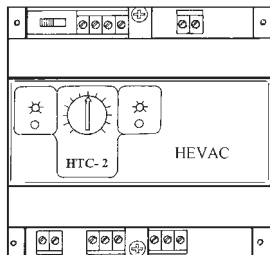
The controllers five relays can each be assigned individual functions and characteristics and the two analog output signals can also be programmed individually for start and range.

The HE-DIGITAL-TC also incorporates a two channel 365 day time clock with optimiser function.

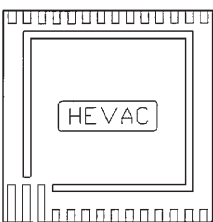
Cat. No.	Part No.	Relays	Outputs	Operating Voltage	Temperature Range	Time Clock
153300	HE-DIGITAL	Five On/Off 2 Amp. (res) 240 Vac	Two Analog 0-10 Vdc Heat - Cool	24 Vac or 240 Vac	8 to 33°C in 0-1 increments	–
153301	HE-DIGITAL-TC					2 Channel, 365 Day & Optimiser
Sensors						
Cat. No.	Part No.	Description				
153306	HE-SRT-D	Room Sensor – Non Adjustable				
153307	HE-SRT-DSP	Room Sensor – Adjustable Setpoint				
153310	HE-SRTA-D	Averaging Room Sensor – Non Adjustable				
153312	HE-SRTA-DSP	Averaging Room Sensor – Adjustable Setpoint				

Hevac HTC Series

Analog Temperature Controllers



HTC-2



The HTC temperature controller is primarily designed for the control of Heat and Cool air conditioning units. Stage switch on points are individually adjustable with their On/Off status displayed via LED indicators. The HTC controller is ideally suited for DIN rail mounting in a switchboard, or directly inside the air conditioning unit if required.

Cat. No.	Part No.	Stages	Relay Outputs	Operating Voltage	Temperature Range
153302	HE-HTC-2	1 Heat / 1 Cool	10 Amp. (res) 240 Vac	24 Vac or 240 Vac	16 to 28°C
153303	HE-HTC-4	2 Heat / 2 Cool			
153299	*HE-HTC-3	1 Heat/1 Cool			
153298	*HE-HTC-5	2 Heat/2 Cool			
Sensors					
Cat. No.	Part No.	Description			
153308	HE-SRT-H	Room Sensor – Non Adjustable			
153309	HE-SRT-HSP	Room Sensor – Adjustable Setpoint			
153311	HE-SRTA-H	Averaging Room Sensor – Non Adjustable			

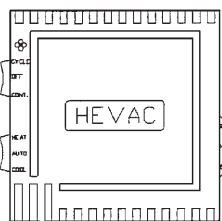
*Have Digital temperature display and fan delay

Surface Mount Enclosure

Cat. No.	Part No.	Description
153313	LP-HTC-ENCL	Suits Digital and HTC Series Controllers

Hevac RTC3 Series Electronic Room Thermostats

The RTC3 thermostat is an ideal replacement or alternative to mechanical thermostats, having a far superior accuracy and response time. A fan control switch and a mode select switch are provided as standard. The Deadband between Heat and Cool is selectable (2 or 3°C), and the setpoint adjuster can be concealed or exposed.

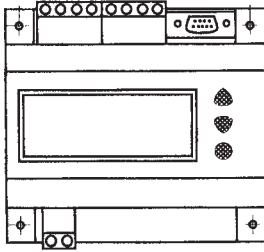


RTC3

Cat. No.	Part No.	Outputs	Operating Voltage	Switches		Temperature Range
				Fan	Mode	
153304	HE-RTC3-C	1 Heat/1 Cool with Dead Band	24 Vac or 240 Vac	Cycle/Off/Cont	Heat/Auto/ Cool	16 to 28°C
153305	HE-RTC3-V			On/Off/Vent		

Air Conditioning Controls

Siemens RWD Series Electronic Universal Controller



RWD Series programmable temperature controllers for heat pump air conditioning applications.

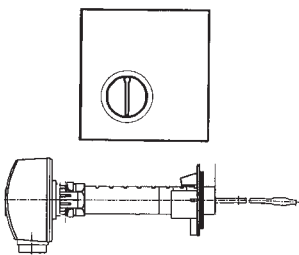
Specifications

- Programmable controller with standard pre-configured applications
- Adjustable compressor time delays
- Selectable alarm inputs
- Economiser "open air" control
- Digital display (on some models) and LED mode indicators
- Din rail mounting

Cat. No.	Model No.	Description	Voltage	Outputs
153408	RWD31	Analogue Heatpump controller	230 Vac	4 x 24 to 240Vac 4A Max
153409	RWD41	Analogue Heatpump controller	24 Vac	
153410	RWD34	Digital Heatpump Controller	230 Vac	
153411	RWD44		24 Vac	2 x 24 to 240Vac 4A Max 2 x 0 to 10 Vdc 1Ma Max
153403	RWD82			
153404	RWD62			

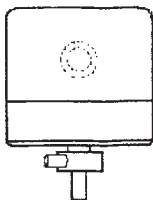
Cat. No.	Model No.	Sensors	Range
153400	QAA24/AP	Wall mounted temp sensor	5 to 35
153401	QAM2120.040	Duct mounted temp sensor	-30 to 80

Cat. No.	Model No.	RWD Series Accessories	Voltage
153412	SEM62.2	Transformer with on/off switch and fuse	240 - 24 Vac 40 Va



Air Damper Actuators

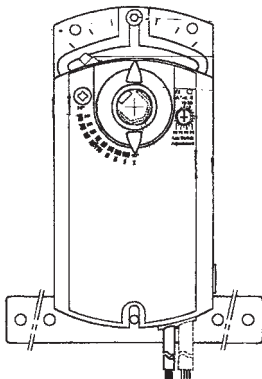
Siemens Domestic Air Damper Actuator



GXD series actuators are suitable for zone control of air flow on Air Conditioning applications where air dampers require control. These actuators have a single open/close action (non modulating) Commonly used on butterfly air duct dampers.

Cat. No.	Model No.	Voltage	Drive Conn: size
153421	GXD331.1A	240V	8mm

Siemens Air Damper Actuator



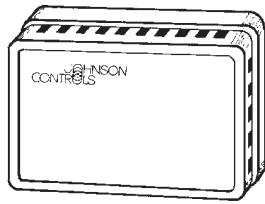
GDB series actuators are suitable for Ventilating and Air Conditioning plant applications where air dampers require control. These actuators have a 0 to 90 degree rotary drive action. Ideal for economy fresh air damper systems.

Features

- Steel gear train
- Overload protection
- Square or round drive coupling connections
- Supplied with pre-wire 900mm lead

Cat. No.	Model No.	Voltage	Drive Conn: size	Torque Rating	Action
153405	GDB131.1A	24 Vac	8 to 10mm	5Nm	3 Position
153406	GDB331.1A	240 Vac	8 to 10mm	5Nm	3 Position
153407	GDB161.1A	24 Vac	8 to 10mm	5Nm	Modulating

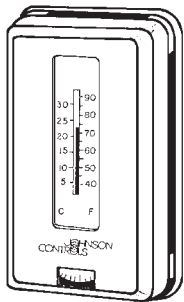
Pneumatic Air Conditioning Controls



Johnson T-4000 Series High Volume Output Thermostats

High volume output thermostats feature pneumatic feedback and volume amplification to provide fast and accurate proportional response. All models feature an output test connection which can be used for service and calibration. Available in kit form – one for straight Johnson replacement and one for the replacement of other brands, or as the thermostat movement only. Each kit comes complete with thermostat movement, tube connector or universal conversion kit, mounting bracket, thermostat cover and a vertical faceplate option.

Cat. No.	Part No.	Type	Colour	Replacement For
Thermostat with Replacement/Conversion Kit				
153116	T-4002-303	Direct Acting	Beige	Universal
Thermostat Movement Only – Less Cover and Kit				
153122	T-4002-9008	Direct Acting		Johnson
153123	T-4002-9009	Reverse Acting		

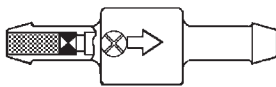


Johnson T-4100 Series Low Volume Output Thermostat

This thermostat uses a ball type, force balance control port to provide proportional feedback and stable control. It is electrically non-conductive and allows test probe access without removing the cover. Mounts vertically and is complete with cover. An adaptor kit is required for mounting.

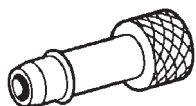
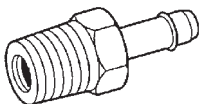
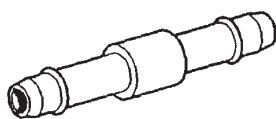
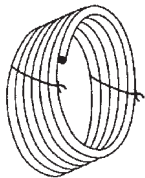
Cat. No.	Part No.	Type
153131	T-4100-4	Reverse Acting

Johnson Restrictors



Cat. No.	Part No.	Description
153098	R-3710-2005	Straight – 1/4" Barb, 0.005" Orifice (Red)
153099	R-3710-2007	Straight – 1/4" Barb, 0.007" Orifice (Aqua)
153101	R-3710-3007	Tee – 1/4" Barb, 0.007" Orifice (Aqua)

Johnson Installation Materials and Tools



Cat. No.	Part No.	Description	Quantity
Tubing			
153160	1219-44003	Polytube 1/4" O.D	250' Roll (76m)
153165	1219-13004	Polytube 5/32" O.D	500' Roll (152m)
153058	PF1000-231	Blue Urethane 1/4" O.D. x 1/8" I.D. Anti-Kink	10' Roll (3m)
Couplings			
153052	PF-300-26	Straight – 1/4" x 1/4" Barb, Brass	Packet of 10
153053	PF-300-30	Straight – 1/4" x 5/32" Barb, Brass	
153054	PF-300-31	Straight – 5/32" x 5/32" Barb, Brass	
153055	PF-500-39	Elbow – 1/4" x 1/4" Barb, Brass	
153056	PF-700-73	Tee – 1/4" x 1/4" Barb, Brass	
Adaptors			
153050	PF-100-21	Straight – 5/32" or 1/4" Barb x 1/8" M.NPT, Brass	Packet of 10
153051	PF-200-33	Straight – 1/4" Barb x 1/4" Compression, Brass	
Plugs			
153060	PF-1000-323	5/32" or 1/4" Barb, Brass	Packet of 10
Tools			
153115	T-4000-119	Blue Hex-Head Adjusting Tool	
153080	JC-5400	Test Gauge Set, for Calibration	
153085	JC-5410	Hand Pump Set	

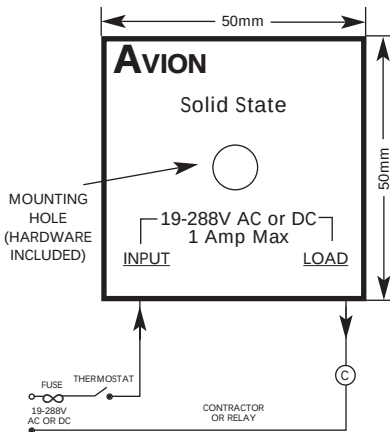
Electronic Timers Controls

Avion Solid State Cube Timers

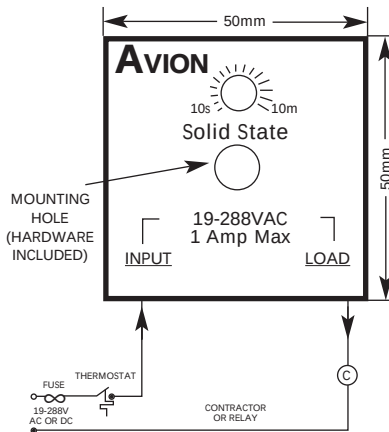
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Cat. No.	Model No.	Description	Control Voltage	Max. Current
155071	TCB320	Anti Cycling Lock Out Timer - 5 Min. Fixed	19-288 vdc or vac	1A
155077	TCB621	Anti Cycling Lock Out Timer - 10 sec. to 10 min.		
155072	TCG621	Delay on Timer - 10 sec. to 10 min.		
155073	TCL621	Solid State limit/By Pass Timer - 10 sec. to 10 min.		
155074	TCR621	Run on 'Lag off' Timer - 10 sec. to 10 min.		
Defrost Timer				
155075	DFT126	Elect. Demand Defrost Timer C/W Probe	230 vac	16A
155079	CSA102	Sensor for DF126 Timer	N/A	N/A
155085	CDP104	Elect. Demand Defrost Timer C/W Probe	24 vac	16A
Microprocessor on Delay Timer				
155078	THA262	Microprocessor on Delay Timer - 0 to 10 Min.	200-260 vac	10A

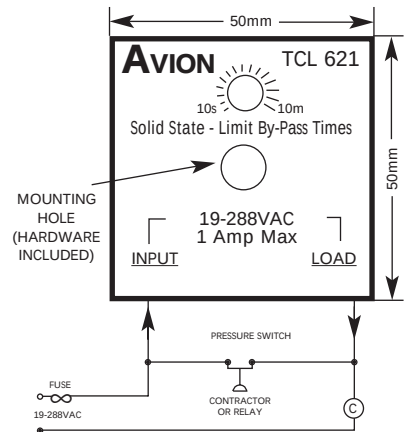
Typical Wiring Diagram TCB 320
Anti-Cycling Lockout



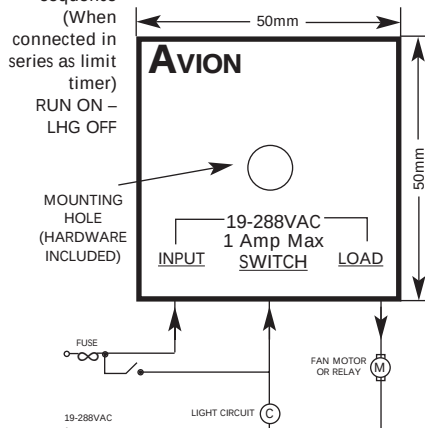
Typical Wiring Diagram TCG 621
Delay-On Make



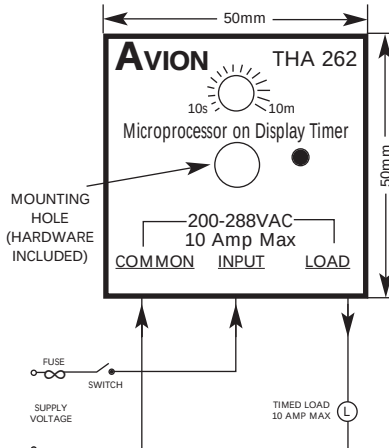
Typical Wiring Diagram TCL 621
Limit By-Pass



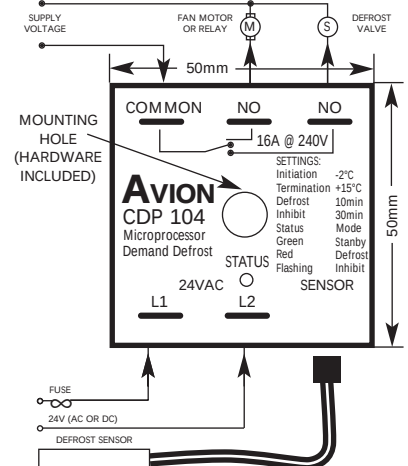
Typical Wiring Diagram TCR 621
RUN ON - LHG OFF



Typical Wiring Diagram TCG 621

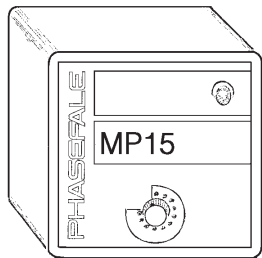


Typical Wiring Diagram CDP 104



Motor Protector

Phasefale MP15 Motor Protector – 3 Phase



The MP15 with adjustable start delay, anti short cycle timer and fault memory, protects all sizes of 3 phase motors against these common causes of motor failure.

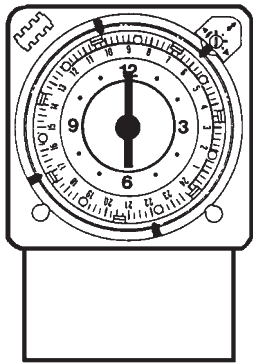
- Voltage imbalance of more than 25% between phases
- Blown fuses causing single phasing
- Chattering or faulty motor starter contacts
- Under voltage supply
- Short cycling controls
- Faulty 415 V switch-gear
- Loose or poor connections, simulating a phase loss

Because the MP15 automatically resets after a 15 minute delay, control systems can run unattended yet still be protected.

Cat. No.	Part No.	Start Delay	Restart Delay
155070	MP 15	1 to 60 Seconds (adjustable)	15 minutes
155069	MP15D (Din Rail Mount)		

Timers

Theben Time Switches



64 CA7

Model 64 B and 64 CA7

240V, 50 Hz, synchronous time switch with surface or flush mounting option. Model 64 CA7 has 24 hour or 7 day dial option, permanent On/Off control and clock hands fitted.

Model FRI 77g

Synchronous time and defrost time switch for control of defrosting operations in refrigeration systems.

Two separate programme dials: 24 hour dial for pre-selection of the hour at which brief switching should occur and 60 minute dial for adjustment of brief switching duration.

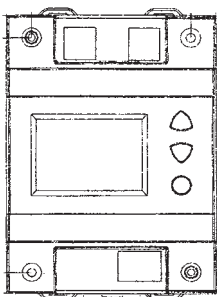
Cat. No.	Part No.	Programme Dial	Time Setting Intervals	Min. Switching Period	No. Pins	Type of Circuit	Elect. Rating 240 VAC
155034	64 BA/7	24 hours	7.5 mins	30 mins.	3 Green 3 Red	Single Pole Change Over	16 (2)
155035	64 CA7/24	24 hours/ 7 days	5 mins./ 30 mins.	20 mins./ 2 hours	16 Blue 16 Red		
155036	FRI 77g	60 mins./ 24 hours	1 min./ 1 hour	2 mins./ 1 hour	4 Green 4 Red	Double Pole Change Over	16 (2.5)

Siemens

Digital Weekly Time Clock

Features

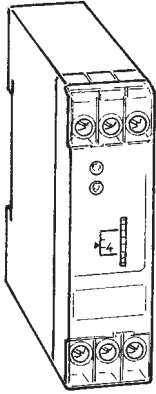
- Weekday and time of day display with daily and weekly programs
- 8 On/Off programming in locations
- Manual override and reset
- Backup with rechargeable nickel battery
- Din Rail mounting



Cat. No.	Model No.	Voltage	Contact amps
155031	SEH62.1	240V	8

Timers

Alstom E Series Electronic Timer



Features

- Multi-function
- DIN Rail Mounting
- Slimline 22.5mm width
- 2 LED's to indicate operational status

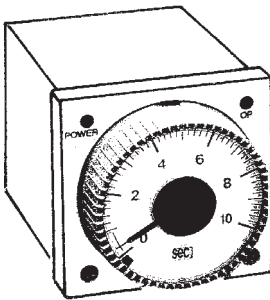
Functions

- ON delay
- OFF delay
- Single pulse on 'ON'
- Flasher starting with 'ON'
- Flasher starting with 'OFF'

Cat. No.	Part No.	Operation Mode	Supply Voltage	Output	Time Range
155080	MFE	Multi Function	24 to 240V ac/dc	1 x SPDT 4 Amp. res 250V ac	0.05 sec. to 100 hrs

1

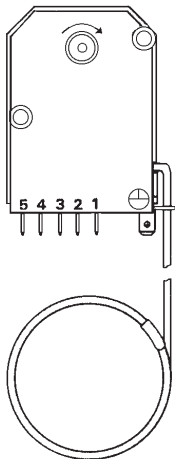
Alstom Time Delay Relays



Features

- 8 pin plug in connection
- DIN sized, 48 x 48mm

Cat. No.	Part No.	Operation Mode	Supply Voltage	Output
155081	GT3A2AF20	5 Functions	100-240 Vac	1 Timed SPDT 1 Instant SPDT 5 Amp 240 Vac
155082	GT3A2AD24	5 Functions	24V ac/dc	
155087	GE1AB10HA220	Power On delay	100-240 Vac	
155088	GE1AB10HAD24	Power On delay	24 Vac/dc	
Base				
Cat. No.	Part No.	Description		
155084	SR2PO5C	8 pin DIN Rail Mounting Base		



Ranco T24 / T25 Series Sequence Timers

The T24 / T25 range of timers has been designed to satisfy the requirements of defrosting domestic or commercial refrigeration equipment. They can be used both on natural convection and forced draft type refrigeration systems.

These timers incorporate a synchronous motor which, together with a gear train assembly, provide a pre-determined, non-adjustable frequency of operation. This assembly, with the necessary switching, provides a time start, time stop feature on all models.

On T24 timers, the inclusion of a thermal power element permits the termination of the defrost cycle in advance of the time period, if defrosting is complete.

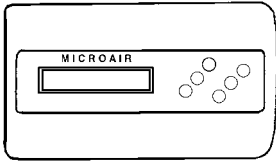
A fan delay feature is included in some versions of T24 and T25 timers.

Cat. No.	Part No.	Defrost Frequency Hours	Defrost Time Minutes	Fan Delay Minutes	Defrost Termination Temp. °C	Capillary	
						Length: mm	Type
155040	T24-L0102	6	30	—	6	1800	Straight
155041	T24-L0107	12	25	—			
155042	T24-L6003	6	20	3			

Motor Rating: 240 Volt, 50 Hz

Programmable Timers

Micro Air T Series



Micro Air T Series programmable timers are available in 1, 2, or 3 Channel models Ideal for Commercial and industrial application where plant equipment maybe required to run independently of each and full control of when the equipment is to be operated allowing for public holidays, daylight savings or late night shopping etc.

Functions

- 365-day programmable time switch that allows for up to 12 single holidays and 12 block holiday periods.
- Multiple switching timers per day
- Temperature optimisation start, extreme temperature override and remote manual override and daylight saving setback
- Memory backup via a super capacitor (no batteries required)
- Security access
- Hour logging of manual run and extreme temperature override mode
- Live on site testing feature allows technicians to manually adjust the inputs and outputs
- Din Rail Mount

Specifications

Power Supply: 240VAC

Relay Contacts: 240 Vac 10A

Size: 160W x 110H x 65D

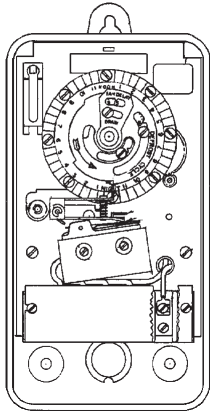
Number of Switching per day 8 timers per channel

Cat. No.	Model No.	Description
155062	T1	Single Channel Programmable Timer
155063	T2	Dual Channel Programmable Timer
155064	T3	4 Channel Programmable Timer

Defrost Time Controls

Paragon

632-21 With Pump Down, Drain or Fan Delay Cycles



Features

- Field-proven heavy-duty synchronous timing motor

Cat. No.	155001
----------	--------

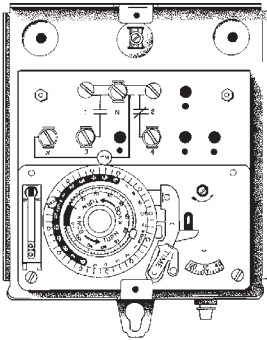
Specifications

Defrost Initiation:	Adjustable from 1 to 8 cycles per day, minimum 3 hours between successive cycles.
Delay or Pump Down Cycle:	Adjustable from 0 to 30 minutes, 3 min. graduation, for stopping fans, reducing refrigerant pressure or hot gas pump down cycle.
Defrost Cycle:	3 to 45 minutes, 3 min. graduation.
Drain or Fan Delay Cycle:	Adjustable from 3 to 15 minutes, 3 min. graduation.
Sequence Switching:	2 NO, 2 NC.
Switch Ratings:	10 Amps, 345 VA pilot duty 120-240 Vac. Switches 2-4 and 3-4 carry 1/2 HP rating
Enclosure:	Heavy steel case, grey finish, knockouts on bottom, side and back, hasp and staple for padlock. Operating Voltage: 240 V. 50 Hz.
Dimensions (mm):	245 H x 137 W x 128 D.

1

Paragon

8245-21 Time Initiated, Pressure Terminated



Features

- Direct read-out dial for cut-in pressure
- Back-up Mechanical Defrost Termination protects against sensor failure
- Positive slider bar switch action
- 40 Amp. 2 HP contacts
- Wide range of cut-in pressure adjustability
- Modular pressure bellows
- Three contact arrangements for hot gas electric heat or compressor shutdown defrost

Cat. No.	155014
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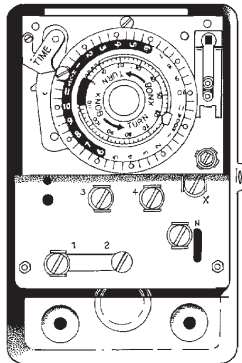
Specifications

Frequency of Defrost:	1 to 6 cycles per day. A minimum of 4 hours between successive defrost cycles.
Back-up Defrost Termination:	Adjustable from 4 to 110 minutes in 2 minute increments.
Switch Ratings per Pole:	40 Amp. 2 HP, 690 VA pilot duty, 120-240 Volts AC.
Pressure Settings:	Adjustable cut-in pressure setting dial calibrated from 248 to 758 kPa (36 to 110 psi)
Case:	Heavy steel enclosure. Grey finish. Knockouts on top.
Operating Voltage:	208-240 Volt 50 Hz. Motor: Heavy duty synchronous industrial type.
Dimensions (mm):	223 H x 176 W x 105 D.

Paragon

8145-21

Time Initiated, Remote Temperature or Pressure Terminated



Features

- Works with an external temperature or pressure control
- 40 Amp. 2 HP contacts
- Positive slider bar switch action
- Back-up Mechanical Defrost Termination protects against sensor malfunction

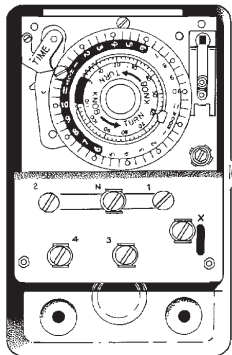
Cat. No.	155015
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Specifications

Frequency of Defrost:	1 to 6 cycles per day. A minimum of 4 hours between successive defrost cycles.
Back-up Defrost Termination:	Adjustable from 4 to 110 minutes in 2 minute increments.
Switch Ratings per Pole:	40 Amp. 2 HP, 690 VA pilot duty, 120-240 Volts AC.
Case:	Heavy steel enclosure. Grey finish. Knockouts at bottom, back and sides. Hasp and staple for padlock.
Operating Voltage:	208-240 Volts, 50 Hz. Motor: Heavy duty synchronous industrial type.
Dimensions (mm):	188 H x 119 W x 102 D.

Paragon

8045-21 Time Initiated, Time Terminated



Features

- Positive Slider bar switch action
- Simplified setting of both defrost initiation and duration
- 40 Amp. 2 HP contacts

Cat. No.	155017
----------	--------

Specifications

Frequency of Defrost:	Adjust. from 1 to 6 cycles per day. Min. of 4 hours between successive operations.
Duration of Defrost Cycle:	Adjustable from 4 to 110 minutes in 2 minute increments.
Accuracy of Defrost Duration:	±2 minutes.
Switch Rating per Pole:	40 Amps, 2 HP, 690 VA pilot duty, 120-240 Volts AC.
Case:	Heavy steel enclosure. Grey finish. Knockouts on bottom, back and sides. Hasp and staple for padlock.
Operating Voltage:	208-240 Volts, 50 Hz. Motor: Heavy duty synchronous industrial type.
Dimensions (mm):	188 H x 119 W x 102 D.

Domestic Defrost Timers

Sankyo Seiki TMDE Series

Time Initiating Time Terminating

TMDE timers automatically initiate defrost period at a preset time and terminate on completion of fixed duration defrost cycle. Defrost initiation time can be set manually to required time of day, when refrigeration unit is installed, to suit the loading of the unit or after power failure.

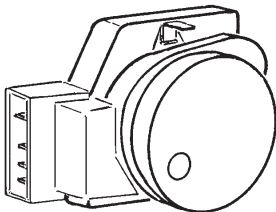
Features

Heavy duty, long life and reliable performance at low cost. Wide application for household and commercial refrigerators, freezers and electrical appliances, or any other application requiring an automatic 'switch on' and 'switch off' function.

Specifications

Starting Voltage with rated load:	170V ac. 50 Hz
Volt range of synchronisation:	200-260V. ac. 50 Hz
Input Current:	At 240V. ac. 50 Hz. Less than 15 Ma
Contact Life:	More than 15,000 switchings with rated load
Switch Rating:	3.6 amps at 240V. ac 50 Hz
Ambient Temperature Range:	-24°C to 63°C

Cat. No.	Part No.	Replaces	Defrosts in 24 Hours	Defrost Frequency Hours	Defrost Time Minutes
159030	TMDE 520ZR	DFC6H25D	4	6	25 ± 2.5
159035	TMDE 720ZF	DFC8H20G	3	8	20 ± 3.5
159028	TMDEX 30ZF	DFC12Q5	2	12	30 ± 5
159026	TMDE 309ZC	DFC4H14B	6	4	14 ± 2
159029	TMDEX 30ZF-K	DFC12Q5F	2	12	30 ± 5
159031	TMDE 520ZR-K	DFC12Q6 DFC12Q6E	4	6	25 ± 2.5
159036	TMDE 230ZC1	DFC24H30A	1	24	30 ± 5



769 Series

Paragon 769 and A1400 Series

Time Initiating Time Terminating

The 769 and A1400 Series are low cost repeat-cycle timers primarily intended for household refrigerator defrost control and can be wired for electric heating or hot gas defrosting. They can be applied to any process requiring a continuously repeating cycle of contact operations.

These are single-cam controls which activate an SPDT switch. Their operating cycle consists of transferring the switch for a pre-set duration once every 4, 6, 8, 12 hours. Both the frequency of operation and switch-transfer duration are pre-set at the factory and are not adjustable. The cycle will repeat as long as the motor is energised. An integral clutch mechanism permits initial adjustment of the cycle starting time.

Rating – 769 Series:	0.25 Kw, 5 Amp, 240V. ac
A1400 Series:	0.37 Kw, 8 Amp. Non-Ind, 240V. ac

Cat. No.	Part No.	Defrosts in 24 Hours	Defrost Frequency Hours	Defrost Time Minutes
769 Series				
159051	L769-21	2	12	21
159052	A769-21	4	6	21
159053	N769-21	6	4	21
159055	D769-21	3	8	30
159056	F769-21	4	6	28
A1400 Series				
159050	A1400-21	4	6	21

Notes

1



Your best Solution...

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Notes

This image shows a full page of blank graph paper. The grid consists of small, uniform squares formed by thin, light blue lines. There are no margins, text, or other markings on the page.

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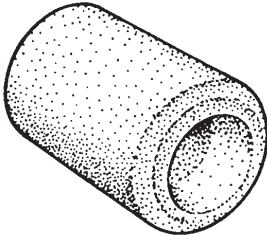
Replaceable Filter-Drier Cores / Blocks

Flow Controls (Alco) Filter-Drier Blocks and Filter Cores

Flow Controls suction filter cores (F-48) and desiccant blocks (D-48, UK-48, W-48, H-100) fit most competitive shell type filter-driers. These filter-drier blocks protect the compressor from soluble and solid contaminants. To ensure efficient clean-up results, they feature exceptional acid and wax removal capacities, plus superior moisture pickup.

Features

- Highest water capacity rating on the market today, thus keeping flow rates up together with filtration and system capacity to its optimum
- Exceptional acid capacities for normal system protection or to effectively clean-up following a compressor burnout
- Wax removal capabilities, if desired, for low temperature applications, or for complete clean-up following a compressor burnout (W Series)
- UK-48 Special Features:
 - A balance of high water/acid capacity (75% molecular sieve/25% activated alumina) to keep HFC/POE systems at optimum conditions
 - Perfect for new refrigerants, POE oils and retrofit guidelines
 - Desiccant blend protects POE additives
 - 20 micron filtration reduces sludge caused by POE oils
 - Complies with Copeland's recommendations for filter-driers on POE/HFC systems



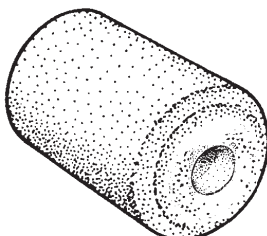
Cat. No.	Part No.	Description	Filter Area cm ²	Suits Nominal Shell Diam: mm
169011	D-48	Standard Block	445	115
169013	UK-48	High Capacity POE Block		
169002	H-100	High Capacity Block	710	150
169003	W-48	Burnout Block	445	115
169012	F-48R	Filter Core - Reverse Flow	677	

▼ Part No.	Water Capacity: Drops					
	R134a		R22		R404A, R507	
	Liquid Temperature: °C					
	24	52	24	52	24	52
D48	415	340	363	254	457	343
UK-48	1272	1168	1181	1072	1319	1241
H-100	1112	834	962	673	1199	839
W-48	387	294	335	226	417	289

Refrigerant Recycling Filter-Drier Blocks

Refrigerant Recycling Filter-Drier Blocks offer the ultimate in contaminant control for refrigerant recovery-recycling machines that utilise demountable type drier shells fitted with the conventional 95mm diameter 48 cubic inch desiccant assembly.

These blocks provide 25% more desiccant volume than the conventional model by having additional desiccant in the inside of the unit, while maintaining the same outside diameter and overall length. This affords a significant increase in water capacity, while maintaining the same high acid capacity.



Cat No.	Part No.	Description	Water Capacity - Drops**						Acid Capacity mg
			R12		R22		R502		
			24°C	52°C	24°C	52°C	24°C	52°C	
169010	RH-48*	Recycling Block	1399	1001	877	653	962	753	35,450

*Caution: The recycling refrigerant filter-drier blocks should not be used in conventional air conditioning or refrigeration systems that require high refrigerant flow rates. Use in these systems will result in excessively high pressure drop through the filter-drier and possible system damage.

**Water capacities are based on an Equilibrium Point Dryness of 15 ppm for R12, 60 ppm for R22 and 30 ppm for R502. 20 Drops of Water = 1 gram = 1cc

Replaceable Filter-Drier Cores / Blocks

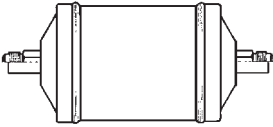
Flow Controls (Alco)

EK Series – Liquid Line Filter-Driers

The EK Filter-Drier is designed to handle the toughest system protection requirements. It incorporates a specially formulated and blended desiccant package to meet the needs of POE oils hygroscopic properties.

Features

- Soluble contaminant capacities for water and acid technology out-performing its competitors
- Fibreglass filter network provides 20 micron filtration
- Desiccant blend: 75% molecular sieve and 25% activated alumina making the EK Series drier stand alone in the market place as the most efficient drier of today.
- Copeland approved for POE oils
- Maximum Working Pressure: 032 to 4175 : 4140 kPa



Cat. No.	Part No.	Connections		Liquid Flow Capacity @ 7 kPa Pressure Drop kW ①				Nominal System Capacity: kW ②					Dimensions mm	
								Refrig. Low Temp. and Commercial Installations			A/C Field Replace. and Field Install.			
		M.Flare	Solder	R134a	R22	R404A R507	R410A	R134a	R22	R404A R507	R134a	R22	O/All Length	Body Diam.
171002	EK032	1/4"		7	7.7	5.3	7.7	0.9	0.9	0.9	1.8	1.8	111	41
171003	EK032S		1/4"	9.5	10.2	6.7	10.2						98	
171006	EK033	3/8"		10.6	11.3	7.4	11.3						119	
171007	EK033S		3/8"	10.6	11.6	7.7	11.6						103	
171008	EK052	1/4"		7.4	8.1	5.3	8.1	1.2	1.2	1.2	2.6	2.6	122	67
171009	EK052S		1/4"	11.6	12.7	8.4	12.7						113	
171010	EK053	3/8"		12.3	13.4	8.8	13.4	1.2	1.2	1.2	5.3	7	130	
171011	EK053S		3/8"	15.5	16.9	11.3	17.2						114	
171014	EK082	1/4"		8.1	8.8	6	8.8	1.8	1.8	1.8	2.6	3.5	143	67
171015	EK082S		1/4"	10.9	12	8.1	12						133	
171016	EK083	3/8"		14	15.1	10.2	15.5	3.5	3.5	3.5	7	7	151	
171017	EK083S		3/8"	15.8	17.2	11.6	17.6						135	
171018	EK084	1/2"		23.5	25.7	17.2	26	5.3	5.3	3.5	10.6	10.6	157	67
171013	EK084S		1/2"	25	27	18.3	27.4						137	
171020	EK162	1/4"		8.1	8.4	5.6	8.8	3.5	5.3	2.6	3.5	5.3	167	67
171019	EK162S		1/4"	10.9	12	8.1	12.3						157	
171021	EK163	3/8"		13.7	15.1	10.2	15.1	7	8.8	7	10.6	10.6	175	
171022	EK163S		3/8"	15.5	16.9	11.2	17.2						159	
171023	EK164	1/2"		25.3	27.4	18.3	27.8	7	10.6	7	10.6	17.6	179	67
171024	EK164S		1/2"	30	32.3	21.8	32.7						160	
171025	EK165	5/8"		34.1	36.9	24.6	37.3	8.8	10.6	8.8	17.6	17.6	191	78
171026	EK165S		5/8"	35.5	38.3	25.7	38.7						10.6	
171028	EK303	3/8"		15.1	16.5	10.9		10.6	10.6	7	10.6	14	244	
171027	EK303S		3/8"	22.1	23.9	15.8							229	
171029	EK304	1/2"		28.5	30.9	20.7		10.6	17.6	10.6	17.6	26.4	251	78
171030	EK304S		1/2"	35.2	38	25.3							232	
171031	EK305	5/8"		37.3	40.4	27		14	17.6	17.6	26.4	26.4	262	
171032	EK305S		5/8"	44	47.5	31.6							237	
1710321	EK306S		3/4"	52	56.3	37.6		17.6	26.4	17.6	26.4	35.2	246	
171033	EK307S		7/8"	59	64	42.9							251	
171036	EK414	1/2"		36.5	39.7	26.4		17.6	17.6	17.6	17.6	26.4	254	94
171037	EK414S		1/2"	38	41.1	27.4							235	
171038	EK415	5/8"		42.2	45.7	30.6		26.4	26.4	26.4	26.4	26.4	265	
171039	EK415S		5/8"	59.8	64.7	43.2							240	
171040	EK417S		7/8"	71.4	77.4	51.7		35.2	35.2	26.4	35.2	35.2	254	94
171042	EK757S		7/8"	78	84	56.6							52.7	
171044	EK759S		1 1/8"	115	124	83		70.3	88	52.7	70.3	88	400	

① Flow Capacities in accordance with ARI Standard 710-86, 30°C liquid temperature, -15°C Saturated Vapour Temperature and 7 kPa pressure drop across the drier.

② Nominal system capacity applies to common installations with liquid temperatures up to 30°C and evaporating temperatures down to -15°C. The next larger size should be selected for installations with lower evaporating temperatures, excessive pipe length, excessive refrigerant content or other. The next smaller model can be selected in factory assembled units (low humidity content, low dirt contamination) and/or for higher evaporating temperatures.

R410A: The EK filter-drier is UL listed for 4140 kPa maximum working pressure for sizes 032 to 417S.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Filter-Driers

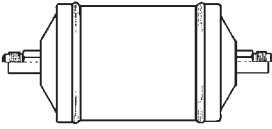
Flow Controls (Alco)

BOK Series – Burnout Filter-Driers

The BOK Series liquid line filter-drier was designed for maximum effectiveness in the clean-up of systems following a severe burnout where maximum capacity for water and acids is essential.

This series utilises a molded block of activated alumina, molecular sieve and activated carbon. This blend of activated alumina and activated carbon will remove the acids and by-products of a compressor burnout.

The activated carbon also possesses the ability to absorb waxes that are sometimes found in refrigeration oils that present serious problems with expansion valves on low temperature systems.



Features

- Extra moisture and acid removal capacity
- Wax control for low temperature applications
- Corrosion resistant epoxy powder paint finish
- Maximum Working Pressure: 3450 kPa

Cat. No.	Part No.	Connections		Liquid Flow Capacity: kW		
		M. Flare	Solder	R134a	R22	R404A, R507
171060	BOK 082	1/4"		4.9	5.6	3.5
171061	BOK 083	3/8"		13.7	14.8	9.8
171062	BOK 162	1/4"		4.9	5.6	3.5
171063	BOK 163	3/8"		15.1	16.5	10.9
171073	BOK 163S		3/8"	20.4	22.2	14.8
171064	BOK 164	1/2"		29.9	32.7	21.8
171074	BOK 164S		1/2"	35.9	39	26
171065	BOK 165	5/8"		45.4	48.9	32.7
171075	BOK 165S		5/8"	45.4	48.9	32.7
171068	BOK 305	5/8"		47.5	51.3	34.5
171082	BOK 417S		7/8"	69.6	75.6	50.6

Flow Capacities in accordance with ARI Standard 710-86, 30°C liquid temperature, -15°C Saturated Vapour Temperature and 7 kPa pressure drop across the drier.

Part No.	Nominal System Capacity: kW					
	Refrigeration Low Temperature/Commercial			Air Conditioning Field Replacement		
	R134a	R22	R404A, R507	R134a	R22	R404A, R507
BOK 082	1.8	1.8	1.8	2.6	3.5	2.6
BOK 083	3.5	3.5	3.5	7	7	7
BOK 162	3.5	5.3	2.6	3.5	5.3	3.5
BOK 163/163S	7	7	7	10.6	10.6	7
BOK 164/164S	7	10.6	7	10.6	17.6	10.6
BOK 165/165S	7	10.6	7	17.6	17.6	14
BOK 305	14	17.6	17.6	26.4	26.4	17.6
BOK 417S	35	35	26.4	35	35	26.4

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Filter-Driers

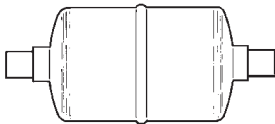
Flow Controls (Alco)

BFK Series Bi-Directional Liquid Line Heat Pump Filter/Driers

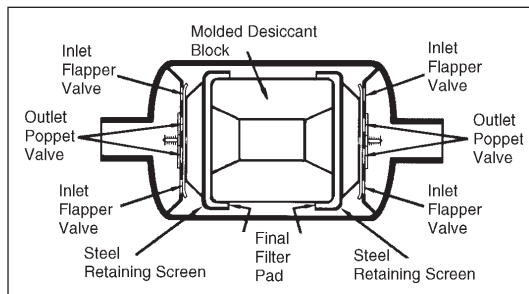
Alco BFK Series Bi-Directional Heat Pump Filter-Driers are designed to protect the system refrigerant from contamination in both heating and cooling cycles. The BFK design prevents contaminants collected in one direction from being flushed back out when the flow reverses. Eliminates the need for two external check valves and two conventional driers – reducing complex piping and resulting costs.

Features

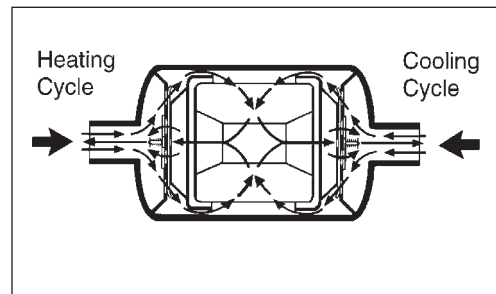
- Internal check valves allow flow and filtration in either direction
- May be mounted in any position
- Protection for both heating and cooling cycles in one filter-drier
- Provides effective removal of acids, moisture and solid contaminants
- Corrosion resistant epoxy powder paint finish
- Copeland approved for POE oils
- Desiccant blend - 75% molecular sieve and 25% activated alumina
- Maximum Operating Pressure: 4140 kPa (083 to 167)



Internal Construction



Basic Flow Patterns



Cat. No.	Part No.	Connections		▼ Liquid Flow Capacity kW			Water Capacity Drops: R22	Water Capacity Drops: R410A		Filter Area cm ²	Desiccant Volume cm ³	
							Liquid Temperature					
		M.Flare	Solder	R134a	R22	R404A R507	24°C	52°C	24°C			52°C
171051	BFK 083	3/8"		14.8	15.8	10.2	159	144	85	75	106.5	75.4
1710511	BFK 083S		3/8"	16.5	17.9	11.6						
171052	BFK 084	1/2"		20.8	22.5	14.8						
171049	BFK 084S		1/2"	21.8	23.6	15.5						
171053	BFK 085	5/8"		25.3	27.4	17.9						
171050	BFK 085S		5/8"	26.4	28.5	18.6	323	294	178	160	182.6	163.9
171054	BFK 163	3/8"		14.8	16.2	10.6						
171058	BFK 163S		3/8"	16.9	18.3	12						
171055	BFK 164	1/2"		25	27	17.6						
171059	BFK 164S		1/2"	26.4	28.5	18.6						
171056	BFK 165	5/8"		27	29.2	19						
171057	BFK 165S		5/8"	28.1	30.6	20						
1710591	BFK 167S		7/8"	34.1	36.9	24.6						

Flow Capacities in accordance with ARI Standard 710-86, 30°C liquid temperature, -15°C Saturated Vapour Temperature and 7 kPa pressure drop across the drier.

Water capacities are based on: Equilibrium Point Dryness of 60 Parts per million for R22
20 drops of water = 1 gram = 1cc

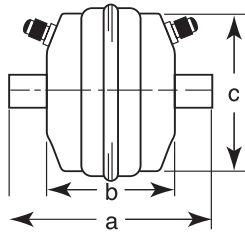
R410A: The BFK filter-drier is UL listed for 4140 kPa maximum working pressure for sizes 083 to 167.

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Filter-Driers

Flow Controls (Alco)

Dimensional Data



CSFD Compact Suction Line Burnout Filter-Drier

The CSFD compact suction line filter-drier is used in applications where other driers won't fit. It is primarily used to remove contamination after a burnout and is designed for short lay-ins. It removes moisture, acid and contaminants and is suitable for CFC, HCFC and HFC refrigerants.

Features

- High performance special decciant blend, the CSFD range will filter contaminants down to 40 microns
- All solder connections are solid copper to ensure easy soldering and quick installation
- The CSFD filter-drier is suitable for R410A having a maximum working pressure of 3450 kPa
- Competitive pricing with higher results
- Dual Access Valves

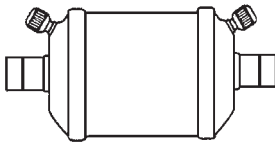
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Cat. No.	Part No.	Suction Line Flow Capacity: kW														
		R134a					R22					R404A, R507				
		Evaporating Temperature: °C														
		4	-7	-18	-29	4	-7	-18	-29	-40	4	-7	-18	-29	-40	
172030	CSFD14S4V V	4.57	3.16	1.75	1.05	7.00	4.57	3.16	2.11	1.05	4.57	2.81	1.75	1.05	0.7	
172031	CSFD14S5V V	8.08	5.27	3016	1.75	12.66	8.44	5.62	3.50	1.75	9.14	5.97	3.86	2.46	1.05	
172032	CSFD14S6V V	10.90	7.73	4.92	2.46	17.23	11.25	7.73	4.92	2.46	12.66	8.08	5.27	3.16	1.75	
172033	CSFD14S7V V	11.60	7.73	4.92	2.46	18.28	11.95	8.08	5.27	2.81	12.66	8.08	5.27	3.16	1.75	
172034	CSFD14S9V V	15.82	10.55	6.33	3.50	24.61	16.17	10.90	7.03	3.50	17.23	10.90	7.03	4.57	32.46	

Cat. No.	Part No.	Connection Type	Dimensions (mm)		
			A	B	C
172030	CSFD14S4V V	1/2" Solder	108	70	117.5
172031	CSFD14S5V V	5/8" Solder	114		
172032	CSFD14S6V V	3/4" Solder	111		
172033	CSFD14S7V V	7/8" Solder	109		
172034	CSFD14S9V V	1 1/8" Solder	124		

SFD Series – Suction Line Burnout Filter-Driers

SFD suction line filter-driers incorporate a protective filter, plus a desiccant specially blended for maximum moisture and acid removal. SFD models are specially suited for system clean-up after a burnout, or when major work has been performed on the system.



Features

- Rugged steel shells for shock resistance
- Corrosion resistant epoxy powder paint finish
- Low pressure drop - full flow fittings
- Filtration recommendation: 40 microns
- Dual access valves
- Solid copper fittings - easy to solder in
- Maximum Operating Pressure: 2760 kPa

Cat. No.	Part No.	Conn.		Suction Line Flow Capacity: kW													
				R134a				R22				R404A, R507					
				Evaporating Temperature: °C													
				4	-7	-18	-23	4	-7	-18	-29	-40	4	-7	-18	-29	-40
		M.Flare	Solder	Pressure Drop: kPa													
				14	10	7	3	21	14	10	7	3	21	14	10	7	3
172018	SFD 13F3-VV	3/8"		2.5	1.4	0.7	0.4	4.9	2.8	1.4	0.7	0.4	4.6	2.5	1.4	0.7	0.4
172019	SFD 13S3-VV		3/8"	4.6	2.8	1.8	0.7	7.7	4.6	2.8	1.8	0.7	6.7	3.9	2.5	1.4	0.7
172020	SFD 13F4-V V	1/2"		5.3	3.5	2.1	1	8.4	5.6	3.9	2.5	1.4	7.4	4.6	3.2	1.8	1
172021	SFD 13S4-V V		1/2"	8.1	5.3	3.5	1.8	12.3	8.1	5.6	3.5	2.1	10.6	6.7	4.6	2.8	1.4
172022	SFD 13F5-V V	5/8"		8.8	6	3.9	2.1	13	8.4	5.6	3.5	2.1	11.3	7	4.9	3.2	1.8
172023	SFD 13S5-V V		5/8"	10.9	7.4	4.6	2.5	17.2	11.3	7.7	4.9	2.8	14.8	9.5	6.3	3.9	2.1
172024	SFD 13S6-V V		3/4"	14.4	9.5	6	3.2	22.5	14.8	9.8	6.3	3.5	19.7	12.3	8.1	4.9	2.5
1720241	SFD 13S7-V V		7/8"	15.5	10.6	6.7	3.5	25.3	16.2	10.6	6.7	3.5	22.2	13.7	9.1	5.3	2.8
172025	SFD 27S7-V V		7/8"	16.5	10.9	6.7	3.5	26.4	16.9	11.3	7	3.9	22.9	14.4	9.5	5.6	2.8
172026	SFD 27S9-V V		1 1/8"	18.3	12	7	3.5	29.9	19	12.3	7.4	3.9	26.4	16.2	10.6	6	3.2
172027	SFD 54S11-V V		1 3/8"	15.8	10.2	6	3.2	25.7	16.2	10.6	6.3	3.5	22.5	13.7	8.8	5.3	2.5
172028	SFD 54S13-V V		1 5/8"	16.2	10.6	6.3	3.2	26	16.5	11.3	7	3.5	22.9	14.1	9.1	5.6	2.8

All ratings in accordance with ARI Standard 730-86

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Oil Driers / Filter

Flow Controls (Alco)

AOFD Oil Filter-Drier

The AOFD is designed specifically for refrigerant systems that use POE oil. POE oil is hygroscopic in nature, which means that it attracts and absorbs water. Moisture in a closed system can produce acid and will harm the compressor. Alco's AOFD protects compressors by removing moisture and trapping contaminants.

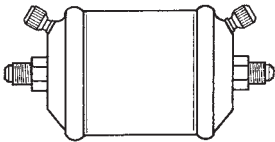


Features

- Designed to clean and dry POE Oil
- 3/8" male flare connections for easy replacement
- Large filter surface area to provide maximum filtration
- Contains 100% molecular sieve XH-9 desiccant for moisture removal
- Designed to operate at a very low pressure drop
- 10 micron filtration for optimum oil cleaning

Cat. No.	Part No.
172041	AOFD 553

ASF Oil Filter / Suction Line Filter



Features

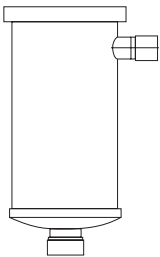
- Specially designed to protect the compressor from dirt and all solid contaminants
- Full flow fittings minimises pressure drop
- Dual access valves
- 3/8" male flare connections for easy installation on oil lines
- Filtration to 10 microns for maximum compressor protection
- Corrosion resistant epoxy powder paint finish
- Maximum Operating Pressure: 3450 kPa

Cat. No.	Part No.
172040	ASF 45F 3-VV

AOFD High Efficiency Take-Apart Oil Filter

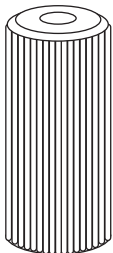
Application

Specifically designed to protect the compressor from dirt and all solid contaminants including metallic magnetic particles



Features

- Compatible with all oils
- Solid copper fittings
- Quick change filter cartridge
- Corrosion resistant epoxy paint finish
- 98% efficient to 4 micron particles
- 3/8" ODF connections
- Maximum working pressure 3450 kPa



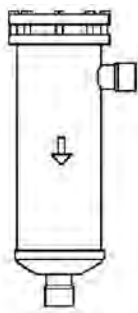
Cat. No.	Part No.	Description
172045	AOFD 553	3/8" Solder - Oil filter demountable drier
169020	FO23	AOF Oil filter cartridge

Clean-up Procedure for Compressor Motor Burnout

1. Determine the extent of the burnout. A severe burnout exists if the oil is discoloured, an acid odour is present, and contamination products are found on the high and low side. In this condition, caution should be exercised to avoid breathing the acid vapours - also avoid skin contact with the contaminated liquid.
2. Thoroughly clean and replace all system controls such as thermo valves, solenoids, check valves, reversing valves, etc. Remove all strainers and filter-driers.
3. Install replacement compressor and make a complete electrical check.
4. Make sure suction line adjacent to compressor is clean. Install an over-sized liquid line filter-drier and an Alco suction line filter-drier.
5. Pressure and leak-test the system according to unit manufacturer's recommendations.
6. Triple evacuate to at least 500 microns.
7. Charge the system to equipment manufacturer's recommendations.
8. Start the compressor and put the system in operation. Record the pressure drop across the suction line filter-drier.
9. Replace the suction line filter-drier if the pressure drop becomes excessive.
10. Observe the system during the first 4 hours. Repeat step 9 as often as required, until no further change in pressure drop is observed.
11. After the system has been in operation for 48 hours, check the condition of the oil with the Alco Acid Alert test kit. If the oil test indicates an acid condition, replace both the liquid and suction line filter-driers.
12. Check the system again after approximately 2 weeks of operation. If the oil is still discoloured, replace the liquid and suction line filter-driers.
13. Clean-up is complete when the oil is clean and odour-free, and is determined to be acceptable with the Alco acid Alert test kit.

Demountable Drier Shells

Flow Controls (Alco)



ATD Series – Filter-Drier / Filter Shells

Flow Controls ATD Series of Replaceable Core Drier Shells for liquid and suction line service offers the flexibility of using either replaceable filter cores as protection against solid contaminants, or replaceable filter-drier blocks for protection against acid, moisture and solids. They provide high liquid line flow capacities for larger air conditioning and refrigeration applications.

Features

- Tapped ring eliminates the need for nuts. Faster filter changes
- Aluminium flange cover
- Spring loaded core retainer
- Internal gasket seal to eliminate refrigerant bypass
- Solid copper ODF fittings
- Durable steel shell with corrosion resistant paint
- Safe working pressure 3450 kPa

2

Shell Only			Filter-Drier Blocks		Liquid Line Filter-Drier Ratings								
Cat. No.	Part No.	Solder Connections	No. and Size of Blocks Req'd.	Desiccant Volume Cubic Inches	Liquid Flow Capacity ① at 7 kPa Pressure Drop kW			Suggested Nominal System Capacity: kW					
								Refrig. Low Temperature and Commercial Installations			Air Cond. Field Replacement and Field Installations		
					R134a	R22	R404A R507	R134a	R22	R404A R507	R134a	R22	R404A R507
172130	ATDS 487 TSSSTD	7/8"	1 x 48	48	123	133	88	35	45	35	35	44	35
172131	ATDS 489 TSSSTD	1 1/8"			172	186	126	35	52	35	35	52	35
172132	ATDS 4811 TSSSTD	1 3/8"			197	214	144	45	70	45	45	70	45
172133	ATDS 4813 TSSSTD	1 5/8"											
172134	ATDS 4817 TSSSTD	2 1/8"											
172135	ATDS 967 TSSSTD	7/8"	2 x 48	96	133	144	98	70	88	52	70	88	52
172136	ATDS 969 TSSSTD	1 1/8"			204	221	147	88	105	70	88	105	70
172137	ATDS 9611 TSSSTD	1 3/8"			256	277	186	105	123	88	105	123	88
172138	ATDS 9613 TSSSTD	1 5/8"			274	299	200	123	140	105	123	140	105
172139	ATDS 9617 TSSSTD	2 1/8"											
172140	ATDS 1449 TSSSTD	1 1/8"	3 x 48	144	232	214	154	105	140	105	105	140	105
172141	ATDS 14411 TSSSTD	1 3/8"			284	309	207	140	175	123	140	175	123
172142	ATDS 14413 TSSSTD	1 5/8"			316	341	228	158	193	140	158	193	140
172143	ATDS 14417 TSSSTD	2 1/8"			362	394	263	175	211	158	175	211	158
172144	ATDS 19211 TSSSTD	1 3/8"			302	330	221	175	246	158	175	246	158
172145	ATDS 19213 TSSSTD	1 5/8"	4 x 48	192	334	362	242	211	281	193	211	281	193
172146	ATDS 19217 TSSSTD	2 1/8"			372	404	270	228	299	211	228	299	211

① R22 Capacities in accordance with ARI Standard 710-86

Cat. No.	Part No.	Description
172150	061715	Demountable Drier Bracket

Part No.	Solder Connections	Suction Line Filter-Drier Ratings												
		Flow Capacity: kW ②												
		R134a				R22				R404A / R507				
		Evaporating Temperature: °C												
		4	-7	-18	-29	4	-7	-18	-29	4	-7	-18	-29	-40
		Pressure Drop: kPa												
		14	10	7	3.5	21	14	10	7	21	14	10	7	3.5
ATDS 489 TSSSTD	1½”	28	21	14	3.5	53	31	24	14	45	28	21	14	7
ATDS 4811 TSSSTD	1¾”	35	24	14	7	63	38	28	17	60	35	21	14	10
ATDS 4813 TSSSTD	1⅝”	45	28	17	10	81	45	35	21	70	42	24	17	14
ATDS 4817 TSSSTD	2⅛”	60	35	24	14	109	70	45	24	95	60	35	21	17
ATDS 9617 TSSSTD	2⅛”	63	42	21	14	116	70	45	28	95	60	38	24	17

② Capacities are based on 38°C liquid refrigerant temperature and suction gas superheated 5.5 K.

Note:

Filter-drier blocks or filter cores are not included with above demountable drier shells. These must be ordered separately. Refer Page 109.

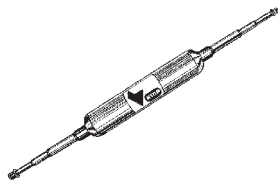
All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.



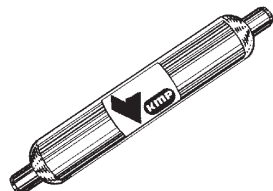
Your best Solution...

Domestic Driers/Joiners/Strainers

Copper Spun Filter-Driers – For R134a With 80mm Copper Tails



Cat. No.	Part No.	Capacity Grams	Connections		Body Dimensions: mm	
			Inlet	Outlet	Diameter	Length
180048	421120201	10	1/4"	1/4"	19	120
180060	421134201	15	5/16" and 1/4"	1/4" and 3/16"	19	134
180061	441132201	25	1/4"	1/4" and 3/16"	25	132
180088	441205201	50	1/4"	3/16"	25	205



Without Copper Tails

180082	121134202	15	1/4"	Capillary	19	134
180081	121134201	15	1/4"	1/4"	19	134
180057	141132201	25	1/4"	1/4"	25	132

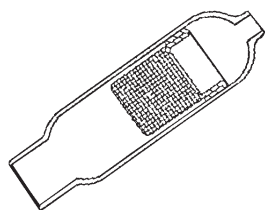
Copper / Aluminium Joiners

These joiners are designed to be used for connecting an aluminium evaporator with the suction side of a compressor in a hermetic system.

Produced from high quality soft copper and aluminium tube with 7.9mm OD. and wall thickness of 1.3mm.

Because of the special soldering process and strict control necessary, joints can be guaranteed even under the toughest conditions.

Cat. No.	Connections		Length: mm	
	Inlet	Outlet	Copper	Aluminium
180040	1/4"	1/4"	104	104
180041	1/4"	1/4" and 5/16"		



Copper Spun Strainers

Cat. No.	Part No.	Screen Type	Connections		Body Dimensions: mm	
			Inlet	Outlet	Diameter	Length
180019	211060001	150 Mesh Monel formed cup construction	1/4"	Capillary	16	60

Service Aids



Silica-Gel

Silica Gel is an amorphous form of silica, manufactured from sodium silicate and sulphuric acid. It is non-corrosive and non-toxic. It has a tremendous number of sub-microscopic pores, i.e. capillaries (approximately 40 cubic centimetres per 100 grams), which attract water vapour, condense it and hold it physically through surface adsorption and capillary condensation.

Cat. No.	Part No.	Mesh	Size Container
183010	540	8-20	680 grams

Thawzone

Liquid Dehydrant



Thawzone, the original pioneer liquid dehydrant, chemically 'dries' all fluorinated refrigerants (R12, R22 etc.). It is an organic liquid that contains no solids, will not deposit residue or damage equipment. It is miscible with all refrigerants and is sufficiently volatile to circulate with them. Thawzone is the fastest drier available. Frozen systems are restored to service by the time the refrigerant has cycled twice and will not refreeze.

Thawzone neutralises acid, reduces gum and can be used in most refrigeration and air conditioning equipment with or without solid driers. Highside's 113 gram charge-kit allows premeasuring of the Thawzone charge, easy purging of charging lines and makes using Thawzone quick and easy. A frozen system can be back in service in five minutes and Thawzone works every time even when other driers fail.

Cat. No.	Part No.	Size Container
183030	17004	113 grams

Trace

Internal Leak Detector



Trace is a red dye tracer type refrigerant leak detector. It is a concentrated dye penetrant in a refrigeration oil base and is completely harmless to refrigeration and air conditioning equipment. Trace will not sludge oil or deposit gum and may be used in most refrigeration and air conditioning systems. When Trace is added to the refrigerant of a system, leaks show as red stains at the location of the leaks. The red stains show through ice and frost and Trace is especially effective in detecting 'On and Off' leaks because the red colour remains on the equipment until wiped off. Trace is soluble in both oil and refrigerant, but is non-volatile; therefore in areas where the refrigerant is a gas, the red colour travels with the oil. In systems that contain oil separators or where the oil does not travel with the refrigerant, Trace must be added to the main refrigerant flow or the oil separator must be temporarily bypassed.

Solid driers are not effected by Trace, but they remove some colour therefore if the colour intensity is reduced, more Trace should be added. Trace is packed in 113 gram Charge-It Kits which allow premeasuring and easy charging. Premeasuring assures that the proper amount of dye is placed in the system, and the Charge-It Kit makes Trace quick and easy to use. Trace is also excellent for use in hydraulic systems to colour hydraulic fluids.

Cat. No.	Part No.	Size Container
183037	20004	113 grams

Service Aids

Flow Controls (Alco)



Acid Alert – Refrigeration Oil Acid Test Kit

Cat. No.	184042
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Alco Acid Alert is an inexpensive, disposable refrigeration oil acid test kit that is a highly accurate service tool. Acid Alert provides a convenient means for determining when the concentration of acid in the system refrigeration oil has reached an unacceptable level. There is no need to make marginal judgement readings when using the Acid Alert Test Kit. The test provides a positive indication of whether the acid number of the refrigeration oil is safe or unsafe. If the test indicates that the oil is contaminated, the system should be cleaned-up by means of an oversized liquid line filter-drier and a suction line filter-drier.

Features

- Accurate and convenient tool for testing refrigeration oil
- Phase separation provides a positive colour change regardless of the colour or condition of oil
- Two bottles, four step procedure provides consistent results
- Each kit contains everything needed to conduct one test

Note:

May not be compatible with ALL refrigeration oils.

Should not be used on systems which contain an oil additive leak detector as results may be inconsistent and/or unreliable.

All Alco products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Virginia



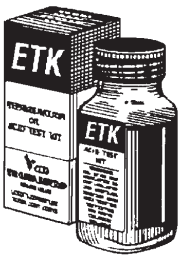
TKO – Refrigeration Oil Acid Test Kit For Mineral and Alkybenzene Oils

Cat. No.	184039
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Fastest way of telling whether compressor oil is safe or acidic using one bottle. Fill with oil up to line on bottle neck and shake, purple is safe, yellow is acidic.

Ultra sensitive colour change guarantees accurate test, inexpensive, colour comparison chart in every box.

Colour changes at neutralisation number of 0.05. If oil is very dark and acidic, colour may be more orange than yellow. If light coloured oil gives orange colour, oil acidity is marginal. Inhibited centrifugal oils will give false acidic test.



ETK – Refrigeration Oil Acid Test Kit For Polyol Ester Oils

Cat. No.	184059
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One bottle test is the faster way of determining if compressor lubricant is safe or acidic. Fill bottle to line with lubricant and shake. Colour change indicates safe, marginal or unsafe.



Watsco

Zoom Spout Oiler

A flexible spout telescopes up to 350mm to reach most remote areas.

Squeeze pressure on the container allows the oil to flow in any direction, including 'straight-up'! The flexible spout reaches everywhere – even around corners.

Filled with highest quality, all purpose lubricating oil.

Cat. No.	Part No.	Size Container
184168	DO 1	118 ml

Service Aids

Refrigeration Technologies



Big Blu Gas and Air Leak Detector

Big Blu is a strong and persistent film forming liquid that has excelled in the field identification of gas leaks. It remains, the only bubble/foam indicator capable of detecting micro gas leakage down to 19 milliliters per year.

Non toxic, non corrosive, biodegradable and approved for use on Oxygen systems.

Cat. No.	Part No.	Size Container
184409	RT100S	1 Litre

2



Viper Coil Degreaser - Food Grade

Viper is a potent degreasing compound that does not contain any hazardous ingredients or give off toxic fumes. Condenser coils require a light water rinse and there is no need to rinse evaporated coils.

Cat. No.	Part No.	Size Container
184408	RT375A	510 gram - Aerosol



ERG

Anti Bacterial Spray

ERG Anti Bacterial Spray is a natural anti bacterial spray. It's non allergenic and ideal for anywhere you need a fresher, healthier environment. Applications include air conditioning evaporators.

Active ingredient - Tee Tree Oil.

Cat. No.	Part No.	Size Container
184099	1601620	200 gram - Aerosol



Spray Oil

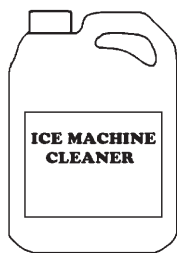
Refrigerant grade spray oil is used during the assembly of components for refrigeration systems such as fittings and crankshaft seals. Suitable for use with HFC and HCFC refrigerants.

Cat. No.	Part No.	Size Container
184089	OG6012	300 ml - Aerosol

Service Aids

Sterile-Care

Ice Machine Cleaner



A pale yellow liquid concentrate for removing sediments and mineral deposits from troughs of ice machines.

It contains an easy to see dye to ensure that no cleaner remains in the unit after cleaning is completed.

Cat. No. ▼	Part No.	Size
184178	IMC-1	1 Litre
184179	IMC-4	4 Litre



Fresh Air Sponge

A specially formulated non polluting gel that sponges up bad odour and fumes. It has a mild smelling aroma.

Available in two sizes, easy to install and requires no maintenance.

Cat. No.	Part No.	Size
184186	FAS-1	500 ml
184187	FAS-4	2 Litre



Duct Seal

Duct Seal is a white water soluble encapsulant of low toxicity for the sealing and binding of residual particles in air ducts.

It is normally sprayed or fogged into air duct systems. It can also be used in conjunction with surivon.

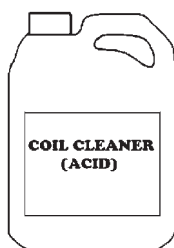
Cat. No.	Part No.	Size
184189	DUS-4	4 Litre



Coil and Filter Cleaner (Alkali)

An alkaline base cleaning agent that incorporates a hospital grade biocide. It is suitable for removing dirt and grime from copper and galvanised air conditioning coils.

Cat. No.	Part No.	Size
184205	AK-1	1 Litre
184190	AK-4	4 Litre



Coil Cleaner (Acid)

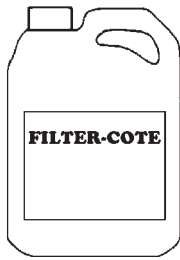
A clear acid base liquid for removing grime and light corrosion from aluminium air conditioning coils.

Cat. No.	Part No.	Size
184204	AB-1	1 Litre
184191	AB-4	4 Litre

Service Aids

Sterile-Care

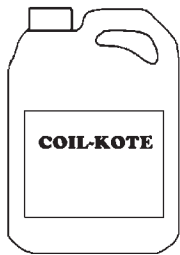
Filter-Cote



Filter-cote is a tacky water based filter adhesive that is designed to increase the efficiency of air filters.

It can withstand high velocity systems, washes out with water and contains a hospital grade biocide.

Cat. No. ▼	Part No.	Size
184196	FC-1	4 Litre



Coil-Kote

Coil-Kote protects coils from being attacked by the harsh elements. It is sprayed onto the coil where it hardens, leaving a fine protective film on the coil.

Coil-Kote is in two parts: "A" the sealer and "B" the catalyst.

Cat. No.	Part No.	Size
184218	CK-5	5 Litre



Surivon

Surivon replaces "Germ-Out" and is an all purpose disinfectant that can be used in a variety of applications, including air ducts and associated equipment.

It is non-toxic, biodegradable and has a colour sensitive time dye.

Cat. No.	Part No.	Size
184213	NV 500	500 gram



Grease Away

Grease-Away is a powerful solvent for removing grease, fats and oil from metal, concrete, plastic, rubber and aluminium surfaces.

It is recommended for cleaning kitchen exhausts, canopies, ducting and cool rooms.

Cat. No.	Part No.	Size
184198	GA-4	4 Litre

Protectolene

Hand Cleaner



Helps protect the hands from the harmful and unpleasant effects of paint, grime, grease, carbon, oil, printer's inks and dyes, tar, fine metal dust and many other industrial soils that can injure the skin.

Protectolene is a stable, concentrated, highly efficient water soluble cream of the combined emulsifier and solvent type containing soothing emollients.

Cat. No.	Part No.	Size
184051	8127125	500 gram
184052	8127602	2 kg
184053	8127404	4 kg

Service Aids

Virginia KMP

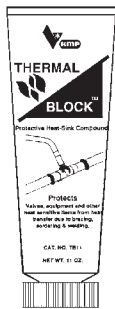


Blast-A-Coil

This innovative coil cleaning formula allows the user to Blast-A-Coil and walk away. It cleans grease, dirt, lint and other debris instantly without mess or fuss.

Features a high pressure nozzle and is environmentally safe for evaporator and condenser use. Authorised by USDA for use in federally inspected meat and poultry plants.

Cat. No. ▼	Part No.
184080	BAC 20I



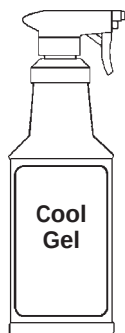
Thermal Block Heat Paste

Virginia Thermal Block applies quickly and easily to all metals directly from the tube. Protects adjacent heat-sensitive materials, delicate parts and painted surfaces. No hassle, no mess, cleans up with water.

Protective heat sink compound confines heat to the welding, brazing or soldering zone.

Thermal Block effectively absorbs surface heat generated by welding, brazing or soldering on metals and other materials. Eliminates heat damage, prevents buckling, warping or other distortions of light gauge material.

Cat. No.	Part No.	Size
184081	TB11	11 oz



La-Co

Cool Gel Heat Dissipating Spray

Cool Gel prevents heat damage to components during soldering, brazing or welding. Unique gelled formula sticks to surfaces without drips and protects adjoining areas of wood, wallboard, insulation etc. No messy cleanup.

Features

- Protects heat sensitive components
- No Drip Formula
- Non corrosive
- Non toxic
- No cleanup
- Non staining

Cat. No.	Part No.	Size
184079	Cool Gel	947 ml
184077	Cool Gel	473 ml

Service Aids

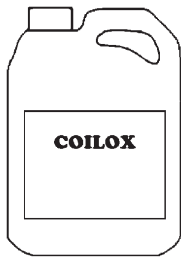
Hydro-Chem



Clean-Ice – Ice Machine Cleaner

An ice machine cleaner which is safe to use on all ice machines, including those with nickel drums and aluminium or galvanised parts. Fast acting, odourless and non-fuming. Simply drain the ice machine and refill with fresh water, add Clean-Ice and circulate for 30 minutes. Brush Clean-Ice on any surfaces not contacted by the solution during circulation. Once scale is removed, drain, flush, refill and continue normal operations.

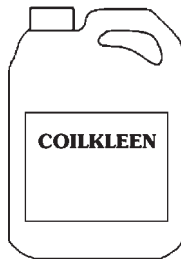
Cat. No. ▼	Part No.	Size
184415	Clean-Ice	1 Litre



Coilox – Coil Cleaning Detergent (Neutral)

Effectively cleans dirty evaporator coils in one step while system is in operation. Spray Coilox into the up-stream side of coils and the air flow causes complete coil penetration. No rinsing required. Contaminated Coilox drains as condensate and cleans the condensate pan and drain as well as the coil.

Cat. No.	Part No.	Size
184410	Coilox	5 Litre



Coilkleen – Detergent Coil Cleaner (Acidic)

Cleans aluminium finned, air-cooled condensers easily and effectively. Simple spray condenser using acid-resistant sprayer and 'expanding foam' pushes contamination outward from the centre of the coils for easy rinsing with water. Leaves condenser as clean and bright as new.

Cat. No.	Part No.	Size
184411	Coilkleen	5 Litre



4X – Coil Cleaner Concentrate (Alkaline)

A 100% active ingredient coil cleaner base. Simply add water! Use 4X on air cooled condensers, evaporators, electric air filters and fan blades. 4X removes grease, exhaust and other sticky residue with expanding foam action. Spray 4X and rinse to remove heavy grease accumulation as well as other heavy debris. 4X is easy to use, effective and its non-acid formulation increases user safety.

Cat. No.	Part No.	Size
184412	4X	1 Litre



Fin Saver – Air Cooled Condenser Protectant

A specially formulated coating containing acrylic polymers and anti corrosion agents designed to protect painted or unpainted metals from rust and corrosion. Fin saver seals and protects aluminium, copper, brass, bronze, chrome, galvanised metal, titanium and stainless steel. It is ideally suited for use on air cooled condensers located in corrosive environments such as paper mills, chemical plants, airports, adjacent to freeways and salt air areas.

Cat. No.	Part No.	Size
184413	Fin Saver	450ml Aerosol

Service Aids

Hydro-Chem

Sta-Clean – Bacterial Control Agent



A cooling coil anti-foulant coating which continuously protects coils from fouling caused by air-borne particles and other contaminants for up to one year by forming a microscopically thin coating over the coil surface. Sta-Clean improves system efficiency by as much as 23% and assists in reducing the risks associated with poor indoor air quality such as sick building syndrome and building related illnesses. Sta-Clean is safe to use and easy to apply. Just clean the coil using Hydro Chem coil cleaning products, then apply Sta-Clean. Allow 30 minutes to cure before the system is put back on line. Sta-Clean is also effective as a condensate pan coating.

Cat. No. ▼	Part No.	Size
184419	Sta-Clean	1 Litre



Wanda Wash – Multi Purpose Concentrated Detergent

A multi-purpose concentrated detergent/filter cleaner. It is biodegradable and contains complex phosphates with a mixed blend of surfactants. The type and degree of contamination will determine the dilution rate. For example, moderately dirty filters would require a dilution rate of approximately 20 to 1.

Cat. No.	Part No.	Size
184422	Wanda-Wash	1 Litre



No More Grease – Degreaser

A liquid blend of phosphates, surfactant and solvents. It is an excellent product for cleaning and removing oil, dirt, ink, exhaust stains and light carbon deposits from most surfaces. It is not flammable and is very economical to use.

Cat. No.	Part No.	Size
184414	No More Grease	5 Litre

Service Aids

Candan

Inox Lubricant



Anti-moisture lubricant, made from high grade lubricating machine oil and specialised chemical compounds. Contains no silicon, acid or acid-forming ingredients, kerosene or petroleum distillate.

Harmless to metal parts and surfaces, plastics, paints, enamel, fibreglass and formica finishes and neoprene seals. Non-static, non-corrosive, non-staining and non-toxic. Does not dry out, become sticky, gooey or gum up or wash off with water. Neutral properties.

Cat. No. ▼	Part No.	Size
184090	Inox	300 gram



CRC

C.O. Contact Cleaner

Precision cleaner for all electronic equipment – mild, for sensitive contacts and equipment.

Rapid and complete evaporation.

Cat. No.	Part No.	Size
184102	2016	350 gram



Zinc-It

Zinc-It offers the protection of hot dip galvanize plus the convenience of on-the-job application.

Zinc-It forms a tough, flexible coating of zinc metal which actually bonds with the base metal.

Cat. No.	Part No.	Size
184103	2085	350 gram



Lectra Clean

Heavy duty electric motor and equipment cleaner and degreaser.

Strong, safe and easy to use.

Cat. No.	Part No.	Size
184104	2018	400 gram



Freeze Spray 75

An inert coolant for quick location of thermal breaks and intermittent faults on electronic components and equipment and for checking thermostats.

It is completely harmless on all materials.

Cat. No.	Part No.	Size
184105	2039	300 gram

Water Treatment Products

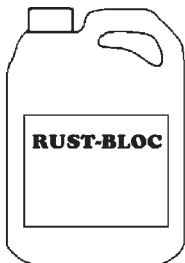
Hydro-Chem

Scalex – Scale Remover



An ultra-easy to use descaler that removes scale with maximum efficiency. Scalex removes calcium carbonate, heavy slime and algae growth from cooling towers, pipes and condensers. Scalex contains no dangerous hydrochloric (matriatic) acid or strong sulphamic acid to cause skin burn or acid fumes. Simply add the right dosage to the circulating water and allow the system to operate normally for 24 to 48 hours, then drain. Scalex is safe to use on paint, wood, fibreglass and commonly used metals, except galvanised coatings.

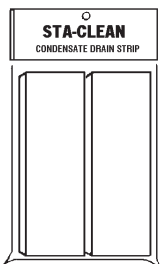
Cat. No. ▼	Part No.	Size
184418	Scalex	5 kg



Rust-Bloc – Corrosion and Scale Inhibitor

An excellent multi-purpose corrosion/scale inhibitor for use in condenser, chilled and heating hot water systems. Rust-Bloc does not contain chromate or any other heavy metals. Rust-Bloc contains a specific inhibitor for copper protection and is economical to use.

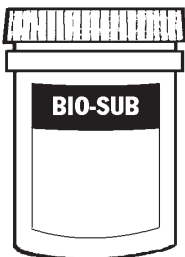
Cat. No.	Part No.	Size
184417	Rust-Bloc	5 Litre



Sta-Clean – Condensate Drain Strips

Condensate pan strips are a water activated, timed release control of micro-bial contaminants in condensate drains. Sta-Clean kills mould, algae, fungi and other micro-organisms – even legionella bacteria. Safe and easy to use – simply place the strip in a wet area of the pan at the opposite end to the condensate drain opening. Sta-Clean lasts for months and reduces foul odours, blocked drains and corrosion by promoting system hygiene.

Cat. No.	Part No.	Size
184420	S/Clean Strip	Packet 6 Strips



Bio-Sub – Slow Release Water Treatment Biocide

Bio-Sub is designed for use in evaporative coolers for long term protection from algae, slime, bacterial growth, including legionella. Bio-Sub contains slow release bromine/chlorine tablets. Bio-Sub is a non foaming easy to use product.

Cat. No.	Part No.	Size
184423	Bio-Sub	Packet of 4

Cooling Tower Maintenance

Hydro-Chem



Bio-Wash – Cooling Tower Cleaner

- Decontaminates and disinfects
- Fast acting oxidizing broad spectrum biocide
- Effective in controlling legionnaires disease causing bacteria
- Aids in the removal of biomass from all wetted surfaces

Cat. No. ▼	Part No.	Size
184424	Bio-Wash	5 Litre



Sterile-Care

Liquid Inhibitor

L.Q. Liquid Inhibitor replaces 'Inhibitab' tablets and is a specially designed liquid corrosion inhibitor for open circuit water cooling systems.

Cat. No.	Part No.	Size
184215	LQ-4	4 Litre



De-Scale

An inhibited liquid acid for the chemical removal of scale, corrosion and heavy sludge build up on metals and other materials in the water cooling system and associated equipment.

Cat. No.	Part No.	Size
184193	DES-4	4 Litre



Tower Wash

Tower Wash is a chlorinated detergent for the cleaning and disinfecting of newly installed or contaminated water cooling systems.

Ideally suited for use in the routine three monthly cleaning programme of water cooling towers.

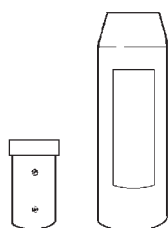
Cat. No.	Part No.	Size
184194	TW-4	4 Litre
184195	TW-25	25 Litre



Anti-Corrosive

AC is free of chromates and other heavy metal compounds. It is ideal for use in water cooling towers and other recirculating water systems.

Cat. No.	Part No.	Size
184192	AC-4	4 Litre



Easy Dose Cartridges

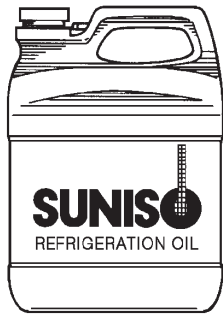
Designed for effective control of algae, bacteria, fungi and legionella in small evaporative coolers and cooling towers up to 3000 litres of circulating water.

When the cartridges are 90% spent, they float to the surface indicating the system needs further treatment.

Cat. No.	Part No.	Size
184199	EDC-M	Mini
184200	EDC-L	Large

Oils

Suniso



Mineral Refrigeration Oils For use with R12, R22, R502, R717 (Ammonia)

Suniso refrigeration oils have been specially prepared to withstand the high speeds and low temperatures encountered in modern refrigerating and air conditioning compressors. The oil is nearly completely dry, having less than 30 parts of water per million parts of oil.

Features

- Chemical Stability - to resist chemical reaction with the refrigerant or any other material normally present in the system.
- Thermal Stability - to eliminate excessive carbon deposits at compressor hot spots such as valves or discharge ports
- Low Wax Content - to prevent separation of flocculent material from the oil-refrigerant mixture at the low temperature points in the system.
- Low Pour Point - to prevent separated oil from congealing in refrigerant lines
- High Dielectric Strength - to ensure good insulating properties. In hermetic units, the oil-refrigerant mixture serves as an insulator between the motor and the compressor body.
- Proper Viscosity - even when diluted with refrigerant so as to ensure high film strength at elevated operating temperatures and while providing good fluidity under coldest operating conditions
- No Contamination - to prevent scarring of bearing surfaces, plugging of lines or oil ports and general deterioration

Suniso Grade	4 Litre Containers	20 Litre Drums	205 Litre Drums
	Cat. No.	Cat. No.	Cat. No.
3GS	184002	184003	184004
4GS	184008	184009	184010
5GS	184015	184016	
4SA		184019	184020

Selection

Unless otherwise specified by the compressor manufacturer, the grade of oil to select can usually be based on the following:

Suniso Grade	Application
3GS	New compressors during the run-in period of less than 3.5 kW capacity. All low temperature applications with suction temp. of approx. -40°C and below. For use with CFC, HCFC and ammonia refrigerants
4GS	Fully run-in compressors (other than ammonia) of 3.5 kW capacity and over, and employed on normal applications with suction temperature of -40°C and higher
5GS	For automotive air conditioning compressors or when a heavy duty, high viscosity oil is required for special purposes
4SA	All Ammonia Compressors (run-in) of 3.5 kW capacity and over and employed on normal applications with suction temperature of -40°C and higher and including some screw compressors

Low Temperature Properties

Refrigeration oils carried with the refrigerant through the system must be compatible with the refrigerant at low temperatures and must not separate waxlike deposits which can clog a system. There are two laboratory tests to measure the low temperature performance of oil. The more meaningful of these is the wax precipitation, or floc-point test. The second test is the pour point test. It determines the lowest temperature at which the oil flows.

Specifications

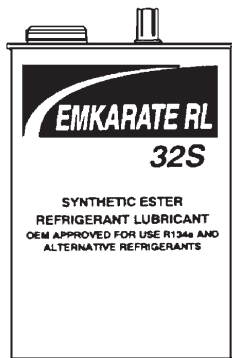
Property	Method*	Suniso Grade			
		3GS	4GS	5GS	4SA
Density g/cm ³ @ 15°C	D 4052	0.9084	0.9122	0.922	0.897
Viscosity cSt @ 40°C	D 445	29.56	55	94.8	54.3
Viscosity cSt @ 100°C	D 445	4.4	6.1	8.2	6.63
Flash, COC, °C	D92	168	179	220	210
Pour Point °C	D97	-42	-36	-30	-40
Floc Point °C (typical)	ASHRAE 86-83	-54	-48	-35	-30
Colour	D1500	L 1.0	L 1.0	L 1.0	2.0
Total Acid No. mg KOH/g	D974	Nil	Nil	Nil	Nil
Dielectric Strength, KV	D877	55	50	45	30-63
Aniline Point, °C	D611	71	73	76	90

*ASTM unless otherwise specified.

Oils

ICI-Emkarate

Polyol Ester Refrigeration Oils



Emkarate RL Synthetic refrigeration lubricants are a range of select Polyol Esters designed to deliver the reliable high performance replacement for traditional mineral oils. Specifically developed for use with HFC's, Emkarate RL exhibits a range of critical features including excellent solubility, viscosity and lubrication performance across the wide temperature spectrum encountered in all refrigeration systems. Emkarate RL may also be used with HCFC's after consultation with compressor manufacturers.

Grade	1 Litre Container	5 Litre Container	20 Litre Container
	Cat. No.	Cat. No.	Cat. No.
RL 22H			
RL 32H			
RL 32S			
RL 32CF	184038	184041	184046
RL 46H			
RL 46S	184082	184083	
RL 68H			
RL 68S	184085	184086	184087
RL 100S		184047	
RL 150S			
RL 220H			

2

Typical Properties													Application Guide			
ISO Grade	Product Code	Viscosity All Measurements in cSt		Viscosity Index No. Units	Pour Point °C	Water Constant ppm	Density @ 15°C g/ml	Flash Point °C	Acid Value mgKOH/g	Colour Hazen	Miscibility 10% Lube in R134a		Industrial/Commercial			
		40°C	100°C								High °C	Low °C	Recip.	Cent.	Screw	Scroll
22	RL22H	18.9	4.2	128	-52	<50	0.998	240	<0.02	ICO	>80	-44	1 ●			
32	RL32H	33.7	5.9	120	-46	<50	0.977	270	<0.02	60	>80	-42	1 ●	●		
	RL32S	32	5.6	114	-46	<50	0.973	250	<0.02	110	>80	-5	1 ●	●		
	RL32CF	SPECIALLY FORMULATED FOR USE IN COPELAND COMPRESSORS											1 ●			
46	RL46H	46	7.1	113	-48	<50	0.977	260	<0.02	70	>80	-37	2 ●	●	●	●
	RL46S	48	7.3	111	-40	<50	0.972	275	<0.02	125	>80	-5	2 ●	●	●	●
68	RL68H	72.3	9.8	116	-39	<50	0.977	270	<0.02	70	>80	-26	●	●	●	●
	RL68S	74.1	10.1	118	-35	<50	0.973	245	<0.02	100	>80	-3	●	●	●	●
100	RL100S	100	12.7	122	-36	<50	0.979	260	<0.02	125	>75	6			●	●
150	RL150S	139	15.5	114	-37	<50	0.976	265	<0.02	150	>67	9			●	
220	RL220H	230	19.5	96	-15	<50	0.976	280	<0.02	100		-16			●	
Test Method		D445		D2270	D97	E1064-85	D1298	D92	In House	D1209	In House					

Test methods are ASTM standard methods unless otherwise stated.

Volume Resistivity is typically $>1 \times 10^{13} \Omega\text{cm}$.

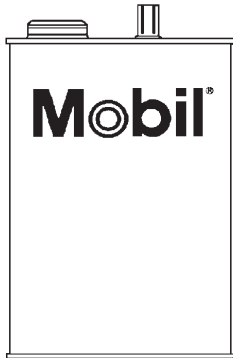
Dielectric Strength is typically $>25\text{KV}$.

1 - Small hermetic and semi-hermetic reciprocating compressors

2 - Larger open drive and semi-hermetic compressors

Oils

Mobil



Polyol Ester Refrigeration Oils

Mobil EAL Arctic Series is a family of synthetic lubricants formulated with selected polyol ester basestocks combined with additives which provide lubricity, stability and resistance to corrosion. They are termed "backward compatible" because they can be used with all types of CFC, HCFC, HFC refrigerants and blends.

Features

- Specially packaged in metal containers to guarantee minimum moisture content
- Compatible with mineral oils, alkylbenzenes and PAO synthetic oils
Not compatible with PAG synthetic oils
- Exhibits the desired miscibility with the refrigerant even at critical temperatures
- Very low viscosity loss
- Outstanding protection against compressor wear to maintain high system efficiency

Application:

EAL Arctic Series lubricants are suitable for use in a wide range of refrigeration compressors. Refer to individual compressor manufacturers for approvals and guidelines for use of these oils.

EAL Arctic 22 CC has been specially formulated for use in Copeland compressors. It is a polyol ester basestock combined with metal passivator, anti-oxidant and anti-wear additives. It has been officially approved by the Copeland Corporation worldwide and is recommended for all models using R134a or R404A refrigerant.

EAL Arctic 22 CC is in metal containers which have been sealed under a nitrogen blanket to avoid water absorption. This guarantees a maximum moisture content of 50 ppm. Containers should not be used again after being opened.

Refer Copeland guidelines for changeover from one refrigerant to another. Copeland recommend that a maximum of 5% mineral oil remain in a system converting from R12 to R134a or R502 to R404A.

EAL Arctic Series	1 U.S. Gallon (3.785 L) Container	5 U.S. Gallon (18.925 L) Container	Compressor Application
	Cat. No.	Cat. No.	
22 CC*	184111	184112	Small Hermetic Compressors
22	184108		
32	184114		Semi-Hermetic Compressors
46	184116		Open Drive and larger Semi-Hermetic Compressors
68	184118		

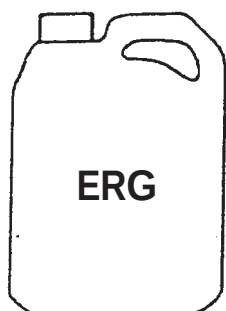
*Approved for use in all Copeland compressors.

Typical Characteristics	EAL Arctic Series				
	22 CC*	22	32	46	68
Product Number	601559	601054	601062	601070	601088
Material Number	978357	974072	974425	974828	974450
Specific Gravity @ 15°C	0.99	0.995	0.993	0.975	0.971
ISO VG Base Oil	22	22	32	46	68
Flash Point °C	230	245	245	251	254
Pour Point °C	-54	-54	-54	-51	-43
Viscosity cSt @ 40°C	23	24.6	31.8	46.4	62.5
Viscosity cSt @ 100°C	4.9	4.8	5.5	6.9	8.1
Viscosity Index	130	116	109	104	101
Water Content (ppm)	50 max.	<100	<100	<100	<100

Oils

ERG

Synthetic Refrigeration Oils



After extensive research and development comes a superior synthetic refrigerant oil, fully compatible with all refrigerants and oils. Tests have also shown that ERG 500 / 1000 reduces compressor running costs – saving time and energy. Its synthetic properties prevent it migrating through the system like mineral oils, thus keeping the evaporators cleaner and lowering operating temperatures.

ERG 500 / 1000 can be safely used in most systems with most refrigerants including: CFC's, HCFC's, HFC's, R717 (ammonia), R600a (isobutane) and R290 (propane).

Features

- Suitable for all applications – ERG 500 / 1000 has been field tested in over 700 compressors of various sizes, types and applications – all with excellent results
- Virtually non-hygroscopic – no moisture carried into the system
- Non-Toxic
- Non-Miscible – being totally non-miscible with CFC, HFC and HCFC and fully miscible with HC refrigerants, ERG 500 / 1000 is the ideal lubricant for maximum efficiency in all applications
- Energy conservation – ERG 1000 is a premium oil containing a unique additive pack. This further increases system efficiency resulting in less energy requirements and a reduction in system operating costs

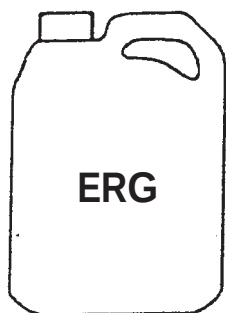
ERG 500		
Cat. No.	Part No.	Container Size
184091	ERG 500 1L	1 Litre
184092	ERG 500 4L	4 Litre
184093	ERG 500 10L	10 Litre
184094	ERG 500 205L	205 Litre

ERG 1000		
Cat. No.	Part No.	Container Size
184095	ERG 1000 1L	1 Litre
184096	ERG 1000 4L	4 Litre
184097	ERG 1000 10L	10 Litre
184098	ERG 1000 205L	205 Litre

Flushing Agent

ERG

Universal Flushing Agent



ERG UFA is a liquid flushing agent, which dissolves gummy oil oxidation products and loosens insoluble materials in refrigeration and air conditioning systems and compressors. It is non-corrosive and acts as an effective corrosion inhibitor to protect bare metal surfaces. Its high flash point makes it safe to use, even if heated to 82°C. Additionally, its low viscosity and solvency increases the effectiveness of the flushing procedure. It is flammable, has a wide boiling range and is a fast evaporating solvent, which quickly evacuates from systems under vacuum.

ERG UFA is used for internally cleaning all refrigeration or air conditioning system componentry or pipework. It may also be used as a fluid for cleaning of parts by immersion.

Used 100% by volume under pressure through the circulation system of air conditioning or refrigeration plant with TX valve, orifice or Capillary bypassed, and with filter drier removed. The compressor should be flushed separately to the rest of the system. Each of the above components should be isolated or replaced with flushing blocks.

Usually required after compressor failure, system contamination through use of incorrect lubricating oil, or the need to change from one lubricant to another required by change of refrigerant type.

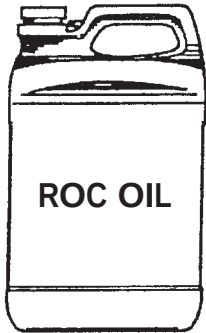
ERG UFA is compatible with modern 'O' ring and seal materials. The most common of which would be Viton. It is also compatible with all refrigerants and lubricants commonly in use.

Cat. No.	Part No.	Container Size
184135	ERG UFA 5L	5 Litre
184136	ERG UFA 20L	20 Litre
184137	ERG UFA 205L	205 Litre

Oils

Rocoil

Synthetic Refrigeration Oils



ROC lubricants comprise of a base stock of highly refined hydrocarbon synthetic oil, blended with special additives particularly suited to the refrigeration and air conditioning industry.

The base stock material is a poly alpha olefin (paraffin like) hydrocarbon mixture with the unique characteristics combination of high temperature viscosity retention, low volatility, very low pour point, high degree of oxidation resistance and completely non hygroscopic.

Features

- Non hygroscopic - will not absorb moisture
- Suitable for use with all types of refrigerants
- Compatible with all other lubricants
- Reduces compressor noise levels
- Improves heat transfer in the evaporator and condenser coils
- Minimal oil carry over
- Operating Temperature Range: -68°C to 315°C

Oil Series	ISO Viscosity Grade	Container Size		
		1 Litre	5 Litre	10 Litre
ROC S1	68	184030	184031	184032
ROC S2	32	184033	184034	184035
ROC S3	22			
ROC AA1	68	184028	184036	
ROC AA2	32			
ROC AA3	180			

Application

ROC S1 lubricant is a highly effective compressor lubricant, designed to improve the heat transfer in the evaporator and condenser coils optimising refrigeration performance.

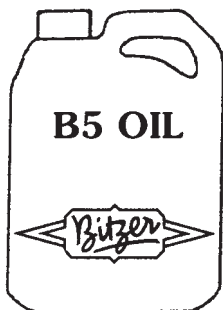
ROC S2 lubricant combines all the features of ROC S1 and has particular application in the refrigeration industry where blended HCFC & HFC refrigerants are used.

ROC S3 also combines the features of S1 and S2 lubricants but is particularly suited to small hermetic compressors up to 1/3 HP.

ROC AA1 is a non-hazardous product (in accordance with OH&S authorities) that can be used in all systems with all refrigerants and oils currently used in vehicle air conditioning. The unique feature of ROC AA1 to operate with all refrigerants and lubricants makes this product ideal for the retrofit market.

ROC AA2 comprises all the features of ROC AA1 and has particular application in the transport refrigeration industry where blended HCFC & HFC refrigerants are used.

ROC AA3 comprises all the features of ROC AA1 and AA2 and is specifically formulated for rotary vane compressors that require higher viscosity for quieter operation.



Bitzer

Refrigeration Oils

Cat. No.	Part No.	Type	Description	Container Size Litre
184120	I06-004	B5 04	B5 Reciprocating Compressor Oil	4
184121	I06-005			20
184131	I06-018	BSE 32	Polyolester Compressor Oil	1
184132	I06-019			2
184133	I06-015			5
184134	I06-012			
184144	I06-028	BSE 170	Polyolester Screw Compressor Oil	20

Oils

Maneurop

Refrigeration Oils



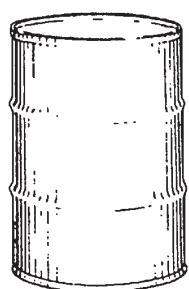
Cat. No.	Part No.	Description	Suits	Container Size
184140	7754001	160 P Mineral Oil	R22	2 Litre
184141	7754002			5 Litre
184143	7754020	160 PZ Polyolester Oil	R404A, R507, R407C, R134a	2 Litre

Centrifugal and Screw Compressor Oils

Listed below are some of the oils available as used in various makes of Centrifugal and Screw type compressors. We do not make recommendations on the particular type and grade of oil to suit these compressor types and will only supply your nominated selection without acceptance of any responsibility for its use or misuse.

Warning

The selection and use of the proper oil in centrifugal and screw compressors is most important. The compressor manufacturers'/suppliers' recommendations should be strictly followed.



Cat. No.	Brand	Type	Container Size
184125	Shell	Turbo T68	18 Litre
184128		Clavus 68	
184126	Mobil	DTE Heavy	20 Litre
184130	Caltex	Capella WF68	

Sanden

Polyalkylene Glycol (PAG) Oils

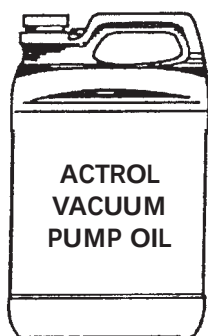
For use in R134a Automotive Air Conditioning Systems



Cat. No.	Part No.	Type	Container Size
184061	3201-1997	SP10	250 c.c.
184062	7800-90305	SP20	

ACTROL

Vacuum Pump Oil



Cat. No.	Type	Part No.	Container Size
184022	ACTROL	1 Litre	1 Litre
184023		4 Litre	4 Litre

Refco

Vacuum Pump Oil



Cat. No.	Part No.	Container Size
184021	DV-06	1 Litre

Oils

Overview of Suitable Lubricants

Traditional Lubricants	CFC's and HCFC's	HFC's
Mineral oil (MO)	Good suitability	Not suitable
Alkyl benzene (AB)	Good suitability	Limited application
Mineral oil + Alkyl benzene	Good suitability	Not suitable
Poly alpha olefin (PAO)	Limited application	Not suitable
New Lubricants		
Polyol ester (POE)	Limited application ^{1,2}	Good suitability ³
Poly vinyl ether (PVE)	Not suitable	Good suitability
Poly alkylene glycol (PAG)	Not suitable	Limited application ²
Hydro treated mineral oil	Not suitable	Not suitable

Notes:

1. denotes lubricant possibly requiring basic viscosity correction
2. denotes lubricant that is especially critical with moisture
3. denotes extensive test program

Wear Check

Oil Sample Kit



Wear Check is a sophisticated, rapid oil analysis, which has been developed to diagnose possible equipment problems before potentially serious damage occurs.

Spectrographic analysis is used to determine lubricant contamination and equipment wear and a variety of tests are used to determine the condition of the oil and indicate mechanical faults. The results of analysis are evaluated and a detailed report is provided to the customer.

As the Kits may be used for any type of lubricant, the sample details are needed to identify the type of oil and thus the set of tests which should be performed.

Samples should be returned through the mail using the pre-paid, pre-addressed mailers.

Each Kit comprises of:

- Plastic sample container (100 ml capacity)
- Self-adhesive pre-addressed label
- Plastic cylindrical mailer
- Sample submission form

Cat. No.
184057

Caltex



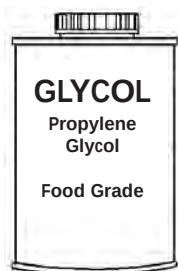
Molygrease EP2

Molygrease EP2 is a multi-purpose, extreme pressure grease containing molybdenum disulphide. It contains rust and oxidation inhibitors and a tackiness agent. Molygrease EP2 possesses good mechanical stability, water resistance and low temperature properties. A black grease, recommended for a wide range of industrial and automotive applications where components are subject to heavy loading.

Effective lubrication is provided by the molybdenum disulphide component which plates out and resists wiping from lubricated surfaces, providing a solid lubricating film that reduces wear and friction.

Cat. No.	Part No.	Description	Container Size
184063	50525	Molygrease EP2	450 gram

Glycol



Propylene Glycol Food Grade

Propylene Glycol may be used as a low temperature heat-transfer medium in brewing and dairy cooling systems and in other refrigeration equipment having cooling coils which are in direct contact with beverages. In aqueous solution, it displays excellent antifreeze properties.

Propylene glycol offers a number of advantages over secondary refrigerants such as chilled water or calcium chloride brine. Because of the extremely low toxicity of the glycol, there is less risk that the product will be unusable if contamination has occurred through small leaks in the system. A 30% concentration of glycol permits coolant temperatures down to about -12°C in contrast, chilled water permits temperatures no lower than 1°C. For applications requiring even lower temperatures, a 50% concentration of propylene glycol may be used which can be operated at -33°C.

Cat. No.	Container Size
184165	4 Litre
184167	20 Litre
184166	200 kg

Refrigerants

2

CFC Refrigerants

Widely used in many applications, the import or manufacture of CFC's was prohibited after 1995 in line with the Montreal Protocol. As a result, the availability and use in general has declined rapidly. **New product is no longer available.**

- R11** Used in existing air conditioning systems and centrifugal chillers. **No longer available.** In many cases R11 units are retrofitted to HCFC R123. Long term zero ozone depleting replacements are continually being researched.
- R12** Previously used extensively in the refrigeration and automotive air conditioning industry. Availability, as with R11, is **No longer available.** In general, R12 units can be converted to an alternative blend like 34M or R413A (Isceon49) or R134A.
- R500** A range of air conditioning units originally designed in the USA for R12 were optimised in other countries to run on 50 Hz power supplies by utilising R500. **No longer available,** units are converted to HCFC blends like R402A or R134a.
- R502** Used for low temperature refrigeration applications, R502 was introduced to overcome problems with high compressor discharge temperatures experienced with R22. **No longer available,** the R502 units are converted to HCFC blends like R402A or any of a number of HFC replacements like R404A, R507, R407B.

HCFC Refrigerants

HCFC refrigerants became controlled substances in Australia after 1995, resulting in licensing and quota limits on total manufacture and import of HCFC's. Restrictions in total quota will ultimately affect availability and increase demand for alternatives.

- R22** Predominantly used in low temperature refrigeration and air conditioning. Has been used in conversions from R12 and R502 and is usually included in the HCFC based replacement blends for CFC's. HFC replacements are available like R410A. R22 will be slowly phased in the coming years.
- R123** Used as a replacement for R11 in air conditioning and centrifugal chillers, R123 has physical properties that make it a good alternative.
- R141b** Predominantly used in foaming production to replace R11, R141B has also found application in the air conditioning and refrigeration industry. Commonly used as a solvent cleaning agent.
- R408A** A blend of HCFC and HFC refrigerants designed to replace R502 in existing systems without the requirements of an oil change. Physical properties nearly identical to that of R502 make it an ideal replacement.
- R409A** Blended from HCFC refrigerants, R409A was developed as a simple to use alternative to R12. Physical properties and no requirement for an oil change have made this HCFC blend a leading replacement for R12.
- R409B** A slight variation on R409A has made this HCFC blend a reliable and simple replacement for R500 in most applications.
- R402A** Another R502 replacement blend, R402A requires an oil change to a minimum 50% alkylbenzene mix.
- R406A** This blend used as a drop in replacement for R12 systems, compatible with mineral oil, but **not suitable** for with Polyol Ester oil, Polyol Alpha Oletin oil, Polyalkalene Glycol oils.

HFC Refrigerants

The development of HFC refrigerants was in response to the required phase-out of ozone depleting substances. A large number of HFC refrigerants are now available to replace both CFC and HCFC bases. Unlike the refrigerant they replace however, pure HFC refrigerants are not miscible with either mineral or alkylbenzene oils. Instead, polyolester oils (or polyalkylglycol oils in automotive air conditioning) are used. Consideration must also be given to material capabilities.

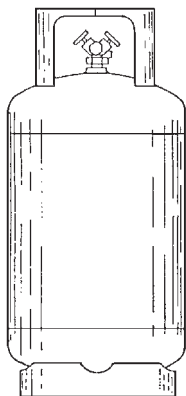
- 34M** This blend used as a drop in replacement for R134A and R12 systems. 34M is compatible with Polyol Ester oil, Polyol Alpha Oletin oil, Polyalkalene Glycol oil and Mineral Oil. Improved sub cooling delivers superior system efficiency which results in accelerated product temperature pull down.
- R134a** Recognised worldwide as the R12 alternative, R134a is now commonly used in both automotive air conditioning and refrigeration applications.
- 22Lt** This blend used as an alternative for R22 and R502 has a zero ozone depleting factor and is not compatible with mineral oils. Polyol Ester oil recommended
- R404A** Used as an R502 replacement R404A is a blend of HFC refrigerants. Closely matching the physical properties of R502, this HFC blend has become the most common replacement. Also suitable for new medium temperature applications.
- R507** Similar to R404A, this azeotropic blend of HFC refrigerants was also designed to replace R502.
- R407B** Similar to R404A and R507.
- R407C** This blend of HFC refrigerants was designed for retrofitting R22 systems. New systems developed to use R407C were redesigned to compensate for some efficiency losses (seen when compared to R22).
- R410A** Introduced in 1996, R410A was developed to replace R22. Having much higher working pressures, new systems were developed to utilise the efficiency gains this refrigerant blend offers. It was not however, designed to retrofit existing R22 systems.
- R413A** Also known as ISCEON 49, this non azeotropic blend was developed as a zero ODP replacement for existing R12 systems. Although predominantly R134a, other non HFC additives make this blend miscible with mineral and alkylbenzene oils.
- R508B** Long term replacement for R13, R503 and R23 in very low temperature (below -40°C) applications such as medical freezers and environmental chambers.



Your best Solution...

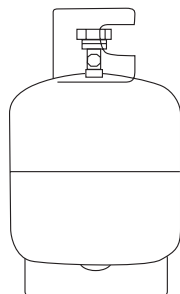
Refrigerants

Decanted Refrigerant



Cat. No.	Refrigerant	Cat. No.	Refrigerant
185002	R22	185009	R407B
185053	22 Lt	185014	R407C
185019	R123	185010	R408A
185018		185006	R409A
185043	34M	185008	R409B
185003	R134a	185007	R410A
185016	R141b	185024	R413A
185015		185028	R406A
185005		185012	R507
185013	R402A	185069	R508B
185011	R404A		

Filled Refrigerant in Containers



Cat. No.	Refrigerant	Stock Cylinder/Drum Contents - kg	
185025	R413A	10	Per Cylinder *
185040	34M	12	
185041		20	
185042		65	
185050	22LT	12	
185051		20	
185052		65	
185021	R717	34	
185023		385	Per Drum

* Note: Cylinder holding deposit applies until cylinder is returned.

Cylinder Filling:

All Actrol branches have facilities to fill customers cylinders with most common refrigerants.

All cylinders presented for filling must conform with regulations contained in AS 2030.1. Defective cylinders, out of test date cylinders or cylinders fitted with incorrect valve shall not be filled.

Cylinder Filling Ratio:

Cylinders may be filled to a maximum weight in accordance with the following table.

Maximum net weight filled = cylinder in kg x filling ratio.

Refrigerant	Filling Ratio	Min. Cylinder Test Pressure MPa	Refrigerant	Filling Ratio	Min. Cylinder Test Pressure MPa
R22	1.03	3.3	R407C	0.95	3.6
R123	1.25	2.5	R408A	0.9	4.2
R134a	1.05	2.5	R409A	1.05	2.5
R141b	1.05	2.5	R409B	1.05	2.5
R402A	0.87	3.6	R410A	0.8	5.2
R404A	0.9	4.2	R413A	1	3.3
R407B	0.9	4.2	R507	0.9	4.2

Filling ratios as per Australian Standard 2030.1.0 SAA Gas Cylinders Code.

Refrigerants

Specifications and Applications

Refrig.	Chemical Name	Proportion %	Boiling Pt. °C	Application	▼
R11	Trichlorofluoromethane	100	23.8	Used in large centrifugal compressors	CFC
R12	Dichlorodifluoromethane		-29.8	Universal refrigerant for all types of compressors and for all applications	CFC
R13	Chlorotrifluoromethane		-81.4	Used in cascade with R12 or R22 to attain temperatures approaching -101°C	CFC
R22	Chlorodifluoromethane		-40.8	Universal refrigerant for low temperature applications, standard commercial refrigeration and air conditioning applications	HCFC
22LT	Difluoromethane	10	-36.5	Long term alternative for R22 and 502 Medium temperature applications and air conditioning	HFC
	Tetrafluoroethane	80			
	Heptafluoropropane	10			
34M	Tetrafluoroethane	95	-27.9	Replacement for R12, 134A. Retrofit, no oil change required	HFC
	Isobutane, Propane	5, 5			
	Ethanol	5, 0.5			
R113	Trichlorotrifluoroethane	100	47.6	Very low vapour pressure refrigerant used in centrifugal compressors.	CFC
R114	Dichlorotetrafluoroethane		3.6	Moderately low vapour pressure refrigerant used in small rotary compressors	CFC
R123	Dichlorotrifluoroethane		17.9	Large centrifugal compressors	HCFC
R134a	Tetrafluoroethane		-26.4	Medium temperature commercial refrigeration. Domestic refrigerators. Automotive air conditioning	HFC
R141b	Dichlorofluoroethane		32	Solvent. Replacement for R113	HCFC
R402A	Chlorodifluoromethane	38	-49.2	Substitute for R502 – Retrofit	HCFC
	Pentafluoroethane	60			
	Propane	2			
R404A	Tetrafluoroethane	4	-45.8	Substitute for R502 – New installations for both low and medium temperature applications	HFC
	Pentafluoroethane	44			
	Trifluoroethane	52			
R406A	Chlorodifluoromethane	55	-32.3	Substitute for R12 and R500	HCFC
	Difluoromethane	41			
	Isobutane	4			
R407B	Tetrafluoroethane	20	-47.4	Substitute for R502 – New installations for both low and medium temperature applications	HFC
	Pentafluoroethane	70			
	Difluoromethane	10			
R407C	Difluoromethane	23	-42.4	Replacement for R22 in air conditioning applications	HFC
	Pentafluoroethane	25			
	Tetrafluoroethane	52			
R408A	Trifluoroethane	46	-44	Substitute for R502 – Retrofit, no oil change required	HCFC
	Pentafluoroethane	7			
	Chlorodifluoromethane	47			

Users should seek the advice of their compressor manufacturer and obtain correct procedures for the retrofitting of existing systems and/or charging of new installations with blends.



Your best Solution...

Refrigerants

Specifications and Applications

Refrig.	Chemical Name	Proportion %	Boiling Pt. °C	Application	▼
R409A	Chlorodifluoromethane	60	-34.2	Substitute for R12 – Low to medium temperature applications – Retrofit, no oil change required	HCFC
	Chlorotetrafluoroethane	25			
	Chlorodifluoroethane	15			
R409B	Chlorodifluoromethane	65	-35.2	Substitute for R12 – Low temperature and Transport Applications and also replacement for R500	HCFC
	Chlorotetrafluoroethane	25			
	Chlorodifluoroethane	10			
R410A	Difluoromethane	50	-52.8	Replacement for R22	HFC
	Pentafluoroethane	50			
R413A	Tetrafluoroethane	88	-35	Substitute for R12 – Retrofit, no oil change required	HFC
	Octafluoropropane	9			
	Isobutane	3			
R500	Dichlorodifluoromethane	74	-34	An azeotropic mixture of R12 and R152a giving higher performance in air conditioning systems	CFC
	Difluoroethane	26			
R502	Chloropentafluoroethane	51.2	-45.6	An azeotropic mixture of R22 and R115 – Low temperature commercial refrigeration applications	CFC
	Chlorodifluoromethane	48.8			
R503	Trifluoromethane	40	-87.7	A low stage refrigerant for cascade systems used to attain the low temperatures required for environmental test chambers, pharmaceutical processing etc.	CFC
	Chlorotrifluoromethane	60			
R507	Pentafluoroethane	50	-46.7	Substitute for R502 – New installations for both low and medium temperature applications	HFC
	Trifluoroethane	50			
R508B	Trifluoromethane	30	-88.2	Substitute for R13, R503 and R23. Used in cascade systems to attain very low temperatures	HFC
	Hexafluoroethane	70			
R717	Anhydrous Ammonia	100	-33.3	A widely used refrigerant in the larger sizes of industrial vapour-compression systems as well as absorption systems	

Users should seek the advice of their compressor manufacturer and obtain correct procedures for the retrofitting of existing systems and/or charging of new installations with blends.

Notes

2



Your best Solution...

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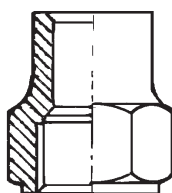
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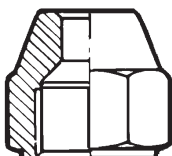
Line Fittings – Brass

Flare Nuts – Plain



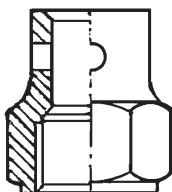
Cat. No.	Part No.	Size: Inches
190002	500-0404	1/4
190003	500-0505	5/16
190004	500-0606	3/8
190005	500-0808	1/2
190006	500-1010	5/8
190007	500-1212	3/4

Flare Nuts – Short Barrel



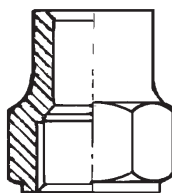
Cat. No.	Part No.	Size: Inches
190012	501-0404	1/4
• 190028	501-0504-410A	5/16
190014	501-0606	3/8
• 190029	501-0606-410A	3/8
190015	501-0808	1/2
• 190030	501-0808-410A	1/2
190016	501-1010	5/8
• 190031	501-1010-410A	5/8
190017	501-1212	3/4
• 190032	501-1212-410A	3/4

Flare Nuts – Frost Proof



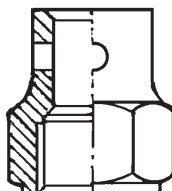
Cat. No.	Part No.	Size: Inches
190022	502-0404	1/4
190023	502-0505	5/16
190024	502-0606	3/8
190025	502-0808	1/2
190026	502-1010	5/8
190027	502-1212	3/4

Flare Nuts – Plain Reducing



Cat. No.	Part No.	Size: Inches
190042	500-0604	3/8 - 1/4
190044	500-0806	1/2 - 3/8
190046	500-1008	5/8 - 1/2

Flare Nuts – Frost Proof Reducing



Cat. No.	Part No.	Size: Inches
190052	502-0604	3/8 - 1/4
190054	502-0806	1/2 - 3/8
190055	502-1006	5/8 - 3/8
190056	502-1008	5/8 - 1/2

• Note Suitable for use with R410A Refrigerants

Line Fittings – Brass

Flare Copper Bonnets

Use with Flare Nut to cap a flare fitting



Cat. No.	Part No.	Size: Inches
190103	1105-04	1/4
190104	1105-05	5/16
190105	1105-06	3/8
190106	1105-08	1/2
190107	1105-10	5/8
190108	1105-12	3/4

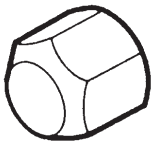
Flare Copper Washers

Use on brass to brass flare connections to prevent leaks



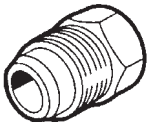
Cat. No.	Part No.	Size: Inches
190113	1110-04	1/4
190115	1110-06	3/8
190116	1110-08	1/2
190117	1110-10	5/8
190118	1110-12	3/4

Flare Seal Cap Nuts



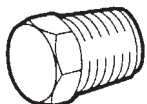
Cat. No.	Part No.	Size: Inches
190122	75-04	1/4
190124	75-06	3/8
190126	75-08	1/2
190127	75-10	5/8
190128	75-12	3/4

Flare Seal Plugs



Cat. No.	Part No.	Size: Inches
190132	70-04	1/4
190134	70-06	3/8
190136	70-08	1/2
190137	70-10	5/8
190138	70-12	3/4

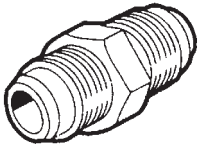
Pipe Plugs – Male BSP



Cat. No.	Part No.	Size: Inches
190141	80-02	1/8
190142	80-04	1/4
190143	80-06	3/8
190144	80-08	1/2
190145	80-12	3/4

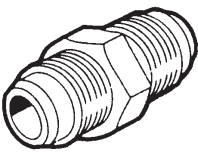
Line Fittings – Brass

Unions – Male Flare to Male Flare



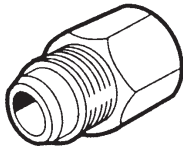
Cat. No.	Part No.	Size: Inches	
		Male Flare	Male Flare
191003	200-0404	1/4	1/4
191005	200-0505	5/16	5/16
191006	200-0606	3/8	3/8
191007	200-0808	1/2	1/2
191008	200-1010	5/8	5/8
191009	200-1212	3/4	3/4

Unions – Male Flare to Male Flare – Reducing



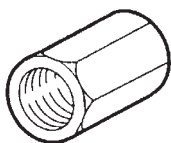
Cat. No.	Part No.	Size: Inches	
		Male Flare	Male Flare
191062	200-0504	5/16	1/4
191064	200-0604	3/8	1/4
191066	200-0804	1/2	1/4
191068	200-0806	1/2	3/8
191069	200-1004	5/8	1/4
191070	200-1006	5/8	3/8
191071	200-1008	5/8	1/2
191073	200-1210	3/4	5/8

Unions – Male Flare to Female Flare



Cat. No.	Part No.	Size: Inches	
		Male Flare	Female Flare
191015	205-0404	1/4	1/4
191020	205-0504	5/16	1/4
191017	205-0406	1/4	3/8
191018	205-0408	1/4	1/2
191019	205-0410	1/4	5/8
191024	205-0604	3/8	1/4
191026	205-0606	3/8	3/8
191027	205-0608	3/8	1/2
191028	205-0610	3/8	5/8
191030	205-0804	1/2	1/4
191032	205-0806	1/2	3/8
191034	205-0808	1/2	1/2
191035	205-0810	1/2	5/8
191036	205-0812	1/2	3/4
191039	205-1008	5/8	1/2
191040	205-1012	5/8	3/4
191042	205-1210	3/4	5/8

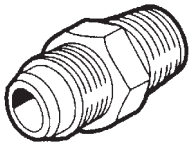
Unions – Female Flare to Female Flare



Cat. No.	Part No.	Size: Inches	
		Female Flare	Female Flare
191045	226-0404	1/4	1/4
191048	226-0606	3/8	3/8
191050	226-0808	1/2	1/2

Line Fittings – Brass

Unions – Male Flare to Male BSP

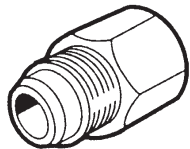


Cat. No.	Part No.	Size: Inches	
		Male Flare	Male BSP
191125	201-0402	1/4	1/8
191126	203-0402	1/4	1/8 Long Taper
191127	201-0404	1/4	1/4
191129	201-0406	1/4	3/8
191130	201-0408	1/4	1/2
191136	201-0602	3/8	1/8
191137	201-0604	3/8	1/4
191138	201-0606	3/8	3/8
191139	201-0608	3/8	1/2
191140	201-0612	3/8	3/4
191143	201-0804	1/2	1/4
191144	201-0806	1/2	3/8
191145	201-0808	1/2	1/2
191146	201-0812	1/2	3/4
191150	201-1008	5/8	1/2
191151	201-1012	5/8	3/4
191155	201-1208	3/4	1/2
191156	201-1212	3/4	3/4
191157	201-1216	3/4	1

Unions – Male Flare to Female NPT

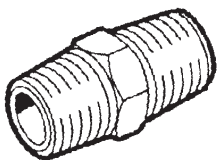
Cat. No.	Part No.	Size: Inches	
1910951	207-0402	1/4 Male Flare	1/8 Female NPT

Unions – Male Flare to Female BSP



Cat. No.	Part No.	Size: Inches	
		Male Flare	Female BSP
191095	206-0402	1/4	1/8
191096	206-0404	1/4	1/4
191097	206-0406	1/4	3/8
191098	206-0408	1/4	1/2
191103	206-0604	3/8	1/4
191104	206-0606	3/8	3/8
191105	206-0608	3/8	1/2
191108	206-0806	1/2	3/8
191109	206-0808	1/2	1/2
191110	206-0812	1/2	3/4
191115	206-1212	3/4	3/4

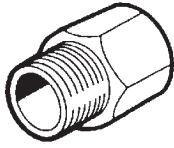
Unions – Male BSP to Male BSP



Cat. No.	Part No.	Size: Inches	
		Male BSP	Male BSP
191171	211-0202	1/8	1/8
191172	211-0404	1/4	1/4
191173	211-0606	3/8	3/8
191174	211-0808	1/2	1/2
191175	211-1212	3/4	3/4
Reducing			
191181	211-0402	1/4	1/8
191183	211-0604	3/8	1/4
191184	211-0804	1/2	1/4
191185	211-0806	1/2	3/8

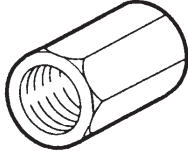
Line Fittings – Brass

Unions – Male BSP to Female Flare



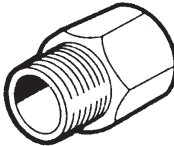
Cat. No.	Part No.	Size: Inches	
		Male BSP	Female Flare
192061	214-0204	1/8	1/4
192062	214-0404	1/4	1/4

Unions – Female BSP to Female BSP (Gas Couplings)



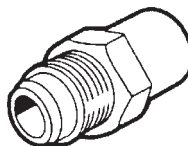
Cat. No.	Part No.	Size: Inches	
		Female BSP	Female BSP
192131	231-0202	1/8	1/8
192132	231-0404	1/4	1/4
192135	231-0606	3/8	3/8
192137	231-0808	1/2	1/2
192138	231-1212	3/4	3/4

Unions – Male BSP to Female BSP (Gas Bushes)



Cat. No.	Part No.	Size: Inches	
		Male BSP	Female BSP
192014	216-0402	1/4	1/8
192016	216-0406	1/4	3/8
192018	216-0602	3/8	1/8
192019	216-0604	3/8	1/4
192022	216-0804	1/2	1/4
192023	216-0806	1/2	3/8
192027	216-1208	3/4	1/2
192028	216-1612	1	3/4

Unions – Male Flare to Solder



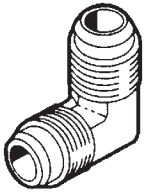
Cat. No.	Part No.	Size: Inches	
		Male Flare	Solder
192031	208-0404	1/4	1/4
192033	208-0406	1/4	3/8
192040	208-0606	3/8	3/8
192041	208-0608	3/8	1/2
192044	208-0806	1/2	3/8
192045	208-0808	1/2	1/2
192046	208-0810	1/2	5/8
192050	208-1008	5/8	1/2
192051	208-1010	5/8	5/8
192052	208-1012	5/8	3/4
192055	208-1210	3/4	5/8
192056	208-1212	3/4	3/4

Unions – ACME

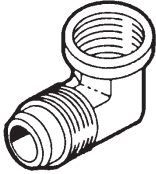
Cat. No.	Part No.	Size: Inches
192150	275-0408	1/2 Female ACME x 1/4 Male Flare
192151	272-0804	1/2 Male ACME x 1/4 Female Flare
192152	270-0802	1/2 Male ACME x 1/8 Male NPT

Line Fittings – Brass

Elbows – Male Flare to Male Flare

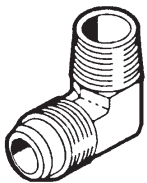


Cat. No.	Part No.	Size: Inches	
		Male Flare	Male Flare
193002	300-0404	1/4	1/4
193004	300-0606	3/8	3/8
193005	300-0808	1/2	1/2
193006	300-1010	5/8	5/8



Elbows – Male Flare to Female Flare

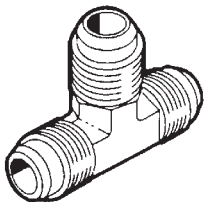
Cat. No.	Part No.	Size: Inches	
193011	306-0404	1/4 Male Flare	1/4 Female Flare



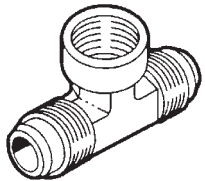
Elbows – Male Flare to Male BSP

Cat. No.	Part No.	Size: Inches	
		Male Flare	Male BSP
193112	302-0402	1/4	1/8
193113	302-0404	1/4	1/4
193114	302-0406	1/4	3/8
193120	302-0604	3/8	1/4
193121	302-0606	3/8	3/8
193122	302-0608	3/8	1/2
193127	302-0808	1/2	1/2
193131	302-1008	5/8	1/2
193132	302-1012	5/8	3/4
193134	302-1212	3/4	3/4

Tees – 3 Way Male Flare

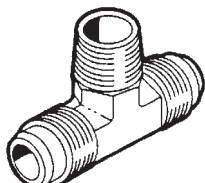


Cat. No.	Part No.	Size: Inches	
		Male Flare Line	Male Flare Branch
194013	400-040404	1/4 X 1/4	1/4
194014	400-050505	5/16 X 5/16	5/16
194015	400-060606	3/8 X 3/8	3/8
194017	400-080808	1/2 X 1/2	1/2
194018	400-101010	5/8 X 5/8	5/8
194019	400-121212	3/4 X 3/4	3/4



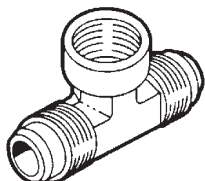
Tees – Male Flare Line to Female Flare Branch

Cat. No.	Part No.	Size: Inches	
		Male Flare Line	Female Flare Branch
194075	408-040404	1/4 X 1/4	1/4



Tees – Male Flare Line to Male BSP Branch

Cat. No.	Part No.	Size: Inches	
		Male Flare Line	Male BSP Branch
194082	401-040402	1/4 X 1/4	1/8
194086	401-040404	1/4 X 1/4	1/4



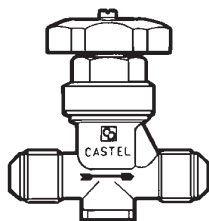
Tees – Male Flare Line to Female BSP Branch

Cat. No.	Part No.	Size: Inches	
		Male Flare Line	Female BSP Branch
194106	409-040402	1/4 X 1/4	1/8
194108	409-040404	1/4 X 1/4	1/4

Diaphragm Valves – Packless

Castel and Heldon

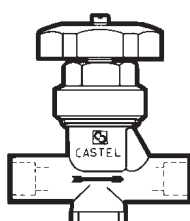
2 Way Line – Male Flare



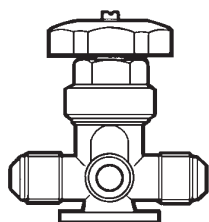
Size: Inches Flare	Castel		Heldon	
	Cat. No.	Part No.	Cat. No.	Part No.
1/4	195121	6210/2	195002	2100-0404
3/8	195122	6210/3	195004	2100-0606
1/2	195123	6210/4	195005	2100-0808
5/8	195124	6210/5	195006	2100-1010
3/4	195125	6210/6	195007	2100-1212

Castel

2 Way Line – Female Solder



Size: Inches ODF Solder	Cat. No.	Part No.
1/4	195126	6220/2
3/8	195127	6220/3
1/2	195128	6220/4
5/8	195129	6220/5
3/4	195130	6220/6



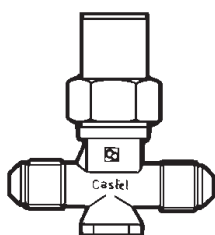
3 Way Line – Male Flare

Size: Inches Flare	Cat. No.	Part No.
1/4	195146	6260/2
3/8	195147	6260/3
1/2	195148	6260/4

Packed Capped Valves

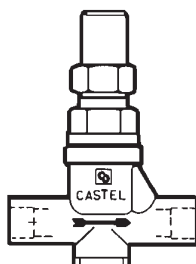
Castel

2 Way Line – Male Flare



Size: Inches Flare	Castel	
	Cat. No.	Part No.
1/4	196039	6010/2
3/8	196051	6410/3
1/2	196052	6410/4
5/8	196053	6410/5
3/4	196054	6410/6

2 Way Line – Female Solder

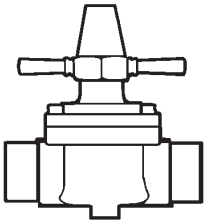


Size: Inches ODF Solder	Castel	
	Cat. No.	Part No.
1/4	196056	6420/2
3/8	196057	6420/3
1/2	196058	6420/4
5/8	196059	6420/5
3/4	196060	6420/6
7/8	196061	6420/7

Packed Capped Valves

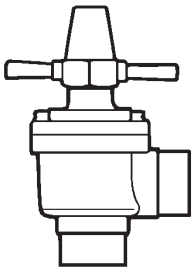
Castel

2 Way Line – Backseating – Female Solder
With 'T' Handle



Size: Inches ODF Solder	Cat. No.	Part No.
7/8	196141	6510/7
1 1/8	196142	6510/9
1 3/8	196143	6510/11
1 5/8	196144	6510/13
2 1/8	196145	6510/17

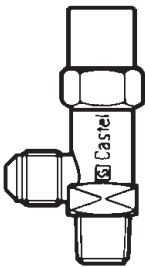
2 Way Angle – Backseating – Female Solder
With 'T' Handle



Size: Inches ODF Solder	Cat. No.	Part No.
7/8	196148	6530/7
1 1/8	196149	6530/9
1 3/8	196150	6530/11
1 5/8	196151	6530/13

Castel and Heldon

2 Way Angle
Male Flare Side to Male Pipe Thread Bottom



Size: Inches		Castel		Heldon	
Flare	NPT*	Cat. No.	Part No.	Cat. No.	Part No.
1/4	1/4	196176	6110/22	196072	2201-0404
1/4	3/8	196177	6110/23	196073	2201-0406
1/4	1/2			196074	2201-0408
3/8	1/4	196183	6110/32	196075	2201-0604
3/8	3/8	196178	6110/33	196076	2201-0606
3/8	1/2			196077	2201-0608
1/2	3/8	196179	6110/43	196079	2201-0806
1/2	1/2	196180	6110/44	196080	2201-0808
5/8	1/2	196181	6110/54	196083	2201-1008
3/4	3/4	196182	6110/66		

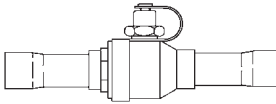
*Castel - NPT

Heldon - BSP

Ball Valves

Flow Controls (Alco)

Ball Valves



Features

- Compatible with Mineral Oil, Polyolester (POE) and Alkyl Benzene lubricants
- Fully welded forged brass body
- Hermetic design
- Full internal ports reduce line pressure drops to a minimum. (Reduced port on 2⁵/₈" model)
- Bi-directional flow characteristics
- Valve stem cap retained by strap attached to main body
- Connections are 100% copper extension stubs
- Access valve mounted on valve body
- Maximum working pressure: 3450 kPa
- Medium temperature: -40° to 150°C

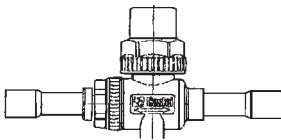
With Access Valve					Without Access Valve	
Cat. No.	Part No.	Connections ODF Inches	Port Size: mm	Overall Length: mm	Cat. No.	Part No.
196220	ABV-3A	3/8	12.7	140	196230	ABV-3
196221	ABV-4A	1/2	12.7	165	196231	ABV-4
196222	ABV-5A	5/8	12.7	165	196232	ABV-5
196223	ABV-7A	7/8	19	190	196233	ABV-7
196224	ABV-9A	1 1/8	25.4	235	196234	ABV-9
196225	ABV-11A	1 3/8	31.8	254	196235	ABV-11
196226	ABV-13A	1 5/8	38.1	276	196236	ABV-13
196227	ABV-17A	2 1/8	50.8	298	196237	ABV-17
196228	ABV-21A	2 5/8	50.8	298	196238	ABV-21

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Not suitable for use with Ammonia.

Castel

Ball Valves



Features

- Fully welded forged brass body
- Hermetic design
- Bi-directional flow characteristics
- Chromium plated ball and P.T.F.E. seat
- Connections are 100% copper extension stubs
- Maximum working pressure: 3500 kPa

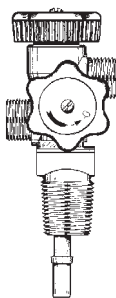
With Access Valve					Without Access Valve	
Cat. No.	Part No.	Connections ODF Inches	Port Size: mm	Overall Length: mm	Cat. No.	Part No.
	6585/2A	1/4	10	121	196091	6590/2
196101	6590/3A	3/8	10	121	196062	6590/3
196102	6590/4A	1/2	10	121	196063	6590/4
196103	6590/5A	5/8	15	138	196064	6590/5
196104	6590/6A	3/4	15	141	196065	6590/6
196105	6590/7A	7/8	19	175	196071	6590/7
196106	6590/9A	1 1/8	25	206	196066	6590/9
196107	6590/11A	1 3/8	32	262	196067	6590/11
196108	6590/13A	1 5/8	38	262	196068	6590/13
196109	6590/17A	2 1/8	50	303	196069	6590/17
196110	6591/21A	2 5/8	50	303	196070	6591/21

All Castel products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Not suitable for use with Ammonia.

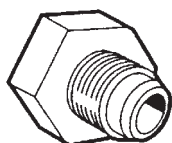
Sundry Valves and Fittings

Cylinder Valve Handles

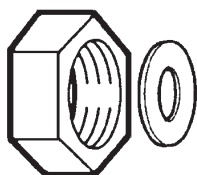


Cat. No.	Part No.	Description
197172	S 1502/5	Red Handle to suit Supa Ceodeux Cylinder Valves
197173	S 1502/4	Blue Handle to suit Supa Ceodeux Cylinder Valves

Cylinder Adaptors – with Washer



Cat. No.	Part No.	Size	
197103	20-0412	1/4" Male Flare	3/4" Female BSP (Parallel)
197104	20-0612	3/8" Male Flare	
197152	21-0812	1/2" Male Acme	
197111	20-0572	5/16" MSAE	

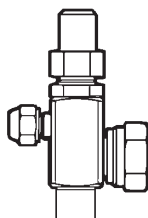


Cylinder Valve Seal Cap – with Washer

Cat. No.	Part No.	Size
197098	26-12	3/4" Female BSP (Parallel)

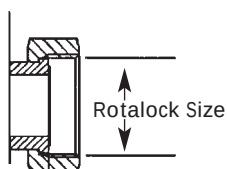
Maneurop

Rotalock Valves



Cat. No.	Part No.	Connections	
		Tube Size: Solder	*Rotalock Ring
197200	8168027	3/8"	1"
197204	8168031	1/2"	1"
197206	8168033	5/8"	1 1/4"
197202	8168029	3/4"	1 1/4"
199203	8168030	7/8"	1 1/4"
197205	8168032	7/8"	1 3/4"
197201	8168028	1 1/8"	1 3/4"
197207	8168025	1 3/8"	2 1/4"

* The Rotalock Ring size is determined by the thread size within the Rotalock nut.



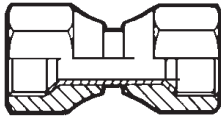
Teflon Seal Rings

For Rotalock Valves

Cat. No.	Suit Valve Size	Outside Diameter
271151	1"	19mm (3/4")
271151	1 1/4"	25.4mm (1")
271151	1 3/4"	31.7mm (1 1/4")

Sundry Valves and Fittings

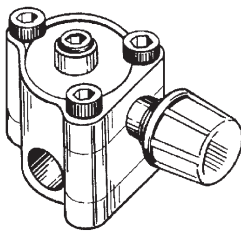
Swivel Connectors



Cat. No.	Part No.	Size Female Flare
198001	95-04/7050-2	1/4"
198002	95-06/7050-3	3/8"
198003	95-08/7050-4	1/2"
198004	95-10/7050-5	5/8"
198005	95-12	3/4"

Supco Bullet®

Line Piercing Valves



Features

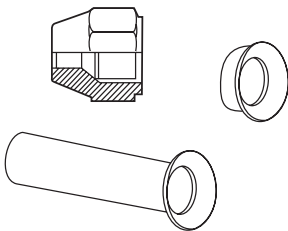
- Install on the high side as a permanent valve on the job, or on round suction lines or uneven tubing, the valve will not leak
- Hex key wrench included. No additional tools required
- The precision piercing needle is engineered for concentricity and hardness to ensure perfect seating every time
- Requires only a 50mm clearance for installation and operation
- Corrosion resistant plated and lacquered finish
- Valves supplied with adaptor sleeves for indicated multiple size applications

Cat. No.	Part No.	Size: OD Tube
198021	BPV-31	1/4", 5/16", 3/8"
198029	BPV-21	1/2", 5/8"

Heldon

Swivel Tail Adaptors

Swivel Tail Adaptors have a brass tail extension and a replaceable flare washer together with a short barrel flare nut. Ideal for replaceable components such as driers eliminating the need to re-flare the line.

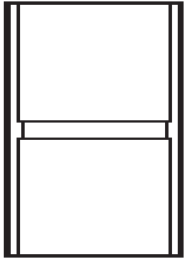


Cat. No.	Part No.	Size Female Flare
198030	96-04	1/4
198031	96-06	3/8
198032	96-08	1/2
198033	96-10	5/8
198034	96-12	3/4

Line Fittings – Copper

Ideal

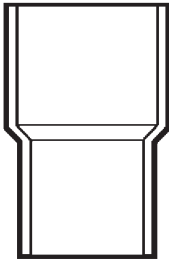
Couplings/Unions – Female to Female – Solder



Cat. No.	Part No.	Inside Diameter Inches
199002	RCC 006	1/4
199004	RCC 010	3/8
199005	RCC 013	1/2
199006	RCC 016	5/8
199007	RCC 019	3/4
199008	RCC 022	7/8

Cat. No.	Part No.	Inside Diameter Inches
199009	RCC 025	1
199010	RCC 029	1 1/8
199012	RCC 035	1 3/8
199014	RCC 041	1 5/8
199017	RCC 054	2 1/8
199019	RCC 067	2 5/8

Reducing Couplings/Unions – Female to Female – Solder

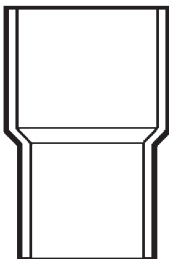


Cat. No.	Part No.	ID x ID Inches
199030	RRRO 1006	3/8 x 1/4
199031	RRRO 1310	1/2 x 3/8
199032	RRRO 1610	5/8 x 3/8
199033	RRRO 1613	5/8 x 1/2
199034	RRRO 1910	3/4 x 3/8
199035	RRRO 1913	3/4 x 1/2
199036	RRRO 1916	3/4 x 5/8
199037	RRRO 2213	7/8 x 1/2
199038	RRRO 2216	7/8 x 5/8
199039	RRRO 2219	7/8 x 3/4
199043	RRRO 2913	1 1/8 x 1/2
199044	RRRO 2916	1 1/8 x 5/8
199045	RRRO 2919	1 1/8 x 3/4

Cat. No.	Part No.	ID x ID Inches
199046	RRRO 2922	1 1/8 x 7/8
199047	RRRO 2925	1 1/8 x 1
199049	RRRO 3516	1 3/8 x 5/8
199051	RRRO 3522	1 3/8 x 7/8
199053	RRRO 3529	1 3/8 x 1 1/8
199059	RRRO 4129	1 5/8 x 1 1/8
199060	RRRO 4135	1 5/8 x 1 3/8
199061	RRRO 5429	2 1/8 x 1 1/8
199067	RRRO 5435	2 1/8 x 1 3/8
199068	RRRO 5441	2 1/8 x 1 5/8
199069	RRRO 6735	2 5/8 x 1 3/8
199070	RRRO 6741	2 5/8 x 1 5/8
199075	RRRO 6754	2 5/8 x 2 1/8

Reducing Couplings/Unions

Outside Diameter to Inside Diameter – Solder



Cat. No.	Part No.	OD x ID Inches
200001	RNNO 1006	3/8 x 1/4
200002	RNNO 1306	1/2 x 1/4
200003	RNNO 1310	1/2 x 3/8
200004	RNNO 1610	5/8 x 3/8
200005	RNNO 1613	5/8 x 1/2
200008	RNNO 1913	3/4 x 1/2
200009	RNNO 1916	3/4 x 5/8
200011	RNNO 2213	7/8 x 1/2
200012	RNNO 2216	7/8 x 5/8
200013	RNNO 2219	7/8 x 3/4
200022	RNNO 2913	1 1/8 x 1/2

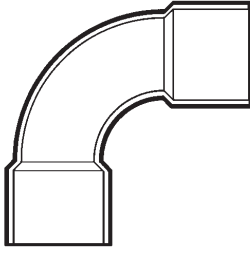
Cat. No.	Part No.	OD x ID Inches
200023	RNNO 2916	1 1/8 x 5/8
200024	RNNO 2919	1 1/8 x 3/4
200025	RNNO 2922	1 1/8 x 7/8
200039	RNNO 3516	1 3/8 x 5/8
200041	RNNO 3522	1 3/8 x 7/8
200043	RNNO 3529	1 3/8 x 1 1/8
200059	RNNO 4129	1 5/8 x 1 1/8
200061	RNNO 4135	1 5/8 x 1 3/8
200083	RNNO 5429	2 1/8 x 1 1/8
200088	RNNO 5435	2 1/8 x 1 3/8
200090	RNNO 5441	2 1/8 x 1 5/8

Note: All copper fittings up to 5/8" are suitable for use with R410A refrigerants.

Line Fittings – Copper

Ideal

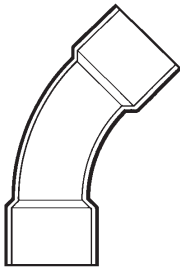
90° Copper Elbows – Female to Female – Solder



Cat. No.	Part No.	Inside Diameter Inches
201001	REN 006	1/4
201003	REN 010	3/8
201005	REN 013	1/2
201007	REN 016	5/8
201010	REN 019	3/4
• 201052	REN 019-410A	3/4
201012	REN 022	7/8
• 201053	REN 022-410A	7/8
201015	REN 025	1
201017	REN 029	1 1/8

Cat. No.	Part No.	Inside Diameter Inches
• 201054	REN 029-410A	1 1/8
201018	REN 032	1 1/4
201019	REN 035	1 3/8
• 201058	REN 035-410A	1 3/8
201020	REN 038	1 1/2
201021	REN 041	1 5/8
201023	REN 050	2
201024	REN 054	2 1/8
201026	REN 067	2 5/8

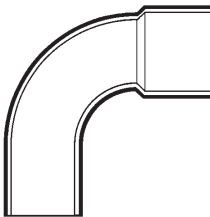
45° Copper Elbows – Female to Female – Solder



Cat. No.	Part No.	Inside Diameter Inches
201034	REF 010	3/8
201035	REF 013	1/2
201036	REF 016	5/8
201037	REF 019	3/4
• 201055	REN 019-410A	3/4
201038	REF 022	7/8
• 201053	REN 022-410A	7/8
201039	REF 025	1

Cat. No.	Part No.	Inside Diameter Inches
201040	REF 029	1 1/8
• 201053	REN 029-410A	1 7/8
201041	REF 032	1 1/4
201042	REF 035	1 3/8
201043	REF 038	1 1/2
201044	REF 041	1 5/8
201047	REF 054	2 1/8
201049	REF 067	2 5/8

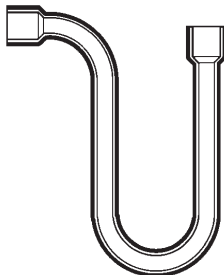
90° Copper Elbows – Male to Female – Solder



Cat. No.	Part No.	O Dia. x I Dia. Inches
201059	RBN 010	3/8 x 3/8
201060	RBN 013	1/2 x 1/2
201061	RBN 016	5/8 x 5/8
201062	RBN 019	3/4 x 3/4
201064	RBN 022	7/8 x 7/8
201065	RBN 025	1 x 1
201066	RBN 029	1 1/8 x 1 1/8

Cat. No.	Part No.	O Dia. x I Dia. Inches
201067	RBN 032	1 1/4 x 1 1/4
201068	RBN 035	1 3/8 x 1 3/8
201069	RBN 038	1 1/2 x 1 1/2
201070	RBN 041	1 5/8 x 1 5/8
201073	RBN 054	2 1/8 x 2 1/8
201075	RBN 067	2 5/8 x 2 5/8

Copper 'P' Traps



Cat. No.	Part No.	Inside Diameter Inches
201090	RPT 016	5/8
201091	RPT 019	3/4
201092	RPT 022	7/8
201093	RPT 029	1 1/8

Cat. No.	Part No.	Inside Diameter Inches
201094	RPT 035	1 3/8
201095	RPT 041	1 5/8
201096	RPT 054	2 1/8

Note: All copper fittings up to 5/8" are suitable for use with R410A refrigerants.
 • Suitable for R410A refrigerants.

Line Fittings – Copper Heldon

Copper Tube End Caps (Stop Ends)

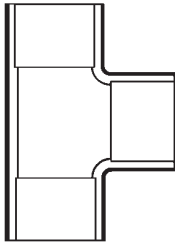


Cat. No.	Part No.	Inside Diameter Inches
202089	1120-08	1/2
202090	1120-10	5/8
202091	1120-12	3/4
202092	1120-14	7/8
202093	1120-16	1
202094	1120-18	1 1/8
202095	1120-20	1 1/4
202096	1120-22	1 3/8

Cat. No.	Part No.	Inside Diameter Inches
202097	1120-24	1 1/2
202098	1120-26	1 5/8
202101	1120-32	2
202102	1120-34	2 1/8
202105	1120-42	2 5/8
202111	1120-64	4
202112	1120-80	5
202113	1120-96	6

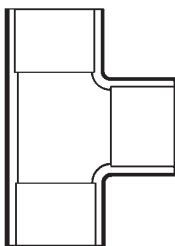
Ideal

Copper Tees



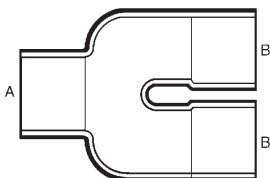
Cat. No.	Part No.	Inside Diameter Inches
203002	RTE 006	1/4
203003	RTE 008	5/16
203004	RTE 010	3/8
203005	RTE 013	1/2
203006	RTE 016	5/8
203007	RTE 019	3/4
203008	RTE 022	7/8
203009	RTE 025	1

Cat. No.	Part No.	Inside Diameter Inches
203010	RTE 029	1 1/8
203011	RTE 032	1 1/4
203012	RTE 035	1 3/8
203013	RTE 038	1 1/2
203014	RTE 041	1 5/8
203016	RTE 050	2
203017	RTE 054	2 1/8
203019	RTE 067	2 5/8



Copper Tees – Reducing on Branch

▼	Cat. No.	Part No.	Line Inside Dia. Inches	Branch Inside Dia. Inches
	203031	RTR 0101006	3/8	1/4
	203033	RTR 0131310	1/2	3/8



Copper 'Y' Pieces

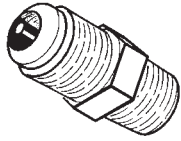
Cat. No.	Part No.	Inside Diameter 'A'	Inside Diameter 'B'
203067	RYPO 1916	3/4"	(2) x 5/8"
203068	RYPO 2216	7/8"	(2) x 5/8"
203070	RYPO 2519	1"	(2) x 3/4"

Note: All copper fittings up to 5/8" are suitable for use with R410A refrigerants.

Line Fittings

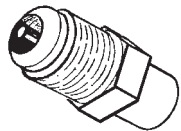
Schrader / Access Valves and Fittings

With 1/4" Male Flare Access Ports



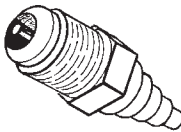
Half Union Type

Cat. No.	Brand	Part No.	Description
207154	Refco	A31482	1/8" NPT
207153	Refco	A31484/10	1/4" NPT



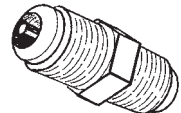
Multi-Size Solder Union

2 - Way			
207152	Refco	A31724	1/4" or 3/8" OD Solder
3 - Way			
207156	Refco	A31720	3/16", 1/4" or 3/8" OD Solder
9 - Way			
207155	Refco	A31729	3/16", 1/4", 5/16", 3/8" or 1/2" OD Also fits 3/16", 1/4" and 5/16" Solder or 1/8" hole may be punched in larger size tube



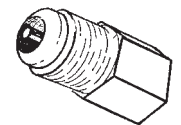
Male Flare Union

207115	Robinair	40404	1/4" Male Flare Connection
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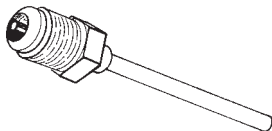
Female Flare Coupling (with Copper Gasket)

207114	Robinair	40410	1/4" Female Flare Connection
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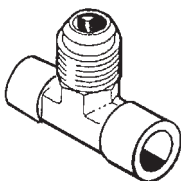
Solder Union Type with Copper Tube Extension

207087	Refco	A31003	3/16" OD Copper Tube Extension
207088	Refco	A31004	1/4" OD Copper Tube Extension
207053	Robinair	40419	5/16" OD Copper Tube Extension
207174	Refco	A31006	3/8" OD Copper Tube Extension



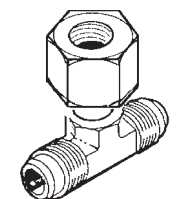
Solder and Flare Tees

207157	Refco	A31134	1/4" OD Tube or 3/8" Solder on Run 1/4" Male Flare Access on Branch
207158	Refco	A31512	1/4" Male Flare and 1/4" Male Flare Access on Run 1/8" Male NPT on Branch



Swivel Tee – 1/4" Flare

207058	Refco	A31851	Access on Branch Female Swivel on One End of Run
207151		A31852	Access on One End of Run with permanent depressor on Female Swivel Branch



Line Fittings

Schrader / Access Valves and Tools 1/4" Flare

Valve Cores



A31999

Cat. No.	Brand	Part No.	Description
207161	Refco	A31999	Valve Core (1)

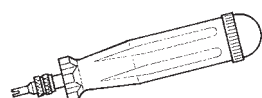
Quick Seal Caps



NFT5-4

Cat. No.	Brand	Part No.	Description
207160	Refco	NFT5-4	Quick Seal Cap (1)

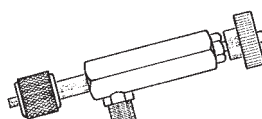
Valve Core Tool



A32000

Cat. No.	Brand	Part No.	Description
207105	Refco	A32000	Valve Core Tool, contains 6 extra Cores, 1 extra Core Remover and 1 Thread Cutter

Valve Core Remover / Installer

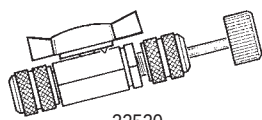


32515

These handy tools remove valve cores without losing the system charge. Designed specifically for use during evacuation or recharging of any system with valve core-type access ports, valve core remover/installers can cut service time for these procedures in half.

A valve core left in place considerably restricts flow during evacuation and charging. By removing the core, the restriction is eliminated and maximum flow results, greatly reducing the time required for pulldown and recharging.

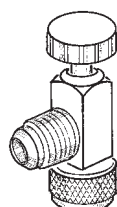
Cat. No.	Brand	Part No.	Description
207100	Refco	32515	This tool removes the valve core and holds it out of the way, inside the tool, to eliminate restriction and provide full flow
207101	Refco	32520	For removing valve cores to permit full flow while retaining the charge - can also be used to replace leaky valve cores while the system is under pressure. Just attach the tool to the access fitting and unscrew the core. When done, close off the system using the top valve and replace the valve core.



32520

Access Control Valve

The CA-1 Steel Access Control Valve controls the flow of all 1/4" male flare depressor type valves. Valve is closed until valve handle is turned, depressing the valve core. A purging port is provided for safety, allowing removal of charging hose without flash of refrigerant. Air in refrigerant line can be purged through the purging port before opening the access valve.

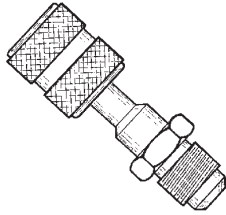


CA-1

Cat. No.	Brand	Part No.	Description
207113	Watsco	CA-1	For use with charging hoses

Line Fittings

Quick Coupler Adaptors



Cat. No.	Brand	Part No.	Size	Description
207077	Robinair	10468A	1/4" Male Flare x 3/16" Female Flare	Straight Connection
207085		40560A	1/4" Male Flare x 1/4" Female Flare	
207075	Imperial	10-C		90° Elbow Connection
207086	Robinair	40563A		
207119		10234		Straight Connection Quick Seal Auto Shut Off
207117		10296	1/4" Male Flare x 3/16" Female Flare	
349089	Refco	R509/10	Packet of 10 Replacement Gaskets	

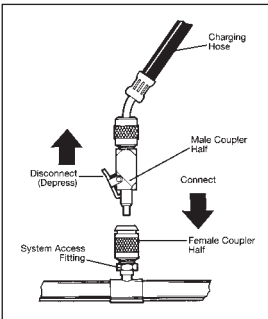
Imperial

Kwik Coupler® – Service Hose Shut-Off

3

Features

- Automatic full depression of core valves without adjustment
- Coupler halves separately connect to access fitting and hose end, then easy push/pull operation automatically opens or closes system without loss of refrigerant
- Simplifies operation of charging critical amount of refrigerant into small systems



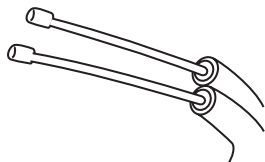
The Kwik Coupler set is intended for use with refrigeration air conditioning service manifold high and low side hoses, when connecting to core valve type service fittings. Conventional threaded connecting is converted to push-pull operation which is faster, easier and positive sealing at all times. Valve cores are depressed automatically without adjustments or loss of refrigerant. Disconnecting is also accomplished without loss of refrigerant.

An automatic shut-off valve retains refrigerant pressure in a disconnected hose. This feature permits transferring high side hose refrigerant through the service manifold into the low side, thereby eliminating waste and hazardous high pressure discharge and atmospheric damage.

Cat. No.	Part No.	Description
207109	16-C	Straight Coupler 1/4" Female x 1/4" Male Flare
207110	17-C	90° Elbow Coupler 1/4" Female x 1/4" Male Flare
207111	18-C	Set – includes 16-C and 17-C
207112	19-C	Set – Same as 18-C except with special female coupler for use on 3/16" automotive access valves

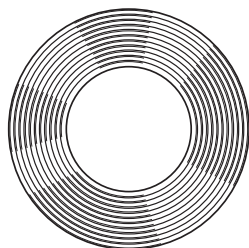
Copper Tubing Crane

Pre-insulated Pair Coil Copper Tube R410A Rated
Fire Rated to AS1530.3 - 1999



Cat. No.	Sizes		Sizes Outside Diameter : Inches	Insulation Outside Diameter	Coil Length
	Outside Diameter : mm	Wall Thickness : mm			
• 208080	6.35	0.8	1/4"	24	20 Metre Coils
	9.52	0.8	3/8"	27	
• 208081	6.35	0.8	1/4"	24	
	12.7	0.8	1/2"	34	
• 208082	6.35	0.8	1/4"	24	
	15.88	1.0	5/8"	37	
• 208084	9.52	0.8	3/8"	27	
	15.88	1.0	5/8"	37	
• 208085	9.52	0.8	3/8"	27	
	19.05	1.22	3/4"	41	
• 208086	12.7	0.8	1/2"	34	
	19.05	1.22	3/4"	41	

Soft Annealed Copper Tubing – Refrigeration Quality



Cat. No.	Size		Size		Coil Length
	Outside Diameter: mm	Wall Thickness: mm	Outside Diameter Inches	Wall Gauge	
• 208094	4.8	0.91	3/16	20	30 metre Coils
• 208096	6.4		1/4		
• 208095	7.9		5/16		18 metre Coils
• 208097	9.5		3/8		
• 208098	12.7		1/2		
• 208099	15.9		5/8		
• 208102	15.9	1.02	5/8	19	
• 208100	19.1	0.91	3/4	20	
• 208103	19.1	1.22	3/4	18	
• 208089	22.2	0.91	7/8	20	

- Suitable for R410A refrigerants.

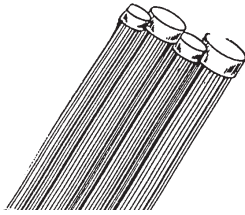
All Refrigeration Copper Tube is supplied in accordance with Australian Standard AS/NZS 1571

Note: As stocks are drawn both from local and overseas sources where standards differ slightly, the values as shown can only be considered as approximate.

Price of copper tubing is constantly changing due to variations in our suppliers base price. Prices of tubing therefore can only be quoted as at date of delivery.

Copper Tubing

Hard Drawn Copper Tube – Refrigeration Quality



Cat. No.	Size		Size		Tube Length
	Outside Diameter: mm	Wall Thickness: mm	Outside Diameter Inches	Wall Gauge	
• 208106	6.4	0.91	1/4	20	6 metre Lengths
• 208108	9.5		3/8		
• 208110	12.7		1/2		
208112	15.9		5/8		
• 208111	15.9	1.02	5/8	19	
• 208113	19.1	1.22	3/4	18	
208114		0.91		20	
208115	22.2	1.22	7/8	18	
208116		0.91		20	
• 208128		1.63		16	
208117	25.4	1.22	1	18	
208118		0.91		20	
208119	28.6	1.22	1 1/8	18	
208090		1.63		16	
208120		0.91		20	
• 208129		1.83		15	
208121	31.8	1.22	1 1/4	18	
208122		0.91		20	
208125	34.9	1.22	1 3/8	18	
208126		0.91		20	
• 208130		2.03		14	
208123	38.1	1.22	1 1/2	18	
208124		0.91		20	
208127	41.3	1.22	1 5/8	18	
208152		0.91		20	
• 208131		2.41		13	
208133	50.8	1.22	2	18	
208134		0.91		20	
208135	54	1.6	2 1/8	16	
208136		1.22		18	
208137		0.91		20	
208147	66.7	1.6	2 5/8	16	
208148		1.22		18	

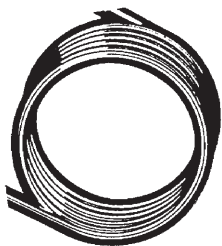
- Suitable for R410A refrigerants.

All Refrigeration Copper Tube is supplied in accordance with Australian Standard AS/NZS 1571

Note: As stocks are drawn both from local and overseas sources where standards differ slightly, the values as shown can only be considered as approximate.

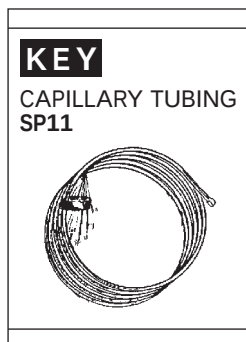
Price of copper tubing is constantly changing due to variations in our suppliers base price. Prices of tubing therefore can only be quoted as at date of delivery.

Capillary Tubing



Cat. No.	Inside Diameter		Outside Diameter		Coil Length
	mm	Inches	mm	Inches	
208036	0.66	0.026	1.72	0.068	30 metre Coils
208037	0.7	0.028	1.76	0.069	
208038	0.8	0.031	2.06	0.081	
208039	0.9	0.035	2.18	0.086	
208041	1	0.039	2.28	0.09	
208042	1.1	0.043	2.16	0.085	
208045	1.2	0.047	2.26	0.089	
208046	1.3	0.051	2.58	0.102	
208048	1.5	0.059	2.82	0.111	
208050	1.78	0.07	3.1	0.122	
208051	1.82	0.072	2.9	0.114	
208052	2.04	0.08	3.44	0.135	

Capillary Tubing Service Packs

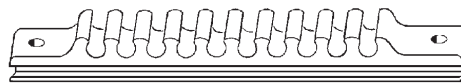


Cat. No.	Part No.	Inside Diameter		Usable Tube Length - mm
		mm	Inches	
208160	SP-1	0.66	0.026	3660
208161	SP-2	0.8	0.0315	
208162	SP-3	0.9	0.0335	3660
208163	SP-4	1.1	0.0435	4270
208171	SP-4.5	1.2	0.0472	
208164	SP-5	1.3	0.051	4270
208165	SP-6	1.4	0.055	3660
208166	SP-7	1.62	0.064	3050
208167	SP-8	1.78	0.07	3660
208168	SP-9	1.9	0.075	2750
208169	SP-10	2.04	0.08	3050
208170	SP-11	2.24	0.088	3660

Copper Tube Clips



Cat. No.	Size - Inches
208001	1/4
208002	5/16
208003	3/8
208004	1/2
208005	5/8
208006	3/4
208007	7/8
208008	1
208009	1 1/8
208010	1 1/4
208011	1 3/8
208012	1 1/2
208013	1 5/8
208014	1 3/4
208015	2
208016	2 1/8
208017	2 1/2
208018	2 5/8
208019	3



Poly-Tube Racks

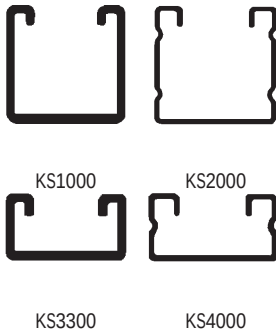
Cat. No.	Part No.	To Suit
208032	14 PO4	1/4" OD Tubing
208033	16 PO6	3/8" OD Tubing

Up to 10 tubes can be held in a compact orderly manner with these tube racks.

Has lips for fastening rack to a base with screws. Also longitudinal grooves for channel mounting.

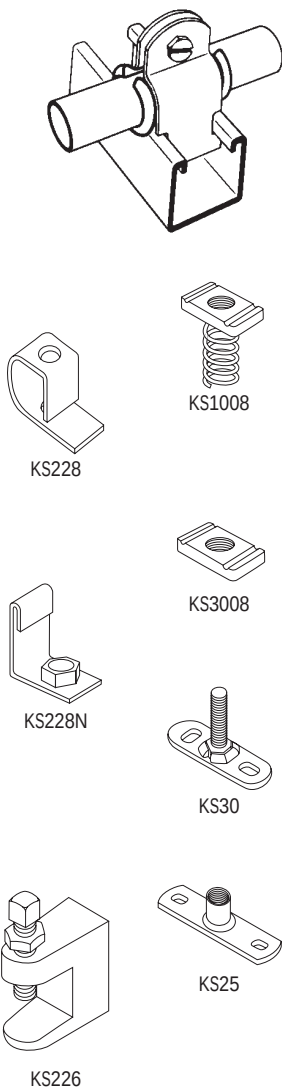
Pipe Supports Binder

Channels – Hot Dipped Galvabond Finish



Cat. No.	Part No.	Nominal Section Dimension: mm	Material Thickness: mm	Length
208302	KS1000H-1	41 x 41	2.5	Supplied in 2 metre Lengths
208304	KS2000H-1	41 x 41	1.6	
208305	KS3300H-1	41 x 22	2.5	
208220	KS4000H-1	41 x 21	1.6	

Pipe Clamps – Zinc Plated



Cat. No.	Part No.	Pipe OD mm (Inches)	Mass kg	Width x Thickness mm	Cat. No.	▼ Part No.	Pipe OD mm	Mass kg	Width x Thickness mm
208222	KS2025	11	0.0432 x 1.6	208227	KS2040	57	0.15	32 x 2.5	
208223	KS2026	14		208228	KS2041	60			
208210	KS2027	17 (5/8)	0.05	208229	KS2042	64	0.16		
208211	KS2028	19 (3/4)		208230	KS2043	67	0.17		
208212	KS2029	22 (7/8)		208231	KS2044	70			
208213	KS2030	25 (1)	0.06	208232	KS2045	73	0.18		
208214	KS2031	29 (1 1/8)	0.07	208233	KS2046	76	0.19		
208215	KS2032	32 (1 1/4)		208234	KS2047	79	0.20		
208216	KS2033	35 (1 3/8)	0.08	208235	KS2048	83	0.21		
208217	KS2034	38 (1 1/2)		208245	KS2058	114	0.30		
208224	KS2035	43 (1 5/8)	0.09	208246	KS2059	117	0.32		
208219	KS2036	44	0.11	208250	KS2066	140	0.36		
208225	KS2037	49	0.13	208251	KS2068	146	0.41		
208226	KS2038	51	0.14	208252	KS2070	152	0.43		
208218	KS2039	54 (2 1/8)	0.15						

Pipe Clamps are supplied with slotted Hex. Head Screws and Nuts.

Where Pipe Clamps are restraining pipework subject to vibration, the use of KS2600 Isolation Barrier is recommended.

Channel Fittings and Accessories

Cat. No.	Part No.	Description
208263	KS1008	Channel Spring Nut M10
	KS3008	Channel Nut M10
	KS25	Wall Plate M10
	KS30	Wall Plate M10
	M10	Galvanised Threaded Rod 3mt Lth
	KS226	Beam Clamp
	KS228	Purlin Clamp
	KS228N	Purlin Clamp

Isolation Barrier

Features

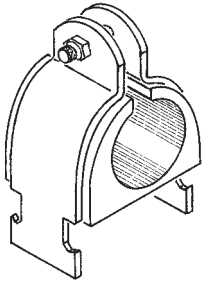
- Shock Absorption
- Protection from corrosion and abrasion
- Allowance for expansion and contraction
- Sound and vibration isolation
- 20m Roll

Cat. No.	Part No.
208259	KS2600

Sold per metre

Pipe Supports Binder

Binsul Clip Pipe Clamps



This range of clamps is ideal for pipe runs where space is limited, or where severe shock and vibration is not present.

Clamps are supplied with a bushing manufactured from a thermoplastic elastomer built to withstand the effects of most oils, chemicals and industrial cleaning compounds in temperatures from -30°C to 125°C. Clamps have a zinc plated finish

Binsul clamps reduce:

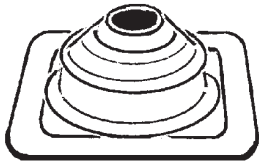
- Vibration
- Shock
- Surge
- Expansion and Contraction problems

Cat. No.	Part No.	Pipe OD Inches
208336	2500.250	1/4
208337	2500.375	3/8
208338	2500.5	1/2
208339	2500.625	5/8
208340	2500.750	3/4
208341	2500.875	7/8
208342	2501.125	1 1/8

Cat. No.	Part No.	Pipe OD Inches
208343	2501.375	1 3/8
208344	2501.625	1 5/8
208345	2502.125	2 1/8
208346	2502.625	2 5/8
208347	2503.125	3 1/8
208348	2503.625	3 5/8

Pipe Flashing Dektite

Pipe Flashing



A roof and pipe flashing product for almost every application.

Flashings in black EPDM (Ethylene Propylene Diene Monomer Polymer) that enable practically any pipe flashing operation to be completed in about 10 minutes.

The Dektite range of flexible pipe flashings is specifically designed to conform to any roof sheet profile or pitch. They can be installed without soldering, skilled labour or special tools. When fitted correctly Dektites form a perfect dust proof and water proof seal.

The flexible EPDM sleeves on Dektite products are specifically compounded to resist ozone, ultra violet light damage and of course, water.

The cone has clearly marked cut lines for different pipe diameters. Around the base of the cone a flexible bead reduces stress on the flashing membrane, as it is formed over the roof profile. Underneath, moulded ribbing increases sealant retention to ensure an effective seal.

There are literally hundreds of applications for Dektite products ranging from soil vents to heating flues, air conditioning and dust extraction pipes, pump and tank mountings, cable entries etc.

Cat. No.	Part No.	Suit Pipe O. Diam. mm	Temp. Range °C
208269	DFE 0-35B	0 to 35	-30 to 115
208270	DFE 5-55B	5 to 55	
208271	DFE 50-70B	50 to 70	
208272	DFE 70-110B	70 to 110	

Also available in silicone for high temperature applications, up to 200°C and larger sizes up to 380mm.

Selection Guide

Roof Pitch 0 - 45°	
0	DFE 0-35
5	Mini
20	Dektite
35	DFE 5-55
40	DFE 5-55
50	DFE 50-70
55	DFE 50-70
65	DFE 50-70
70	DFE 70-110
75	DFE 70-110
85	DFE 70-110
100	DFE 70-110
110	DFE 70-110

For steep pitched roofs, always use the larger size nominated above.

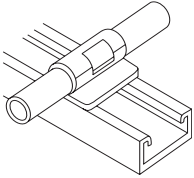
Pipe Supports

RPC Pipe Clips

Channels – Hot Dipped Galvabond Finish

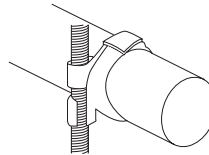
Features

- Fast Channel twist lock and snap action clamp
- UV Resistant with a temperature range of -40°C to 140°C and melting point of 220°C
- Excellent maximum weight holding capacities - Horizontal 100kg - Vertical 12kg
- Resistant to most solvents
- Designed for refrigeration applications with an excellent range of pipe sizes



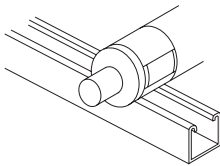
Rapid Clip

Cat. No.	RPC Clip	Size
209100	RPC 3/8	3/8
209101	RPC 1/2	1/2
209102	RPC 5/8	5/8
209103	RPC 3/4	3/4
209104	RPC 7/8	7/8
209105	RPC 1 1/8	1 1/8
209106	RPC 1 3/8	1 3/8
209107	RPC 1 5/8	1 5/8



Stud Clip

Cat. No.	Stud Clip	Size	Stud Size
209120	SC08-15	1/2	8
209121	SC08-20	5/8	8
209122	SC08-22	3/4	8
209123	SC08-25	7/8	8
209124	SC08-28	1	8
209125	SC08-32	1 1/8	8
209126	SC08-35	1 1/4	8
209127	SC08-40	1 3/8	8
209128	SC08-42	1 1/2	8
209129	SC08-50	1 5/8	8
209130	SC08-54	2	8



Insulclip

Cat. No.	RPC Clip	Size
209108	IC0012	1/2
209109	IC0015	5/8
209110	IC0020	3/4
209111	IC0022	7/8
209112	IC0025	1
209113	IC0028	1 1/8
209114	IC0032	1 1/4
209115	IC0035	1 3/8
209116	IC0040	1 1/2
209117	IC0042	1 5/8
209118	IC0050	2
209119	IC0054	2 1/8

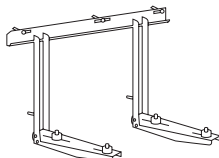
209131	SC10-15	1/2	10
209132	SC10-22	3/4	10
209133	SC10-25	7/8	10
209134	SC10-28	1	10
209135	SC10-32	1 1/8	10
209136	SC10-35	1 1/4	10
209137	SC10-40	1 3/8	10
209138	SC10-42	1 1/2	10
209139	SC10-50	1 5/8	10
209140	SC10-54	2	10
209141	SC10-54	2	10

Unit Brackets

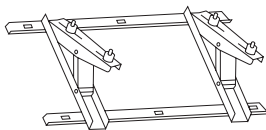
Coris Unit Brackets

Features

- All bracket have been load tested and certified to comply with CE Rules
- Supplied with all necessary accessories, anti-vibration mounts and fasteners
- Quick assembly and installation
- Powder coated finished for extended life
- Adjustable brackets to suit all applications



MVT



MTO

Cat. No.	Model No.	Description	Mounting Depth: mm	Max Bracket Spacing: mm	Load Rating: Kg
209149	MV0 100	A/C Bracket.ADJ. Sloping roof 100kg	500	800	100
209151	MVT 100	A/C Bracket.ADJ. Wall Kit 100kg	360	800	100
209152	MVT 150	A/C Bracket.ADJ. Wall Kit 150kg	430	800	150
209153	MVT 250	A/C Bracket.ADJ. Wall Kit 250kg	550	800	250

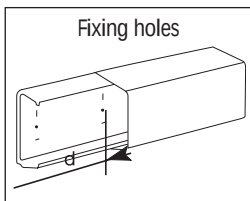
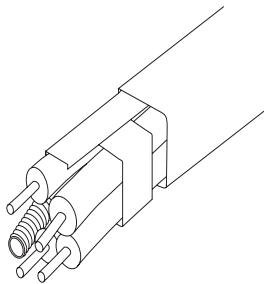
Pipe Ducts

Smartduct

Features

- 1) Affix base 2) Insert Fast Block 3) Snap on Cover

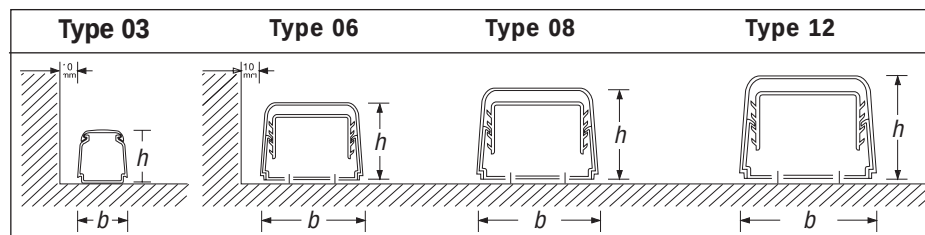
- UV Resistant
- Smart Duct is fast to install
- Minimum effort for maximum impact
- Cost efficient
- Suitable for temperatures from -20°C - 60°C
- The complete Smartduct system is available from Actrol
- Long Lasting
- Available in 4 widths - 20mm, 60mm, 80mm, 110mm



Cat. No.	Part No.	Description	Cat. No.	Part No.	Description
208700	0612-BC	Straight 2m Duct 60mm Width	208746	0811-GF	Flexible Joint 80mm
208702	0812-BC	Straight 2m Duct 80mm Width	208748	0813-DT	"T" Shunt 80mm
208704	1212-BC	Straight 2m Duct 110mm Width	208750	1213-DT	"T" Shunt 110mm
208706	0604-GC	Cover Joint 60mm	208752	0860-RI	Reduction 80mm to 60mm
208708	0812-GC	Cover Joint 80mm	208754	1280-RI	Reduction 110mm to 80mm
208710	1204-GC	Cover Joint 110mm	208756	0603-ST	Fast Block 60mm
208712	0605-AI	Internal Corner 60mm	208758	0803-ST	Fast Block 80mm
208714	0812-AI	Internal Corner 80mm	208760	1203-ST	Fast Block 110mm
208716	1205-AI	Internal Corner 110mm	208762	0341-TS	Cap for Floor Support
208718	0606-AE	External Corner 60mm	208764	0350-SP	Floor Support 350mm
208720	0806-AE	External Corner 80mm	208766	0450-SP	Floor Support 450mm
208722	1206-AE	External Corner 110mm	208768	1000-SP	Floor Support 1000mm
208724	0607-CP	Plain Curve 60mm	Condensate Duct, Tube, and Fittings		
208726	0807-CP	Plain Curve 80mm	208770	0016-TU	Drain Pipe 16mm Diameter
208728	1207-CP	Plain Curve 110mm	208772	0021-GY	Drain "Y" Joint
208730	0609-CM	Corner Wall Elbow Passage 60mm	208774	0312-BC	Straight 2m Duct 20mm Width
208732	0809-CM	Corner Wall Elbow Passage 80mm	208776	0304-GC	Cover Joint 20mm
208734	1209-CM	Corner Wall Elbow Passage 110mm	208778	0305-AI	Internal Corner 20mm
208736	0608-TT	End Cap 60mm	208780	0306-AE	External Corner 20mm
208738	0808-TT	End Cap 80mm	208782	0307-CP	Plain Curve 20mm
208740	0610-PM	Wall Passage 60mm	208784	0308-TT	End Cap 20mm
208742	0810-PM	Wall Passage 80mm	208786	0310-RC	Connection 20mm
208743	1210-PM	Wall Passage 110mm			
208744	0611-GF	Flexible Joint 60mm			

Technical Data (Measures in mm)

Temperature -20°C +60°C



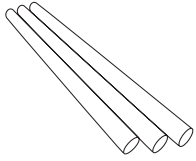
Type	Code	b	h	c	d
03	0321 BC	25	25	-	200
03	0612 BC	60	45	35	200
03	0812 BC	85	60	50	200
03	1212 BC	110	75	80	200

The base must be fixed with extending plugs with a pitch of maximum 600mm and 10 mm from the wall. The brackets must be inserted by the plugs. The corner wall elbow and wall passage have been arranged to be fixed in the wall by plugs

PVC Plastic Pipe and Fittings

ProPipe UV Resistant PVC Plastic Pipes and Fittings

UPVC Pressure for Pipe Air Conditioning and Refrigeration Drains



Cat. No.	Part No.	Pipe Diameter: mm	Pipe Length: Metres
208830	15XCE	15	4
208831	20XCE	20	
208832	25XCE	25	

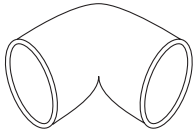


Solvent (Clear)

Cat. No.	Part No.	Size: grams
208818	NO70100	100
208819	NO70500	500

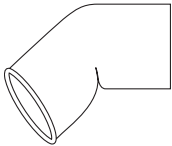
Fittings

90° Elbows



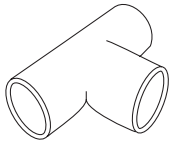
Cat. No.	Part No.	Pipe Diameter: mm
208833	2103015	15
208834	2103020	20
208835	2103025	25

45° Elbows



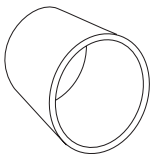
Cat. No.	Part No.	Pipe Diameter: mm
208836	2117015	15
208837	2117020	20
208838	2117025	25

Tees



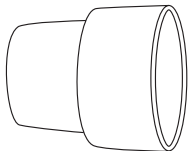
Cat. No.	Part No.	Pipe Diameter: mm
208839	2106015	15
208840	2106020	20
208841	2106025	25

Double End Socket



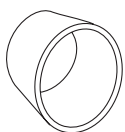
Cat. No.	Part No.	Pipe Diameter: mm
208842	2108015	15
208843	2108020	20
208844	2108025	25

Reducing Socket

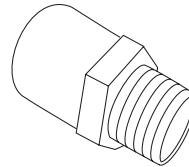


Cat. No.	Part No.	Pipe Diameter: mm	Reducing Diameter: mm
208845	2109020015	15	15
208846	2109025020	20	15
208847	2109025020	25	20

Reducing Bush



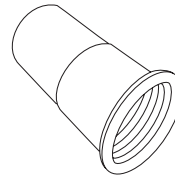
Cat. No.	Part No.	Pipe Diameter: mm	Reducing Diameter: mm
208848	2110020015	20	15
208849	2110020020	25	15
208850	2110020025	25	20



Male Socket

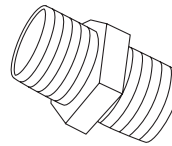
Cat. No.	Part No.	Pipe Diameter: mm
208851	2112015	15
208852	2112020	20
208853	2112025	25

P/T Female Socket



Cat. No.	Part No.	Pipe Diameter: mm
208854	2111015	15
208855	2111020	20
208856	2111025	25

Barrel Unions



Cat. No.	Part No.	Pipe Diameter: mm
208865	2101015	15
208866	2101020	20
208867	2101025	25

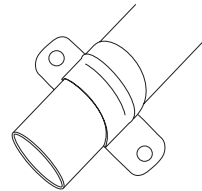
Pipe Cap



Cat. No.	Part No.	Pipe Diameter: mm
208857	REDCAP	20

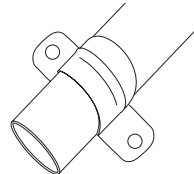
Pipe Fixings

Pipe Saddle (White) Full



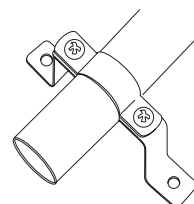
Cat. No.	Part No.	Pipe Diameter: mm
208827	PPS08	15
208828	PPS106	20
208829	PPS143	25

Pipe Saddle (Zinc) Single Side



Cat. No.	Part No.	Pipe Diameter: mm
208858	ZPC075	15
208859	ZPC100	20

Stand Off Bracket (White)



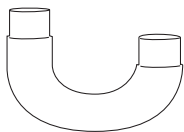
Cat. No.	Part No.	Pipe Diameter: mm
208860	PPSB075	15
208861	PPSB100	20
208862	PPSB125	25

Condensate Traps and Accessories

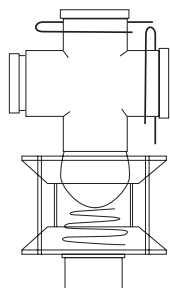
EZTrap (PVC) - Condensate Traps

Jtrap

Versatile trap, which can be used to make any angle condensate trap using, varied type fittings to suit your required needs. Due to its clear construction any blockage or obstruction can be visibly seen.



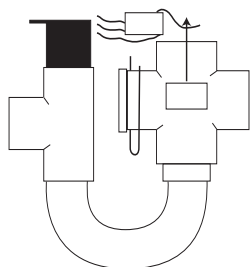
Cat. No.	Part No.	Description	Pipe Diameter: mm
208830	JTRAP	Blow mould Clear Tube	20



UltraTrap

A waterless condensate trap for Negative or Positive pressure systems up to 18.5 kPa and 10L/min. Prevents airflow in either direction while allowing unimpeded flow of condensate water.

Cat. No.	Part No.	Description	Pipe Diameter: mm
208823	EZT150	Ultra Trap Blow Through	20 to 25
208824	EZT160	Ultra Trap Pull Through	20 to 25



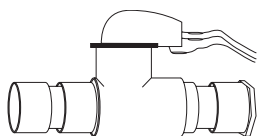
Transparent Cross Trap

Versatile and visible construction, fitted with watertight caps to open for easy cleaning, available with or without float switch to warn if blockage occurs.

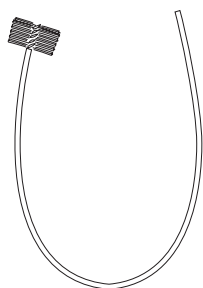
Cat. No.	Part No.	Description	Pipe Diameter: mm
208820	EZT113	Transparent cross trap	20
208822	EZT210	Cross trap with switch 4 AMP@24 VAC	20 to 25

Overflow cut off switch

Suitable for Vertical or Horizontal installation configurations. Easily installed complete with NO/NC Contacts to control unit shut down and alarm signal



Cat. No.	Part No.	Description	Pipe Diameter: mm
208821	EZT225	Overflow Cut Off Switch 4 AMP@24 VAC	20 to 25



Flexible Brush

Allows easy cleaning of condensate traps in seconds

Cat. No.	Part No.	Description	Pipe Diameter: mm
208825	EZT406	Flexible Brush	20

Vibration Eliminators



Vibration Eliminators are flexible metal connectors available in standard sizes to fit copper tube. They are designed for installation in air conditioning and refrigeration piping to minimise transmission of vibration from the compressor to other parts of the system.

Cat. No.	Part No.	Connection I.D. Solder	Cat. No.	Part No.	Connection I.D. Solder
209020	RLV-5614-Y	3/8"	209025	RLV-1010-Y	1 1/8"
209021	RLV-3838-Y	1/2"	209026	RLV-5454-Y	1 3/8"
209022	RLV-1212-Y	5/8"	209027	RLV-6464-Y	1 5/8"
209023	RLV-1258-Y	3/4"	209028	RLV-2020-Y	2 1/8"
209024	RLV-3434-Y	7/8"	209029	RLV-5252-Y	2 5/8"

Application

Oscillations, vibrations and resulting noise are not only a nuisance, but also considerably shorten the service life of the materials subjected to them. Rigidly installed piping within machines and assemblies which are subject to vibration may therefore fracture or show other signs of failure after a short period. This endangers the reliability in service and the economic operation of a plant.

For all such cases, the fitting of Vibration Eliminators is advisable. These purpose-designed elements prevent the transmission of oscillations and in addition reduce noise.

Suitable for use with:

R12, R22, R23, R125, R134a, R401A, R401B, R402A, R402B, R404A, R407A, R407B, R407C, R408A, R409A, R410A, R410B, R412A, R502, R507, R508, R509.

Fitting

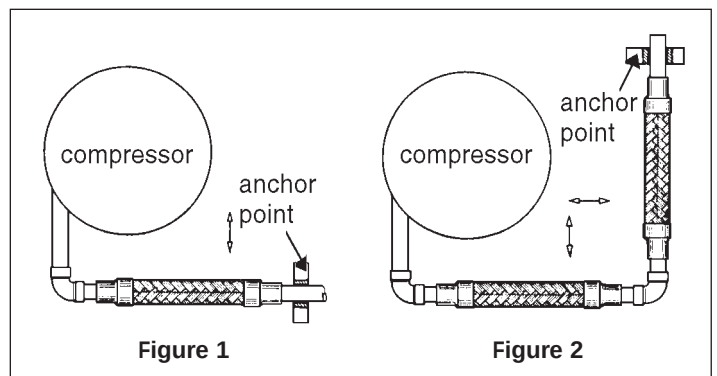
The vibration absorbers are fitted in suction and discharge piping of refrigeration compressors in the immediate vicinity of the shut-off valves. The direction of oscillation must always be noted before fitting, since the hoses only absorb movements which run perpendicular to the hose axis. To fit the hoses, it is therefore often first necessary to bring the piping connections into correct fitting position for the hoses by means of suitable elbow pieces (Fig. 1).

If fitted correctly, the vibrations are picked up and absorbed by the compressor-side hose end, while the other hose end, which is connected to the downstream piping run, remains steady apart from minor residual vibrations. However, to prevent the transmission of these residual vibrations to the piping system, a reliable anchor has to be fitted at this point, directly behind the hose, which is provided with a noise reducing insert.

In the case of additional vibrations in the direction of the hose axis, the fitting of only one vibration absorber is not sufficient, because the hose and the brazed joint would be subjected to excessive compressive or tensile stresses by the vibrational forces. For these applications, two vibration absorbers have to be fitted in a 90° arrangement (Fig. 2).

Vibration Eliminators must be connected free from stress and the two hose connections must not be offset in relation to each other. The vibration absorbers must not be stretched or compressed either during fitting or in operation. The longitudinal changes of the piping brought about by temperature variations must be absorbed by expertly fitted metal hoses or expansion joints specially designed for this purpose.

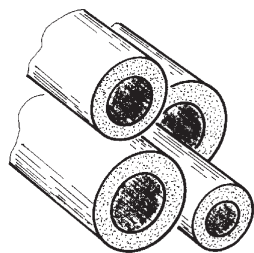
If condensate should form on the outside of the hoses, particularly when they are fitted into suction piping with sub-zero temperatures, the hoses must be connected horizontally. If fitted vertically, condensate may collect in the lower hose fitting as a result of repeated switching on and off, which would deform and destroy the hose when it freezes. In these cases, it is generally best to wind a waterproof tape around the hoses.



Flexible Insulation

Superlon

Pipe Insulation



Superlon is a flexible and light weight elastomeric nitrile rubber material designed for thermal insulation. Superlon insulation is black in colour, available in tubing and sheet form. The extruded flexible tubing is specially designed to fit the standard diameters of steel and copper piping.

Superlon expanded closed cell structure provides the ideal and most efficient vapour barrier for the prevention of condensation or frost formation on cooling systems, chilled water and refrigerant lines.

Superlon also retards heat loss for hot water plumbing and heating, dual temperature piping and solar systems. It protects pipes by acting as a vibration damper and giving protection against corrosion by atmospheric and industrial environment.

Superlon insulation material has been specially designed to provide the following features:

- Its low thermal conductivity (K value) which makes it highly efficient and effective in the insulation of cooling or heating systems.
- The hermetic blister closed cell structure forms an impermeable layer which is in itself a good vapour barrier
- It is suitable for application within the temperature range of -40°C to 105°C
- The material has been specially compounded to be self extinguishing in nature
- Superlon has excellent ozone and ultraviolet rays resistance
- It is CFC, chlorine and fibre free and does not cause skin allergies
- It is also inert to the majority of chemical agents and neutral to pipe metals

Insulation Inside Diameter		Copper Tube Outside Diameter		10mm Wall		13mm Wall		19mm Wall		25mm Wall	
				Cat. No.	No. of Pieces Per Carton	Cat. No.	No. of Pieces Per Carton	Cat. No.	No. of Pieces Per Carton	Cat. No.	No. of Pieces Per Carton
mm	Inches	mm	Inches								
6	1/4	6	1/4	210400	75	210425	100	210450	48		
10	3/8	10	3/8	210401	50	210426	40	210451	36		
13	1/2	13	1/2	210402	45	210427	32	210452	30		
16	5/8	16	5/8	210403	40	210428	28	210453	30		
19	3/4	19	3/4	210404	30	210429	24	210454	26	210485	20
22	7/8	22	7/8	210405	28	210430	18	210455	24	210486	20
25	1	25	1	210406	21	210431	15	210456	20	210471	18
29	1 1/8	29	1 1/8	210407	21	210432	15	210457	20	210487	18
32	1 1/4	32	1 1/4	210408	42	210433	30	210458	20	210473	16
35	1 3/8	35	1 3/8	210409	36	210434	30	210459	18	210488	15
38	1 1/2	38	1 1/2	210414	30						
42	1 5/8	42	1 5/8	210410	30	210435	25	210460	16	210489	12
48	1 7/8	48	1 7/8	210411	28	210436	20	210461	12		
51	2	51	2	210412	24	210437	20	210462	12	210490	9
54	2 1/8	54	2 1/8	210413	20	210438	18	210463	12	210491	9
60	2 3/8	60	2 3/8			210439	18	210464	9		
67	2 5/8	67	2 5/8			210440	13	210465	8	210492	8
76	3	76	3			210442	12	210467	8		
89	3 1/2	89	3 1/2			210444	12	210469	6		

Pipe Insulation Sold in 2 metre Lengths

Note: All dimensions are nominal

Also available:

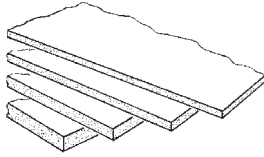
Cat. No.	210399	6mm I.D. x 6mm Wall (125 pieces per carton)
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Superlon may be painted with a vinyl laquer type coating if required for aesthetic reasons

Flexible Insulation

Superlon

Sheet Insulation



Cat. No.	Nominal Thickness		Sheet Size		No. of Sheets Per Carton
	mm	Inches	Metres	Feet	
210501	6	1/4	1.22 x 0.914	4 x 3	40
210502	9	3/8			26
210503	13	1/2			20
210505	19	3/4			14
210506	25	1			10

Sheet Insulation – Continuous Rolls

Cat. No.	Nominal Thickness		Roll Size	
	mm	Inches	Metres	Feet
210509	13	1/2	1.22 x 9.14	4 x 30
210510	19	3/4		

3

Pipe and Sheet Insulation Properties

Average Physical Properties	Rating	Average Physical Properties	Rating
Density	0.08 gm/cm ³ (5.4 lb/cuft)	Thermal Stability 7 Days 95°C	4.5
Thermal Conductivity at 10°C mean Temperature	0.0374 W/mK (0.26 BTU in/hr ft ² °F)	(% shrinkage) 7 Days 105°C	5.5
Temperature Limits °C	-40°C to 105°C	Spread of Flame	Self Extinguishing
Water Absorption (% by weight)	3	Flexibility	Excellent
Water Vapour Permeability Perm - In. Max	0.2	Weather and Ultraviolet Resistance	Good
Ozone Resistance	Excellent	Chemical Resistance	Good
		Odour	Negligible
		Mildew Resistance	No Fungal Growth

- The above average physical properties are values obtained in accordance with accepted test methods.
- At -40°C Superlon Close Cell Insulation becomes hard and as temperature drops below -40°C will be increasingly brittle. However, this hardening characteristic does not affect thermal efficiency or water vapour permeability.
- The Fire Rating standard method of tests conducted under controlled laboratory conditions is a measure of a material to spread flame when compared to a known standard and is not intended to reflect hazards presented by this or any other material under actual fire conditions.

Flexible Insulation

Superlon

Tubing and Sheet Insulation

Thickness Recommendations to Control Condensation in Pipe Insulation of Cooling Lines

Design Conditions	Pipe Size	Recommended Thickness: mm			
		Pipeline Temperature			
		15°C	7°C	2.5°C	-18°C
Mild Condition 27°C, 50% RH	10mm ID to 76mm IPS	9	9	9	19
	76mm IPS to 127mm IPS	9	13	13	25
	127mm IPS to 254mm IPS	13	13	13	25
Normal Condition 30°C, 70% RH	10mm ID to 76mm IPS	9	13	13	25
	76mm IPS to 127mm IPS	13	13	13	31
	127mm IPS to 254mm IPS	13	13	19	31
Severe Condition 32°C, 80% RH	10mm ID to 76mm IPS	13	19	19	38
	76mm IPS to 127mm IPS	13	25	25	38
	127mm IPS to 254mm IPS	13	25	31	50
Extremely Severe Condition 32°C, 85% RH	10mm ID to 76mm IPS	13	25	25	38
	76mm IPS to 127mm IPS	19	31	31	50
	127mm IPS to 254mm IPS	25	31	38	50

- Insulation for pipes of 10mm ID to 76mm IPS is available in tubing form with wall thickness of up to 25mm
- Insulation above 76mm IPS is in precut sheets and available up to 38mm thickness
- Superlon thickness recommended within the specified temperature ranges will control condensation on indoor piping under design conditions defined as follows:

MILD – Air Conditioned and arid areas

NORMAL – Maximum severity of most indoor conditions seldom exceed 30°C and 70% RH

SEVERE and EXTREMELY SEVERE – Conditions of high humidity or poorly ventilated areas where temperature may be depressed below the ambient. Under conditions of high humidity, additional thickness of insulation may be required.

Thickness Recommendations for Insulation of Ductings, Tanks and Equipment of Cooling Systems

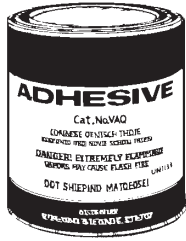
Design Conditions	Recommended Thickness: mm				
	Metal Surface Temperature				
	15°C	12°C	7°C	2.5°C	-18°C
27°C 50% RH	9	9	13	19	25
30°C 70% RH	13	13	19	25	31
32°C 80% RH	13	19	25	31	50
32°C 85% RH	25	25	31	38	50

All measurements are nominal sizes.

Flexible Insulation

Insulation Adhesive

An air-drying contact adhesive that is excellent for joining seams and butt joints of Superlon Pipe and Sheet Insulation. The adhesive may also be used to apply Superlon Sheet Insulation to flat or curved metal surfaces.



Cat. No.	Size
210109	500ml Tin
210110	1 Litre Tin
210111	4 Litre Tin
210130	25mm Plastic Handled Brush for Adhesive Application

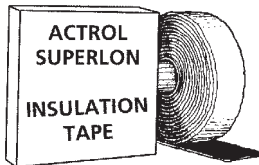
Superlon

Foam Insulation Tape

Prevents pipe sweat, can also be used to reduce heat loss on hot pipes below 70°C. Easily cut in pieces and moulded around fittings and valves, saving the higher cost of specially cast forms. Adheres to clean metal surfaces and to itself.

Wrap tape in a spiral around pipe. Butt the edges so that no metal is showing. For quicker application, overlap by approximately 6mm is suggested. Overlap the tape half its width for a double-layer application. Avoid single layer butt edge wrapping on dual temperature or heated lines.

Irregular shapes can be insulated by pressing small pieces of tape around fittings.



Cat. No.	Nominal Size
210088	3mm thick x 50mm wide 9.14m long roll

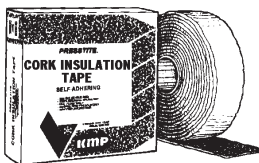
Virginia

Presstite Cork Insulation Tape

Cork Insulation Tape may be used for either hot or cold temperature application, provided that its service temperature range of -29° to 70°C is not exceeded. Used on pipes or tubes, in commercial or residential building, air conditioning units, refrigerated units and in other similar applications.

The thickness of the insulation required for cold pipes depends on the pipe temperature – the colder the pipe, the thicker the insulation needed. High humidities also make necessary a thicker insulation.

Cork Insulation Tape is economical for heat and humidity loads which require up to 6 or 7 wrappings. Since it can be cut in pieces and moulded around fittings and valves, it saves the higher cost of special cast forms for these uses. Cements or supplemental binds are not required. Adheres to clean metal surfaces and to itself; joints are self sealing.



Cat. No.	Part No.	Nominal Size
210087	PT-1	3mm thick x 50mm wide 9.14m long roll

Check Valves

Chatleff

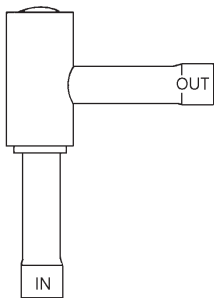
CH Series – Female Solder

Features

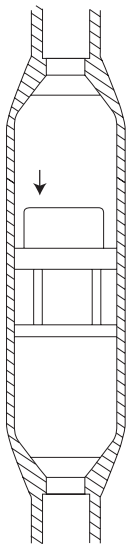
- Positive pressure operation
- Instant action - Non-chattering, even under extremely low flow 3.5 kPa
- Operates efficiently at either high or low pressures
- Maximum temperature range -268°C to 260°C
- Hermetically sealed - operates in all positions

Construction

Extruded brass throughout with copper extension tubes. The sealing surface is Teflon seated on brass. Each unit is 100% leak tested and flow tested before shipment.



Cat. No.	Part No.	Connections: Inches Solder	Internal Orifice mm
213044	CH-1	3/8	11
213045	CH-2	1/2	
213046	CH-3	5/8	16
213047	CH-4	3/4	
213048	CH-5	7/8	
213049	CH-6	1 1/8	24
213050	CH-7	1 3/8	



FlowControls

ACK Check Valve

The ACK magnetic checking valve action ensures a securely and positive closed action for all types of refrigeration cycle applications such as:

Discharge line installations requiring prevention of condenser gas returning back to the compressor during off cycles and liquid lines on heat pump cycles from reverse flows.

Features

- Hermetically spun copper design to prevent refrigerant leakage
- ODF solder copper connections
- Near zero internal leak rate
- Positive magnetic checking action
- Built in 30 mesh stainless steel strainer
- Operational in any position
- Seat surface protection

Specifications

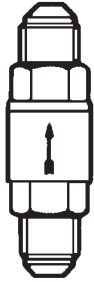
Cat. No.	Model No.	Size	Length: mm	Diameter: mm	Opening Pressure kPa	Maximum Working Pressure kPa	Burst Pressure kPa	Leak Rate cm ³ /min @413 kPa	Normal: Kw R22 Suction 4.4°C@6.9 kPa	Normal: Kw R22 Suction 4.4°C@6.9 kPa
214030	ACK-4	1/4	101.6	22.2	8.27	5515	27579	.0245	1.4	9.1
214031	ACK-6	3/8	101.6	22.2	8.9	5515	27579	.0245	2.1	10.9
214032	ACK-8	1/2	127	28.6	24.1	4412	23442	.0557	4.2	33
214033	ACK-10	5/8	127	28.6	24.1	4412	23442	.0557	4.9	45
214034	ACK-12	3/4	177.8	41.3	26.2	3861	19305	1.212	11.6	94.9
214035	ACK-14	7/8	177.8	41.3	26.2	3861	19305	1.212	13	101.1
214036	ACK-18	1 1/8	213	54	46.8	2757	13789	2	21.1	179.3
214037	ACK-22	1 3/8	238	66	70.3	3033	15168	2.819	33.4	277.8

Check Valves

Castel

3110 Series – Male Flare

Vertical Mounting preferred, with Arrow Upward



3110

Cat. No.	Part No.	Size: Inches M. Flare	Kv Factor m ³ /hr ①	Pressure Diff. kPa ②	Fluid Temp. °C	Max. Pressure kPa
214076	3110/2	1/4	0.4	10	-40 to 120	3000
214077	3110/3	3/8	1.6			
214078	3110/4	1/2	1.8			
214079	3110/5	5/8	3.3			
214080	3110/6	3/4	3.3			

3130 Series – Female Solder – Extended Ends

Vertical Mounting preferred, with Arrow Upward

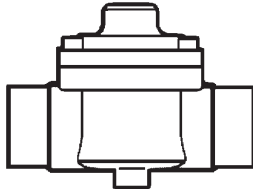


3130

Cat. No.	Part No.	Size: Inches Solder	Kv Factor m ³ /hr ①	Pressure Diff. kPa ②	Fluid Temp. °C	Max. Pressure kPa
214087	3130/2	1/4	0.5	10	-40 to 120	3000
214088	3130/3	3/8	1.6			
214089	3130/4	1/2	1.8			
214090	3130/5	5/8	3.3			

3120 Series – Female Solder

For Horizontal Mounting Only



3122

Cat. No.	Part No.	Size: Inches Solder	Kv Factor m ³ /hr ①	Pressure Diff. kPa ②	Fluid Temp. °C	Max. Pressure kPa
214081	3122/7	7/8	6.6	10	-40 to 120	3000
214082	3122/9	1 1/8	8.8			
214083	3122/11	1 3/8	15.2			
214084	3122/13	1 5/8	25			
214085	3122/17	2 1/8	40			

① kv factor is the water flow in m³/hr at a pressure drop across the valve of 100 kPa

② PD = the minimum pressure difference at which the valve is completely open

Part No.	Connections Inches		Capacity: kW								
	Flare	Solder	Liquid			Suction Vapour			Hot Gas		
			R134a	R22	R404A	R134a	R22	R404A	R134a	R22	R404A
3110/2	1/4		6.7	7.2	4.8	0.9	1.1	0.9	3.4	4.7	4
3110/3	3/8		27	28.8	19	3.5	4.3	3.6	13.6	18.7	16
3110/4	1/2		30.3	32.4	21.4	3.9	4.9	4.1	15.3	21.1	18
3110/5	5/8		55.6	59.4	39.3	7.1	8.9	7.5	28.1	38.6	33
3110/6	3/4		55.6	59.4	39.3	7.1	8.9	7.5	28.1	38.6	33
3130/2		1/4	8.4	9	6	1.1	1.4	1.1	4.3	5.9	5
3130/3		3/8	27	28.8	19	3.5	4.3	3.6	13.6	18.7	16
3130/4		1/2	30.3	32.4	21.4	3.9	4.9	4.1	15.3	21.1	18
3130/5		5/8	55.6	59.4	39.3	7.1	8.9	7.5	28.1	38.6	33
3120/7		7/8	111.2	118.8	78.5	14.3	17.8	14.9	56.1	77.2	66
3120/9		1 1/8	148.3	158.4	104.7	19	23.8	19.9	74.8	103	88
3120/11		1 3/8	256.1	273.6	180.9	32.8	41	34.4	129.2	177.8	152
3120/13		1 5/8	421.3	450	297.5	54	67.5	56.5	212.5	292.5	250
3120/17		2 1/8	674	720	476	86.4	108	90.4	340	468	400

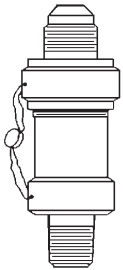
Capacities based on 4°C Evaporating Temperature and 38°C Condensing Temperature

Pressure Relief Valves

Superior

Straight Through Type

For R22, R123, R134a, R404A, R507



Features

- Brass connection
- Positive pressure relief
- Teflon Seat and stainless steel spring
- Excellent reseating characteristics
- Reseat: by 80% of set pressure
- Maximum temperature 163°C

Whenever conditions permit, it is advisable to have the relief valve pressure setting (which must not exceed the design working pressure of the vessel) at least 25% higher than the normal maximum operating pressure for the refrigerant used.

After they have discharged, Relief Valves are designed to reclose automatically at a predetermined pressure. While the valve is discharging, foreign material can collect on the valve seat. This makes it almost impossible to predict, with any degree of certainty, the reliability of Relief Valves to reseal tightly.

Be C.F.C. Safe. REPLACE!

Cat. No.	Model	Connections		Kilograms of Air per Minute	Relief Pressure Settings	
		Inlet	Outlet		kPa	(psig)
215041	3012/300PSIG	1/4" NPT	3/8" Flare	4.6	2068	330
215042	3012/350PSIG	1/4" NPT	3/8" Flare	5.4	2413	350
215046	3014/235PSIG	3/8" NPT	3/8" Flare	3.7	1620	235
215047	3014/300PSIG	3/8" NPT	3/8" Flare	4.6	2068	300
215048	3014/350PSIG	3/8" NPT	3/8" Flare	5.4	2413	350
215052	3015/235PSIG	3/8" NPT	1/2" Flare	3.7	1620	235
215053	3015/300PSIG	3/8" NPT	1/2" Flare	4.6	2068	300
215054	3015/350PSIG	3/8" NPT	1/2" Flare	5.4	2413	350
215056	3015/435PSIG	3/8" NPT	1/2" Flare	6.5	2930	425
215057	3015/450PSIG	3/8" NPT	1/2" Flare	6.8	3102	450
215059	3020/300PSIG	1/2" NPT	5/8" Flare	9.2	2068	300
215060	3020/300PSIG	1/2" NPT	5/8" Flare	10.7	2413	350
215061	3020/400PSIG	1/2" NPT	5/8" Flare	12.2	2758	400
215063	3020/450PSIG	1/2" NPT	5/8" Flare	14	3102	450

Henry

3-Way Dual Shut-Off Valves

For dual Relief Valves and Drier ByPass installations or applications requiring simultaneous opening of one line and closing of another.

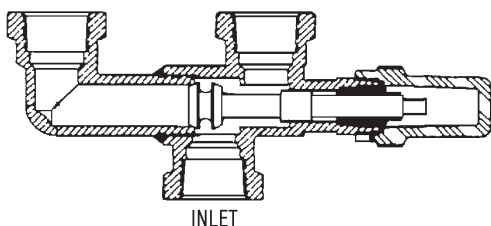
A dual Relief Valve installation consists of one three-way shut-off valve and two relief valves so arranged that both relief valves cannot be shut-off from the protected pressure vessel at the same time. This permits safe removal of either Relief Valve for repair or replacement, while the vessel is protected and under pressure. Each Relief Valve must have sufficient capacity to provide the necessary discharge flow when used alone.

Tight shut-off can be obtained at either extreme of stem position, closing off either the left or right outlet port. The system should not be run with the valve stem in the centre position.

The design of this three-way valve provides full discharge area through the valve regardless of stem position, assuring maximum protection. Furthermore, this design provides for convenient parallel mounting of the two Relief Valves.

Maximum Working Pressure: 3100 kPa (450 psig)

Maximum Temperature Rating: -29°C to 150°C



Cat. No.	Part No.	Conn. Size	Body Material
215022	925	1/2" FPT	Forged Brass
215024	8021A		Forged Steel
215023	8022A	3/4" FPT	

Conversion Factors:

psig x 6.895 = kPa kPa ÷ 1000 = MPa

Pounds of air per minute x 0.378 = cubic metres per minute

Liquid and Moisture Indicators

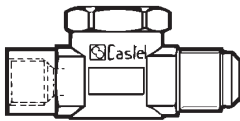
Castel

Male Flare



Size: Inches Flare	Cat. No.	Part No.
1/4	217101	3710-22
3/8	217102	3710-33
1/2	217103	3710-44
5/8	217104	3710-55
3/4	217105	3710-66

Male to Female Flare



Size: Inches Flare	Cat. No.	Part No.
1/4	217110	3750-22
3/8	217111	3750-33
1/2	217112	3750-44
5/8	217113	3750-55

Castel and Heldon

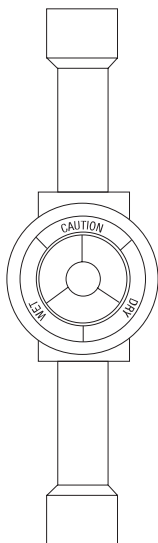
Female Solder with Copper Extensions



Size: Inches ODF Solder	Castel		Heldon	
	Cat. No.	Part No.	Cat. No.	Part No.
1/4	217126	3740-2		
3/8	217127	3740-3	217011	665-0606
1/2	217128	3740-4	217012	665-0808
5/8	217129	3740-5	217013	665-1010
3/4	217130	3740-6	217014	665-1212
7/8	217131	3740-7	217015	670-1414
1 1/8	217132	3740-9	217017	670-1818
1 3/8			217019	670-2222
1 5/8			217021	670-2626

Liquid and Moisture Indicators

Flow Controls (Alco)



The AMI was designed to provide an accurate method of determining the moisture content of a system's refrigerant. Unique 3% high accuracy moisture indicator for CFC, HCFC and HFC refrigerants, including R410A.

Features

- Hermetic design for complete leakage assurance
- Maximum Working Pressure: 4688 kPa
- 3% relative humidity indication compared to 10% paper indicators
- Wide angle viewing for ease of monitoring all common refrigerants
- All brass corrosion resistant body and solid copper fitting

Cat. No.	Part No.	Size: Inches
Male Flare		
217300	HMI-1-MM2	1/4
217301	HMI-1-MM3	3/8
217302	HMI-1-MM4	1/2
217303	HMI-1-MM5	5/8
217304	HMI-1-MM6	3/4
Female Solder with Copper Tails		
217305	HMI-1-TT2	1/4
217306	HMI-1-TT3	3/8
217307	HMI-1-TT4	1/2
217308	HMI-1-TT5	5/8
217309	HMI-1-TT6	3/4
217310	HMI-1-TT7	7/8
217311	HMI-1-TT9	1 1/8

Cat. No.	Part No.	Size: Inches
Female to Male Flare		
217312	HMI-1-FM2	1/4
217313	HMI-1-FM3	3/8
217314	HMI-1-FM4	1/2
Female Swivel to Male Flare		
217315	HMI-1-MU2	1/4
217316	HMI-1-MU3	3/8
217317	HMI-1-MU4	1/2
217318	HMI-1-MU5	5/8

HMI Moisture Content Colour Code (ppm H₂O)

Indication	DRY (Dark Blue)			CAUTION (Purple)			WET (Salmon)		
	24°C	38°C	52°C	24°C	38°C	52°C	24°C	38°C	52°C
R134A	20	35	60	35	55	85	130	160	190
R22	25	35	50	40	65	90	145	205	290
R407C	26	50	64	42	68	109	150	230	370
R410A	30	55	75	50	85	120	165	290	420
R404A/R507	15	25	45	33	50	80	120	150	180

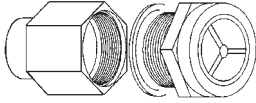
A minimum period of 12 hours is recommended after installation of the Moisture-Liquid Indicator before attempting to accurately determine system moisture content.

All Alco products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Liquid and Moisture Indicators

Heldon

Spiggot – Solder – Brass, with Removable Top Assembly

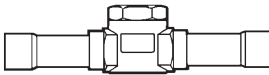


Spiggot Outside Diam.	Cat. No.	Part No.
7/8"	217025	680-14

Liquid Indicators – Sight Glasses

Castel

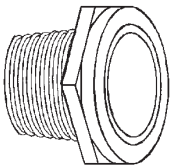
Female Solder – with Copper Extensions



Size: Inches ODF Solder	Cat. No.	Part No.
1/4	217133	3640-2
3/8	217134	3640-3
1/2	217135	3640-4
5/8	217136	3640-5
3/4	217137	3640-6

Heldon and AC&R

Male Pipe Thread Connection



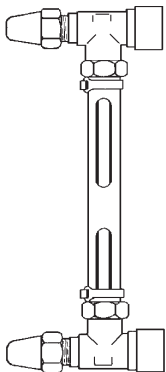
Size: Inches MPT*	Type	Heldon		AC&R	
		Cat. No	Part No.	Cat. No	Part No
3/4	Steel	217051	611-12	217052	SG1006
1 1/2	Steel			217055	SG1012
3/4	Steel with Floating Aluminium Ball			217053	SG1206

*Heldon: BSP (Tapered). AC&R: NPT (Tapered)

Henry

Type 502 – Liquid Level Gauge Set

For all Refrigerants including Ammonia (R717)



Types 502 liquid level gauge valves contain a safety ball check to prevent excessive loss of refrigerant in case the gauge glass is broken while the system is pressurised and the gauge valves are in the open position. High pressure glass tubing is protected by metal guard.

Gauge valves are forged steel, zinc plated.

The gauge set includes: non-back seating, packed capped type upper and lower valves, a gauge glass and a slotted metal guard.

Recommended maximum working pressures for glass lengths:

113mm to 500mm : 2900 kPa

520mm to 760mm : 2350 kPa

780mm to 1000mm : 2000 kPa

For mounting centres greater than 1000mm it is recommended that multiple gauge sets be used.

Temperature Rating: -29°C to 65°C

Cat. No	Part No.	Connections	Dimensions: mm		
			Glass Size	Mounting Centres	
				Standard	Minimum
217060	5024	1/2" FPT	12.7 Dia. x 338	381	156

Notes

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Notes

3



Your best Solution...

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Notes

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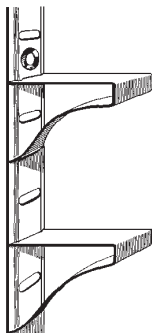
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Cabinet Accessories

Shelf Support Strip and Clips



Adjustable Shelf Support Strip

Supplied in four standard lengths. Special lengths on application.

Fixing Holes

Spaced 140mm apart ensures against sag away from walls.

Shelving can be fixed to almost any surface by either wood screws, pop rivets or self tapping screws.

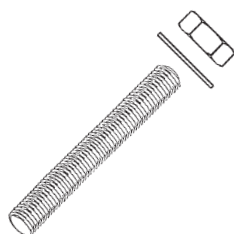
Adjustment

Shelf heights can be raised or lowered in 13mm increments.

Material

Stainless Steel.

Cat. No.	Description	Length
230026	Adjustable Shelf Support Strip	914mm (3')
230027		1219mm (4')
230028		1524mm (5')
230029		1829mm (6')
230037	Plain Clips	
230038	Clips with Lug	

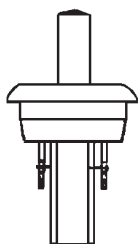


Allthread Brass Rod, Nuts and Washers

Cat. No.	Description	Size
230055	Threaded Brass Rod (Whitworth)	3/8" Dia. x 914 mm (3') long
230059	Brass Nuts (Whitworth)	3/8"
230064	Brass Washers	3/8"

Door and Cabinet Switches

Quick Connect Terminals – SPST



Cat. No.	Part No.	Description	Action	Rating	Plunger Length
231037	S50 E/8423 K1	Light Switch	Press OFF Norm/Closed	1/2 Amp 250 VAC	14mm
231038	S51E	Fan Switch	Press ON Norm/Open	1/4 Amp 250 VAC	11mm

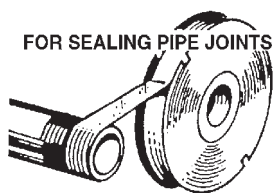
Notes: Body White, S50 Brass Contact Legs. S51 Silver plated contact legs with coloured dot on base.

Interior Light Globes



Cat. No.	Connection	Watts	Volts	Type
231015	Bayonet	15	240	Pilot
231016	Screw			
231017	Small Bayonet			
231018	Small Screw			

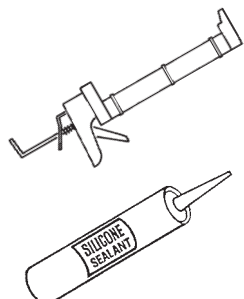
Sealants



PTFE Pipe Thread Tape

- The most suitable tape for sealing all types of pipe made of lead, iron, stainless steel, plastics, etc
- Because of the tape's minimum coefficient of friction, pipe screws in easily and snugly. Also easy to remove
- For its self-fusing property, just one turn of lapping it around the thread joint makes a perfect seal

Cat. No.	Size
231143	13mm x 10 metre roll



Caulking Gun

Cat. No.	Description
231010	Caulking Gun

Silicone Sealant

Cat. No.	Description	Size
231009	Silicone Sealant – Non-Acetic	300 gram Cartridge

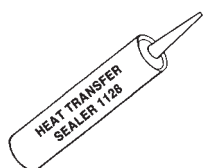
Bostik

Heat Transfer Sealer

Bostik Heat Transfer Sealer is designed specifically for use in the refrigeration industry as an odourless, non-staining, non-oxidising, non-skinning oil based sealer.

Temperature Range: -30°C to 100°C.

Its heat transfer properties make it ideal for improving the efficiency of freezer units by increasing the surface contact between refrigerator coils and cabinets. It can also be used for other applications where odour free non-staining characteristics are required.



Cat. No.	Part No.	Description	Size	Colour
231275	042951	Bostik 1128 Heat Transfer Sealer	460 gram cartridge	Aluminium Grey
231278	131504	Bostik 5603 Same as 1128 but 15% thinner, designed to be pumped	20 kg container	

Non-Skinning Mastic

Bostik 5612 is a non-skinning mastic for general sealing applications. Safe for use on expanded polystyrene. Remains permanently flexible. Does not skin and will tolerate a high degree of joint movement.

Temperature Resistance: -35°C to 65°C



Cat. No.	Part No.	Description	Size	Colour
231274	170526	Bostik 5612 Non-Skinning Mastic	450 gram cartridge	White

Virginia

Permagem Slugs Sealing Compound

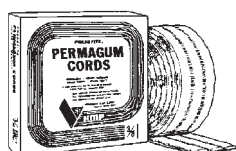
A heavy duty sealing compound to protect openings and seams, copper tube and hose entries against air, moisture and loss of insulating efficiency. Non-shrinking, odourless, does not harden with age. White Permagem will not attack plastics or rubber and can be painted with oil-based paints immediately after applying.



Cat. No.	Part No.	Size
231146	PP22	900 gram (2 lb.)

Permagem Cords Sealing Compound

Grey-white Permagem extruded in cords (or beaded) forms. All purpose utility sealant. Same product as White Permagem Slugs. Non-staining, odourless and never hardens.



Cat. No.	Part No.	Size
231148	PP36	3/8 " Cords -6 metre (20') roll

Sealants

Highside

Leak Lock – Flexible Joint Sealer

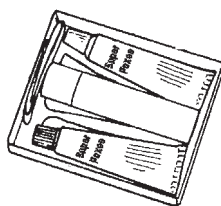


Leak Lock is a soft setting, pipe joint compound. It is a resin based, brushable paste that seals by adhering to internal joint surfaces and by filling joint voids. Use it to seal threaded joints, flange joints, gasket surfaces and all mating surfaces. This permanently flexible material keeps joints tighter under extremes of vibration at temperatures from -70°C to 200°C and pressures from full vacuums to 69,000 kPa. It may be used on all piping materials, both metal and plastic, to seal refrigerants (R11, R12, R22, R134a etc.), petroleum products, natural or manufactured gases and liquids, steam, water and most chemicals.

Cat. No.	Size
231139	39 ml tube

Watsco

Super Poxee



Rapid set, fast cure requires no external heat. An all-purpose epoxy for bonding: aluminium, copper, stainless steel and sealing evaporator leaks.

Initial cure takes approximately 15 minutes. In one hour cures to 75% of maximum mechanical strength. Cure at room temperature for maximum resistance.

Kit contains: two tubes (1 resin, 1 hardener), vial of cleaning solvent, emery cloth, aluminium foil patch and mixing spatulas.

Cat. No.	Part No.
231140	DP-2

La-Co

Heat-Seal Stik



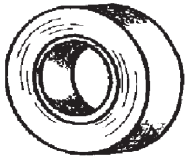
- Makes a cured epoxy repair in seconds – restore service immediately
- Melts and cures in one operation
- Use on aluminium evaporators and tubing, welded joints, process systems, laboratory glassware
- For any metal, glass or ceramics

Seals small leaks instantly. Withstands refrigerants, oil, gas, water, air, chemicals, solvents. Use on pressure and vacuum systems. An ideal tool for refrigeration and air conditioning servicemen, pipe-fitters, welders, laboratory technicians. An easy-to-use maintenance product for every industry. Temperature to 175°C. Pressure to 1725 kPa.

Cat. No.	Part No.
231135	11 grams

Tapes

PVC Duct Tape



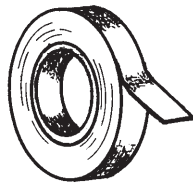
Features

- Ideal for both warm and cold air ducts; either high or low velocity systems and dust collecting systems
- Low MVT rate allows its use as a vapour barrier seal on both rigid and flexible insulation material with plastic, foil and paper coatings
- Conformability provides increased heating efficiency by sealing irregular surfaces tightly

Caution:

Do not use without mechanical methods to support the ductwork.

Cat. No.	Width	Length	Colour
231047	50 mm	30 metres	Black
231048			Grey
231049	72 mm		



Electrical Insulation Tape

Cat. No.	Width	Length
231145	18mm	20 metres



Abrasive Cloth Tape

Cat. No.	Grit No.	Width	Length
231099	100	25mm	50 metres (sold per metre)
231100	180		

Precision

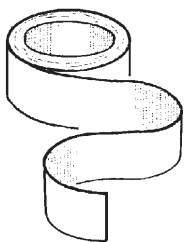
Aluminium Foil Tape

Application

Insulation and sealing in appliances and air conditioning and refrigeration industries.

Characteristics

Excellent reflection of both heat and light. Low moisture vapour transmission. Permanent adhesive gives long ageing both indoors and outdoors. Very high co-efficient of heat transmission. Very high co-efficient of expansion.



Cat. No.	Width	Length
231122	24mm	45 metres
231123	48mm	50 metres
231124	72mm	
231125	96mm	

Reinforced Foil Tape

Application

Primarily used for sealing aluminium foil covering on air conditioning ductwork. For insulating and protecting applications in building industry, horticulture, pastoral and associated fields. General holding, sealing and strapping applications when high strength and adhesion required.

Construction

Aluminium foil paper lamination reinforced by glass fibre filaments. The high tack adhesive is protected by a paper interliner.

Characteristics

Very high adhesion values, tensile and high tear strength – fire resistant.

Cat. No.	Width	Length
231041	48mm	50 metres
231039	72mm	

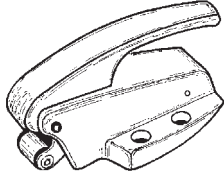
Refrigeration Hardware

Efco

Medium Duty Locks and Strikes

For Commercial Cabinets and Coolrooms

R57 Series



Application

Designed for use on commercial cabinets and coolrooms

Specifications

Body, handle and strike – zinc machine cast

Rollers – Nylon

Finish – Chrome Plated

Note: Strike must be ordered separately



Cat. No.	Part No.	Description
233082	R5710	Latch only (Not lockable)
233083*	R5722	60° Standard Strike. Adjustable Offset 19-25mm
233085	R5723	90° Strike. Adjustable Offset 19-25mm

***Note:** Should be used with latches where safety regulations require burst open emergency exit.

Heavy Duty Locks and Strikes

For Commercial Coolrooms and Cold Stores

R56 Series



Application

Designed for use on commercial coolrooms and cold stores.

Operation

Spring loaded roller provides gasket compression.

Lockable on outside by padlock.

Specifications

Body, handle and strike – zinc machine cast.

Roller – Nylon.

Safety release body – steel, galvanised.

Safety release rod – aluminium.

Finish – chrome plated.

Note:

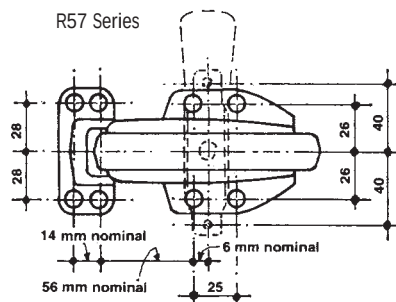
Lock will release from inside with padlock fitted.

Strike must be ordered separately.

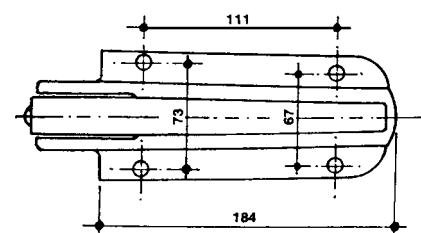


Cat. No.	Part No.	Description
233068	R5612-1A	Standard lock only
233069	R5612	Lock c/w Internal Release
233071	R5622	Strike 0-16mm Adjustable Offset
233064	R5623	Strike 16-32mm Adjustable Offset

R57 Series



R56 Series



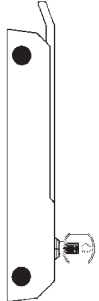
Refrigeration Hardware

Efco

Latches and Locks

R6188 Series

Edge Mounted 'Finger-Tip' Locks and Latches



Application

The R6188 Series can be used in many locations including refrigeration and hot cabinets, cold storage rooms and industrial refrigerators and freezers.

Operation

The edge mounted mechanical locking design, assures positive locking and sealing. It is designed to keep doors on multidoor installations firmly shut when adjacent doors are slammed. A finger-touch is all that's needed to release the catch.

Specifications

Lock:	R6188L fitted with positive cylinder lock and keyed to differ only.
Latch:	R6188N
Strike:	R6188AS Adjustable Strike. (Must be ordered separately).
Projection Adjustment:	5mm
Vertical Adjustment:	2mm
Material:	Zinc – machine cast
Finish:	Chrome plated
Screw Sizes:	Drilled and countersunk for 8 gauge or M5 metal thread screws.
Note:	Screws NOT supplied.

Safety

Simple internal emergency pressure release when door is closed, but not locked. Door may be opened with force of 70 Nm.



▼ Cat. No.	Part No.	Description
233002	R6188N	Latch w/o Strike (Non-Lockable)
233003	R6188L	Lock w/o Strike (Lockable)
233004	R6188AS	Adjustable Strike

R196 Series

Free Mounted Latches

Application

Designed for use inside cabinets.

Operation

Spring loaded roller, adjustable for spring tension.

See below for Part No. and spring strengths.

R1961 adjustable from 6.8 kg to 16.3 kg.

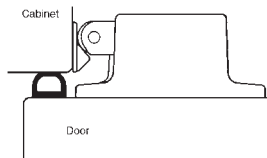
R1962 adjustable from 12.7 kg to 31.8 kg.

Specifications

Body and strike – zinc machine cast

Roller – nylon

Finish – chrome plated.



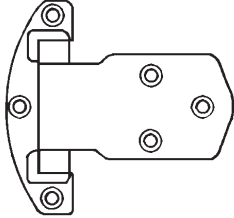
Cat. No.	Part No.	Spring Type	Description
233162	R1961	Light	Latch c/w Strike
233165	R1962	Heavy	

Refrigeration Hardware

Light and Medium Duty Hinges

Efco

R40 Series

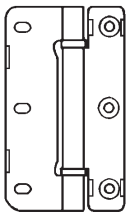


Features

- Designed for use on medium size offset cabinet doors
- Offset adjustable from 19mm to 25mm
- Body and flap – zinc machine cast
- Bushes – nylon
- Pin – steel, zinc plated
- Finish – chrome plated

Cat. No.	Part No.
233016	R40

R52 Series

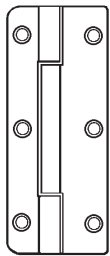


Features

- Designed for use on small refrigerator and cabinet doors
- Face to face mounting with optional covers for both blades to conceal fixing
- Hinge – steel
- Optional covers – brass
- Finish – chrome plated

▼ Cat. No.	Part No.	Description
233037	R52	Hinge less covers

4



R100 Series

Features

- Designed for use on refrigerator and cabinet doors
- Face to face fixing
- Flaps – brass
- Pin – steel
- Finish – chrome plated

Cat. No.	Part No.
233126	R100

Marget

M83 Series

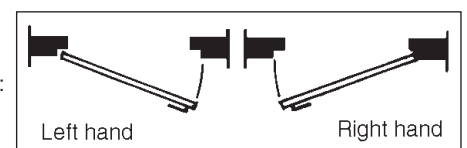


Features

- Designed for use on self service cabinets
- Self closing rising hinge. Opens to 180°
- Designed to close door from approximately 90°
- Hinge flaps – zinc machine cast
- Rising cams – delrin
- Finish – chrome plated

▼ Cat. No.	Part No.	Description
233201	M83 (LH)	Left Hand Hinge
233202	M83 (RH)	Right Hand Hinge
233168	B.P.S.	Back Packing Strip

Please state hand when ordering:



Refrigeration Hardware

Kason

Heavy Duty Locks and Strikes

For Commercial Coolrooms and Cold Stores

56 Series



Safeguard latch offers the ultimate in protection against accidental entrapment with an extra margin of safety. Specifically designed for the industry trend to lighter weight doors, this latch offers remarkable ease of operation combined with quality and durability.

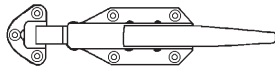
Specifications

Material: High pressure die-cast zinc body and strike housing, forged brass handle.

Finish: Chrome plated.

Cat. No.	Part No.	Description
233232	0056-H05020	Latch Only
233231	0056-005003	Offset Strike - Adjustable 19 to 38mm
233230	0056-005005	Offset Strike - Adjustable 45 to 63mm
2332311	0056-005002	Flush Strike

58 Series



Safeguard latch with radial tongue that rolls into closed position.

Specifications

Material: High pressure die-cast zinc.

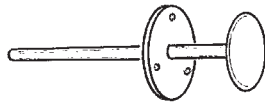
Finish: Chrome plated.

Cat. No.	Part No.	Description
233235	0058-L05021	Latch Only
233238	0058-005001	Flush Strike

Inside Release Handles

No. 481 Push Type Inside Release Handle

For use with 56 and 58 Series Latch



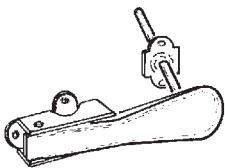
481

Specifications

Material: Steel rod and flange, safety-glow plastic knob. Finish: Kasonised.

No. 483 Paddle Type Inside Release Handle

For use with 56 Series Latch.



483

Specifications

Material: Steel.

Finish: Kasonised.

Cat. No.	Part No.	Description
233249	0481-A00600	Push Type – Inside Release Handle
233250	0483-000004	Paddle Type – Inside Release Handle

171 Series – Edge Mount Magnetic Latch

A powerful magnetic force assures positive, air-tight closure of refrigerator and freezer doors. With the latch body edge-mounted, the striker surface-mounted

and with maximum tolerances, installation is easy. Latch is adjustable 2 ways: vertically to compensate for door sag; horizontally to increase tension when gasket compresses.



Specifications

Material: High pressure die-cast zinc body and adjustment plate. Steel strike.

Finish: Highly polished chrome plated. Drilled and countersunk for No. 10 (5mm) screws. Removable plug allows simple on site cylinder lock conversion.

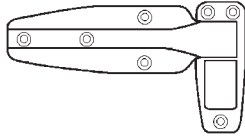
Cat. No.	Part No.
233228	0171-000004

Refrigeration Hardware

Kason

1245 Cam-Lift Reversible Hinges

The 1245 is a reversible self closing, rising hinge with a built-in 'dwell stop' designed to keep door open if swung beyond the 90° position. A lift-off feature allows door to be lifted off without removing hinges. Self-lubricating nylon cams give smooth, trouble-free door operation.



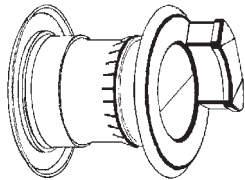
Specifications

Material: High pressure die-cast zinc.
 Finish: Chrome plated.
 Offsets: Flush and 29mm
 Weight: 2.7 kg per pair
 Drilled and countersunk for 6mm flat head screw.

Cat. No.	Part No.
233240	Flush 1245-000028
233241	Offset: 29mm 1245-000040

Nordon

Coolroom / Freezer Room Pressure Vents



Nordon Pressure Equalising Vents are designed for installation in freezer rooms which have a perfect seal around all wall panel joins and the door to wall gasket. The function of the vent is to allow a quick equalisation of the internal and external pressures which are created every time the door is opened.

When a person enters the room and closes the door a quantity of warm air is trapped in the room. As this air cools, the pressure in the room drops below that outside the room, making the door very difficult, if not impossible, to open until both pressures equalise.

Without a Pressure Relief Vent, equalisation may take some time and cause damage to the door gasket, unnecessary delays before entering or leaving the room, discomfort or even claustrophobia if delayed in the freezer room.

Function

The PRV102 has no mechanically moving parts to foul or seize, simply a flexible membrane. When a pressure difference occurs between the inside and outside of the freezer room, the membrane flexes, creating an opening allowing air to flow until the pressures equalise. When the pressure has equalised, the membrane closes.

Specifications

Wall Flanges: 158mm diameter
 Hole through Wall: 102mm diameter
 Telescoping design adapts to walls up to 150mm thick.
 Flexible polyurethane membrane opens with pressure change.
 The telescoping halves clip into wall panels, no screws or rivets.
 Anti-freeze heating element, low power input, 240 volt 8 watts.
 Air filter in vent tube.
 Larger rooms need multiple vents.

▼ Cat. No.	Part No.	Description
233355	PRV102	Pressure Relief Vent (Less Heater Cable)
233356	PRV Cable	Heater Cable: 8 Watt

External Room Size Metres	Internal Room Volume Cubic Metres	No. of Heated Vents 1° to -25°C
2 x 2 x 2.4	7	1
3 x 3 x 2.4	17	1
5 x 5 x 2.4	50	2
7 x 7 x 2.4	102	3
8 x 8 x 2.4	134	3
10 x 10 x 2.4	211	3
12 x 12 x 2.4	306	4

Refrigeration Door Gaskets

Extruded Rubber Gaskets



Cat. No.	Part No.
239018	5/RG32



Cat. No.	Part No.
240008	5/RG53

PVC Gaskets



Cat. No.	Part No.	Colour
240015	PVC32 B	Black
240017	PVC32 W	White



Cat. No.	Part No.	Colour
240016	PVC53 N	Natural

Coolroom Door Gaskets



Cat. No.	Part No.	Description
240024	CRS 13B25	2 Leg



Cat. No.	Part No.	Description
240034	RF2	2 Leg - 5mt Length



Cat. No.	Part No.	Description
240025	Windlace	Fabric covered Sponge rubber

Magnetic Door Gaskets



These magnetic Gaskets are used on the majority of modern domestic refrigerator doors.

- Replaces worn or damaged magnetic door gaskets
- Replaces obsolete locks and catches
- Suitable for other appliances where door locks or catches are not fitted

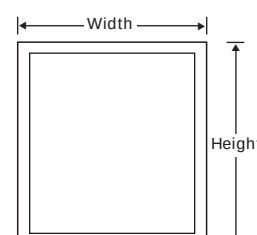
Comprises

A PVC gasket section in 3.96 metre lengths which become magnetic when the matching Magnetic Filler, also in 3.96 metre lengths, is inserted.

Cat No.	Brand	Description
240041	K-Weld	Magnetic Filler Only
240040		Magnetic Gasket Only

Magnetic Door Gasket Fabrication Service

We have special facilities for fabricating complete pre-joined Magnetic Door Gaskets to your specification quickly. All we require is a sketch or drawing showing the outside dimensions as illustrated below.



Thermal Insulation

Sista

General Purpose Foam



Non-shrinking, one component, flexible polyurethane foam for joining, mounting, filling, sealing. 600 grams yields up to 30 litres of cured foam. You can sand it, saw it, file it, paint it!

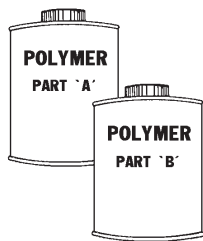
Read instructions on the can carefully. Avoid skin and eye contact – we recommend wearing protective gloves during application.

Cat. No.	Part No.	Size
242003	213376	600 gram

Polymer

Polyurethane Pouring Foam

Self Extinguishing Rigid Foam for Buoyancy, Insulation, etc



The material is supplied in two cans marked A and B. When mixed together in equal proportions foaming occurs, and produces a closed cell structure which sets to form a rigid polyurethane foam of approximate density of 32 to 36 kg/m³ ie. each cubic metre of foam will produce 27.3 kg buoyancy. The foam is not affected by water, oil or petrol. Polyester resin may be applied directly to it, thus making fibre-glassing a simple operation, or paints and adhesives may be used on the set foam.

Originally designed for low temperature insulation, the closed cells also make it ideal for use as a buoyancy material, cores in light weight sandwich construction, potting and encapsulation of electric and electronic components, reinforcement, void filling, wreath rings, models, etc. It has also found great use in the making of stage props, because of its strength and lightness. Adhesion to metals, wood and many plastics is excellent.

Application	Panel Thickness: mm	Final Density: kg/m ³	Free Rising Density: kg/m ³
Refrigerators	25 to 38	43 to 51	32
Freezers	50 to 70	38 to 45	
Building Panels	38 to 60	51 to 58	

Cat. No.	Part No.	Kit Size (2 Part Mix)
242022	AU20/01	1 kg
242023	AU20/02	2 kg
242024	AU20/04	4 kg
242025	AU20/50	50 kg

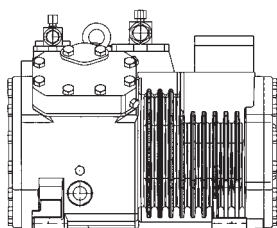
Compressors

Bitzer

Accessible Hermetic – OCTAGON® Series

For R404A, R507, R22, R407C and R134a

The Bitzer OCTAGON® Series of reciprocating accessible hermetic compressors features a range of compact models from 0.7 to 15 kW nominal motor power.



Standard Features

- Polyolester oil charge standard (Mineral oil charge available on request)
- Splash feed lubrication
- Crankcase heater fitted
- Electronic thermal motor protection
- Terminal box enclosure class IP65
- Integrated VARICOOL option for suction gas cooling or direct suction with external air cooling
- 4 cylinder models supplied with one head prepared for capacity control
- Power supply: 380-420 Volt, 3 Ph, 50 Hz

Optional Features

- Discharge gas temperature control device
- Additional cooling fan
- Solenoid valve assembly for capacity control on 4 cylinder models

Cat. No.	Model	Motor Nominal HP/kW	Displ. @ 1450 rpm m³/hr	No. of Cyls.	Oil Charge Litres	Weight kg	Connections		Cap. Cont. (Opt.)
							Disch. Valve	Suct. Valve	
250030	2HC-1.2Y	1/0.7	6.51	2	1	44	1½"	⅝"	N/A
250031	2HC-2.2Y	1.5/1.1				45			
250032	2GC-2.2Y	1.5/1.1	7.58	2	1	45	1½"	⅝"	
250033	2FC-2.2Y	1.5/1.1	9.54	2	1	45	1½"	⅝"	
250034	2FC-3.2Y	1.8/1.3				47			
250035	2EC-2.2Y	2/1.5	11.36	2	1.5	67.5	⅝"	⅞"	
250036	2EC-3.2Y	3/2.2				70.5			
250037	2DC-2.2Y	2/1.5	13.42	2	1.5	67.5	⅝"	⅞"	
250038	2DC-3.2Y	3/2.2				70.5			
250039	2CC-3.2Y	3/2.2	16.24	2	1.5	70	⅝"	⅞"	
250040	2CC-4.2Y	4/3				70			
250041	4FC-3.2Y	3/2.2	18.05	4	2	82	⅝"	⅞"	50%
250042	4FC-5.2Y	5.5/4				86			
250043	4EC-4.2Y	4/3	22.72	4	2	84	⅝"	1½"	
250044	4EC-6.2Y	5.5/4				86			
250045	4DC-5.2Y	5.5/4	26.84	4	2	85.5	⅞"	1½"	
250046	4DC-7.2Y	7.5/5.5				88.5			
250047	4CC-6.2Y	7.5/5.5	32.48	4	2	90.5	⅞"	1½"	
250048	4CC-9.2Y	9/7	32.48	4	2	90.5	⅞"	1½"	
250049	4VC-6.2Y	6/4	34.7	4	2.6	132	⅞"	1½"	
250050	4VC-10.2Y	10/7.5	34.7	4	2.6	141	⅞"	1½"	
250051	4TC-8.2Y	8/5.5	41.3	4	2.6	137	1½"	1⅜"	
250052	4TC-12.2Y	12/9.2	41.3	4	2.6	14.4	1½"	1⅜"	
250053	4PC-10.2Y	10/7.5	48.5	4	2.6	142	1½"	1⅜"	
250054	4PC-15.2Y	15/11	48.5	4	2.6	150	1½"	1⅝"	
250055	4NC-12.2Y	12/9.2	56.2	4	2.6	144	1½"	1⅝"	
250056	4NC20.2Y	20/15	56.2	4	2.6	153	1½"	1⅝"	

Refer to following pages for refrigeration capacities and power consumption.

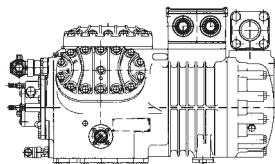
Compressors

Bitzer

Accessible Hermetic – 4 and 6 Cylinder Series

For R404A, R507, R22, R407C and R134a

The Bitzer 4 and 6 Series Second Generation range of reciprocating accessible hermetic standard compressors have efficient and robust design features for operation with the new chlorine free refrigerants. A range of models from 9.5 to 37 kW nominal motor power.



Standard Features

- Polyolester oil charge standard (Mineral oil available on request)
- Oil pump lubrication
- Crankcase heater fitted
- Electronic thermal motor protection
- Terminal box enclosure class IP54
- Oil pressure safety control
- 4 & 6 cylinder models supplied with one head prepared for capacity control
- Power Supply: 380 - 420 Volt, 3Ph, 50 Hz, part winding start

Optional Features

- Motor protection device with additional functions, INT 389
- Discharge gas temperature control device
- Solenoid valve assembly for capacity control
- Additional cooling fan

Cat. No.	Model	Motor Nominal HP/kW	Displ. @ 1450 rpm m³/hr	No. of Cyls.	Oil Charge Litres	Weight kg	Connections		Cap. Cont. (Opt.)
							Disch. Valve	Suct. Valve	
250090 250091	4J-13.2Y 4J-22.2Y	13/9.5 22/16	63.5	4	4	179 190	1½"	1⅝"	50%
250092 250093	4H-15.2Y 4H-25.2Y	15/11 25/18.5	73.6	4	4 4.5	183 203	1½"	1⅝" 2¼"	
250094 250095	4G-20.2Y 4G-30.2Y	20/15 30/22	84.5	4	4.5	192 206	1½"	2¼"	
250096 250097	6J-22.2Y 6J-33.2Y	22/16 33/24	95.3	6	4.75	213 213	1¾"	2¼"	33% Altern. 66%
250098 250099	6H-25.2Y 6H-35.2Y	25/18.5 35/26	110.5	6	4.75	224 235	1¾"	2¼"	
250100 250101	6G-30.2Y 6G-40.2Y	30/22 40/30	126.8	6	4.75	228 238	1¾"	2¼"	
250102 250103	6F-40.2Y 6F-50.2Y	40/30 50/37	151.6	6	4.75	239 241	1⅝"	2¼"	

Refer to following pages for refrigeration capacities and power consumption.

Compressors

Bitzer

R404A / R507 Accessible Hermetic

Refrigeration Capacities in Watts = Q Power Consumption in kW = P

Model	Cond. Temp. °C	▼ Q= Watts P = kW	Evaporating Temperature: °C											
			7.5	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
2HC-1.2Y*	40	Q				4210	3420	2740	2160	1670	1250	900	610	345
	50	P				1.66	1.54	1.42	1.28	1.12	0.97	0.8	0.65	0.49
2HC-2.2Y*	40	Q	6760	6170	5120	4210	3420	2740	2160	1670	1250			
	50	P	1.8	1.75	1.68	1.6	1.5	1.39	1.27	1.13	0.99			
2GC-2.2Y*	40	Q	5510	5040	4190	3430	2780	2210	1730	1320	960	1080	750	475
	50	P	2.14	2.08	1.96	1.84	1.69	1.53	1.36	1.18	0.99	0.96	0.77	0.57
2FC-2.2Y*	40	Q	7870	7200	5980	4920	4010	3220	2540	1980	1490	1080	750	475
	50	P	2.07	2.05	1.97	1.87	1.74	1.62	1.47	1.32	1.14	0.96	0.77	0.57
2FC-3.2Y*	40	Q	6430	5880	4900	4020	3270	2610	2050	1570	1160	825	545	
	50	P	2.44	2.39	2.26	2.12	1.96	1.78	1.59	1.39	1.17	0.95	0.72	
2EC-2.2Y*	40	Q				6090	4960	3990	3160	2460	1860	1370	960	640
	50	P				2.36	2.19	2	1.8	1.59	1.36	1.14	0.92	0.71
2EC-3.2Y*	40	Q	9720	8890	7390	6090	4960	3990	3160	2460	1860			
	50	P	2.56	2.51	2.39	2.27	2.13	1.98	1.8	1.61	1.42			
2DC-2.2Y*	40	Q	7870	7200	5980	4910	3990	3180	2510	1930	1430			
	50	P	3.04	2.96	2.79	2.61	2.41	2.17	1.93	1.68	1.42			
2DC-3.2Y*	40	Q				7360	6030	4870	3860	3030	2320	1700	1160	700
	50	P				2.84	2.64	2.42	2.17	1.91	1.66	1.39	1.08	0.75
2CC-3.2Y*	40	Q	11700	10680	8890	7360	6030	4870	3860	3030	2320	1210	750	
	50	P	3.04	3	2.9	2.76	2.58	2.38	2.16	1.92	1.68	1.28	0.91	
2DC-4.2Y*	40	Q	9400	8620	7190	5930	4830	3870	3030	2330	1740			
	50	P	3.6	3.52	3.33	3.1	2.85	2.58	2.28	1.98	1.67			
2CC-4.2Y*	40	Q				8740	7160	5790	4630	3630	2780	2030	1380	830
	50	P				3.24	3.05	2.81	2.54	2.26	1.97	1.64	1.28	0.92
4FC-3.2Y*	40	Q	13740	12600	10560	8740	7160	5790	4630	3630	2780			
	50	P	3.52	3.48	3.37	3.23	3.04	2.8	2.54	2.26	1.98			
4EC-4.2Y*	40	Q	11190	10280	8610	7120	5820	4700	3720	2870	2110			
	50	P	4.19	4.1	3.91	3.66	3.37	3.05	2.72	2.38	2			
4FC-5.2Y*	40	Q				10700	8790	7120	5690	4440	3380	2510	1730	1060
	50	P				3.98	3.71	3.4	3.06	2.67	2.26	1.88	1.44	1
4EC-5.2Y*	40	Q	17520	16050	13340	11030	9020	7260	5760	4460	3380	1830	1120	
	50	P	4.44	4.39	4.22	4.01	3.75	3.46	3.13	2.77	2.38	1.81	1.25	
4FC-6.2Y*	40	Q	14040	12830	10710	8890	7270	5840	4620	3560	2610			
	50	P	5.32	5.18	4.88	4.54	4.16	3.76	3.36	2.92	2.43			
4EC-6.2Y*	40	Q				12320	9970	8010	6340	4920	3730	2780	1960	1290
	50	P				4.48	4.15	3.79	3.41	3	2.56	2.15	1.71	1.28
4FC-7.2Y*	40	Q	19930	18290	15060	12320	9970	8010	6340	4920	3730	2120	1410	
	50	P	4.8	4.79	4.62	4.37	4.07	3.73	3.37	2.98	2.56	2.12	1.6	
4EC-7.2Y*	40	Q	16410	14870	12380	10020	8060	6400	5030	3880	2920	2120	1410	
	50	P	5.72	5.56	5.3	4.88	4.45	3.99	3.55	3.09	2.62	2.14	1.6	
4EC-8.2Y*	40	Q				15360	12490	10050	7980	6230	4780	3580	2540	1700
	50	P				5.35	5	4.59	4.16	3.69	3.22	2.74	2.2	1.67
4EC-9.2Y*	40	Q				12320	10020	8080	6390	4950	3760	2760	1910	
	50	P				6.05	5.52	4.98	4.44	3.9	3.35	2.79	2.2	

*Capacities are based on European Standard EN 12900 at 50 Hz with 20°C suction gas temperature, without liquid subcooling, evaporating and condensing temperatures correspond to "dew" point conditions (saturated vapour).

 Denotes additional cooling requirement.

Compressors

Bitzer

R404A / R507 Accessible Hermetic – OCTAGON® Series

Refrigeration Capacities in Watts = Q Power Consumption in kW = P

Model	Cond. Temp. °C	Q= Watts P = kW	Evaporating Temperature: °C											
			7.5	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
4EC-6.2Y*	40	Q	24700	22550	18710	15360	12490	10050	7980	6230	4780			
	50	P	5.86	5.81	5.65	5.36	5.01	4.6	4.17	3.69	3.22			
4DC-5.2Y*	40	Q	19790	18110	15010	12320	10020	8080	6390	4950	3760			
	50	P	7.01	6.86	6.49	6.03	5.52	4.99	4.44	3.9	3.35			
4DC-7.2Y*	40	Q				18670	15180	12170	9640	7530	5760	4220	3020	2040
	50	P				6.63	6.17	5.65	5.08	4.49	3.87	3.22	2.62	2.03
4CC-6.2Y*	40	Q	29200	26850	22500	18670	15180	12170	9640	7530	5760			
	50	P	6.91	6.93	6.81	6.55	6.11	5.6	5.06	4.48	3.89			
4CC-9.2Y*	40	Q	24100	22100	18470	15140	12300	9860	7740	5960	4470			
	50	P	8.21	8.09	7.77	7.31	6.78	6.18	5.5	4.78	4.04			
4VC-6.2Y*	40	Q				22050	18010	14550	11570	9030	7020	5220	3680	2430
	50	P				7.92	7.37	6.74	6.04	5.32	4.66	3.96	3.2	2.46
4VC-10.2Y*	40	Q	32841	30161	25322	22050	18010	14550	11570	9030	7020	5220	3680	2430
	50	P	8.35	8.27	8.01	7.92	7.37	6.74	6.04	5.32	4.66	3.96	3.2	2.46
4TC-8.2Y*	40	Q	27056	24864	20882	17230	14080	11370	9080	7130	5430	4000	2750	
	50	P	9.80	9.62	9.16	8.6	7.86	7.07	6.3	5.54	4.74	3.96	3.15	
4TC-12.2Y*	40	Q				22750	18670	15140	12090	9470	7230	5320	3720	2380
	50	P				8.12	7.45	6.76	6.03	5.28	4.52	3.74	2.95	2.15
4PC-10.2Y*	40	Q	36100	33100	27600	22850	18720	15120	12020	9350	7060	5120	3490	
	50	P	8.71	8.54	8.15	7.67	7.13	6.51	5.84	5.13	4.37	3.57	2.75	
4NC-12.2Y*	40	Q	29400	26950	22450	18500	15060	12080	9500	7290	5400	3800	2470	
	50	P	10.05	9.74	9.09	8.40	7.66	6.90	6.09	5.26	4.39	3.50	2.57	
4PC-15.2Y*	40	Q				27750	22800	18480	14760	11560	8830	6520	4580	2960
	50	P				9.86	9.05	8.20	7.34	6.46	5.57	4.66	3.74	2.81
4NC-20.2Y*	40	Q	43500	39850	33300	27550	22600	18260	14530	11330	8590	6280	4330	
	50	P	10.71	10.51	10.01	9.42	8.75	8.00	7.19	6.34	5.44	4.52	3.59	
4PC-20.2Y*	40	Q	35400	32400	27050	22350	18240	14660	11570	8900	6620	4680	3050	
	50	P	12.37	12.00	11.21	10.36	9.46	8.52	7.54	6.52	5.47	4.40	3.30	
4NC-25.2Y*	40	Q				32300	26500	21500	17130	13400	10220	7520	5240	3350
	50	P				11.43	10.51	9.53	8.50	7.45	6.38	5.31	4.26	3.24
4NC-30.2Y*	40	Q				21500	17280	13660	10550	7890	5640	3760		
	50	P				11.31	10.09	8.83	7.56	6.31	5.08	3.90		
4NC-35.2Y*	40	Q	52200	47800	39900	33000	27050	21850	17340	13470	10170	7360	4990	
	50	P	12.50	12.21	11.56	10.84	10.04	9.18	8.26	7.28	6.25	5.17	4.05	
4NC-40.2Y*	40	Q	42550	39000	32500	26800	21800	17480	13730	10500	7730	5380	3400	
	50	P	14.34	13.83	12.82	11.80	10.76	9.70	8.60	7.45	6.24	4.97	3.63	
4NC-45.2Y*	40	Q				37000	30350	24600	19650	15390	11760	8680	6100	3950
	50	P				13.39	12.31	11.14	9.93	8.68	7.42	6.19	4.99	3.87
4NC-50.2Y*	40	Q				24650	19850	15700	12130	9070	6480	4300		
	50	P				13.26	11.81	10.34	8.88	7.42	5.99	4.59		
4NC-55.2Y*	40	Q	60600	55500	46300	38250	31250	25200	19980	15500	11680	8450	5740	
	50	P	14.98	14.66	13.88	12.97	11.94	10.83	9.64	8.42	7.18	5.94	4.74	
4NC-60.2Y*	40	Q	49450	45300	37700	31050	25250	20250	15880	12150	8970	6280	4030	
	50	P	17.04	16.45	15.25	14.00	12.71	11.38	10.02	8.63	7.21	5.77	4.31	

*Capacities are based on European Standard EN 12900 at 50 Hz with 20°C suction gas temperature, without liquid subcooling, evaporating and condensing temperatures correspond to "dew" point conditions (saturated vapour).

Denotes additional cooling requirement.

Compressors

Bitzer

R404A / R507 Accessible Hermetic

Refrigeration Capacities in Watts = Q Power Consumption in kW = P

Model	Cond. Temp. °C	▼ Q= Watts P = kW	Evaporating Temperature: °C											
			7.5	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
4J-13.2Y*	40	Q				42800	35250	28700	23000	18150	14000	10470	7500	5020
	50	P				15.16	14.08	12.90	11.62	10.27	8.87	7.44	6.00	4.57
4J-22.2Y*	40	Q	67100	61500	51500	42700	35100	28500	22800	17870	13670	10110	7120	
	50	P	16.36	16.12	15.49	14.67	13.69	12.59	11.37	10.08	8.74	7.37	6.02	
4H-15.2Y*	40	Q	55900	51300	42900	35550	29100	23550	18730	14590	11060	8070	5560	
	50	P	19.41	18.93	17.85	16.62	15.26	13.81	12.28	10.71	9.12	7.54	6.00	
4H-25.2Y*	40	Q				49850	41150	33600	27100	21500	16730	12660	9240	6380
	50	P				18.16	16.80	15.34	13.82	12.25	10.65	9.05	7.47	5.93
4G-20.2Y*	40	Q	77400	71000	59500	49400	40650	33000	26450	20800	15930	11800	8320	
	50	P	19.56	19.22	18.37	17.32	16.11	14.76	13.31	11.78	10.20	8.60	7.00	
4G-30.2Y*	40	Q	64500	59100	49500	41000	33600	27200	21600	16830	12740	9260	6340	
	50	P	22.78	22.18	20.84	19.33	17.71	15.98	14.18	12.34	10.49	8.65	6.86	
4G-20.2Y*	40	Q				57200	47300	38700	31200	24800	19250	14540	10540	7160
	50	P				20.94	19.36	17.68	15.93	14.13	12.30	10.47	8.65	6.89
4G-30.2Y*	40	Q	89100	81800	68600	57000	47000	38250	30700	24200	18610	13860	9850	
	50	P	23.37	22.88	21.73	20.38	18.88	17.26	15.56	13.81	12.06	10.33	8.68	
6J-22.2Y*	40	Q	74300	68200	57100	47400	38900	31500	25100	19580	14840	10810	7410	
	50	P	27.01	26.20	24.46	22.58	20.60	18.56	16.50	14.45	12.45	10.54	8.76	
6J-33.2Y*	40	Q				63800	52600	42800	34350	27100	20900	15640	11210	7510
	50	P				22.91	21.24	19.43	17.48	15.45	13.34	11.19	9.03	6.88
6J-33.2Y*	40	Q	101500	93000	77700	64300	52700	42600	33900	26400	20050	14640	10110	
	50	P	24.30	23.90	22.90	21.60	20.10	18.34	16.46	14.45	12.35	10.19	8.00	
6H-25.2Y*	40	Q	84400	77400	64600	53300	43550	35050	27700	21400	16040	11500	7700	
	50	P	28.00	27.40	25.80	24.00	22.00	19.80	17.48	15.08	12.65	10.25	7.91	
6H-35.2Y*	40	Q				74700	61600	50200	40400	31900	24700	18590	13440	9130
	50	P				27.20	25.18	23.00	20.68	18.28	15.82	13.36	10.92	8.54
6H-35.2Y*	40	Q	116300	106600	86300	74100	60900	49450	39600	31100	23800	17670	12480	
	50	P	29.81	29.20	27.79	26.14	24.30	22.29	20.14	17.88	15.53	13.13	10.71	
6G-30.2*	40	Q	96600	88600	74100	61400	50400	40700	32400	25250	19160	14000	9670	
	50	P	34.17	33.23	31.19	28.96	26.56	24.04	21.41	18.71	15.96	13.20	10.45	
6G-40.2Y*	40	Q				84000	69300	56600	45550	36050	27900	21000	15130	10210
	50	P				30.86	28.50	26.00	23.38	20.68	17.90	15.07	12.21	9.34
6G-40.2Y*	40	Q	133400	122400	102700	85400	70300	57300	46000	36300	28000	20900	14940	
	50	P	35.49	34.61	32.70	30.62	28.38	26.02	23.54	20.96	18.30	15.57	12.80	
6F-40.2Y*	40	Q	110800	101800	85400	70900	58300	47350	37800	29550	22500	16450	11330	
	50	P	40.19	38.97	36.42	33.73	30.91	27.99	24.99	21.92	18.79	15.63	12.46	
6F-50.2Y*	40	Q				100900	83100	67600	54300	42800	32950	24600	17570	11680
	50	P				36.00	33.43	30.59	27.55	24.36	21.06	17.73	14.40	11.14
6F-50.2Y*	40	Q	157900	145000	121700	101300	83600	68300	55000	43600	33850	25600	18620	
	50	P	43.13	42.10	39.80	37.22	34.43	31.47	28.40	25.28	22.15	19.09	16.14	
6F-50.2Y*	40	Q	131000	120200	100800	83800	68900	56000	44800	35150	26950	19960	14090	
	50	P	49.80	48.21	44.85	41.30	37.60	33.83	30.02	26.24	22.53	18.97	15.59	

*Capacities are based on European Standard EN 12900 at 50 Hz with 20°C suction gas temperature, without liquid subcooling, evaporating and condensing temperatures correspond to "dew" point conditions (saturated vapour).

Denotes additional cooling requirement.

Compressors

Bitzer

R22 Accessible Hermetic

Refrigeration Capacities in Watts = Q Power Consumption in kW = P

Model	Cond. Temp. °C	▼ Q = Watts P = kW	Evaporating Temperature: °C						
			12.5	10	7.5	5	0	-5	-10
2HC-1.2*	40	Q						3880	3120
	50	P						1.39	1.29
2HC-2.2*	40	Q	7710	7030	6400	5810	4770	3880	3120
	50	P	1.61	1.6	1.58	1.55	1.49	1.41	1.31
2GC-2.2*	40	Q	6660	6070	5530	5020	4110	3340	2670
	50	P	1.94	1.91	1.86	1.82	1.72	1.6	1.47
2FC-2.2*	40	Q	9000	8210	7480	6800	5590	4560	3680
	50	P	1.8	1.79	1.79	1.77	1.72	1.65	1.56
2FC-3.2*	40	Q	7790	7110	6480	5890	4850	3950	3190
	50	P	2.19	2.16	2.12	2.08	1.97	1.85	1.72
2EC-2.2*	40	Q						2270	4510
	50	P						2	1.86
2EC-3.2*	40	Q	10830	9900	9040	8240	6800	5570	4510
	50	P	2.26	2.25	2.23	2.2	2.12	2.02	1.89
2DC-2.2*	40	Q	9450	8630	7870	7160	5890	4800	3870
	50	P	2.76	2.71	2.65	2.59	2.46	2.3	2.13
2DC-3.2*	40	Q						6670	5400
	50	P						2.38	2.19
2CC-3.2*	40	Q	12950	11880	10885	9890	8180	6670	5400
	50	P	2.52	2.56	2.56	2.56	2.48	2.35	2.18
2CC-4.2*	40	Q	11320	10320	9390	8460	6870	5530	4390
	50	P	3.27	3.2	3.1	3.01	2.76	2.51	2.3
4FC-3.2*	40	Q						8010	6460
	50	P						2.76	2.56
4EC-4.2*	40	Q	15590	14290	13075	11860	9760	8010	6460
	50	P	2.89	2.93	2.93	2.93	2.83	2.7	2.5
4FC-5.2*	40	Q	13670	12400	11300	10200	8250	6630	5250
	50	P	3.76	3.67	3.57	3.46	3.17	2.88	2.64
4EC-2.2*	40	Q						9960	8080
	50	P						3.3	3.06
4EC-3.2*	40	Q	19190	17610	16130	14650	12090	9960	8080
	50	P	3.58	3.63	3.63	3.62	3.5	3.32	3.08
4EC-4.2*	40	Q	16690	15230	13890	12550	10220	8240	6570
	50	P	4.62	4.53	4.39	4.26	3.91	3.55	3.24
4EC-5.2*	40	Q						11200	9020
	50	P						3.79	3.49
4EC-6.2*	40	Q	22100	20150	18420	16690	13700	11200	9020
	50	P	4.01	4.04	4.03	4.01	3.86	3.66	3.38
4EC-7.2*	40	Q	19360	17640	16050	14460	11740	9430	7450
	50	P	5.21	5.09	4.93	4.77	4.38	3.99	3.62
4EC-8.2*	40	Q						13910	11240
	50	P						4.58	4.26
4EC-9.2*	40	Q						11510	9140
	50	P						4.89	4.48

*Capacities are based on European Standard EN 12900 at 50 Hz with 20°C suction gas temperature, without liquid subcooling, evaporating and condensing temperatures correspond to "dew" point conditions (saturated vapour).

Compressors

Bitzer

R22 Accessible Hermetic

Refrigeration Capacities in Watts = Q Power Consumption in kW = P

Model	Cond. Temp. °C	▼ Q = Watts P = kW	Evaporating Temperature: °C						
			12.5	10	7.5	5	0	-5	-10
4EC-6.2*	40	Q	27000	24750	22650	20550	16930	13910	11240
		P	4.85	4.91	4.91	4.9	4.75	4.51	4.19
	50	Q	23650	21500	19595	17690	14320	11510	9140
4DC-5.2*	40	Q	6.3	6.15	5.97	5.8	5.3	4.82	4.42
		P						16860	13610
	50	Q						5.6	5.19
4DC-7.2*	40	Q						14200	11250
		P						6.1	5.57
	50	Q	32800	30050	27500	24950	20550	16860	13610
4DC-7.2*	40	P	5.82	5.9	5.89	5.88	5.7	5.42	5.03
		Q	28650	26100	23825	21550	17620	14200	11250
	50	P	7.53	7.38	7.18	6.99	6.45	5.89	5.39
4CC-6.2*	40	Q						20200	16410
		P						6.52	6.03
	50	Q						16960	13520
4CC-9.2*	40	Q						7.06	6.44
		P	38872	35638	36618	29797	24703	20200	16410
	50	Q	7.45	7.42	7.36	7.26	7.00	6.52	6.03
4VC-6.2*	40	Q	34256	31353	28638	26098	21504	16960	13520
		P	9.27	9.05	8.82	8.57	8.06	7.06	6.44
	50	Q						22200	18130
4VC-10.2*	40	Q						6.89	6.38
		P						19200	15610
	50	Q						7.74	7.06
4VC-10.2*	40	Q	42200	38750	35500	32500	27000	22250	18110
		P	7.41	7.38	7.32	7.23	6.97	6.61	5.66
	50	Q	36850	33800	30950	28250	23400	19190	15530
4TC-8.2*	40	Q	8.99	8.83	8.65	8.44	7.97	7.43	6.82
		P						27100	22100
	50	Q						8.39	7.77
4TC-12.2*	40	Q						23400	19040
		P						9.40	8.58
	50	Q	50800	46600	42700	39100	32500	26800	21850
4PC-10.2*	40	Q	9.07	9.03	8.95	8.84	8.52	8.09	7.56
		P	44400	40700	37250	34050	28200	23150	18770
	50	Q	11.07	10.87	10.64	10.38	9.80	9.13	8.39
4PC-15.2*	40	Q						31400	25650
		P						9.74	9.03
	50	Q						27250	22150
4NC-12.2*	40	Q						10.92	9.94
		P	60900	55800	51100	46750	38850	31950	25950
	50	Q	10.65	10.57	10.45	10.29	9.88	9.35	8.72
4NC-20.2*	40	Q						36500	29750
		P						11.61	10.76
	50	Q						32300	26200
4NC-20.2*	40	Q						13.22	12.04
		P	70600	64800	59300	54200	45000	37000	30100
	50	Q	13.15	13.02	12.85	12.63	12.06	11.34	10.51
4NC-20.2*	40	Q	61900	56700	51900	47400	39250	32150	26000
		P	15.74	15.40	15.01	14.59	13.65	12.60	11.46

*Capacities are based on European Standard EN 12900 at 50 Hz with 20°C suction gas temperature, without liquid subcooling, evaporating and condensing temperatures correspond to "dew" point conditions (saturated vapour).

Compressors

Bitzer

R22 Accessible Hermetic

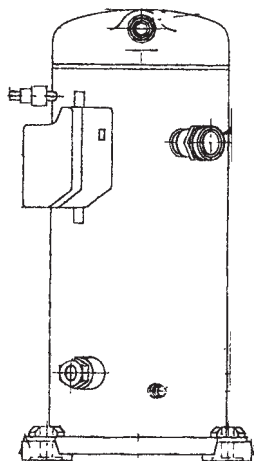
Refrigeration Capacities in Watts = Q Power Consumption in kW = P

Model	Cond. Temp. °C	Q = Watts P = kW	Evaporating Temperature: °C						
			12.5	10	7.5	5	0	-5	-10
4J-13.2*	40	Q P						40750 12.86	33150 11.91
	50	Q P						35950 14.74	29100 13.51
4J-22.2*	40	Q P	78200 14.48	71700 14.24	65700 13.97	60000 13.68	49900 13.01	41000 12.24	33350 11.36
	50	Q P	69600 16.90	63800 16.56	58300 16.19	53300 15.79	44150 14.90	36200 13.90	29300 12.79
4H-15.2*	40	Q P						46850 14.91	38100 13.81
	50	Q P						41700 17.11	33700 15.67
4H-25.2*	40	Q P	89700 16.75	82300 16.47	75400 16.16	68900 15.82	57300 15.05	47150 14.17	38350 13.18
	50	Q P	80500 19.56	73800 19.16	67600 18.74	61700 18.27	51100 17.25	41950 16.10	33950 14.83
4G-20.2*	40	Q P						53700 17.39	43700 16.04
	50	Q P						47800 20.10	38750 18.40
4G-30.2*	40	Q P	103000 19.78	94500 19.46	86500 19.09	79100 18.68	65700 17.74	54000 16.67	44000 15.49
	50	Q P	92300 23.40	84600 22.90	77400 22.30	70700 21.70	58600 20.40	48100 19.04	39000 17.57
6J-22.2*	40	Q P						61200 19.29	49750 17.87
	50	Q P						54000 22.10	43650 20.30
6J-33.2*	40	Q P	117400 21.70	107600 21.40	98600 21.00	90100 20.50	74800 19.53	61600 18.36	50100 17.05
	50	Q P	104400 25.40	95700 24.90	87600 24.30	80000 23.70	66300 22.40	54300 20.90	43950 19.20
6H-25.2*	40	Q P						70300 22.40	57200 20.70
	50	Q P						62600 25.60	50600 23.50
6H-35.2*	40	Q P	134600 25.20	123500 24.70	113200 24.30	103500 23.70	86000 22.60	70800 21.30	57600 19.78
	50	Q P	120900 29.40	110800 28.80	101400 28.10	92700 27.40	76800 25.90	63000 24.20	51000 22.30
6G-30.2*	40	Q P						80600 26.10	65600 24.10
	50	Q P						71700 30.10	58200 27.60
6G-40.2*	40	Q P	154600 29.70	141800 29.20	129800 28.60	118600 28.00	98500 26.60	81100 25.00	66000 23.20
	50	Q P	138500 35.20	127000 34.40	116200 33.50	106100 32.60	88000 30.70	72200 28.60	58500 26.40
6F-40.2*	40	Q P						95300 31.90	77700 29.50
	50	Q P						85100 36.40	69200 33.50
6F-50.2*	40	Q P	181700 37.60	166700 36.90	152800 36.10	139800 35.20	116300 33.30	95900 31.30	78300 29.00
	50	Q P	163200 43.00	149700 42.10	137100 41.10	125300 40.10	104100 37.90	85700 35.50	69700 32.80

*Capacities are based on European Standard EN 12900 at 50 Hz with 20°C suction gas temperature, without liquid subcooling, evaporating and condensing temperatures correspond to "dew" point conditions (saturated vapour).

Compressors

Copeland Scroll Compressors



ZF Series R404A

For Refrigeration Applications

Copeland now brings the advantage of scroll technology - higher efficiency, superior sound performance and unmatched reliability potential to more models. Each model employs the axial and radial compliance for which Copeland Scroll is famous, making it the most efficient hermetic compressor in its class.

Features

- Ultra high efficiency
- Fewer moving parts
- Rugged design and proven durability
- Compliance feature offers unprecedented liquid handling capability
- Five decibels quieter than piston compressors
- Very low gas pulsation
- Internal motor protection with start winding protection on single phase models

Cat. No.	Model	Cond. Temp. °C	Evaporating Temperature: °C kW @ 20°C Suction Gas Return										
			-40	-35	-30	-25	-20	-15	-10	-5	0	5	7
256050	ZF09K4E-TFD-550	Q 40	1.54	1.95	2.42	2.97	3.62	4.37	5.24	6.25	7.41	8.73	9.31
		50	1.32	1.67	2.07	2.53	3.07	3.69	4.43	5.28	6.23	7.40	7.89
		P 40	1.78	1.79	1.81	1.86	1.93	2.01	2.11	2.22	2.34	2.48	2.53
		50	2.17	2.17	2.19	2.22	2.28	2.35	2.44	2.54	2.66	2.79	2.85
256051	ZF11KE-TFD-550	Q 40	1.95	2.46	3.04	3.72	4.51	5.43	6.51	7.77	9.23	10.90	11.63
		50	1.66	2.10	2.59	3.16	3.81	4.59	5.50	6.56	7.80	9.24	9.88
		P 40	2.14	2.16	2.20	2.27	2.35	2.46	2.58	2.71	2.87	3.03	3.10
		50	2.54	2.56	2.61	2.68	2.76	2.86	2.98	3.11	3.25	3.41	3.48
256052	ZF13K4E-TFD-551	Q 40	2.19	2.78	3.48	4.31	5.27	6.38	7.66	9.11	10.76	12.61	13.41
		50	1.94	2.40	2.95	3.62	4.42	5.35	6.44	7.70	9.14	10.77	11.48
		P 40	2.27	2.33	2.41	2.49	2.59	2.70	2.83	2.97	3.13	3.30	3.37
		50	2.78	2.85	2.93	3.02	3.12	3.23	3.35	3.48	3.62	3.78	3.85
256053	ZF15K4E-TFD-551	Q 40	2.66	3.42	4.29	5.30	6.47	7.84	9.43	11.26	13.37	15.76	16.81
		50	2.36	2.95	3.64	4.44	5.40	6.53	7.86	9.41	11.22	13.31	14.22
		P 40	2.68	2.82	2.95	3.09	3.24	3.41	3.60	3.80	4.04	4.30	4.41
		50	3.26	3.42	3.58	3.73	3.90	4.07	4.25	4.45	4.67	4.92	5.02
256054	ZF18K4E-TFD-551	Q 40	3.29	4.17	5.18	6.34	7.70	9.30	11.17	13.36	15.91	18.84	20.13
		50	2.81	3.57	4.41	5.38	6.50	7.83	9.40	11.25	13.42	15.94	17.06
		P 40	3.29	3.40	3.53	3.67	3.83	4.00	4.18	4.38	4.59	4.82	4.91
		50	3.92	4.04	4.18	4.33	4.49	4.67	4.85	5.05	5.26	5.48	5.57
256063	ZF33K4E-TFD-551	Q 40	4.52	6.60	8.74	11.02	13.52	16.30	19.44	23.01	27.10	31.76	33.81
		50	4.18	5.78	7.43	9.22	11.23	13.51	16.16	19.24	22.83	26.99	28.84
		P 40	5.83	6.21	6.58	6.94	7.31	7.69	8.09	8.52	8.98	9.49	9.71
		50	7.00	7.44	7.85	8.25	8.65	9.04	9.45	9.88	10.33	10.82	11.03

Q (kw) = Refrigeration Capacity

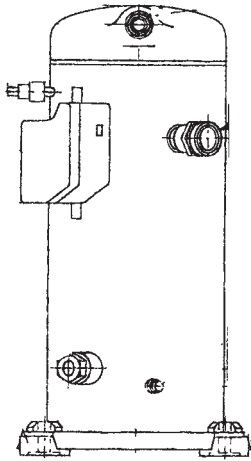
P (kw) = Power Input

Compressors

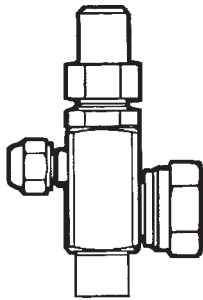
Copeland Scroll Compressors

ZR Series R22

For Air Conditioning Applications



ZR Series R22		Watts @ 7.2°C SST	Connection Size Inches		Connection Type		Voltage	RLA
Cat. No.	Model No.		Suction	Discharge	Tube	Rotorlock		
256117	ZR40K3-PFJ-522	9760	3/4	1/2	Yes		240	17.1
256119	ZR40K3-TFD-522	9760	3/4	1/2	Yes		415	6.4
256120	ZR47K3-PFJ-522	11500	7/8	1/2	Yes		240	17.5
256122	ZR47KC-TFD522	11500	7/8	1/2	Yes		415	7.2
256124	ZR54KC-TFD-522	12900	7/8	1/2	Yes		415	8.2
256125	ZR61KC-PFZ-522	14760	7/8	1/2	Yes		240	28.6
256126	ZR61KC-TFD-522	14606	7/8	1/2	Yes		415	10.0
256127	ZR68KC-PFJ-522	16400	7/8	1/2	Yes		240	30.7
256131	ZR68KC-TFD-522	16400	7/8	1/2	Yes		415	10.0
256132	ZR72KC-TFD-522	17400	7/8	1/2	Yes		415	10.0
256133	ZR81KC-TFD-522	20334	7/8	3/4	Yes		415	12.0
256134	ZR94KC-TFD-523	22942	1 1/8	7/8		Yes	415	16.4
256135	ZR105KC-TFD-523	26253	1 3/8	7/8		Yes	415	17.3
256136	ZR125KC-TFD-523	30720	1 3/8	7/8		Yes	415	19.2
256139	ZR144KC-TFD-523	35200	1 3/8	7/8		Yes	415	19.6
256137	ZR16M3-TWD-551	36720	1 3/8	7/8		Yes	415	25.0
256116	ZR19M3-TWD551	45900	1 5/8	1 1/8		Yes	415	27.2

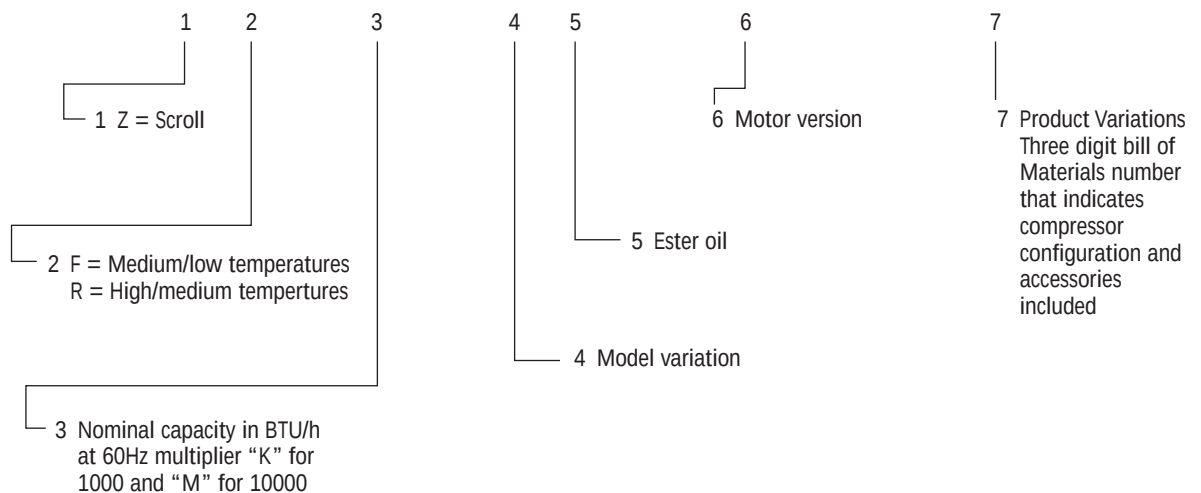


Rotalock Valve Kits

Cat. No.	Part No.	Description
256094	998-0069-01	Rotalock Adaptor Kit (Quantum)
256095	510-0331-08	Valve Kit (Quantum)
256101	510-0331-07	Valve Kit Rotalock 7/8 OD Suct 1/2 OD Dis
256103	998-5100-27	Valve Kit Rotalock 13/8 OD Suct 7/8 OD Dis
256106	8511928	Valve kit Rotalock 15/8 OD Suct 11/8 OD Dis
256107	998-5100-24	Valve Kit Rotalock 11/8 OD Suct 3/4 OD Dis

Model designation

Z F 3 0 K 4 E - T F D - 5 5 1
Z R 4 5 K C E - T F D - 5 5 1

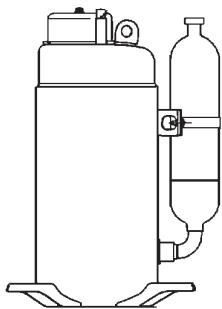


Compressors

Sanyo

R22 – Rotary

For Air Conditioning Application



Cat. No.	Part No.	Model No.	Nom. HP	Displ. cc/rev.	Nom. Cap. Watts	Oil Charge cc	Current Amps		Winding Res. @ 25°C ohms		Motor Input Watts	Connections		Weight (incl. oil) kg
							Nom. Run	Locked Rotor	Start	Run		Suction	Disch.	
257003	KR 7647	C-1R75 H5U	1	16.3	2675	370	3.9	19	6.44	3.96	850	3/8"	5/16"	9.9
257005	KR 7645	C-R112 H5Y	1.5	23.3	3930	550	6.1	28	7.24	1.88	1310	1/2"		14.1
257006	KR 5256	C-R132 H5C	1.75	25.9	4440	500	6.6	36	3.64	1.82	1460	1/2"	3/8"	15.4
257007	KR 4048	C-2R160 H5J	2	34.2	5930	600	8.1	42	3.45	1.51	1900			20.6
257008	KR 5758	C-2R180 H5W	2.4	38.8	6825	800	9.9	44	3.15	1.38	2250	5/8"	3/8"	21
257009	KR 7641	C-R140 H5W	2	29	4910	500	7.7	38	3.61	1.56	1400	1/2"	3/8"	21

Rating Basis: 240V, 1ph, 50 Hz Power Supply
54.4°C Condensing
7.2°C Evaporating
35°C Suction Gas
46.1°C Liquid Temperature
35°C Ambient

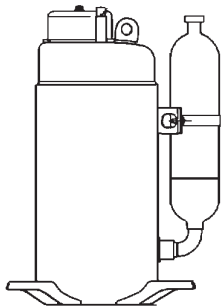
Motor Type: 216/264V, 1ph, induction (PSC), 2 pole. 2870 rpm
As this is a PSC starting system, pressures must be allowed to nearly equalise prior to start up.

Conversion: Watts x 3.412 = BTU/Hr BTU/Hr x 0.293 = Watts

Siam

Rotary

For Air Conditioning Application



Cat. No.	Model	Refrig.	Norm. HP	Displ. cc/rev	Nom. Cap. Watts	Voltage	Current Amps	Run Cap (uF/VAC)	Connections	
									Suction	Disch.
257201	RH135-VHAT	R22	0.87	13.5	2279	240	3.45	25/370	3/8"	5/16"
257202	RG140-VHAT	R22	0.9	14.0	2385	240	3.45	25/370	3/8"	5/16"
257205	RH165-VHAT	R22	1.07	16.5	2814	240	4.2	25/370	3/8"	5/16"
257208	RH189-VHAT	R22	1.2	18.9	3244	240	4.8	30/370	1/2"	5/16"
257209	RE189-VHSMT	R407C	1.14	18.9	3210	240	4.8	30/370	1/2"	5/16"
257210	RH207-VHET	R22	1.34	20.7	3581	240	6.16	30/370	1/2"	5/16"
257211	RH231-VHAT	R22	1.47	23.1	4011	240	6.2	30/400	1/2"	5/16"
257212	RH247-VHAT	R22	1.61	24.7	4226	240	6.6	35/400	1/2"	5/16"
257213	RH277-VHAT	R22	1.74	27.7	4826	240	7.4	35/400	1/2"	5/16"
257221	PH28-VNET	R22	1.68	28.1	4895	240	7.2	40/370	5/8"	3/8"
257223	PH33-VPET	R22	2.01	33.8	5977	240	8.6	50/370	5/8"	3/8"
257225	PH39-VPET	R22	2.28	39	6884	240	10	60/400	5/8"	3/8"
257239	NH-56-VNDT	R22	3.6	56.9	10209	240	16.1	60/420	3/4"	3/8"
257247	NH47-YDET	R22	2.9	47.4	8372	415	5	N/A	5/8"	3/8"
257248	NH52-YDET	R22	3.4	52.4	9442	415	5.5	N/A	3/4"	3/8"
257249	NH56-YDET	R22	3.6	56.9	10291	415	5.8	N/A	3/4"	3/8"

Rating Basis: 54.4°C Condensing
35°C Suction Gas
35°C Ambient

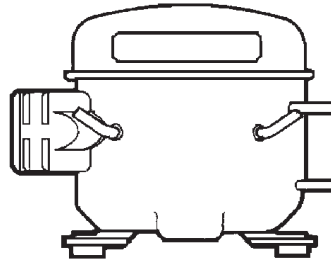
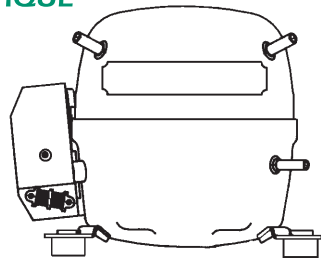
7.2°C Evaporating
46.1°C Liquid Temperature

Compressors

L'Unite Hermetique



R12 and R134a – Hermetic – For Low Temperature Applications



Features

- Anti-Vibration mounts supplied
- R12 compressors charged with mineral oil and dry nitrogen
- R134a compressors charged with polyolester oil and dry nitrogen

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	Cooling	Capacity: Watts						Oil Charge cm³	Connections Inches		
							Evaporating Temperature: °C							Suct.	Disch.	
							-35	-30	-23.3	-20	-15	-10				
R12 Domestic Application																
258550	AZ 1320A	1/12	2.25	PTCSIR	0.45	N	21	32	50	59	75	95	270	1/4" Tube	3/16" Tube	
258551	AZ 1328A	1/10	2.95		0.6		30	45	68	80	102	128				
258552	AZ 1335A	1/8	3.6		0.7		43	60	90	107	138	171				250
258553	AZ 1340A	1/7	4				51	70	103	123	158	197				270
258555	AEZ 1360A RH	1/5	7.55		1.1	O.C.	67	98	154	187	246	314	450	5/16" Tube	1/4" Tube	
258556	AEZ 1380A RH	1/4	8.85	RSIR	1.2		84	124	193	232	298	373				
258557	AEZ 1410D RH	1/3	9.4	PTCSIR	1.8		121	169	251	298	379	467				
258558	AE 1410A RH			12.05	RSIR		2	105	158	250	304	400				510
258559	AE 1412A RH	3/8	14.15				2.2	141	202	311	376	496				634
R134a Domestic and Commercial Applications																
258191	THB1335Y	1/8	3.58	PTCSIR	0.52	N	36	53	85	104	137	175	200	1/4" Tube	3/16" Tube	
258192	THB1340Y	1/7	4.23		0.6		44	66	106	126	163	205	250			
258193	THB1350Y	1/6	5.6		0.7		51	76	123	148	194	248	250			
258194	THB1360Y	1/5	6.1		0.9		68	96	149	177	229	289	250			
258600	AZ 1320Y	1/12	2.95		0.46		17	29	52	66	91	120	270			
258601	AZ 1330Y	1/10	3.6		0.5		30	47	77	95	125	160				
258602	AZ 1335Y	1/8	4		0.55		42	58	89	108	141	180				250
258603	AZ 1339Y	1/7	5		0.7		40	63	104	129	171	220				270
258604	AZ 1348Y	1/6	5.6		0.85		53	76	122	150	201	261	250			
258605	AZ 1355Y		5.9				58	88	140	170	223	284	300			
258606	AEZ 1370Y	1/5	8.1		1.2	82	115	177	215	282	361	450	5/16" Tube	1/4" Tube		
258198	AEZ1380Y	1/4	9.4		1.7	94	144	223	267	338	417					
258608	AEZ 1380Y RH	1/4	9.4		1.7	94	144	223	267	338	417					
258610	AE 1410Y RH	1/3	12.05	RSIR	1.8	O.C.	92	151	259	324	436				566	
258611	CAE 2410Y			CSIR	1.7		F	96	174	306	383				514	663
258612	AE 1412Y RH	3/8	14.15	RSIR	1.8	O.C.										
258613	CAE 2412Y			CSIR	1.9		F									

Capacity Rating Basis: 32°C Ambient Temperature, 32°C Evaporator Outlet, 54.5°C Condensing, 32°C Liquid entering expansion valve. Capacities extracted from 'LUH' General Catalogue 2001 – 50 Hz.

Standard low back pressure ratings at -23.3°C evaporating temperature are shown in the outlined column.

Current FLA are given at nominal voltage, rated conditions and -23.3°C evaporating temperature.

Motor Types: 1 Phase, 50 Hz, 220-240 Volt

- PTCSIR: Positive Temperature Coefficient Resistance Start Induction Run
 - RSIR: Resistance Start Induction Run
 - CSIR: Capacitor Start, Induction Run. (Suitable for Capillary Tube or Expansion Valve operation)
- Low starting torque suitable for Capillary Tube operation only

Cooling:

N: Natural Air Flow

O.C.: Oil Cooler Fitted (3/16" tube connections)

F: Fan cooling required

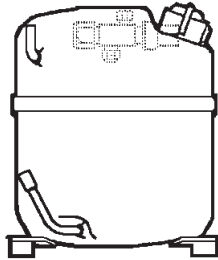
Conversion: Watts x 3.412 = BTU/Hr BTU/Hr x 0.293 = Watts

Compressors

L'Unite Hermetique



R134a – Hermetic – For Medium / High Temperature Applications



Features

- Anti-Vibration mounts supplied
- Charged with polyolester oil and dry nitrogen
- Rotalock suction valve on CAJ/TAJ models
- Rotalock suction and discharge valves on FH/TFH and TAG models
- Crankcase heater on FH/TFH and TAG models
- Oil sight glass on FH/TFH and TAG models
- All models suit capillary tube or expansion valve operation

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	Cooling	R134a Capacity: Watts						Oil Charge cm³	Connections Inches	
							Evaporating Temperature: °C							Suct.	Disch.
							-15	-10	-5	0	7.2	15			
258620	AZ 4410Y	1/8	2.95	CSIR	0.8	N	76	99	130	168	237	329	400	1/4" Tube	3/16" Tube
258621	AZ 4412Y	1/7	3.6		1		91	124	165	215	301	414	270		
258622	AZ 4414Y	1/6	4		1.16		97	138	188	246	343	469	300		
258623	AZ 4419Y	1/5	5.6		1.5		156	207	269	344	472	638	450		
258624	AEZ 4425Y		7.55		1.8	185	260	350	455	635	866				
258625	AEZ 4430Y	1/4	8.85		2.2	245	328	432	558	777	1065	887			
258626	CAE 4440Y	3/8	12.05		3	310	421	561	731	1026	1413		3/8" T.	1/4" T.	
258627	CAE 4448Y	1/3	14.15		3.2	403	530	693	892	1242	1705	1/2" V.	1/4" T.		
258629	CAJ 4452Y		15.2		3.5	370	528	724	957	1358	1879	887	3/8" T.	1/4" T.	
258628	CAE 4456Y	1/2	16		4.06	458	604	787	1009	1396	1904	450	887	1/2" Valve	1/4" Tube
258630	CAJ 4461Y		18.3		4	475	642	856	1115	1569	2168	887		1/2" V.	5/16" T.
258631	CAJ 4476Y	5/8	21.75		4.78	536	756	1030	1358	1926	2668			1480	5/8" Valve
258632	CAJ 4492Y	3/4	25.95		5.6	584	871	1215	1617	2295	3164	1960	7/8" Valve		5/8" Valve
258633	CAJ 4511Y	1	32.7	CSR	5.3	878	1227	1654	2160	3026	4148				
258634	TAJ 4511Y			3Ø	2.1										
258635	FH 4518Y	1 1/2	53.2	CSR	7.8	1036	1650	2371	3200	4583	6333	5/8" Valve	1/2" Valve		
258636	TFH 4518Y			3Ø	3.35										
258637	FH 4525Y	2	74.25	CSR	9.83	1667	2343	3201	4239	6053	8442	1960	7/8" Valve	5/8" Valve	
258638	TFH 4525Y			3Ø	3.91										
258639	TAG 4528Y	2 1/2	90.2		4.3	1368	2166	3208	4492	6766	9799				
258640	TAG 4534Y	2 3/4	100.7		4.7	1946	2871	4061	5514	8071	11460				
258641	TAG 4537Y	3	112.5		5.4	2281	3308	4634	6258	9123	12926				
258642	TAG 4543Y	3 1/2	124.4			5.9	2400	3442	4848	6620	9812	14124			

Capacity Rating Basis: 35°C Ambient, 11K Return Gas Superheat, 54.5°C Condensing, 46°C Liquid entering Expansion Valve.

Data extracted from 'LUH' General Catalogue 2001 - 50 Hz.

Current FLA are given at nominal voltage, rated conditions and 7.2°C evaporating temperature.

Motor Types:

- CSIR: Capacitor start, Induction run } 1 Phase, 50 Hz, 220-240 Volt
- CSR: Capacitor start and run
- 3Ø: 3 Phase, 50 Hz, 400 Volt

Cooling:

N: Natural Air Flow

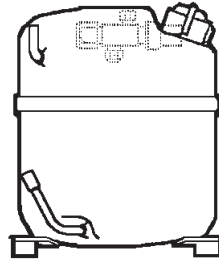
F: Fan Cooled

Conversion: Watts x 3.412 = BTU/Hr BTU/Hr x 0.293 = Watts

Compressors

L'Unite Hermetique Tecumseh Europe

R22 – Hermetic – For Medium / High Temperature Applications



Features

- Anti-Vibration mounts supplied
- Charged with polyolester oil and dry nitrogen
- Rotalock suction valve on CAJ/TAJ models
- Rotalock suction and discharge valves on FH/TFH and TAG models
- Crankcase heater on FH/TFH and TAG models
- Oil sight glass on FH/TFH and TAG models
- Fan cooling required on all models
- All models suit capillary tube or expansion valve operation
- Equalisation Ports on TAGP models for parallel applications

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	R134a Capacity: Watts								Oil Charge cm³	Connections Inches			
						Evaporating Temperature: °C									Suct.	Disch.		
						-25	-20	-15	-10	-5	0	7.2	15					
258650	AEZ 4425E	1/5	4.5	CSIR	1.75			192	256	329	413	553	728	450	1/4" Tube	3/16" Tube		
258651	AEZ 4430E	1/4	5.7		2.2			255	336	430	538	718	945					
258652	AEZ 4440E	1/3	7.55		2.6			362	464	588	733	980	1298					
258653	AEZ 9440T			CSR	2.03	222	280	362	464	588	733	980	1298		3/8" Tube	1/4" Tube		
258654	CAE 4450E	3/8	9.4	CSIR	3.3			426	554	710	896	1212	1623					
258655	CAE 9450T		9.5	CSR	2.6	256	325	426	554	710	896	1212	1623					
258656	CAE 9460T	1/2	11.3		3.2	324	423	553	715	909	1134	1514	2000					
258657	CAJ 9408T	5/8	15.2		3.68	461	603	786	1011	1278	1586	2103	2761	887	1/2" V.	5/16" T.		
258658	CAJ 9510T	1	18.3		4.8	545	728	956	1229	1547	1909	2510	3266		5/8" Valve	5/16" Tube		
258659	CAJ 9513T	1 1/8	24.2		5.9	526	765	1074	1451	1896	2411	3272	4366					
258660	CAJ 4517E	1 1/4	25.95	6.1			1233	1673	2171	2727	3629	4743	5/8" Valve		3/8" Tube			
258661	TAJ 4517T			3Ø	2.5													
258662	TAJ 4519T	1 1/2	34.45	3Ø	3.5			1780	2304	2911	3601	4738	6162					
258663	FH 4522F	1 3/4	39.95	CSR	8.4			1598	2202	2927	3774	5206	7042	1480	5/8" Valve	1/2" Valve		
258664	TFH 4522F			3Ø	3.74													
258665	FH 4524F	2	43.5	CSR	9.55			1841	2456	3219	4131	5706	7759					
258666	TFH 4524F			3Ø	3.9													
258667	FH 4531F	2 1/2	56.65	CSR	12.6			2620	3504	4517	5659	7528	9854		7/8" Valve	1/2" Valve		
258668	TFH4531F				4.75													
258669	TFH 4540F	3	74.25	3Ø	6.08			3000	4301	5745	7330	9863	12938					
258670	TAG 4546T	4	90.2		6.6	1328	2102	3103	4368	5934	7839	11253	15961	1960	7/8" Valve	5/8" Valve		
258671	TAG 4553T	4 1/2	100.7		7.4	1528	2644	3875	5306	7022	9105	12927	18406					
258673	TAG 4561T	5	112.5		9	2059	3119	4465	6133	8164	10593	14870	20658		17/8" Valve	5/8" Valve		
258676	TAG 4568T	6	124.4		9.6	2493	3687	5157	6967	9180	11862	16676	23359					
258678	TAG 4573T	6 1/2	134.8		11	2803	4094	5629	7501	9804	12632	17816	25204					
258786	TAGP 4546T	4	90.2		6.6	1328	2102	3163	4368	5934	7839	11253	15961	1960	7/8" Valve	5/8" Valve		
258787	TAGP 4553T	4 1/2	100.7		7.4	1528	2644	3875	5306	7022	9105	12927	18406					
258788	TAGP 4561T	5	112.5		9	2059	3119	4465	6133	8164	10593	14870	20658		11/8" Valve	5/8" Valve		
258789	TAGP 4568T	6	124.4		9.6	2493	3687	5157	6967	9180	11862	16676	23359					

Capacity Rating Basis: 35°C Ambient, 11K Return Gas Superheat, 54.5°C Condensing, 46°C Liquid entering Expansion Valve.

Data extracted from 'LUH' General Catalogue 2001 - 50 Hz.

Current FLA are given at nominal voltage, rated conditions and 7.2°C evaporating temperature.

Motor Types:

- CSIR: Capacitor start, Induction run } 1 Phase, 50 Hz, 220-240 Volt
- CSR: Capacitor start and run
- 3Ø: 3 Phase, 50 Hz, 400 Volt

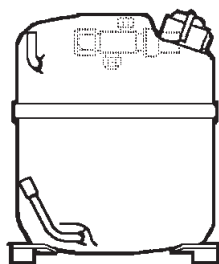
Conversion: Watts x 3.412 = BTU/Hr BTU/Hr x 0.293 = Watts

Compressors

L'Unite Hermetique



R404A – Hermetic – For Low Temperature Applications



Features

- Anti-Vibration mounts supplied
- Charged with polyolester oil and dry nitrogen
- Rotalock suction valve on CAJ/TAJ models
- Rotalock suction and discharge valves on FH/TFH and TAG models
- Crankcase heater on FH/TFH and TAG models
- Oil sight glass on FH/TFH and TAG models
- Fan cooling required on all models
- All CAJ/TAJ models have been improved ('SE' range) to provide reduced noise level, plus higher efficiency
- Equalisation Ports on TAGP models for parallel applications

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	R404A Capacity: Watts						Oil Charge cm³	Connections Inches			
						Evaporating Temperature: °C							Suct.	Disch.		
						-35	-30	-23.3	-20	-15	-10					
258690	AE 1417Z*	1/3	11.3	RSIR	2.6	161	280	460	557	716	891	450	5/16" T.	1/4" T.		
258691	CAE 2417Z			CSR	1.9								3/8" T.	1/4" T.		
258692	AE 1420Z*	1/2	12.54	RSIR	3.2	232	357	547	654	836	1047		5/16" T.	1/4" T.		
258693	CAE 2420Z			CSIR	3.1								3/8" Tube	1/4" Tube		
258694	CAE 2424Z	5/8	15	CSR	2.4	291	442	664	783	981	1199					
258695	CAJ 2428Z	1/2	15.2	CSIR	3.3	254	390	635	779	1024	1296	887	1/2" V	1/4" T.		
258696	CAJ 2432Z	5/8	18.3	CSR	2.5	328	509	787	945	1224	1559		1/2" Valve	5/16" Tube		
258697	CAJ 2446Z	3/4	26.15		3.9	578	817	1210	1438	1832	2290		5/8" Valve	3/8" Tube		
258698	CAJ 2464Z	1 1/2	34.45	CSR	5.5	741	1084	1608	1902	2407	2995					
258699	TAJ 2464Z			3Ø	2											
258700	FH 2480Z	2	53.2	CSR	7.7	738	1319	2183	2662	3476	4419	1625	5/8" Valve	1/2" Valve		
258701	TFH 2480Z			3Ø	2.7											
258702	FH 2511Z	3	74.25	CSR	11.5	1380	2016	3135	3796	4931	6222					
258703	TFH 2511Z				3.4											
258704	TAG 2516Z	4	112.5	3Ø	4.64	1743	2704	4356	5335	7043	9038				1960	7/8" V.
258705	TAG 2522Z	5.5	134.8		6.1	2378	3542	5522	6688	8711	11062	11/8" V.	5/8" V.			
258798	TAGP 2516Z	4	112.5	3Ø	4.64	1743	2704	4356	5335	7043	9038	1960	7/8" V.	5/8" V.		
258799	TAGP 2522Z	5.5	134.8	3Ø	6.1	2378	3542	5522	6688	8711	11062	1960	11/8" V.	5/8" V.		

Capacity Rating Basis: 32°C Ambient, 32°C Evaporator Outlet, 54.5°C Condensing, 32°C Liquid entering Expansion Valve.

Data extracted from 'LUH' General Catalogue 2001 - 50 Hz.

Current FLA are given at nominal voltage, rated conditions and -23.3°C Evaporating Temperature.

*AE models are only suitable for Capillary Tube operation. All other models suit Capillary Tube or Expansion Valve Operation.

Motor Types:

- RSIR: Resistance Start, Induction Run
 - CSIR: Capacitor Start, Induction Run
 - CSR: Capacitor Start and Run
 - 3Ø: 3 Phase, 50 Hz, 400 Volt
- 1 Phase, 50 Hz, 220-240 Volt

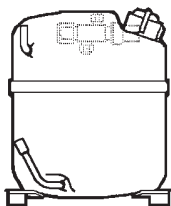
ALL MODELS ARE ALSO SUITABLE FOR OPERATION WITH R507 AND R407B

Conversion: Watts x 3.412 = BTU/Hr BTU/Hr x 0.293 = Watts

Compressors

L'Unite Hermetique Tecumseh Europe

R404A – Hermetic – For Medium / High Temperature Applications



Features

- Anti-Vibration mounts supplied
- Charged with polyolester oil and dry nitrogen
- Rotalock suction valve on CAJ/TAJ models
- Fan cooling required on all models
- All models suit Capillary Tube or Expansion Valve Operation

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	R404A Capacity: Watts								Oil Charge cm³	Connections Inches	
						Evaporating Temperature: °C									Suct.	Disch.
						-25	-20	-15	-10	-5	0	7.2	15			
258710	AEZ 4425Z	1/5	4.5	CSIR	1.88			198	263	341	432	587	787	450	1/4" Tube	3/16" Tube
258711	AEZ 4430Z	1/4	5.7		2.4			258	346	441	550	741	1010			
258712	AEZ 4440Z	1/3	7.55	CSIR	2.8			357	462	590	743	1004	1342		3/8" Tube	1/4" Tube
258713	AEZ 9440Z			CSR	2.2	214	274	357	462	590	743	1004	1342			
258714	CAE 4450Z	3/8	9.4	CSIR	3.76			434	567	731	927	1270	1729			
258715	CAE 9450Z			CSR	2.8	250	329	434	567	731	927	1270	1729			
258716	CAE 9460Z	1/2	11.3		3.33	297	409	546	711	908	1141	1545	2086			
258717	CAE 9470Z		13.3		3.95	383	508	669	869	1109	1392	1878	2514			
258718	CAJ 9480Z	5/8	15.2		4.1	393	571	774	1009	1284	1607	2172	2943	887	1/2" Valve	5/16" Tube
258719	TAJ 9480Z			3Ø	1.81											
258720	CAJ 9510Z	1	18.3	CSR	5.2	527	732	970	1252	1583	1972	2650	3563		5/8" Valve	5/16" Tube
258721	TAJ 9510Z			3Ø	2.1											
258722	CAJ 9513Z	1 1/8	24.2	CSR	6.4	497	783	1114	1501	1955	2485	3406	4646		5/8" Valve	3/8" Valve
258723	TAJ 9513Z			3Ø	2.45											
258724	CAJ 4517Z	1 1/4	25.95	CSR	7.1			1364	1776	2273	2857	3860	5173			
258725	TAJ 4517Z			3Ø	2.25											
258726	CAJ 4519Z	1 1/2	34.45	CSR	9.9			1769	2353	3009	3756	5030	6735			
258727	TAJ 4519Z			3Ø	4											

Capacity Rating Basis: 35°C Ambient, 11K Return Gas Superheat, 54.5°C Condensing, 46°C Liquid entering Expansion Valve.

Data extracted from 'LUH' General Catalogue 2001 - 50 Hz.

Current FLA are given at nominal voltage, rated conditions and 7.2°C Evaporating Temperature.

Motor Types:

- CSIR: Capacitor Start, Induction Run } 1 Phase, 50 Hz, 220-240 Volt
- CSR: Capacitor Start and Run
- 3Ø: 3 Phase, 50 Hz, 400 Volt

ALL MODELS ARE ALSO SUITABLE FOR OPERATION WITH R507 AND R407B

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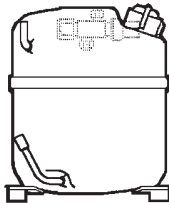
Compressors

L'Unite Hermetique Tecumseh Europe

R404A – Hermetic – For Medium / High Temperature Applications



L'UNITE
HERMETIQUE



Features

- Anti-Vibration mounts supplied
- Charged with polyolester oil and dry nitrogen
- Rotolock suction and discharge valves on FH/TFH and TAG models
- Crankcase heater on FH/TFH and TAG models
- Oil sight glass on FH/TFH and TAG models
- Fan cooling required on all models
- All models suit Capillary Tube or Expansion Valve Operation
- Equalisation Ports on TAGP models for parallel applications

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	R404A Capacity: Watts								Oil Charge cm³	Connections Inches	
						Evaporating Temperature: °C									Suct.	Disch.
						-25	-20	-15	-10	-5	0	7.2	15			
258728	FH 4522Z	1¾	39.95	CSR	9.7			1541	2240	3038	3947	5475	7459	1480	5/8" Valve	1/2" Valve
258729	TFH 4522Z			3.91												
258730	FH 4524Z	2	43.5	CSR	10.7			1835	2570	3407	4361	5977	8101		7/8" Valve	1/2" Valve
258731	TFH 4524Z			3Ø	4.32											
258732	FH 4531Z	2½	56.65	CSR	14.1			2382	3300	4419	5706	7782	10222		7/8" Valve	1/2" Valve
258733	TFH 4531Z			3Ø	5.27											
258706	FH4540Z	3	74.25	CSR	19.8			3388	4475	5771	7276	9814	13056	1960	7/8" Valve	5/8" Valve
258735	TFH 4540Z	3	74.25	3Ø	7.52											
258736	TAG 4546Z	4	90.2		7			2806	4292	5996	7956	11297	15719		7/8" Valve	5/8" Valve
258737	TAG 4553Z	4½	100.7		7.76			3461	4922	6752	8958	12805	17880			
258738	TAG 4561Z	5	112.5		9			4363	5895	7942	10452	14772	20227		1½" Valve	5/8" Valve
258739	TAG 4568Z	6	124.4		10.2			5322	7077	9294	11972	16636	22760			
258740	TAG 4573Z	6½	134.8			11.4			5788	7710	10163	13123	18228	24806	1960	7/8" Valve
258790	TAGP 4546Z	4	90.2		7			2806	4292	5996	7956	11297	15719			
258791	TAGP 4553Z	4½	100.7		7.76			3461	4922	6752	8958	12805	17880	1½" Valve		5/8" Valve
258792	TAGP 4561Z	5	112.5		9			4363	5896	7942	10452	14772	20227			
258793	TAGP 4568Z	6	124.4		10.2			5322	7077	9294	11972	16636	22760			
258794	TAGP 4573Z	6½	134.8		11.4			5788	7710	10163	13123	18228	24806			

Capacity Rating Basis: 35°C Ambient, 11K Return Gas Superheat, 54.5°C Condensing, 46°C Liquid entering Expansion Valve.

Data extracted from 'LUH' General Catalogue 2001 - 50 Hz.

Current FLA are given at nominal voltage, rated conditions and 7.2°C Evaporating Temperature.

Motor Types:

- CSIR: Capacitor Start, Induction Run } 1 Phase, 50 Hz, 220-240 Volt
- CSR: Capacitor Start and Run
- 3Ø: 3 Phase, 50 Hz, 400 Volt

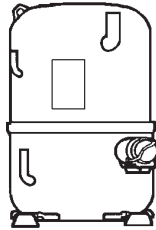
ALL MODELS ARE ALSO SUITABLE FOR OPERATION WITH R507 AND R407B



Compressors

L'Unite Hermetique Tecumseh Europe

R22 – Hermetic – For Air Conditioning Applications



Features

- Anti-Vibration mounts supplied
- Charged with mineral oil and dry nitrogen
- Crankcase heater on TAG models
- Fan cooling required on all models

Cat. No.	Model	Nominal HP	Displ. cm³/rev	Motor Type	Nominal Current FLA	Exp. Device	R22 Capacity: Watts						Oil Charge cm³	Connections Inches				
							Evaporating Temperature: °C							Suct.	Disch.	Proc.		
							-10	-5	0	7.2	10	15						
258750	AE 5465E	1/2	12.05	PSC	3.2	C	718	928	1170	1572	1746		450	3/8" Tube	1/4" Tube	3/8" T.		
258751	AJ 5510F	3/4	18.6		5.2		922	1297	1728	2447	2758							
258752	AJ 5512E	1	21.75		5.9		1254	1662	2130	2909	3246							
258753	AJ 5513E		24.2		6		1468	1893	2386	3213	3572							
258754	AJ 5515E	1 1/4	25.95		7.2		1680	2169	2722	3631	4020			887	1/2" Tube	5/16" Tube	1/4" Tube	
258755	AJ 5518E	1 1/2	32.7		9.3		2204	2771	3436	4563	5056							
258756	AJ 5519E		34.45		9.96		2313	2894	3587	4779	5305							
258768	FH 5522F	1 3/4	40.8				8.36											1330
258769	TFH 5522F			3Ø	3.7	C/V	2298	3059	3955	5483	6153							
258770	FH 5524F	2	43.9	PSC	9.4	C	2484	3309	4279	5929	6652							
258771	TFH 5524F			3Ø	3.7	C/V												
258772	FH 5528F	2 1/4	49	PSC	10.7	C	2914	3852	4950	6811	7625		1625	3/4" Tube	3/8" Tube	5/16" Tube		
258773	TFH 5528F			3Ø	4.28	C/V												
258774	FH 5532F	2 1/2	53.08	PSC	12	C	3303	4327	5540	7619	8534							
258775	TFH 5532F			3Ø	4.59	C/V												
258776	FH 5538F	2 3/4	67.5	PSC	15.1	C	4146	5384	6848	9353	10454			1960	7/8" Tube		1/2" Tube	3/8" Tube
258777	TFH 5538F			3Ø	5.56	C/V												
258778	FH 5542F	3	74.15	PSC	17.6	C	4343	5645	7215	9951	11166							
258779	TFH 5542F																	
258781	TAG 5546E	3 3/4	90.2	3Ø	6	C/V	4368	5934	7839	11253	12815	15961			7/8" Tube	1/2" Tube	3/8" Tube	
258782	TAG 5553E	4	100.7		6.6		5306	7022	9105	12922	14713	18406						
258783	TAG 5561E	5	112.5		7.4		6133	8164	10593	14870	16802	20658						
258784	TAG 5568E	6	124.4		9		6967	9180	11862	16676	18887	23359						
258785	TAG 5573E	6 1/2	134.8		11		7501	9804	12632	17816	20238	25204						

Capacity Rating Basis: 35°C Ambient, 11K Return Gas Superheat, 54.5°C Condensing, 46°C Liquid entering Expansion Valve.

Data extracted from 'LUH' General Catalogue 2001 - 50 Hz.

Current FLA are given at nominal voltage, rated conditions and 7.2°C Evaporating Temperature.

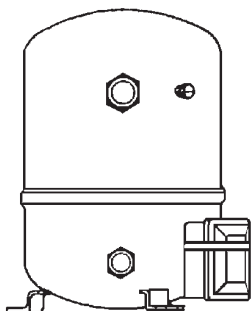
Motor Types: PSC = Permanent Split Capacitor, 1 Phase, 50 Hz. 220-240 Volt
3Ø: 3 Phase, 50 Hz, 400 Volt

Expansion Device: C = Capillary Tube
C/V = Capillary Tube or Expansion Valve

Compressors

Maneurop

R22 – Hermetic – MT Series



Features

- Anti-Vibration mounts supplied
- Charged with Maneurop Mineral Oil 160P
- MT 18 / MT 160
- Rotalock suction and discharge solder sleeves
- Rotalock service valves or angle adaptors available
- Optional 'V' version with sight glass and oil equalisation fitting available
- MT 100 / MT 160
- Oil sight glass standard

Cat. No.	Model	Elec. Supply Volts/ Phase	Nom kW / HP	Comp. Displ. m³/h	R22 Capacity: Watts							Oil Charge Litres	Current Running Amps	Weight kg
					Evaporating Temperature: °C									
					10	5	0	-5	-10	-15	-20			
258285	MT18 -5	230/1	1.1/1.5	5.26	4831	3796	2929	2212	1628	1160	–	0.95	6.3	22
258286	MT18 -4	400/3			4831	3796	2929	2212	1628	1160	–		2.5	
258287	MT22 -5	230/1	1.35/1.8	6.58	6525	5266	4164	3207	2381	1673	–		7.6	23
258288	MT22 -4	400/3			6525	5266	4164	3207	2381	1673	–		2.9	
258289	MT28 -5	230/1	1.75/2.3	8.29	8719	7224	5889	4703	3656	2734	–		12.3	24.5
258290	MT28 -4	400/3			8719	7224	5889	4703	3656	2734	–		4	
258291	MT32 -5	230/1	2/2.7	9.3	9591	7857	6338	5016	3873	2890	–		12.1	25
258292	MT32 -4	400/3			9591	7857	6338	5016	3873	2890	–		4.2	
258284	MT36 -5	230/1	2.25/3	10.6	10903	9094	7467	6010	4711	3559	–		12.8	25.5
258293	MT36 -4	400/3			10903	9094	7467	6010	4711	3559	–		4.9	
258294	MT40 -4	400/3	2.5/3.5	12	12164	10113	8267	6614	5141	3834	–	1.8	5.5	26
258295	MT45 -4		2.8/3.75	13.2	12980	10595	8530	6665	5050	3615	2380		6.6	36
258296	MT51 -4		3/4	14.8	14770	12100	9755	7705	5935	4390	3085		6.3	37
258297	MT57 -4		3.4/4.6	16.72	16410	13505	11000	8855	7035	5505	4240		8.1	
258298	MT65 -4		3.75/5	18.6	18850	15460	12540	10040	7930	6155	4695		8.1	37.5
258299	MT73 -4		4.4/6	20.92	21415	17515	14190	11300	8875	6855	5175		8.8	39
258300	MT81 -4		4.85/6.5	23.7	24285	19825	15990	12715	9945	7630	5725		9.7	42
258301	MT100 -4		6.3/8.5	29.8	28195	22865	18269	14339	11008	8208	5871	3.9	12.9	66.5
258302	MT125 -4		7.5/10	37.6	36554	29882	24123	19186	14988	11445	8477		14.4	68
258310	MT144 -4		9/12	42	41418	33801	27243	21646	16912	12941	9635		19.36	69
258303	MT160 -4		9.7/13	47.25	46002	37557	30289	24091	18850	14459	10807		19.02	

Capacity Rating Basis: 50°C Condensing Temperature, 11K Superheat, 8.3K Subcooling.

Current Running Amps at -5°C Evaporating Temperature, 54°C Condensing Temperature.

Conversion: Watts x 3.412 = BTU/Hr.
BTU/Hr x 0.293 = Watts

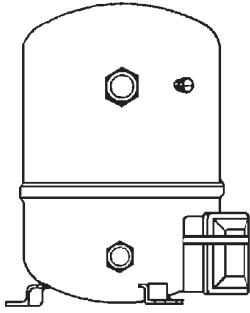
Maneurop Compressor Rotalock Valve Selection

Rotalock Size	1"		1 1/4"			1 3/4"	
Connection ODS	3/8"	1/2"	5/8"	3/4"	7/8"	7/8"	1 1/8"
Model							
MT/MTZ 18	D	S					
MT/MTZ 22	D	S					
MT/MTZ 28	D	S					
MT/MTZ 32		D	S				
MT/MTZ 36		D	S				
MT/MTZ 40		D	S				
MT/MTZ 45				D		S	
MT/MTZ 51				D		S	
MT/MTZ 57				D		S	
MT/MTZ 65				D		S	
MT/MTZ 73				D		S	
MT/MTZ 81				D			S
MT/MTZ 100					D		S
MT/MTZ 125					D		S
MT/MTZ 160					D		S

S = Suction D = Discharge
Standard usage - other combinations are possible

Compressors

Maneurop



R404A / R507 Hermetic – LTZ Series

For Low Temperature Application

Features

- Anti-vibration mounts supplied
- Charged with Maneurop POE Oil 160 PZ
- Rotolock suction and discharge solder sleeves
- Rotolock service valves or angle adaptors available
- 'V' version with sight glass and oil equalisation fitting is standard

Cat. No.	Model	Elec. Supply Volts/ Phase	Nom kW / HP	Comp. Displ. m³/h	Cond. Temp. °C	R404A, R507 Capacity: Watts					Oil Charge Litres	Current Running Amps	Weight kg
						Evaporating Temperature: °C							
						-20	-25	-30	-35	-40			
258349	LTZ22-5V	230/1	1.35/1.8	8.3	40	2390	1875	1400	1000	650	1	6.8	22
258351	LTZ22-4V	400/3			50	1850	1440	965	670			2.6	
258352	LTZ28-5V	230/1	1.75/2.3	12	40	3450	2780	2070	1500	950		12	
258353	LTZ28-4V	400/3			50	2740	2140	1430	985			4	
258354	LTZ40-4V	400/3	2.5/3.5	16.7	40	5245	4100	3060	2250	1570	2	5.3	35
258355	LTZ44-4V		2.8/3.75	18.6	50	4140	3135	2285	1640	1070			
					60	2970	2180	1540	1060				
258356	LTZ50-4V		3/4	23.7	40	6330	4740	3420	2400	1600	2	6.4	
					50	4740	3465	2470	1740	1230			
60	3270		2340	1710	1260								
258357	LTZ88-4V		5.5/7.3	37.6	40	7780	6080	4540	3340	2330	4	8.1	36
					50	6140	4650	3390	2430	1590			
					60	4400	3230	2280	1570				
258358	LTZ100-4V		6.3/8.5	47.25	40	11740	8780	6500	4580	3220	4	11.5	63
					50	9380	6940	4790	3100	2000			
					60	6690	4910	2970	1920				
					40	15400	11510	8400	6290	4220	4	14.8	67
					50	11980	9100	6630	4590	2690			
					60	8850	6440	4430	2520				

Capacity Rating Basis: 11K Superheat, 8.3K Subcooling.

Current Running Amps at -25°C Evaporating Temperature, 54°C Condensing Temperature.

- The LTZ low temperature compressors have been designed and optimised for a reliable and efficient running operation within the evaporating temperature range -20°C to -40°C. It is mandatory to use an expansion valve with a maximum operating pressure (MOP) of -20°C or a starting regulator.
- Use only R404A – R507 specified components (ie: filter drier, T.X. valve, etc.)
- LTZ compressors with 160 PZ oil can be used to replace LTE compressors operating in existing systems where 160 PE oil is present.

Conversion: Watts x 3.412 = BTU/Hr. BTU/Hr x 0.293 = Watts

Maneurop Compressor Rotolock Valve Selection

Rotalock Size	1"	1 1/4"		1 3/4"	
Connection ODS	1/2"	5/8"	3/4"	7/8"	1 1/8"
Model					
LT/LTZ 22	D	S			
LT/LTZ 28	D	S			
LT/LTZ 40			D	S	
LT/LTZ 44			D	S	
LT/LTZ 50			D		S
LT/LTZ 80			D		S
LT/LTZ 100			D		S

S = Suction

D = Discharge

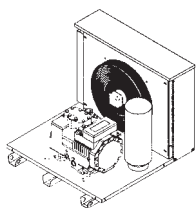
Standard usage - other combinations are possible

Condensing Units

Bitzer

IS Series – R04A / R507 – Air Cooled – Accessible Hermetic

For Indoor Application



This extensive range of Compact Condensing Units features the Bitzer Octagon® Series of accessible hermetic compressors.

Features

- Air cooled condenser
- Discharge line vibration eliminator
- Polyolester oil charged (standard)
- Liquid receiver
- Electronic motor protection monitoring INT 69 V6/V7
- Standard power supply: 415/3/50 Hz
- Crankcase heater
- Dual pressure control with flexible lines
- Optional extras are available
- Liquid line drier and sightglass
- R134A - R22 Units available on request

Cat. No.	Model	Motor Nominal HP/kW	R404A/R507 Refrigeration Capacity : Watts									
			Evaporating Temperature : °C									
			5	0	-5	-10	-15	-20	-25	-30	-35	-40
251053	2HC-1.2Y-IS1-4P	1/0.7			4000	3350	2750	2390	1780	1360	1000	700
251054	2HC-2.2Y-IS1-4P	1.5/1.1	5560	4710	4000	3375	2750	2390	1780	1360	1000	700
251055	2GC-2.2Y-IS1-4P	1.5/1.1	6120	5330	4650	3760	3190	2600	2070	1600	1190	840
251056	2FC-2.2Y-IS1-4P	1.5/1.1			5170	4410	3700	3050	2440	1910	1430	1030
251057	2FC-3.2Y-IS2-6P	1.8/1.3	7630	6600	5530	4750	3940	3210	2570	2020	1490	1060
251058	2EC-2.2Y-IS2-6P	2/1.5			6610	5590	4680	3820	3070	2400	1810	1300
251059	2EC-3.2Y-IS2-6P	3/2.2	8860	7850	6720	5670	4730	3870	3090	2410	1820	1300
251060	2DC-2.2Y-IS2-6P	2/1.5			7460	6340	5450	4390	3540	2780	2100	1550
251061	2DC-3.2Y-IS2-4P	3/2.2	11130	7410	8040	6800	5680	4630	37000	2880	2160	1550
251062	2CC-3.2YIS2-4P	3/2.2			9710	8060	6760	5590	4530	3480	2640	1850
251063	2CC-4.2Y-IS3-4P	4/3	13950	12090	10330	8700	7220	5880	4670	3520	2770	1900
251064	4FC-3.2Y-IS3-6P	3/2.2			10730	9130	8450	6880	5030	4140	2960	2110
251083	4FC-3.2Y-IS3-4P	3/2.2			9996	8459	7050	5774	4635	3630	2795	2020
251084	4FC-5.2Y-IS3-6P	5.5/4			10618	8896	7366	5995	4799	3721		
251065	4FC-5.2Y-IS3-4P	5.5/4	15150	13180	11280	9530	7940	6480	5180	4030	3020	2190
251085	4FC-5.2Y-IS4.3-6P	5.5/4	15200	13090	11180	9410	7820	6410	5140	4030	3070	2230
251086	4FC-5.2Y-IS4.3-4P	5.5/4	15820	13570	11540	9680	8020	6540	5240	4100	3110	2260
251066	4EC-4.2Y-IS3-4P	4/3			13090	11310	9360	7720	6240	4920	3750	2730
251067	4EC-6.2Y-IS4.3-4P	5.5/4	18430	16070	13760	11660	9730	8000	6430	5050	3830	2780
251068	4DV-5.2Y-IS5-6P	5.5/4			16110	13810	11560	9510	7650	6010	4550	3290
251087	4DC-5.2Y-IS5-4P	5.5/4			16920	14280	11880	9740	7820	6140	4670	3410
251069	4DC-7.2Y-IS5-4P	7.5/5.5	22900	19900	17040	14410	12010	9820	7880	6160	4660	3360
251088	4CC-6.2Y-IS5-6P	7.5/5.5			18665	15858	13314	10938	8797	6988	5223	3849
251070	4CC-6.2Y-IS5-4P	7.5/5.5			19410	16540	13870	11470	9280	7330	5600	4090
251089	4CC-9.2Y-IS5-4P	9/6.7	26400	22900	19690	16710	13980	11530	9320	7370	5660	4180

Capacity data basis: 35°C ambient temperature, 20°C suction gas temperature, 3K liquid subcooling, 50 Hz.

For 32°C ambient multiply above figures by correction factor 1.03. For 38°C ambient multiply above figures by correction factor 0.97.

Condensing Units

Bitzer

IS Series – R04A / R507 – Air Cooled – Accessible Hermetic

For Indoor Application

Dimensions

Model	A	B	C	D	E	F	G	Minimum Clearance	Sound Data *dB(A)	
									Speed Controlled	High Speed
IS1 4P	705	1073	15	N/A	1018	680	630	150	53.0	57.3
IS2 4P	705	1073	15	N/A	1018	680	630	150	53.7	55.4
IS2 6P	7.5	1073	15	N/A	1018	680	630	200	57.0	60.0
IS3 4P	860	1178	15	570	1148	680	630	150	53.7	55.4
IS3 6P	860	1178	15	570	1148	680	630	200	57.0	60.0
IS4.3 6P	860	1578	15	780	1548	680	630	200	51.5	55.2
IS4.3 4P	860	1578	15	780	1548	680	630	250	60.3	63.3
IS5 6P	860	1578	15	780	1548	680	630	200	51.5	55.2
IS5 4P	860	1578	15	780	1548	680	630	250	60.3	63.3

*Sound Pressure at 3m distance - to convert to sound power level add 17dBA

Specifications

Compressor Model	Max Current Amps	Max Power Consumption kW	Heater Watts 240/1/50
2HC-1.2	3.5	2.0	85
2HC-2.2	4.3	2.4	85
2GC-2.2	4.7	2.7	85
2FC-2.2	4.9	2.8	85
2FC-3.2	5.8	3.4	85
2EC-2.2	5.7	3.3	165
2EC-3.2	6.9	4.0	165
2DC-2.2	6.9	3.9	165
2DC-3.2	7.8	4.5	165

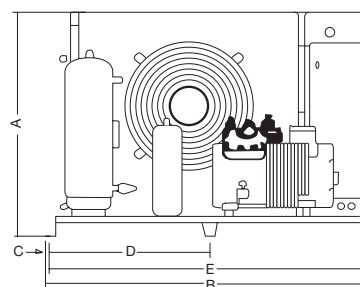
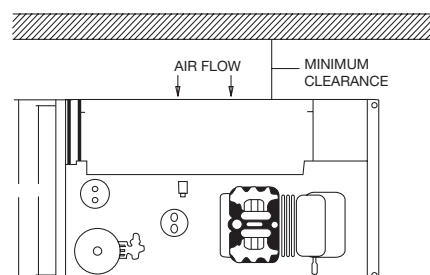
Compressor Model	Max Current Amps	Max Power Consumption kW	Heater Watts 240/1/50
2CC-3.2	8.5	5	165
2CC-4.2	9.4	5.6	165
4FC-3.2	9.2	5.4	165
4FC-5.2	10.8	6.2	165
4EC-4.2	10.7	6.4	165
4EC-6.2	13.2	7.9	165
4DC-5.2	13.5	8	165
4DC-7.2	15.9	9	165
4CC-6.2	15.9	9	165
4CC-9.2	20	10.5	165

Condenser Model	Fan Voltage	Fan Total Amps	Fan Total kW	Air Flow L/S	Number of Fans	Liquid Line Size	Suction Line Size	Unit Weight kg	Receiver Pump Down R404A/R22
IS 1-4P	240/1/50	0.6	0.14	760	1x350mm	3/8	5/8	100	3.8/4.2
IS 2-6P	240/1/50	0.79	0.16	870	1x450mm	3/8	7/8	120	3.8/4.2
IS 2-4P	240/1/50	1.1	0.25	1170	1x450mm	3/8	7/8	120	3.8/4.2
IS 3-6P	240/1/50	0.79	0.16	1000	1x450mm	1/2	1 1/8	150	7/7.8
IS 3-4P	240/1/50	1.1	0.25	1330	1x450mm	1/2	1 1/8	150	7/7.8
IS 4.3-6P	240/1/50	1.58	0.32	2350	2x450mm	5/8	1 1/8	163	7/7.8
IS 4.3-4P	240/1/50	2.2	0.49	3100	2x450mm	5/8	1 1/8	163	7/7.8
IS 5-6P	240/1/50	1.58	0.32	2100	2x450mm	5/8	1 1/8	167	7/7.8
IS 5-4P	240/1/50	2.2	0.49	2900	2x450mm	5/8	1 1/8	167	7/7.8

• Based on DOL starting for 380-420 Y/3/50Hz.

Other voltages on request.

Note: For total unit power consumption, add compressor and condenser values together.

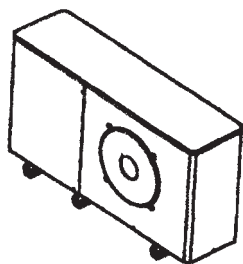


Packaged Condensing Units

Bitzer

CS Series – R04A / R507 – Air Cooled – Accessible Hermetic

For Outdoor Application



This extensive range of Compact Condensing Units features the Bitzer Octagon® Series of accessible hermetic compressors.

Features

- Fully wired electrical panel
- Crankcase heater
- Polyolester oil charged (Standard)
- Air cooled condenser
- Dual pressure control with flexible lines
- Standard power supply: 415/3/50 Hz
- Liquid receiver
- Liquid linedrier and sightglass
- Optional extras are available
- Available R134a - R22 Units on request

Cat. No.	Model	Motor Nominal HP/kW	R404A/R507 Refrigeration Capacity : Watts									
			Evaporating Temperature : °C									
			5	0	-5	-10	-15	-20	-25	-30	-35	-40
251035	2HC-1.2Y-CS1-4P	1/0.7			4000	3350	2750	2390	1780	1360	1000	700
251036	2HC-2.2Y-CS1-4P	1.5/1.1	5560	4710	4000	3375	2750	2390	1780	1360	1000	700
251037	2GC-2.2Y-CS1-4P	1.5/1.1	6120	5330	4650	3760	3190	2600	2070	1600	1190	840
251038	2FC-2.2Y-CS1-4P	1.5/1.1			5170	4410	3700	3050	2440	1910	1430	1030
251039	2FC-3.2Y-CS2-6P	1.8/1.3	7630	6600	5530	4750	3940	3210	2570	2020	1490	1060
251040	2EC-2.2Y-CS2-6P	2/1.5			6610	5590	4680	3820	3070	2400	1810	1300
251041	2EC-3.2Y-CS2-6P	3/2.2	8860	7850	6720	5670	4730	3870	3090	2410	1820	1300
251042	2DC-2.2Y-CS2-6P	2/1.5			7460	6340	5450	4390	3540	2780	2100	1550
251043	2DC-3.2Y-CS2-4P	3/2.2	11130	7410	8040	6800	5680	4630	3700	2880	2160	1550
251044	2CC-3.2Y-CS2-4P	3/2.2			9710	8060	6760	5590	4530	3480	2640	1850
251045	2CC-4.2Y-CS3-4P	4/3	13950	12090	10330	8700	7220	5880	4670	3520	2770	1900
251046	4FC-3.2Y-CS3-6P	3/2.2			10730	9130	8450	6800	5030	4140	2960	2110
251047	4FC-5.2Y-CS3-4P	5.5/4	15150	13180	11280	9530	7940	6480	5180	4030	3020	2160
251080	4FC-5.2Y-CS4.3-6P	5.5/4	15200	13090	11180	9410	7820	6410	5140	4030	3070	2260
251090	4FC-5.2Y-CS4.3-4P	5.5/4	15820	13570	11540	9680	8020	6540	5240	4100	3110	2260
251048	4EC-4.2Y-CS3-4P	4/3			13090	11310	9360	7720	6240	4920	3750	2730
251049	4EC-6.2Y-CS4.3-6P	5.5/4	18430	16070	13760	11660	9730	8000	6430	5050	3830	2780
251050	4DC-5.2Y-CS5-6P	5.5/4			16110	13810	11560	9510	7650	6010	4550	3290
251081	4DC-5.2Y-CS5-4P	5.5/4			16920	14280	11880	9740	7820	6140	4670	3410
251051	4DC-7.2Y-CS5-4P	7.5/5.5	22900	19900	17040	14410	12010	9820	7880	6160	4660	3360
251052	4CC-6.2Y-CS5-4P	7.5/5.5			19410	16540	13870	11470	9280	7330	5600	4090
251082	4CC-9.2Y-CS5.4P	9/6.7	26400	22900	19690	16710	1380	11530	9320	7370	5660	4180

Capacity data basis: 35°C ambient temperature, 20°C suction gas temperature, 3K liquid subcooling, 50 Hz.

For 32°C ambient multiply above figures by correction factor 1.03. For 38°C ambient multiply above figures by correction factor 0.97.

Packaged Condensing Units

Bitzer CS Series – R04A / R507 – Air Cooled – Accessible Hermetic

For Outdoor Application

Dimensions

Model	A	B	C	D	E	F	G	H	Minimum Clearance	Sound Data *dB(A)	
										Speed Controlled	High Speed
CS1 4P	700	1335	180	470	470	482	442	443	150	50.8	56.2
CS2 6P	700	1335	180	470	470	482	442	443	150	52.7	53.7
CS2 4P	700	1335	180	470	470	482	442	443	200	55.6	58.6
CS3 6P	850	1490	220	400	650	482	442	500	150	52.7	53.7
CS3 4P	850	1490	220	400	650	482	442	500	200	55.6	58.6
CS4.3 6P	850	1890	220	400	1050	482	442	500	200	50.0	54.2
CS4.3 4P	850	1890	220	400	1050	482	442	500	250	29.2	62.2
CS5 6P	860	1890	220	400	1050	482	442	500	200	50.0	54.2
CS5 4P	860	1890	220	400	1050	482	442	500	250	59.2	62.2

*Sound Pressure at 3m distance - to convert to sound power level add 17dBA

Specifications

Compressor Model	Max Current Amps	Max Power Consumption kW	Heater Watts 240/1/50
2HC-1.2	3.5	2.0	85
2HC-2.2	4.3	2.4	85
2GC-2.2	4.7	2.7	85
2FC-2.2	4.9	2.8	85
2FC-3.2	5.8	3.4	85
2EC-2.2	5.7	3.3	165
2EC-3.2	6.9	4.0	165
2DC-2.2	6.9	3.9	165
2DC-3.2	7.8	4.5	165

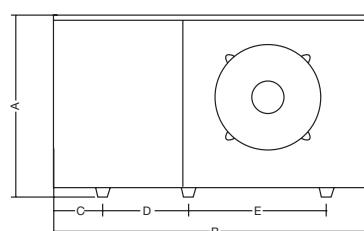
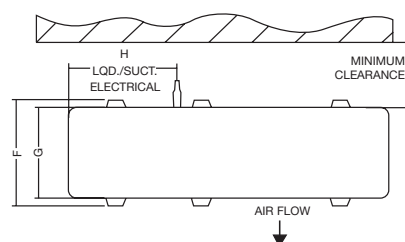
Compressor Model	Max Current Amps	Max Power Consumption kW	Heater Watts 240/1/50
2CC-3.2	8.5	5	165
2CC-4.2	9.4	5.6	165
4FC-3.2	9.2	5.4	165
4FC-5.2	10.8	6.2	165
4EC-4.2	10.7	6.4	165
4EC-6.2	13.2	7.9	165
4DC-5.2	13.5	8	165
4DC-7.2	15.9	9	165
4CC-6.2	15.9	9	165
4CC-9.2	20	10.5	165

Condensor Model	Fan Voltage	Fan Total Amps	Fan Total kW	Air Flow L/S	Number of Fans	Liquid Line Size	Suction Line Size	Unit Weight kg	Receiver Pump Down R404A/R22
CS 1-4P	240/1/50	0.6	0.14	760	1x350mm	3/8	5/8	104	3.8/4.2
CS 2-6P	240/1/50	0.79	0.16	870	1x450mm	3/8	7/8	127	3.8/4.2
CS 2-4P	240/1/50	1.1	0.25	1170	1x450mm	3/8	7/8	127	3.8/4.2
CS 3-6P	240/1/50	0.79	0.16	1000	1x450mm	1/2	1 1/8	160	7/7.8
CS 3-4P	240/1/50	1.1	0.25	1330	1x450mm	1/2	1 1/8	160	7/7.8
CS 4.3-6P	240/1/50	1.58	0.32	2350	2x450mm	5/8	1 1/8	178	7/7.8
CS 4.3-4P	240/1/50	2.2	0.49	3100	2x450mm	5/8	1 1/8	178	7/7.8
CS 5-6P	240/1/50	1.58	0.32	2100	2x450mm	5/8	1 1/8	182	7/7.8
CS 5-4P	240/1/50	2.2	0.49	2900	2x450mm	5/8	1 1/8	182	7/7.8

• Based on DOL starting for 380-420 Y/3/50Hz.

Other voltages on request.

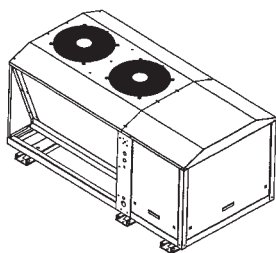
Note: For total unit power consumption, add compressor and condenser values together.



Packaged Condensing Units

Bitzer

LCS Series – R04A / R507 – Air Cooled – Accessible Hermetic
For Outdoor Application



The extensive range of LCS Condensing Units incorporates the latest C4 series octagon compressors.

Features

- New C4 semi-hermetic compressor technology
- Liquid receiver
- Fully wired electrical panel with 3 phase isolator
- Drier
- Dedicated condenser sub-cooling circuit
- Sight glass
- Dual pressure control
- Line valve
- Sump heater
- BSE 32 oil
- Electronic motor protection monitoring
- Powder coated panels

Cat. No.	Model	Motor Nominal HP/kW	R404A/R507 Refrigeration Capacity : Watts									
			Evaporating Temperature : °C									
			5	0	-5	-10	-15	-20	-25	-30	-35	-40
251100	3VC-6.2Y-LCS1-LS	6/4.5				18140	15110	12370	9910	7750	5860	4230
251101	4VC-10.2Y-LCS1-LS	10/7.5	29400	25500	22300	18250	15120	12320	9810	7600	5660	3980
251102	4TC-8.2Y-LCS1-LS	8/6				21480	17870	14680	11810	9260	7040	5110
251103	4TC-12.2Y-LCS-HS	12/9	35000	30300	25900	21800	18130	14810	11820	9180	6890	4900
251104	4PC-10.2Y-LCS1-LS	10/7.5				24100	20200	16630	13390	10530	7990	5770
251106	4PC-15.2Y-LCS2-HS	15/11	42700	36900	31500	26500	21900	17830	14160	10940	8120	5690
251107	4NC-12.2Y-LCS2-LS	12/9				27900	23400	19250	15320	12160	9270	6720
251108	4NC-20.2Y-LCS2-HS	20/15	47600	41200	35300	29800	24700	20100	16030	12400	9220	6470

Capacity data basis: 35°C ambient temperature, 20°C suction gas temperature, 3K liquid subcooling, 50 Hz.

For 32°C ambient multiply above figures by correction factor 1.03. For 38°C ambient multiply above figures by correction factor 0.97.

Accessories

Cat. No.	Part No.	Description
251120	U40-500	LCS Part Wind/Elec Option-LCS1
251121	U40-501	LCS Part Wind/Elec Option LCS2
251122	U40-510	LCS LED Fault Panel Indic/Panel
251123	U40-105	LCS Fans Speed Control 3PH

Packaged Condensing Units

Bitzer

LCS Series – R04A / R507 – Air Cooled – Accessible Hermetic
For Outdoor Application

Dimensions

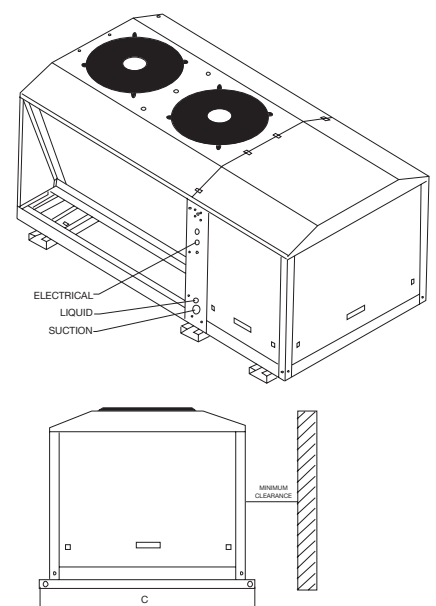
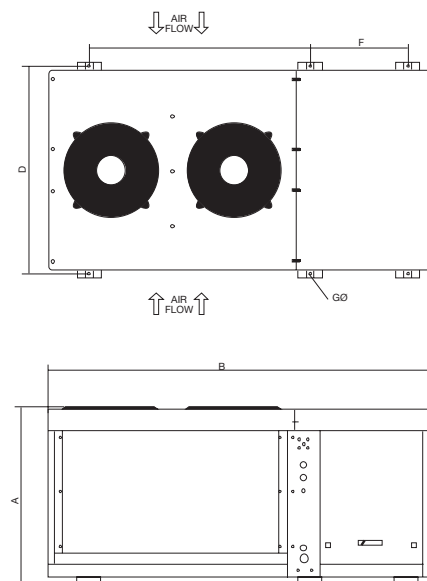
Model	A	B	C	D	E	F	GØ	Minimum Clearance
LCS1-L/S	1135	2150	1200	1160	1233	550	15mm	800mm
LCS1-H/S	1135	2150	1200	1160	1233	550	15mm	800mm
LCS2-L/S	1135	2150	1200	1160	1233	550	15mm	800mm
LCS2-H/S	1135	2150	1200	1160	1233	550	15mm	800mm

Specifications

Compressor Model	Max Current Amps	Max Power Consumption kW	Starting current (locked rotor)	Electrical supply (Part Winding)	Motor Version	Capacity control steps	Oil charge litres	Heater Watts 240/150
4VC-6.2	14	8.1	39/68	380..420YY	2	optional 50%	2.6	120
4VC-10.2	21	11.3	59/99	3 phase 50Hz	1	optional 50%	2.6	120
4TC-8.2	17	9.4	49/81	3 phase 50Hz	2	optional 50%	2.6	120
4TC-12.2	24	13.8	69/113	3 phase 50Hz	1	optional 50%	2.6	120
4PC-10.2	21	11.7	59/99	3 phase 50Hz	2	optional 50%	2.6	120
4PC-15.2	31	16.3	81/132	3 phase 50Hz	1	optional 50%	2.6	120
4NC-12.2	24	14.1	69/113	3 phase 50Hz	2	optional 50%	2.6	120
4NC-20.2	37	19.5	97/158	3 phase 50Hz	1	optional 50%	2.6	120
4J-13.2	27	15.7	81/132	3 phase 50Hz	2	optional 50%	4	140
4H-15.2	31	18.1	81/132	3 phase 50Hz	2	optional 50%	4	140

Condenser Unit Model	Fan Voltage	Fan Total Amps	Fan Total kW	Condensor Air Flow L/S	Number of Fans	Liquid Line Size	Suction Line Size	Unit Weight Kg	Receiver pump down R404a/R22
LCS1-LS	415/3/50	1.88	1.10	4900	2x500mm	5/8"	1 1/8" "	485	30/33.5
LCS1-HS	415/3/50	2.7	1.56	5800	2x500mm	5/8"	1 3/8" "	485	30/33.5
LCS2-LS	415/3/50	1.88	1.10	4600	2x500mm	7/8"	1 3/8" "	520	30/33.5
LCS2-HS	415/3/50	2.7	1.56	5400	2x500mm	7/8"	1 5/8" "	520	30/33.5

Note: For total unit power consumption, add compressor and condenser values together



Condensing Units Accessories

Bitzer

CS & IS Series – Electrical Wiring Panel

Cat. No.	Part No.	IS Model
251200	U10-255	IS1
251201	U10-256	IS2
251202	U10-257	IS3
251203	U10-258	IS4/IS4.3/IS5

Oil Separators

Cat. No.	Unit Model No.		Connection Size	Part No.
	CS Units	IS Units		
251220	CS1	IS1	1/2"	B37-006
251220	CS2	IS2	1/2"	B37-006
251221	CS3	IS3	5/8"	B37-007
251221	CS4	IS4	5/8"	B37-007
251225	CS5	IS5	7/8"	B37-008
251204	Oil Separator Fitting Charge			U51-008A

Suction Accumulators

Cat. No.	Unit Model No.	Connection Size	Part No.
	CS Units & IS Units		
251222	2HC to 2FC	5/8"	B43-304
251223	2EC to 4FC	7/8"	B43-300
251224	4EC to 4CC	1 1/8"	B43-301
251205	Suction Accumulator Fitting Charge		U51-009

Liquid Line Solenoid Valve Fitted

Cat. No.	Unit Model No.		Connection Size	Part No.
	CS Units	IS Units		
251206	CS1	IS1	3/8"	U40-040
251206	CS2	IS2	3/8"	U40-040
251207	CS3	IS3	1/2"	U40-041
251208	CS4 & CS5	IS4 & IS5	5/8"	U40-042

Fan Speed Control Fitted

Cat. No.	Part No.	Description
251210	FV31	U40-100

Fan Cycle Pressure Control Fitted

Cat. No.	Description
251209	U40-090

Traxon Oil Control Fitted

Cat. No.	Part No.	Description
251211	U40-097	Suits Octagon Series
251214	U40-099	Suits 2nd Gen Series

Capacity Control Solenoid for 4FC to 4CC Units Fitted

Cat. No.	Part No.	Description
251212	347600-01	Solenoid Valve Kit
251213	343303-06	Solenoid Coil

Head Cooling Fans Fitted

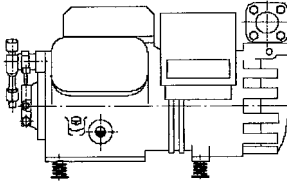
Cat. No.	Part No.	Description
251215	343021-08	Suit Models 2HC to 2CC
251216	343021-09	Suit Models 4FC to 4CC

MP 15 Phase Failure Control Fitted

Cat. No.	Part No.
251217	K01-150

Semi-Hermetic Compressors

DWM Copeland



The standard K, L and S-series Compressors have a high performance range from 0.5 to 70hp for use with R404A, R507, R407C, R134a and R22 Refrigerants. Compressors are charged with Polyolester oil.

Features

- Motors are suitable for DOL or star delta, part winding starting
- Motors have thermal protection
- Copeland reliability and efficiency
- Optional Capacity control kits and crankcase heaters

Cat No.	Model	Cond. Temp. °C	R404A Refrigeration Capacities: kW 50Hz														
			Evaporating Temperature: °C														
			-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	7	10	12.5
256200	DLE-20X-EWL	Q 40			0.57	1.09	1.67	2.35	3.15	4.05	5.15	6.40	7.80	9.45	10.15	11.30	12.35
		Q 50				0.58	1.09	1.68	2.34	3.10	4.00	5.05	6.20	7.60	8.20	9.15	2.58
		P 40			0.74	0.96	1.18	1.40	1.62	1.83	2.03	2.20	2.35	2.47	2.51	2.55	
		P 50				0.81	1.07	1.34	1.61	1.88	2.14	2.39	2.62	2.83	2.90	3.00	
256201	DLF-30X-EWL	Q 40		0.72	1.25	1.88	2.63	3.50	4.55	5.80	7.20	8.80	10.65	12.80	13.70		
		Q 50			0.79	1.33	1.96	2.71	3.60	4.60	5.80	7.15	8.75	10.50	11.30		
		P 40		1.02	1.32	1.61	1.89	2.17	2.43	2.67	2.89	3.08	3.24	3.37	3.41		
		P 50			1.17	1.50	1.83	2.16	2.49	2.80	3.11	3.39	3.65	3.88	3.97		
256202	DLL-40X-EWL	Q 40		1.13	1.82	2.67	3.70	4.95	6.40	8.15	10.20	12.55	15.30	18.40	19.70		
		Q 50			1.17	1.88	2.74	3.80	5.05	6.50	8.25	10.30	12.65	15.40	16.50		
		P 40		1.40	1.77	2.16	2.55	2.93	3.31	3.67	4.01	4.32	4.60	4.84	4.92		
		P 50			1.49	1.99	2.49	3.00	3.50	3.98	4.45	4.89	5.30	5.65	5.80		
256203	D2SA-55X-EWL	Q 40				4.45	5.95	7.70	9.80	12.20	15.00	18.20	21.90	23.50			
		Q 50				3.40	4.60	6.05	7.75	9.70	12.00	14.60	17.60	19.00			
		P 40				3.25	3.77	4.31	4.84	5.35	5.75	6.05	6.25	6.30			
		P 50				3.28	3.83	4.45	5.10	5.70	6.30	6.85	7.25	7.40			
256205	D2SC65X-EWL	Q 40				5.60	7.35	9.45	11.80	14.60	17.80	21.40	25.60	27.50			
		Q 50				4.35	5.90	7.65	9.65	11.90	14.55	17.60	21.10	22.60			
		P 40				4.17	4.71	5.25	5.80	6.30	6.70	7.05	7.25	7.35			
		P 50				4.31	4.92	5.55	6.20	6.85	7.45	8.00	8.45	8.65			
256205	D3SC-75X ⁽³⁾ -AWM	Q 40		1.61	2.79	5.50	7.50	9.95	12.85	16.30	20.30	24.90					
		Q 50			1.75	2.89	5.75	7.70	10.10	12.90	16.20	20.10					
		P 40		2.76	3.51	4.32	5.15	6.05	6.90	7.80	8.60	9.35					
		P 50			3.43	4.29	5.20	6.20	7.20	8.20	9.20	10.10					
256206	D3SC-100X-AWM	Q 40				7.85	10.35	13.35	16.80	21.00	25.70	31.00	37.50	40.50			
		Q 50				6.10	8.25	10.75	13.65	17.10	21.10	25.70	31.00	33.50			
		P 40				5.35	6.10	6.90	7.70	8.40	9.10	9.65	10.10	10.20			
		P 50				5.40	6.25	7.20	8.15	9.05	9.95	10.80	11.50	11.80			

Q(kW) = Refrigeration Capacity, P(kW) = Power Input Operating Conditions 20°C Suction Gas Return

(3) Operating conditions may be restricted: please see Copeland Selection Software for further details.

☐ Additional cooling required

Model Designation

- | | | | | | | | | | | |
|--|----------|----------|----------|----------|----------|----------|------------|-----------|------------|------------|
| 1 DWM Copeland | D | K | * | S | J | 8 | 10X | W2 | EWL | 000 |
| 2 Compressor model (k, L or LH) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 Number of Cylinders | | | | | | | | | | |
| 4 Not always included: compressor variations | | | | | | | | | | |
| - S(K/L) = long-stroke compressor | | | | | | | | | | |
| - S(2/3/4/6/8) = reed valve plates | | | | | | | | | | |
| - D = Discus version | | | | | | | | | | |
| - T = 2-stage compressor | | | | | | | | | | |
| 5 Displacement, valve plate, stroke, bore | | | | | | | | | | |
| 6 Body version | | | | | | | | | | |
| 7 Motor size (X: ester oil) | | | | | | | | | | |
| 8 Water-cooled models only | | | | | | | | | | |
| 9 Motor version | | | | | | | | | | |
| 10 Service number | | | | | | | | | | |

Continued on following page

Semi-Hermetic Compressors

DWM Copeland

Cat No.	Model	Cond. Temp. °C	R404A Refrigeration Capacities: kW 50Hz														
			Evaporating Temperature: °C														
			-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	7	10	12.5
256207	D3SS-100X ⁽³⁾ -AWM	Q 40		2.68	4.50	8.15	10.80	13.95	17.60	21.90	26.80	32.50					
		Q 50			3.00	4.80	8.75	11.35	14.45	18.00	22.20	27.00					
		P 40		4.42	5.20	6.15	7.20	8.35	9.50	10.70	11.80	12.90					
		P 50			5.40	6.35	7.45	8.70	10.00	11.40	12.80	14.20					
256208	D3SS-150X-AWM	Q 40					11.35	14.65	18.60	23.10	28.30	34.50	41.50	49.00	52.50		
		Q 50					9.00	11.90	15.20	19.00	23.40	28.50	34.50	41.00	44.00		
		P 40					7.60	8.75	9.80	10.80	11.80	12.70	13.50	14.30	14.50		
		P 50					7.65	9.00	10.30	11.60	12.80	14.00	15.10	16.10	16.50		
256209	D4SF-100X ^(3/4) -AWM	Q 40		3.15	5.20	9.30	12.35	15.90	20.20	25.20	31.00	38.00					
		Q 50			3.35	5.30	9.65	12.65	16.20	20.40	25.30	31.00					
		P 40		4.26	5.45	6.70	7.90	9.10	10.30	11.40	12.40	13.30					
		P 50			5.15	6.60	8.05	9.50	10.90	12.30	13.70	14.90					
256210	D4SA-200X-AWM	Q 40					11.80	15.60	20.00	25.20	31.00	38.00	46.00	55.00	59.50		
		Q 50					9.05	12.30	16.10	20.30	25.30	31.00	37.50	45.50	48.50		
		P 40					7.70	8.85	10.00	11.10	12.10	13.00	13.70	14.30	14.50		
		P 50					7.80	9.15	10.50	11.90	13.20	14.40	15.50	16.40	16.70		
256212	D4SH-250X-AWM	Q 40					14.60	19.20	24.60	31.00	38.00	46.50	56.50	67.50	72.50		
		Q 50					11.45	15.30	19.70	24.70	30.50	37.50	45.00	54.00	58.00		
		P 40					9.95	11.40	12.90	14.30	15.60	16.70	17.80	18.60	18.90		
		P 50					10.50	12.10	13.80	15.50	17.20	18.70	20.20	21.50	22.00		
256211	D4SL-150X ⁽³⁾ -AWM	Q 40		4.30	7.00	12.15	16.10	20.60	26.00	32.00	39.50	48.00					
		Q 50			4.75	7.25	12.75	16.50	20.90	26.00	32.00	39.00					
		P 40		5.80	7.20	8.70	10.20	11.80	13.40	15.00	16.50	18.00					
		P 50			7.10	8.75	10.50	12.40	14.20	16.10	18.00	19.90					
256217	D6ST-300X-AWM	Q 40					16.80	22.40	28.90	36.50	45.00	55.50	67.00	80.50	86.50		
		Q 50					12.90	17.60	23.00	29.20	36.50	44.50	54.00	65.00	70.00		
		P 40					11.00	12.90	14.80	16.70	18.50	20.10	21.70	23.00	23.40		
		P 50					11.00	13.30	15.50	17.70	19.90	22.10	24.10	25.90	26.60		
256214	D4SJ-300X-AWM	Q 40					17.50	23.20	29.80	37.50	46.50	57.00	69.00	82.50	88.50		
		Q 50					13.45	18.30	23.90	30.50	38.00	46.50	56.50	68.00	73.00		
		P 40					11.30	13.20	15.20	17.10	18.90	20.70	22.20	23.50	24.00		
		P 50					11.50	13.70	16.00	18.30	20.50	22.70	24.70	26.60	27.30		
256213	D4ST-200X ⁽³⁾ -AWM	Q 40		4.60	7.85	14.15	18.90	24.50	31.00	38.50	47.50	57.50					
		Q 50			4.85	8.00	14.75	19.40	24.90	31.50	39.00	47.50					
		P 40		6.25	8.00	9.90	11.80	13.70	15.60	17.40	19.10	20.70					
		P 50			7.60	9.75	11.90	14.20	16.50	18.70	20.90	22.90					
256216	D6SH-350X-AWM	Q 40					21.60	28.40	36.50	45.50	56.50	69.00	83.50	100.0	107.0		
		Q 50					16.80	22.60	29.10	36.50	45.50	55.50	67.00	80.50	86.50		
		P 40					14.50	17.20	19.80	22.30	24.50	26.50	28.10	29.30	29.70		
		P 50					14.80	17.80	20.80	23.70	26.40	28.90	31.10	33.00	33.70		
256215	D6SL-250X ⁽³⁾ -AWM	Q 40		6.10	9.85	17.60	23.40	30.50	38.00	47.50	57.50	69.50					
		Q 50			6.50	10.15	18.50	24.10	30.50	38.00	47.00	56.50					
		P 40		8.25	10.40	12.70	15.10	17.60	20.00	22.40	24.70	26.70					
		P 50			10.30	12.80	15.50	18.30	21.20	24.00	26.70	29.30					
256218	D6SJ-400X-AWM	Q 40					25.50	33.50	43.00	53.50	66.00	80.50	97.50	116.5	125.0		
		Q 50					19.70	26.30	34.00	42.50	52.50	64.50	77.50	93.00	100.0		
		P 40					17.10	19.80	22.60	25.30	27.90	30.30	32.20	34.40	35.00		
		P 50					17.60	20.70	23.80	27.00	30.20	32.30	34.30	38.90	39.90		
256219	D6SK-500X-AWM	Q 40					30.00	39.50	51.00	64.50	80.00	98.00	118.5	142.0	152.0		
		Q 50					23.10	31.50	41.00	52.00	65.00	79.50	97.00	116.5	125.0		
		P 40					19.50	22.80	26.30	29.60	32.90	35.80	38.50	40.70	41.40		
		P 50					19.30	23.10	27.10	31.10	35.10	39.00	42.70	46.00	47.30		

Q(kW) = Refrigeration Capacity, P(kW) = Power Input Operating Conditions 20°C Suction Gas Return

(3) Operating conditions may be restricted: please see Copeland Selection Software for further details.

☐ Additional cooling required

Compressor Accessories

DWM Copeland Semi Hermetic Compressors

Crankcase Heaters

Cat. No.	Part No.	Suits Models
256240	2834369	DLE20X
		DLF30X
		DLL40X
		D2SA55X
		D2SC65X
256241	2834198	D3SC75X
		D3SC100X
		D3SS100X
		D3SS150X
256242	6610169	D4S4100X
		D4SA200X
		D4SL150X
		D4SH250X
		D4ST200X
		D4SJ300X
		D6SL250X
		D6SH350X
256243	2832205	D6ST300X
		D6SJ400X
		D6SK500X

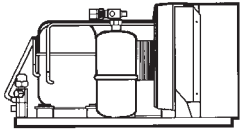
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Capacity Control Items

Cat. No.	Part No.	Description
270157	703RC001	Solenoid Valve
270159	2954954	Gasket
123285	ASC2	Solenoid Coil

Condensing Units

L'Unite Hermetique



R404A – Hermetic – For Low Temperature Applications

HTA - the High Temperature Answer.

The HTA range has been developed to meet Australia's specific requirements:

- High ambient temperature capability up to 46°C
- For situations where air circulation to the condensing unit is restricted
- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

Features

- Compressor charged with Polyolester oil and dry nitrogen
- Rotalock suction and liquid valves on CAJ/TAJ, FH/TFH and TAG models
- Crankcase heater, oil sight glass and automatic reset HP/LP control on FH/TFH and TAG models
- All models fitted with liquid receiver

▼ Cat. No.	Model	Compressor		Amb. Temp °C	R404A Capacity : Watts							Conns. Suction: Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C									
					-40	-35	-30	-23.3	-20	-15	-10			
259570	CAE T 2417ZBR	1/3	CSR	32 43 46	155 126 121	236 192 182	319 263 251	435 368 352	494 423 406	586 512 493	682 606 586	3/8" : 1/4"	1/202	2.25
259571	CAE T 2420ZBR	1/2	CSIR	32 43 46	226 178 166	328 264 248	437 359 339	594 501 478	676 578 553	806 703 676	944 838 811	3/8" : 1/4"	1/250	3.25
259572	CAE T 2424ZBR	5/8	CSR	32 43 46	318 251 234	431 347 326	559 459 434	753 635 605	858 734 702	1030 897 864	1216 1080 1045	3/8" : 1/4"	1/300	2.51
259573	CAJ 2428ZBR	1/2	CSIR	32 43 46	271 213 199	395 318 298	529 434 410	722 609 581	823 704 673	984 858 826	1154 1025 993	1/2" : 1/4"	1/300	3.98
259574	CAJ T 2432ZBR	5/8	CSR	32 43 46	250 197 184	414 333 312	588 483 456	840 708 675	971 830 794	1179 1027 989	1398 1242 1202	1/2" : 3/8"	1/300	3.1
259575	CAJ T 2446ZBR	3/4	CSR	32 43 46	371 292 272	571 460 431	792 650 615	1119 944 900	1293 1105 1058	1573 1371 1320	1874 1664 1611	5/8" : 3/8"	1/300	3.97
259576 259577	CAJ T 2464ZBR TAJ T 2464ZBR	1 1/2	CSR 3Ø	32 43 46	337 265 247	714 574 539	1094 898 849	1609 1357 1294	1825 1594 1525	2256 1966 1892	2650 2354 2279	5/8" : 3/8"	1/356	5.57 2.25
259578 259579	FH T 2480 ZBR TFH T 2480ZBR	2	CSR 3Ø	32 43 46	872 687 640	1334 1073 1007	1800 1478 1397	2432 2051 1955	2746 2347 2245	3225 2811 2705	3709 3295 3189	5/8" : 3/8"	1/356	8.34 2.79
259585 259580	FH T 2511 ZBR TFH T 2511ZBR	2 1/2	CSR 3Ø	32 43 46	1194 940 877	1744 1402 1317	2356 1934 1828	3274 2762 2632	3767 3219 3080	4566 3979 3830	5427 4821 4666	7/8" : 3/8"	2/356	12.1 3.98
259581	TAG T 2516ZBR	4	3Ø	32 43 46	1671 1316 1226	2429 1954 1834	3268 2683 2536	4519 3812 3633	5188 4434 4243	6269 5463 5258	7430 6600 6388	7/8" : 3/8"	2/356	5.21
259582	TAG T 2522ZBR	5 1/2	3Ø	32 43 46	2024 1594 1486	3077 2474 2323	4202 3450 3261	5826 4915 4684	6674 5704 5458	8019 6989 6726	9438 8383 8114	1 1/8" : 3/8"	2/406	6.65
259583	TAGD T 2532ZBR	2 x 4	3Ø	32 43 46	3141 2474 2304	4566 3673 3447	6134 4959 4818	8500 7200 6900	9753 8335 7976	11785 10270 9885	13968 12408 12009	1 1/8" : 3/8"	2/208	10.4
259584	TAGD T 2544ZBR	2 x 5 1/2	3Ø	32 43 46	3821 3178 2823	5809 4932 4413	7933 6878 6196	11000 9800 8900	12601 11373 10370	15140 13395 12779	17904 16714 15417	1 3/8" : 3/8"	2/508	13.3

Capacity Rating Basis: Return gas at ambient temperature, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient and -23.3°C evaporating.

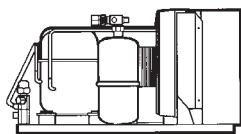
Motor Types:
 • CSIR: Capacitor Start, Induction Run } 1 Phase, 50 Hz, 220-240 Volt • 3Ø: 3 Phase, 50 Hz, 400 Volt
 • CSR: Capacitor Start and Run

ALL MODELS ARE ALSO SUITABLE FOR OPERATION WITH R507 AND R407B

Condensing Units

L'Unite Hermetique

R404A – Hermetic – For Medium / High Temperature Applications



HTA - the High Temperature Answer.

The HTA range has been developed to meet Australia's specific requirements:

- High ambient temperature capability up to 46°C
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- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

Features

- Compressor charged with Polyolester oil and dry nitrogen
- All models fitted with liquid receiver
- Rotalock suction and liquid valves on CAJ/TAJ models

▼ Cat. No.	Model	Compressor		Amb. Temp °C	R404A Capacity : Watts								Conns. Suction : Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C										
					-25	-20	-15	-10	-5	0	5	10			
259590	AEZ T 4425ZHR	1/5	CSIR	32 43 46			251 218 211	322 282 272	399 351 340	481 425 413	607 540 526	659 588 574	3/8" : 1/4"	1/205	2.05
259591	AEZ T 4430ZHR	1/4	CSIR	32 43 46			337 293 283	422 369 357	515 453 439	617 545 530	781 695 677	850 759 740	3/8" : 1/4"	1/250	2.16
259593	AEZ T 9440ZMHR	1/3	CSR	32 43 46	277 239 229	373 323 311	477 415 401	590 516 499	715 629 609	851 752 730	1067 950 925	1158 1034 1008	3/8" : 1/4"	1/250	2.52
259594	CAE T 9450ZMHR	3/8	CSR	32 43 46	323 278 267	447 387 373	584 508 491	734 642 621	898 790 765	1077 952 924	1361 1211 1180	1480 1321 1288	3/8" : 1/4"	1/300	3.14
259595	CAE T 9460ZMHR	1/2	CSR	32 43 46	446 384 369	567 491 473	715 622 601	886 775 750	1078 948 919	1286 1136 1104	1608 1431 1394	1737 1550 1512	3/8" : 1/4"	1/300	3.86
259596	CAE T 9470ZMHR	1/2	CSR	32 43 46	539 464 446	689 597 575	865 753 727	1061 928 898	1279 1124 1090	1515 1339 1300	1881 1674 1631	2032 1814 —	3/8" : 1/4"	1/300	4.47
259597	CAJ T 9480ZMHR	5/8	CSR	32 43 46	651 561 539	844 731 704	1052 916 884	1278 1118 1081	1523 1339 1298	1786 1578 1533	2206 1964 1913	2382 2126 —	1/2" : 3/8"	1/300	4.48
259599	CAJ T 9510ZMHR	1	CSR	32 43 46	736 634 609	960 831 801	1211 1054 1017	1484 1298 1256	1781 1566 1518	2098 1854 1801	2587 2303 2243	2786 2487 —	5/8" : 3/8"	1/320	5.45
259600	CAJ T 9513ZMHR	1 1/8	CSR	32 43 46	961 828 796	1265 1095 1055	1592 1386 1337	1947 1703 1648	2336 2054 1991	2762 2441 2371	3456 3076 2997	3753 3350 3267	5/8" : 3/8"	1/356	6.88
259602 259603	CAJ T 4517ZHR TAJ T 4517ZHR	1 1/4	CSR 3Ø	32 43 46			1850 1610 1554	2251 1969 1905	2719 2391 2317	3229 2853 2772	3979 3542 3451	4259 3802 —	5/8" : 3/8"	1/356	7.59 3.05
259604 259605	CAJ T 4519ZHR TAJ T 4519ZHR	1 1/2	CSR 3Ø	32 43 46			2154 1875 1809	2856 2498 2417	3532 3105 3010	4202 3713 3607	5197 4626 4507	5606 5004 4881	5/8" : 3/8"	1/406	10.4 4.48

Capacity Rating Basis: 11K Return gas superheat, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient, 32°C return gas and 7.2°C evaporating.

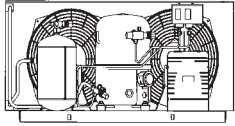
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 • CSR: Capacitor Start and Run

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Continued on following page

Condensing Units

L'Unite Hermetique



R404A – Hermetic – For Medium / High Temperature Applications

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- High ambient temperature capability up to 46°C
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- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

Features

- Compressor charged with Polyolester oil and dry nitrogen
- All models fitted with liquid receiver
- Rotolock suction and liquid valves on FH/TFH and TAG models
- Crankcase heater, oil sight glass and automatic reset HP/LP control on FH/TFH and TAG models

Cat. No.	Model	Compressor		Amb. Temp °C	R404A Capacity : Watts						Conns. Suction : Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C								
					-15	-10	-5	0	5	10			
259608 259609	FH T 4524ZHR TFH T 4524ZHR	2	CSR 3Ø	32 43 46	2654 2310 2229	3315 2900 2805	4012 3527 3419	4750 4198 4077	5905 5256 5121	6387 5701 —	5/8" : 3/8"	1/406	11 4.2
259610 259611	FH T 4531ZHR TFH T 4531ZHR	2½	CSR 3Ø	32 43 46	3594 3128 3019	4508 3944 3815	5462 4802 4655	6464 5712 5549	8009 7129 6945	8646 7717 7527	7/8" : ½"	2/356	14.8 5.4
259586 259612	FH T 4540ZHR TFH T 4540ZHR	3	CSR 3Ø	32 43 46	4419 3846 3712	5465 4781 4624	6571 5777 5600	7759 6857 6660	9655 8594 8373	10464 9340 9110	7/8" : ½"	2/406	20.8 6.97
259613	TAG T 4546ZHR	4	3Ø	32 43 46	3942 3431 3311	4922 4306 4165	6352 5585 5414	8110 7167 6962	10957 9753 9502	12091 10792 10526	7/8" : 5/8"	2/406	7.47
259614	TAG T 4553ZHR	4½	3Ø	32 43 46	5359 4664 4502	6769 5922 5728	8359 7349 7124	10101 8926 8671	12834 11424 11130	13953 12454 —	7/8" : 5/8"	2/406	7.79
259615	TAG T 4561ZHR	5	3Ø	32 43 46	5509 4794 4628	6954 6083 5884	8691 7641 7407	10639 9402 9133	13649 — —	14838 — —	1½" : 5/8"	2/406	9.98
259616	TAG T 4568ZHR	6	3Ø	32 43 46	6765 5888 5863	8820 7716 7463	10928 9608 9314	13102 11578 11247	16346 14550 14175	17647 15752 15363	1½" : 5/8"	2/406	10.2
259617	TAG T 4573ZHR	6½	3Ø	32 43 46	7410 6449 6224	9224 8069 7805	11205 9851 9550	13354 11801 11463	16346 14932 14548	17647 16257 15856	1½" : 5/8"	2/406	10.9
259618	TAGD T 4590ZHR	2 x 4	3Ø	32 43 46	9301 8095 7813	11749 10278 9942	14346 12613 12227	17107 15117 14685	21396 19045 18555	23167 20679 20169	1½" : 5/8"	2/508	15.8
259619	TAGD T 4610ZHR	2 x 4½	3Ø	32 43 46	10366 9022 8707	12827 11221 10854	15905 13984 13556	19396 17140 16650	24718 22001 21435	26757 23883 23295	1½" : 5/8"	2/508	16.3
259620	TAGD T 4612ZHR	2 x 5	3Ø	32 43 46	12488 10868 10490	15544 13598 13153	18812 16540 16033	22308 19714 19149	27763 24712 24076	30028 26803 26142	1¾" : 5/8"	2/508	20.2
259621	TAGD T 4614ZHR	2 x 6	3Ø	32 43 46	14446 12572 12135	18202 15923 15403	21725 19101 18516	25340 22393 21752	31371 27923 27205	34184 30513 29761	1¾" : 5/8"	2/508	23.2

Capacity Rating Basis: 11K Return gas superheat, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient, 32°C return gas and 7.2°C evaporating.

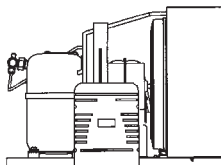
Motor Types: • CSIR: Capacitor Start, Induction Run } 1 Phase, 50 Hz, 220-240 Volt • 3Ø: 3 Phase, 50 Hz, 400 Volt
• CSR: Capacitor Start and Run }

ALL MODELS ARE ALSO SUITABLE FOR OPERATION WITH R507 AND R407B

Condensing Units

L'Unite Hermetique

R134a – Hermetic – For Medium / High Temperature Applications



HTA - the High Temperature Answer.

The HTA range has been developed to meet Australia's specific requirements:

- High ambient temperature capability up to 46°C
- For situations where air circulation to the condensing unit is restricted
- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

*AZ Models are not included in the HTA range of units

Features

- Compressor charged with Polyolester oil and dry nitrogen
- Models shown with 'R' suffix are fitted with liquid receiver
- Rotalock suction and liquid valves on CAJ/TAJ models

▼ Cat. No.	Model	Compressor		Amb. Temp °C	R134a Capacity : Watts								Conns. Suction : Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C										
					-15	-10	-5	0	5	7.2	10	15			
259500	AZ 4412YH*	1/7	CSIR	32	119	157	196	241	290	313	338	403	1/4" : 1/4"	1/170	1.22
259501	AZ 4414YH*	1/6	CSIR	32	152	187	228	277	332	357	393	457	3/8" : 1/4"	1/202	1.35
259502	AZ 4419YH*	1/5	CSIR	32	206	259	323	392	468	507	558	651	3/8" : 1/4"	1/202	1.72
259503	AEZ T 4425YHR	1/5	CSIR	32 43 46	249 217 209	325 284 275	411 361 350	507 448 435	613 544 530	663 590 575	729 651 —	857 — —	3/8" : 1/4"	1/205	1.89
259504	AEZ T 4430YHR	1/4	CSIR	32 43 46	318 277 267	420 367 355	530 466 452	652 576 560	782 695 676	844 751 732	925 826 —	1078 — —	3/8" : 1/4"	1/250	2.63
259505	CAE T 4440YHR	3/8	CSIR	32 43 46	438 381 368	551 482 466	685 602 584	841 743 722	1019 905 881	1104 983 957	1220 1089 —	1444 1295 —	3/8" : 1/4"	1/250	3.07
259506	CAE T 4448YHR	1/3	CSIR	32 43 46	513 446 431	680 595 575	860 756 733	1053 931 904	1262 1121 1091	1359 1210 1179	1487 1327 1295	1727 1549 —	3/8" : 1/4"	1/300	3.52
259507	CAE T 4456YHR	1/2	CSIR	32 43 46	606 527 509	764 668 646	944 830 805	1145 1012 983	1369 1216 1184	1474 1312 1278	1615 1442 —	1885 1691 —	3/8" : 1/4"	1/300	4.37
259509	CAJ T 4461YHR	1/2	CSIR	32 43 46	680 592 571	868 759 735	1082 951 922	1323 1169 1136	1591 1413 1375	1718 1529 1490	1886 1683 1642	2212 1984 —	1/2" : 1/4"	1/300	4.38
259510	CAJ T 4476YHR	5/8	CSIR	32 43 46	763 664 641	1006 880 851	1267 1114 1080	1549 1369 1330	1851 1644 1600	1991 1772 1727	2175 1941 —	2524 — —	1/2" : 3/8"	1/300	5.23
259511	CAJ T 4492YHR	3/4	CSIR	32 43 46	953 829 801	1235 1080 1045	1555 1367 1325	1916 1693 1645	2316 2057 2002	2505 2230 2172	2757 2461 2400	3240 2907 2841	1/2" : 3/8"	1/356	5.4

Capacity Rating Basis: 11K Return gas superheat, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient, 32°C return gas and 7.2°C evaporating.

Motor Types:

- CSIR: Capacitor Start, Induction Run
- CSR: Capacitor Start and Run

} 1 Phase, 50 Hz, 220-240 Volt • 3Ø: 3 Phase, 50 Hz, 400 Volt

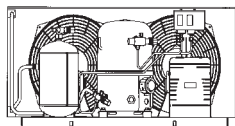
Continued on following page

Condensing Units

L'Unite Hermetique



L'UNITE
HERMETIQUE



R134a – Hermetic – For Medium / High Temperature Applications

HTA - the High Temperature Answer.

The HTA range has been developed to meet Australia's specific requirements:

- High ambient temperature capability up to 46°C
- For situations where air circulation to the condensing unit is restricted
- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

Features

- Compressor charged with Polyolester oil and dry nitrogen
- Models shown with 'R' suffix are fitted with liquid receiver
- Rotolock suction and liquid valves on CAJ/TAJ, FH/TFH and TAG models
- Crankcase heater, oil sight glass and automatic reset HP/LP control on FH/TFH and TAG models

Cat. No.	Model	Compressor		Amb. Temp °C	R134a Capacity : Watts								Conns. Suction : Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C										
					-15	-10	-5	0	5	7.2	10	15			
259512	CAJ T 4511YHR	1	CSR 3Ø	32	1276	1646	2061	2525	3036	3277	3598	4212	5/8" : 3/8"	1/356	5.66
259513	TAJ T 4511YHR			43	1111	1440	1812	2231	2697	2917	3212	3779			
				46	1072	1393	1757	2167	2625	2842	3132	—			
259514	FH T 4518YHR	1½	CSR 3Ø	32	1909	2420	3050	3800	4674	5098	5674	6804	5/8" : 3/8"	2/356	7.16
259515	TFH T 4518YHR			43	1661	2117	2682	3358	4151	4538	5065	6104			
				46	1604	2048	2600	3262	4041	4421	4940	5965			
259516	FH T 4525YHR	2	CSR 3Ø	32	2306	3138	4000	4940	6006	6526	7245	8710	5/8" : 3/8"	2/356	9.05
259517	TFH T 4525YHR			43	2007	2745	3517	4365	5335	5809	6467	7814			
				46	1937	2655	3409	4240	5192	5659	6307	7636			
259518	TAG T 4528YHR	2½	3Ø	32	2267	3103	4073	5179	6426	7020	7818	9359	7/8" : 3/8"	2/406	4.21
				43	1973	2715	3581	4577	5708	6249	6978	8396			
				46	1904	2626	3471	4446	5555	6088	6806	—			
259519	TAG T 4534YHR	2¾	3Ø	32	2940	3954	5115	6426	7893	8588	9519	11308	7/8" : 3/8"	2/406	5.18
				43	2559	3459	4497	5679	7011	7644	8497	10144			
				46	2470	3346	4360	5516	6823	7448	8287	9914			
259520	TAG T 4537YHR	3	3Ø	32	3167	4294	5586	7042	8662	9427	10447	12396	7/8" : 3/8"	2/406	5.53
				43	2756	3757	4911	6223	7694	8391	9325	11121			
				46	2470	3634	4761	6045	7488	8175	9095	10868			
259521	TAG T 4543YHR	3½	3Ø	32	3547	4856	6249	7834	9615	10462	11597	13791	7/8" : 3/8"	2/406	5.85
				43	3174	4248	5494	6923	8540	9312	10351	12372			
				46	3063	4109	5326	6725	8312	9073	10096	—			

Capacity Rating Basis: 11K Return gas superheat, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient, 32°C return gas and 7.2°C evaporating.

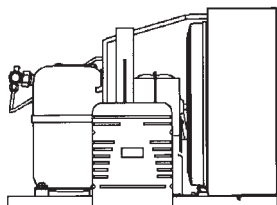
Motor Types:

- CSR: Capacitor Start and Run, 1 Phase, 50 Hz, 220-240 Volt
- 3Ø: 3 Phase, 50 Hz, 400 Volt

Condensing Units

L'Unite Hermetique

R22 – Hermetic – For Medium / High Temperature Applications



HTA - the High Temperature Answer.

The HTA range has been developed to meet Australia's specific requirements:

- High ambient temperature capability up to 46°C
- For situations where air circulation to the condensing unit is restricted
- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

Features

- Compressor charged with Mineral oil and dry nitrogen
- Rotalock suction and liquid valves on CAJ/TAJ models
- All models fitted with liquid receiver

Cat. No.	Model	Compressor		Amb. Temp °C	R22 Capacity : Watts								Conns. Suction : Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C										
					-25	-20	-15	-10	-5	0	7.2	15			
259531	AEZ T 4425EHR	1/5	CSIR	32 43 46			248 216 208	308 269 261	379 333 323	461 407 396	591 526 513	740 664 —	3/8" : 1/4"	1/205	1.79
259533	AEZ T 4430EHR	1/4	CSIR	32			336	410	495	589	741	929	3/8" : 1/4"	1/250	2.16
259537	AEZ T 9440TMHR	1/3	CSR	32 43 46	299 258 248	371 321 309	461 401 387	566 495 479	688 605 586	824 728 707	1045 930 906	1313 1178 1151	3/8" : 1/4"	1/250	2.24
259541	CAE T 9450TMHR	3/8	CSR	32 43 46	358 308 296	447 387 373	565 492 475	712 623 602	882 775 752	1074 949 922	1379 1227 1196	1738 1559 1524	3/8" : 1/4"	1/300	2.91
259542	CAE T 9460TMHR	1/2	CSR	32 43 46	443 382 367	569 493 474	713 621 599	878 768 743	1061 933 904	1264 1117 1085	1588 1413 1377	1983 1779 —	3/8" : 1/4"	1/300	3.37
259543	CAJ T 9480TMHR	5/8	CSR	32 43 46	602 519 498	782 677 652	989 861 831	1220 1067 1032	1474 1296 1256	1749 1546 1501	2182 1942 1892	2694 — —	1/2" : 3/8"	1/300	3.91
259544	CAJ T 9510TMHR	1	CSR	32 43 46	721 621 597	934 809 779	1173 1021 985	1439 1259 1218	1735 1525 1479	2061 1821 1769	2588 2304 —	3243 — —	5/8" : 3/8"	1/320	4.85
259545	CAJ T 9513TMHR	1 1/8	CSR	32 43 46	815 702 675	1099 952 916	1429 1244 1200	1803 1577 1526	2218 1950 1890	2671 2360 2293	3385 3013 2935	4233 3797 —	5/8" : 3/8"	1/356	6.15
259546 259547	CAJ T 4517EHR TAJ T 4517THR	1 1/4	CSR 3Ø	32 43 46			1708 1486 1435	2105 1841 1781	2543 2236 2167	3026 2674 2598	3818 3398 3311	4829 — —	5/8" : 3/8"	1/356	6.5 2.83
259548	TAJ T 4519THR	1 1/2	3Ø	32 43 46			2308 2009 1939	2819 2466 2385	3401 2990 2899	4055 3583 3481	5131 4567 4450	6485 5818 —	5/8" : 3/8"	1/406	3.44

Capacity Rating Basis: 11K Return gas superheat, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient, 32°C return gas and 7.2°C evaporating.

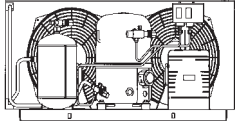
Motor Types:

- CSIR: Capacitor Start, Induction Run } 1 Phase, 50 Hz, 220-240 Volt • 3Ø: 3 Phase, 50 Hz, 400 Volt
- CSR: Capacitor Start and Run

Continued on following page

Condensing Units

L'Unite Hermetique



R22 – Hermetic – For Medium / High Temperature Applications

HTA - the High Temperature Answer.

The HTA range has been developed to meet Australia's specific requirements:

- High ambient temperature capability up to 46°C
- For situations where air circulation to the condensing unit is restricted
- Ideal for product pull down where high evaporating temperatures occur
- Where greater efficiency is required to lower energy consumption

Features

- Compressor charged with Mineral oil and dry nitrogen
- Rotalock suction and liquid valves on FH/TFH and TAG models
- Crankcase heater, oil sight glass and automatic reset HP/LP control on FH/TFH and TAG models
- All models fitted with liquid receiver

Cat. No.	Model	Compressor		Amb. Temp °C	R22 Capacity : Watts						Conns. Suction : Liquid	Cond. Fan(s) No./Dia. mm	Nom. Current Comp. + Fan(s) FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C								
					-15	-10	-5	0	7.2	15			
259551 259552	FH T 4524FHR TFH T 4524FHR	2	CSR 3Ø	32 43 46	2486 2164 2088	3122 2731 2642	3865 3398 3294	4698 4152 4033	6026 5364 5226	7587 6806 —	5/8" : 3/8"	1/406	11 4
259555 259556	FH T 4531FHR TFH T 4531FHR	2½	CSR 3Ø	32 43 46	3670 3194 3083	4432 3877 3750	5332 4688 4544	6337 5600 5440	7907 7038 6857	9676 8680 —	7/8" : 3/8"	2/356	15 4.67
259558	TFH T 4540FHR	3	3Ø	32 43 46	4298 3741 3610	5319 4653 4501	6483 5700 5525	7771 6867 6671	9800 8723 8499	12165 10913 —	7/8" : 1/2"	2/406	7.04
259559	TAG T 4546THR	4	3Ø	32 43 46	4686 4078 3936	5862 5128 4960	7278 6399 6203	8959 7917 7690	11884 10578 10306	15795 14170 13847	7/8" : 5/8"	2/406	7.51
259560	TAG T 4553THR	4½	3Ø	32 43 46	5429 4725 4560	6705 5866 5674	8229 7235 7014	10042 8874 8620	13245 11789 11486	17621 15808 15448	7/8" : 5/8"	2/406	8.34
259561	TAG T 4561THR	5	3Ø	32 43 46	5990 5213 5032	7739 6770 6549	9614 8453 8194	11611 10261 9967	14684 13070 12734	18261 16882 —	1½/8" : 5/8"	2/406	10.6
259562	TAG T 4568THR	6	3Ø	32 43 46	6766 5888 5683	8746 7651 7401	10899 9582 9289	13225 11687 11352	16874 15020 14633	21186 19006 18574	1½/8" : 5/8"	2/406	10.4
259563	TAG T 4573THR	6½	3Ø	32 43 46	7309 6361 6140	8985 7860 7603	10873 9560 9267	12972 11463 11135	16367 14568 14193	20539 18426 18007	1½/8" : 5/8"	2/406	11.3
259564	TAGD T 4590THR	2 x 4	3Ø	32 43 46	8448 7352 7096	10667 9331 9026	13186 11593 11238	16003 14142 13737	20585 18323 17851	22534 20114 19618	1½/8" : 5/8"	2/508	14
259565	TAGD T 4610THR	2 x 4½	3Ø	32 43 46	9688 8431 8138	12426 10870 10515	15251 13409 12998	18248 16126 15664	23035 20503 19976	25091 22396 21844	1½/8" : 5/8"	2/508	15.6
259566	TAGD T 4612THR	2 x 5	3Ø	32 43 46	12140 10565 10198	15464 13528 13086	19071 16767 16254	22960 20290 19709	29060 25866 25201	31591 28198 27503	1¾/8" : 5/8"	2/508	18
259567	TAGD T 4614THR	2 x 6	3Ø	32 43 46	12698 11051 10666	16035 14027 13569	19854 17456 16922	24154 21345 20734	31195 27767 27052	34205 30531 29779	1¾/8" : 5/8"	2/508	20.4

Capacity Rating Basis: 11K Return gas superheat, temperature of refrigerant at condenser outlet is subcooled within the condensing limits of the unit. Current FLA are given at nominal voltage, 32°C ambient, 32°C return gas and 7.2°C evaporating.

Motor Types:

- CSR: Capacitor Start and Run, 1 Phase, 50 Hz, 220-240 Volt
- 3Ø: 3 Phase, 50 Hz, 400 Volt

Condensing Units

L'Unite Hermetique HTA Condensing Units

Specifications

R404A Low Temperature

Cat No.	Model No.	Overall Dimensions			Weight kg	Sound Power* Level dBA
		Height	Depth	Width		
259570	CAE T 2417ZBR	300	495	350	24	62
259571	CAE T 2420ZBR	300	495	350	24.3	66
259572	CAE T 2424ZBR	340	495	430	25.5	68
259573	CAJ T 2428ZBR	340	485	430	33.4	69
259574	CAJ T 2432ZBR	340	485	430	33.4	70
259575	CAJ T 2446ZBR	340	485	430	35.8	71
259576	CAJ T 2464ZBR	445	610	510	43.3	71
259577	TAJ T 2464ZBR	445	610	510	43.1	75
259578	FH T 2480ZBR	445	630	510	59	76
259579	TFH T 2480ZBR	445	630	510	59	75
259585	FH T 2511ZBR	469	618	1002	101	77
259580	TFH T 2511ZBR	469	618	1002	101	78
259581	TAG T 2516ZBR	465	593	1020	107	78
259582	TAG T 2522ZBR	565	650	1080	107	81
259583	TAGD T 2532ZBR	868	720	1417	210	82
259584	TAGD T 2544ZBR	868	720	1417	215	83

R404A Medium/High Temperature

259590	AEZ T 4425ZHR	257	352	316	20	59
259591	AEZ T 4430ZHR	300	495	345	24.4	64
259593	AEZ T 9440ZMHR	300	495	355	28	66
259594	CAE T 9450ZMHR	340	495	430	29	68
259595	CAE T 9460ZMHR	340	495	430	29	68
259596	CAE T 9470ZMHR	340	495	430	30	67
259597	CAJ T 9480ZMHR	340	485	430	41	66
259599	CAJ T 9510ZMHR	395	610	510	43	69
259600	CAJ T 9513ZMHR	445	630	510	45	74
259602	CAJ T 4517ZHR	445	630	510	51	75
259603	TAJ T 4517ZHR	445	630	510	48	75
259604	CAJ T 4519ZHR	558	600	600	72	78
259605	TAJ T 4519ZHR	558	600	600	51	78
259608	FH T 4524ZHR	558	608	600	73	79
259609	TFH T 4524ZHR	558	608	600	69	79
259610	FH T 4531ZHR	469	642	1002	80	77
259611	TFH T 4531ZHR	469	642	1002	78	77
259586	FH T 4540ZHR	565	650	1080	112	82
259612	TFH T 4540ZHR	565	650	1080	90	81
259613	TAG T 4546ZHR	565	644	1080	98	84
259614	TAG T 4553ZHR	565	644	1080	97	84
259615	TAG T 4561ZHR	565	644	1080	106	84
259616	TAG T 4568ZHR	565	650	1080	135	84
259617	TAG T 4573ZHR	565	650	1080	135	83
259618	TAGD T 4590ZHR	868	720	1417	208	87
259619	TAGD T 4610ZHR	868	720	1417	213	87
259620	TAGD T 4612ZHR	868	720	1417	218	87
259621	TAGD T 4614ZHR	868	720	1417	228	88

All Dimensions Nominal subject to change without notice

Refer to following page for R134a and R22 units * Subtract 17dBA to convert to sound pressure at 3m distance

Actrol Engineering Services
Actrol provides a compressive Application engineering service to the trade for the following:
Heat load calaculations, Equipment selection
Technical support

Whether it be to size up a:
Coolroom, Blast freezer room
Humidity controlled environment, Multiple refrigeration plant
Upgrade or Refurbishment, Air-cooled condenser selection
Refrigerant pipeline sizing

Contact your Actrol state applications engineer for assistance.



Your best Solution...

Condensing Units

L'Unite Hermetique HTA Condensing Units

Specifications

R134a Medium/High Temperature

Cat No.	Model No.	Overall Dimensions			Weight kg	Sound Power Level dBA
		Height	Depth	Width		
259503	AEZ T 4425YHR	257	352	316	19	60
259504	AEZ T 4430YHR	300	495	355	22.3	64
259505	CAE T 4440YHR	300	495	355	22.8	66
259506	CAE T 4448YHR	340	495	430	25.2	68
259507	CAE T 4456YHR	340	495	430	25.6	68
259508	CAJ T 4452YHR	340	485	430	33.1	69
259509	CAJ T 4461YHR	340	485	430	32.2	68
259510	CAJ T 4476YHR	340	485	430	36.5	66
259511	CAJ T 4492YHR	445	610	510	42.1	74
259512	CAJ T 4511YHR	445	610	510	40.2	74
259513	TAJ T 4511YHR	445	610	510	41	74
259514	FH T 4518YHR	469	618	1002	80	76
259515	TFH T 4518YHR	469	618	1002	80.5	76
259516	FH T 4525YHR	469	618	1002	78.5	78
259517	TFH T 4525YHR	469	618	1002	79	78
259518	TAG T 4528YHR	565	650	1080	87	81
259519	TAG T 4534YHR	565	650	1080	98	80
259520	TAG T 4537YHR	565	650	1080	98	80
259521	TAG T 4543YHR	565	650	1080	104	81

R22 Medium/High Temperature

259531	AEZ T 4425EHR	257	352	316	20	59
259533	AEZ T 4430EHR	300	495	345	24.4	64
259537	AEZ T 9440TMHR	300	495	355	28	66
259541	CAE T 9450TNHR	340	495	430	29	69
259542	CAE T 9460TMHR	340	495	430	29	69
259543	CAJ T 9480TMHR	340	485	430	41	67
259544	CAJ T 9510TMHR	395	610	510	43	69
259545	CAJ T 9513TMHR	445	630	510	45	74
259546	CAJ T 4517 EHR	445	630	510	51	75
259547	TAJ T 4517THR	445	630	510	44	75
259548	TAJ T 4519THR	558	600	600	73	78
259551	FH T 4524FHR	558	608	600	69	76
259552	TFH T 4524FHR	558	608	600	70	78
259555	FH T 4531FHR	469	642	1002	80	77
259556	TFH T 4531FHR	469	642	1002	77	77
259558	TFH T 4540FHR	565	650	1080	90	81
259559	TAG T 4546THR	565	644	1080	97	82
259560	TAG T 4553THR	565	644	1080	96	82
259561	TAG T 4561THR	565	644	1080	108	81
259562	TAG T 4568THR	565	650	1080	135	81
259563	TAG T 4573THR	565	650	1080	135	81
259564	TAGD T 4590THR	868	720	1417	208	85
259565	TAGD T 4610THR	868	720	1417	213	85
259566	TAGD T 4612THR	868	720	1417	218	85
259567	TAGD T 4614THR	868	720	1417	228	86

All Dimensions Nominal subject to change without notice

* Subtract 17dBA to convert to sound pressure at 3m distance

Condensing Units

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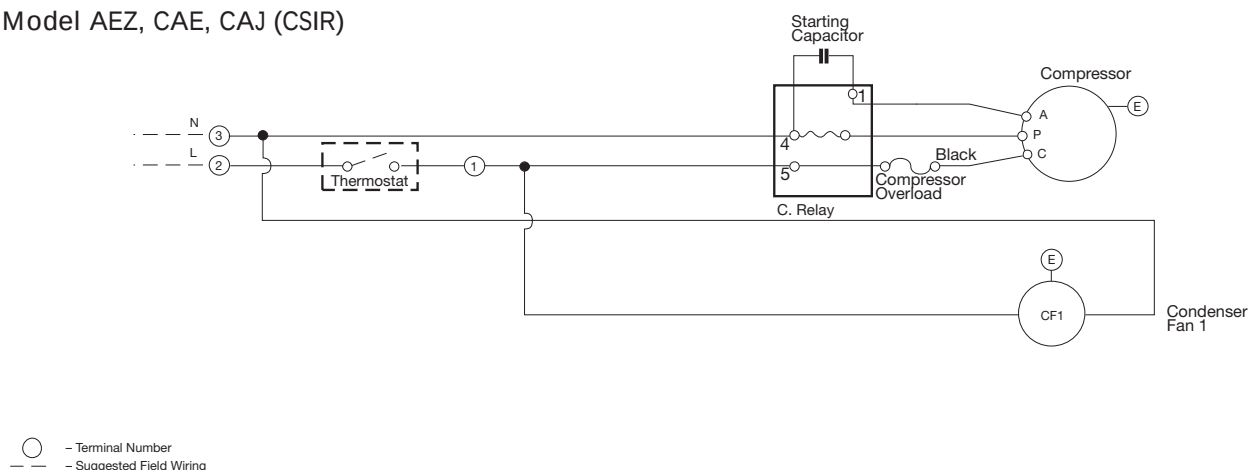
Condensing Unit Wiring Diagrams

Condensing Units

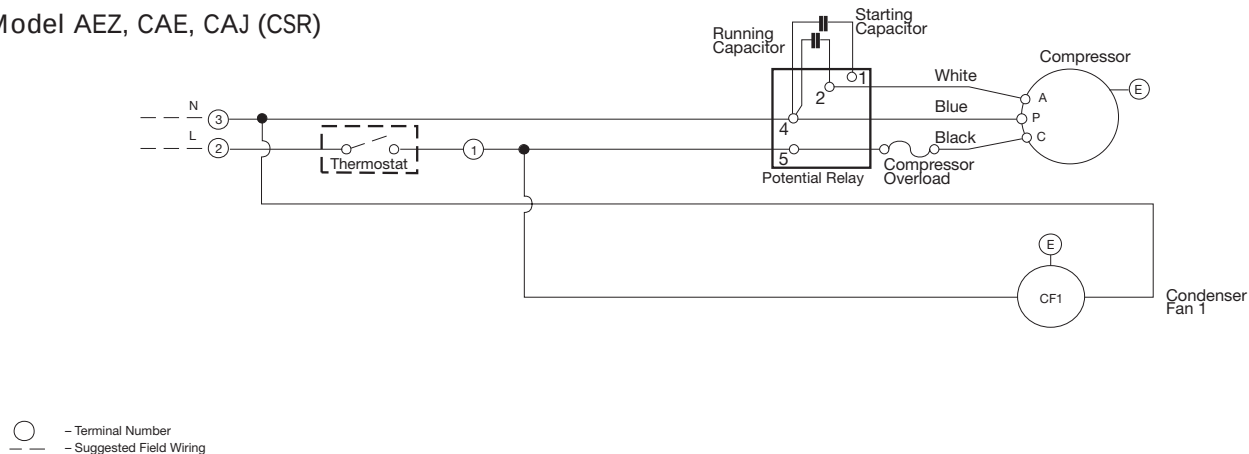
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Condensing Unit Wiring Diagrams

Model AEZ, CAE, CAJ (CSIR)

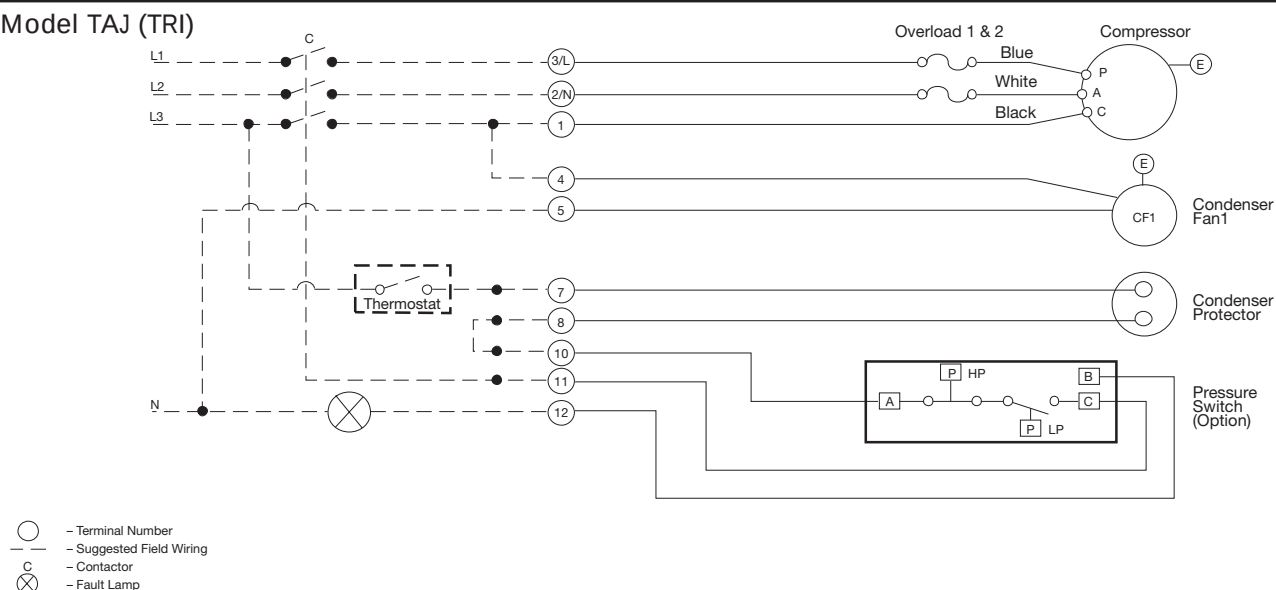


Model AEZ, CAE, CAJ (CSR)



4

Model TAJ (TRI)

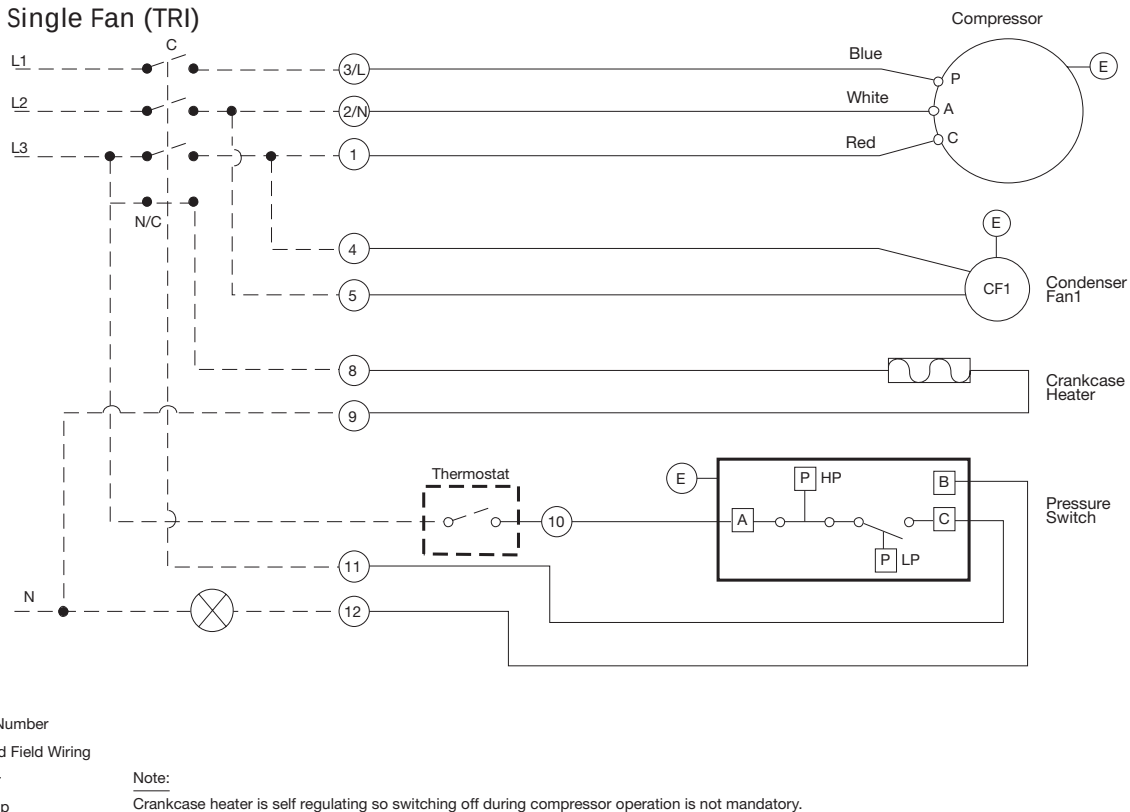


Condensing Units

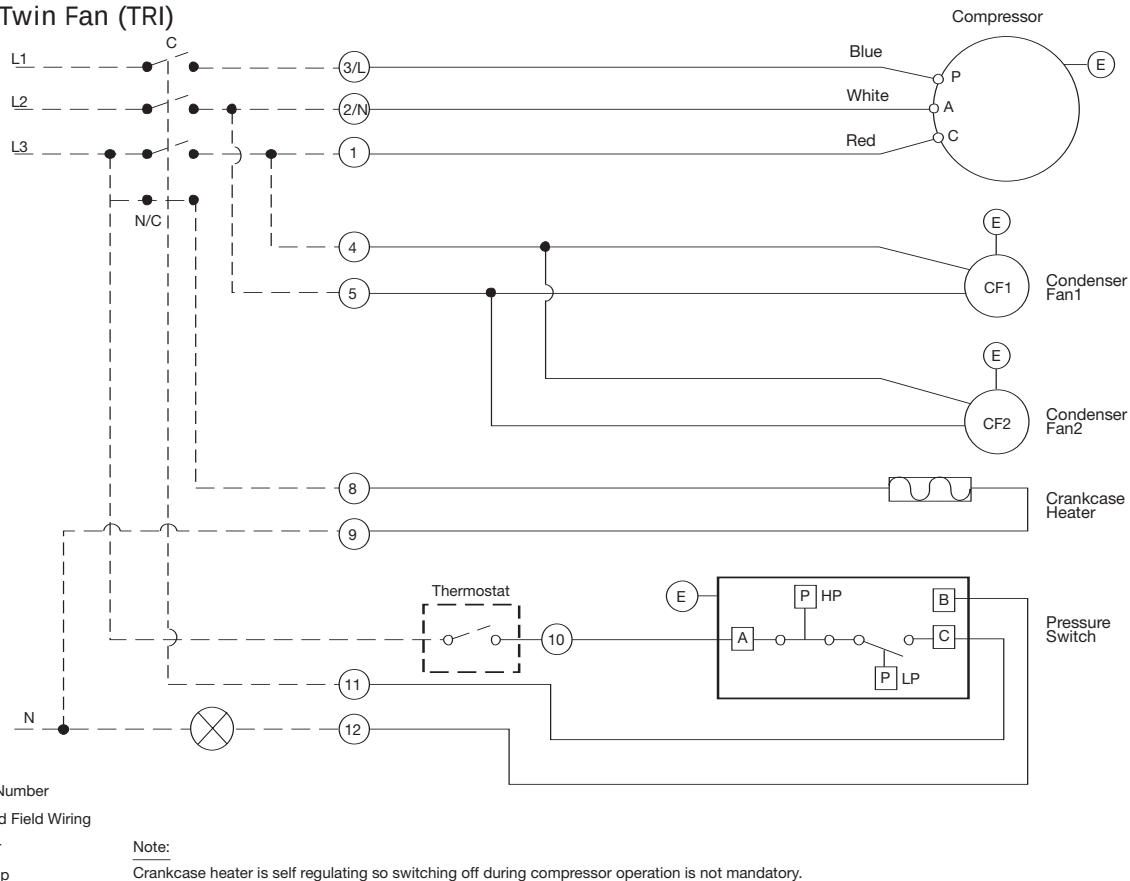
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Condensing Unit Wiring Diagrams

Model TFH Single Fan (TRI)



Model TFH Twin Fan (TRI)

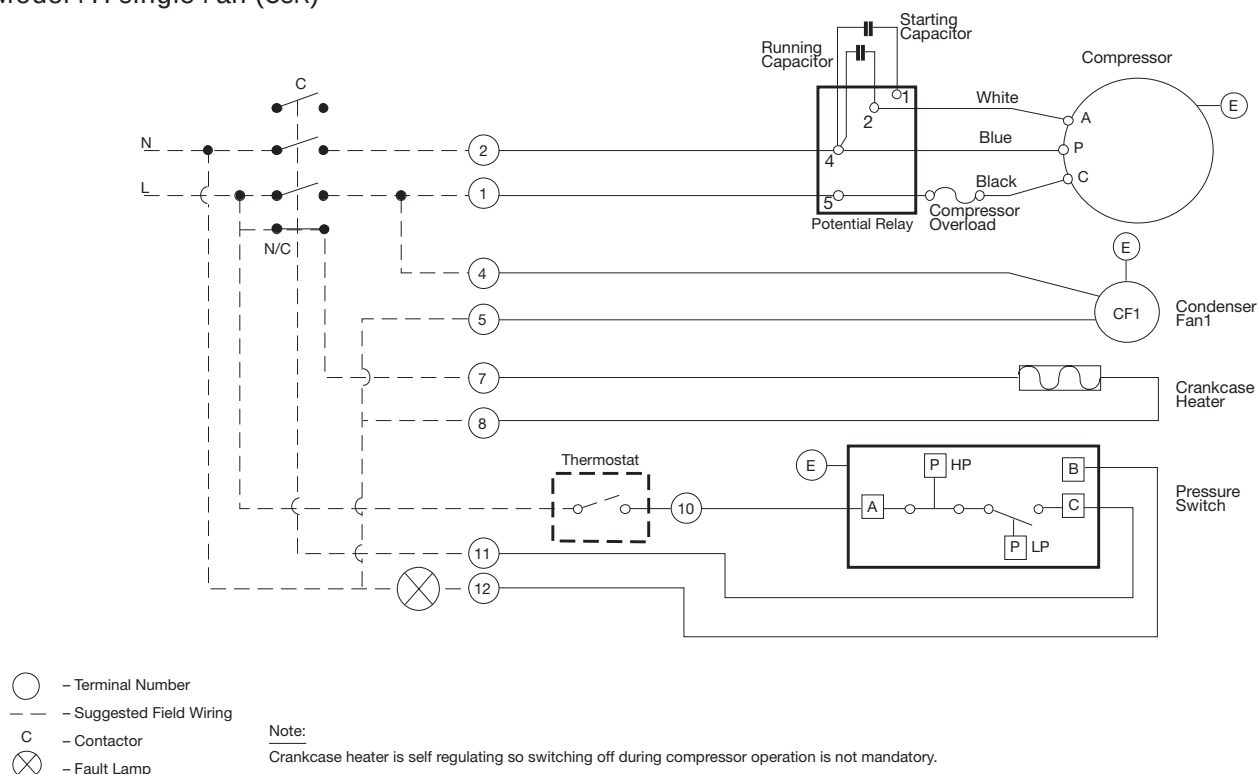


Condensing Units

L'Unite Hermetique

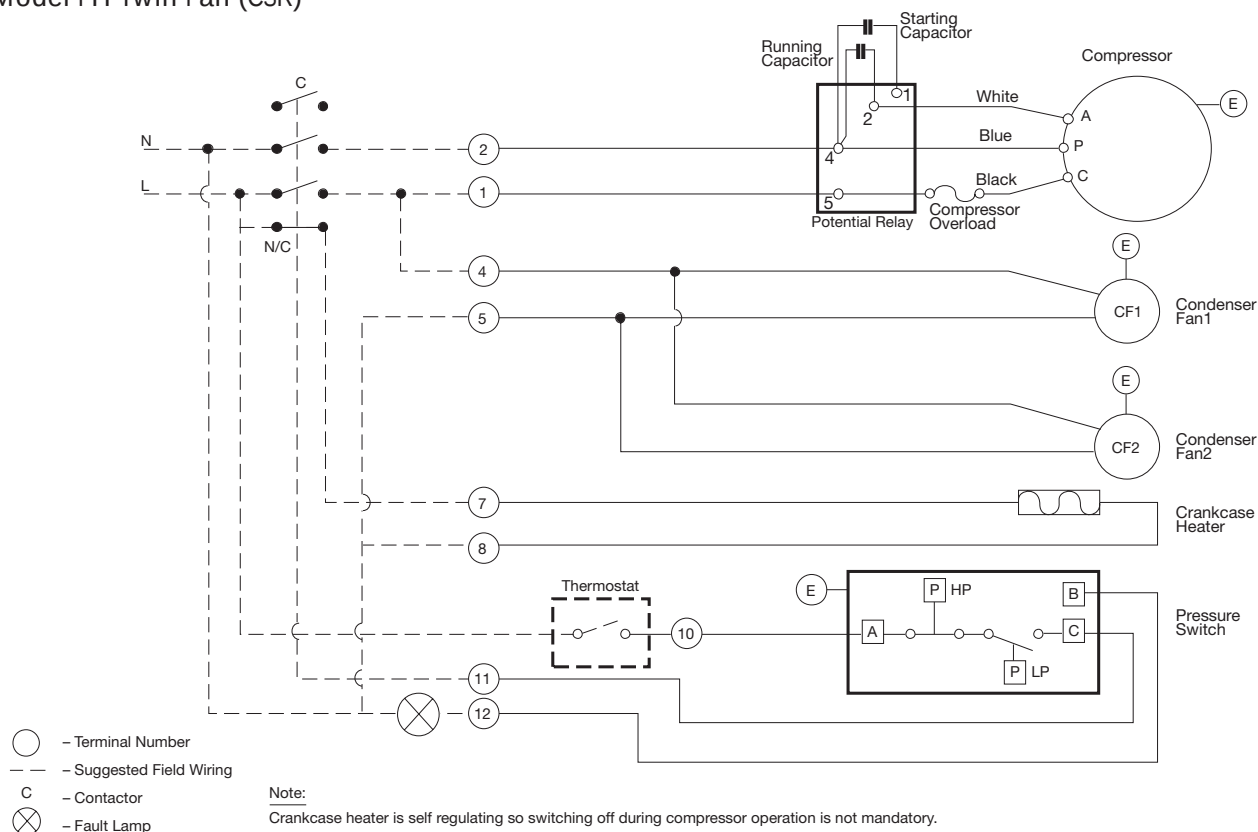
Condensing Unit Wiring Diagrams

Model FH Single Fan (CSR)



4

Model FH Twin Fan (CSR)

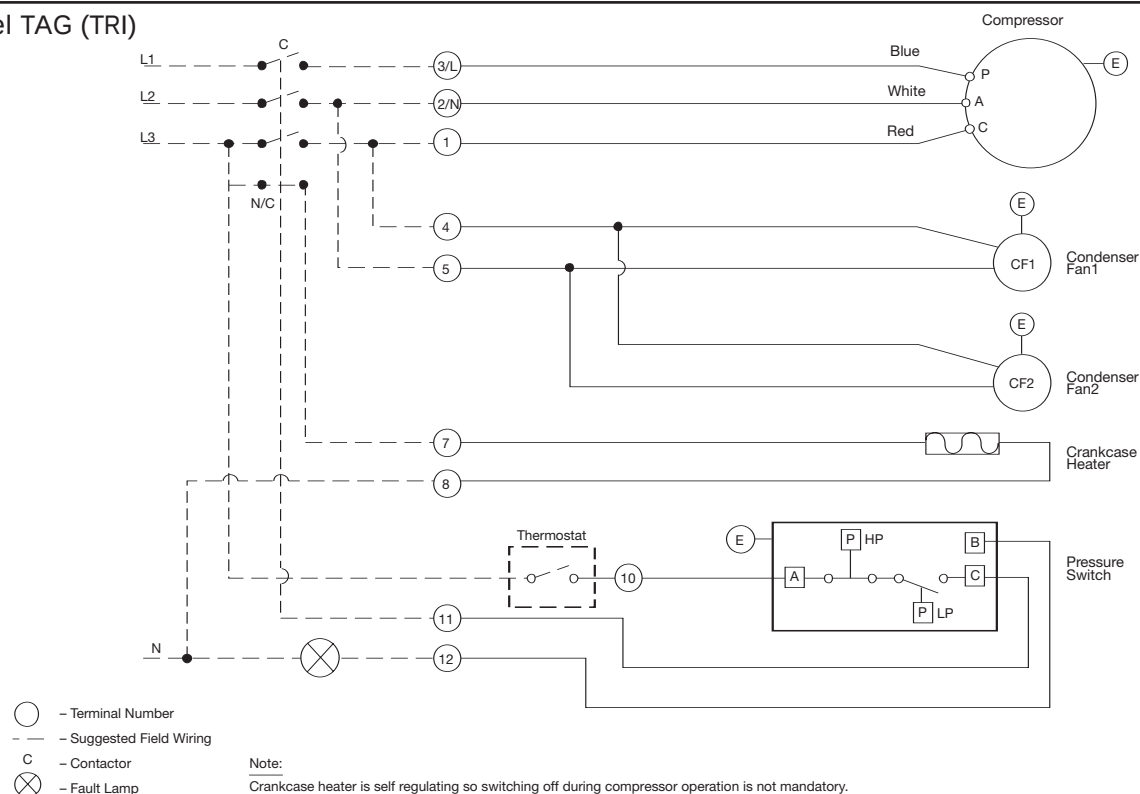


Condensing Units

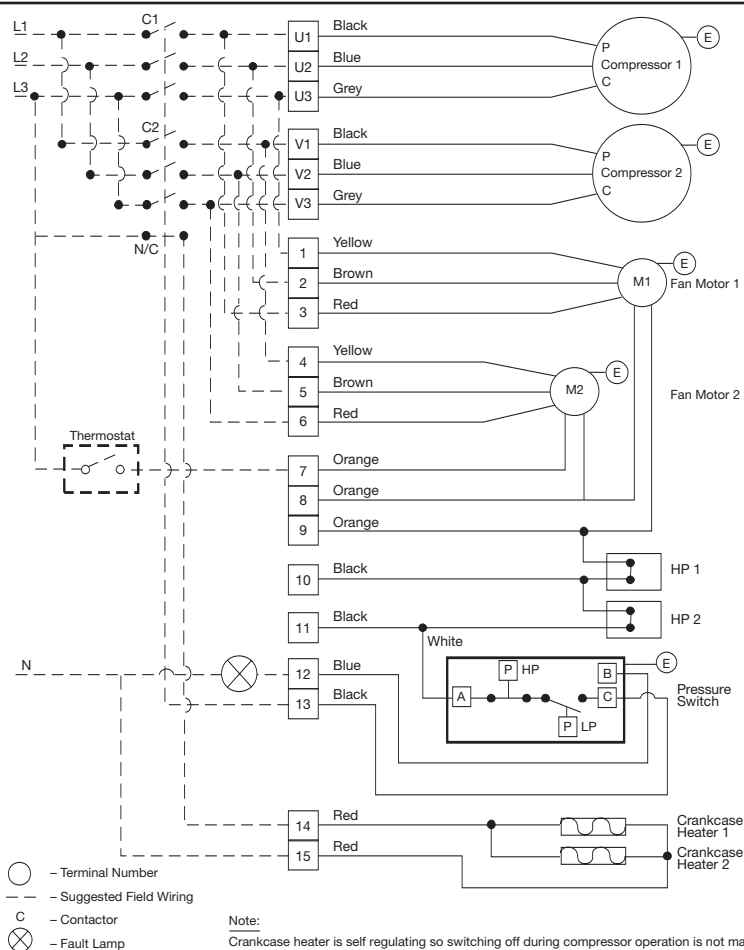
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Condensing Unit Wiring Diagrams

Model TAG (TRI)



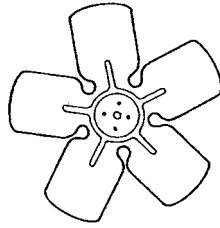
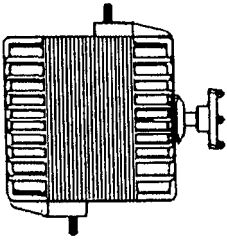
Model TAGD (TRI)



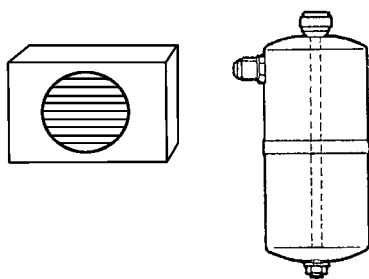
Condensing Units

L'Unite Hermetique

HTA Condensing Unit Spare Parts



Model	Fan & Motor Assy						Fan Motor					
	Cat No.	LUH P/No	Motor Watts	Fan Dia.	Shaft Height	Motor P/No	Cat No.	LUH P/No	Watts	Volts	Hz	Ph
R404A Low Temperature Parts												
CAET2417ZBR	310017	8668755	5	202mm	120mm	5302593	310015	8668129	5	220	50/60	1
CAET2420ZBR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
CAET2424ZBR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT2428ZBR	310013	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT2432ZBR		8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT2446ZBR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT2464ZBR		8668551	120	256mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TAJT2464ZBR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
FHT2480ZBR		8668551	120	256mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TFHT2480ZBR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TFHT2511ZBR		8668553	90	356/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TAGT2516ZBR		8668553	90	356/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TAGT2522ZBR		8668550	120	406mm	257mm	519638	310021	8551050	120	380/440	50/60	1
TAGDT2532ZBR		668553	180	205mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
TAGDT2544ZBR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
R404A Medium/High Temperature												
AEZT4425ZHR	310017	8668755	5	202mm	120mm	5302593	310015	8668129	5	220	50/60	1
AEZT4430ZHR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
AEZT9440ZMHR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
CAET9450ZMHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAET9460ZMHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAET9470ZMHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT9480ZMHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT9510ZMHR		8668737	25	320mm	175mm	5302505	310009	8668113	25	220/240	50	1
CAJT9513ZMHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
CAJT4517ZHR		8668551	120	356/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TAJT4517ZHR		8668553	90	356/24°	200mm	519641	310023	8551053	90	380/440	50/60	1
CAJT4519ZHR		8668741	120	406mm	N/A	5192531	310010	8651039	120	220	50/60	1
TAJT4519ZHR		8668742	120	406mm	N/A	5192525	310013	8651040	120	380/440	50/60	1
FHT4524ZHR		8668741	120	406mm	N/A	5192531	310010	8651039	120	220	50/60	1
TFHT4524ZHR		8668742	120	406mm	N/A	2192525	310013	8651040	120	380/440	50/60	1
FHT4531ZHR		8668551	120	356/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TFHT4531ZHR		8668553	90	356/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TFHT4540ZHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4546ZHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4553ZHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4561ZHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4568ZHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4573ZHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGDR4590ZHR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
TAGDT4610ZHR		668553	180	508mm	N/A	5192487	310012	8651041	180	340/440	50/60	1
TAGDT4612ZHR		668553	180	208mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
TAGDT4614ZHR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3

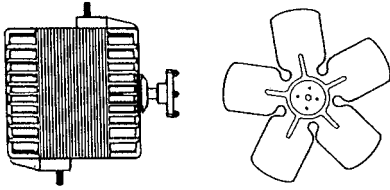


Model	Fan Blade					Fan Guard		Condenser		Liquid Receiver		
	Cat No.	P/No	Dia. mm	No of Blades	Pitch Degrees	Cat No.	P/No.	Cat No	Part No	Cat No	Part No	Volume
R404A Low Temperature												
CAET2417ZBR	305107	8555097	202	5	23		8363147	295038	8338205	302070	8380142	0.75
CAET2420ZBR	305104	8668022	250	3	30		8363155	295031	8338229	302071	8661567	1.5
CAET2424ZBR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAJT2428ZBR	305105	8668023	300	3	20		8363119	295033	8338219	302071	8661567	1.5
CAJT2432ZBR	305105	8668023	300	3	20		8363119	295033	8338219	302071	8661567	1.5
CAJT2446ZBR	305105	8668023	300	3	20		8363119	295034	8338221	302071	8661567	1.5
CAJT2464ZBR	305103	8668014	356	3	24		8363098	295039	8337092	302072	8661566	2.35
TAJT2464ZBR	305103	8668014	356	3	24		8363098	295039	8337092	302071	8661567	1.5
FHT2480ZBR	305103	8668014	356	3	24		8363098	295035	8338093	302072	8661566	2.35
TFHT2480ZBR	305103	8668014	356	3	24		8363098	295035	8338093	302072	8661566	2.35
TFHT2511ZBR	305103	8668014	356	3	24		8363098	295040	8337027	302074	8380160	6
TAGT2516ZBR	305103	8668014	356	3	24		8363098	295050	8337028	302074	8380160	6
TAGT2522ZBR	305109	8668015	406	3	26		8318584	295042	8337104	302074	8380160	6
TAGDT2532ZBR	305110	8668018	508	3	32		8318615	295043	8337143	302077	8380156	12
TAGDT2544ZBR	305110	8668018	508	3	32		8318615	295044	8337144	302077	8380156	12
R404A Medium/High Temperature												
AEZT4425ZHR	305107	8555097	202	5	23		8363147	295038	8338205	302070	8380142	0.75
AEZT4430ZHR	305104	8668022	250	3	30		8363155	295045	8338208	302071	8661567	1.5
AEZT9440ZMHR	305104	8668022	250	3	30		8363155	295031	8338229	302071	8661567	1.5
CAET9450ZMHR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAET9460ZMHR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAET9470ZMHR	305105	8668023	300	3	20		8363119	295034	8338221	302072	8661566	2.35
CAJT9480ZMHR	305105	8668023	300	3	20		8363119	295046	8338248	302071	8661567	1.5
CAJT9510ZMHR	305108	8668013	320	3	20		8318560	295047	8337103	302071	8661567	1.5
CAJT9513ZMHR	305103	8668014	356	3	24		8363098	295035	8338093	302071	8661567	1.5
CAJT4517ZHR	305103	8668014	356	3	24		8363098	295035	8338093	302072	8661566	2.35
TAJT4517ZHR	305103	8668014	356	3	24		8363098	295035	8338093	302071	8661567	1.5
CAJT4519ZHR	305109	8668015	406	3	26		8318616	295048	8337096	302074	8380160	6
TAJT4519ZHR	305109	8668015	406	3	26		8318616	295048	8337096	302072	8661566	2.35
FHT4524ZHR	305109	8668015	406	3	26		8318616	295049	8337097	302072	8661566	2.35
TFHT4524ZHR	305109	8668015	406	3	26		8318616	295049	8337097	302074	8380160	6
FHT4531ZHR	305103	8668014	356	3	24		8363098	295050	8337028	302074	8380160	6
TFHT4531ZHR	305103	8668014	356	3	24		8363098	295050	8337028	302074	8380160	6
TFHT4540ZHR	305109	8668015	406	3	26		8318584	295042	8337104	302074	8380160	6
TAGT4546ZHR	305109	8668015	406	3	26		8318584	295052	8337030	302074	8380160	6
TAGT4553ZHR	305109	8668015	406	3	26		8318584	295052	8337030	302074	8380160	6
TAGT4561ZHR	305109	8668015	406	3	26		8318584	295052	8337030	302075	8380157	9.5
TAGT4568ZHR	305109	8668015	406	3	26		8318584	295053	8337258	302075	8380157	9.5
TAGT4573ZHR	305109	8668015	406	3	26		8318584	295053	8337258	302075	8380157	9.5
TAGDT4590ZHR	305110	8668018	508	3	32		8318615	295054	8337145	302077	8380156	12
TAGDT4610ZHR	305110	8668018	508	3	32		8318615	295054	8337145	302077	8380156	12
TAGDT4612ZHR	305110	8668018	508	3	32		8318615	295055	8337257	302077	8380156	12
TAGDT4614ZHR	305110	8668018	508	3	32		8318615	295055	8337257	302077	8380156	12

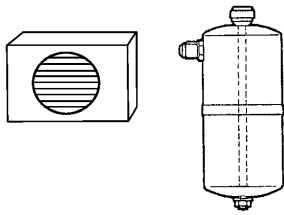
Condensing Units

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HTA Condensing Unit Spare Parts



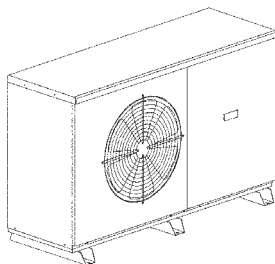
Model	Fan & Motor Assy						Fan Motor					
	Cat No.	LUH P/No	Motor Watts	Fan Dia.	Shaft Height	Motor P/No	Cat No.	LUH P/No	Watts	Volts	Hz	Ph
R134a Medium/High Temperature												
AEZT4425YHR	310017	8668755	5	202mm	120mm	5302593	310015	8668129	5	220	50/60	1
AEZT4430YHR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
CAET4440YHR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
CAET4448YHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAET4456YHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT4452YHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT4461YHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT4476YHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT4492YHR		8668551	120	256mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
CAJT4511YHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TAJT4511YHR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
FHT4518YHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TFHT4518YHR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
FHT4525YHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TFHT4525YHR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TAGT4528YHR		8668550	120	406mm/26°	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4534YHR		8668550	120	406mm/26°	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4537YHR		8668550	120	406mm/26°	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4543YHR		8668550	120	406mm/26°	257mm	5192638	310021	8551050	120	380/440	50/60	1
R22 Medium/High Temperature												
AEZT4425EH	310017	8668755	5	202mm	120mm	5302593	310015	8668129	5	220	50/60	1
AEZT4425EHR	310017	8668755	5	202mm	120mm	5302593	310015	8668129	5	220	50/60	1
AEZT4430EH		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
AEZT4430EHR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
AEZT9440TMHR		8668733	22	250mm	130mm	5302471	310014	8668123	22	208/220	50	1
CAE9450TNHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAET9460TMHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT9480TMHR	310016	8668734	22	300mm	160mm	5302471	310014	8668123	22	208/220	50	1
CAJT9510TMHR		8668737	25	320mm	175mm	5302505	310009	8668113	25	220/240	50	1
CAJT9513TMHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
CAJT4517EHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TAJT4517THR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TAJT4519THR		8668742	120	406mm	N/A	5192525	310013	8651040	120	380/440	50/60	1
FHT4525FHR		8668741	120	406mm	N/A	5192531	310010	8651039	120	220	50/60	1
TFHT4524FHR		8668742	120	406mm	N/A	5192525	310013	8651040	120	380/440	50/60	1
FHST4531FHR		8668741	120	406mm	N/A	5192531	310010	8651039	120	220	50/60	1
TFHST4531FHR		8668742	120	406mm	N/A	5192525	310013	8651040	120	380/440	50/60	1
FHT4531FHR		8668551	120	356mm/24°	200mm	5192639	310022	8551051	120	220	50/60	1
TFHT4531FHR		8668553	90	356mm/24°	200mm	5192641	310023	8551053	90	380/440	50/60	1
TFHT4540FHR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4546THR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4553THR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4561THR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4568THR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGT4573THR		8668550	120	406mm	257mm	5192638	310021	8551050	120	380/440	50/60	1
TAGDT4590THR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
TAGDT4610THR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
TAGDT4612THR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3
TAGDT4614THR		668553	180	508mm	N/A	5192487	310012	8651041	180	380/440	50/60	3



Model	Fan Blade					Fan Guard		Condenser		Liquid Receiver		
	Cat No.	P/No	Dia. mm	No of Blades	Pitch Degress	Cat No.	P/No.	Cat No	Part No	Cat No	Part No	Volume
R134a Medium/High Temperature												
AEZT4425YHR	305107	8555097	202	5	23		8363147	295038	8338205	302070	8380142	0.75
AEZT4430YHR	305104	668022	250	3	30		8363155	295032	8338234	302071	8661567	1.5
CAET4440YHR	305104	8668022	250	3	30		8363155	295031	8338229	302071	8661567	1.5
CAET4448YHR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAET4456YHR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAJT4452YHR	305105	8668023	300	3	20		8363119	295033	8338219	302071	8661567	1.5
CAJT4461YHR	305105	8668023	300	3	20		8363119	295033	8338219	302071	8661567	1.5
CAJT4476YHR	305105	8668023	300	3	20		8363119	295046	8338248	302071	8661567	1.5
CAJT4492YHR	305103	8668014	356	3	24		8363098	295039	8337092	302072	8661566	2.35
CAJT4511YHR	305103	8668014	356	3	24		8363098	295035	8338093	302072	8661566	2.35
TAJT4511YHR	305103	8668014	356	3	24		8363098	295035	8338093	302071	8661567	1.5
FGT4518YHR	305103	8668014	356	3	24		8363098	295040	8337027	302074	8380160	6
TFHT4518YHR	305103	8668014	356	3	24		8363098	295040	8337027	302074	8380160	6
FHT4525YHR	305103	8668014	356	3	24		8363098	295050	8337028	302074	8380160	6
TFHT4525YHR	305103	8668014	356	3	24		8363098	295050	8337028	302074	8380160	6
TAGT4528YHR	305109	8668015	406	3	26		8318584	295060	8337029	302074	8380160	6
TAGT4534YHR	305109	8668015	406	3	26		8318584	295060	8337029	302074	8380160	6
TAGT4537YHR	305109	8668015	406	3	26		8318584	295060	8337029	302074	8380160	6
TAGT4543YHR	30519	8668015	406	3	26		8318584	295042	8337104	302075	8380157	9.5
R22 Medium/High Temperature												
AEZ4425EH	305107	8555097	202	5	23		8363147	295038	8338205		N/A	N/A
AEZT4425EHR	305107	8555097	202	5	23		8363147	295038	8338205	302070	8380142	0.75
AEZT4430EH	305104	8668022	250	3	30		8363155	295045	8338208		N/A	N/A
AEZT4430EHR	305104	8668022	250	3	30		8363155	295045	8338208	302071	8661567	1.5
AEZT9440TMHR	305104	8668022	250	3	30		8363155	295031	8338229	302071	8661567	1.5
CAET9450TMHR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAE9460TMHR	305105	8668023	300	3	20		8363119	295033	8338219	302072	8661566	2.35
CAJT9480TMHR	305105	8668023	300	3	20		8363119	295046	8338248	302071	8661567	1.5
CAJT9510TMHR	305108	8668013	320	3	20		8318560	295047	8337103	302071	8661567	1.5
CAJT9513TMHR	305103	8668014	356	3	24		8363098	295035	8338093	302071	8661567	1.5
CAJT4517EHR	305103	8668014	356	3	24		8363098	295035	8338093	302072	8661566	2.35
TAJT4517THR	305103	8668014	356	3	24		8363098	295035	8338093	302071	8661567	1.5
TAJT4519THR	305109	8668015	406	3	26		8318616	295048	8337096	302072	8661566	2.35
FHT4524FHR	305109	8668015	406	3	26		8318616	295049	8337097	302072	8661566	2.35
TFHT4524FHR	305109	8668015	406	3	26		8318616	295049	8337097	302074	8380160	6
FHST4531FHR	305109	8668015	406	3	26		8318616	295049	8337097	302076	8380159	3.9
TFHST4531FHR	305109	8668015	106	3	26		8318616	295049	8337097	302076	8380159	3.9
FHT4531FHR	305103	8668014	356	3	24		8363098	295050	8337028	302074	8380160	6
TFHT4531FHR	305103	8668014	356	3	24		8363098	295050	8337028	302071	8380160	6
TFHT4540FHR	305109	8668015	406	3	26		8318584	295042	8337104	302074	8380160	6
TAGT4546THR	305109	8668015	406	3	26		8318584	295052	8337030	302074	8380160	6
TAGT4553THR	305109	8668015	406	3	26		8318584	295052	8337030	302074	8380160	6
TAGT4561THR	305109	8668015	406	3	26		831584	295052	8337030	302075	8380157	9.5
TAGT4568THR	305109	8668015	406	3	26		8318584	295053	8337258	302075	8380157	9.5
TAGT4573THR	305109	8668015	406	3	26		8318584	295053	8337258	302075	8380157	9.5
TAGDT4590THR	305110	8668018	508	3	32		8318615	295054	8337145	302077	8380156	12
TAGDT4610THR	305110	8668018	508	3	32		8318615	295054	8337145	302077	8380156	12
TAGDT4612THR	305110	8668018	508	3	32		8318615	295055	8337257	302077	3230156	12
TAGDT4614THR	305110	8668018	508	3	32		8318615	295055	8337257	302077	8380156	12

Packaged Condensing Units

Acpac High Ambient Series – R404A & R507



The Acpac Series of Packaged Condensing Units provide a high quality professional solution for all commercial refrigeration applications. Acpac has been designed in Australia to operate efficiently in both the hot and cold temperature extremes of the Australian environment. Acpac will appeal aesthetically whether installed in the rugged Australian outback or the most architecturally designed buildings.

Features

- Designed for R404A and R507 refrigerants
- Proven reliability with Tecumseh Europe compressors
- Corrosion resistant condensers
- Extra large condensers for high ambient temperature capability
- External rotor fan motors for quiet and efficient operation
- Fan speed control for stable operation across all ambient conditions on three phase models
- HP Fan Control fitted to single phase models
- Compact footprint with robust powder coated enclosure
- Crankcase heater, (3Ø units only) HP/LP and internal compressor protection
- Liquid Line drier, moisture indicator & pump down valve located in compressor compartment for ease of servicing
- Spare DIN rail eliminates the need for a separate control board
- All units pre-wired with contactor, overload and current protection
- Internal Oil separator and Suction Accumulator on Low Temperature and TAGD models
- Internal Oil separator fitted on single phase medium temperature models

Cat. No.	Model	Compressor			Fan(s)			Fan Air Flow	Liquid Receiver Capacity kg @80%	Refrigerant Connections : mm		Nett Weight kg	
		Model	Volts/Phase	MOC Amps	No. Diam. mm	Volts/Phase	MOC Amps			Air Flow l/s	Suction		Liquid
Medium Temperature Application													
259003	AP1.7M1-1	CAJ9480Z	240/1	4.1	1x300	240/1	0.37	483	Vertical	2.3	12.7	9.5	68
259004	AP2.1M1-1	CAJ9510Z		5.2	1x300		0.37	483	Vertical	2.3	15.9	9.5	70
259005	AP2.5M1-1	CAJ9513Z		6.4	1x300		0.37	483	Vertical	2.3	15.9	9.5	70
259006	AP2.8M1-1	CAJ4517Z		7.1	1x300		0.37	483	Vertical	2.3	15.9	9.5	71
259007	AP3.9M1-1	CAJ4519Z		9.9	1x350		0.70	725	Vertical	2.3	15.9	9.5	71
259008	AP4.1M1-1	FH4524Z		10.3	1x350		0.70	1625	Vertical	3.9	15.9	9.5	81
259012	AP5.5M1-1	TFH4531Z	415/3	6.5	1x450	240/1	2.6	1625	Horizontal	6	12.7	9.5	124
259014	AP7.7M1-1	TFH4540Z		8.9	1X450		2.6	1550	Horizontal	6	12.7	9.5	130
259016	AP8.6M1-1	TAG4553Z		9.8	1x450		2.6	1550	Horizontal	12	19.1	12.7	160
259018	AP10.9M1-1	TAG4561Z		11.4	1x500		3.0	1725	Horizontal	12	19.1	12.7	161
259020	AP13.1M1-1	TAG4573Z		14.3	1x500		3.0	1725	Horizontal	12	19.1	12.7	162
259022	AP15.8M2-TAGD	2xTAGP4546Z		2x8.5	2x500		2x3.0	3450	Vertical	12	28.6	15.9	258
259024	AP19.2M2-TAGD	2xTAGP4553Z		2x9.8	2x500		2x3.0	3450	Vertical	12	28.6	15.9	259
259026	AP22.0M2-TAGD	2xTAGP4561Z		2x11.4	2x500		2x3.0	3450	Vertical	12	28.6	15.9	261
259028	AP26.3M2-TAGD	2xTAGP4573Z		2x14.3	2x500		2x3.0	3450	Vertical	12	28.6	15.9	265
Low Temperature Application													
259032	AP1.1L1-1	CAJ2432Z	240/1	3.9	1x300	240/1	0.37	483	Vertical	2.3	12.7	6.1	71
259034	AP1.6L1-1	CAJ2446Z		5.8	1x300		0.37	483	Vertical	2.3	12.7	9.5	71
259036	AP1.9L1-1	CAJ2464Z		7.8	1x300		0.70	483	Vertical	2.3	15.9	9.5	73
259038	AP2.9L1-1	FH2480Z		4.1	1x350		2.6	725	Vertical	3.9	12.7	9.5	90
259042	AP3.3L1-1	TFH2511Z	415/3	5.1	1x450	240/1	2.6	1625	Horizontal	6	12.7	9.5	130
259044	AP4.7L1-1	TAG2516Z		7.3	1x450		2.6	1550	Horizontal	12	19.1	12.7	155
259046	AP6.2L1-1	TAG2522Z		9.4	1x500		3.0	1725	Horizontal	12	19.1	12.7	193
259048	AP10.1L2-TAGD	2xTAGP2516Z		2x7.3	2x500		2x3.0	3450	Vertical	12	28.6	15.9	258
259050	AP12.7L2-TAGD	2xTAGP2522Z		2x9.4	2x500		2x3.0	3450	Vertical	12	28.6	15.9	258

Compressor MOC = Maximum Operating Current at Medium Temperature 15°C SST / 60°C SCT, Low Temperature -10°C SST / 60°C SCT

Packaged Condensing Units

Acpac Refrigeration Capacities : Watts – R404A and R507

Medium/High Temperature Application

Cat. No.	Model	Ambient Temp. C°	Saturated Suction Temperature: °C						
			-15	-10	-5	0	5	10	15
259003	AP1.7M1-1	32	1208	1466	1764	2068	2385	2707	3078
		35	1143	1391	1659	1945	2273	2583	2889
		38	1068	1302	1573	1847	2131	2420	2752
		43	956	1170	1419	1669	1927	2187	2439
259004	AP2.1M1-1	32	1453	1773	2102	2444	2783	3165	3476
		35	1379	1668	1978	2329	2654	2964	3325
		38	1291	1580	1876	2181	2480	2823	3092
		43	1158	1422	1691	1966	2234	2547	2785
259005	AP2.5M1-1	32	1662	2047	2449	2922	3349	3756	4268
		35	1549	1910	2335	2733	3204	3605	3971
		38	1461	1812	2177	2603	2987	3350	3804
		43	1304	1627	1962	2348	2696	3023	3368
259006	AP2.8M1-1	32	1966	2352	2813	3241	3650	4146	4484
		35	1843	2239	2633	3026	3494	3851	4322
		38	1746	2089	2503	2882	3241	3688	3977
		43	1566	1875	2201	2593	2913	3191	2585
259007	AP3.9M1-1	32	2674	3268	3888	4512	5210	5799	6324
		35	2515	3072	3702	4300	4879	5546	6054
		38	2381	2911	3464	4018	4645	5162	5614
		43	2138	2618	3117	3616	4188	4649	5048
259008	AP4.1M1-1	32	2701	3361	4060	4887	5651	6407	7390
		35	2497	3123	3852	4549	5400	6136	6838
		38	2336	2937	3566	4318	4996	5663	6569
		43	1991	2593	3166	3748	4476	5079	5669
259012	AP5.5M1-1	32	3770	4577	5527	6339	7263	8000	8555
		35	3460	4335	5124	6057	6742	7412	8242
		38	3240	3981	4910	5598	6444	7100	7572
		43	2811	3503	4458	5007	5569		
259014	AP7.7M1-1	32	5679	6610	7656	8765	10086	11203	12216
		35	5236	6134	7269	8347	9431	10720	11705
		38	4902	5774	6744	7763	8978	9977	10867
		43	4269	5095	6005	6951	8086	8994	9786
259016	AP8.6M1-1	32	5782	7111	8597	10382	11932	13774	15014
		35	5329	6732	8173	9663	11431	12787	14495
		38	4989	6206	7560	9197	10585	12265	13336
		43	4344	5473	6722	8248	9514	10932	
259018	AP10.9M1-1	32	7478	9123	10948	12962	15332	17449	19395
		35	7024	8491	10227	12344	14361	16320	18607
		38	6457	7991	9671	11509	13680	15576	17290
		43	5622	7067	8631	10329	12054	14074	15610
259020	AP13.1M1-1	32	9561	11214	13141	15551	17707	20313	22209
		35	8807	10390	12490	14500	16948	18919	20605
		38	8252	9790	11565	13792	15737	17526	19772
		43	7190	8636	10292	12380	14160	15772	
259022	AP15.8M2-TAGD	32	9703	12745	15781	19227	22268	25050	28365
		35	9112	11843	14996	17948	20771	24038	26361
		38	8367	11152	13914	17074	19816	22294	25319
		43	7272	9856	12401	14932	17855	20103	22477
259024	AP19.2M2-TAGD	32	12378	15419	19177	23085	27143	31737	35672
		35	11620	14555	17953	21651	25897	29775	33397
		38	10714	13507	16968	20535	24214	28401	31906
		43	9345	11937	15162	18456	21835	25113	28883
259026	AP22.0M2-TAGD	32	14886	18289	21971	25965	30632	34773	38585
		35	13982	17020	20521	24728	28694	32531	37014
		38	12854	16019	19405	23052	27332	31049	34416
		43	11190	14167	17316	20688	24084	28059	31084
259028	AP26.3M2-TAGD	32	19070	22427	26295	31107	35405	40609	44434
		35	14566	20776	24990	29002	33886	37834	41253
		38	16459	19574	23135	27585	31466	35058	39591
		43	14340	17264	20583	24756	28316	31563	32147

Capacity ratings are at 18°C return vapour and 3 K sub-cooling.

Packaged Condensing Units

Acpac Refrigeration Capacities : Watts – R404A and R507

Low Temperature Application

Cat. No.	Model	Ambient Temp. C°	Saturated Suction Temperature: °C						
			-40	-35	-30	-23.3	-20	-15	-10
259032	AP1.1L1-1	32	457	629	837	1113	1191	1309	1611
		35	424	588	782	1046	1122	1238	1514
		38	391	547	732	982	1051	1157	1431
		43	333	478	645	873	936	1032	1284
259034	AP1.6L1-1	32	721	953	1219	1566	1661	1804	2149
		35	669	890	1150	1480	1564	1693	2042
		38	622	834	1074	1387	1472	1601	1911
		43	538	727	957	1243	1320	1437	1720
259036	AP1.9L1-1	32	900	1181	1502	1929	2029	2180	2612
		35	839	1115	1421	1816	1918	2072	2448
		38	784	1039	1328	1714	1802	1935	2325
		43	681	923	1188	1539	1618	1738	2096
259038	AP2.9L1-1	32	1286	1753	2276	2942	3115	3376	4011
		35	1173	1625	2147	2786	2953	3207	3814
		38	1073	1510	1993	2624	2770	2990	3561
		43	879	1307	1756	2316	2457	2672	3194
259042	AP3.3L1-1	32	1670	1964	2415	3282	3739	4493	5387
		35	1542	1827	2260	3065	3539	4265	5001
		38	1358	1642	2061	2860	3273	3945	4750
		43	1102	1380	1776	2522	2904	3518	4250
259044	AP4.7L1-1	32	2080	2608	3369	4728	5509	6745	8049
		35	1880	2392	3158	4431	5131	6394	7628
		38	1708	2199	2893	4123	4833	5938	7225
		43	1387	1853	2499	3634	4288	5299	6333
259046	AP6.2L1-1	32	3027	3635	4544	6204	7135	8822	10555
		35	2735	3335	4214	5851	6739	8251	9865
		38	2483	3068	3914	5425	6264	7789	9335
		43	2018	2586	3385	4786	5558	6955	8362
259048	AP10.1L2-TAGD	32	4386	5320	6750	10062	10999	13503	16118
		35	3858	4782	6290	9345	10230	12798	15327
		38	3471	4386	5736	8772	9640	11897	14519
		43	2776	3672	4954	7757	8568	10627	12731
259050	AP12.7L2-TAGD	32	6314	7415	9144	12734	14243	17657	21182
		35	5573	6684	8374	11986	13447	16506	19792
		38	4999	6111	7770	11100	12485	15586	18741
		43	3996	5109	6704	9819	11101	13939	16800

Capacity ratings are at 18°C return vapour and 3 K sub-cooling.

Dimensions

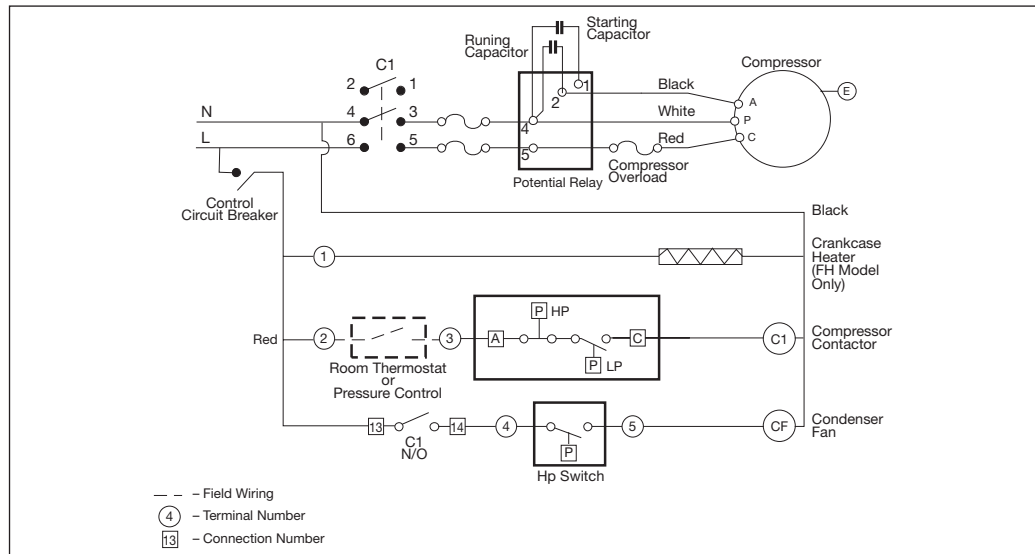
Model	Overall Dimensions : mm			Case Width mm	Case Height mm	Mounting Holes	
	Length	Width	Height			Length	Width
1 Phase 1 Fan	1070	480	820	480	650	1030	440
3 Phase 1 Fan	1405	535	885	480	885	625+625	495
3 Phase 2 Fans	1660	790	1015	735	885	715+715	750



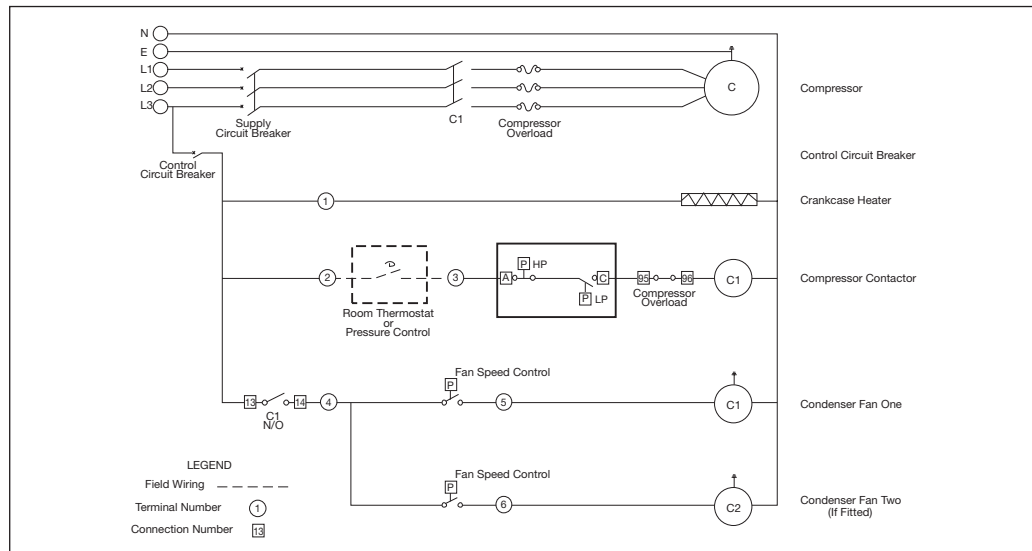
Your best Solution...

Packaged Condensing Units

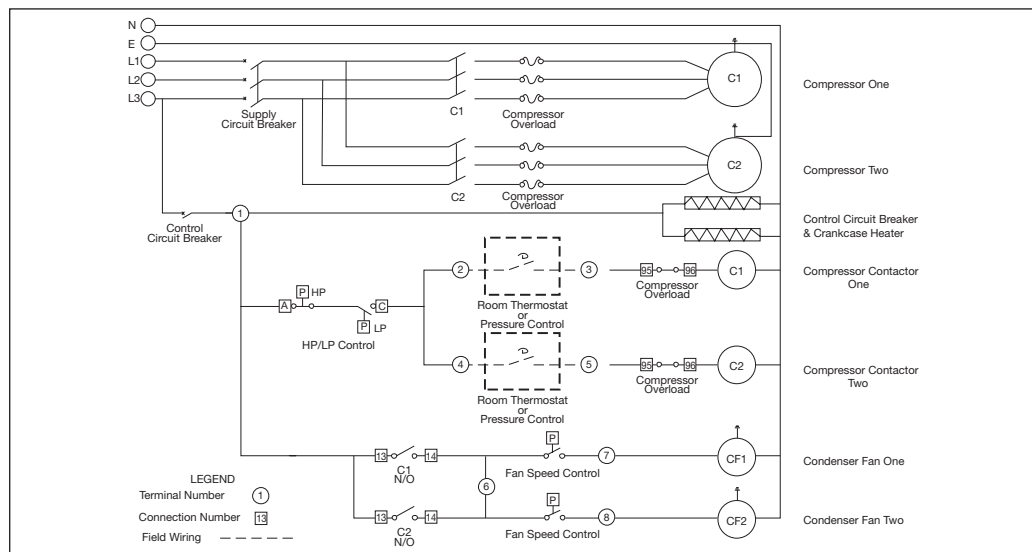
Acpac Wiring Diagrams



1Ø Acpac



3Ø Single Compressor/Fan Acpac



3Ø Twin Compressor/Fan Acpac



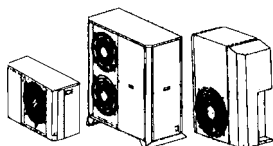
Packaged Condensing Units

Silensys High Ambient Series - R404A

Tecumseh Europe new HTA Silensys range of packaged condensing units offers a streamline and low noise high ambient style condensing unit using L'Unité Hermetique Reciprocating Compressor.

Features

- Lowest noise level on the market
- Robust and durable zinc-plated steel and epoxy powder coat paint
- Liquid line drier
- Sightglass
- Receiver
- Fully wired electrical panel with din rail connection block
- Dual pressure switch
- Crankcase heater
- Fan speed control
- Acoustic insulation and floor or wall mount options
- Floor and wall mounting (Except on large series models floor mount only)



R404A Medium Temperature Application

Cat. No.	Model	Compressor		Amb. Temp °C	R404A Capacity : Watts								Conns. Suction : Liquid	Nom. FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C									
					-25	-20	-15	-10	-5	0	7.2	10		
259709	H14Z-CAE9460Z	1/2	CSR	32	483	615	771	949	1132	1334	1663	1782	3/8" : 1/4"	4.4
				38	445	568	714	880	1053	1243	1555	1668		
				43	416	533	671	830	996	1179	1480	1590		
259708	H21Z-CAJ9480Z	5/8	CSR	32	633	848	1062	1294	1569	1834	2280	2428	1/2" : 3/8"	6.9
				38	583	784	981	1201	1459	1709	2132	2273		
				43	411	565	741	972	1178	1413	1761	1886		
259714 259715	H38Z-CAJ4517Z H38Z-TAJ4517Z	1 1/4	CSR 415/3	32			1702	2125	2488	3011	3623	3953	5/8" : 3/8"	11.2 4.6
				38			1575	1972	2314	2806	3388	3701		
				43			1481	1859	2187	2661	3225	3528		
259716 259717	H49Z-CAJ4519Z H49Z-TAJ4519Z	1 1/2	CSR 415/3	32			2256	2724	3245	3727	4566	4852	5/8" : 3/8"	16
				38			1953	2387	2836	3310	4046	4317		
				43			1665	2065	2452	2897	3546	3770		
259716 259717	H49Z-CAJ4519Z H49Z-TAJ4519Z	2	CSR 415/3	32			2446	3097	3774	4552	5877	6354	5/8" : 3/8"	11.2 4.6
				38			2122	2654	3344	4061	5243	5681		
				43			1830	2378	2919	3567	4620	5016		
259713	H116Z-TAG4546Z	4	415/3	32			4251	5529	6863	8394	11313	12171	7/8" : 1/2"	12.6
				38			3935	5130	6382	7823	10578	11395		
				43			3454	4491	5756	703	9275	9921		
259718	H166Z-TAG4573Z	6 1/2	415/3	32			7477	9065	10884	12792	16203	17454	1 1/8" : 5/8"	20.4
				38			6921	8410	10121	11922	15150	16340		
				43			5926	7384	8903	10510	11952	12654		

Operating conditions: Return gas at 20°C
Current FLA are given at nominal voltage @ ambient

R404A Low Temperature Application

Cat. No.	Model	Compressor		Amb. Temp °C	R404A Capacity : Watts						Conns. Suction: Liquid	Nom. FLA
		Nom. HP	Motor Type		Evaporating Temperature : °C							
					-40	-35	-30	-23.3	-15	-10		
259706	B09Z-CAJ2440Z	3/4	CSR	32	343	507	672	936	1368	1644	1/2" : 3/8"	6.8
				38	316	468	622	869	1278	1537		
				43	256	362	497	764	1042	1269		
259725	B22Z-TFH2480Z	2	415/3	32	798	1259	1752	2160	3051	3484	5/8" : 3/8"	4.5
				38	703	1121	1576	1972	2832	3267		
				43	628	1012	1438	1824	2659	3095		
259726	B29Z-TFH2511Z	2 1/2	415/3	32	960	1569	2145	2920	4182	5130	5/8" : 3/8"	5.6
				38	766	1288	1789	2587	3759	4513		
				43	638	1026	1502	2226	3132	3821		
259705	B43Z-TAG2516Z	4	415/3	32	1378	2160	2665	4495	6631	8046	7/8" : 3/8"	11
				38	879	1830	2129	3903	5807	7111		
				43	664	1384	1904	3347	5189	6474		
259704	B53Z-TAG2522Z	5 1/2	415/3	32	1810	2634	3080	5296	7642	9195	7/8" : 3/8"	15.2
				38	1594	2345	2596	4835	7093	8622		
				43	1175	1752	2398	3871	5745	7003		

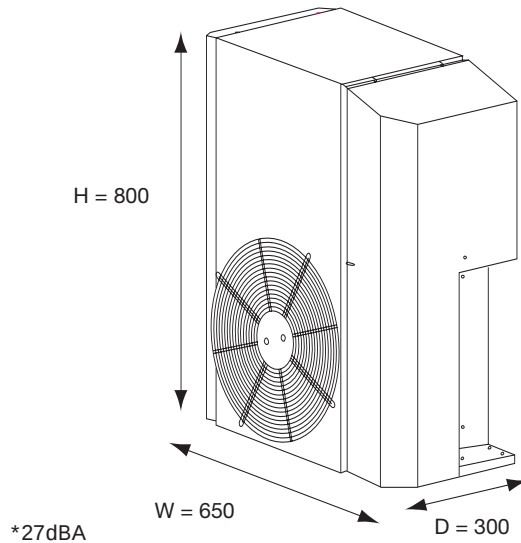
Operating conditions: Return gas at 20°C
Current FLA are given at nominal voltage @ ambient

Packaged Condensing Units

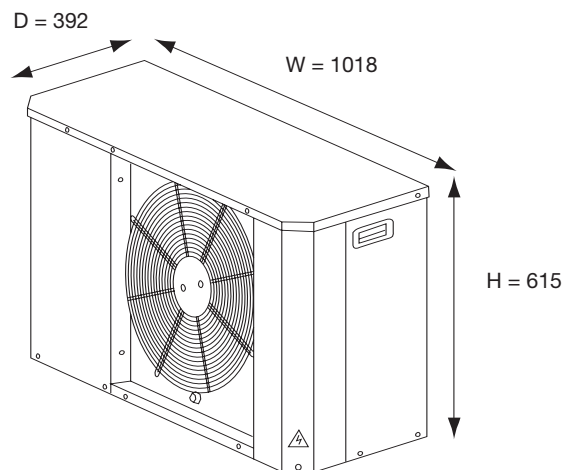
Silensys

Dimensions (mm)

Model No. H14Z, H21Z, B09Z

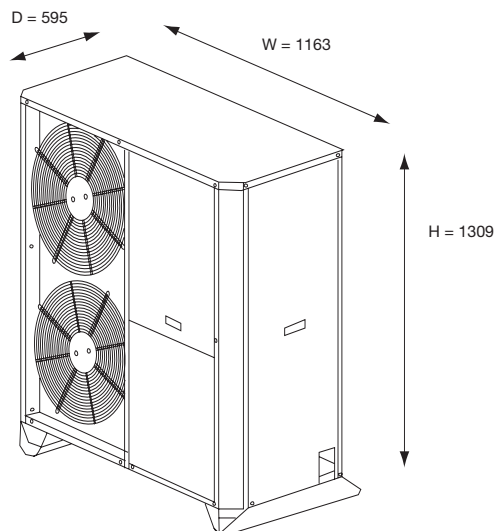


Model No. H38Z, H49Z, H54Z, B22Z, B29Z



*33dBA

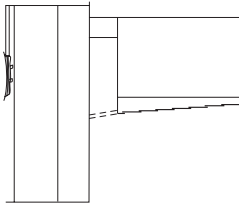
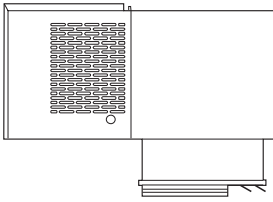
Model No. H116Z, H166Z, B43Z, B53Z



*42dBA

Packaged Refrigeration Units

Zanotti



Drop-in and slide-in coolroom refrigeration systems complete with all controls, easy to install, fully wired.

Features

- No drainage required - unit incorporates condensate vapourisation system
- Low profile evaporator giving minimal room intrusion
- Coldroom bulkhead light and prewired connection supplied with each unit
- Reduced electrical supply required due to hot gas defrost on all models
- Digital controller incorporating anti short cycle timer and defrost termination
- Both medium and low temperature units rated to 45°C ambient.
- R404A refrigerant used in all systems
- Three pin plug fitted to all units
- Defrost heat contained external to room
- Prewired for door sensor (and door heater on low temperature models)

Cat. No.	Part No.	Description	Capacity : Watts	Amps
261100	MSB120T	Drop - In Medium Temp	920	4.4
261101	MSB125T		1450	8.4
261102	MSB225N		2080	12
261103	MSB225T		2450	12.5
261118	MSB135N		3270	19.7
261104	MSB135T		4400	23.9
261105	BSB125T	Drop - In Low Temp	1190	9.1
261106	BSB225T		1690	21.1
261107	BSB135T		2480	22
261108	MGM1070	Slide - In Medium Temp	1360	8.3
261109	MGM1100		1500	11.2
261110	MGM2110		1960	12.4
261111	MGM2130		2600	18
261112	MGM3150		3440	18.1
261113	MGM3200		3850	17.1
261114	BGM1170	Slide - In Low Temp	1010	7
261115	BGM2180		1210	11.7
261116	BGM2200		1660	20.9
261117	BGM3300		2650	25.1

Rated Conditions

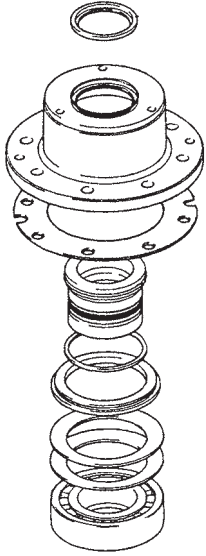
Medium Temperature = +2°C room temperature at +35°C Ambient.

Low Temperature = -20°C room temperature at +35°C Ambient

Compressor Parts

Shaft Seals

Kelvinator



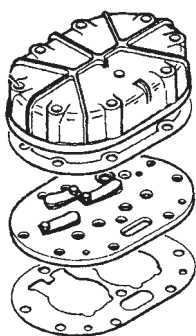
Replacement Seal and Gasket		Seal Plate		Shaft Size	To Suit Model
Cat. No.	Part No.	Cat. No.	Part No.		
267072	FA116	267044	BY00130	5/8"	H, H42
267073	FA117	267045	BY00140	7/8"	K, K62, 62
267074	FA118	267046	BY00145	1 ³ / ₁₆ "	Y, Y72
267075	FA119	267047	BY00155	1 ³ / ₈ "	T, T82, 82
267076	FA130			3/4"	42
267077	FA131			1 ¹ / ₄ "	72

Note: When changing bellows type seal, a new seal plate must be used

Cat. No.	Part No.	Shaft Size	To Suit Model
Bock			
268040	62200	25mm	F1, F2, F3
268041	62201	40mm	F4, F5
268042	62203	50mm	F6
268039	62202		AM5
268044	62203A	60mm	F16
Bitzer			
268030	374 008 02	18mm	No. 2,3
268031	374 008 03	20mm	No. 4
268032	374 008 04	30mm	No. 5
268033	374 008 05	35mm	No. 6
268034	374 011 02	42mm	4T, 4P, 4N Mineral Oil Only
268036	374 011 05	42mm	4T, 4P, 4N Polyolester Oil Only
268035	374 017 03	50mm	4H, 4G, 6H, 6G, 6F
Terry			
268061	170-76	1 ³ / ₁₆ "	A, AF, J, JF, F, FF, P, PF
268064	170-95	1 ¹ / ₄ "	PJ, PY, JY, PY, WA, PJS
268060	170-94	1 ³ / ₈ "	V4S, V4P, VS

Compressor Parts

Valve Plate Assemblies c/w Gaskets



Cat. No.	Brand	Part No.	To Suit Model
269043	Kelvinator	BY00001	H, GH
269040		BY00005	K, K62
269041		BY00010	Y, Y72, 72
269042		BY00015	T, T82
270035	Terry	BW01005	PJ, PJS, JY, V4S, VS
271021	Bitzer	304 050 05	No. 4
271022		304 050 06	No. 5

Copeland Capacity Control Solenoid Valve

Cat. No.	Brand	Part No.	Description	To Suit Model
270157	Alco	703RC001	Solenoid Valve Less Coil	D4D, D6D, D8D Series
270159	DWM	2954954	Solenoid Valve Gasket	D3D, D4D, D6D, D8D
123285	Alco	ASC2	Solenoid Coil 240V	ALL

Service Valve Gaskets

Cat. No.	Bolt Hole Centres	Centre Hole Diameter
271142	41.3mm (1 ⁵ / ₈ ")	14.3mm (9/ ₁₆ ") Suit Beer Coolers
271143	41.3mm (1 ⁵ / ₈ ")	19mm (3/ ₄ ")
271146	69.8mm (2 ³ / ₄ ")	35mm (1 ³ / ₈ ")

4

Teflon Seal Rings

For Rotolock Valves

Cat. No.	Suit Valve Size	Outside Diameter
271151	1"	19mm (3/ ₄ ")
271152	1 ¹ / ₄ "	25.4mm (1"
271153	1 ³ / ₄ "	31.7mm (1 ¹ / ₄ ")

Sheet Gasket Material

Cat. No.	Thickness	Sheet Size
271155	0.4mm (1/ ₆₄ ")	500mm x 500mm
271156	0.8mm (1/ ₃₂ ")	
271157	1.6mm (1/ ₁₆ ")	

'A' Section

Cat. No.	Belt Size	
	Metric	Imperial
279001	A540	A20
279002	A570	A21
279003	A590	A22
279004	A620	A23
279005	A640	A24
279006	A670	A25
279007	A700	A26
279008	A720	A27
279009	A740	A28
279010	A770	A29
279011	A790	A30
279012	A820	A31
279013	A850	A32
279014	A870	A33
279015	A890	A34
279017	A920	A35
279018	A950	A36
279019	A970	A37
279020	A990	A38
279021	A1020	A39
279022	A1050	A40
279023	A1070	A41
279024	A1100	A42
279026	A1130	A43
279027	A1150	A44
279028	A1180	A45
279029	A1200	A46
279030	A1230	A47
279031	A1250	A48
279032	A1280	A49
279033	A1300	A50
279034	A1330	A51
279035	A1360	A52
279036	A1380	A53
279037	A1410	A54
279038	A1430	A55
279039	A1460	A56
279040	A1480	A57
279041	A1510	A58
279042	A1530	A59
279043	A1550	A60
279044	A1580	A61
279045	A1610	A62
279046	A1640	A63
279047	A1660	A64
279048	A1690	A65
279049	A1710	A66
2790491	A1740	A67
279050	A1760	A68
279051	A1790	A69
279052	A1810	A70
279053	A1840	A71
279054	A1860	A72
279058	A1960	A76
279059	A2020	A78
279060	A2050	A79

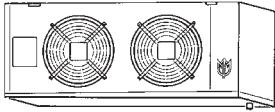
'B' Section

Cat. No.	Belt Size	
	Metric	Imperial
279096	B800	B30
279097	B830	B31
279098	B880	B33
279099	B910	B34
279100	B930	B35
279101	B960	B36
279102	B980	B37
279103	B1000	B38
2791031	B1030	B39
279104	B1060	B40
279105	B1080	B41
279106	B1100	B42
279107	B1130	B43
279108	B1160	B44
279109	B1180	B45
279110	B1210	B46
2791101	B1240	B47
279111	B1260	B48
279112	B1290	B49
279113	B1310	B50
279114	B1340	B51
279115	B1370	B52
279116	B1390	B53
279117	B1410	B54
279118	B1440	B55
279119	B1460	B56
279120	B1490	B57
279121	B1510	B58
279122	B1540	B59
279123	B1560	B60
2791231	B1590	B61
279124	B1620	B62
279125	B1640	B63
279126	B1670	B64
279127	B1690	B65
279128	B1720	B66
279129	B1740	B67
279130	B1760	B68
2791301	B1790	B69
279131	B1820	B70
279132	B1850	B71
279133	B1870	B72
279134	B1900	B73
279135	B1920	B74
279136	B1950	B75
279137	B1970	B76
279138	B2000	B77
279139	B2020	B78
279140	B2050	B79
279141	B2070	B80
279142	B2100	B81
279145	B2180	B84
279146	B2200	B85
279147	B2250	B87
279149	B2330	B90

Induced Draught Evaporators

Buffalo Trident BR Series – Medium Temperature

Features



- Optimised for HFC refrigerants
- Internal ripple finned tube for higher heat transfer performance and better oil return
- Flush mounting aluminium case with stainless steel fastenings
- Hinged access door both ends – easily removable if req.
- Hinged fully reversible drip tray
- Circuited for multiple refrigerants
- Interchangeable orifice plate in distributor
- Low energy sickle blade fan motors with inbuilt thermal protection
- Compact high efficiency heat exchanger
- Electrical components pre-wired to common connection box

Cat. No.	Part No.	Capacity @ -4°C SST & 6 KTD : Watts			Air Flow l/s	Air Throw metres (*)	No. of Fans	Fan Motors			Connections mm		Overall Dimensions mm		
		R22	R404A	R134a				Total Watts	Total Amps	Heat/ 24 Hrs Total Watts	Suct.	Liquid and TX Inlet	Length	Depth	Height
300mm Diameter Fan Models - Fin Series 6 236 Fins/m															
290001	BR 16	1622	1719	1511	427	8.6 (11.8)	1	73	0.32	1752	12.7	6.35	676	425	415
290002	BR 19	1867	1979	1740	402	8.4 (11.7)									
290003	BR 21	2102	2228	1959	354	7.9 (10.5)									
2900031	BR 27	2725	2889	2540	406	8.4 (11.7)	1	73	0.32	1752	12.7	6.35	845	425	415
290004	BR 32	3243	3438	3023	854	10.5 (13.7)	2	146	0.64	3504	12.7	6.35	1057	425	415
290005	BR 37	3735	3959	3481	804	10.3 (13.6)									
290006	BR 42	4203	4456	3918	708	9.8 (13)									
290007	BR 49	4865	5157	4534	1281	12.5 (16.4)	3	219	0.96	5256	15.8	9.5	1438	425	415
290008	BR 56	5602	5938	5221	1206	12.3 (16.3)									
290009	BR 60	6018	6379	5609	1125	12 (15.9)									
290011	BR 63	6305	6683	5876	1062	11.7 (15.5)	4	292	1.28	7008	22.2	12.7	1819	425	415
290014	BR 75	7469	7917	6961	1608	14 (18.2)									
290015	BR 84	8407	8911	7835	1416	13.4 (17.4)									
353mm Diameter Fan Models - Fin Series 6 236 Fins/m															
290010	BR 62	6174	6544	5754	1554	17.2 (21.5)	2	260	1.16	6240	15.8	9.5	1544	425	492
290012	BR 66	6560	6953	6114	1458	16.9 (21)									
290013	BR 71	7074	7498	6593	1422	16.5 (21.6)									
290016	BR 93	9261	9817	8631	2331	18.7 (23.3)	3	390	1.74	9360	28.5	12.7	2154	425	492
290017	BR 98	9839	10430	9170	2187	14.4 (23)									
290018	BR 106	10610	11247	9889	2133	17.9 (22.3)									
290019	BR 123	12348	13089	11508	3108	21 (26)	4	520	2.32	12480	28.5	12.7	2764	425	492
290020	BR 131	13119	13906	12227	2916	20.8 (25.7)									
290021	BR 141	14147	14996	13185	3844	20.2 (25)									
290022	BR154	15435	16361	14385	3885	22.6 (27.5)	5	650	2.9	15600	28.5	12.7	3373	425	492
290023	BR 164	16399	17383	15284	3645	21.7 (26.4)									
290024	BR 177	17684	18745	16482	3555	20.6 (25.1)									

Capacity Correction Factors

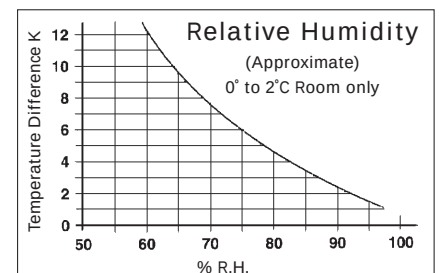
Suction Temp. °C	-10	-8	-6	-4	-2	0	2	4	6
Capacity Multiplier	0.87	0.9	0.95	1	1.045	1.17	1.23	1.28	1.35

Fin Series	4	5	6	7	8	Refrigerant	R22	R407B	R407C	R507
Cap. Multiplier	0.82	0.91	1	1.06	1.12	Cap. Multiplier	1	0.92	0.98	1.07

Capacity for suction temperatures, other than -4°C can be calculated from correction table, however where operating suction temperature selection varies more than ±5°C from standard (-4°C), nominate condition at time of order so that correct distributor is fitted.

Selection of expansion valves for models fitted with refrigerant distributors should be sized for a pressure drop of 400 kPa for R134a and 700 kPa for R22. All models require externally equalised T.X. valves.

Air throw based on C.R.M.A. guidelines, (*) Air throw of units fitted with optional air straightening grilles.

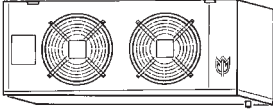


ACTROL Your best Solution...

Induced Draught Evaporators

Buffalo Trident

BRLE Series – Low Temperature Electric Defrost



Features

- Optimised for HFC refrigerants
- Internal ripple finned tube for higher heat transfer performance
- Flush mounting aluminium case with stainless steel fastenings
- Hinged access door both ends – easily removable if required
- Hinged fully reversible drip tray
- Low energy sickle blade fan motors with inbuilt thermal protection
- Interchangeable orifice plate in distributor
- Compact high efficiency heat exchanger
- Double annealed defrost elements fitted into coil block
- Defrost termination, fan delay and heater safety thermostats
- Electrical components pre-wired to common connection box

Cat. No.	Part No.	Capacity @ -24°C SST & 6 KTD : Watts			Air Flow l/s	Air Throw metres	No. of Fans	Fan Motors			Defrost Heaters 240 Volt		Connections mm		Overall Dimensions mm		
		R22	R404A	R507				Total Watts	Total Amps	Heat/ 24 Hrs Total Watts	Total Watts	Total Amps	Suct.	Liquid and TX Inlet	Length	Depth	Height
300mm Diameter Fan Models – Fin Series 6 236 Fins/m																	
290030	BRLE 12	1154	1223	1246	418	7.4	1	73	0.32	1752	1360	5.7	12.7	6.35	676	425	415
290031	BRLE 13	1337	1417	1443	394	7.2											
290032	BRLE 15	1495	1585	1614	347	6.8											
2900321	BRLE 19	1933	2049	2087	412	7.2	1	73	0.32	1752	1970	8.2	12.7	6.35	845	425	415
290033	BRLE 23	2308	2446	2492	836	9.1	2	146	0.64	3504	2560	10.7	12.7	6.35	1057	425	415
290034	BRLE 27	2673	2833	2887	788	8.9											
290035	BRLE 30	2990	3169	3229	694	8.4											
290036	BRLE 35	3462	3669	3739	1254	10.8	3	219	0.96	5256	3600	15	15.8	9.5	1438	425	415
290037	BRLE 40	4010	4250	4330	1182	10.6											
2900371	BRLE 43	4280	4537	4623	1101	10.3											
290039	BRLE 45	4485	4754	4843	1041	10.1	4	292	1.28	7008	4800	20	22.2	9.5	1819	425	415
290042	BRLE 53	5346	5667	5774	1576	12.1											
290043	BRLE 60	5980	6338	6458	1388	11.6											
353mm Diameter Fan Models – Fin Series 6 236 Fins/m																	
290038	BRLE 44	4420	4685	4773	1522	14.8	2	260	1.16	6240	3840	16	15.8	9.5	1544	425	492
290040	BRLE 47	4697	4979	5073	1428	14.6											
290041	BRLE 51	5064	5368	5470	1393	14.2											
290044	BRLE 66	6630	7027	7160	2283	16.1	3	390	1.74	9360	5760	24	28.5	12.7	2154	425	492
290045	BRLE 70	7046	7468	7609	2142	15.9											
290046	BRLE 76	7597	8052	8204	2090	15.5											
290047	BRLE 88	8840	9370	9547	3044	18.1	4	520	2.32	12480	7680	32	28.5	12.7	2764	425	492
290048	BRLE 94	9394	9958	10146	2856	18											
290049	BRLE 101	10129	10737	10939	2786	17.4											
290050	BRLE 110	11050	11712	11933	3805	19.5	5	650	2.9	15600	9600	40	28.5	12.7	3373	425	492
290051	BRLE 117	11743	12447	12682	3570	18.7											
290052	BRLE 127	12661	13421	13674	3483	17.8											

Note: Please specify refrigerant when ordering.

Capacity Correction Factors

Suction Temp. °C	-40	-35	-30	-25	-24	-20	-15	-10	-5	Fin Series	4	5	6	Refrigerant	R22	R407B	R134a
Capacity Multiplier	0.5	0.71	0.85	0.98	1	1.06	1.14	1.23	1.35	Capacity Multiplier	0.82	0.91	1	Capacity Multiplier	1	0.955	0.68

Capacity for suction temperatures, other than -24°C can be calculated from correction table, however where operating suction temperature varies more than ±5°C from standard (-24°C), nominate condition at time of order so that correct distributor is fitted.

Selection of expansion valves for models fitted with refrigerant distributors should be sized for pressure drop of 900 kPa for R404A and 700 kPa for R22. All models require externally equalised T.X. valves.

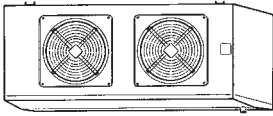
All fans are supplied with low temperature grease permissible air temperatures of -50°C to 70°C for 300mm fan models and -40°C to 55°C for 353mm fan models. Air throw based on C.R.M.A. guidelines.

BRLW Water Defrost and BRLH Hot Gas Defrost models are also available.

Induced Draught Evaporators

Buffalo Trident **BBM Series** Heavy Duty Medium Temperature

Features



- Optimised for HFC refrigerants
- Internal ripple finned tube for higher heat transfer performance and better oil return
- Stucco embossed aluminium case
- Hinged access door both ends – easily removable where coil installed close to adjacent wall
- Hinged fully reversible drip tray
- Sickle blade fans statically and dynamically balanced, aerodynamically constructed for economical and quiet operation
- Dual speed 3 phase motors - 1300/1000 RPM

Cat. No	Model	High Speed Watts @ -4sst 6Ktd			Air Flow l/s	Air Throw metres	No. of 500mm Fans	Total Motor Watts on High	Total Motor Amps on High	Suction Conn. mm	TX Valve Conn. mm	Overall Dimensions mm		
		R22	R404A	R134a								Length	Depth	Height
290080	BBM 81	8124	8612	7572	2388	21	1	780	1.35	28.5	12.7	1260	646	903
290081	BBM 106	10554	11187	9836	2180							1610		1030
290082	BBM 139	13908	14742	12962	2454							2210		903
290083	BBM 162	16249	17224	15144	4776	23	2	1560	2.7	34.9	15.9	3160		
290084	BBM 184	18361	19462	17112	4628							3310		
290085	BBM 211	21108	22374	19672	4360							3310		
290086	BBM 244	24373	25836	22716	7164	25	3	2340	4.05	41.2	22.2	3310	646	903
290087	BBM 275	27541	29194	25668	6942							3310		
290088	BBM 317	31661	33561	29508	6540							3310		
290089	BBM 359	35856	38007	33418	9044	26	4	3120	5.4	54	28.5	3310	646	1030
290090	BBM 421	41208	43681	38406	8456							3310		

Capacities based on -4°C saturated suction temperature and Fin Series 5 (197 Fins/m)

* Air throw based on C.R.M.A. guidelines and includes temperature correction factor for 2°C room.

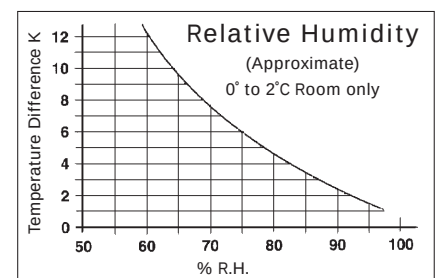
**Based on manufacturers data.

Capacity Correction Factors

Suction Temp. °C	-10	-8	-6	-4	-2	0	2	4	6
Capacity Multiplier	0.87	0.9	0.95	1	1.045	1.17	1.23	1.28	1.35

For the purpose of correct circuiting and distributor selection, please advise Refrigerant, SST, KTD and Fin Series when different from standard.

Fin Series	3	4	5	6	Refrigerant	R22	R407B	R407C	R507
Capacity Multiplier	0.8	0.9	1	1.1	Capacity Multiplier	1	0.92	0.98	1.07

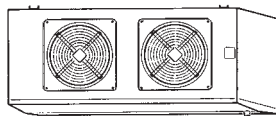


Induced Draught Evaporators

Buffalo Trident EBBL Series

Heavy Duty, Low Temperature with Electric Defrost

Features



- Optimised for HFC refrigerants
- Internal ripple finned tube for higher heat transfer performance and better oil return
- Stucco embossed aluminium case
- Hinged access door both ends – easily removable where coil installed close to adjacent wall
- Hinged, fully reversible drip tray
- Sickle blade fans statically and dynamically balanced, aerodynamically constructed for economical and quiet operation
- Dual speed 3 Phase Motors – 1340/1000 RPM
- Defrost elements fitted within coil block improved heat dissipation

Cat. No	Model	High Speed Watts @ -24sst 6Ktd			Air Flow l/s	Air Throw metres	No. of 500mm Fans	Total Motor Watts on High	Total Motor Amps on High	Suction Conn. mm	TX Valve Conn. mm	Defrost Heaters		Overall Dimensions mm		
		R22	R404A	R134a								Watts	Amps	Length	Depth	Height
					High	High										
290091	EBBL 66	6552	6945	7076	2409	19	1	780	1.35	28.5	12.7	6000	25	1260	646	903
290092	EBBL 85	8502	9012	9182	2213					34.9	15.9					1030
290093	EBBL 110	11106	11772	11994	2471	20					8200	34.2	1610	903		
290094	EBBL 131	13103	13889	14151	4818	21	2	1560	2.7	41.2					22.2	12000
290095	EBBL 148	14795	15683	15979	4680											
290096	EBBL 170	1700	18024	18364	4426						23	3	2340	4.05	54	
290097	EBBL 197	19655	20834	21227	7227											
290098	EBBL 222	22193	23524	23968	7020	24	4	3120	5.4	34.9						19000
290099	EBBL 255	25506	27036	27546	6639											
290100	EBBL 281	28104	29790	30352	8872											
290101	EBBL 323	32280	34216	34862	8600											

Capacities based on -24°C saturated suction temperature and Fin Series 5 (197 Fins/m)

* Air throw based on C.R.M.A. guidelines and includes temperature correction factor for -18°C room.

** Based on manufacturer's data.

Capacity Correction Factors

Suction Temp. °C	-40	-35	-30	-25	-24	-20	-15	-10	-5
Capacity Multiplier	0.5	0.71	0.85	0.98	1	1.06	1.14	1.23	1.35

For the purpose of correct circuiting and distributor selection, please advise Refrigerant, SST, KTD and Fin Series when different from standard.

Fin Series	3	4	5	6
Cap. Multiplier	0.8	0.9	1	1.1

Refrigerant	R22	R407B	R134a
Cap. Multiplier	1	0.955	0.68

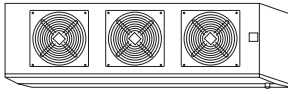
WBBL Water Defrost and HBBL Hot Gas Defrost models are also available.

Induced Draught Evaporators

Buffalo Trident

PC Series Medium Temperature

Buffalo Trident PC Series (product coolers) are specifically designed for produce rooms. These medium temperature evaporators come with internal ripple finned tube for increased heat transfer, motors and heaters are pre-wired to a common junction box, hinged access doors at both ends of coil so it is easily serviced and assisted electric defrost for sub zero room temps.



Features

- High air flow for quick product pull down
- Internal ripple finned tube for increased heat transfer
- Hinged access door at both ends of coil
- Reversible drip tray

Cat. No	Part No.	Capacity @ 4C SST 6Ktd : Watts			Air Flow l/s	Air Throw metres	No. of Fans	Fan Motors			Connections : mm		Overall Dimensions mm		
		R22	R404A	R134a				Total Watts	Total Amps	Defrost # Heaters Watts	Suction	TX Valve	Length	Depth	Height
290110	PC214	21420	22704	19968	4583	26	1	1900	3.2	5800	35	22	1738	688	1110
290111	PC428	42840	45408	39930	9166	28	2	3800	6.4	11600	41	28	3188		1141
290112	PC642	64260	68118	59892	13749	29	3	5700	9.6	17400	54	35	4638		1173
290115	PCE214	21420	22704	19968	4583	26	1	1900	3.2	5800	35	22	1738		1110
290116	PCE428	42840	45408	39930	9166	28	2	3800	6.4	11600	41	28	3188		1141
290117	PCE642	64260	68118	59892	13749	29	3	5700	9.6	17400	54	35	4638		1110

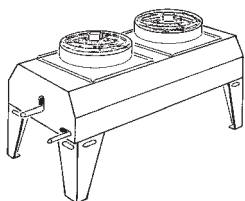
Cat No's: 290115, 290116 and 290117 are electric defrost

Suction Temp. °C	-10	-8	-6	-4	-2	0	2	4
Capacity Multiple	0.87	0.90	0.95	1.00	1.045	1.17	1.23	1.28

Other Fin Series	3	4	5	6
Capacity Multiplier	0.78	0.89	1.00	1.06

Condensers

Buffalo Trident RC. Std. 4 Pole Series - Air Cooled



Features

- Epoxy coated fins as standard
- Sickle blade fans statically and dynamically balanced, aerodynamically constructed for economical and quiet operation
- Dual speed motors on 3-phase - 1340/1000 RPM (4 Pole) as standard
"Q" Series available - 900/640 RPM (6 pole)
- Stucco embossed aluminium case
- Stainless steel fixings
- Staggered copper tube with rippled aluminium fins drawn to cover tube
Fins waved and rippled for maximum heat transfer
- Internal ripple finned copper tube
- Common condensers for both vertical and horizontal air flow

Cat. No	Model	Fan Speed	Capacity - Total Heat Rejection Watts @10KTD				Air Flow l/s	Fans No./Dia mm	Total Motor Watts		Oper. Charge*	Pump Down Cap. **	Net Weight kg
			R22	R404A	R407C	R134a			High Speed		kg R22		
290120	RC009C	High	6059	6362	5877	5817	788	1/350	130 1 Phase	0.58 1 Phase	0.41	2.15	32
290121	RC012C		7770	8159	7537	7459	764				0.60	3.22	37
290122	RC013C		8810	9251	8546	8458	741				0.78	4.29	42
290123	RC018C		11634	12216	11285	11169	1550	2/350	260 1 Phase	1.16 1 phase	0.74	3.86	46
290124	RC023C		14805	15545	14361	14213	1494				1.07	5.79	55
290125	RC025C		16842	17684	16337	16168	1441				1.39	7.72	64
290126	RC019C	High Low	12212 9747	12823 10234	11846 9455	11724 9357	2163 1418	1/500	780 3 Phase	1.35 3 Phase	0.73	3.83	50
290127	RC024C	High Low	15792 12069	16582 12672	15318 11707	15160 11586	2007 1305				1.07	5.75	55
290128	RC028C	High Low	18092 13235	18997 13897	17549 12838	17368 12706	1870 1204				1.38	7.67	60
290129	RC030C	High Low	20055 15204	21058 15964	19453 14748	19253 14596	2306 1519				1.58	8.54	64
290130	RC034C	High Low	22869 16241	24012 17053	22183 15754	21954 15591	2215 1454				2.06	11.50	72
290131	RC037C	High Low	25027 18077	26278 18981	24276 17535	24026 17354	2130 1394				2.54	14.38	80
290132	RC047C	High Low	31584 24138	33163 25345	30636 23414	30321 23172	4014 2610	2/500	1560 3 Phase	2.7 3 Phase	2.13	11.50	93
290133	RC054C	High Low	36267 27839	38080 29231	25179 27004	34816 26725	4374 2870				2.66	14.38	108
290134	RC062C	High Low	41580 30856	43659 32399	40333 29930	39917 29622	4150 2710				3.45	19.17	121
290135	RC074C	High Low	49119 35476	51575 37250	47645 34412	47154 34057	4260 2788				5.08	28.75	149
290136	RC082C	High Low	54275 39708	56989 41693	52647 38517	52104 38120	5610 3612	3/500	2340 3 Phase	4.05 3 Phase	4.14	23.01	157
290137	RC093C	High Low	62370 46284	65489 48598	60499 44895	59875 44433	6225 4065				5.18	28.75	175
290138	RC100C	High Low	66906 47593	70251 49973	64899 46165	64230 45689	5919 3840				6.35	35.94	195
290139	RC109C	High Low	72366 52944	75984 55591	70195 51356	69471 50826	7480 4816	4/500	3120 3 Phase	5.4 3 Phase	5.52	30.67	207
290140	RC115C	High Low	76524 54406	80350 57126	74228 52774	73463 52230	6996 4460				6.77	38.34	228

* Based on -4°C SST, 25°C suction gas temp., 40°C condensing and 2K subcooling.

** Pump down capacity based on 80% of total volume.

Capacity Correction Factors

Refrigerant	R22	R507	R407B
Capacity Multiplier	1	1.045	0.975

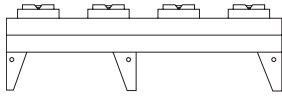
For heat rejection factors refer to 'Air Cooled Condenser Selection' in Section 8.

Options

- Single phase motors (single speed only)
- Copper fins
- Electro-tinning
- Multiple circuits
- Stainless steel case
- Hazardous location motors (eg flameproof)
- Special applications on request

Condensers

Buffalo Trident Delta Series B Air Cooled Condenser



Model DV

The Buffalo Delta series B air cooled condenser has dual refrigerant circuits, sickle blade fans, motors wired to a common junction box, internal ripple finned copper tube, 1.6mm marine grade aluminium casing with a positive air seal between all fans. The Delta series delivers superior performance all year round. All fans statically and dynamically balanced, aerodynamically constructed for economical and quiet operation.

Features

- Dual Refrigerant Circuits
- Quiet operation
- Epoxy coated fins
- Dual speed motors standard on 3-phase
 - 4 Pole 1340/1000 RPM (DV/H Series)
 - 6 Pole 900/640 RPM (DV Q Series)

Cat. No	Model	Fan Speed	Capacity - Total Heat Rejection Kilo Watts @10KTD			Air Flow I/s	Fans No./Dia. mm	Total Motor Watts	Total Motor Amps	Oper. Charge*	Pump Down Cap. **	Net Weight kg
			R22	R404A	R134a			High Speed		kg R22		
290169	DV110B	High Low	91.065 64.851	95.619 68.094	87.423 62.257	9031 5939	4/500	3120 3 Phase	5.4 3 Phase	9.84	52.88	318
290170	DV121B	High Low	100.614 74.005	105.644 77.705	96.589 71.045	11710 7720	5/500	3900 3 Phase	6.75 3 Phase	9.41	49.21	364
290171	DV137B	High Low	113.833 81.064	119.525 85.117	109.280 77.821	11289 7424				12.23	65.67	397
290172	DV165B	High Low	136.599 97.276	143.428 102.140	131.135 93.385	13547 8909	6/500	4680 3 Phase	8.1 3 Phase	14.61	78.50	477
290173	DV192B	High Low	159.365 113.489	167.333 119.163	152.990 109.949	15804 10393	7/500	5460 3 Phase	9.45 3 Phase	17.00	91.34	557
290174	DV220B	High Low	182.131 129.698	191.237 136.182	174.846 124.510	18062 11878	8/500	6240 3 Phase	10.8 3 Phase	19.36	104.02	636
290175	DH110B	High Low	91.065 64.851	95.619 68.094	87.423 62.257	90031 5939	4/500	3120 3 Phase	5.4 3 Phase	9.84	52.88	318
290181	DH121B	High Low	100.614 74.005	105.644 77.705	96.589 71.045	11710 7720	5/500	3900 3 Phase	6.75 3 Phase	9.41	49.21	364
290182	DH137B	High Low	113.833 81.064	119.525 85.117	109.280 77.821	11289 7424				12.23	65.67	397
290183	DH165B	High Low	136.599 97.276	143.428 102.140	131.135 93.385	13547 8909	6/500	4680 3 Phase	8.1 3 Phase	14.61	78.50	477
290184	DH192B	High Low	159.365 113.489	167.333 119.163	152.990 108.949	15804 10393	7/500	5460 3 Phase	9.45 3 Phase	17.00	91.34	557
290185	DH220B	High Low	182.131 129.698	191.237 136.182	174.846 124.510	18062 11878	8/500	6240 3 Phase	10.8 3 Phase	19.36	104.02	636
290162	DV110B-Q	High Low	66.781 50.370	70.120 52.889	64.110 48.355	6008 4232	4/500	1280 3 Phase	2.96 3 Phase	9.84	52.88	318
290163	DV121B-Q	High Low	78.453 57.480	82.376 60.354	75.315 55.180	7828 5582	5/500	1600 3 Phase	3.70 3 Phase	9.41	49.21	364
290164	DV137B-Q	High Low	83.477 62.962	87.651 66.110	80.138 60.444	7510 5290				12.23	65.67	397
290165	DV165B-Q	High Low	100.172 75.554	105.181 79.332	96.165 72.532	9012 6348	6/500	1280 1920 3 Phase	4.44 3 Phase	14.61	78.50	477
290166	DV192B-Q	High Low	116.867 88.147	112.711 92.554	112.193 84.621	10514 7406	7/500	2240 3 Phase	5.18 3 Phase	17.00	91.34	557
290167	DV220B-Q	High Low	133.563 100.736	140.241 105.773	128.220 96.707	12016 8464	8/500	2560 3 Phase	5.92 3 Phase	19.36	104.02	636

* Based on -4°C SST, 25°C suction gas temp., 40°C condensing and 2K subcooling.

** Pump down capacity based on 80% of total volume.

High fan speed connect in Delta, low fan speed connect in Star.

DV = Vertical Air Flow DH = Horizontal Air Flow

Capacity Correction Factors

Refrigerant	R22	R507	R407B
Capacity Multiplier	1	1.045	0.975

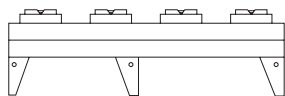
For heat rejection factors refer to 'Air Cooled Condenser Selection' in Section 8

Options

- Galvanized or stainless steel case
- Copper fins
- Single or multiple circuits
- Separate sub-cooling circuits
- Other fan speeds

Condensers

Buffalo Trident Delta Series B Air Cooled Condenser



Model LDV

The Buffalo Delta series B air cooled condenser has dual refrigerant circuits, sickle blade fans, motors wired to a common junction box, internal ripple finned copper tube, 1.6mm marine grade aluminium casing with a positive air seal between all fans. The Delta series delivers superior performance all year round. All fans statically and dynamically balanced, aerodynamically constructed for economical and quiet operation.

Features

- Dual Refrigerant Circuits
- Epoxy coated fins
- Quiet operation
- Dual speed motors standard on 3-phase
- 4 pole 1310/1000RPM

Cat. No	Model	Fan Speed	Capacity - Total Heat Rejection Kilo Watts @10KTD			Air Flow l/s	Fans No./Dia. mm	Total Motor Watts High Speed	Total Motor Amps 3 Phase	Oper. Charge*	Pump Down Cap. **	Net Weight kg
			R22	R404A	R134a							
290150	LDV227B	High Low	163.3 136.7	171.5 143.6	156.8 131.3	19463 14966	4/630	10400 3 Phase	19.2 3 Phase	13.44	72.2	516
290151	LDV252B	High Low	180.1 148.6	189.1 156.0	172.9 142.6	18825 14418				16.49	90.3	566
290152	LDV273B	High Low	192.0 155.8	201.6 163.5	184.3 149.5	18203 13886				19.40	108.3	614
290168	LDV302B	High Low	213.5 180.7	224.2 189.8	205.0 173.5	20658 15985				24.73		752
290153	LDV340B	High Low	245.0 205.1	257.2 215.3	235.2 196.9	29195 22449	6/630	15600 3 Phase	28.8 3 Phase	20.16	135.4	759
290154	LDV378B	High Low	269.0 223.3	283.1 234.4	258.9 214.3	28238 21627				24.73		831
290155	LDV409B	High Low	287.2 233.7	301.6 245.4	275.7 224.3	27305 21627				29.10	162.5	895
290156	LDV454B	High Low	326.6 273.5	323.0 287.1	313.6 262.5	38926 29932	8/630	20800 3 Phase	38.4 3 Phase	26.88	144.4	1012
290157	LDV505B	High Low	360.3 297.7	378.3 312.5	345.9 285.8	37650 28836				32.98	180.5	1112
290158	LDV547B	High Low	384.0 311.6	403.2 327.1	368.6 299.1	36406 27772				38.80	216.6	1228
290159	LDV568B	High Low	408.3 341.8	428.8 358.9	392.0 328.2	48658 37415	10/630	26000 3 Phase	48.3 Phase	33.60	180.5	1301
290160	LDV631B	High Low	450.4 372.1	472.9 390.7	432.3 357.2	47063 36045				41.22	225.6	1418
290161	LDV684B	High Low	480.0 389.4	504.0 408.9	460.8 373.9	45508 34715				48.50	270.8	1535

* Based on -4°C SST, 25°C suction gas temp., 40°C condensing and 2K subcooling.

** Pump down capacity based on 80% of total volume.

High fan speed connect in Delta, low fan speed connect in Star.

LDV = Vertical Air Flow LDH = Horizontal Air Flow

Capacity Correction Factors

Refrigerant	R22	R507	R407B
Capacity Multiplier	1	1.045	0.975

For heat rejection factors refer to 'Air Cooled Condenser Selection' in Section 8

Options

- Galvanized or stainless steel case
- Copper fins
- Single or multiple circuits
- Separate sub-cooling circuits
- Other fan speeds
- Horizontal air flow

Cabinet Coolers

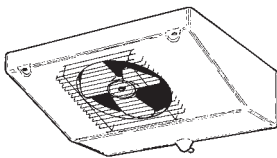
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P Series

Features

- Suitable for all the common HFC and HCFC refrigerants including R22, R134a & R404A/R507
- Easily cleaned and hygienic white 4.5mm 'Refrigeration Grade' ABS cover with rounded corners
- Reinforced white colourbond base and white powder-coated inlet grille
- Efficient inner grooved copper tubing with corrosion protected lacquer coating on return bends
- Balanced acrylic fans with ball bearing race motors
- Cover removed by two captive stainless steel screws
- Internal components secured by captive nuts
- Suitable for capillary or TX valve operation
- Epoxy coated fins

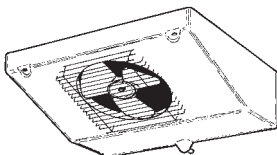
PC Series – Medium Temperature



Cat No.	Model No.	Capacity Watts @ 6 KTD			No. of Fans	Motor Input Watts	Connections mm		Overall Dimensions mm		
		R22	R404A	R134a			Suction	Liquid	Length	Width	Height
292001	PC30	310	313	295	1	30	9.5	9.5	440	395	135
292004	PC41	410	414	390	1	30			440		
292006	PC53	530	535	504	1	30			440		
292008	PC64	640	646	608	1	30			440		
292014	PC76	760	768	722	2	60			705		
292015	PC100	1020	1030	969	2	60			70		
292016	PC135	1350	1364	1283	3	90			840		

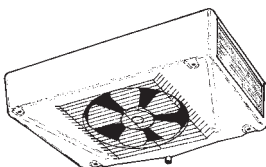
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PCL Series – Low Temperature



Cat No.	Model No.	Capacity Watts @ 6 KTD		No. of Fans	Motor Input Watts	Connections mm		Overall Dimensions mm			Defrost Heater Watts
		R22	R404A			Suction	Liquid	Length	Width	Height	
292010	PCL40	396	400	1	30	9.5	9.5	440	395	135	400
292040	PCL50	495	500	1	30			440			400
292041	PCL60	594	600	2	60			705			600
292042	PCL80	792	800	2	60			705			600
292043	PCL100	990	1000	3	90			840			800

PDC Series – Dual Coil – Medium Temperature



Cat N9.5o.	Model No.	Capacity Watts @ 6 KTD			No. of Fans	Motor Input Watts	Connections mm		Overall Dimensions mm		
		R22	R404A	R134a			Suction	Liquid	Length	Width	Height
292025	PDC45	450	455	428	1	50	9.5	9.5	565	335	160
292026	PDC60	600	606	570							
292027	PDC80	800	808	760							
292028	PDC100	1000	1010	950							
292023	PDC120	1200	1212	1140			12.5		610	430	

Ratings based on -4SST for medium temperature models and -24SST on low temperature models.

Evaporator Spare Parts

Buffalo Trident Evaporator Heater Elements

Cat. No.	Part Number	Description	Model Number	Number of Parts Per unit													
	BRME Series (300mm Fan)																
			BRME	18	19	21	27	32	37	42	49	56	60	63	75	84	
	R52000064	Defrost Heater Core		1													
	R52000065	Defrost Heater Core			1	1											
	R52000122	Defrost Heater Core					1										
	R52000066	Defrost Heater Core						1									
	R52000067	Defrost Heater Core							1	1							
	R52000068	Defrost Heater Core									1						
	R52000069	Defrost Heater Core										1	1	1			
	R52000070	Defrost Heater Core													1	1	
	BRME Series (350mm Fan)																
			BRME	62	66	71	93	98	106	123	131	141	154	164	177		
	R52000077	Defrost Heater Pan		1	1	1											
	R52000078	Defrost Heater Pan					1	1	1								
	R52000079	Defrost Heater Pan								1	1	1					
	R52000080	Defrost Heater Pan											1	1	1		
	BRLE Series (300mm Fan)																
			BRLE	12	13	15	19	23	27	30	35	40	43	45	53	60	
	R52000056	Defrost Heater Core		2	2												
	R52000057	Defrost Heater Core				2											
	R52000102	Defrost Heater Core					2										
	R52000058	Defrost Heater Core						2	2								
	R52000059	Defrost Heater Core								2							
	R52000060	Defrost Heater Core									2	2					
	R52000061	Defrost Heater Core											2	2			
	R62000062	Defrost Heater Core													2		
	R52000063	Defrost Heater Core														2	
	R52000093	Defrost Heater Pan		1	1	1											
	R52000103	Defrost Heater Pan					1										
	R52000094	Defrost Heater Pan						1	1	1							
	R52000095	Defrost Heater Pan									1	1	1	1			
	R52000096	Defrost Heater Pan													1	1	
	BRLE Series (350mm Fan)																
			BRLE	44	47	51	66	70	76	88	94	101	110	117	127		
	R52000071	Defrost Heater Core		2	2	2											
	R52000072	Defrost Heater Core					2	2	2								
	R52000073	Defrost Heater Core								2	2						
	R52000074	Defrost Heater Core										2					
	R52000076	Defrost Heater Core											2	2			
	R52000076	Defrost Heater Core													2		
	R52000077	Defrost Heater Pan		1	1	1											
	R52000078	Defrost Heater Pan					1	1	1								
	R52000079	Defrost Heater Pan								1	1	1					
	R52000080	Defrost Heater Pan											1	1	1		
	EBBL Series																
			EBBL	66	85	110	131	148	170	197	222	255	281	323			
	R52000117	Defrost Heater Core		5	5												
	R52000118	Defrost Heater Core				5											
	R52000119	Defrost Heater Core					5	5	5								
	R52000120	Defrost Heater Core								5	5	5					
	R52000121	Defrost Heater Core											5	5			
	R52000112	Defrost Heater Pan		1	1												
	R52000113	Defrost Heater Pan				1											
	R52000114	Defrost Heater Pan					1	1	1								
	R52000115	Defrost Heater Pan								1	1	1					
	R52000116	Defrost Heater Pan											1	1			

Evaporator and Condenser Parts

291-294

Cat. No.	Brand	Part No.	Description	Suits
Fan / Motor / Grille Assembly				
294109	Ziehl-ebm	S4E300-AP26-38	300mm dia. Induced Draught 4 Point Mounting, 230V. 1 Ph.	Buffalo Trident
294110	Ziehl-ebm	S4E300-AB03-43	300mm dia. Forced Draught 4 Point Mounting, 240V. 1 Ph.	Buffalo Trident
294113	Ziehl-ebm	S4E350-AP06-48	350mm dia. Induced Draught 4 Point Mounting, 230V. 1 Ph.	Buffalo Trident Muller (P/No. 88181W2)
294117	Ziehl-ebm	FC050-VDQ-4F.5	500mm dia. Induced Draught Square Plate Mounting, 415V. 3 Ph.	Buffalo Trident Muller
294118	Ziehl-ebm	FC045-VDL-4C.5	450mm dia. Induced Draught	Muller
Fan / Motor Assembly				
294116	Ziehl-ebm	A4E300-AA03-41	300mm Dia. 240V. 1Ph.	
294122	Muller	879074W	500mm Dia. Induced Draught	Muller MAC67D to 270D
Fan Blades				
294028	Fan Blades	PU5203N15R56AA	203mm dia. 6mm Bore 1 Piece Aluminium, 5 Blades	Muller CN Series (P/No. 83763Y)
294027	JRM	FBP1782NY	178mm dia. Plastic, 3 Blades	Muller CSN & CSL Series TC060, MJ140H, MJ220H
291186	Betts	5-R5.56-5AC 187	140mm dia. 3/16" Bore Plastic, 5 Blades	Kirby TA 100 to 300 TL 92 to 270
Capacitors				
294119	Ref/Elec.	1.5 x 400V	Run Capacitor - 2 Wires & Stud	Ziehl - ebm Motors
Thermostats				
294194	Derwent	80920Y-1	Defrost/Fan Delay (3 Wire)	
294195	Derwent	80920Y-2	Heater Safety (2 Wire)	

Drain

Cat. No.	Part No.	Watts	Type
294047	3272	20	Braided
294105	8132	10	PVC
294106	8133	25	
294107	8138	46	

Crankcase

L'Unite Hermetique / Tecumseh

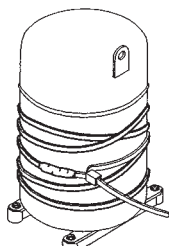


Cat. No.	Part No.	Volts	Watts	Type	Application
294137	CH101-40	240	54	External	AH Series
294138	CH101-3-40	440			AJ Series
294139	CH102-40	240	60	Internal	FH, TAG Series
294144	8681590	480	27		

Thermon

The Thermon CCH-2 is a self regulating crankcase heater cable that incorporates a self regulating polymer core that controls its heat without a thermostat. Overheating is avoided by cutting back heat output at the point the cable touches or overlaps itself or by reacting to changes in ambient temperature. CCH is jacketed with a thermoplastic sheath that resists abrasion and the effects of most chemicals. Each unit is completely self contained meaning less wasted time and materials occur during installation.

- Fits compressors up to 5hp with up to 2.3 litres of oil
- Easy to install
- Can be crossed or overlapped
- No thermostat required
- Flexible to -51°C



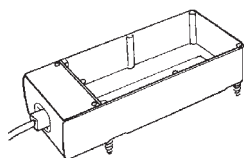
CCH-2

Cat. No.	Part No.	Volts	Watts	Type	Application
294140	651-1010	240 Vac	52 at 10°C	External	Compressors up to 1200mm circumference

Domestic

Cat. No.	Part No.	Description
294046	8130	Drain Pan Heater, 20 Watt 32 Volt
294101	8131	Transformer 240/32 Volt - Suit above Pan Heater

Condensate Evaporation Pans

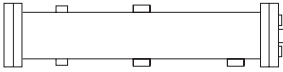


Cat. No.	Part No.	Description
294014	EPI-300	Cast Aluminium General Purpose, 300 Watts
294015	DR008	Universal Plastic Evap Tray for Domestic Compressors

Water Cooled Condensers

Inline RCC Series Water Cooled Condenser

Ideal for use as a condenser muffler, adequate storage and pump down capacity allows the condenser to be used as a liquid receiver for most standard applications. Removable water heads provide easy access for tube inspection, cleaning/replacement.



Features

- Shell and tube type construction
- Mechanically cleanable
- Shell wall carbon steel pipe
- Tubes - 1/4" diameter, lo-fin copper tube with 23 fins per inch
- Tube sheets - low carbon steel, machined and grooved for rolled tube construction
- Water boxes - cast iron
- Finish - grey prime coat

Cat No.	Model No.	Total heat rejection kw			Overall Length mm	Water Flow l/s	Pressure Drop kpa	Water in/out BSP	Refrigerant conn.		Pump Down Capacity (kg)			Shipping Weight kg
		R22	R134a	R404A					in SWT	out BSP	R22	R134a	R404A	
297001	RCC-1424	10	8.9	10.6	760	0.55	18	1 1/4	1 1/8	1 1/4	15	14.9	12.8	65
297002	RCC-1436	20	17.8	21.3	1070	0.86	43				23	23.3	20	82
297003	RCC-3824	35	31.1	37.3	760	1.5	18				12	12.2	10.5	72
297004	RCC-2648	50	44.5	53.2	1360	2.16	92				29	29.2	25.1	102
297005	RCC-3848	75	66.7	79.8		3.16					25	25.7	22.1	110
297006	RCC-4860	120	107	127.8	1660	5	45	1 1/2	1 3/8	1 1/2	30	30.4	26.1	136
297007	RCC-4872	150	134	159.7	1960	6.12	55				37	37.5	32.2	155
297008	RCC-30	200	178	213	1970	8.66	33				64	84.9	55.7	233
297009	RCC-40	250	223	226.2		10.8	35		90	91.3	78.3	295		
297010	RCC-50	350	312	327.7		15.2	40		82	83.1	71.3	316		
297011	RCC-60	400	356	426		17.3	45		100	101	87	435		
297012	RCC-75	500	445	532.5		2320	21.6		50	2 1/2	2	115	117	100

Condenser selection based: Water in 29.5°C, Condensing 40°C.

Fouling factor: 0.088 sq.m °C/kw (fresh water)

Approval standards: AS1210, AS1677

Design and Test Pressures		
Design	Shell Side	Water Side
	2.0MPa	0.69MPa
Test	3.0MPa	1.38MPa

Inline RCC Series Water Cooled Condenser: Marine Grade

The inline RCC Series marine grade Water Cooled Condenser offers extra reliability and durability due to its strong construction. The Marine Grade condenser resists rust and corrosion. It features 316 stainless steel tube sheets, copper nickel tubes, and gun metal water boxes. Ideal for salt water marine application.

Cat No.	Model No.	Total heat rejection kw			Overall Length mm	Water Flow l/s	Pressure Drop kpa	Water in/out BSP	Refrigerant conn.		Pump Down Capacity (kg)			Shipping Weight kg	
		R22	R134a	R404A					in SWT	out BSP	R22	R134a	R404A		
297020	RCCM-1424	10	8.9	10.6	760	0.55	18	1 1/4	1 1/8	1 1/4	15	14.9	12.8	65	
297021	RCCM-1436	20	17.8	21.3	1070	0.86	43				23	23.3	20	82	
297022	RCCM-3824	35	31.1	37.3	760	1.5	18				12	12.2	10.5	72	
297023	RCCM-2648	50	44.5	53.2	1360	2.16	92				29	29.2	25.1	102	
297024	RCCM-3848	75	66.7	79.8		3.16					25	25.7	22.1	110	
297025	RCCM-4860	120	106.8	127.8	1660	5	45	1 1/2	1 3/8	1 1/2	30	30.4	26.1	136	
297026	RCCM-4872	150	133.5	159.7	1960	6.12	55				37	37.5	32.2	155	
297027	RCCM-30	200	178	213	1970	8.66	33			1 1/8	64	84.9	55.7	233	
297028	RCCM-40	250	222.5	266.2		10.8	35			2	1 3/8	90	91.3	78.3	295
297029	RCCM-50	350	311.5	327.7		15.2	40					82	83.1	71.3	316
297030	RCCM-60	400	356	426		17.3	45					100	101	87	435
297031	RCCM-75	500	445	532.5	2320	21.6	50				2 1/2	2	115	117	100.1

Condenser selection based: Water in 29.5°C, Water out 35°C, Condensing 40°C.

Fouling factor: 0.088 sq.m °C/kw (fresh water)

Approval standards: AS1210, AS1677

Design and Test Pressures		
Design	Shell Side	Water Side
	2.0MPa	0.69MPa
Test	3.0MPa	1.38MPa

All condensers have two tubes in the bottom row, below the liquid level, to provide subcooling. These tubes are not included in capacity ratings.



Your best Solution...

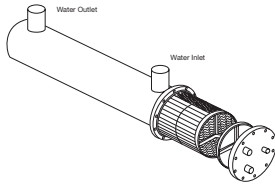
Evaporators

Inline Bech Series Shell and Tube Evaporators

The Inline DX Chiller has removable heads for access for inspecting, cleaning and replacement. Robust in construction, they are made in a choice of copper or 316 stainless steel tube sheets to international standards. The water side of the chiller can pass quite large particle matters without obstruction, thus maintaining its efficiency, an important factor in the long service of the unit.

Features

- Easily accessed for cleaning
- High efficiency fin copper tube

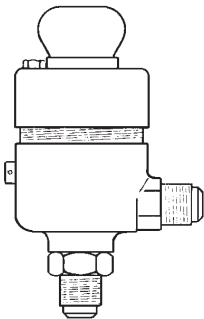


Cat No.	Model No.	Cooling capacity kw			Overall Length mm	Water Flow l/s	Pressure Drop kpa	Water Stubs BSP	Refrigerant conn.		Volume Shell Tube Litres		Shipping Weight kg
		R22	R134a	R404					suction inches	TX inches			
297100	BECH-18	18	16	19.2	565	0.72	5	2	7/8	7/8	5.8	2.9	48
297101	BECH-24	24	21.4	25.6	815	0.96	7				8.9	4.2	52
297102	BECH-30	30	26.7	31.9	1065	1.2	15				11.9	5.5	57
297103	BECH-36	36	32	38.3	1315	1.43	28				15	6.9	60
297104	BECH-42	42	37.4	44.7	1565	1.67	47				18.1	8.2	85
297105	BECH-48	48	42.7	51.1	1815	1.91	73	3	1 1/8	1 1/4	21.2	9.6	100
297106	BECH-56	56	49.8	59.6	2065	2.23	97				24.3	11	110
297107	BECH-210	250	222.5	266	2250	9.26	150				158	53	400

Chiller selection based: Water in 12°C, Water out 7°C, Suction temp 1°C.

Fouling factor: 0.088 sq.m °C/kw (fresh water)

Beverage Cooler Parts



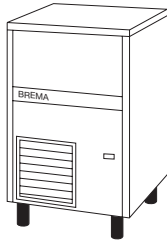
Cat No.	Brand	Part No.	Description
300025	Temprite	GB00001	R12/R134a Constant Pressure Valve
300026		GB00005	R22 Constant Pressure Valve
300009		GD00005	Cartidge

Ice Cuber Parts

Cat No.	Part No.	Description	Application
300139	76-2601-3	Water Pump	Series 200 to 1200
300142	83-6904-9	Float Valve	Series 150 to 600
300143	83-6905-9		Series 800 to 1700
300141	76-1996-3	Ice Thickness Control	
300144	76-2375-3	Unitised Sensor Board	
300133	24-0520-3	Dump Valve Assy Less Coil	
300134	24-0522-3	Dump Valve Coil	
300135	76-2061-3	Ice Thickness Probe	Dual Evap

Ice Makers

Brema Ice Makers



Features

- Compact stainless steel design
- Wide range of models to suit on counter, under counter, free standing and self serve dispensers
- Simple operation and a large choice of ice storage bins
- Cubed or Flaked ice models available

Cat No.	Model No.	Description	Refrigerant	Voltage	24hr Ice Production Kg	Bin Storage Capacity Kg	Dimensions mm	Shipping Weight Kg
300250	CB184A	Counter/Under-Bar Self-Cont. Cuber 21Kg	R404A	240	21	4	345 x 400 x 590	31
200251	CB249A	Counter/Under-Bar Self-Cont. Cuber 28Kg		240	28	9	390 x 460 x 690	44
300252	CB316A	Counter/Under-Bar Self-Cont. Cuber 33Kg		240	33	16	500 x 580 x 690	56
300253	CB416A	Counter/Under-Bar Self-Cont. Cuber 42Kg		240	42	16	500 x 580 x 690	60
300254	CB425A	Counter/Under-Bar Self-Cont. Cuber 46Kg		240	46	25	500 x 580 x 800	64
300255	CB640A	Self-Contained Cuber 65Kg		240	65	40	738 x 600 x 920	89
300256	CB840A	Self-Contained Cuber 80Kg		240	80	40	738 x 600 x 920	98
300257	CB955A	Self-Contained Cuber 90Kg		240	90	55	738 x 600 x 1020	102
300258	CB1265A	Self-Contained Cuber 130Kg		240	130	65	840 x 740 x 1075	133
300259	CB1565A	Self-Contained Cuber 155Kg		240	155	65	840 x 740 x 1075	138
300260	VB250	Self-Contained Cuber 105Kg		240	105	352	738 x 600 x 980	85
300262	IW45	Self-Cont. Cuber with Water/Ice Disp. 42Kg		240	42	25	688 x 580 x 800	80
300263	DSS42	Self-Cont. Cuber with Water/Ice Disp. 42Kg		240	42	12	500 x 630 x 920	74
300264	VM350	Modular Cuber Head 140Kg		240	140	N/A	540 x 544 x 707	95
300265	VM500	Modular Cuber Head 140Kg		240	225	N/A	770 x 550 x 800	101
300266	VM900	Modular Cuber Head 140Kg		240	415	N/A	770 x 550 x 800	124
300267	C80	Modular Cuber Head 140Kg		240	90	N/A	862 x 470 x 620	92
300268	C150	Modular Cuber Head 140Kg		240	155	N/A	862 x 555 x 720	128
300269	C300	Modular Cuber Head 140Kg		240	300	N/A	1250 x 580 x 848	178
300270	GB902	Self Contained Flaker 90Kg		240	90	20	500 x 660 x 690	67
300271	GB1555	Self Contained Flaker 150Kg		240	150	55	738 x 690 x 1020	105
300272	G250	Modular Flaker Head 250Kg		240	250	N/A	640 x 470 x 687	93
300273	G500	Modular Flaker Head 500Kg		240	500	N/A	640 x 470 x 704	113
300274	G1000	Modular Flaker Head 1000Kg		240	1000	N/A	934 x 684 x 700	195
300275	M350	Muster Sub-Zero Dry Flat Flake Ice 320Kg		240	320	N/A	900 x 588 x 705	150
300276	M800	Muster Sub-Zero Dry Flat Flake Ice 850Kg		400	850	N/A	1107 x 700 x 880	328
300277	M350 Split	Muster Sub-Zero Dry Flat Flake Ice 320Kg		240	320	N/A	454 x 588 x 705	82
300278	M800 Split	Muster Sub-Zero Dry Flat Flake Ice 850Kg		400	850	N/A	567 x 700 x 880	160

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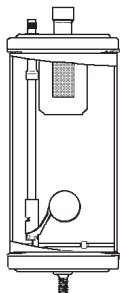
Brema Accessories

Cat No.	Model No.	Description
300279	BIN180	Bin Stainless Steel 180Kg
300280	BIN250	Bin Stainless Steel 250Kg
300281	BIN380	Bin Stainless Steel 380Kg
300282	BIN240 Plastic	Bin PE 240Kg
300283	Single Roller Bin	Single Roller bin 125Kg
300284	Double Roller Bin	Double Roller Bin 266Kg
300285	Water Filter Assy	Water Filter Assy C/W Cartridge & Bracket

Oil Separators

Flow Controls (Alco)

A-W Series



Flow controls oil separators feature a unique screen and baffle arrangement to enhance oil separation from refrigerant gas mixtures. The use of a light-weight stainless steel float allows for a faster response in returning refrigeration lubricants back to the compressor. Solid copper fittings and $\frac{3}{8}$ " flare fitting for the oil return, allows for easy installation. Ideal for use in air conditioning, commercial refrigeration and low temperature applications.

The use of an oil separator will lower system energy costs, increase evaporator efficiency, greatly reduce oil slugging and increase compressor life by maintaining correct oil levels. They are UL listed for a safe working pressure of 3100 kPa.

Selection

It is recommended that an oil separator should not have connection sizes smaller than the compressor discharge line size. Refer to capacity table.

Installation

The oil separator should be mounted vertically in the compressor discharge line. Add oil to the separator prior to final connection. Oil must be of the same grade as used in the compressor.

Cat. No.	Part No.	Connections ODF Solder Inches	Capacity Ratings : kW						Dimensions mm	
			R134a		R22		R404A / R507		Overall Height	Diameter
			Evaporating Temperature °C							
			-40	5	-40	5	-40	5		
301130	A-W55824 3/8	1/2	3.5	6.3	5.3	7	5.3	7	260	102
301131	A-W55855 3/8	5/8	11.2	15.8	15.8	19.3	14.1	19.3	362	
301132	A-W55877 3/8	7/8	16.9	22.5	24.6	28	22.9	29.9	450	
301133	A-W55889 3/8	1 1/8	22.5	29.9	31.7	37	29.9	38.7	533	
301134	A-W559011 3/8	1 3/8	28.1	40	40.4	47.5	36.9	49.2	540	
301137	A-W569213 3/8	1 5/8	41.5	56.3	56.3	63.3	52.7	66.8	473	152

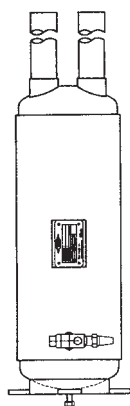
All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.

Bitzer

External Float Type

Features

- Large physical size ensures low pressure drop
- Oil separator also acts as a very efficient discharge muffler dramatically reducing compressor noise levels and pulsations
- Separator elements employ a double mesh filter wall on both inlet and outlet ports, ensuring highly efficient oil separation
- Double mesh filters allow for bi-directional piping of inlet and outlet connections
- Manufactured in Australia to AS1210
- $\frac{3}{8}$ " Solder Rotolock oil valve
- Larger sizes available on request



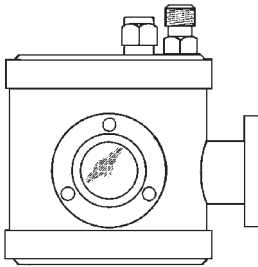
Cat. No.	Part No.	Max Capacity kW		Conns. ODF Solder Inches	Suits Bitzer Accessible Hermetic Compressors	Dimensions mm		Minimum Operating Oil Charge Lts
		R22	R4040A R507			Height (less conns)	Diameter	
301150	B36-001	15.4	16.5	$\frac{7}{8}$	2HC to 2CC	320	168	0.87
301151	B36-009	23.2	24.8	$1\frac{1}{8}$	4FC to 4CC	370		
301152	B36-004	34.8	36.5	$1\frac{1}{8}$	4Z to 4V	435		
301153	B36-011	48	50.5	$1\frac{3}{8}$	4T to 4H	435		
301154	B36-010	78.3	82	$1\frac{5}{8}$	4G to 6F	495	220	1.8

Capacities Rated @ -10°C Saturated Suction Temperature
40°C Saturated Condensing Temperature

Oil Control Accessories

AC&R

Adjustable Oil Level Regulators



These regulators provide a means of adjustment of the oil level of the compressor crankcase between 1/2 and 1/4 sight glass at various pressure differentials. If the oil level in the crankcase is either too high or too low, a simple adjustment can be made by turning the adjustment screw provided on the top of the regulator. This can be done while the system is in operation. This exclusive design eliminates the need to shut the system down and disconnect the oil feed lines in order to adjust the oil level regulator.

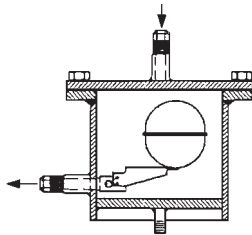
The S-9190 Oil Level Regulator is for parallel compressor systems with a satellite compressor. The satellite compressor shares a common discharge line with all the compressors on the system, but has an independent suction line. It operates at a different suction pressure than the rest of the compressors. This can cause a greater pressure differential between the oil reservoir, which is common to all the compressors on the system, and the satellite compressor oil level regulator.

If this pressure differential is above 207 kPa, the 620 kPa maximum differential adjustable oil level regulator is recommended.

Cat. No.	Part No.	Pressure Differential kPa	Description
301095	S-9130	35 to 207	Adjustable Oil Level Regulator - Maintains Oil Level between 1/2 and 1/4 of Sight Glass
301094	S-9190	207 to 620	
301098	3-033-217		Universal Adaptor Mounting Kit

The Universal Adaptor Mounting Kit includes a 3 hole flange to mount to the regulator. The compressor end of the kit is a 1 1/4" OD steel tube. The existing compressor sight glass gland or flange must be bored out or bushed down to accept the 1 1/4" tube. The tube is then brazed or welded to the reworked gland or flange and installed on the compressor. A sight glass, seals and hardware are included in the kit.

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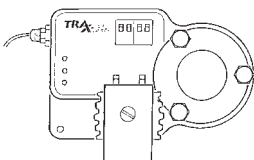


This oil float assembly is designed to be mounted to refrigeration components requiring an automatic float valve assembly. Rising liquid level within the chamber causes the float mechanism to disengage the needle from the metering orifice. Liquid will then exit through the 3/8" flare connection. Fitted with convenient mounting stud and nut. Designed and constructed to AS1210, Class 3 requirements.

Cat. No.	Part No.	Oil Return Connection
301051	AA-HS	3/8" Male Flare

Traxoil

Oil Level Control System



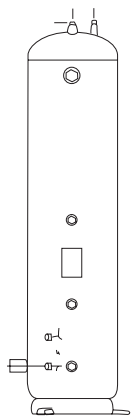
Traxoil offers accurate detection and control of oil levels from a single, compact unit. It replaces the need for separate oil tanks, high-side floats and pressure differential valves, with a self-contained system that is accurate, reliable and extremely cost effective.

Traxoil features built-in time delays for maximum compressor protection. Once a low oil level has been detected, the solenoid valve is held open until the oil level is satisfied. If the solenoid valve remains open for more than two minutes, the relay signals an alarm condition. A patented float and stagnant chamber offers optimum accuracy. Traxoil injects oil directly into the sump allowing refrigerant to boil out without affecting the float chamber.

Cat. No.	Part No.	Description
301053	T03	Suits L'Unite Hermetique Compressors
301054	T02	Suits Copeland Scroll Compressors
301055	T01 C	Suits Copeland Semi-Hermetic Compressors
301056	T01 B	Suits Bitzer Semi-Hermetic Compressors
301057	ADP003	Adaptor for T01B to suit Bitzer Octagon Compressors
301058	T05	Suits Bock Compressors

Liquid Receivers

Bitzer



Cat No.	Part No.	Pump Down Capacity Kg		Inlet	Outlet	Height mm	DIA mm
		R22	R404A				
302060	RV73	28	25	3/4 Rotalock	3/4 Rotalock	920	220
302061	RV80	42	37	1 1/8 Rotalock	1 1/8 Rotalock	1200	220
302065	RV221	90	79.4	1 3/8 Rotalock	1 3/8 Rotalock	1160	356

Pump Down Capacity @ 80% of Volume @ 35°C

- Vertical receivers supplied c/w - 3 x Rotalock sight glasses
2 x 1/2" NPT sockets (liquid level alarm)
1/2" BSP socket (relief valve)
3/4" NPT socket (Hansen level probe)
- Vessels designed to accommodate a wide variety of applications
- Manufactured in Australia to AS1210

Discharge Mufflers

AC&R



Horizontal or Vertical

Mufflers are designed to eliminate pulsation in compressor discharge lines running to remote condensers. They have internal baffles designed for minimum pressure drop. These baffles change the velocity of the discharge gasses passing through the muffler. This results in a dampening effect on high frequency sound waves in the gasses on high speed compressors and also reduces the pulsating waves in low speed compressors.

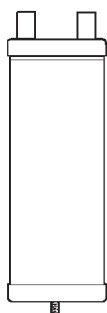
The muffler should have the same size connections as the discharge line. Offset connector fittings permits vertical, horizontal or angle mounting.

Cat. No.	Part No.	Connections		Dimensions : mm		Working Pressure
		Size : Inches	Type	Diameter	O/A Length	
302116	S 6304	1/2	Copper ODF Solder	76	200	3100 kPa (450 psig)
302121	S 6405	5/8		102	170	
302122	S 6407	7/8			180	
302123	S 6411	1 1/8			340	
302124	S 6413	1 3/8			350	
302125	S 6415	1 5/8			465	
302126	S 6621	2 1/8		152	535	
302127	S 6625	2 5/8				

Suction Accumulators

Flow Controls (Alco)

For Air Conditioning, Heat Pump and Refrigeration Applications



Compressors are designed to compress vapours, not liquids. Many systems are subject to the return of excessive quantities of liquid refrigerant, which dilutes the oil, washes out bearings and in some cases leads to complete loss of oil in the crankcase. This results in broken valve reeds, pistons, rods, crankshafts, etc. The purpose of the accumulator is to act as a reservoir to temporarily hold the oil-refrigerant mixture and return it at a rate which the compressor can safely handle.

Features

- Prevents compressor damage due to slugging of refrigerant and oil
- Positive oil return at all rated conditions
- Designed for operation as low as -40°C evaporator temperature
- Low pressure drop
- Acts as a suction muffler
- Suction gas temperature as low as -12°C at the accumulator
- UL listed at 2070 kPa working pressure

Cat. No.	Part No.	Conns. ODF Solder Inches	Capacity: kW – Evaporating Temperature: °C									Liquid Holding Capacity* kg	Weight Kg
			R134a			R22			R404A / R507				
			-18	-7	5	-18	-7	5	-18	-7	5		
302320	A-AS-384	1/2	2.1	2.8	4.2	3.2	4.9	7	2.8	3.5	4.6	0.9	0.8
302321	A-AS-3125	5/8	2.8	4.2	6	4.9	7.4	10.5	4.2	5.6	7	1.4	1
302322	A-AS-3126	3/4	3.5	5.6	8.1	6.3	9.8	14	5.3	7	9		
302323	A-AS-596												
302324	A-AS-597	7/8	6.3	9.8	14	11.6	18	25.7	9.5	12.7	16.2	2.7	2.4
302325	A-AS-5126	3/4	3.5	5.6	8.1	6.3	9.8	14	5.3	7	9		
302326	A-AS--5127	7/8	6.3	9.8	14	11.6	18	25.7	9.5	12.7	16.2	4	3.6
302327	A-AS-5137												
302328	A-AS-5139	1 1/8	10.9	17.6	25.3	18.6	29.2	41.5	15.5	20.7	26.7	4.3	3.7
302329	A-AS-5179												
302330	A-AS-51711	1 3/8	16.2	25.7	37.6	29.9	46.4	66	25.3	33.8	43	5.4	3.8
302331	A-AS-61411												
302332	A-AS-62013	1 5/8	25.7	41	60	45	70	100	37.6	50	64	9	7.4

*Holding Capacity of R22 at 4°C Evaporator Temperature.

Part No.	Dimensions : mm	
	Diameter	Vessel Length
A-AS-384	76	190
A-AS-3125		295
A-AS-3126		
A-AS-596	127	215
A-AS-597		295
A-AS-5126		
A-AS-5127		300
A-AS-5137		340
A-AS-5139		
A-AS-5179		435
A-AS-51711		
A-AS-61411	152	350
A-AS-62013		515

Minimum recommended kW should be no less than 15% of recommended kW to ensure positive oil return.

All data based on actual refrigeration kW and is not related to horsepower.

Minimum evaporator temperature -40°C.
Minimum suction gas temperature through the accumulator -12°C.

Maximum recommended refrigeration kW based on a pressure drop through the accumulator equivalent to 0.6K.

Conversion: Tons x 3.517 = kW.
kW x 0.284 = Tons

All Flow Controls products approved for use with all CFC, HCFC and HFC Refrigerants, except R123, R410A (where designated) and those listed in ASHRAE Standard 34 as A1/A2, A2, A3, B2 and B3.



Your best Solution...

Suction Accumulators

Bitzer



Compressors are designed to compress vapours, not liquids. Many systems, especially low temperature, are subject to the return of excessive quantities of liquid refrigerant, which dilutes the oil, washes out bearings and in some cases leads to complete loss of oil in the crankcase. This results in broken valve reeds, pistons, rods, crankshafts, etc. The purpose of the accumulator is to act as a reservoir to temporarily hold the excess oil-refrigerant mixture and return it at a rate which the compressor can safely handle.

Features

- Large physical capacity ensures minimal pressure drop (max 6 kPa)
- Complete vapourisation of the refrigerant liquid leaving the accumulator
- Modification of suction connections for ease of insulation
- Positive oil return system
- Manufactured in Australia to AS1210
- Larger sizes and models with heat exchanger available on request

Note: Selection should be arranged to ensure system capacity does not drop below 30% of accumulator capacity.

Cat. No.	Part No.	Model	R404A Capacity : kW					Conns. ODF Solder Inches	Suits Bitzer Accessible Hermetic Compressors	Dimensions mm	
			Sat. Suction Temperature : °C							Height (less conns.)	Diameter
			-40	-30	-20	-10	0				
302150	B40-026	SXE 75	2.57	4.54	7.26	14.24		7/8	2HC to 2CC	355	168
302151	B40-028	SXE 125	5.08	8.95	14.28	28		1 1/8	4FC to 4V	430	
302152	B40-030	SXE 250	7.82	13.73	21.98	33.06		1 5/8	4T, 4P, 4N	510	220
302153	B40-032	SXE 500	14.72	26.16	42.48	64.45	92.16	2 1/8	4J, 4H, 4G	615	
302154	B40-034	SXE 800	22.11	39.36	63.84	96.72	138.6	2 1/8	6J to 6F	815	

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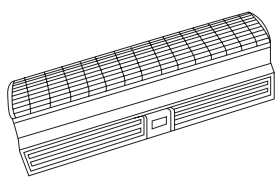
Features

- Prevents compressor damage due to slugging of refrigerant and oil
- Constructed and tested in accordance with AS1210, Class 3 requirements
- Solid copper inlet and outlet connections
- Low pressure drop
- Acts as a suction muffler
- Relief and drain connections provided
- 12mm diameter mounting stud and nut
- Larger size accumulators available on application
- Liquid line heat exchange loop on application

Cat. No.	Part No.	Conns. ODF Solder Inches	Liquid Holding Capacity* kg	Dimensions : mm		Net Weight kg
				Diameter	Height	
302296	ASA 1 1/8	1 1/8	5.66	168	550	11.8
302297	ASA 1 3/8	1 3/8	6.46		590	13.5
302298	ASA 1 5/8	1 5/8	11.82	219	590	21.7
302299	ASA 2 1/8	2 1/8	18.02		810	32.8
302300	ASA 2 5/8	2 5/8	30.21	273	790	40.8
302301	ASA 3 1/8	3 1/8	35.21		890	51

*Holding capacity of R22 at 80% full and 30°C Liquid Temperature.
Fitting of required pressure relief device is installers responsibility.

Air Curtains Gree



Applications

- Public establishments - stores, theatres, restaurants, hospitals, offices, etc
- Industries - all factories with air conditioned facilities, pharmaceutical, chemical, food processing, etc
- Residential - all houses, apartments, etc

Functions

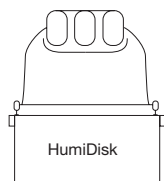
- Heat insulation - prevents cool air from escaping when warm air moves in during summer. Savings in electricity. Ensures maximum coldness with minimum power consumption
- Coldness insulation - during winter, prevents warm air from escaping and cold air from moving in. Maintains a comfortable working temperature
- Reduces the likely entry of odours, dusts, etc. and promotes a clean environment and physical health

Features

- Smart appearance
- Small size
- Durable high performance 2 speed fans
- Easy hand adjustment of air flow directional louvres
- Quiet operation
- Easy installation
- Low power consumption

Cat No.	Model	Span (mm)	Voltage (V)	Frequency (Hz)	Power (W)	Weight (kg)	Dimensions (mm) (W x H x D)	Air Flow (m ³ /h)	Air Speed (m/min)	Fan dia. (mm)	Sound Level
304198	FM125-09	900	240	50	95	17	900 x 215 x 193	1150	>480	125	<60
304199	FM125-12	1200	240	50	135	21	1200 x 215 x 193	1640	>480	125	<60

Humidification Carel Humidisk Adiabatic Humidifier



HumiDisk is an adiabatic humidifier which, due to its centrifugal action, atomises the water into a drop-free fine mist. This results in a humidification system which is simple, economical and easy to maintain.

Applications

HumiDisk is especially suitable for applications such as:

- Cold rooms and storage facilities for fresh produce, where lack of humidity leads to loss of weight and product deterioration;
- Printing facilities, where the correct level of humidity must be maintained in order to avoid variations in paper size;
- Textile industries, where humidity maintenance is an important factor in the productive processes, and the need to eliminate the heat produced by the looms is essential.

Features

- Variable humidification power, from a minimum of 1.5 litres/hour to a maximum of 5 litres/hour
- built-in fan
- atomising unit with horizontally-adjustable outlet vent
- water pre-heating system which guarantees the operation of the humidifier in applications with temperatures near 0°C
- Water-collection tank cleaning cycle on humidifier shut-down, preventing the formation of bacteria and algae;
- electrical element which dries the tank
- an infrared remote control is also available to manage the electrical panel control
- easily-replaceable filter

Cat No.	Part No.	Humidification Litres/hour	Supply Voltage	Rated Current
304550	HDU05RM230	1.5 to 5	230VAC	3A

Humidifier Controller

A low cost solution to control the Carel HumiDisk is an IR32W3000 Controller. Other controllers are available depending on application.

Cat No.	Part No.	Supply Voltage	Input	Possible Humidity Probes:
146126	IR32W3000	12/24 VAC/DC	4/20MA	ASH1, ASH2, ASDC11, ASDC111, ASPC11, ASPC23, ASWH1, ASWC11, ASWC111

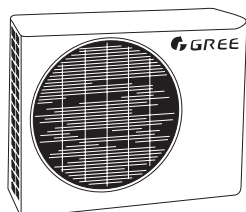
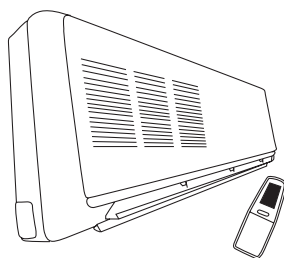
*Note humidity probes not included. IR32W3000 requires a transformer Cat No. 146118

Air Conditioners

Gree

Features

- 5 Year Warranty on parts and labour (domestic use only)
- Compact design
- Original 5-Bending evaporator
- User Friendly Remote Control
- Cryptocatalyst Technology
- 3 Layer High Density Air Filter
- Super Quiet Operation
- Flexible Fan Blade Design



Cat No.	Model No.	HP	Cooling Capacity Watts	Heating Capacity Watts	Dimensions W x H x D mm Indoor Unit	Dimensions W x H x D mm Outdoor Unit	Weight kg		Pipe Sizes
							Indoor	Outdoor	
304167	KFR25/Wall	1	2500	2800	770 x 250 x 180	848 x 540 x 320	8.5	32	1/4 : 3/8
304191*	KFR35/Wall	1.5	3500	3800	830 x 285 x 189	848 x 540 x 320	11	36	1/4 : 1/2
304169	KFR45/Wall	2	4500	5000	830 x 285 x 189	848 x 540 x 320	11	40	1/4 : 1/2
304170	KFR60/Wall	2.5	6000	7000	907 x 290 x 195	950 x 710 x 410	12	59	3/8 : 5/8
304171	KFR70/Wall	3	7000	7500	1220 x 360 x 206	950 x 840 x 412	27	75	3/8 : 5/8
304195	KFR80/Wall	3.5	8000	8800	1220 x 360 x 206	950 x 840 x 412	28	78	3/8 : 5/8

*KFR35 includes an LCD display on the indoor unit.

Cassette Splits

Cat No.	Model No.	HP	Cooling Capacity Watts	Heating Capacity Watts	Dimensions W x H x D mm Indoor Unit	Dimensions W x H x D mm Outdoor Unit	Weight kg		Pipe Sizes
							Indoor	Outdoor	
305174	KFR70	3	8200	8500	840 x 240 x 840	950 x 840 x 412	36.5	75	3/8 : 5/8
305175	KFR120	5	12000	12308	840 x 840 x 320	950 x 1250 x 412	44.5	112	1/2 : 3/4

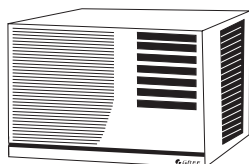
All cassette splits systems are supplied with built in condensate pump.

Ducted Splits

Cat No.	Model No.	HP	Cooling Capacity Watts	Heating Capacity Watts	Dimensions W x H x D mm Indoor Unit	Dimensions W x H x D mm Outdoor Unit	Weight kg		Pipe Sizes
							Indoor	Outdoor	
304179	KFR80	3.5	8000	8200	1159 x 260 x 656	950 x 840 x 412	37	75	3/8 : 5/8

Ducted units supplied with thermostat.

RAC



Cat No.	Model No.	Cooling Capacity Watts	Heating Capacity Watts	Dimensions W x H x D mm Indoor Unit	Weight kg
304176	KCR25	2560	2490	560 x 375 x 610	45
304173	KCR50	4300	3900	660 x 430 x 760	52

Gree manufactures a wide range of air conditioners. Specifications are continually being upgraded as technology changes. Please contact us for current information on the Gree product, ranging from RAC's to Wall Hung Splits (Single and Multi Head) along with Inverter units. Also available are a wide range of ducted units.

Notes

Notes

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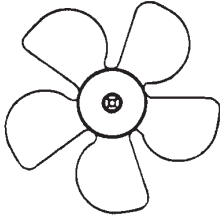
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Fan Blades

Betts

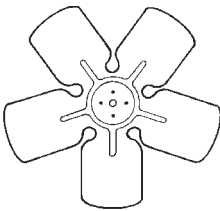
Plastic



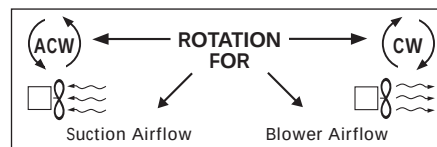
Cat. No.	Part No.	Diam. mm (inches)	Bore	Number of Blades	Direction of Rotation	Application
305052	5-S4-4-CCW 125F	100 (4)	1/8"	4	ACW	Domestic Frost Free Refrigerators
305051	5-S5-5-CCW 125	125 (5)	1/8"	5	ACW	
305085	5-R10530-CWD 312	254 (10)	5/16"	5	CW	

Radlon

Aluminium Hub Mount



Cat. No.	Part No.	Diameter mm (inches)	Pitch	Airflow
305097	A 200S-30	200 (8)	30°	Suction Airflow with ACW Rotation
305096	A 230+	230 (9)		
305098	A 250S-30	254 (10)		



JRM

Plastic

Cat. No.	Part No.	Diameter mm (inches)	Type of Mounting	No. of Blades
305049	FBP190FR-UWESR	196 (7 3/4)	Hub Mount or 6mm Bore	5

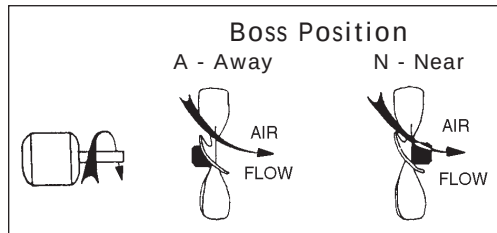
L'Unite Hermetique

Please refer to pages 235 to 238 for HTA Condensing Unit Spare Parts

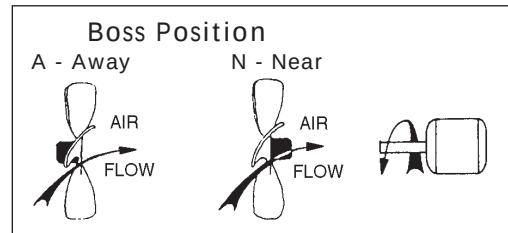
Fan Blades

Identification

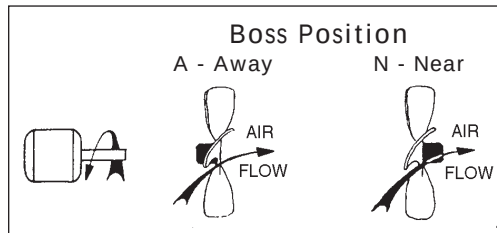
Blow on Clockwise Motor



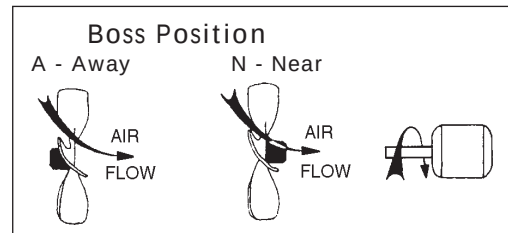
Suck on Clockwise Motor



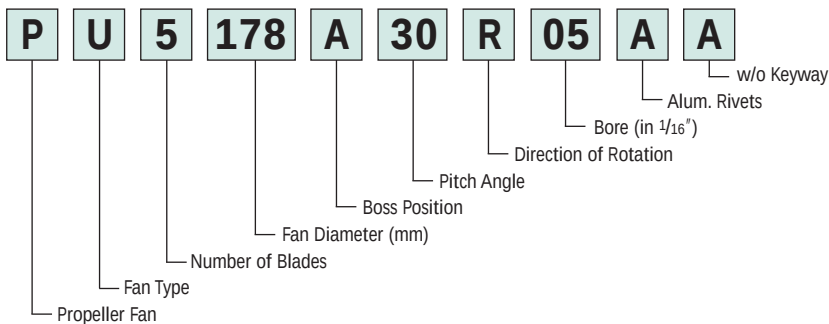
Blow on Anti-Clockwise Motor



Suck on Anti-Clockwise Motor



Part Numbering System



NB

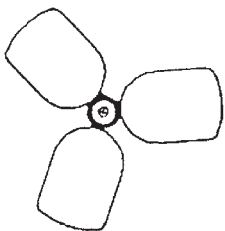
Direction of rotation and boss position is determined with the fan blowing toward you, then fan is either clock (R) or anti-clock (L) and boss is either near (N) or away (A).

Note

Direction of rotation for a MOTOR is always determined when looking at the driving shaft end.

Type 'S' Light Duty

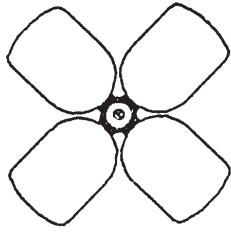
Fabricated from plated drawing quality steel spiders with riveted aluminium blades.



Cat. No.	Part No.	Diam. mm (inches)	Bore	Application
307056	PS3178N18L05AA	178 (7)	5/16"	Suck on Clockwise Motor
307073	PS3178N32R05AA			Suck on Anti-Clockwise Motor
307062	PS3178A20L05AA			Blow on Anti-Clockwise Motor
307045	PS3203A28L05AA	203 (8)		Suck on Anti-Clockwise Motor
307009	PS3203N28R05AA			Suck on Clockwise Motor
307034	PS3203N29L05AA			Blow on Clockwise Motor
307046	PS3229A29R05AA	229 (9)		Suck on Clockwise Motor
307135	PS3229N30L05AA			Blow on Anti-Clockwise Motor
307142	PS3229A30L05AA			Blow on Clockwise Motor
307008	PS3244A31R05AA	244 (9 1/2)		Suck on Clockwise Motor
307014	PS3244N24L05AA			Suck on Anti-Clockwise Motor
307111	PS3244N29R05AA			Blow on Anti-Clockwise Motor
307031	PS3254N29R05AA	254 (10)		Blow on Clockwise Motor
307025	PS3254A29L05AA			Suck on Clockwise Motor
307026	PS3254N29L05AA			Blow on Clockwise Motor
307032	PS3254A29R05AA	305 (12)		Suck on Anti-Clockwise Motor
307039	PS3305N20R05AA			Blow on Anti-Clockwise Motor
307051	PS3305A20L05AA			Suck on Clockwise Motor
307057	PS3305N20L05AA			Blow on Clockwise Motor
307016	PS3305A20R05AA			

Fan Blades continued next page

Fan Blades and Blower Wheels



Type 'H' Heavy Duty

Fabricated from plated drawing quality steel spiders with riveted aluminium blades

Cat. No.	Part No.	Diam. mm (inches)	Bore	Application
307148	PH3457A20L08AA	457 (18)	1/2"	Blow on Anti-Clockwise Motor
307149	PH3457N20R08AA			Suck on Anti-Clockwise Motor
307145	PH3457A20R10AA		5/8"	Blow on Clockwise Motor
307144	PH3508A16R08AA	508 (20)	1/2"	

Type 'M' Medium Duty

Fabricated from plated drawing quality steel spiders with riveted aluminium blades

Cat. No.	Part No.	Diam. mm (inches)	Bore	Application
307106	PM3356N20R05AA	356 (14)	5/16"	Suck on Anti-Clockwise Motor
307113	PM3356A16L05AA			Blow on Anti-Clockwise Motor
307052	PM3356A26R05AA			Blow on Clockwise Motor
307055	PM3356N31L09AA		9/16"	Suck on Clockwise Motor
307088	PM3356A31R09AA			Blow on Clockwise Motor
307134	PM3406A20R08AA	406 (16)	1/2"	Suck on Anti-Clockwise Motor
307146	PM3406N20R08AA			Blow on Clockwise Motor
307109	PM3406A20R09AA		9/16"	Suck on Anti-Clockwise Motor
307072	PM3406N20R09AA			Blow on Anti-Clockwise Motor
307074	PM3406A20L09AA			Suck on Anti-Clockwise Motor
307143	PM3406N20R10AA		5/8"	Blow on Clockwise Motor

Type 'U' Light Duty

One piece pressings in aluminium

Cat. No.	Part No.	Diam. mm (inches)	Bore	Application
307001	PU5178A30R05AA	178 (7)	5/16"	Blow on Clockwise Motor
307002	PU5203A30R05AA	203 (8)		
307004	PU5203N35R05AA			Suck on Anti-Clockwise Motor
307006	PU5229N35R05AA	229 (9)		
307003	PU5254A30R05AA	254 (10)		Blow on Clockwise Motor

Blower Wheels – Single Inlet

Injection moulded plastic

Cat. No.	Part No.	Diam. x Width	Bore	Type
307156	GA0201010-R08-46	203mm (8") x 203mm (8")	1/2"	Left and Right Hand

Fan Motors

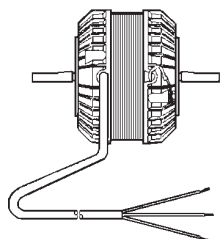
Fasco

50D Series

Auto Reset Thermal Protection, Ball Bearings, 102mm Body Diameter.

Double Shaft Bi-Directional

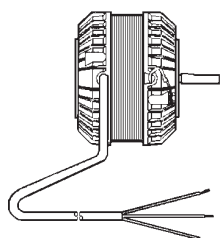
240 Volt 50Hz 1300 rpm



Cat. No.	Part No.	Amps	Watts Output	Maximum Fan Blade Dia. x Pitch	Dimensions - mm			Mounting
					Shaft Diameter	Body Diameter	Body Length	
309041	50D501-80A	0.3	10	225 X 40°	7.9 (5/16")	102	62	3 and 4 Hole
309053	50D502-80A	0.5	20	250 X 40°			66	
309042	50D503-80A	0.75	40	275 X 40°			73	
309005	50D505-80A	1	60	350 X 30°			85	

Single Shaft

240 Volt 50Hz 1300 rpm



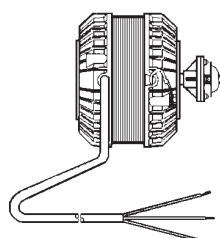
Cat. No.	Part No.	Amps	Watts Output	Rotation	Maximum Fan Blade Diam. x Pitch	Dimensions - mm		
						Shaft Diameter	Body Diameter	Body Length
309011	50D501-61C	0.3	13	CW	225 X 40°	7.9 (5/16")	102	60
309004	50D502-61C	0.5	20	CW	250 X 40°			66
309013	50D503-61C	0.75	40	CW	275 X 40°			73
309006	50D505-61C	1	60	CW	350 X 30°			85

Special Purpose

Cat. No.	Part No.	Watts Output	Rotation	Replaces / Application
309082	50D501-74C	10	CW	Acrow Drink Dispenser Motor
309052	50D521-76A	10	ACW	Agitator Motor, 140mm Shaft
309076	50D509-22A	40	ACW	415V (Kirby) Two Phase Motor Rep. Brinsmead BG4A
309040	50D505-71C	60	CW	BP146C (Muller), BDS60-1C
309092	50D551-01A	14	ACW	5-2868-509-039, General Replacement, Muller CDN, CDL Series
309008	50D539-03A	30	ACW	5-2868-513-081, 3 Stud Mount
309019	50D543-01A	35	ACW	

Hub Mount – Threaded Shaft

240 Volt 50Hz 1300 rpm to suit Hubless Fan Blades



Cat. No.	Part No.	Watts Output	Rotation	Replaces / Application
309001	50D520-82A	8	ACW	39D520-79A
309002	50D501-81A	10	ACW	39D501-70A
309009	50D552-01A/S	10	ACW	BKM 90150, Kysor Warren, 3 Hole Mount, Low Temperature Bearings -50°C
309010	50D551-02A	20	ACW	BKM 9170, 3 or 4 Hole Mount
309018	50D543-03A	35	ACW	

Bearing Service Pack

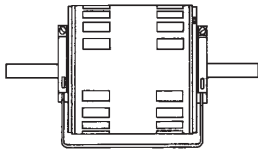
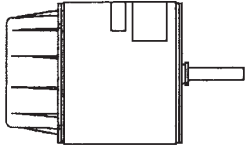
Cat. No.	Part No.	Description
309043	391-074-01	Two Bearings, Wave Washers, etc

Rotation viewed from shaft end ACW = Anti-Clockwise CW = Clockwise

Fan Motors and Mounting Brackets

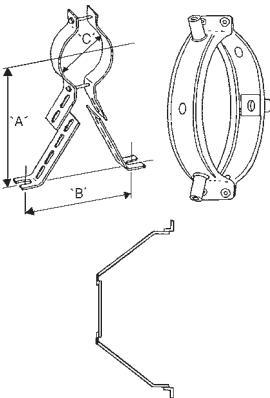
Fasco

S Series



Cat. No.	Part No.	Volts/Phase	Watts Output	Speed RPM	Enclos.	Capacitor mfd / V	Application
Weatherproof – Single Shaft							
309100	808554LTB-A80	240/1	180	1400 x 1	T.E.	4/440	Band Mount
309090	61S137-80	240/1	250	910 x 1	T.E.	6/440	Band Mount
309091	808536MTB-A11	415/3	250	900 x 1	T.E.		Band Mount
Double Shaft							
309094	61S122-80	240/1	130	1370 x 3	Vented	4/440	Scroll Fans
309088	61S082-80	240/1	550	1330 x 2	Vented	15/440	Scroll Fans
309089	61S057-80	240/1	90/60	940/820	T.E.	4/440	Lug Mount Email P/No. 2681011709
Multi Purpose R.A.C. Usage							
309075	61S109-01	240/1	290/425	1315 x 3	Vented	2/440	Double Shaft, Room Air Cond.
GMF Replacements							
309084	61S107-02	415/3	180	1400 x 1	T.E.		Single Shaft, Suit Muller Cond. Evap.
309083	61S072-09	240/1	180	1340 x 1	T.E.	4/440	Single Shaft, Suit Muller Cond. Evap.
Non Weatherproof – Single Shaft							
309078	8554LTB-A13	415/1	185	1400 x 1	T.E.	6/440	Lug Mount replaces FBS905
309072	61S109-03	240-1	315	1300 x 3	Vented	4/440	Scroll Fans
Other							
309085	61S009-06	240/1	250	915 x 1	T.E.	6/440	Air Cond.
309073	61S082-03	240/1	550	1300 x 3	Vented	6/440	

Motor Mounting Brackets



Cat. No.	Part No.	Type	Centre Height 'A' mm		Feet Centres 'B' mm		Motor Diameter 'C' mm
			Maximum	Minimum	Maximum	Minimum	
309047	AFB19	Adjustable Height	260	119	222	110	102
309081	391-160-02	3 Lug Collar	Suits Fasco Apollo / 35F Series Motors				
309077	391-160-01	4 Lug Collar					
309106	391-127-U	Stud Band Mounting, 3 or 4 Post Suits Fasco S Series	189mm External Diameter				
309107	391-127-V		176mm External Diameter				
309108	MUA 134-1	Spider Mount Bracket Suits Fasco 50D Series	254mm Blade				
309109	MUA 133-1		300mm Blade				

Rotation viewed from shaft end ACW = Anti-Clockwise CW = Clockwise

L'Unite Hermetique

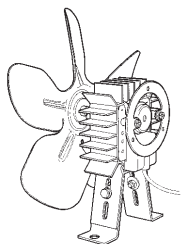
Please refer to pages 235 to 238 for HTA Condensing Unit Spare Parts

Fan Motors

Fasco

Universal Replacement

Motor / Fan / Bracket Assembly – Ball Bearings



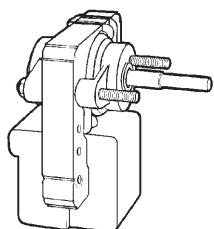
Cat. No.	Part No.	Volts	Amps	Air Movement	Fan Size	Mounting Bracket
309200	J06RFK19	240	0.22	Suck Over Motor	200mm (8")	Foot or Ring Mount, Adjustable Feet, from 100mm to 180mm between Base and Shaft Centre
309202	J12RFK19		0.42		254mm (10")	

Evaporative Cooler Series

240V 1Ph. R.S.I.R., 2 Speed, Resilient Mount, Ball Bearings, Auto Reset Overload

Cat. No.	Part No.	Watts Output	Amps	Speed RPM	Enclosure	Rotation
309220	9441 PVB-B11	550/180	5.9/3.2	1440/960	Drip Proof	CW
309221	9441 QYB-B11	750/250	6.9/3.6			

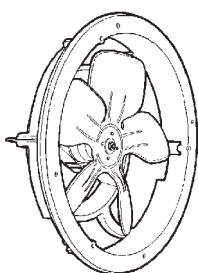
Open Frame – 240V, 50Hz



Cat. No.	Part No.	Rotation	Amps	Stack	Shaft	Application
310055	J03RF03	CW (Reversible)	0.11	9.5mm (3/8")	3.2mm (1/8")	Domestic Frost Free Refrigerators
310065	J06RF07	ACW	0.3	19mm (3/4")	4.8mm (3/16")	Muller CSN, CSL, Series Cabinet Coils
310058	5-MU206	Muller Mounting Bracket				To Suit Cat. No. 310065
310066	J06RF24	CW	0.3	19mm (3/4")	4.8mm (3/16")	Kirby, Repco Cabinet Coils
310063	J06KR09	ACW	0.36	19mm (3/4")	4.8mm (3/16")	To Suit Muller Replaces 2858-306-005
310062	J06FM02	ACW	0.26	19mm (3/4")	6mm (1/4")	Muller CN Series P/No. MPB 220-1
310061	J09BM05	ACW	0.15	28mm (1 1/8")		Kirby UECL, UJAV Drop-in Replaces 46C019-02A
309209	J09R05S	ACW	0.22	28mm (1 1/8")		Threaded Shaft Suit Orford Cabinets

Open Frame – 240V, 50Hz – Ball Bearings

Complete with Blade – Ring Mounted

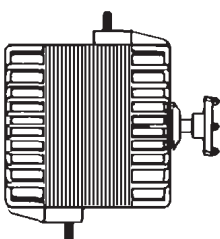


Cat. No.	Part No.	Fan Size	Amps	Stack	Air Flow m³/hr
310047	J06RFK11	203mm (8")	0.3	19mm (3/4")	260

All are assembled air movement over the motor.

Radlon

Type RMAV – 220-240V, 50/60Hz



Cat. No.	Part No.	Rotation	Watts Output	Amps	Shaft	Suggested Blades	
						Diam. mm	Pitch
310038	RMAV-010CCW	ACW	10	0.25	Fan Hub	250	26° to 30°
310039	RMAV-010CW	CW					
310044	RMAV-016CCW	ACW	16	0.35		300	20°
310026	RMAV-025AUS*	ACW	25	0.56		300	20° to 30°

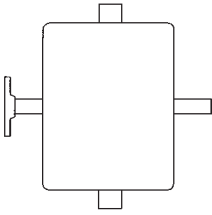
*Long Shaft

Rotation viewed from shaft end ACW = Anti-Clockwise CW = Clockwise

Fan Motors

CMG

CT52 Series



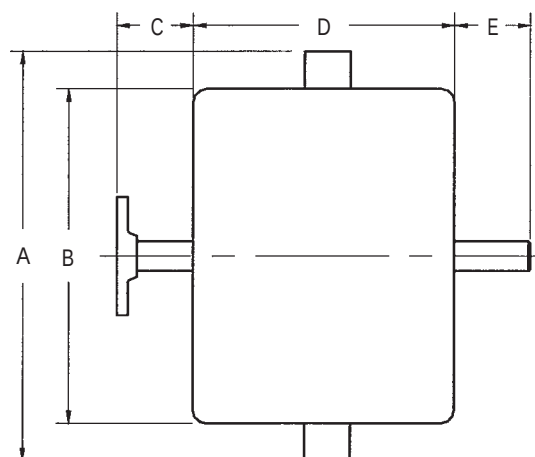
Features

- Efficient PSC Design
- Electrically reversible
- Standard Shaft and Hub Drive (40 watt only)
- Totally enclosed
- Universal Mounting Arrangement
- Auto reset overload
- Capacitor Supplied
- Hex and Phillips head mounting screws supplied
- 4-in-1 Design (40 watt only)

Cat. No.	Part No.	Watts Out	Full Load Amps	Speed RPM	Capacitor		Reversible	Voltage	Suits Fan Diam	Suits Fan Pitch
					Size	Supplied				
309340	CT52-54001T-H02	13	0.15	1350	2/440	YES	YES	240	229	40°
309342	CT52-54002T-H02	20	0.25	1300	2/440	YES	YES	240	254	40°
309344	CT52-54004T-N02	40	0.5	1300	2/440	YES	YES	240	275	40°

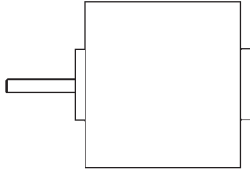
CMG	Fasco	Kulthorn	Brinsmead
CT52-54001T-H02	30D501-80A 50D501-80A	KLD10D	BLD13-11A
CT52-54002T-H02	30D502-80A 50D502-80A	KLD20D	BLD20-11A
CT52-54004T-N02	30D503-80A 50D503-80A	KLD40DB	BLD40-11A

Part No.	Dimensions				
	A	B	C	D	E
CT52-54001T-H02	111	90.4	-	70	32
CT52-54002T-H02	111	90.4	-	70	32
CT52-54004T-N02	111	90.4	36	70	32



Fan Motors

CMG



Standard Features

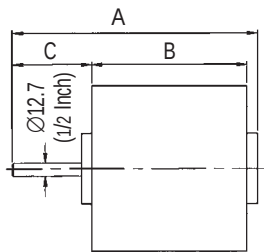
- Low noise
- Designed to international standards
- Long bearing life
- Interchangeable with other brands
- Permanent split capacitor design
- Dynamically balanced rotors
- Auto reset thermal overload on single and three phase motors

Single Shaft Scroll Fan Motors

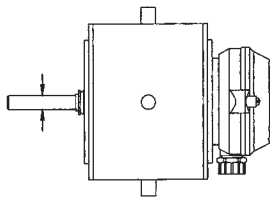
Features

- Resilient mount
- 3 Speed tapped winding

Cat. No.	Part No.	Kw	FLA	Phase	Speed RPM	Rotation*	Reversible	Fasco	Kulthorn
309311	CT85-55031V-B02	0.315	2.5	Single	1350	CW	No	8061S109-03/8061S109-07/808555NVA-A13	HF2J4701K
309312	CT85-55060V-B02	0.6	4.4		1200			8061S082-03/8061S082-17/8061S082-24	KHF2T4703
309313	CT85-55075V-B02	0.75	4.9		1360			8061S128-02/8061S128-06	



Part No.	Dimensions		
	A	B	C
CT85-55031V-B02	236	119	101.5
CT85-55060V-B02	260	144	101.5
CT85-55075V-B02	260	144	101.5

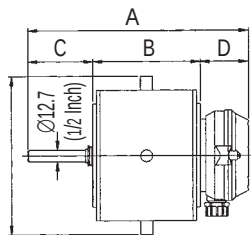


Single Shaft Totally Enclosed Condenser Fan Motors

Features

- Totally Enclosed

Cat. No.	Part No.	Kw	FLA	Phase	Speed RPM	Rotation*	Reversible	Fasco	Kulthorn
309303	CT85-57015X-M02	0.15	1.2	Single	1400	CW	Yes	808557KTB-A11/61S059-80	HF3G4701K
309300	CT85-54018X-M02	0.18	1.25	Single	1380			808554LTB-A80-61S072-80	KHF2F4702
309301	CT85-34018X-M02	0.18	0.9	Three	1400			808534LTB-A12	
309302	CT85-34018X-F02	0.18	0.75	Three	1400			8061S107-02	
309304	CT85-56025X-M02	0.25	2.3	Single	910	ACW		8061S137-80	KHF3J4702
309305	CT85-56025T-M02	0.25	2.6	Single	915	CW	No	8061S009-06	
309308	CT85-36025X-M02	0.25	0.95	Three	900		Yes	808536MTB-A11-61S124-80	
309306	CT85-57030T-M02	0.3	2.7	Single	910		No	8061S118-02/8061S118-03	
309307	CT85-56037X-M02	0.37	2.9	Single	900	ACW	Yes	8061S120-80	HF3Q4700K
309309	CT85-36037T-B02	0.37	1.1	Three	890	CW	Yes	8061S121-80	



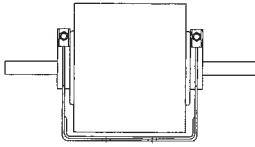
Part No.	Dimensions				
	A	B	C	D	E
CT85-54018X-M02	230	103	70	57	-
CT85-34018X-M02	232	103	72	57	-
CT85-34018X-F02	232	103	75	57	176
CT85-57015X-M02	234	115	62	57	-
CT85-56025X-M02	258	127	74	57	-
CT85-56025T-M02	211	132	79	-	-
CT85-57030T-M02	207	145	62	-	-
CT85-56037X-M02	267	140	70	57	-
CT85-36025X-M02	253	122	74	57	-
CT85-36037T-B02	205	131	60	-	-

* Note: Rotation viewed from shaft end

Fan Motors

CMG

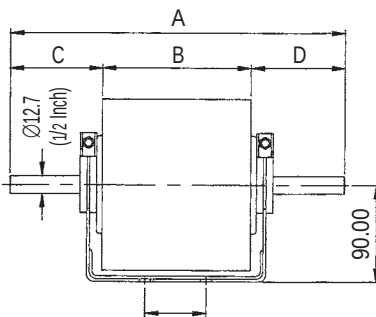
Double Shaft Scroll Fan Motors



Features

- Low noise
- Designed to international standards
- Long bearing life
- Interchangeable with other brands
- Permanent split capacitor design
- Resilient mount with cradle
- Dynamically balanced rotors
- Auto reset thermal overload
- 3 speed tapped winding

Cat. No.	Part No.	Kw	FLA	Phase	Speed RPM	Rotation*	Reversible	Fasco	Kulthorn
309322	CT85-57004T-C02	0.04	0.45	Single	900	CW/Lead End	Yes	8061S134-80	
309315	CT85-55008T-C02	0.08	0.8		1350	ACW/Lead End		8061S111-80	
309316	CT85-55010V-C02	0.1	1.1		1370			8061S083-80	
309317	CT85-55013V-C02	0.13	1.2		890			8061S122-80	KHF2D4701
309323	CT85-57020V-C02	0.2	2		1300	8061S004-80			
309318	CT85-55025V-C02	0.25	1.8		1350	8061s019-80		KHF2F4701	
309319	CT85-55031V-C02	0.315	2.5		1330	ACW/Lead end		8061S109-01/8061S109-04/808555NVA-A16/8061S109-08	HF2J4702K
309320	CT85-55060V-C02	0.6	4		1360			8061S082-80/8061S082-15/8085555PVA-A11	KHF2Q4700 HF2T4702K
309321	CT85-55075V-C02	0.75	4.9					8061S128-80/808555QVA-A11	KHF2T4704



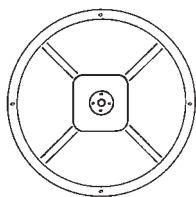
Part No.	Dimensions			
	A	B	C	D
CT85-55008T-C02	458	93	182	182
CT85-55010V-C02	493	93	200	200
CT85-55013V-C02	450	94	178	178
CT85-55025V-C02	517	99	209	209
CT85-55031V-C02	555	111	222	222
CT85-55060V-C02	543	136	203.5	203.5
CT85-55075V-C02	610	136	237	237
CT85-57004V-C02	610	100	255	255
CT85-57020V-C02	520	111	204	204

Fan Motors

Radlon

Type RDMV – 220-240V, 50/60Hz

Ring Mounted – Less Blade – Suitable for Display Cases / Frozen Food Cabinets

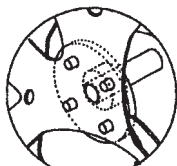


Cat. No.	Part No.	Fan Size mm (inches)	Rotation	Watts Output	Amps	Shaft	Ambient Temp. Range
310046	RDMV07-200	200 (8)*	ACW	7	0.24	Fan Hub	-30° to 52°C
310056	RDMV12-250	250 (10)**		12	0.35		

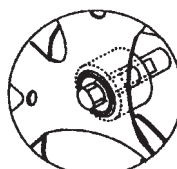
*Suit Fan Blade Cat. No. 305097

**Suit Fan Blade Cat. No. 305098

FAN MOUNTING



Type A



Type B

Fan Motor – To Suit Condensing Units

▼ Cat. No.	Part No.	Watts	Volts/Phase	Fan Mounting
310024	RM-006	5	220/1	A
310026	RMAV.25AUS	25	220/1	A

▼ Cat. No.	Part No.	Watts	Volts/Phase	Fan Mounting
310025	RMV-025.5	25	240/1	B (8mm)

Maneurop

Fan Motor and Blade Assembly

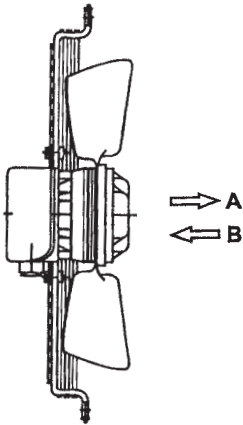
Cat. No.	Part No.	Electrical Supply	Watts	Fan Diameter mm	To Suit Condensing Unit Model ▼
310101	8176044	400V 3 Ph 50Hz	170	300	MGM/MGZ 32-40 HGM 22-36 HGZ 22-32 LGZ 28-40
310078	8176046		230	355	MGM/MGZ 50-64 HGM 40 HGZ 36-40 LGZ 44-50
310102	8176048		230	355	MGM/MGZ 80 HGM/HGZ 50
310103	8176069		450	450	MGM/MGZ 100-160 HGM/HGZ 64-100 LGZ 88-100
310071	8176021	230/400V 3 Ph 50Hz	200	350	GMH 22-64 GLT 40-100 GM/GME 18-36
310072	8176023		630	500	GM/GME 40-50
310080	8176018	230V 1 Ph 50Hz	70	254	MGM/MGZ 16-28 HGM 18 HGZ 18 LGZ 22
310077	8176043		170	300	MGM/MGZ 32-40 HGM 22-36 HGZ 22-32 LGZ 28-40
310070	8176020		170	350	GM/GME 18-36

Fan Motor Only

Cat. No.	Part No.	Electrical Supply	Watts	To Suit Condensing Unit Model
310085	8176004	230V 1 Ph, 50Hz	170	GMH 22-64 GM/GME 18-36

Fan Motors

Soler Palau Fan Motor Assembly



The Rotorex range is a series of external rotor motor axial fans, specially designed to be used on refrigeration and air conditioning equipment, using the most advanced technology in order to ensure efficiency together with the lowest noise level.

Features

- Induced, asynchronous, with external rotor design
- Ball bearing construction
- Motor housing and fan made from aluminium and dynamically balanced for quite operation
- Thermal protection
- Speed controls can be fitted to single phase motors and 3 phase motors can be wired in delta or star

Fan Selection

The following table allows the selection of the most appropriate ROTOREX model according the specific requirements needed:

HR 1 / 2 - 3 - 4 5 6 7

1 Motor

- B: Single Phase
- T: Three Phase

2 Speed (Nom.)

2 pole	(2800 rpm)
4 pole	(1400 rpm)
6 pole	(900 rpm)
8 pole	(700rpm)

3 Impeller (Dia./Pitch)

• 200	• 450/25	• 560/25
• 250	• 450/30	• 560/30
• 300	• 450/35	• 560/35
• 315	• 500/25	• 630/25
	• 500/30	• 630/30
	• 500/35	• 630/35

4 Air direction

- A: Motor-impeller
- B: Impeller-motor

5 Type of connection

If nothing is indicated, the choice is for Terminal Box, (including the capacitor in the single phase models)
Lead out (not including the capacitor in the single phase models for models 200-400)

6 Support

- N : Flat
- PN : Basket type
- S : Without support

7 Voltage

• 230V	50Hz
• 230/400V	50Hz
• 400V Δ/Y	50Hz

Cat. No.	Model No.	Description	Volts	Amps	RPM
310145	HRB/2-200BPN	200mm 1PH	240	0.34	2775
310146	HRB/4-250BPN	250mm 1PH	240	0.21	1450
310147	HRB/4-300BPN	300mm 1PH	240	0.33	1380
310148	HRB/4-350BPN	350mm 1PH	240	0.55	1400
310149	HRB/4-400BPN	400mm 1PH	240	0.71	1150
310155	HRT/4-400BPN	400mm 3PH	415	0.32	1250
310120	HRB/4-450/30BPN	450mm 1PH	240	2.4	1320
310150	HRT/4-450/30BPN	450mm 3PH	415	0.48	1340
310122	HRB/4-500/25BPN	500mm 1PH	240	1.9	1340
310153	HRB/6-500/35BPN	500mm 1PH	240	1.3	867
310130	HRT/4-500/30BPN	500mm 3PH	415	2.5	1360
310152	HRT/4-500/25BPN	500mm 3PH	415	1.1	1340
310151	HRB/6-560/30BPN	560mm 1PH	240	1.8	830
310158	HRT/4-560/25BPN	560mm 3PH	415	0.84	850
310154	HRB/6-630/35BPN	630mm 1PH	240	1.9	820
310159	HRT/4-630/25BPN	630mm 3PH	415	2.5	1330
310160	HRT/6-630/30-BPN	630mm 3PH	415	1.35	830
310161	HRT/6-710/30BPN	710mm 3PH	415	2.3	900

Compressor Electricals

L'Unite Hermetique

Relays and Overloads

Compressor Model	Motor Type	Relay		Overload	
		Cat. No.	Part No.	Cat. No.	Part No.
AZ1320A	PTCSIR	315125	MSDA 1 B	315155	4TM 129 NFBYY-52/71
AZ1320Y				315246	MRP 319 HZ-3240
AZ1328A				315265	4TM 142P FBYY-52/71
AZ1330Y				315267	4TM 142 NFBYY-52/71
AZ1335A				315247	MRP 419 HZ-3240
AZ1335Y					
AZ1339Y				315226	4TM 181 NFBYY-52/71
AZ1340A					
AZ1348Y				315161	MRP 390 HZ-3240
AZ1355Y					
AZ4410Y	CSIR	315212	MTRP 0138-31	315247	MRP 419 HZ-3240
AZ4412Y		315213	MTRP 0010-31	315161	MRP 390 HZ-3240
AZ4414Y		315124	MTRP 0139-31		
AZ4419Y		315214	MTRP 0140-31		
AE1410A RH	RSIR	315104	9660 B 467-145	315133	MRT 58 AMN-3240
AE1410Y RH				315160	MRP 61 AMK-3240
AE1412A RH		315210	MTRP 46-31	315133	MRT 58 AMN-3240
AE1412Y RH		315104	9660 B 467-145	315160	MRP 61 AMK-3240
AE1417Z		315166	MTRP 0012-31	315131	MRP 36 AMK-3240
AE1420Z		315218	9660 A 467-168	315240	MRT 36 ALK-3240
AE5465E	PSC		NOT REQUIRED	315137	MST 18 AMK-3252
AEZ1360A RH	RSIR	315109	9660 B 467-118	315134	MRP 380 AMK-3240
AEZ1370Y	PTCSIR	315125	MSDA 1 B	315139	MRP 304 AMN-3240
AEZ1380A RH	RSIR	315106	9660 B 467-131	315241	T0071-A0
AEZ1380Y RH	PTCSIR	315125	MSDA 1 B	315242	MRP 304 AMN-3240
AEZ1410D RH	RSIR	315104	9660 B 467-145	315271	MRT 59 AMK-3240
AEZ4425E	CSIR	315110	9660 B 467-125	315136	MRP 63 AMK-3240
AEZ4425Y					
AEZ4425Z					
AEZ4430E		315211	MTRP 0027-31	315273	MRP 56 AMK-3240
AEZ4430Y				315133	MRT 58 AMN-3240
AEZ4430Z		315102	9660 B 467-138	315273	MRP 56 AMK-3240
AEZ4440E		315167	MTRP 0030-31	315243	MST 58 AMN-3240
AEZ4440Z					
AEZ9440T	CSR	315129	3ARR3 T 3 AB 3	315154	MSP 61 AMK-3252
AEZ9440Z				315244	T0318-B9
CAE2410A	CSIR	315102	9660 B 467-138	315132	T0333-A0
CAE2410Y				315248	T0069-A0
CAE2412A		315215	MTRP 0029-31	315132	T0333-A0
CAE2412Y		315102	9660 B 467-138	315249	T0057-A4
CAE2417Z	CSR	315216	3ARR3 T 3 AU 3	315250	T0333-C0
CAE2420Z	CSIR	315162	9660 A 467-158	315251	MST 28 AMK-3240
CAE2424Z	CSR	315216	3ARR3 T 3 AU 3	315151	T0420-B9
CAE4ZF11	CSIR	315211	MTRP 0027-31	315135	MRP 36A MHD-3240
CAE4440A		315166	MTRP 0012-31	315252	MST 36A MHD-3240
CAE4440Y				315253	T0056-A4
CAE4448Y				315251	MST 28 AMK-3240
CAE4448Y				315251	MST 28 AMK-3240

Compressor Electricals

L'Unite Hermetique

Relays and Overloads

Compressor Model	Motor Type	Relay		Overload	
		Cat. No.	Part No.	Cat. No.	Part No.
CAE4450E	CSIR	315167	MTRP 0030-31	315274	T0420/A4
CAE4450Z		315162	9660 A 467-158		
CAE4456Y		315218	9660 A 467-168	315168	T0691-A0
CAE59ZF9	CSIR	315110	MTRP 37-31	315140	MRP 59A MHD-3240
CAE9450T	CSR	315114	3ARR3 T 3 AV 3	315277	T0334-B9
CAE9450Z		315219	RVA 2 L 3 D	315254	T0431-B9
CAE9460T		315114	3ARR3 T 3 AV 3	315151	T0420-B9
CAE9460Z		315220	RVA 3 M 3 D		
CAE9470Z		315219	RVA 2 L 3 D	315264	T0425-B9
CAJ2428L	CSIR	315111	3ARR18 A 101 B	315141	MRT 16 APK-3253
CAJ2428Z					
CAJ2432L	CSR	315164	3ARR3 T 10 AD 3	315142	T0348-C2
CAJ2432Z					
CAJ2446L		315112	3ARR3 T 6 AC 3	315158	MRT 00 AJZ-3256
CAJ2446Z					
CAJ2464L		315126	3ARR3 T 10 AA 3	315255	MST 18 AJW-3253
CAJ2464Z				315256	T0155-C2
CAJ2T12	CSIR	315111	3ARR18 A 101 B	315276	MRA 38114-3253
CAJ4452A		315163	3ARR18 A 44 B	315257	T0249-C1
CAJ4452Y					
CAJ4461A				315256	T0155-C2
CAJ4461A					
CAJ4461Y					
CAJ4476Y		315111	3ARR18 A 101 B	315144	MRT 24 AJN-3253
CAJ4492A		315113	3ARR18 A 98 B	315153	MRT 00 AJK-3256
CAJ4492Y					
CAJ4511A	CSR	315126	3ARR3 T 10 AA 3	315258	MST 00A HKE-3256
CAJ4511Y		315223	RVA 6 M 3 D	315170	MST 16 AGZ-3253
CAJ4517E		315120	RVA 4 L 3 D	315259	GA3 SHU 00-16
CAJ4517Z		315221	3ARR3 T 10 AS 3	315257	T0249-C1
CAJ4519Z					
CAJ9480T		315224	RVA 3 I 3 D	315142	T0348-C2
CAJ9480Z					
CAJ9510T		315112	3ARR3 T 6 AC 3	315169	MST 00A LKD-3256
CAJ9510Z				315260	T0161-C1
CAJ9513T		315126	3ARR3 T 4 AA 3	315150	MST 18 AIW-3253
CAJ9513Z		315121	3ARR3 T 6 AU 3	315146	MST 18 AKN-3253
AJ5510F	PSC		NOT REQUIRED	315147	MRT 18 AJN-3253
AJ5512E				315150	MST 18 AIW-3253
AJ5513E				315245	T0657-C2
AJ5515E				315149	GA3 SJU 81-16
AJ5518E				315275	CRA 38013-3057
AJ5519E					INTERNAL
CAH4518A	CSR	315221	3ARR3 T 10 AS 3		
CAH4525A		315222	3ARR3 T 6 AV 3		
FH2480Z		315225	RVA 4 Q 3 D		
FH2511Z		315226	RVA 4 I 3 D		

Electrical

L'Unite Hermetique

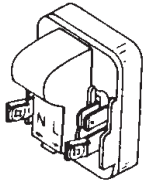
Relays and Overloads

Compressor Model	Motor Type	Relay		Overload			
		Cat. No.	Part No.	Cat. No.	Part No.		
FH4518Y	CSR	315221	3ARR3 T 10 AS 3		INTERNAL		
FH4522F		315226	RVA 4 I 3 D				
FH4522Z							
FH4524F							
FH4524Z		315120	RVA 4 L 3 D				
FH4525Y							
FH4531F		315223	RVA 6 M 3 D				
FH4531Z							
FH4540Z	PSC		NOT REQUIRED				
FH5522F							
FH5524F							
FH5528F							
FH5532F							
FH5538F							
FH5542F							
TAJ2464Z				3 PH		315279	MRT 58 AMN-3257
TAJ4511Y						315261	T0600-A9
TAJ4517T						315278	MRT 36A IND-3257
TAJ4517Z	315262	MRP 61 AMJ-3257					
TAJ4519T	315263	MRT 59A MKD-3257					
TAJ4519Z	315279	MRT 58 AMN-3257					
TAJ9480Z	PTCSIR	315127	PTC407/8P 4.8MM			315303	4TM 129R FBYY52/71
TAJ9510Z				315304	T0434-AO		
TAJ9513Z				315305	T0595-AO		
THB1335Y				315306	T0423-AO		
THB1340Y							
THB1350Y							
THB1360Y							

Electrical

Danfoss

Starting Equipment

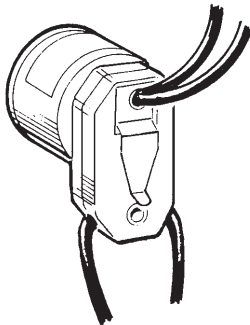


Cat. No.	Part No.	Description	For Compressor Type
324123	103N0011	PTC Starting Device (LST)	PL, TL, NL, FR
324124	103N0002	PTC Starting Device (LST)	SC10B, G/12A, B, G/15A, F
324125	117-7011	Starting Device (HST)	SC10GHH/15, 15D/21, 21B

Refrigeration Electricals

Type SR Relay / Overload

- Replaces almost every make relay and overload combination including hot wire relays and centrifugal starting switches from 1/12 HP to 3/4 HP
- Calibrated in Australia for Australian conditions in individual stages
- Select by HP or Full Load current
- Quick clip-on or screw mount – multi-positional
- No starting contacts to pit or wear
- Vibration and shock resistant
- Long operating life
- Overload protection
- Simple wiring connections



Cat. No.	Part No.	HP	FL Amps	Volts
324201	SR12	1/12	0.6	240
324202	SR10	1/10	0.8	
324203	SR8	1/8	1	
324204	SR6	1/6	1.3	
324205	SR5	1/5	1.5	
324206	SR4	1/4	2	
324207	SR3	1/3	3	
324208	SR2	1/2	4	
324209	SR7	3/4	5.5	

At least 45 seconds must be allowed between starts. Do not use with a Run Capacitor.

Type REA-1 – Solid State Relay

For Refrigeration, Air Conditioning, General Single Phase Electric Motor Applications up to 2 HP

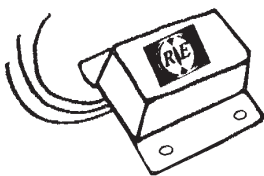
Cat. No.	Part No.
324215	REA-1

Completely Encapsulated

Ideal for dusty - damp - oily - sub zero - conditions such as submersible pumps or cool rooms. Can be used with or without start or run capacitors. Can be mounted in any position.

May be used to replace the following

- GE Types 3ARR2 etc., Potential (Voltage) Relays
- RBM Potential (Voltage) Relays
- Klaxon Current Type Relays
- Centrifugal Switches - etc



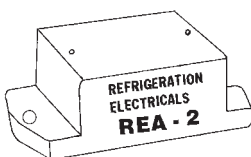
Type REA-2 – Solid State Centrifugal Switch Replacement

For Capacitor Start and Capacitor Start and Run Motors – 0.25 hp to 3 hp, 240 Volt ac, 50Hz

The REA-2 senses the induced back EMF from the starting winding, engages the start winding for starting ramp up and disengages at 70% to 80% of synchronous speed. If the motor speed falls back to near 50% of synchronous speed then the start winding will re-engage. (This device is not time dependent).

- Solid State Arc Free Switch
- Guarantees Maximum Starting Torque
- Improves Motor Life and Performance
- Remote Installation Possible

Cat. No.	Part No.
324216	REA-2



This device cannot be used on split phase motors unless a capacitor is fitted. The largest capacitor is not to exceed 300mf. Maximum current is 25 amps. If a centrifugal switch is fitted this should be removed.

Electrical

Supco

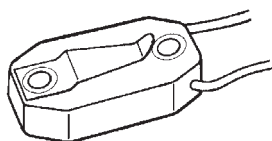
Solid State Relays, Overloads and Capacitors

Features

- No starting contacts to pit or wear
- May be directly substituted for contact starters such as centrifugal, magnetic and thermal type starting switches
- Acoustically and electrically noise free
- Vibration and shock resistant
- Long operating life and low cost

ICG Series Relay

One size for all compressors from 1/12 HP through 1/2 HP

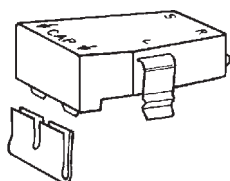


- Will replace most current type relays
- Easy to install. Can be mounted on the fence of the compressor with quick 'snap-on-bracket' or installed in any convenient location by using screws through the mounting holes
- Can be used with or without a start capacitor

Cat. No.	Part No.
324051	ICG-220

PO Series Relay

One size for all compressors from 1/12 HP through 1/2 HP

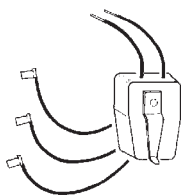


- Replaces all push-on current type relays
- For use on compressors with 'pin-type' terminals
- Can be used on all capacitor and non-capacitor start motors
- Lowest resistance solid state relay
- Fastest cool down time of all solid state relays
- Will restart balanced system within one minute
- Quick and easy to install

Cat. No.	Part No.
324058	PO-230

RO Series Relay and Overload

Replaces ALL Hermetic refrigerator compressor relay and overload units from 1/12 HP through 1/3 HP



- Can be used in conjunction with a start capacitor
- Relay and overload - in one Combination Unit
- Pre-wired for fast, simple installation
- Attached mounting clip makes installation easy
- Superior locked rotor protection eliminates start winding overheating

Cat. No.	Part No.	HP
324054	RO-82	1/12, 1/10, 1/8
324059	RO-62	1/6, 1/5
324055	RO-42	1/4, 1/3

RSC Series Starting Relay and Capacitor

One size for all compressors from 1/12 HP through 1/2 HP



For both domestic and commercial refrigerators and freezers. The installation of a start capacitor in series with the start winding in order to overcome starting problems was common practice. Then manufacturers started using push-on relays which left no practical way to install a start capacitor. Now this problem has been solved with a New Combination Relay and Start Capacitor - 'The Big Relay'.

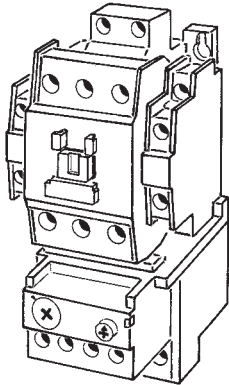
A combined solid state starting relay and capacitor, completely pre-wired for a fast, simple hook up. Installs quickly and easily by just pushing the three female pin terminals on to the compressor terminals.

- Replaces current type relays
- Provides added boost for hard start and unbalanced systems
- Prevents low voltage starting problems
- No additional wires required

Cat. No.	Part No.
3240591	RSC-20

Electrical

Alstom



Contactors

With 240 Vac, 50 Hz Coil		Ratings: AC3, 380-440 V		Auxiliary Contacts
Cat. No.	Part No.	kW	Amps	
324057	GMC-9-11-U	2.5	9	1 NO & 1 NC
324060	GMC-12-U	5.5	12	
324099	GMC-18-11-U	7.5	18	
324061	GMC-22-U	11	22	
324062	GMC-32-U	15	35	
324063	GMC-40-U	18.5	40	
324064	GMC-50-U	22	50	
324065	GMC-65-U	30	65	

Accessories

To Suit GMC-9 to GMC-65 Contactors

Cat. No.	Part No.	Description
324066	AU - 1	Auxiliary Contacts – Side Mount, 1 NO & 1 NC
324067	AU - 220	Auxiliary Contacts – Top Mount, 2 NO
324068	AU - 202	Auxiliary Contacts – Top Mount, 2 NC
324069	AR 9	Mechanical Interlock Unit

Coils

Cat. No.	Part No.	Rating	To Suit Contactors
324090	C09-40-AC 24V	24 Vac, 50 Hz	GMC 9 to GMC 40
324091	C09-40-AC 240V	240 Vac, 50 Hz	GMC 9 to GMC 40
324092	C09-40-AC 415V	415 Vac, 50 Hz	GMC 9 to GMC 40

Thermal Overload Relays

Cat. No.	Part No.	Rating : Amps	To Suit Contactors
324070	GTK-22-016	0.16 – 0.25	GMC – 9 GMC – 12 GMC – 18 GMC – 22
324071	GTK-22-025	0.25 – 0.4	
324072	GTK-22-040	0.4 – 0.63	
324073	GTK-22-063	0.63 – 1	
324074	GTK-22-1	1 – 1.6	
324075	GTK-22-1.6	1.6 – 2.5	
324076	GTK-22-2.5	2.5 – 4	
324077	GTK-22-4	4 – 6	
324078	GTK-22-6	6 – 9	
324079	GTK-22-9	9 – 13	
324080	GTK-22-12	12 – 18	
324081	GTK-22-16	16 – 22	
324082	GTK-40-16	16 – 22	GMC – 32 GMC – 40
324083	GTK-40-18	18 – 26	
324084	GTK-40-24	24 – 36	
324085	GTK-40-28	28 – 40	GMC – 50 GMC – 65
324086	GTK-85-34	34 – 50	
324087	GTK-85-45	45 – 65	

Separate Mounting Units

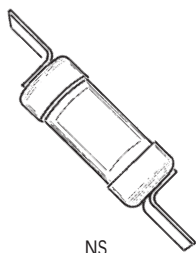
DIN Rail Mount

Cat. No.	Part No.	To Suit Thermal Overload Relays
324088	AZ-22 H	GTK-22
324089	AZ-40 H	GTK-40

Electrical

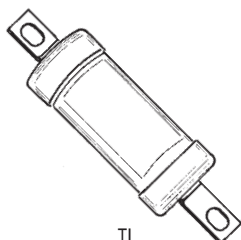
Alstom

HRC BS Type Fuse Cartridges, 415V With offset Tags and Clip Fixing



Cat. No.	Part No.	Rating : Amps	Overall Length
324420	NS 2	2	62mm
324421	NS 4	4	
324422	NS 6	6	
324423	NS 10	10	
324424	NS 16	16	
324425	NS 20	20	
324426	NS 25	25	
324427	NS 32	32	

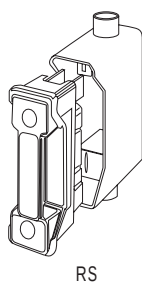
HRC BS Type Fuse Cartridges, 415V With offset Tags and Two Hole Fixing



Cat. No.	Part No.	Rating : Amps	Fixing Centres
324430	TIA 10L	10	73mm
324431	TIA 16L	16	
324432	TIA 20L	20	
324433	TIA 25L	25	
324434	TIA 32L	32	
324435	TIS 40L	40	
324436	TIS 50L	50	
324437	TIS 63L	63	

Fuses for Modular Fuse Holders, 500V

Cat. No.	Part No.	Rating : Amps	Body Size
324441	10G 16	16	10 x 38mm
324442	10G 20	20	
324443	10G 25	25	



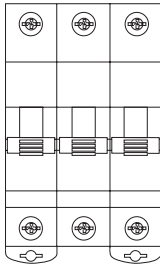
Fuse Holders

Cat. No.	Part No.	To Suit Fuse	Rating : Amps	Connection	Colour
Safeclip Fuse Holder					
324438	SC 32H	NS	32	Front Wired	Black
Red Spot Fuse Holder					
324439	RS 32H	TIA	32	Front Wired	Black
Compact Modular Fuse Holder					
324440	FMC 101	10G	32		

Electrical

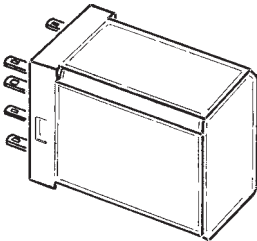
Alstom

Circuit Breakers



Cat. No.	Part No.	Control Voltage	Phase
324502	G61D10	10	1
324509	G61D16	16	
324510	G61D20	20	
324511	G63D10	10	3
324503	G63D20	20	
324504	G63D25	25	
324505	G63D32	32	
324506	G63D40	40	
324507	G63D50	50	
324508	G63D63	63	

Flat Pin Relays



Cat. No.	Part No.	Voltage	C/O Contacts	Pins	Rating Amps
324412	HC2-H-AC 240V	220/240 Vac	2	8	7
324413	HC2-H-AC 24V	24 Vac	2	8	7
324414	HC4-H-AC 240V	220/240 Vac	4	14	5
324415	HC4-H-AC 24V	24 Vac	4	14	5

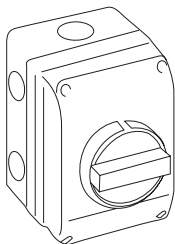
Flat Pin Relays with LED Built-in Indication

324417	HL2-L-AC 240V	220/240 Vac	2	8	10
324418	HL2-L-AC 24V	24 Vac	2	8	10

Bases for Flat Pin Relays

Cat. No.	Part No.	Suits Relay Type	Mounting
324416	HC4-SFD-K	HC4	DIN Rail
3244161	PTF08 A-E	HL2	DIN Rail

Enclosed Control Isolators - IP65



Cat. No.	Part No.	No of Poles	Current A	Dimensions (mm)
324100	ESD225	2	25	124 x 84
324101	ESD325	3	25	124 x 84

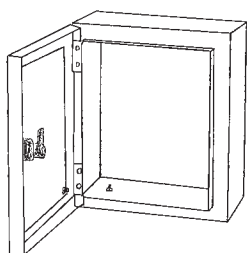
Specifications

Rated thermal current I _{the}	25A
Rated thermal current I _{th}	25A
Category AC21A	
Rated operating current	25A
Rated operating voltage	690V
Category AC22A	
Rated operating current	25A
Rated operating voltage	690V
Category AC23A	
3 x 230V—kW	6
3 x 400V—kW	9
3 x 500V—kW	12
3 x 690V—kW	15
Maximum Connection Section Switch	10mm ²
Maximum Connection Section PE-N Terminals	10mm ²

Electrical

EL steel

Metal Enclosures

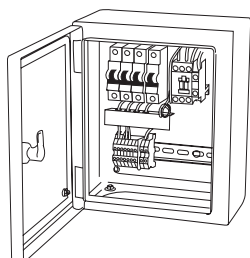


Features

- IP65 Mild steel
- Powder coated RAL 7032
- Fully welded construction
- Includes mounting plate. Mounting brackets and Gland plate

Cat. No.	Part No.	Description	Dimensions		
			Width	Height	Depth
324640	50620	Metal Enclosure	250	300	150
324641	50630	Metal Enclosure	300	300	150

Easyboard Electrical Switchboard (Pre-wired)



The Actrol Easyboard series packages together Carel and Alstom technology to deliver a range of switchboards which offer maximum protection and control of refrigeration and air conditioning plants. Easyboard reduces installation time and reliance on electrical contractors and all boards are pre-wired for hassle free installation. Furthermore Easyboard comes with a 12 month warranty. Custom designs welcome made to order.

Note: Overloads and other accessories sold separately.

Cat. No.	Part No.	Description	Features	Applications
324600	EBMT	Easyboard Medium Temp	Control & Power Circuit breakers, Contactor Wiring Diagram, Terminal strip and all pre-wired	Medium temperature applications up to a duty of 16FLA
324604	EBLT	Easyboard Low Temp	Control & Power Circuit breakers, Contactor Wiring Diagram, Terminal strip and all pre-wired An extra contactor for heating elements and a relay for evaporator fans	Low temperature applications up to a duty of 16FLA
324608	EBPL	Easyboard PCO2 Large	Control Board fitted with Carel pCO ² Controller Large. Pre-wired with terminal strips, Relays & Transformers	Suitable for chiller control, milk vats, air handling units, freezer rooms and cool rooms. Specific software is available
324610	EBPM	Easyboard PCO2 Medium	Control Board fitted with Carel pCO ² Controller Medium. Pre-wired with terminal strips, Relays & Transformers	
324612	EBPS	Easyboard	Control Board fitted with Carel pCO ² Controller Small. Pre-wired with terminal strips, Relays & Transformers	
324614	EBPRS	Easyboard Rack Control Small	Control Board fitted with Carel pCO ² Rack Controller Small. Pre-wired with terminal strips, Relays & Transformers	Multiple evaporator and capacity control with condenser fan control and duty rotation.
324616	EBPRL	Easyboard Rack Control Large	Control Board fitted with Carel pCO ² Rack Controller Large. Pre-wired with terminal strips, Relays & Transformers	
324620	EBMTD	Easyboard Medium Temp Dual Compressor	Control & Power Circuit breakers, Dual Compressor Contactor, Wiring Diagram, Terminal Strip and all pre-wired	Medium temperature applications up to a duty of 25FLA
324622	EBLTD	Easyboard Low Temp Dual Compressor	Control & Power Circuit breakers, Dual Compressor Contactor, Wiring Diagram, Terminal Strip and all pre-wired	Low temperature applications up to a duty of 25FLA
324618	EBPP	Easyboard pCO ² Programming	Application Programming of Carel pCO ² Rack Controller	When fitted

*Refer to next page on selection of Easyboard and Overload to suit our range of Hermetique 3 Phase HTA Condensing Units.

Electrical

Selection Guide - For Easyboard, Contactor and Overload

L'Unite Hermitique - 3 Phase Condensing Units

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Custom designs welcome, made to order.

Note: Overloads and other accessories sold separately.

Low Temperature R404A

Cat. No.	Condensing Units	FLA	Easyboard Cat No.	Contactor Cat No.	O/Load Cat No.
259577	TAJ T 2464ZBR	2.25	324604	324060	324075
259579	TFH T 2480ZBR	2.79			324076
259580	TFH T 2511ZBR	3.98			324077
259581	TAG T 2516ZBR	5.21			324077
259582	TAG T 2522ZBR	6.65			324078
259583	TAGD T 2532ZBR	10.4	324622		2 x 324077
259584	TAGD T 2544ZBR	13.3			2 x 324078

Medium/High Temperature R404A

Cat. No.	Condensing Units	FLA	Easyboard Cat No.	Contactor Cat No.	O/Load Cat No.
259603	TAJ T 4517ZHR	3.05	324600	324060	324076
259605	TAJ T 4519ZHR	4.48			324077
259609	TFH T 4524ZHR	4.2			
259611	TFH T 4531ZHR	5.4			
259612	TFH T 4540ZHR	6.97			
259613	TAG T 4546ZHR	7.47			
259614	TAG T 4553ZHR	7.79		324078	
259615	TAG T 4561ZHR	9.98			
259616	TAG T 4568ZHR	10.2			
259617	TAG T 4573ZHR	10.9	324061	324079	
259618	TAGD T 4590ZHR	15.5			
259619	TAGD T 4610ZHR	16.2		324620	2 x 324078
259620	TAGD T 4612ZHR	19.4			2 x 324079
259621	TAGD 4614ZHR	22.5			

Electrical

Selection Guide - For Easyboard, Contactor and Overload

L'Unite Hermitique - 3 Phase Condensing Units

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Note: Overloads and other accessories sold separately.

Medium/High Temperature R134a

Cat. No.	Condensing Unit	FLA	Easyboard Cat No.	Contactor Cat No.	O/Load Cat No.
259513	TAJ T 4511YHR	2.23	324600	324060	324076
259515	TFH T 4518YHR	3.47			324077
259517	TFH T 4525YHR	3.74			
259518	TAG T 4528YHR	4.21			324078
259519	TAG T 4534YHR	5.18			
259520	TAG T 4537YHR	5.93			
259521	TAG T 4543YHR	5.85			

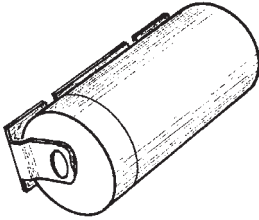
Medium/High Temperature R22

Cat. No.	Condensing Unit	FLA	Easyboard Cat No.	Contactor Cat No.	O/Load Cat No.	
259547	TAJ T 4517THR	2.83	324600	324060	324076	
259548	TAJ T 4519THR	3.44			324077	
259552	TFH T 4524FHR	4.0				
259556	TFH T 4531FHR	5.08			324078	
259558	TFH T 4540FHR	7.04				
259559	TAG T 4546THR	7.51			324061	324079
259560	TAG T 4553THR	8.34				
259561	TAG T 4561THR	10.6		324620		2 x 324078
259562	TAG T 4568THR	10.4				
259563	TAG T 4573THR	11.3			2 x 324079	
259564	TAGD T 4590THR	14.1				
259565	TAGD T 4610THR	15.1				
259566	TAGD T 4612THR	17.6				
259567	TAGD T 4614THR	24.5				

Capacitors

Refrigeration Electricals

Motor Start Capacitors



Cat. No.	Part No.	MFD	Volts AC
326001	25-30 MFD - 250V	25-30	250
326002	36-43 MFD - 250V	36-43	
326004	47-56 MFD - 250V	47-56	
326005	53-64 MFD - 250V	53-64	
326006	63-72 MFD - 250V	63-72	
326007	72-88 MFD - 250V	72-88	
326008	80-100 MFD - 250V	88-108	
326009	108-130 MFD - 250V	108-130	
326010	124-149 MFD - 250V	124-149	
326011	145-175 MFD - 250V	145-175	
326012	161-193 MFD - 250V	161-193	
326013	189-227 MFD - 250V	189-227	
326014	216-259 MFD - 250V	216-259	
326015	243-274 MFD - 250V	243-274	

Electrolytic or Motor Start Capacitors

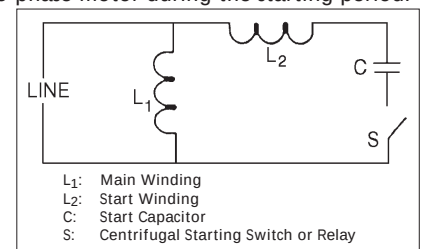
These capacitors are used for motor starting only, the length of time in the circuit being controlled by the starting relay. They are designed for intermittent duty and can be damaged if left in the circuit longer than the period prescribed by the maker (usually about 3 seconds duration).

Ratings

Operating: These capacitors are designed to operate within the ambient temperature range of -40°C to 65°C
 Storage: These capacitors may be subjected, without permanent damage, to conditions in transit where temperatures range from -55°C to 95°C.
 Tolerance: Unless otherwise specified, temperature tolerance shall be $\pm 3^\circ\text{C}$.
 Frequency: Unless otherwise specified, frequency shall be 50-60Hz.

Application

Capacitor start motors are designed for high starting torque but require an extra 'push' provided by the capacitor in order to start. The function of the capacitor is to provide out-of-phase starting current to the starting winding, forcing the motor to operate as a two-phase motor during the starting period. The starting capacitor is not intended for continuous duty and should not be used more frequently than 60 one-second, 30 two-second or 20 three-second starts per hour. These duty cycles are based on the necessity for proper heat dissipation to ensure maximum life. As the motor reaches full operating speed, the starting winding and capacitor are taken out of the circuit by either a centrifugal switch or a voltage or current-sensitive relay. The average time for a motor to reach full operating speed is approximately one second. Rarely does it require more than three seconds to reach full operating speed.



Failure Modes

Conditions which shorten life and increase failure rate are:

- Duty cycle greater than recommended
- High operating temperatures
- Application of voltages in excess of ratings
- Overloading, preventing motor from reaching running speed promptly
- Physical damage to case or terminals
- Failure of starting switch to open promptly when motor reaches running speed
- Worn or frozen motor bearings causing excessive loads on the start cycles
- Low line voltage preventing motor from reaching running speed
- Incorrect capacitance rating (seldom encountered except where previous replacement was incorrect)
- Improper voltage rating (again seldom encountered except where previous replacement was incorrect). A higher voltage rating may be used, but never a lower rating

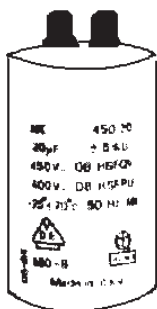
Replacement

Replacement of a defective capacitor should be made by using an equivalent unit. When this is not available, the new unit should have the same capacitance rating and a voltage rating equal to or higher than the defective unit. The motor nameplate voltage bears little or no relationship to the required voltage rating of the capacitor, because the motor designer has several options at his disposal which can determine the rating required. Whenever replacement is attempted, an AC voltmeter should be used to monitor the voltage across the capacitor.

Capacitors

Refrigeration Electricals

Motor Run Capacitors



Self-Healing Single-Phase Metallized Polypropylene Film Capacitors with plastic case, specially suited to motor applications. Potting of the capacitive element by means of suitable resin assures good electrical and mechanical performances.

They are both VDE and IMQ approved and comply with the IEC Standards.

Class of application according to DIN 40040 (97% survival):

HSFNT (10,000 hrs) at 400 Vac

HSFPU (3,000 hrs) at 450 Vac

Specifications

Capacitance tolerance $\pm 5\%$

Working frequency 50/60Hz

Loss factor $\leq 20 \cdot 10^{-4}$

Test voltage $V_p \sim = 2.15 V_n \times 2 \text{ secs}$

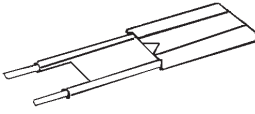
Test voltage between terminals and case $V_p \sim = 2400 \text{ V} \sim \times 1 \text{ secs}$

Working temperature -25°C to 70°C (HSF)

Cat. No.	Part No.	MFD	Volts AC
326320	MK 450-2	2	450
326321	MK 450-3.15	3.15	
326322	MK 450-4	4	
326323	MK 450-5	5	
326324	MK 450-6.3	6.3	
326325	MK 450-8	8	
326326	MK 450-10	10	
326327	MK 450-12.5	12.5	
326328	MK 450-14	14	
326329	MK 450-15	15	
326330	MK 450-16	16	
326331	MK 450-18	18	
326332	MK 450-20	20	
326333	MK 450-25	25	
326334	MK 450-30	30	
326335	MK 450-35	35	
326336	MK 450-40	40	
326337	MK 450-45	45	
326338	MK 450-50	50	
326340	MK 450-55	55	
326341	MK 450-60	60	

Heater Cable

Thermon



Self Regulating Heater Cable – With Tinned Copper Braid

FLX self limiting heating cables are designed for use in applications requiring basic freeze protection or the maintenance of process temperatures up to 65°C. As a complete range of heater cables exists for a variety of applications, any attempt to use FLX for other than refrigeration purposes may be inappropriate.

FLX heating cables are rated for nominal heat outputs of 8 or 10 watts per foot at 10°C when connected across 240 Vac. The heat output of FLX cable varies in response to its temperature.

FLX cables have an outer tinned copper braid. This braid, used in conjunction with earth leakage protection equipment, provides earthing, eliminating the possibility of electric shock.

Ratings

Maximum Continuous Temperature: Power On: 65°C Power Off: 85°C

Minimum Installation Temperature: -51°C

Minimum Bending Radius: 32mm

Cat. No.	Part No.	Description
327039	FLX-10-2BC	10 Watts per ft – 33 Watts per m Cable
327040	SX-TERM-1BC	End and Power Connection Kit
327037	ATUM 12/4 400	Shrink Tube 400mm Lengths

The SX-TERM-1 BC kit is used for end of circuit and power termination of braided Self Regulating Cables. The Kit comprises of power termination boot, end cap, braid terminating lug and sealant.



Cat. No.	Part No.	Description
327035	CDH-2-1-OJ	Condensate Drain Heater - 1m Terminated

Power Connection

140 mm
115 mm
METALLIC BRAID
BUS WIRES
INSULATING JACKET
SEMI-CONDUCTIVE MATRIX

1. Twist metallic braid back 140mm from the cable end for connection to ground. Remove 115mm of the insulating jacket and semi-conductive matrix between the bus wires, making sure the cable bus wires are not damaged.

RTV-2
TBX-3L TERMINATION BOOT

2. Apply a generous amount of RTV-2 sealant inside the TBX-3L boot. Push boot over the bus wires so that the boot fully overlaps the primary cable insulation and the bus wires extend through the 'legs' of the boot 13-25mm. Metallic braid is not to be run through the boot with the bus wires. Squeeze the boot to work out any air pockets and wipe off excess sealant.

End Termination

METALLIC BRAID
INSULATING JACKET
SINTERED TEFLON TAPE (ST-6)
38 mm
18 mm

1. Slide braid back 38mm and then cut 18mm off the exposed heater cable. Repeat step 1 shown above in the bare cable section.

RTV-2 SEALANT
ET-8 END CAP

2. Apply the RTV-2 sealant generously to the inside of the ET-8 end cap and onto the end of the cable.

METALLIC BRAID OVER END CAP
8 AWG LUG

3. Slide the end cap onto the cable with a twisting motion, making sure to work out any air pockets. Wipe off the excess sealant. Pull the braid over the end cap and then crimp together the braid ends with the 8-AWG compression lug supplied.

Further installation detail on next page

Heater Cable

Thermon

Recommended Safe Practices

For a safer installation and workplace, Thermon strongly recommend the following when using electric heat tracing cables:

1. Braided FLX Cable

New installations should, where possible, utilise braided cable and relevant accessories for use with earth leakage circuit breakers. Where heat tracing is installed on non-metallic pipe (such as plastic drain lines), it is important that the cable used has an earth braid. All metallic piping should always be earthed. (AS 3000)

2. Installation Instructions

Before installing electric heating cable make sure the installation instructions are carefully read and ensure that all electrical connections are made by a qualified electrician.

3. Earth Leakage Protection

Although not yet mandatory in electrically classified non hazardous areas, we strongly recommend the use of earth leakage circuit breakers on all electric heat tracing circuits. The earth leakage protection device should have a sensitivity of not greater than 30 mA.

4. Mechanical Protection

All installed heat tracing cable should be covered by some form of insulation and cladding.

5. Caution Labels

Clear and permanent caution labels should be attached to the cladding every 3 metres and should be affixed in prominent positions which are visible to all. Labels indicating end terminations and cable splice positions are also available.

Circuit Breaker Sizing

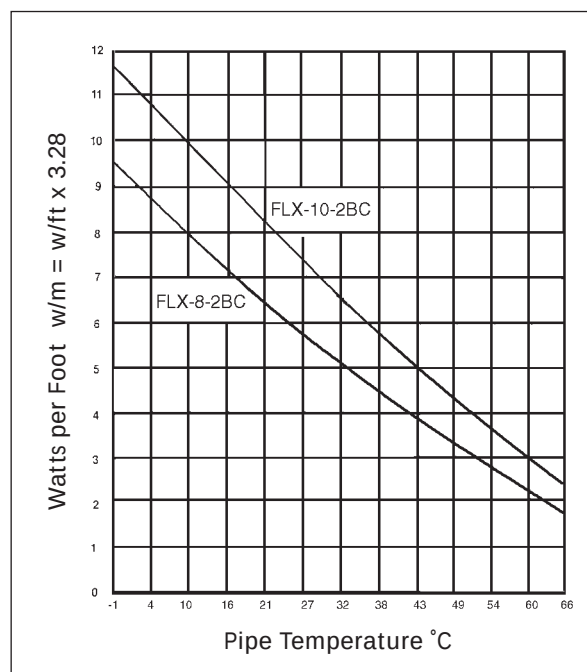
Circuit Breaker Size vs
Maximum Circuit Length : Metres
Service Voltage: 240 VAC

FLX-8-2BC if started at:	15A	20A	30A	40A
10°C	90	125	133	133
-18°C	62	85	133	133
-29°C	56	76	122	133
-40°C	50	68	110	133

FLX-10-2BC if started at:	15A	20A	30A	40A
10°C	76	105	117	117
-18°C	55	75	117	117
-29°C	49	67	107	117
-40°C	46	61	98	117

Power Output Curves

The power output shown applies to cable installed on insulated metallic pipe, at the service voltage stated.



Heater Cable

Springfield

Silicone Insulated Fibreglass Cable

Springfield Silicone (SR) Insulated Heater Cable is rated for 150°C and should not be run above a recommended maximum of 50 Watts per metre. The nominal outside diameter is 2.8mm. It is ideally suited to the demands of commercial refrigeration where heavier and/or severe condensation occurs. Available in 100 metre and 610 metre rolls.

Selection Chart for 'SRG' Heater Cable (240 Volt 50Hz)

Cat. No.	Part No. (Ohms per metre)	Length of Cable Required – Metres			Equivalent Ohms per Foot
		Applications			
		Normal Temp. Door Frames	Low Temp. Door Frames	Low Temp. Drain Lines	
327601	SRG5	26 to 41	19 to 31	17 to 27	1.5
327602	SRG10	20 to 26	14 to 19	11.5 to 17	3
327603	SRG15	16.2 to 20	11 to 14	9.1 to 11.5	4.6
327604	SRG25	13.3 to 16.2	9.1 to 11	7.1 to 9.1	7.6
327605	SRG35	11.5 to 13.3	7.9 to 9.1	6.1 to 7.1	11
327606	SRG45	10.5 to 11.5	7.2 to 7.9	5.5 to 6.1	14
327607	SRG50	9.4 to 10.5	6.7 to 7.2	5.2 to 5.5	15
327608	SRG60	8.5 to 9.4	6.1 to 6.7	4.7 to 5.2	18
327609	SRG75	7.4 to 8.5	5.3 to 6.1	4.2 to 4.7	23
327610	SRG100	6.3 to 7.4	4.5 to 5.3	3.6 to 4.2	30
327615	SRG150	5.3 to 6.3	3.8 to 4.5	2.9 to 3.6	46
327617	SRG200	4.4 to 5.3	3.2 to 3.8	2.5 to 2.9	61
327620	SRG300	3.6 to 4.4	2.7 to 3.2	2.1 to 2.5	91
327621	SRG400	3.1 to 3.6	2.3 to 2.7	1.9 to 2.1	122

Select the SRG Ohms/metre where length of cable required falls in the range indicated for the particular application.

Example 1

Selection of SRG Cable.

Length to be used: 6 metres.

Application: Normal temperature door frame. Heavy condensation area.

From chart, a 6 metre length falls in the range of Size SRG150 Cable. If heat output (W_m) needs to be known, it can be calculated using the Formula detailed below. See Example 2.

Example 2

To calculate actual heat output (Watts/m) using SRG 150 Cable.

$$W_m = \frac{V^2}{R_m \times L^2} \quad \text{Where: } V = 240$$

L = Length of cable = 6 metres
 R_m = Resistance/m = 150 Ohms/m

$$\therefore W_m = \frac{240^2}{150 \times 6^2} = 10.7 \text{ Watts/metre}$$

Selection Formulae

The amount of heat required to effectively control condensation will vary between applications, therefore, the type of cable selected will depend on the insulation surface temperature liable to be required, the resistance of the cable per unit length and the maximum temperature ratings of the cables available. The following formulae may be used to calculate the Resistance per metre, the Watts per metre and the Length in metres.

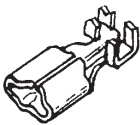
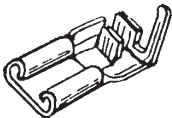
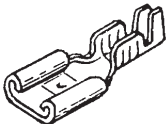
$$R_m = \frac{V^2}{W_m \times L^2} \quad W_m = \frac{V^2}{R_m \times L^2} \quad L = \sqrt{\frac{V^2}{W_m \times R_m}}$$

Where: R_m = Resistance/metre (Ohms/m)
 V = Volts

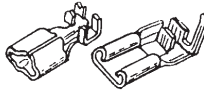
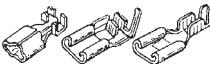
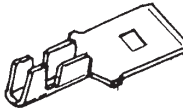
W_m = Watts/metre
 L = Length (metres)

Quick Connect Terminals

Refrigeration Electricals

	Cat. No.	Part No.	Type
	327050	RE 1T	Fusite Pin Terminal
	327051	RE 2T	Female Flag Terminal (Right Angle)
	327052	RE 3T	Female Straight Terminal
	327053	RE 4T	Eyelet 4mm Diameter

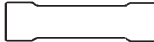
All of the above Terminals are sold in packs of 30

	Cat. No.	Part No.	Type
	327054	RE 5T	Eyelet 5mm Diameter
	327055	RE 1-2T	Mixed Terminals
	327056	RE 1-2-3T	Mixed Terminals
	327057	RE 9T	Male Tab Terminals

All of the above Terminals are sold in packs of 30

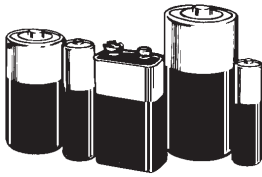
Hansa

	Cat. No.	Part No.	Type
	327105	RTG/1	Insulated Joiner 2.5 to 3mm Cable Packet of 14
	327106	R309/WF	Fully Insulated Female Terminal 2.5 to 3mm Cable Packet of 12
	327107	R309/M	Insulated Male Terminal 2.5 to 3mm Cable Packet of 14
	327108	R13/5	Insulated Eyelet (5mm Diam.) 2.5 to 3mm Cable Packet of 20
	327109	R201/F	Insulated Female Round Connector 4mm Cable Packet of 10

	Cat. No.	Part No.	Type
	327110	RTG/2	Insulated Joiner 4mm Cable Packet of 11
	327111	R383/FM	Insulated M/F Terminal 2.5 to 3mm Cable Packet of 10
	327112	R309/F	Insulated Female Terminal 2.5 to 3mm Cable Packet of 14
	327113	R13Y/4	Insulated Cut-Away Eyelet 2.5 to 3mm Cable Packet of 20
Contents 200 Terminals and One Crimping Tool	327115	TKP200	Crimp Type Terminal Kit

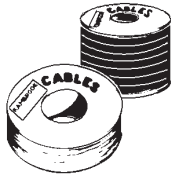
Electrical

Alkaline Batteries



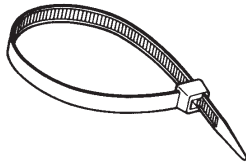
Cat. No.	Nom. Voltage	Description
327174	1.5	'AAA' Size – 2 Pack
327169	1.5	'AA' Size – 2 Pack
327168	1.5	'AA' Size – 4 Pack
327166	1.5	'C' Size – 2 Pack

Cat. No.	Nom. Voltage	Description
327163	1.5	'D' Size – 2 Pack
327170	9	Single Pack
327179	6	Square Lantern



Cat. No.	Part No.	Description
327049	32/020	3 Core Flex – 10 Amp (sold per metre)
327454	100LCL	3 Pin Plug

Cable Ties

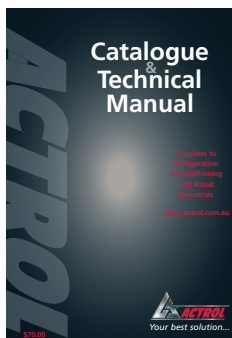


Cat. No.	Part No.	Size	Colour	Pack Quantity
327102	C14036B	143 x 3.3	Black (UV Stable)	100
327103	C20048B	194 x 4.5		
327104	C29548B	280 x 4.5		

Technical Books

Actrol Parts

Catalogue and Technical Manual



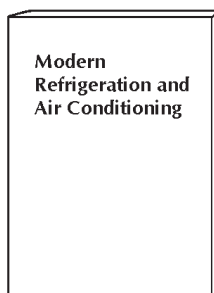
Cat. No.	899288
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If you are reading this item, you already know how valuable, useful and almost indispensable the role this Manual plays in the Refrigeration and Air Conditioning Industry.

Recommend it to your friends and associates.

Modern Refrigeration and Air Conditioning

Althouse, Turnquist, Bracciano

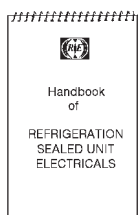


Cat. No.	327286
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Modern Refrigeration and Air Conditioning provides a thorough and authoritative course on the basic and advanced principles of refrigeration and air conditioning. It also covers the practical application of refrigeration, air conditioning, heat pumps, automotive air conditioning, thermoelectric, solar energy, absorption, special devices and applications. Up-to-date methods of installing, maintaining, diagnosing and repairing refrigeration systems are explained.

R.E.

Handbook of Refrigeration Sealed Unit Electricals



Cat. No.	327292
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This handbook, compiled by Refrigeration Electricals Pty Ltd is provided specifically for the refrigeration service mechanic, to assist him in the day to day problems encountered in the field of sealed unit refrigeration service. If a replacement relay, overload or capacitor is required, merely identify it alongside the appropriate motor compressor and order by the Refrigeration Electricals Pty Ltd' part number or the Actrol Parts Catalogue Number.

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Notes

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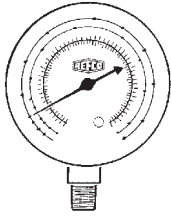
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Gauges—Pressure and Compound Refco

60mm Diameter Dual Scale – Direct Mounted – Bottom Entry 1/8" NPT

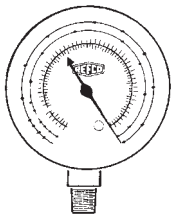


Cat. No.	Part No.	Type	Range	Temperature °C Refrigerant	Features
330059	M2-252-R134a/22	Compound	-100 : 1000 kPa 30" : 0 : 140 psi	R134a, R22, R404A	Bourdon Type Adjustable
330060	M2-502-R134a/22	Pressure	0 : 3000 kPa 0 : 400 psi		
330052	M2-255-kPa-R410A	Compound	-100 : 3600 kPa 30" : 0 : 520 psi	R410A	
330053	M2-555-kPa-R410A	Pressure	-100 : 5400 kPa 30" : 0 : 780 psi		
330054	R3-220-DS-R410A	Compound	-100 : 3600 kPa 30" : 0 : 520psi		
330055	R3-320-DS-R410A	Pressure	-100 : 5400 kPa 30" : 0 : 780 psi	R134a, R22, R404A	Bellows Type, Adjustable Oil Filled Aluminium Housing
330065	R3-220-kPa-R22	Compound	-100 : 1000 kPa 30" : 0 : 140 psi		
330066	R3-320-kPa-R22	Pressure	0 : 3000 kPa 0 : 400 psi		

Refco

80mm Diameter Vacuum Gauge with Safety Valve

A recalibratable gauge with a scale of 1000–0 mbar and 1/8 NPT Connection.

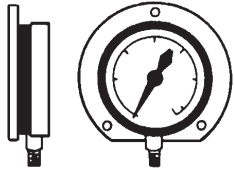


Cat. No.	Part No.
330070	19800 SV

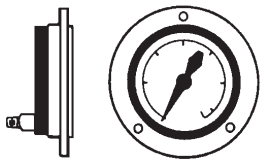
Gauges—Pressure and Compound

Floyd

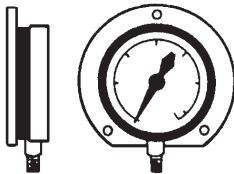
For R134a, R22, R404A, R717 (Ammonia) and Oil



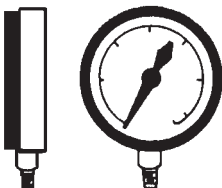
Type SBSR
Surface Mount, Rear Flange
Bottom Entry



Type FRR
Flush (Panel) Mount
Front Flange, Rear Entry



Type SBSR/SBA
Surface Mount, Rear Flange
Bottom Entry



Type DBA/DBSR
Direct Mount, Bottom Entry

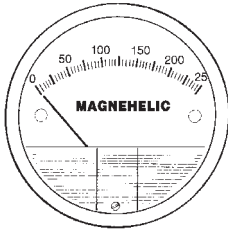
Other scales available
upon request

Cat. No.	Range kPa	Temp. °C Refrigerant	Type	Nom. Diameter : mm	Liquid Fill	
Type SBSR Surface Mount, Rear Flange, Bottom Entry, 1/4” Male Flare						
330192	-100 : 1000	R134a	Compound	63	No	
330091	-100 : 1600	R22				
330095		R404A				
330092	0 : 1600	Oil	Pressure			
330193	0 : 2000	R134a				
330155	0 : 2500	R22				
330094	0 : 3000					
330096		R404A				
Type FRR Flush (Panel) Mount, Front Flange, Rear Entry, 1/4” Male Flare						
330194	-100 : 1000	R134a	Compound	63	No	
330160	-100 : 1600	R22			Yes	
330217	-100 : 1000	R134a				
330215	-100 : 1600	R22	Pressure		No	
330158	0 : 1600	Oil			Yes	
330195	0 : 2000	R134a				
330218		0 : 2500			R22	No
330216	-100 : 1600				R134a	100
330157			R22			
330196		R22				
330166		R404A				
330206	0 : 1600	Oil	Pressure			
330164	0 : 2000	R134a				
330197	0 : 2500	R22				
330162	0 : 3000	R404A				
330207						
Type SBSR Surface Mount, Rear Flange, Bottom Entry, 1/4” Male Flare						
330198	-100 : 1000	R134a	Compound	100	No	
330173	-100 : 1600	R22				
330175		R404A				
330210	-100 : 1600	R22			Yes	
330212		R404A				
330250		None				
330171	0 : 1600	Oil	Pressure		No	
330214					Yes	
330199	0 : 2000	R134a			No	
330169	0 : 2500	R22			Yes	
330211					No	
330176	0 : 3000	R404A			Yes	
330213						
330251		None				
Type DBSR – Direct Mount, Bottom Entry 1/4” Male Flare						
330191	0 : 2000	R134a		63	No	
330084	0 : 2500	R22				
330152	0 : 1600	Oil				
330154	-100 : 1600	R22				
330190	-100 : 1000	R134a				
Ammonia Type SBA – Surface Mount, Rear Flange, Bottom Entry 3/8” Male BSP (Parallel)						
330183	-100 : 1000	R717	Low Pressure	100	No	
330182	-100 : 2500		High Pressure			
Ammonia Type DBA – Direct Mount, Bottom Entry 1/4” Male BSP (Tapered)						
330188	-100 : 1600	R717	Low Pressure	100	No	
330189	-100 : 2500		High Pressure			

Gauges – Differential Pressure

Dwyer

Series 2000 Magnehelic® Gauges



Dwyer's exclusive Magnehelic Principle eliminates wear, backlash and hysteresis in Magnehelic gauges. The Magnehelic Principle is Dwyer's method of transmitting the effect of changes in air pressure from a diaphragm to an indicating pointer - by means of magnetic linkage and without the use of gears or other direct mechanical linkages. This system avoids wear and physical contact which might destroy the accuracy and sensitivity of the instrument.

Features

- Exceptionally responsive. Accuracy is guaranteed within 2% of full scale
- Inertia-free, drift-free pointer movement
- High resistance to shock and vibration and virtually no hysteresis
- Unharmful by pressure surges up to 100 kPa
- Ambient temperature range -7°C to 60°C
- Operates in any position. Surface or flush mounted. Has both side and back connections

Applications

- As an air filter gauge to measure pressure drop across an air filter
- Sensing static pressure in an air stream
- Liquid level measurement by measuring back pressure of purge air in a dip tube
- As an orifice meter by measuring back pressure of purge air or compatible fluids
- A check on control equipment, automatic valves, gas-air ratio controls etc

Cat. No.	Range
331144	0 - 60 Pa*
331145	0 - 125 Pa*
331146	0 - 250 Pa
331148	0 - 500 Pa
331149	0 - 750 Pa
331152	0 - 2 kPa

*Calibrated for vertical scale position

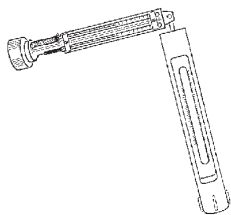
Air Filter Accessory Package

This package adapts any standard Magnehelic® gauge for use as an air filter gauge. Includes aluminium surface mounting bracket with screws, two 1500mm lengths of 1/4" aluminium tubing two static pressure tips and two moulded plastic vent valves, integral compression fittings on both tips and valves.

Cat. No.	Part No.
331147	A-605

Sling Psychrometers

Bacharach



The uniquely compact Bacharach Sling Psychrometer accurately determines percent relative humidity without the necessity of consulting complex tables. There is no need to wet the wick each time a reading is taken; the Sling Psychrometer has a built-in water reservoir and can be whirled freely in the hand.

The Bacharach Sling Psychrometer contains a slide rule calculator which correlates wet and dry bulb thermometer indications for direct reading of relative humidity. When not in use, the thermometer case telescopes into the handle for protection.

Features

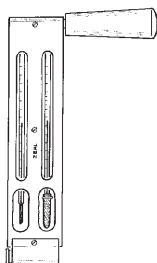
- Designed for portability (190mm long x 25mm diameter)
- Slide rule construction quickly converts temperature to relative humidity
- Built-in water reservoir holds sufficient water for several hours of testing
- Thin bulb design gives fast, thermal response
- Thermometers constructed of shock-resistant glass; stems have deep etched numerals and 1° scale divisions for easy reading
- Accurate within $\pm 5\%$ RH

Applications

- Measurement of comfort conditions in air conditioned environments, hospital operating rooms, storage areas, laboratories, etc
- Tests in industrial atmospheres where high or low humidity may be critical in manufacturing processes
- School Athletics; to determine safe conditions for practice

Cat. No.	Part No.	Temperature Range	Dimensions mm	Fill
331031	012-7013	-5 to 50°C	190 x 25 Diameter	Mercury
Spare Parts				
331029	012-0265	Psychrometer Thermometer Refill		
331043	012-0011	Wick		
331028	6-5456	Black Cap		

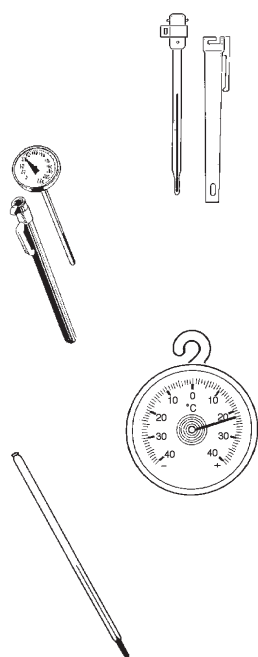
Zeal



Robust plastic frame with folding handle. Plastic water cistern. Mercury filled (replaceable) thermometers. Supplied with hygrometric tables and spare wick. Conforming to BS 2842.

Cat. No.	Part No.	Temperature Range	Dimensions mm	Colour
331033	1HYGW50	-5 to 50°C	230 x 50	Yellow
Spare Parts				
331027	1HYGWR50	Psychrometer Refill		
331042	1HYGCSWP	Plastic Case		

Thermometers



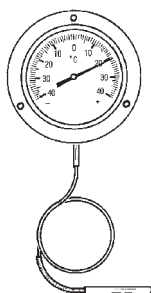
Cat. No.	Brand	Part No.	Range °C	Fill	Description
Pocket Thermometers					
331130	Brannan	22/463/2	-30 to 50	Mercury	155mm Long c/w Plastic Case
331131		22/363/2		Red Spirit	
Pocket Thermometers – Dial Type					
331138	Arrow	6AW138L	-40 to 50		Digital 25mm Dial. 112mm Stem
331048		6DLMC25	-10 to 110		25mm Dial. 127mm Stem c/w Pocket Tube and Clip
331191	Refco	15150	-40 to 40		
Cabinet Thermometers					
331190	Refco	15519	-40 to 40		Circular Plastic 64.5mm Diameter
Stem Thermometers					
331093	Zeal	1L 110	-10 to 110	Mercury	Stirring Rod Type 305mm long
331037	Brannan	40/401	-10 to 50	Mercury	305mm Long Non-Roll Caps
331038		40/403	-10 to 110		

Refco

Dial Thermometers

Features

- Glass crystal
- White dial with black numbers
- Copper capillary with PVC insulation

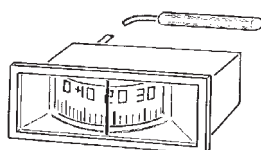


Cat. No.	Part No.	Size mm	Description	Capillary Length - m	Range °C
332049	F84-60MM-FA	60	Front Flange Rear Entry	1.5	-40 to 40
332053	F84-100MM-FA	100			
332050	F84-60MM-FP	60	Rear Flange Bottom Entry		
332051	F84-80MM-FP	80			
332052	F84-100MM-FP	100			
332057	F87R- 60MM	60	Reversible Flange can be changed from Front Flange to Rear Flange Mounting Bottom Entry		
332056	F87R-100MM	100			
332055	F87R-100MM-7.5M	100			
				7.5	

Rectangular Thermometer

Features

- Suitable for building into cabinets
- Capillary tube and sensing lead
- Adjustable setting
- Measures on distant gases, liquid etc, with minimum reaction time

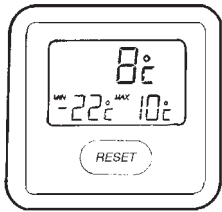


Cat. No.	Part No.	Size Rectangular mm	Range °C	Capillary Length m
332060	15165	26 x 58	-40 to 40	1.5

Electronic Thermometers

Temptech

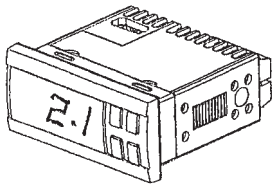
Maximum / Minimum Thermometer



Features

- Water resistant digital thermometer
- Two separate sensors for indoor and outdoor temperature measurement
- Displays indoor temperature and the indoor max/min temperatures at the same time, when the external sensor probe is removed
- Displays outdoor temperature and the outdoor max/min temperatures at the same time, when the external sensor probe is inserted into the sensor jack
- Built-in low battery signal indication
- Integrated plastic stand

Cat. No.	Part No.	Range °C	Resolution °C	Sampling Cycle Seconds	External Sensor Length : m	Battery Type (Included)
331057	EMT 88	-5 to 50	1	10	3	G13 or LR44



Carel

Panel Mount Thermometers

Cat. No.	Part No.	Range °C	Power Supply	Sensor (not included)
332025*	IR33MOON00	-50 to 50	12VAC	NTC
332026	IR33MOER00		240VAC	

*Transformer is additional.

Refco

Digital Pocket Thermometer

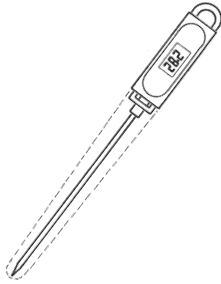


Cat. No.	Model No.	Description	Range
332113	15140	Digital Pocket Thermometer	-50 to 150°C

Electronic Thermometers

Temptech

RT-600 Pocket Type Thermometer



The RT-600 is suitable for use with fresh chilled foods, frozen foods, chemicals, vaccines and food processing. It has a hole for hanging and a protective probe cover with pocket clip. The cover may be used for stirring or may serve as an extra long handle. Covered push buttons provide On/Off, °C/°F, and HOLD functions.

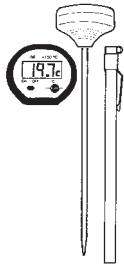
Features

- Pointed end for easy penetration
- Auto power off after 10 minutes
- Water resistant
- Industrial quality
- Easy to clean
- Quick reading

Cat. No.	Part No.	Temperature Range °C	Length : mm	Probe Size mm	Sampling Time Seconds	Battery
332119	RT-600	-50 to 150	200	3.5 Dia. x 120	0.7	1.5V LR44 or Equiv.

Testo

Mini Thermometer



A quick-action immersion/penetration thermometer for measuring temperatures in air, soft or powdery substances and liquids. Applications in HVAC, food and transport industries. Battery can be changed quickly and easily.

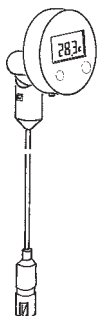
Features

- Large, easy to read display
- On/Off switch
- Includes protective stem case with pocket clip
- Probe stem: 4mm diameter x 120mm long

Cat. No.	Part No.	Temperature Range °C	Resolution °C	Stem Material	Battery Life
332077	0900-0525	-50 to 150	0.1 (-19.9 to 150) 1 (Remaining Range)	Stainless Steel	Approx 1 Year (cont. use)

Immerse stem tip at least 30mm into medium.
Not for use as an oven thermometer.

Mini Surface Thermometer



A quick-action mini surface thermometer with a swivel head that can be turned through an angle of 180° ensuring that the display can always be read.

The sprung crossband thermocouple probe guarantees a quick and accurate reading by adapting itself to any uneven surface being measured.

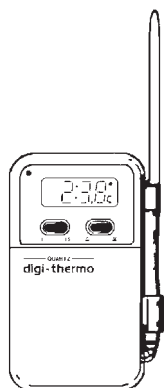
Features

- Pocket size
- Swivel head
- Sprung crossband thermocouple probe
- Auto Off function (approx. 10 minutes)
- Includes multi-purpose clip and battery
- Probe: 12mm diameter – Stem: 150mm Long

Cat. No.	Model No.	Part No.	Temperature Range °C	Resolution °C	Battery
332076	905-T2	0560-9052	-50 to 350 Short Term to 500	0.1	3V Round Cell CR 2032 Approx Life: 150 Hr

Electronic Thermometers

Digi-thermo



Features

- Portable pocket size
- Stainless steel probe with 1m cable
- Built-in table stand and pocket clip
- Thermometer has LCD digital temperature display with °C or °F selection
- Selection of fast or slow temperature sensing speed
- High limit temperature and low limit temperature setting function
- Temperature alarm beep sound when temperature display reaches high limit or low limit of temperature

Cat. No.	Range °C	Resolution °C	Ambient Operating Temp. °C	Sensing Cycle	Battery Type (included)	Dimensions mm
332114	-40 to 50	0.1 min. to 0.3 Max.	-10 to 60	Normal 15 sec. Fast 1 sec.	1.5V 'AAA'	106 x 66 x 20
332120	-50 to 260	0.1 min. to 0.5 Max.	0 to 50	Normal 10 sec. Fast 2 sec.		

IMO

TES – 1300

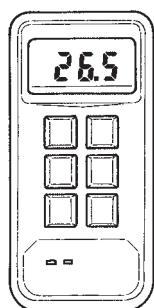
Features

- Type 'K' Thermocouple input
- Room temperature compensated
- Switchable resolution 0.1°/1°
- Aux output jacks
- °C and °F switching
- Max/Data hold function

Specifications

- Measuring Range: -50°C to 1300°C
- Sensor: K Type Thermocouple Single Input
- Auxiliary Outputs: 1mV/°C at 0.1°C range, 0.1mV/°C at 1°C range
- Sampling Rate: 2.5 times/second
- Weight: 235 g
- Accessories: Instruction Manual, Probe and Holster included

Cat. No.	Part No.	Range °C	Probe (included)	Battery (included)	Dimensions mm
332001	TES-1300	-50 to 1300	69-K01	9V	135 x 72 x 31



TES – 1306 – K/J Dual Channel

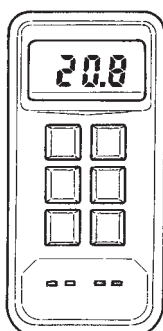
Features

- K/J type Thermocouple Input
- Multi-Channels Scanner T1 → T2 → T1-T2
- Max / Min / Relative Reading / Data Hold
- Easy to operate, touch-tone buttons

Specifications

- Measuring Range: Type K: -200°C to 1370°C
Type J: -200°C to 760°C
- Resolution: 0.1°C
- Weight: 235g
- Accessories: Instruction Manual, 2 Probes and Holster included

Cat. No.	Part No.	Range °C	Probes (included)	Battery (included)	Dimensions mm
332006	TES-1306	Type K -200 to 1370 Type J -200 to 760	2 x Type K, TP-K01	9V	135 x 72 x 31



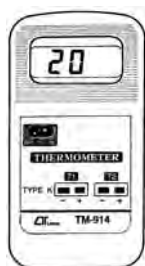
Thermocouple Temperature Probes – Type K

Cat. No.	Part No.	Range : °C	Type
332002	69-K01	-50 to 200	Bead - Air
332003	69-K02	-50 to 1000	Immersion - Liquid or Gels
332004	69-K03	-50 to 750	Surface

Electronic Thermometers

Lutron

TM-914C – Dual Channel



Features

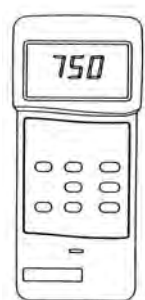
- Two channel input, wide range
- Pocket size compact housing
- LCD display allows clear readout even at high ambient light conditions
- Low power consumption
- Suits any standard type K (NiCr-NiAl) probe
- Fitted with standard type K input measuring socket
- Durable, long lasting components, including a strong, light weight ABS plastic housing
- Thermocouple sensor for fast response time
- Range of optional thermocouple probes available

Specifications

- Display: 3½ digits, 15mm LCD
- Sensor type: Thermocouple K (supplied separately)
- Measurement: Two channel input (T1, T2)
- Sampling time: Approx. 0.4 second

Cat. No.	Part No.	Range °C	Resolution °C	Battery (included)	Dimensions mm
332116	TM-914C	-40 to 1200	1	9V	108 x 73 x 23

TM-915 – Dual Channel



Features

- Microprocessor circuit assures high accuracy and provides special functions and features
- Multi functions, dual channel temperature input, differential temperature measurement, temperature change rate measurement, °C/°F, data hold
- Suits any standard type K (NiCr-NiAl) probe
- Fitted with standard type K input measuring socket
- Large LCD display, easy reading
- Records maximum, minimum readings with recall
- RS 232 PC serial interface
- Built-in temperature linearity compensation circuit, high accuracy and wide measurement
- Built-in precision cold junction compensation circuit
- Thermocouple sensor for Temperature measurement, fast response time

Specifications

- Display: 13mm LCD display
- Measurement: Dual channel, °C/°F, data hold, T1, T2, T1-T2, T2-T1
Temperature change rate (degrees per minute)
- Resolution/Range: 1°C/-50°C to 1230°C
- Sampling Time: Approx. 0.4 second
- Power Supply: 006P DC 9V battery. MN1604 (PP3) or equivalent
- Weight: 240g
- Dimensions: 180 x 72 x 32mm
- Sensor Type: Thermocouple K (supplied separately)

Cat. No.	Part No.	Range °C	Resolution °C	Description
332115	TM-915	-50 to 1230	1	Thermometer c/w, case and battery, less Probes

Thermocouple Probes – Type K

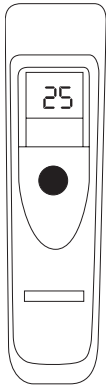
Suits TM-914C and TM-915 Thermometers

Cat. No.	Part No.	Range °C	Description
338112	TP-01	-40 to 250	Fast response, naked bead thermocouple wire. General purpose applications
338113	TP-02A	-50 to 900	3.2mm Diameter, 100mm tube. Penetration and immersion applications
338115	TP-04	-50 to 400	15mm Diameter sensing head x 120mm probe Surface temperature applications

Non-Contact Thermometers

Fluke

Fluke 61 Infrared Thermometer



These handheld portable tools enable professionals to monitor the status of electric motors and electrical panels, research heating and ventilation problems with ease.

Features

- Bright Laser beam provides easy targeting
- Display clearly supplies data at a glance
- Shock absorbing holster increases ruggedness
- 0.2°C resolution up to 275°C
- Backlight illuminates the screen in the dark
- Automatic sleep mode after 7 seconds extends battery life
- Alkaline batteries provide 4000 typical measurements

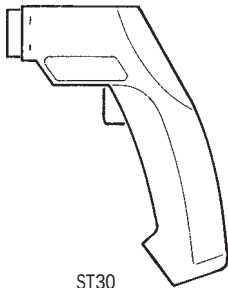
Measurement Accuracy with the instrument stable between 23-25°C
 -18°C to -1°C ±3°C above -1°C to 275°C ±2% of reading or 2°C

Cat. No.	Model No.	Part No.	Temperature Range °C	Resolution °C	Distance to Spot Ratio
332140	Fluke 61	0560-8256	-18 to 275	0.2	8:1

Raytek

Non-Contact Infrared Thermometers – With Laser Sighting

Raytek IR thermometers can safely measure the surface temperature of hazardous, hot or hard-to-reach objects without contact. Compact, rugged and easy to use. Simply point, aim the laser, pull the trigger and read the temperature on the large backlit display.



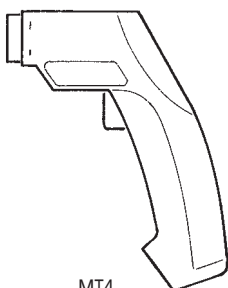
ST30

ST30 Pro

Features

- D:S (Distance to Target Spot Size Ratio) is 12:1
- LCD Backlit Display
- Laser Sighting: 8 point circular
- Display Resolution: 0.2°C
- Max. Temperature display
- Selectable °C or °F
- Power: 9V Alkaline or NiCad battery
- Dimensions: 200 x 160 x 55mm
- Weight: 320 gm
- Hard carrying case

Cat. No.	Part No.	Temperature Range °C
332122	ST30 Pro	-32 to 545



MT4

MT4 MiniTemp

Features

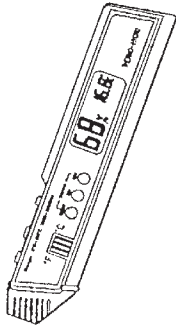
- Pocket size
- Laser sighting: Single point
- D:S (Distance to Target Spot Size Ratio) is 6:1
- LCD Backlit display
- Selectable °C or °F
- Power: 9V Battery

Cat. No.	Part No.	Temperature Range °C
332123	MT4 MiniTemp	-18 to 260

Humidity Measuring Instruments

IMO

PTH 338 Thermo-Hygrometer



Features

- Displays temperature and relative humidity at the same time
- Min/Max memory functions
- °C/°F selectable
- Portable, clip and carry pouch included

Applications

- HVAC application and drying rooms
- Clean rooms
- Semi-conductor assembly plant
- Paper and textile industries
- Greenhouse

Specifications

Temperature Measurement

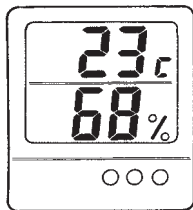
Range: 0° to 50°C
Resolution: 0.1°C
Accuracy: ±1°C between 0° and 40°C

Cat. No.	Part No.
332106	PTH 338

Humidity Measurement

Range: 2% to 98% RH
Resolution: 1% RH
Accuracy: ±5% between 40% and 80% RH and temperature between 15° to 40°C
Battery: 2 pieces 1.5 Volt LR-44 (included)

JB-913 Thermo-Hygrometer



Features

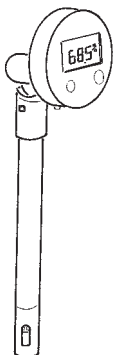
- Large LCD displays of both temperature and humidity
- Indoor and outdoor temperatures
- Min/Max memory function
- Wall mounting or stand alone on in-built stand
- 3 metre long outdoor temperature sensor probe
- Dimensions: 107 x 99 x 20mm
- Battery: 1 x UM-4 or AAA

Cat. No.	Part No.	Temperature Range °C	Temperature Resolution	Humidity Range: %RH	Humidity Resolution
332107	JB-913	Indoor: 0 to 50 Outdoor: -50 to 70	1°C	Indoor only: 25 to 95	1% RH

Testo

605-H1 Humidity Measuring Stick

Measures Air Humidity, Temperature and Dew Point



The 605-H1 is a compact, accurate instrument that provides quick and low cost measurement of air humidity and temperature. The swivel head can be turned through an angle of 180° ensuring that the display can always be read.

Applications include monitoring of HVAC, food storage, cheese maturing, work areas and garden centres.

Features

- Swivel head
- Large, quick action display
- Sensor protection cap
- Auto Off function (approx. 10 minutes)
- Includes multi-purpose clip, duct holder and battery
- Probe: 12mm diameter – Stem: 125 mm long

Cat. No.	Model No.	Part No.	Range	Resolution	Battery
332108	605-H1	0560-6051	5 to 95% RH -20 to 70°C	0.1% RH 0.1°C	3V Round Cell CR 2032 Approx. Life 200hr
332109	608-H1	0560-6091	2 to 95% RH -10 to 70°C		

Electrical Test Meters

Fluke

T3 – Voltage and Continuity Tester

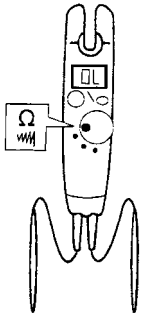


Features

- 7 different voltage indicators
- Automatically switches to continuity beeper or AC/DC voltage measurement mode
- Auto on and Auto off modes
- Over voltage protection

Cat. No.	Part No.	Description	Maximum Range
338050	T3WF	AC/DC Voltage	1000V

T5-600 Digital Clamp Meter



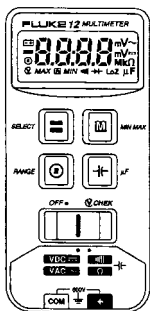
Features

- Open Jaw: Easy access to cable for AC current measurement
- Large LCD Digital Display
- Rotary switching functions
- Heavy duty test leads
- Over voltage protection

Cat. No.	Part No.	Measuring	Maximum Ranges
338014	T5-600	AC Current	100 A
		AC/DC Voltage	600 V
		Resistance	1000Ω

Cat. No.	Part No.	Description
338013	H5	Holster to suit T5/T3

12 – Digital Multimeter



Features

- Automatically switches to continuity beeper or AC/DC voltage measurement mode
- Over voltage protection
- 4000 count LED Display
- Min/Max record with elapsed time clock
- Diode test

Cat. No.	Part No.	Measuring	Maximum Ranges
338025	FLUKE12	AC/DC Voltage	600V
		Resistance	40M
		Capacitance	1000UF

Fluke –12 Specifications

Maximum Voltage between any Terminal and Earth Ground

600V ms

Display

3 3/4 digits, 4000 counts, updates 4/sec

Operating Temperature

-10°C to 50°C

Storage Temperature

-30°C to 60°C indefinitely (to -40°C for 100 hrs)

Temperature Coefficient

0.1 x (specific accuracy)/°C (<10°C or >28°C)

Relative Humidity

0% to 90% (-10°C to 35°C)
0% to 70% (35°C to 50°C)

Battery Type

9V, NEDA 1604 or IEC 6F22

Battery Life

650 continuous hours with alkaline
450 continuous hours with carbon-zinc

Shock Vibration

1 meter shock. Per MIL-T-28800D

Size (HxWxL)

1.35" x 2.75" x 5.55"
(3.46cm x 7.05cm x 14.23cm)

Weight

10oz (286g)

Safety

Designed to Protection Class II requirement of UL 3111
ANSI/ISA-S82, CSA C22.2 No 231, and VDE 0411 and IEC
1010 overvoltage category III

EMI Regulations

Complies with FCC Part 15, Class B, and VDE 0871B

Function	Range
V~	4000mV* 4.000V 40.00V 400.0V 600V
V ===	4000mV* 4.000V 40.00V 400.0V 600V
Ω	400.0Ω 4.000kΩ 40.00kΩ 400.0kΩ 4.000MΩ 40.00MΩ
⎓	1.000μF 10.00μF 100.0μF 10000μF
)))>+	2.0000V

Electrical Test Meters

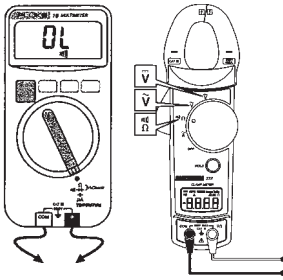
Fluke

HVAC – Multimeter and Clampmeter Combo Kit

This unique combination meter kit has been specifically selected for the HVAC industry

Features

- Fluke 16 Multimeter
- 80BK intergraded temperature probe
- Packaged in a sturdy plastic carry case
- Fluke 322 Clampmeter
- TL75 hard point test lead
- Over voltage protection



Cat. No.	Part No.	Description
338026	FLUKE 16/322KIT	HVAC Multimeter and Clampmeter Combo Kit

Fluke 16 Specifications

Accuracy is specified for a period of one year after calibration, at 18°C to 28°C (64°F to 82°F) with relative humidity to 90%. AC conversions are AC-coupled, average responding, and calibrated to the RMS value of a sine wave input. Accuracy specifications are given as follows: $\pm[(\% \text{ of reading}) + (\text{number of least significant digits})]$

Function	Range	Resolution	Accuracy
Temperature	-10°C to 400°C 14°F to 752°F	0.1°C or 0.2°F	$\pm(1.0\% + 0.8^\circ\text{C})$ typical $\pm(1.0\% + 1.5^\circ\text{C})$ typical
(Type K Thermocouple)	-40°C to -10°C 40°F to 14°F	0.1°C or 0.2°F	$\pm(5.0\% + 1.5^\circ\text{C})$ typical $\pm(5.0\% + 3.3^\circ\text{C})$ typical
Error does not include Type K Thermocouple errors			
Function	Range	Resolution	Accuracy
V~	4000mV* 4.000V 40.00V 400.0V 600V	1mV 0.001V 00.01V 000.1V 1V	$\pm(1.9\% + 3)$ $\pm(1.9\% + 3)$ $\pm(1.9\% + 3)$ $\pm(1.9\% + 3)$ $\pm(1.9\% + 3)$
V=	4000mV* 4.000V 40.00V 400.0V 600V	1mV 0.001V 00.01V 000.1V 1V	$\pm(0.9\% + 2)$ $\pm(0.9\% + 2)$ $\pm(0.9\% + 1)$ $\pm(0.9\% + 1)$ $\pm(0.9\% + 1)$
Ω	400.0 Ω 4.000k Ω 40.00k Ω 400.0k Ω 4.000M Ω 40.00M Ω	0.1 Ω 0.001k Ω 0.01k Ω 0.1k Ω 0.001M Ω 0.01k Ω	$\pm(0.9\% + 2)$ $\pm(0.9\% + 1)$ $\pm(0.9\% + 1)$ $\pm(0.9\% + 1)$ $\pm(0.9\% + 1)$ $\pm(1.5\% + 3)$
$\rightarrow$	1.000 μ F 10.00 μ F 100.0 μ F 10000 μ F	0.001 μ F 0.01 μ F 0.1 μ F 1 μ F	$\pm(1.9\% + 2)$ $\pm(1.9\% + 2)$ $\pm(1.9\% + 2)$ $\leq 1000\mu\text{F} \pm(1.9\% + 2)$ $> 1000\mu\text{F} \pm(10\% + 90)$
))) $\rightarrow$	2.0000V	0.001V	$\pm(1.9\% + 3)^2$
1. The 4000 mV range can be entered only in manual range mode. Use the 4000mV range with accessories 2. The beeper is guaranteed to come on at $< 25\Omega$. The meter detects opens or shorts $\geq 250\mu\text{s}$.			

Function	Range	Resolution	Accuracy	Burden Voltage
μA (50Hz to 400Hz)	0 to 200 μ A	0.1 μ A	$\pm(2\% + 3 \text{ counts})$	$< 5\text{mV}/\mu\text{A}$
μA	0 to 200 μ A	0.1 μ A	$\pm(1\% + 2 \text{ counts})$	$< 5\text{mV}/\mu\text{A}$

Function	Overload Protection	Output Impedance (Nominal)	
V~	600V rms	$> 5\text{M}\Omega < 100 \text{ pF}$ V•Check and LoZ = $> 2\text{k}\Omega < 200\text{pF}^2$	
V=	600V rms	$> 10\text{M}\Omega < 100 \text{ pF}$ V•Check and LoZ = $> 2\text{k}\Omega < 200\text{pF}^2$	
		Common Mode Rejection Ratio (1K Ω Unbalanced)	Normal Mode Ratio
V~	600V rms	$> 60\text{dB}$ at dc 50 or 60Hz	
V=	600V rms	$> 100\text{dB}$ at dc 50 or 60Hz	$> 50\text{dB}$ at dc 50 or 60Hz
		Open Circuit Test Voltage	Full Scale Voltage To 4.0M Ω 40M Ω
Ω	600V rms	$< 1.5\text{V}$ dc	$< 450\text{mV}$ dc $< 1.5\text{V}$ dc
$\rightarrow$	600V rms	2.4-3.0V dc	2.400V dc
		Short Circuit Current	
Ω	600V rms	500 μ A	
$\rightarrow$	600V rms	0.95mA (typical)	

1. 3×10^6 Hz maximum.
2. $\approx 2\text{k}\Omega$ input impedance up to 500V. Impedance increases with input voltage to $> 300\text{k}\Omega$ at 600V.

MIN MAX Recording Accuract and Response Time

Specified accuracy of the measurement function ± 12 digits in dc for changes $> 200\text{ms}$ in duration (± 40 digets in ac) Typical 100ms response to 80%
 Example 1: This would mean $\pm 1.2^\circ$ when recording temperature
 Example 2: This would mean $\pm 12^\circ \mu\text{A}$ when recording μA or $\pm 12\text{A}$ if used with a dc amp probe (with a mV input).

Fluke 322 Specifications

*@23°C±5°C, 0 -90% RH		322
A~	Range	0 - 400.0A 40.0 - 400.0A
	Accuracy	50 - 60 Hz 1.8% ± 5 counts 60 - 400 Hz 3.0% ± 5 counts
	AC Response	Avg
V~	Range	0 - 400.0, 400 - 600V
	Accuracy	60 - 400 Hz 3.0% ± 5 counts
V=	Range	0 - 400.0A 40.0 - 600.0A
	Accuracy	1.0% ± 5 counts

*@23°C±5°C, 0 -90% RH		322
Ω	Range	0 - 400.0 Ω
	Accuracy	1.0% ± 5 counts
Continuity)))		$\leq 30\Omega$
Jaw Opening		1" or 26mm
IP Rating		40
Storage Temp.		30°C to 60°C
Operating Temp.		30°C to 60°C
Altitude		200m
EMC - EN61326		

CAT III 600V, pollution degree II:

CAT III equipment is designed to protect against transients in equipment in fixed - equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.

* $< 18^\circ\text{C}$, $> 28^\circ\text{C}$ add 0.1 x (specified accuracy) C.

A Guide to Data Logging

What is Data Logging?

Data logging is a simple way of recording information.

In times gone by there was no option but to do this manually; Sometimes this meant lengthy periods of hours tied up recording periodic temperatures, often in a freezer at -30°C.

Thankfully these days have gone.

Today periodic sampling, collection and reporting of this information is made simple by using a Data Logger.

These are in-expensive and accurate electronic instruments to measure:

- Temperature
- Relative Humidity
- Light Intensity
- Motor on/off
- Freezer/Chiller - Open/Closed
- Voltage
- Pressure
- Events Over Time
- Amperage

Loggers are small, battery operated devices that are equipped with a microprocessor, data storage & sensor.

Data Loggers utilize software on a personal computer to initiate the logger and view the collected data

Where are Data Loggers used? Who uses them?

Data Loggers are used where historical documentation of measurement is required.

- Refrigeration
- Air Conditioning
- Transportation Monitoring
- Laboratories
- Horticulture
- Food Processing
- Trouble Shooting
- General Research & Educational Science
- Quality Assurance

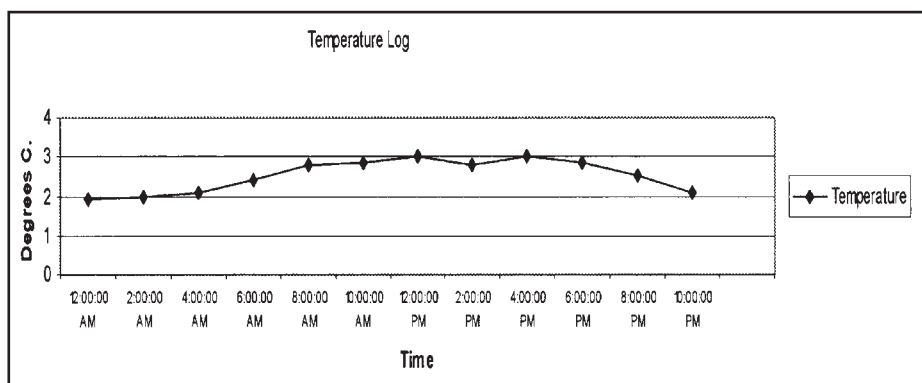
How does a Data Logger work?

The logger is connected to a personal computer via software where the logging parameters are set.

Examples of parameters are: intervals and duration of logging.

The logger records each measurement and stores it in memory along with the time and date.

To retrieve the data, the logger is then reconnected to the personal computer, via the software data is read and measurements plotted graphically. The data can also be viewed in a table or exported to a spreadsheet.



Data Loggers

Hobo

H8 Data Loggers

Single, Two, and Four Channel Models



The H8 family of data loggers, provide easy-to-use data collection at affordable prices. Based upon your application, choose single, two or four channel models to measure temperature, relative humidity, light intensity or external inputs. External sensors or input cables allow H8 loggers to measure external temperature, AC current, or accept mA and voltage inputs from third party equipment.

Family Features & Specifications

- 8-bit resolution
- Record 8K readings (4 channel external records 32K readings)
- Programmable start time/date
- Programmable sampling rate (0.5 seconds to 9 hours)
- Blinking LED confirms operation
- Programmable start time/date
- User-replaceable battery lasts 1 year
- Battery level indication at launch
- Non-volatile memory retains data even if battery fails
- NIST-Traceable temperature accuracy certification available
- Compliance certification available
- Readout and relaunch with optional Shuttle
- Size/Weight: 6.8 x 4.8 x 1.9cm / 29gms

Cat. No.	Part No.	Description
Data Loggers (Indoor)		
335151	H08-001-02	Temperature Logger
335152	H08-002-02	Temperature/External
335153	H08-003-02	RH/Temperature
335154	H08-004-02	RH/Temperature/Light/External
335184	H08-007-02	RH/Temperature/2x External
335167	H08-006-04	4-Channel Indoor
	CV-A	0-20 Amp split-core AC Current Sensor
	CV-B	0-40 Amp split-core AC Current Sensor
	CV-C	0-100 Amp split-core AC Current Sensor
	CV-D	0-200 Amp split-core AC Current Sensor
	CV-E	0-600 Amp split-core AC Current Sensor

H8 Pro Series (Outdoor)

335180	H08-030-08	Pro Temp
335181	H08-031-08	Pro Temp/RH

Software

335172	BCP4.3-DL	BoxCar Pro (Windows)
335160	BC3.7-DL	BoxCar 3.7 Starter Kit (Windows)

External Sensor

335163	TMC6-HD	Water/Soil Temperature Sensor - 1.8m (6ft cable)
335182	TMC6-HC	Stainless Steel Temperature Probe

Options & Accessories

A data shuttle is a pocket sized device that can be used to offload/restart multiple data loggers and transport the data back to a personal computer, allowing the loggers to stay in place for continuous monitoring/recording. The shuttle connects to a PC and is used with the software to readout and view the data.

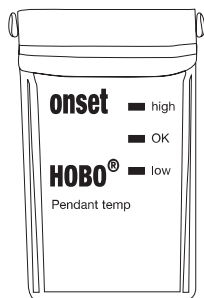
335155	H09-003-08	Shuttle (optional)
335179	CABLE-PC-3.5	Interface Cable
335166	HRB-TEMP	Replacement batteries (Box of 10)

Data Loggers

Hobo

Pendant Data Loggers

Temperature & Temperature Light Intensity with Optic USB Interface



The Pendant Logger is a miniature, ultra-low-cost data logger that is ideal in condensing environments, such as Freezers/Chillers & Refrigerators.

The Pendant provides $\pm 0.5^{\circ}\text{C}$ accuracy and up to 52,000 readings, making it suitable for long-term deployment. It also features a 1 year user replaceable battery and an eyelet for easy mounting with cable ties.

Features

- Convenient, connector-free data offload
The Pendant offloads data to a PC via a convenient USB-based optical interface, which provides high-speed, reliable data offload in a condensing environment.
- Easy, intuitive software
For plotting and analysing temperature and light data, offers HOBOWare™2.0 for Windows, a highly intuitive graphing and analysis software package. HOBOWare provides a user-friendly graphical interface and enables users to quickly and easily print out graphs to view and document conditions.
- The Pendant is available with both 8K and 64K memory
The 8K storing up to 6,500 readings
At 1 hourly temperature only readings logging would continue for 261 days & 16 hrs.
The 64K storing up to 52,000 readings
At 1 hourly temperature only readings logging would continue for 2,173 days & 2 hrs.
- The temperature-only version of the Pendant, includes high and low LED alarms

Cat. No.	Part No.	Description
Data Loggers (Indoor)		
	UA-001-08	8K Pendant Logger with alarms
	UA-001-64	64K Pendant Logger with alarms
	UA-002-08	8K Pendant Logger temperature/light
	H08-002-64	64K Pendant Logger temperature/light
	BASE-U-1	Optic Base Station
	BHW-PC	HOBOWare Software

Windows Software

- Offers Windows applications for data management. BoxCar Pro 4.0 is a powerful enhanced version of BoxCar 3.7 that adds new features for graphing, data analysis, data export and management of multiple loggers. BoxCar 3.7 provides basic launch, data readout, plotting and data export capabilities.

General Features

- Toolbar provides quick access to commonly used functions
- Runs in Windows 3.1x or Windows 95/98/NT/2000/MW/XP
(Data archive reader utility for Pro Series only runs in Windows 95/98/NT/2000/MW/XP)
- On-line help
- Readout log provides a summary of saved data logger files
- DOS Utility allows you to launch, readout and save files from PCs that only have MS - DOS

Data Loggers

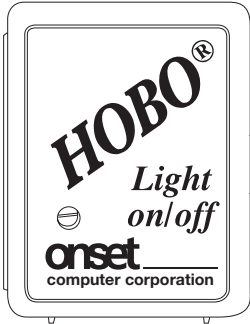
Hobo

H6 Data Loggers

The H6 family of data loggers record on/off or open/closed status changes - storing time, date and state information for each change.

A great diagnostic tool clearly recording Compressor short cycling.

- State open/closed
- Motor on/off
- AC Field sensor
- Light on/off
- Vibration sensor



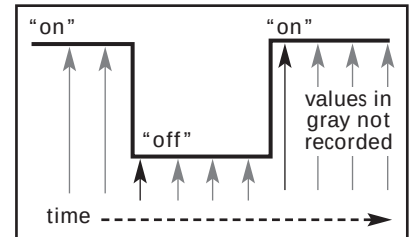
Features & Specifications

- Operating range: -20°C to 70°C, 0 to 95% relative humidity, non-condensing, non-fogging
- Capacity: 2000 state changes
- Time Resolution: 0.5 seconds
- Time Accuracy: ±1 minute per week at +20°C
- Programmable start time/date
- Readout & re-launch with optional Shuttle
- Blinking LEDs show current state
- Memory modes: stop pwhen full, wrap-around when full
- Download full logger in just 90 seconds
- Non-volatile memory retains data even if battery fails
- User-replaceable battery lasts 1 year
- Mounting kit included (hook/loop, magnet and tape)
- Drop proof to 5 feet
- Size/Weight: 6.0 x 4.8 x 1.9cm / approx 29gms

Monitors when doors are open/closed using an internal magnetic reed switch and external magnet. External input cable included to monitor contact closures of remote devices such as Chiller/Freezer door switches.

Key Specifications

Two Inputs: a magnetic sensor mounted on the logger detects when doors are opened and closed (external magnet included). An external input cable detects contact closures.



Cat. No.	Part No.	Description
Data Loggers (Indoor)		
	H06-001-02	State with cable and magnet
	H06-003-02	Motor on/off (vibration sensor)
	H06-004-02	Motor on/off (AC-field sensor)
Software Starter Kits - One Required		
335172	BCP4.3-DL	BoxCar Pro (Windows)
335160	BC3.7-DL	BoxCar 3.7 Starter Kit (Windows)
Options & Accessories		
335155	H09-003-08	Shuttle
	CABLE-USB232	USB Serial Adapter
335179	CABLE-PC-3.5	Interface Cable
335166	HRB-TEMP	Replacement batteries (Box of 10)
	CABLE-2.5-STEREO	Voltage input cable for state (contact closures) 1.8m

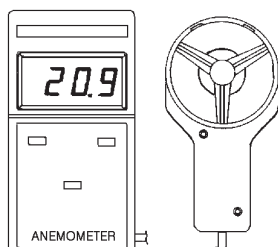
Velocity Measuring Instruments

Lutron

AM-4202 – Digital – Rotating Vane – With Temperature Measurement

Features

- This portable anemometer provides fast, accurate digital readings and the convenience of a remote sensor
- Multi-functions measurement
- Low friction ball-bearing design allows free vane movement, resulting in accuracy at both high and low velocities
- A sensitive balanced vane wheel rotates freely in response to air flow
- Data Hold function for storing desired value on display
- Large LCD display, easy to read
- Durable, long lasting components are used, including a strong, light weight ABS plastic case
- Small and light weight design allows one hand operation
- Low battery indicator
- Wide applications: use the anemometer to check air conditioning and heating systems, measure air velocities, temperatures, wind speeds, etc.



Specifications

Display:	18mm LCD (Liquid Crystal Display) 3 ¹ / ₂ digits
Operating Temp:	0° to 50°C
Operating Humidity:	Maximum 90% RH (0° to 35°C)
Power supply:	006P DC 9V battery (heavy duty type)
Power consumption:	Approx. DC 6 mA
Dimensions:	Main Instrument: 168 x 80 x 35mm Sensor Head: Round 72mm Diameter
Standard Accessories:	Instruction manual, Sensor probe

Measurement	Range	Resolution	Accuracy at 23°C ± 5°
Metres per second	0.4 - 30	0.1	± (2% + 1d)
Kilometres per Hour	1.4 - 108	0.1	± (2% + 3d)
Feet per Minute	80 - 5910	10	± (2% + 2d)
Knots	0.8 - 58.3	0.1	
Temperature	0 to 60°C / 32 to 140°F	0.1°C / 0.1°F	± 0.8°C / 1.5°F

Cat. No.	Part No.	Description
335380	AM-4202	Anemometer c/w Case

Testo

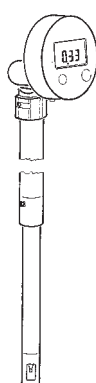
405-V1 Velocity Measuring Stick – Measures m/s, m³/h and °C

The 405-V1 is a mini anemometer which can measure air velocity, volume flow and temperature. Volume flow is calculated based on the velocity measured and is displayed at the touch of a button. The swivel head can be turned through an angle of 180° ensuring that the display can always be read. The lower part of the probe stem can be twisted 90° and a universal joint also allows it to be bent through 180° enabling display to be read while at the same time observing air flow direction.

Applications include monitoring air velocity (m/s) and quantities (m³/h) in HVAC ducts and outlets, extraction systems and hoods. With a probe stem length of 300mm it is also suitable for larger ducts.

Features

- Swivel head
- Universal joint in probe stem
- Sensor protection cap
- Auto Off function (approx. 5 minutes)
- Includes multi-purpose clip, duct holder and battery
- Probe: 12 / 16mm diameter – Stem: approx. 300mm long

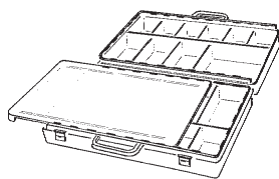


Cat. No.	Model No.	Part No.	Range	Resolution	Battery
335381	405-V1	0560-4051	0 to 5 m/s @ -20 to 0°C 0 to 10 m/s @ 0 to 50°C 0 to 99.99 m ³ /h @ -20 to 50°C	0.01 m/s 0.1°C	3 x AAA Approx. Life 20 Hr (750 Measure. @ 2 min. each)

Equipment and Tools

Exactapak

Carrying Cases

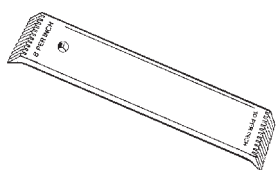


These grey ABS plastic storage/carrying cases provide secure placement of small items with instant and easy access to all compartments. They can be used in a wide range of applications to eliminate storage chaos.

Cat. No.	Part No.	Internal Dimensions : mm (For each half case)
346001	Exactapak	484 x 312 x 62
346002	Multi*	367 x 176 x 70

*The multi case includes 4 ABS plastic insert tubs. Additional tubs are available.

Fin Combs

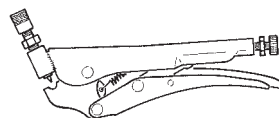


Cat. No.	Part No.	Brand	Description – Fins Per Inch (FPI)
347003	P8	Watsco	4, 5, 8 and 10 FPI (Orange)
347004	P9		9 and 15 FPI (Yellow)
347005	P11		11 and 13 FPI (Blue)
347006	P12		6, 7, 12 and 14 FPI (Green)
347010	14142	Refco	All Sizes c/w Spare Comb

Refco

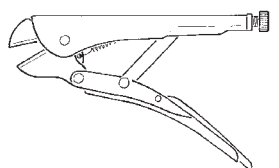
Service Piercing Pliers

This item enables an immediate piercing of the charging tube on any domestic refrigerator or freezer. Just pierce the tube and the system is ready for evacuation or charging. On completion of job, pinch-off charging tube behind the service piercing pliers and braze the tube. Replaceable piercing needle and access fitting.



Cat. No.	Part No.	Description
348004	14210-STD	Service Piercing Pliers
348005	14210-01	Spare Needle

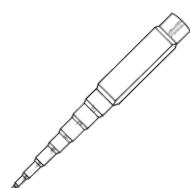
6



Pinch-Off Pliers

Jaws are designed to pinch-off and lock onto copper tubing or rubber fuel, refrigerant or coolant hoses up to approximately 12mm diameter.

Cat. No.	Part No.
348003	14200



Swaging Pole

Expands 7 Sizes of Tubing.
For 1/8", 3/16", 1/4", 5/16", 3/8", 7/16" and 1/2" O.D. Tube.

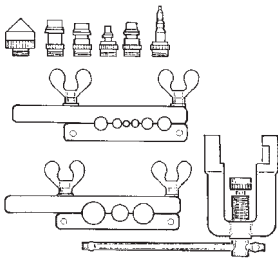
Cat. No.	Part No.
348014	T-21100

Equipment and Tools

Refco

Flaring and Swaging Tool Kit

Converts quickly into flaring or swaging tool. Hand chrome finished with self-centering, slip on forged steel yoke.



Kit Contains:

- Flaring tool for $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ " O.D.
- 5 swage adaptors which cover $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ " O.D.
- Sturdy Plastic Case

Cat. No.	Part No.
348091	RF-175-FS

Refco

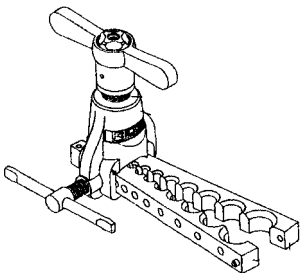
Eccentric Flaring Tool Kit

Suitable for R410A Refrigerant Tube

Refco RF-888Z 45° eccentric flaring tool kit is constructed from forged high quality steel and features a clutch to prevent over tightening and thinning of the flare wall. Supplied in a sturdy case.

- Flaring Size $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ " O.D.

Cat. No.	Part No.
348089	RF-175-FS



Rothenberger

Eccentric Flaring Tool Kit

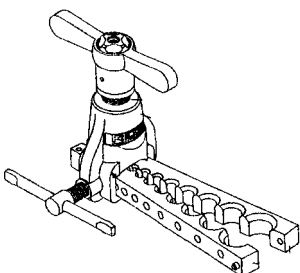
Suitable for R410A Refrigerant Tube

Heavy duty flaring tool for use with thicker gauge tubing which is required for some new refrigerants. The eccentric flaring cone and roller bearings make flaring smoother with less effort.

The Rothenberger R222402 also features a clutch, to prevent over tightening and thinning of the flare-wall and is supplied in a sturdy plastic case.

- Flaring Size $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ " O.D.
- Sturdy Plastic Case

Cat. No.	Part No.
348112	R222402



Equipment and Tools

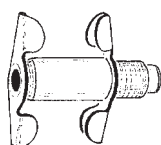
Imperial

Replacement Parts for Flaring and Swaging Tools

Cat. No.	Part No.	Description	Suit Model
348063	278-FS-03 x 04 x 06	3/16", 1/4", 3/8" OD Swaging Adaptor	275-FS
348060	278-FS-08	1/2" OD Swaging Adaptor	
348061	278-FS-10	5/8" OD Swaging Adaptor	
348062	278-FS-12	3/4" OD Swaging Adaptor	
348058	86944-01	Wing Nut	
348043	78858-01	Yoke Assembly without cone or adaptors	
348068	38600	Flare Saddle Cone	275-FS 375-FS
348059	38766	Bar for 1/8", 3/16", 1/4", 5/16", 3/8" and 7/16" OD Tubing	
348049	38767	Bar for 1/2", 5/8" and 3/4" OD Tubing	375-FS
348058	86944-01	Wing Nut	
348044	38769	Yoke Assembly	

Replacement parts for other models available on request.

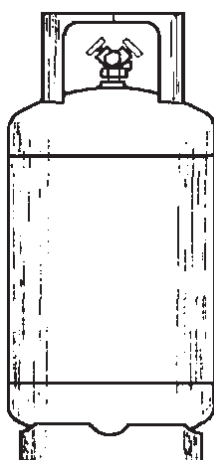
Process Tube Adaptors



A convenient method of making a service connection to a hermetic unit. Also ideal for providing a connection in testing coils, tubing installations, etc. Handles pressures to 690 kPa (100 psi). To connect to a hermetic system, pinch-off tube is cut off and Adaptor is slipped over cut end of tube and tightened. Synthetic rubber seal of adaptor grips outside of tube. This gives a 1/4" male flare connection to the system for purging, charging or testing. After system is recharged, tube is pinched off next to adaptor, which is then removed and tube cut off and sealed with solder. Adaptor can be used repeatedly.

Cat. No.	Part No.	Tube OD Inches	Flare Connection
349140	241-F-03	3/16	1/4" Male Flare
349061	241-F-04	1/4	
349138	241-F-05	5/16	
349139	241-F-06	3/8	

Refrigerant Cylinders Fitted with Liquid / Vapour Valve



Cat. No.	Water Capacity kg	R12	R134a	R22	R402A	R404A
		Filling Ratio				
		1.15	1.05	1.03	0.87	0.9
		Refrigerant Capacity : kg				
349001	11	12.5	11.5	11	9.5	10
349002	22	25	23	22.5	19	20
349003	47	54	49	48	40	42
349008	65	75	68	67	56	58

Cat. No.	Water Capacity kg	R407C	R408A	R409A	R410A	R507
		Filling Ratio				
		0.95	0.9	1.05	0.8	0.9
		Refrigerant Capacity : kg				
349001	11	10.4	10	11.5	8.8	10
349002	22	20.9	20	23	17.6	20
349003	47	44	42	49	37	42
349008	65	61	58	68	52	58

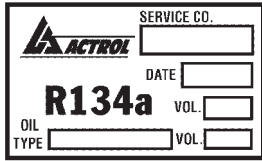
All cylinders are manufactured in accordance with SAA Codes and supplied complete with built-in Relief Valves

Equipment and Tools

System Identification Labels

Self Adhesive: 100 x 60mm

Segments provided to record: Service Co, Date of Service, Refrigerant Volume, Oil Type and Volume.



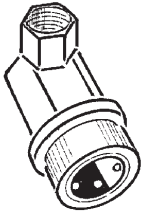
Cat. No.	Refrigerant
349100	R134a
349106	R402A
349101	R404A
349105	R407C
349098	34M

Cat. No.	Refrigerant
349102	R408A
349103	R409A
349099	R413A
349104	R507
349097	22Lt
349096	R410A

Refco

R134a Automotive A/C Service Valves

Quick connect valves for the servicing of R134a automotive air conditioning systems. These spring loaded valves close automatically on disconnection thus preventing any loss of refrigerant.

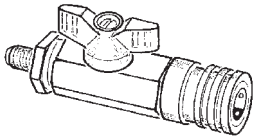


Cat. No.	Part No.	Description	Connection
349196	RC02-R-M14 x 1.5	High Side Valve – Red	M14 x 1.5mm Female x Auto Quick Connect
349197	RC02-B-M14 x 1.5	Low Side Valve – Blue	

R134a Automotive A/C Ball Service Valves

For Charging Hoses

These valves have an adjustable depressor-spindle to provide access to many makes of vehicles. Ball valve ensures a leak free service job.

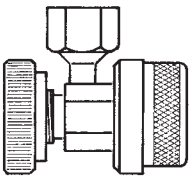


Cat. No.	Part No.	Description	Connection
349203	CX-AUTO-R-1/4	High Side Valve – Red	1/4" M. Fl. x Auto Quick Connect Supplied with Angle Adaptor
349202	CX-AUTO-B-1/4	Low Side Valve – Blue	

Aeroquip

R134a Automotive A/C Service Couplings

Compact quick connect/disconnect service couplings that provide a safe reliable method for evacuating and charging R134a automotive air conditioning systems.

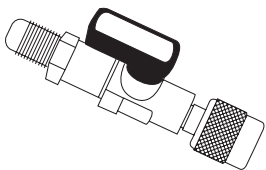


Cat. No.	Part No.	Description	Connection
349190	RC01C-003	High Side Coupling – Red	M14 x 1.5mm Female x Auto Quick Connect
349191	RC01C-002	Low Side Coupling – Blue	

Refco

Charging Line Valve

Inbuilt core depressor and ball valve construction for positive shut off .



Cat. No.	Model No.	Description	Connection
349210	CA-1/4 SAEY	Charge Line Valve	F 1/4 SAE to M1/4 SAE
349211	CA-1/2 2OUNF		FM 5/6 SAE to M1/4 SAE R410A Rated

Equipment and Tools

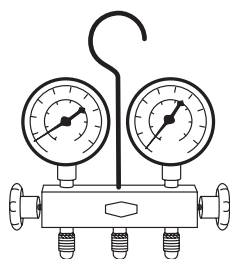
Service Manifolds

Refco

Ultra Series

This manifold series features Burdon type pulse free gauges, front recalibration of gauges, piston valve seats, colour coded charging lines & hanging hook

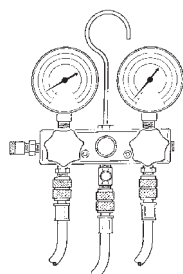
For R134a, R22 and R404A



Cat. No.	Part No.	Description
349136	ULTRA-2-6-kPa-R22-M2	Manifold with dual scale (kPa/psi) gauges and 3 x 900mm charging lines

BM2 Series

This BM2 manifold series features Bourdon type pulse free gauges, built-in sight-glass, front recalibration of gauges, piston valve seats, colour coded charging lines and hanging hook.



Cat. No.	Part No.	Description
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For R134a, R22 and R404A

349125	BM2-6-R134a/22-kPa/psi	Manifold with dual scale (kPa/psi) gauges and 3 x 900mm charging lines
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For R134a Automotive Air Conditioning

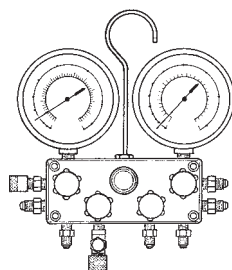
349123	BM2-3-kPa-R134A-Acme	Autoset R134a manifold, gauges 3 x 1800mm charging lines and CX-Auto couplings supplied in plastic case
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For R410A

349126	BM2-3-K8a-R410A	Manifold with dual scale (kPa/psi) gauges and 3 x 900mm charging lines and 1/2"–20UNF (5/16"SAE) connection and core depressor on the unit side. Supplied in plastic case.
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M4 Series – 4-Way Service Manifold

This 4-way manifold features Burdon type pulse free gauges, colour coded charging hoses, sight-glass and hanging hook.



Cat. No.	Part No.	Description
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For R134a, R22 and R404A

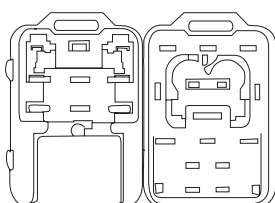
349132	BM4-3-M2	Manifold with dual scale gauges and 3 x 1800mm charging lines. Supplied in plastic case.
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For R410A

349129	M4-3-Deluxe-DS-R410A	Manifold with dual scale (kPa/psi) oil filled gauges and 3 x 900mm charging lines with 1/2"–20 UNF (5/16" SAE) connection and core depressor on the unit side. Supplied in plastic case.
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Multicase

This plastic case protects manifolds in a safe and practical way. There is also an additional space to store tools inside.



Cat. No.	Part No.	Description
349137	M4-6-15	Empty plastic case

WARNING:

These products are designed and manufactured for use by technically trained air conditioning and refrigeration service engineers only. Due to the high pressures employed and the danger due to the physical and chemical nature of refrigerants and oils used in the systems, incorrect application could result in accident, injuries or death. Safety goggles must be worn when using these products.

Equipment and Tools

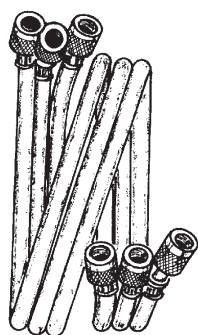
Refco

Replacement Parts for Service Manifolds

Cat. No.	Part No.	Description	Suit Models
349127	M4-6-11	Sight Glass Assembly	All Refco
349128	M4-6-04	Piston c/w 'O' Ring & Gasket	
349131	M2-10-95	Valve Seat & Stem	
349134	M2-6-09B	Knob - Blue	BM2, M2, Ultra
349135	M2-6-09R	Knob - Red	
349270	M4-6-09B	Knob - Blue	M3, M4, BM4
349271	M4-6-09R	Knob - Red	
349272	M4-6-09N	Knob - Black	
349273	M4-6-09Y	Knob - Yellow	

Charging Hoses – 1/4" Flare Swivel Connection

Three colours – red, blue and yellow - provide easy identification of lines for high side, low side and charge. One straight and one angled elbow connection with knurled nuts provide easy, fingertip connections. The angled elbow end has valve core depressor for use with depressor on access fittings.



Cat. No.	Part No.	Nominal Length	Colour
349290	CCL-36	Set of 3 - 900mm (36")	Blue, Red, Yellow
349291	CCL-72	Set of 3 - 1500mm (72")	Blue, Red, Yellow
349277	CL-36B	900mm (36")	Blue
349275	CL-36R		Red
349276	CL-36Y		Yellow
349280	CL-60B	1500mm (60")	Blue
349278	CL-60R		Red
349279	CL-60Y		Yellow
349283	CL-72B	1800mm (72")	Blue
349281	CL-72R		Red
349282	CL-72Y		Yellow
349288	CL-144B	3600mm (144")	Blue
349289	CL-144R		Red
349287	CL-144Y		Yellow

Replacement Parts – For 1/4" Flare Charging Hoses

Cat. No.	Part No.	Description
349039	P509/10	Black Neoprene Gasket (Packet of 10)
349040	P509T/10	White Teflon Gasket (Packet of 10)
349204	40082	Valve Core Depressor (Packet of 6)

Replacement Parts – For 3/8" Flare Charging Hoses

Cat. No.	Part No.	Description
349120	P510/10	3/8 Charging Line Gasket (Packet of 10)

Charging Hoses – 3/8" Flare Swivel Connection

Cat. No.	Part No.	Nominal Length
349315	HCL6-36Y	900mm (36")
349116	HCL6-48Y	1200mm (48")
349117	HCL6-60Y	1500mm (60")

Charging Hoses – For R410A

These hoses are equipped with 1/2"-20 UNF (5/16" SAE) connection with core depressor on the unit side and 1/4" SAE flare on the manifold side.

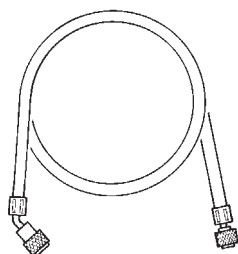
Cat. No.	Part No.	Description	Working Pressure
349029	CCL-36- 1/2"-20 UNF	Set of 3 hoses, 1 each Blue, Red & Yellow. 900mm (36") long	6000 kPa (870 psig)
349028	CCL-60- 1/2"-20 UNF	Set of 3 hoses, 1 each Blue, Red & Yellow. 1500mm (60") long	

Equipment and Tools

Refco

Type CPV Charging Hoses – With Built-In Valve – 1/4" Flare Connection

Refco CPV Charging Hoses are constructed with a special built-in valve, which works fully automatically. If the charging hose is under pressure (high or low side) the automatic valve will close immediately when disconnecting the charging hose from the system. Therefore, no loss of refrigerant or pressure can occur in the service line.



Features

- No loss of refrigerant
- No burning of the skin
- Easy to handle and operate
- Other lengths available ex factory
- One side straight connection, other side 45° elbow

Cat. No.	Part No.	Nominal Length	Ends	Colour
349313	CPV-72B	1800mm (72")	1 x 45° Elbow 1 x Straight	Blue
349312	CPV-72R			Red
349310	CPV-72Y			Yellow

Ryco

Ammonia Charging Hoses – One Wire Braid



Cat. No.	Part No.	Length	Connections
349323	HA-AS18P-3M	3 Metre	A02-6F 1/2" F. BSP Flat Face Swivel Connection
349326	HA-AS18P-6M	6 Metre	
349328	HA-AS18P-10M	10 Metre	

Imperial

Replacement Parts for Service Manifolds

Cat. No.	Part No.	Description	Suites Models
349248	400RH	High Side Repair Kit	Old 400 Series
349249	400RL	Low Side Repair Kit	
349251	405RH	Low Side Repair Kit	New 400 Series
349252	405RH	High Side Repair Kit	
349259	600R	Diaphragm Kit	600 Series
349260	601R	Vac/Refrig Knob Kit	
349261	402R	Hi/Low Know Kit	

Series Identification

Old series has Imperial Eastman on the manifold body, New series has Imperial USA on the manifold body

Imperial

Kwik Charge® – Liquid Low Side Charger



Kwik-Charge accepts liquid refrigerant from the cylinder and discharges into low side of the system. Charging rate is up to eight times faster than vapour charging. In addition, liquid charging is required when using tracing dye.

Kwik-Charge is attached to the low side of the charging manifold. Charging hose is connected from Kwik-Charge outlet to low side of refrigeration system.

Internal Kwik-Charge metering element reduces liquid flow to a level below capacity of compressor. This assures a safe, fast charge without endangering the compressor. A built-in ball check valve automatically opens when drawing a vacuum to assure rapid, unrestricted evacuation.

Can be used with all fluorinated hydrocarbon refrigerant systems.

Features

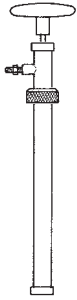
- Provides fast, safe charge, essential when using tracing dye
- Up to 8 times faster than vapour charging
- No need to heat refrigerant cylinder
- Built-in check valve opens for drawing unrestricted vacuum
- No pressure drop in cylinder
- One charger services all units 1750 watts or larger

Cat. No.	Part No.	Connections
349186	535-C	1/4" Female Flare Inlet 1/4" Male Flare Outlet

Equipment and Tools

Refco

Charge-Oil Pump

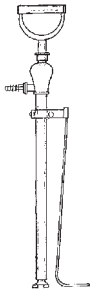


The Refco Charge-Oil pump eliminates the danger of drawing air and moisture into a refrigeration system when charging a compressor with oil. It charges without pumping the compressor down thus reducing charging time. It pumps approximately 1 Litre in 20 full strokes of the piston.

Cat. No.	Part No.
349458	21702

Regal

Manual Oil Pump



This high pressure sprayer is ideal for applying all chemicals, even difficult non-dissolvable powders.

Made extensively from heavy gauge brass, they are strong and durable and resist corrosion. This unit has a cast pressure air chamber and brass ball valves which provide a continuous even flow of spray. A fully adjustable metal foot rest is also fitted.

Cat. No.	Part No.
349459	RMP

Wagner

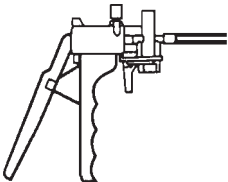
Oil Transfer System

Fast Oil Changes in Minutes with no Mess

Now there is a quick and easy way to change refrigerant oil with absolutely no spillage or mess. This unique hand pump creates a powerful vacuum for the transfer of oil to or from the compressor crankcase at a faster rate than present methods.

Features

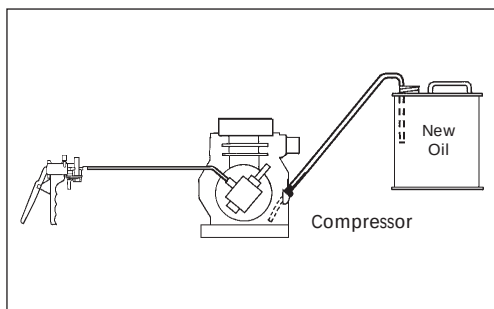
- Oil never touches the pump, thus preventing cross contamination
- Pump, durable waste oil container and all necessary hoses are included



Cat. No.	Part No.	Description
349462	GOTS-1	4.7 Litre

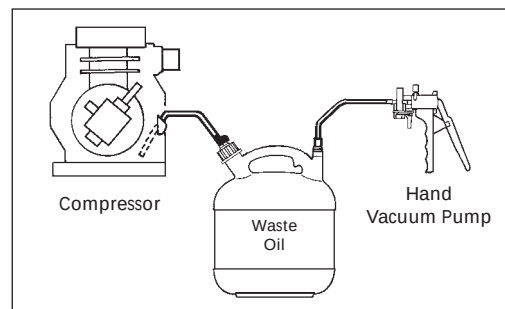
To Dispense Oil into the Compressor

Oil is transferred to the compressor by creating a vacuum in the compressor



To Remove Oil

Oil is removed from the compressor by creating a vacuum in the waste oil tank provided



Equipment and Tools

Refco

Electronic Charging Scale

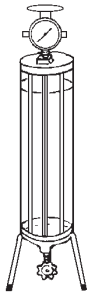
Fully portable weighing scales.



Features:

- Modern design, large LCD display
- Compact and lightweight (2.5kg)
- Sturdy construction for a long lifetime
- High accuracy and resolution
- Programmable
- Large platform for refrigerant cylinders
- Supplied in carrying pouch
- Field calibratable

Cat. No.	Part No.	Capacity : grams	Accuracy	Battery	Resolution
349456	Ref-meter	100kg	±0.5kg	9V	2 grams



Refco

Charging Cylinders

Cat. No.	Part No.	Capacity : grams	Temp. Scales °C	Calibration ▼
349398	10445H-R134a	1000	R134a	Metric
349404	10750H-R134a	2000	R404A	

Note: Supplied complete with 220-240V, 50/60 Hz Heating Element

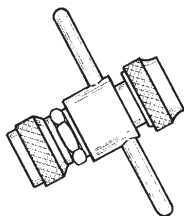
Replacement Parts for Charging Cylinders

Cat. No.	Part No.	Description	Suit Model
349409	10505-05	Sight Glass	10445
349410	10505-23		10750
349414	10750-29	Gasket Set	10750/10445
349424	12605-R134a-24	Cylinder Scale	10445
349423	10705-R134a-24		10750
349420	10505-36	Pressure Gauge	10750/10445
349422	V35024	Hand Valve	

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Charging Tool

A special tool designed to fit on to various makes of compressors for charging purposes.



Cat. No.	Part No.	Description
349037	MR664	Charging Valve Tool less hose
349035	MR716-1	Charging Tool Adaptor
349042	MR517	'O' Ring Seals

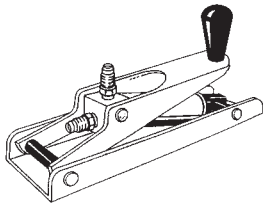
Equipment and Tools

Vacuum / Pressure Controls Pump

The Tool to Check and Set Vacuum or Pressure on Controls

Pressure Controls to 3450 kPa (500 psi) and -85 kPa (25 inches of vacuum) are quickly and accurately tested and set using Controls Pump and your gauge manifold.

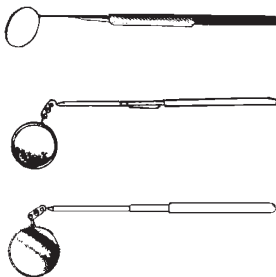
This handy tool eliminates guesswork and handling of heavy nitrogen cylinders.



Cat. No.	Part No.
349187	40200

Inspection Mirrors

Invaluable for inspecting those previously inaccessible areas and joints. Models with fixed and adjustable heads and telescoping.

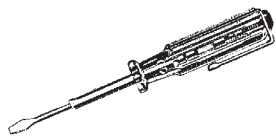


Cat. No.	Part No.	Brand	Description
350001	8MIRPL5/ 8HD LKN	Zea	Standard Fixed Head
350017	M-1	Wagner	Swivel Mirror with double ball joint links. With telescoping feature 160mm long extending to 475mm. Mirror 32mm Diameter
350018	M-2		Same specifications as M1 but telescoping feature 250mm long extending to 355mm. Mirror 57mm Diameter

Safe Test Screwdriver

A small screwdriver is invaluable when carrying out electrical repairs. The neon indicator tube located in the handle glows when the uninsulated end of the blade comes in contact with an active terminal or wire.

Suitable for all voltages between 110 and 500.



Cat. No.	Description
350011	Safe Test Screwdriver

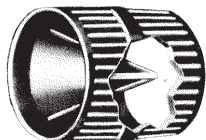
Refco

Inner-Outer Tube Reamer

Reams both inside and outside edges of tube with three hollow ground tool steel cutters.

Fluted body is shaped to fit comfortably in palm.

Reaming Capacity: $\frac{3}{16}$ " to $1\frac{1}{2}$ " OD.



Cat. No.	Part No.	Description
350008	RFA-209	For copper, aluminium and brass tubing

Equipment and Tools

Leak Detectors – Electronic Type – Models TEK-Mate and D-TEK™

Common Features to both Models

- Hand-held leak detector with proven D-TEK™ heated diode sensor technology
- Sensitive to all CFCs, HFCs and HCFCs
- Automatically adjusts for different refrigerants
- Automatically compensates for changing background contamination
- Reliable, even under damp conditions
- Uses a variable intensity audible alarm to help pinpoint leaks

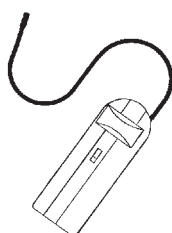
These Refrigerant Leak Detectors incorporate an electrochemical sensor consisting of a ceramic substrate, doped with a reactive element and maintained at high temperature by a built-in heating element. When a halogen-bearing gas contacts the hot surface, the chlorine, fluorine or bromine atoms are separated from the molecule and ionised. This causes an electrical current to flow within the ceramic to a collection electrode at the centre.

Careful selection and application of the ceramic permits the sensor to provide similar responses to CFCs (such as R11 and R12), HCFCs (such as R22 and R123), HFCs (such as R134a) as well as replacement blends (such as R404A and R410A) so that the operator need not determine the refrigerant in use, nor remember to set a selector switch. Furthermore, when searching for HFCs, the instrument does not have an exaggerated response to traces of chlorine-bearing vapours which are frequently present.

The Automatic Background Compensation feature takes advantage of the heated diode sensor technology to continuously monitor and automatically compensate for changing background refrigerant levels in the test area, without the need for manual adjustments by the operator.

TEK-Mate

A moderately priced, accurate hand-held leak detector with proven D-TEK™ heated diode sensor technology.



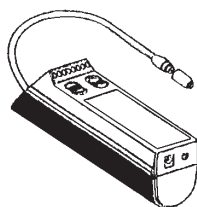
Specifications

- Sensitivity to CFCs, HCFCs, HFCs: 0.4 oz/yr, 11gr/yr
- Controls: 3-position slide switch-off, low sensitivity, high sensitivity
- Power: 2 D-size 1.5 volt alkaline batteries
- Contamination adjustment: Automatic
- Weight with batteries: 700 grams
- Yellow LED low battery indicator
- Operating temperature range: -27° to 50°C
- Probe: Chrome plated flexible metal, approximate length: 430mm
- Sampling system: Positive displacement pump
- Dimensions: 215 x 88 x 57mm

Cat. No.	Part No.	Description
351009	705-202-G1	TEK-Mate Electronic Leak Detector
351011	703-020-G1	Replacement Sensor

D-TEK™

D-TEK™ is the first true breakthrough in portable leak-detection technology in decades. And it means the end of having to choose between inaccurate, unreliable battery-operated units and clumsy plug-in devices. Amazingly, its most sophisticated technology also makes it more rugged – and simple to use. No need to baby it. No re-setting for different refrigerants. Just turn it on and experience high-performance leak detection.



Specifications

Minimum Sensitivity to R12: 0.25 oz/year, R134a: 7gm/year

Controls: On/Off and High/Low sensitivity

Background Zeroing: Automatic

Power Options: 240 Volt AC adaptor, 1.8m cord

3 NiCad rechargeable power cells – 1/2 D size for 3 hour continuous operation

Recharger: Built in

Operating Temperature Range: 0° to 45°C

Storage Temperature Range: -10° to 60°C

Cat. No.	Part No.	Description
351010	703-006-G7	D-Tek Electronic Leak Detector
351011	703-020-G1	Replacement Sensor

Fixed Refrigerant Detectors

The need for Fixed Refrigerant Detectors

Why do we need fixed refrigerant detectors?

In 2002 the Australian/New Zealand Standard under section 1677.2 made amendments to the act regarding practical limits of exposure to refrigerants in the case of a refrigerant leak.

What criteria's warrant a fixed refrigerant leak detector?

- Category of occupancy
- Maximum refrigerant charge that could be expelled into occupancy
- The classification of the refrigerant type in regards to toxicity and flammability
- The practical exposure limit in kg/m³ within an occupied area

Example: R22 refrigerant has a practical limit rating of 0.14 kg/m³ and depending on the occupancy classification for that area the total refrigerant charge doesn't have to be very high to exceed the standards set by AS/NZ Standard.

Therefore all contractors should have a copy of the new standard and check to see if their installation requires fixed refrigerant leak detectors.

How do Fixed Refrigerant Leak Detectors work?

The basic principle of operation is quite basic. To warn of a refrigerant leak, sensors are placed within the area of potential exposure and depending on the area size, more than one sensor may be required to cover the total area. Then if the sensor picks up on an area containing particles of refrigerant, it then relays that signal back to the controller, which then provides various functions to warn us of a refrigerant leak.

Such as:

- Audible Alarm
- Visible Alarm
- Relay Outputs: Control fans and other ancillary equipment
- Communications for modem and computer systems.

Murco

Fixed Refrigerant Detectors

The Murco MGD Range of Leak Monitors are all 230v and come with one to six sensors.

Features

- Highly accurate sensors, sensing 0 - 10000 PPM of hydrocarbons in 30 seconds
- Single or Dual Level Monitoring
- Automatic or Manual Reset
- Visible and Audible Alarms with Relay
- Internal Siren on signal and Dual Channel models and External Sirens on 4 - 6 sensor models
- Delayed alarm response to prevent false alarms.

Cat. No.	Model No.	Description	Refrigerant Type
351068	MGD2S2LR22/CH4	Gas Leak Monitor 4 Channel	R22
351069	MGD1SNH32L	Gas Leak Monitor 1 Channel	Ammonia
351070	MGD1SA 1L	Gas Leak Monitor 1 Channel	R22
351071	MGD1SC1L	Gas Leak Monitor 1 Channel	R404A, R134a, R123, R11
351072	MGD2SA1L	Gas Leak Monitor 2 Channel	R22
351073	MGD2SC1L	Gas Leak Monitor 2 Channel	R404A, R134a, R123, R11
351074	MGD4SA1L	Gas Leak Monitor 4 Channel	R22
351075	MGD4SC1L	Gas Leak Monitor 4 Channel	R404A, R134a, R123, R11
351076	MGD6SA1L	Gas Leak Monitor 6 Channel	R22
351077	MGD6SC1L	Gas Leak Monitor 6 Channel	R404A, R134a, R123, R11
351078	SETUP KIT CRA	Calibration Kit R22	R22
351079	SETUP KIT GRC	Calibration Kit R404A	R404A, R134a, R123, R11

Example MGD1SC-1L

MGD	1S	C	- 1L
MURCO Gas Detector	Number of Sensors or Channels 1,2,3,4,5 or 6	Gas Classification A or C or otherwise delete letter and quote specific gas ie: Isobutane, Ammonia, etc	Number of detection levels - One or Two, 1L or 2L

Equipment and Tools

Spectroline®

Fluorescent Leak Detection System

Pinpoints the Exact Source of Every Refrigerant and Fluid Leak

Procedure

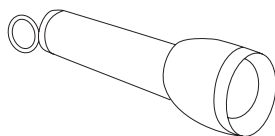
1. Add dye and let it circulate 2. Inspect with an ultraviolet lamp, and see all leaks in ONE inspection

AR-GLO® dyes work in any size AC&R system and are available for all commonly used refrigerants and lubricants. OEM-approved AR-GLO lubricant-specific dyes are designed to match the lubricant in the system, so there is no change in lubricant properties or other adverse effects. AR-GLO universal dyes are compatible with all AC&R lubricants for added convenience. All AR-GLO dyes are solvent-free.

Additional dyes are available for oil, fuel, water and hydraulic systems.

All Spectroline dyes remain safely in the system, making it easy to pinpoint leaks, confirm repairs and perform preventive maintenance checks in the future.

All Spectroline dyes are super-concentrated to provide the brightest fluorescent response.



Cat. No.	Part No.	Fluorescent Leak Detection Kits & Accessories
351080	HVLD-80GS/F (240V)	*Complete Kit – Ideal for large systems. Contains BIB-150P UV lamp, Starter Assortment pack of GLO-STICK capsules, Quick disconnect attachment and 2-bleed valves.
351083	TLK-100 GS/E (12V)	*Complete Kit – Ideal for large systems. Contains TITAN TL-100/12 UV/Blue lamp. Starter – assortment pack of Universal GLO-STICK capsules. Quick disconnect attachment and 2-bleed valves.
351127	101-250 BMP-450CS	Telescopic LED UV Lamp with Mirror
351128	OPX-1000	Rechargeable battery LED UV lamp. AC charger c/n enhancing glasses
351125	CR-1600	GLOW-AWAY dye cleaner/remover 237ml

*All kits include lamp, fluorescence-enhancing glasses, plastic carrying/storage case, and 226g bottle of GLO-AWAY dye cleaner/remover. 12-volt kits also include – BP-12A portable rechargeable battery pack, AC battery charger, and nylon carrying case with shoulder strap.

Cat. No.	Part No.	Oil Compatibility	Components
351115	GS-101/E	Universal Dye compatible with Mineral Alkylbenzene Ester Lubricants	GLO-STICK Fluorescent Capsules
351116	GS-1/E		
351117	GS-2/E		
351104	GS-3/E		
351094	GS-101/PAG	PAG Lubricants	

Cat. No.	Part No.	Components
351107	AR-GLO 1	Fluorescent Additive 0.5 oz Bottle Mineral Oil
351108	AR-GLO 2	
351109	AR-GLO 3	
351121	AR-GLO 4/E	Fluorescent Additive 56 grams Bottle Universal Dye
351092	MI-200 A	Mist Infuser 56 grams Capacity

6

System Lubricant	Refrigerant or Oil Charge					Dye Type
	Up to 2.9 lbs of Refrigerant	Up to 4.9 lbs of Refrigerant	5 to 9.9 lbs of Refrigerant	10 to 25 lbs of Refrigerant	Use 1/4 oz of AR-GLO 4 per gallon of oil	
	Small AC&R systems, eg. ice machines and automobiles	Residential Systems*	Light Commercial and large Residential Systems*	Commercial and light Industrial, including all Split Systems*	Large capacity Systems with more than 4 gallons of Refrigeration Oil	
Mineral Oil Ester Oil PAG Oil Alkyl Benzene (eg. Low Temp. Systems)	GS-101/E	GS-1/E	GS-2/E	GS-3/E	AR-GLO 4/E	Universal Dye (/E)
Mineral Oil		AR-GLO 1	AR-GLO 2	AR-GLO 3		Mineral Oil
PAG Oil	GS-101/PAG					PAG Oil

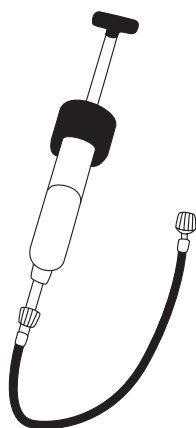
* Use GS-3 Series or AR-GLO 3 with all split systems, even if they are being used for residential applications and they hold less than 4.5kg of refrigerant. One GS-3 capsule or one AR-GLO 3 bottle will treat a system containing 7.5 litres of refrigeration oil.



Your best Solution...

Equipment and Tools

Spectroline Oil Acid Neutralizing Solution



Eliminates acid buildup in AC & R systems. Prevents compressor burnout.

Features

- Twice as concentrated as competitive acid neutralizing solutions
- Works with all refrigerants and lubricants (mineral oil, polyolester and alkylbenzene)
- Compatible with semi-hermetic and hermetic compressors
- Direct, reusable BigEZ™ injector eliminates the need for an oil pump
- Prefilled, disposable cartridges are easy to use.

EASY

ACID-BUSTER is a ready-to-use acid neutralizing solution that can be injected directly into an air-conditioning or refrigeration system. Simply connect the BigEZ injector to the systems low-side service port and turn the handle to inject the exact amount of ACID-BUSTER required.

ECONOMICAL

Using ACID-BUSTER is the most cost-effective way to clean up acid build-up in any AC & R system. Only 56grams of super concentrated ACID-BUSTER is needed to treat 3.8 litres of oil, half as much competitive acid neutralizing solutions. Each disposable 113 grams ACID-BUSTER cartridge treats up to 3.8 litres of oil, while the 226 grams disposable cartridge can treat up to 15 litres oil.

SAFE

Can be used with all AC & R Systems. It does not contaminate the refrigerant or lubricant or leave behind a residue of corrosive salts. ACID-BUSTER is designed for use in CFC, HCFC and HFC refrigerants using mineral oil, polyester and alkylbenzene lubricants.

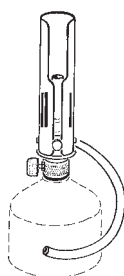
▼ Cat. No.	Part No.	Description
351085	AB-400CS	ACID-BUSTER (less gas Cartridge)
351886	AB-4CS	ACID-BUSTER 113 grams Cartridge
351087	AB-8	ACID-BUSTER 226 grams Cartridge

Halide Lamp Leak Detector

For detecting all refrigerant gas molecules containing fluorine, chlorine, bromine or iodine

Features

- A proven principle providing safe operation
- Low gas consumption
- Ease and speed of putting into operation
- Heavy gauge copper burner for long life
- Simplicity of operation



Cat. No.	Part No.	Brand	Description
352020	BG 100L	Blue Gaz	Leak Detector (Less Gas Cartridge)
352021	BG 1001		Gas Cartridge – Screw Type
352022	27-CZ-206-05		Burner Unit
352023	27-CZ-206-05		Replacement Jet
352028	C206	Halogaz	Gas Cartridge
352027	2600		Burner Unit

Equipment and Tools

Rothenberger

Superfire 2 Brazing Torch

Features

- Concentrated high heat turbine action flame
- Adjustable flame control
- Stainless steel burner
- Piezzo Trigger ignitor
- On/off and lock flame trigger convenience
- Operates on Mapp® or Propane gas

Cat. No.	Part No.	Description
352288	3.5644	Super Fire 2 Torch

Superfire 3 Brazing Torch

The next generation in portable brazing torches for soft soldering, brazing and other applications comes complete with cylinder collar, cyclone & fine flame burners and gas cylinder safety stand

Features

- Will burn on any angle - even upside down
- Metal construction
- Gas cylinder stand
- Piezzo ignition, no need for flints or lighters
- "Twist & Load" burner tubes

Cat. No.	Part No.	Description
352293	35435	Super Fire 3 Torch Set

Uniweld

Soldering and Brazing Mapp® Kit

- Brass and stainless steel piston regulator
- Special regulating system with safety shutoff feature. Capable of operating in any position even upside down
- Quick adjustment Off to full On in two turns
- Produces a stable wrap-around flame with a concentrated target heat of 1316°C
- Tip swivels 360° for use in any position

▼ Cat. No.	Part No.	Item	Description
352284	MKT-4L	Unitorch Mapp® Gas Kit	• RP3-E Regulator • UT5 LP Twister Tip

TurboTorch

Self-Lighting Torch

- For soft soldering and brazing of copper, brass, bronze and aluminium
- Operates on propane or Mapp® gas with no modification
- Trigger lock and flame adjustment valve
- Tip swivels 180° for ease of positioning
- Convenient trigger ignitor provides instant start-up

Cat. No.	Part No.	Item	Description
352287	CTL-44	Turbo Lite® Self-Lighting Torch	For direct connection to Mapp® Gas Cylinder. Cuts brazing time up to 30%
352304	CT44-TL	Tip Assembly	Replacement tip assembly for CTL-44 torch

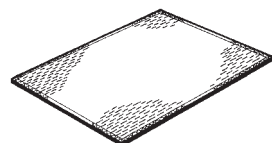
Disposable Gas Cylinders

Cat. No.	Part No.	Cylinder Contents
352285	MT-1	453 grams (16 oz) of Mapp® Gas
352359	PT-1	400 grams (14.1 oz) of Propane Gas

Plumber Pad

Asbestos Free, insulated pad for protection of domestic and commercial furnishing, fittings & upholstery against torch flame, radiant heat or molten debris during pipe & duct fitting, brazing, cutting, welding, grinding, silver soldering, etc;

Cat. No.	Description	Rated Temp. °C	Dimensions : mm
352289	Heat Resistant, Insulated Pad	1000	250 x 300

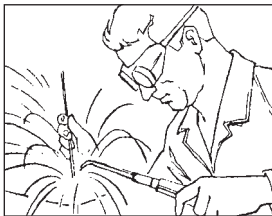


Your best Solution...

Equipment and Tools

Silver Solder Brazing Alloys

Cat. No.	Part No.	Description
353014	No. 2 'Yellow Tip'	2% AMFOS Silver Solder Melting Range: 644 to 740°C These Silver-Copper-Phosphorous alloys are recommended for the brazing of copper without the use of a flux.
353022	No. 5 'Sil/Gr Tip'	5% SIL-FOS Silver Solder Melting Range: 650 to 710°C Used on copper or copper alloys, these brazing materials provide sound joints of considerable ductility.
353010	No. 15 'Brown Tip'	15% SIL-FOS Silver Solder Melting Range: 644 to 700°C Sil-Fos, with the higher silver content is the most ductile of the group. They may also be used on brass and bronze using Easy-Flo Flux.
353013	No. 45 'Blue Tip'	45% EASY-FLO Silver Solder. Melting Range: 607 to 620°C. A cadmium-bearing alloy with a low melting temperature, a short melting range with excellent flow characteristics. Brazed joints produced have high strength and ductility, smooth fillets and good corrosion resistance. Used widely in refrigeration, air conditioning and general industry.
353023	ALU-SOL	Aluminium to Copper Solder
Flux		
353020	EASY-FLO Flux Paste 250 gram	A general purpose flux with good fluxing activity and long life at temperature. Working Range: 550 to 800°C



Soldering and Brazing Defined

Soldering- A joining process using a filler metal with working temperature below 427°C, and below the melting point of the base metal.

Brazing- A joining process using a filler metal with working temperature above 427°C, but below the melting point of the base metal.

Heating Source

Most soldering and brazing alloys can be applied with a portable, light weight torch. Many repairs, in fact, can be performed with a small propane hand torch. On occasion oxyacetylene, or heavier duty acetylene or propane torches may be better suited for in-shop work, but such equipment should not be normally necessary for field repairs.

Pre-Cleaning the Joint Area

Surface oxides must be removed for sound joining of metals. Cleaning is divided into two categories: Mechanical- Joint areas should be abraded with materials such as plumber's sandpaper, emery cloth or steel wool. CAUTION: Always slant tubing downward when abrading so that shavings are not introduced into the system.

Chemical – In service trade applications, mechanical cleaning is usually adequate. If it is necessary to swab the interior surfaces of hard drawn tubing, a solvent should be used. In refrigeration applications avoid using carbon tetrachloride or other chlorinated solvents.

Post-Cleaning

Most fluxes permit quick, easy and complete post-cleaning. Remove flux residue with hot water saturated cloth.

Note: In refrigeration repairs, remove flux residue as soon as system is put under pressure, not before.

Filler Metals Most Commonly Employed

Silver Brazing Alloys (usually given the misnomer 'silver solders').

Copper - Silver - Phosphorus Brazing Alloys.

Copper - Phosphorus Brazing Alloys.

Aluminium Brazing Alloys.

Soft Solders.

Purpose of a Flux

To dissolve and sweep away surface films and oxides during the brazing or soldering process.

To prevent oxides from forming.

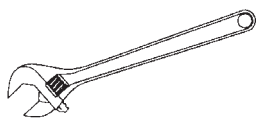
To 'signal' moment when temperature is reached to apply the brazing alloy or solder.

To promote fluid flow and increase adhesion of the filler metal. Fluxes are formulated for specific applications.

Each flux is precisely calibrated with an activity range corresponding to the flow point of the filler metal. In refrigeration applications, the service engineer needs a flux with sufficient activity, yet one that will not be drawn into the system.

Equipment and Tools

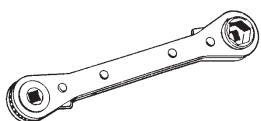
Adjustable Spanners



Cat. No.	Part No.	Size : mm
354567	7.0440	100
354568	7.0441	150
354569	7.0442	200
354570	7.0443	250
354571	7.0444	300

Refco

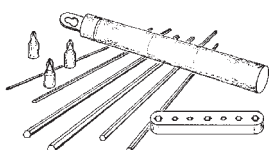
Ratchet Spanners – Reversible



Cat. No.	Part No.	Description
354024	RFA-124-C	1/2", 9/16", Hex. 3/16", 1/4" Square Ratchets
354025	RFA-127-C	1/4", 3/8", 3/16", 5/16" Square Ratchets
354023	RFA-127-C - Offset	

Watsco

Magnetic Hex Wrench Sets

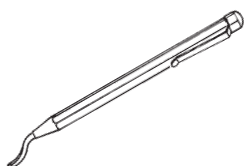


These high quality wrench sets feature magnetised hardened steel shafts to make it easy to retrieve screws from the most inaccessible places. The long hexagonal shafts are ideal for reaching that inaccessible set screw on a blower wheel or pulley.

Cat. No.	Part No.	Description
354059	TL17	Master Handle, Six 9" Long Hex. Wrenches 3/32", 1/8", 5/32", 3/16", 7/32", 1/4" and three Phillips Nos. 1, 2, 3, Tips

Refco

Reamer

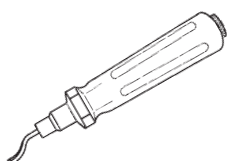


For deburring edges of tubular and sheet materials. Small and handy, ideal for carrying about. Blade can be swivelled to match material contours.

Cat. No.	Part No.	Description
350007	RFA0209-STYLO	Reamer HSS blade

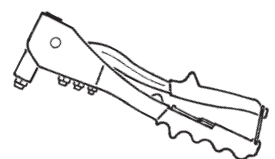
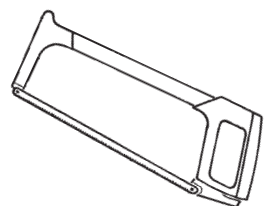
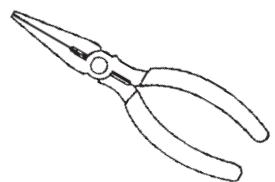
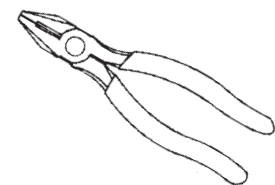
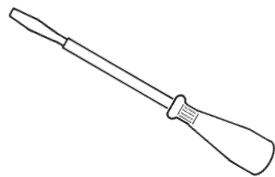
Rothenberger

GRATFIX Deburrer



For quick deburring of edges, tubular and sheet materials. Replaceable HSS blade. Plastic Handle.

Cat. No.	Part No.	Description
354030	21655	GRATFIX with HSS general purpose blade
354031	21652	Spare HSS general purpose blade



Cat. No.	Part No.	Description
Screwdrivers		
354196	74102	Insulated – Slotted : 2.8 x 75mm
354197	74104	Insulated – Slotted : 4 x 100mm
354198	74119	Insulated – Slotted : 4.5 x 175mm
354199	74105	Insulated – Slotted : 5.5 x 125mm
354200	74501	Insulated – Phillips : No. 0 x 60mm
354201	74502	Insulated – Phillips : No. 1 x 80mm
354206	86301	Non-Insulated – Slotted : 2.5 x 75mm
354212	94404	Non-Insulated – Phillips : No. 2 x 100mm
354194	620757	6 Piece Premium 1000V Insulated Set – Slotted : 2.8, 4, 5.5, 6.5mm, Phillips : No. 1, No. 2
354214	620585	7 Piece Economy 1000V Insulated Set – Test Driver, Slotted : 2.8, 4, 5.5, 6.5mm, Phillips : No. 1, No. 2
Pliers		
354120	MA 880	220mm Heavy-duty Linesman's Pliers
354121	MA 500200	200mm Long Nose Pliers
354122	MA 600	150mm Diagonal Cutting Nippers
354123	MA 730	200mm High Leverage Cutting Nippers
354126	MWC 250 PV	250mm Multi-Grips – Grooved Joint, Curved Jaws
354127	LP1	250mm Locking Pliers
Saws		
354142	HSP	Hacksaw – Adjustable
354144	WPS	Wall Board and Plaster Saw with Wooden Handle
354154	R 9593M	Holesaw Metric Kit – contains one of each: 16, 20, 25, 32, 40, 51mm Saws, 1/4" round x 14 to 30mm Mandrel, 7/16" Hex. QC x 32 to 152mm Mandrel, Mandrel Adaptor
Allen Keys		
354139	AK18	8 Piece Imperial Set – 5/64, 3/32, 1/8, 5/32, 3/16, 1/4, 5/16, 3/8"
354140	AKM8	8 Piece Metric Set – 2, 2.5, 3, 4, 5, 6, 8, 10mm
Tin Snips		
354132	TSL	Tin Snips – Cuts Left & Centre
354133	TSR	Tin Snips – Cuts Right & Centre
Knives		
354134	MEK 70M	Single Blade Marine Knife – s/s Blade
354135	UK 1	Utility Knife with 5 Blades
Riveter		
354146	H5	Pop Riveter – Hand Type

Equipment and Tools

Rothenberger

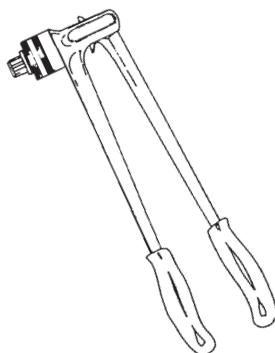
Screwdriver Set

Cat. No.	Part No.	Description
354500	323126	4 x Flat Blade Screwdrivers, 2 x Phillips Screwdrivers, 1 x Voltage Tester 250 Volts

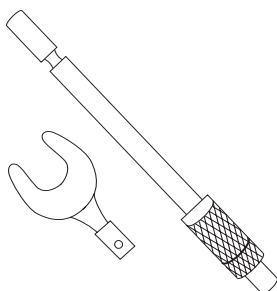
Rothenberger

Copper Tube Expander

The tube expander is designed to expand the ends of annealed copper tubing so that one tube will accurately slide into the other to ensure a perfect joint. The amount of expansion required is governed by the tube wall thickness.



Cat. No.	Part No.	Size	Description
355020	1.1121X	Kit	c/w 4 Heads – 1/2", 5/8", 3/4", 7/8"
355022	11052	3/8"	Heads – Standard Size
355023	11053	1/2"	
355024	11054	5/8"	
355025	11055	3/4"	
355026	11056	7/8"	
355027	11057	1"	
355028	11058	1 1/8"	
355029	11059	1 1/4"	
355011	51206	1 3/8"	Heads – Large Size
355013	10351	1 5/8"	



Refco

Torque Wrench Kit

Suitable for correct tension of R410A flare nuts and other applications.
Supplied in a sturdy plastic case.

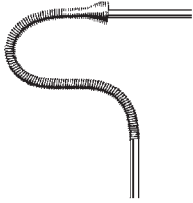
Cat. No.	Part No.	Description
354018	TW8	Torque wrench kit c/w 7 different sized interchangeable spanners to fit R410A flare nuts Sizes: 17, 19, 22, 24, 26, 27, 29mm Adjustable torque setting range 10 - 75Nm

Equipment and Tools

Refco

Spring Type Tube Benders

For hand bending soft copper and aluminium tubing to any shape without collapsing walls. Special spring steel nickel finished. One end belled for quick tube removal. Each tool bends one size.



Cat. No.	Part No.	Tube OD
355060	BS-4	1/4"
355061	BS-5	5/16"
355062	BS-6	3/8"
355063	BS-8	1/2"
355064	BS-10	5/8"
355065	BS-12	3/4"

Internal Tube Benders

Ideal for split system air conditioning installations where pair coil tubing is used. Simply insert the flexible plastic tube inside tube to be bent and bend to the desired angle, then pull the plastic tube from the copper tube leaving a crimp free bend.



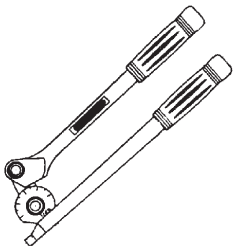
Cat. No.	Part No.	Description
355068	BENDER 02	3/8" Internal Bender 4m long
355069	BENDER 03	1/2" Internal Bender 4m long
355070	BENDER 04	5/8" Internal Bender 4m long
355071	BENDER 05	3/4" Internal Bender 4m long

Refco

Lever Type Tube Benders

Each tool bends one size. Open side type which slips over tube at any point. Makes smooth short radius bends up to 180° with minimum effort. No marking, scraping or flattening of tubing. Calibrated to show angle of bend.

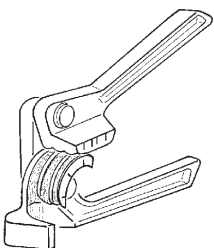
Fixed hook tube benders supplied for 1/4" to 1/2" OD sizes have easy 90° start – require much less effort to make fast, accurate bends. Wide fixed hook simplifies operation, holds tubing securely.



Cat. No.	Part No.	Tube OD
355116	RFA-364-FHB-04	1/4"
355117	RFA-364-FHB-06	3/8"
355118	RFA-364-FHB-08	1/2"
355119	RFA-364-FHB-10	5/8"
355120	RFA-364-FHB-12	3/4"

3-in-1 Lever Type Tube Benders

Innovative multi tube size design does the work of 3 conventional lever-type benders. Calibrated markings for making accurate left-hand, right-hand and offset bends. 90° start requires less effort – makes bending fast and easy. Wide fixed hook simplifies operation, holds tubing securely. Open side – slips on tubing at any point. Black and chrome finish. For bending annealed copper, aluminium, brass, steel, stainless steel and other metals.



Cat. No.	Part No.	Tube OD
355121	FRA368FH	1/4", 5/16", 3/8"

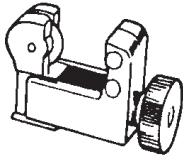
Equipment and Tools

Tube Cutters

For Hard or Soft Copper and Aluminium

Refco

Type Mini



Designed for use in tight quarters where other cutters won't fit. Minimum swing radius. Satin Finish.

Cat. No.	Part No.	Description	Swing Radius
356010	14300	For 1/8" to 5/8" (4 to 15mm) OD Tubing	35mm

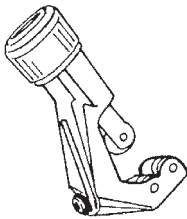
Type Big Mini

Big capacity, small size. Designed for use in tight quarters where other cutters won't fit. Requires only 57mm swing radius. Black finish, brushed highlights

Cat. No.	Part No.	Description
356012	RFA-174F	For 3/8" to 1 1/8" (10 to 28mm) OD Tubing

Hi-Duty Series

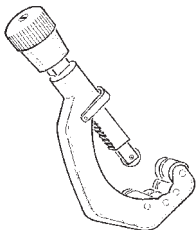
Makes clean, right-angle cuts with no burrs or chips to clog tubing. Roller has flare cut-off groove, fold away reamer and spare cutting wheel. Aluminium body designed for handling ease. Satin finish and nickel-chrome plated body.



Cat. No.	Part No.	Description
356011	RFA-274-FC	For 1/8" to 1 1/8" (4 to 28mm) OD Tubing
356013	RFA-312-FB	For 1/4" to 1 5/8" (7 to 41mm) OD Tubing

Imperial

Adjust-O-Matic Series



Ratchet feed mechanism speeds up cutting operation – opens quickly to insert tubing, slides to cutting position instantly. Extra wide rollers with flare cut-off groove stabilise tubing. Spare cutting wheel included in handle recess. Enclosed screw-type feed mechanism; light weight aluminium alloy body.

Cat. No.	Part No.	Description	Length Closed
356041	206-FB	For 3/8" to 2 5/8" (10 to 66mm) OD Tubing	200mm
356076	406-FA	For 2" to 4 1/8" (51 to 104mm) OD Tubing	285mm

Equipment and Tools

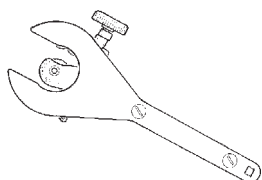
Ratch-Cut

Ratchet Tube Cutter

Ratch-Cut is an easy to use, ratchet type tool for cutting small diameter plumbing and refrigeration tubing.

Cuts different sizes of pipes in a variety of materials. Suitable for cutting copper tubing, mild steel pipe and plastic pipe in diameters of $\frac{5}{16}$ " to $1\frac{1}{8}$ ". Special cutter wheel for RC-1125 to suit stainless steel.

Gives clean cuts in small spaces. The action radius of the Ratch-Cut is smaller than any other tube cutter on the market. Each movement is only 10° .



▼	Cat. No.	Part No.	Description
	356020	RC-1125	Ratchet Tube Cutter for $\frac{5}{16}$ " to $1\frac{1}{8}$ " OD Tubing
	356021	RC-375	Mini Ratchet Tube Cutter for $\frac{1}{8}$ " to $\frac{3}{8}$ " OD Tubing
	356022	RC-1125-7	Cutter Wheel for RC-1125
	356023	RC-1125-7HS	Cutter Wheel for RC-1125 (for Stainless Steel)
	356024	RC-375-7	Cutter Wheel for RC-375

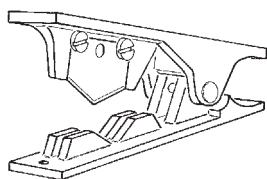
Replacement Parts for Tube Cutters

Cat. No.	Part No.	Item	To Suit Model
356043	32633	Cutter Wheel	TC 1050, 127 FB, 227 FA
356025	881624		TC 1000, 274 FC, 312 FB, 174 F, TC 1020, 374 FC, RFA 174 F, RFA 274 FC, RFA 312 FB
356045	74761		206 FB
356051	74833		406 FA
356049	26883		TC 1050, 127 FB, 227 FA
356050	74762	Axle Screw	TC 1000, 274 FC, 312 FC, 174 F, TC 1020, 374 FC
356067	77511		206 FB

'Snimp'® Plastic Tubing Shear

The most compact shear available - only 73mm overall. 'Snimp' easily cuts nylon, poly-flo, polypropylene and other plastic tubing. Also cuts non-wire reinforced synthetic hose.

Shear is spring-loaded for safety - closes automatically, completely covering cutting edge of blade. Hardened steel blade produces clean, right-angle cuts. 'Snimp' can be bench or wall mounted.

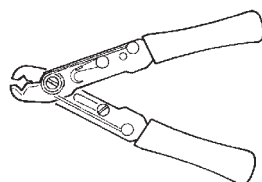


Cat. No.	Part No.	Description
356031	307-FP	Plastic Tube and Hose Shear for $\frac{1}{16}$ " to $\frac{1}{2}$ " (1 to 13mm) OD hose or tubing

Refco

Capillary Tube Cutter

A unique tool to cut all sizes of capillary tubing without crushing the tube.



Cat. No.	Part No.
356015	14215

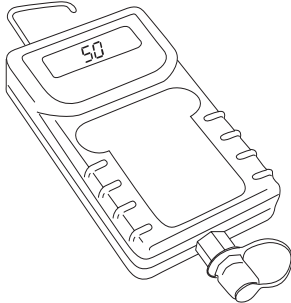
Equipment and Tools

JB Industries

Digital Vacuum Gauge

Features

- Reads Vacuum in 7 different international units: Microns, PSIA, InHg, mBars, Pascals, Torr, mTorr
- Digital Display with solid state circuitry
- 0°C to 48.9°C Ambient temperature
- 2000 kPa Maximum Pressure
- Requires no calibration
- Simple 2 button operation
- Sealed touch buttons protects against spills & dust
- Solid state design - No adjustment necessary for temperature
- 10 minute Automatic power off battery saver
- Saves last vacuum readout after shutdown
- Low battery indicator
- Uses one 9 volt battery (not included)
- Retractable Hanging hook
- Supplied with protective carry case



Cat. No.	Part No.	Range	Conn: Size
361022	DV-24N	25 to 12000 microns	1/4" MF

Operation

1. Push square button to turn gauge on. If unit does not display any characters, check to be sure batteries are correctly installed. The start-up display will show the letters 'J:B' followed by either the micron value or the overrange indicator '1'.
2. Push the lower square button to select the desired display units. The gauge will save the selected unit and use that unit every time the gauge is turned on.
3. The micron gauge power saver feature automatically turns the gauge off after 10 minutes. To continue, re-press the start button; J:B will be displayed followed by the current reading

Low Battery Indicator

If 3 blinking decimal points are displayed, the battery is low. Replace with 9 volt battery.

Cleaning Vacuum Sensor

Fill vacuum hose connection fitting half full with alcohol. Replace cap. Gently shake the gauge to allow the alcohol to rinse the inside of the sensor. Remove cap and pour out the alcohol. Turn the gauge upside down and allow the vacuum sensor to dry for 20 - 30 minutes before using gauge or replacing cap

Testing Vacuum Pump

It is a good idea to attach the micron gauge to the vacuum pump before evacuation to make sure the pump pulls down to at least 50 microns. If it doesn't, your pump is contaminated and the oil should be changed. Do not shut-off the blank-off valve on the pump and expect the gauge to hold a vacuum as the gauge will fall back to the atmosphere. The reason for this is that the sensor is too close to the pump and the gauge's sensor doesn't have time to equalize.

Equipment and Tools

Wagner

Rubber Tie Down Strap



Quickly ties down ladders, tubing, gas cylinders or almost anything in just seconds.

Features extra heavy steel 'S' hooks on each end. Designed with extra elasticity for wider variety of uses.

Cat. No.	Part No.	Length : mm	Recom. Max. Stretch : mm
357061	RS-15	380	475
357062	RS-20	510	765
357063	RS-31	785	980

Lash-N-Strap

Secure Loose Gear Safely

Features

- Tie down ladders, tubing, gas cylinders or almost anything in seconds
- Safe - cannot snap back
- Strong, durable 25mm polypropylene webbing
- Reinforced grommet lets you hang it up, tie it up, hook it up or attach it permanently
- Spring loaded, adjustable buckle
- Easy to get firm tension with no slipping
- May be used in conjunction with rubber tie downs
- Strong, versatile, durable, easy to use
- Make an endless length by connecting two or more Hang-N-Straps together



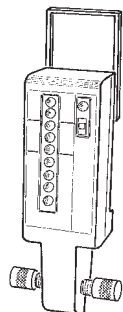
Cat. No.	Part No.	Length : mm
357030	HS30	785
357031	HS60	1520

Refco

Electronic Vacuum Gauge

The DV-150 battery operated electronic vacuum gauge measures from atmospheric pressure to a vacuum of 50 microns.

Cat. No.	Part No.	Range	Battery Included
361010	DV-150	atm. to 50 microns	9 Volt



Operation

Establish the output of vacuum pump by connecting vacuum gauge directly to pump and running pump for 2 to 3 minutes, then read end vacuum obtained.

To evacuate a system, run the vacuum pump until an end vacuum of 400 to 500 microns is achieved then close valve and switch off pump. If the end vacuum at the gauge increases to 1000 microns after 2 minutes and remains constant it is a sign of moisture in the system that is evaporating. In this case the evacuation process should be continued.

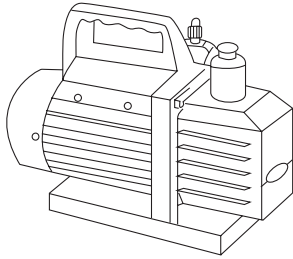
If the end vacuum still increases slowly to 1000 microns or more, the system is leaking.

If the end vacuum reaches approximately 400 microns and then increases to only 600 to 700 microns after 2 minutes and stays constant, the evacuation can be considered as finished.

Equipment and Tools

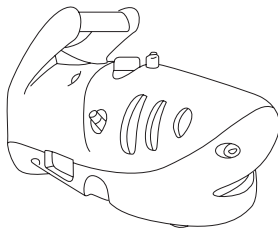
Robinair

Vacuum Pumps



- Two stage design - second stage parts pumping at a lower pressure to pull a deeper ultimate vacuum
- Integral Check Valve - prevents pump oil from being sucked into the system if a power loss occurs
- Die-Cast Aluminium Housing - lightweight but durable
- Moulded Base - Durable polycarbonate base improves pump balance and minimise vibration

Cat. No.	Model No.	Capacity Litre/min	End Vacuum Microns	Motor HP	Weight Kg	Intake Ports	Oil Capacity
362040	15151	35	50	1/4	9.6	1/4" & 1/4"	220ml
	15301	71	40	1/3	12.5		
362041	15501	118	40	1/3	12.5		



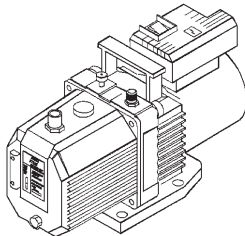
Javac

'Shark' Double Stage and Robust

Cat. No.	Model No.	Capacity Litre/min	End Vacuum Microns	Motor HP	Weight Kg
362035	VNR-152-2	150	15 - 10	.3	12

Javac

'C' Series High Vacuum Pumps



Cat. No.	Model No.	Capacity Litre/min	End Vacuum Microns	Motor HP	Motor RPM
362009	CD - 40	40	1	.250	2800
362011	CD - 75	75		.550	1400
362026	CD - 150	150			
362030	CD - 30D	300			

Hire Equipment

Actrol offers a range of products for hire on a daily basis to assist you with a quick solution when your equipment is tied up or in for repair.

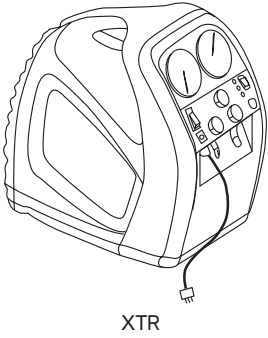
Daily Equipment Hire

Cat. No.	Description
899884	*Refrigerant Recovery Unit
899887	*Vacuum Pump
899889	Portable Lifter

* Note it is Actrol policy to sell 1 litre of new vacuum pump oil Cat No. 184037 for each vacuum pump hire. It is Actrol policy to sell a new inlet drier for each hire of Refrigerant Recovery units.

Equipment and Tools

Javac



XTR

XTR Refrigerant Recovery Unit

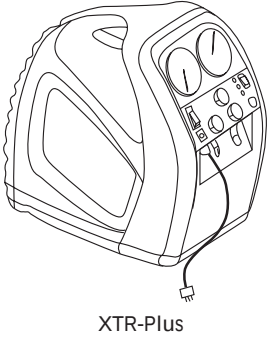
The Xtract-R is suitable for all the common CFC, HCFC and HFC refrigerants including the high pressure blend R410A. An oil free compressor ensures no cross contamination of refrigerants and no maintenance or oil checks. A built-in manifold with gauges provides safe and convenient control of all functions, while the high volume condenser fan allows for efficient operation at high ambient temperatures. Together with the ergonomically designed blow moulded case this provides a unit that is light weight (10.8 kg), rugged and easy to operate.

Complete high pressure starts with inlets up to 1500 kPa and discharge up to 3200 kPa mean faster recovery.

Features

- Oil-less compressor
- Blow moulded case
- Control manifold
- High capacity fan
- High pressure safety switch
- Resettable circuit breaker

Cat. No.	Part No.
362088	XTRA-2



XTR-Plus

XTR Plus (High capacity oil free)

Features

- Twin head oil free compressor
- Fast recovery rates for bigger jobs
- Combined liquid & vapour recovery
- Multi refrigerant capability R12 through R410a
- Integrated Manifold HP & LP gauges
- Integrated purge + HP safety switch
- Twin condenser & Twin fans
- Unique circuit wont "cook" cylinders
- Automatic shutdown at vacuum
- Deep vacuum switch
- Pressure relief valve
- 3/8 flare connections
- ARI rated @24Kg/hr
- Combined rated to >70 Kg/hr

Cat. No.	Part No.
362087	XTRB-2

Specifications

Model	Refrigerant	Category	Category	Liquid*	Vapour	Combined*
XTR	R134a	III Kg/hr	240	60	9	20
	R22	IV / Kg/hr	290	72	11	30
	R410a	V / Kg/hr	350	50	12	25
XTR plus	R143a	III Kg/hr	300	90	15	30
	R134a, R22	IV / Kg/hr	330	100	16	45
	R410a	V / Kg/hr	400	70	17	40

Independent certification program ARI 740-98 TUV CE and C-tick (pending)

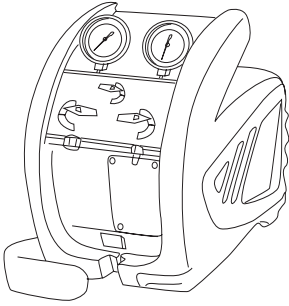
*Liquid throttled

Dimension: mm

Model	XTR	XTR Plus
Length	390mm	390mm
Width	250mm	250mm
Height	380mm	380mm
Weight	10.8kg	11.5kg
Warranty	12 months	12 months
Motor	0.25kw	0.3kw

Equipment and Tools

Inficon



Vortex AC Refrigeration Recovery Unit

The Vortex is suitable for all common CFC, HCFC and HFC refrigerants including R410A. Having a compressor with ceramic bearings provides even longer life and increased recovery rates. Vortex AC contains a single valve, oil-less compressor driven by a 1/2hp AC motor. With its 3 valve design you can purge the unit without changing hoses. Vortex is light, compact and well balanced, providing convenience with durability.

Features

- Oil-less compressor
- Ceramic compressor bearings
- Purges without changing hoses
- Large rear mounted fan provides exceptional cooling
- Gauges are protected, yet accessible for quick easy change

Cat No.	Refrigerant	Category	Push Pull Rate kg/hr	Liquid Rate kg/hr	Vapour Rate kg/hr
362080	R134a	III	171.69	56.47	4.99
	R22	IV	267.85	67.36	6.58
	R410A	V	256.96	78.25	6.58

INFICON Vortex AC has been independently tested and certified to be in conformance with ARI standard 740-1988 by Underwriters Laboratories, Inc.

Specifications

Refrigerants	Recovers commonly used CFCs, HCFCs, and HFCs including blends such as R410A
Weight	12.2kg
Dimensions	457mm x 241mm x 368mm
High-pressure shut-off	550 psig
Gauge ranges	Low pressure 30" Hg Vac - 500psig. High pressure 0-800 psig.
Compressor	1/2 HP oil-less, single valve, AC motor drive
Power	8.3 amps 240 Vac 50Hz

Vacuum Pump Spare Parts

Cat No.	Part No.	Brand	Description	Suits
362036	VS4016	Javac	Exhaust Demister Oil Filter Kit	Javac Shark
362037	VC2005	Javac	Drain Plug	Javac Shark
362039	VC2036	Javac	Power Socket Panel Mount	Javac Shark
362038	PS-4106	Javac	Power Cord	Javac
362074	S20-502	Javac	Round Oil Sight Glass	Javac SE Series
362090	S20-501	Javac	Vertical Sight Glass	Javac JD/DD/DS Series
362058	ROY-725-046	Refco	Oil Sight Glass C/W Gasket	Refco Royal 2
362059	ROY-632-014	Refco	Oil Plug	Refco Royal 2
362044	523195	Robinair	Oil Fill Plug	Robinair 15151, 15301, 15501

Recovery Unit Spare Parts

Cat No.	Part No.	Brand	Description	Suits
362089	QS22014	Javac	Manifold Knob Set	Javac XTRACT-R, XTR

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This image shows a full page of blank graph paper. The background is a solid light blue color. Overlaid on this background is a precise grid of thin, dark gray horizontal and vertical lines. These lines intersect to form a continuous pattern of small, identical squares across the entire surface of the page. There are no margins, text, or other markings present.

This image shows a full page of blank graph paper. The grid consists of thin, light blue horizontal and vertical lines that intersect to form small squares across the entire surface. There are no margins, text, or other markings on the paper.

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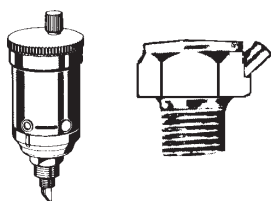
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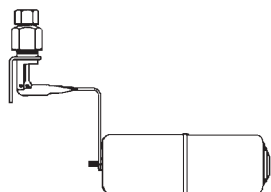
Hydronic System Accessories

Air Vents – Automatic and Manual



Cat. No.	Part No.	Description
540110	EA122	Automatic Air Vent - 3/8" Male BSP Connection
540111	17	Manual Air Vent – Key Operation
540112	19	Key – To Operate No. 17 Vent

Maid-O-Mist Water-Boy Float Control Valve



Type 53 Series Float Control Valve is designed to fill requirements for humidifying units, pan fillers, air conditioning equipment, evaporative coolers and other applications where dependable water level control is essential in limited space to meet various operating conditions.

Cat. No.	Part No.	Description
540113	53Y	High Duty Water Feeder – Vertical Mounting

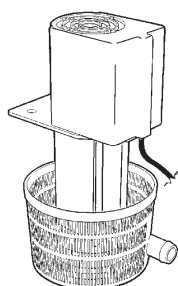
Pumps

JRM Evaporative Cooler Pumps

JRM Pumps incorporate features based on a world wide study and are manufactured in Australia using double coated winding wire produced and tested in the JRM plant, thus assuring a top quality product.

Features

- 240 V, 50 Hz encapsulated, shaded pole motor
- Double insulated motor does not require earthing
- Auto reset overload
- ABS plastic body mouldings
- Stainless steel shaft
- Acetal impeller
- Precision double shielded ball bearings
- Optional filter basket

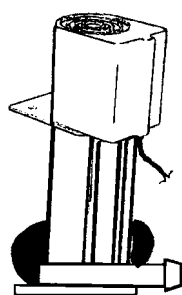


Cat. No.	Part No.	Capacity Litre/Min. (16mm Hose)				Outlet	Electrical	
		Water Head : mm					Volts/Hz	Amps
		600	1000	1400	1600			
550023	38	29.5	27.5	24.5	23	To Suit 16mm PVC Hose	240/50	0.35
550024	50	38	35.5	32	30.5			0.45
550022	BAS/STR	Optional Filter Basket for above						

Akira Evaporative Cooler Pumps

Features

- 240 V, 50 Hz encapsulated, shaded pole motor
- Double insulated motor
- Stainless steel shaft

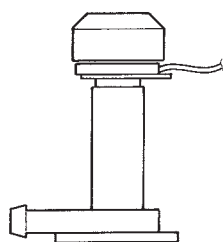


Cat. No.	Model	Capacity
550009	TOO30L	30 Litre/Min.
550010	TOO35L	35 Litre/Min.

ZIEHL-ebm Evaporative Cooler Pump

Features

- Moisture protected external rotor motor with capacitor
- Stainless steel shaft – corrosion free
- Ball bearings – double shielded against moisture ingress
- Polymer pump housing and impeller – corrosion free
- Inbuilt auto reset thermal motor protection
- Requires only 57mm minimum water depth



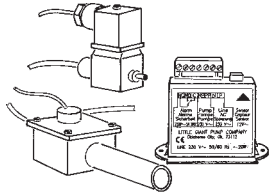
Cat. No.	Part No.	Outlet	Nom. Capacity : Litre / Min.				Electrical		
			Water Head : mm				Volts/Hz	Amps	Watts
			600	1000	1300	1500			
550017	ebm 40 JB	To Suit 15mm Hose	28.5	26	24	22.5	230/50	0.25	60

Pumps

Little Giant

EC-250 Condensate Pump

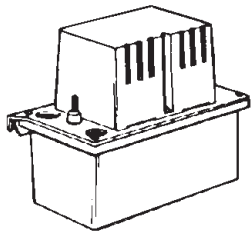
Removes condensate from wall or ceiling mounted air conditioners. The EC-400 consists of three components: control unit, detection reservoir and pump. All three components can be placed inside the air handler, or any of the three can be placed outside the air handler. The pump and control unit can be placed up to one metre above the air handler. A three position float detection system assures reliable On, Off and Safety Alarm functions. The EC-400 is suitable for use with split air conditioners up to 10 kW.



Cat. No.	Part No.	Maximum Flow Rate Litres/Hr	Maximum Pump Head : m	Maximum Suction Lift : m	Operating Point	Electrical		
						Volts/Hz	Amps	Watts
550031	EC-400	18	14	1	6 l/h @ 4m Head	230/50-60	0-125	20

VCM / VCC Condensate Pumps

For condensate and waste water removal tasks, Little Giant vertical pump automatic condensate removal units are an efficient, low cost answer. Designed to fit most larger mechanical refrigeration and air conditioning units, these pump units also serve as excellent waste water disposal systems where gravity drainage is impossible.



Features

- Air cooled vertical pump
- High impact polystyrene tank
- ABS cover, volute and impeller
- Stainless steel shaft
- Safety switch
- 3/8" OD discharge with check valve
- 75 watt, thermally protected motor
- 240 V, 50 Hz power supply

Model VCMA-20S

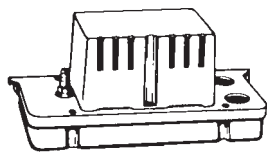
Float switch turns pump on when approximately 62mm of water collects in tank and automatically switches off when tank drains to approximately 28mm.

Length: 240mm Width: 120mm Height: 180mm

Model VCC-20S

Low-profile shallow tank model for limited space installations. Float switch turns pump on when approximately 25mm of water collects in tank and automatically switches off when tank drains to approximately 10mm.

Length: 310mm Width: 160mm Height: 130mm

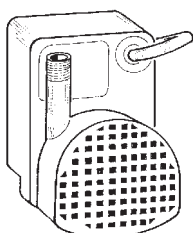


Cat. No.	Model	Capacity : Litre/Min.					Amps
		Water Head : Metres					
		0.5	1	1.5	3	Max. 4.3	
550032	VCMA-20S	4.8	4.7	4.5	3.3	0	0.6
550033	VCC-20-S						

PE Submersible Pumps

Features

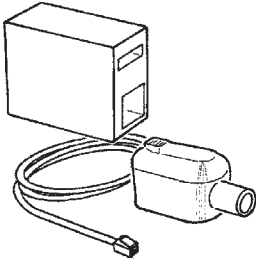
- Continuous operation
- Epoxy encapsulated motor
- Removable inlet screen
- Operates fully submerged
- Motor overload protection on PE-2
- Sump type pick-up
- Can be installed on any of five sides
- Filled with special oil that provides lifetime lubrication and rapid dissipation of heat through housing



Cat. No.	Part No.	Capacity : Litre/Min.		Maximum Water Head : mm	Connections		Electrical	
		300 mm Water Head	Free Discharge		Thread	Hose Discharge	Volts/Hz	Watts
550035	PE-1	9	10	1400	1/4" M NPT	1/2"	240/50	28
550036	PE-2	15	18	2500				45

Pumps

Sauermann



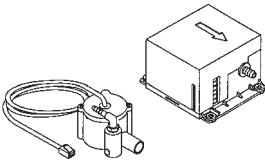
SI3200 Condensate Pump

The Sauermann mini piston condensate pumps are suitable for wall and ceiling mounted air conditioners. Consisting of a pump unit and remote detection unit with a 3 level float (on/off/alarm), they are designed for units with limited internal space.

Features

- Thermal protection 90°C on the pump coil
- Supplied with 1.5m electrical cable and plug
- Rubber mounting and vibration bracket included

Cat. No.	Part. No.	Flow Rate l/hr (Max)	Suction Head (Max)	Discharge Head (Max)	Alarm Contact (Amps Resistive)	Applications
550040	SI3200	20	2	6	8	A/C up to 20kw



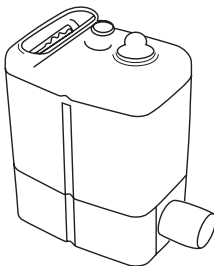
SI1730 Condensate Pump

The Sauermann mini piston condensate pumps are suitable for wall and ceiling mounted air conditioners. The SI1730 consists of a pump unit and remote detection unit with a 3 level float (on/off/alarm)

Features

- Thermal protection 90°C on the pump coil

Cat. No.	Part. No.	Flow Rate l/hr (Max)	Suction Head (Max)	Discharge Head (Max)	Alarm Contact (Amps Resistive)	Applications
550041	SI1730	30	2.5	10	8	A/C up to 30kw



SI1082 Condensate Pump

The Sauermann SI1802 is a monoblock piston condensate pump and is designed for a quick installation of the pump in a Smartduct elbow. Consisting of a monoblock pump unit with a 3 level float (on/off/alarm), they are designed for units with limited or no internal space.

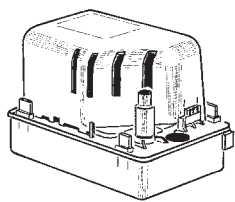
Features

- Thermal protection 90°C on the pump coil
- Supplied with 1.5m electrical cable and plug
- Rubber mounting and vibration bracket included

Cat. No.	Part. No.	Flow Rate l/hr (Max)	Suction Head (Max)	Discharge Head (Max)	Alarm Contact (Amps Resistive)	Applications
550045	SI1082	8	0	6	8	A/C up to 8kw

Pumps

Sauermann



SI1800 / SI1820 Condensate Pump

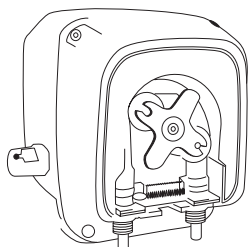
The SI1800 and SI1820 are packaged units comprising of a monoblock centrifugal impeller pump and an integrated 2-litre tank suitable for heavy or contaminated condensate to 65°C.

They are designed for high volume condensate removal in refrigeration and air conditioning applications such as display cabinets and counters, cool room evaporators and ducted air conditioning.

Features

- Thermal protection 105°C
- 3 level float (on/off/alarm)
- Integrated check valve

Cat. No.	Part. No.	Flow Rate l/hr (Max)	Suction Head (Max)	Discharge Head (Max)	Alarm Contact (Amps Resistive)
550047	SI1800	300	0	4.7	4
550039	SI1820	500	0	5.4	4



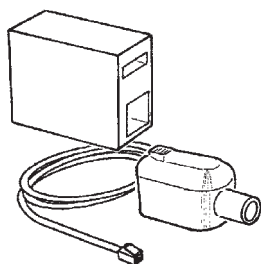
PE5000 Condensate Pump

The PE5000 is a monoblock peristaltic pump controlled by the air conditioning unit compressor signal and stops 3 minutes after the compressor stops. It's ideally suited for the removal of heavy, contaminated condensate.

Features

- IP65 protection
- Able to run dry

Cat. No.	Part. No.	Flow Rate l/hr (Max)	Suction Head (Max)	Discharge Head (Max)	Applications
550042	PE5000	6	2	12	A/C up to 8kw



Easy Condensate Pumps

The Easy range is an economy series of mini piston condensate pumps, which are suitable for wall and ceiling mounted air conditioners. Consisting of a pump unit and remote detection unit with a 3 level float (on/off/alarm), they are designed for units with limited internal space.

Features

- Thermal protection 90°C on the pump coil

Cat. No.	Part. No.	Flow Rate l/hr (Max)	Suction Head (Max)	Discharge Head (Max)	Alarm Contact (Amps Resistive)	Applications
550043	Easy10	10	1.5	6	8	A/C up to 10kw
550044	Easy20	20	1.5	6	8	A/C up to 20kw

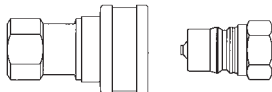
Sauermann manufacture a wide range of condensate pumps and accessories in addition to what is listed in this catalogue. For assistance with other applications or technical advice, just contact your local Actrol branch.

Couplings Hansen

Quick Connect Couplings

Quick Connect couplings provide the means to easily connect and disconnect fluid or gas lines with minimum fuss and without loss of time. There are 3 main types in the Hansen product range:

Two Way Shut Off, One Way Shut Off and Straight Through types.



TWO WAY SHUT OFF couplings have valves in both socket and plug which seal off immediately upon disconnection avoiding any loss of fluid or gas and preventing inclusion of air, moisture or dirt. Common applications are in hydraulic lines, refrigeration hoses, steam lines and in chemical processing where any loss of fluid can be dangerous or costly. These couplings can have very high pressure ratings and are available in steel, brass or stainless steel.



Two Way Series	Typical Application	Connection Sizes Available	Socket & Plug Material
HK	Hydraulic Service, Liquids, Chemicals, Steam, Gases and Vacuum	1/8" to 2 1/2" FNPT or FBSP	Steel, Brass or Stainless Steel (303 & 316 Grade)
IA	Hydraulic Oil	1/4" BSP to 1" BSP	Steel
FF (Flat Face)	Hydraulic Systems up to 25,000 kPa	3/8" BSP & 1/2" BSP	Steel
UP (Ultra Pressure)	Hydraulic Systems up to 68,947 kPa	1/4" NPT & 3/8" NPT	High Strength Steel

ONE WAY SHUT OFF couplings are primarily used for pneumatic applications connecting air hoses and air tools to compressed air supplies. There are however many other applications involving different fluids and gases and these couplings are used where it is only necessary to seal the pressure end of a line on disconnection and where loss of fluid through the plug end of the coupling is not important. Only the socket contains the shut off valve that is automatically opened when the mating plug is inserted. Within this design are special couplings which have features to prevent hose whip on accidental disconnection, and others which can be used for breathing air applications.



One Way Series	Typical Application	Connection Sizes Available	Socket & Plug Material
1000	Compressed Air, Gases and Liquids	1/8" to 3/8" NPT or Hose Stem	Brass Socket, Steel or Brass Plug
3000 (Auto-Connect)	Compressed Air, Gases and Liquids	1/8" to 3/8" NPT or Hose Stem	Brass Socket, Steel or Brass Plug
Auto-Flo 23	Compressed Air, Interchanges with Ryco, Jamec & ARO	1/4" to 3/8" BSP or Hose Stem	Steel and Brass Socket
RL	Compressed Air	1/8" to 3/4" NPT or Hose Stem	Steel & Brass Socket Steel Plug

STRAIGHT THROUGH couplings do not have valves in either the socket or plug and are ideal for applications where maximum flow and minimum pressure drop is required. The smooth bore of these couplings provide very little restriction to flow and allows the coupling to be thoroughly cleaned. As there are no valves in the socket or plug, fluid flow should be shut off before the coupling is disconnected. These couplings have high pressure ratings and are available in brass and stainless steel and also with steel plugs.



Straight Through Series	Typical Application	Connection Sizes Available	Socket & Plug Material
ST	Fluid Transfer, Pressure Wash, Steam Cleaning, Carpet Cleaning	1/8" to 2 1/2" NPT or Hose Stem	Brass or Stainless Steel Socket. Brass, Steel or Stainless Steel Plug

The couplings shown above are only part of the large Hansen range available. For more information contact your nearest Actrol Branch and obtain a Hansen Coupling Catalogue.

Hansen

Quick Connect Couplings

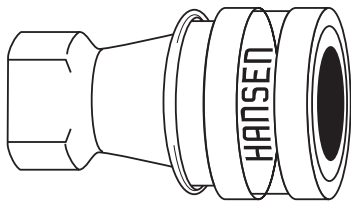
There's a Hansen Quick Connective Coupling suitable for use in most fluid power applications. . . compressed air, industrial gases, grease, oil, fuel, refrigerants, paint, steam, water, chemicals and vacuum service.

The Couplings are available in brass, steel, stainless steel and plastic, with failure pressures up to 206,842 kPa and the ability to withstand severe service treatment. This means long life, under most environments and working conditions.

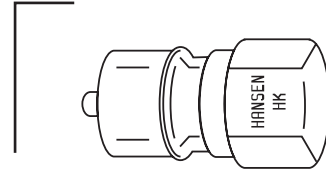


**two-way
shut-off
couplings**

These effectively seal both ends of fluid lines when disconnected. Positive sealing valves in both socket and plug put an end to the loss of gas or liquid. There is no chance of premature flow or waste due to partial connection, as the plug must be fully seated and locked in the socket before valves remain open. Series HK Couplings have female pipe thread end connections from 1/8" to 3".



SOCKETS



PLUGS

Standard HK Series

SIZE FPT	STEEL		BRASS		Service Press kPa	STEEL		BRASS		SIZE FPT
	Part No.	Cat. No.	Part No.	Cat. No.		Part No.	Cat. No.	Part No.	Cat. No.	
1/8"	1H11	586001	B1H11	586009	27,579	1K11	586101	B1K11	586109	1/8"
1/4"	2H16	586002	B2H16	586010	25,510	2K16	586102	B2K16	586110	1/4"
3/8"	3H21	586003	B3H21	586011	27,579	3K21	586103	B3K21	586111	3/8"
1/2"	4H26	586004	B4HP26	586012	27,510	4K26	586104	B4K26	586112	1/2"
3/4"	6H31	586007	B6HP31	586013	13,789	6K31	586107	B6K31	586113	3/4"
1"	8H36	586008	B8HP36	586014	10,342	8K36	586108	B8K36	586114	1"
1 1/4"	10H41	586015	B10H41		17,236	10K41	586115	B10K41		1 1/4"
1 1/4"	12H41		B12H41		15,168	12K41		B12K41		1 1/4"
1 1/2"	12H46		B12H46	586593	15,168	12K46	586594	B12K46	586594	1 1/2"
2"	20H51		B20H51		10,342	20K51		B20K51		2"
2 1/2"	20H56		B20H56		10,342	20K56		B20K56		2 1/2"
3"	20H61		B20H61		10,342	20K61		B20K61		3"

High Pressure HK Series

SIZE FPT	STEEL		Service Press kPa	STEEL		SIZE FPT
	Part No.	Cat. No.		Part No.	Cat. No.	
1/4"	2H16C	586092	51,710	2K16C	586205	1/4"
3/8"	3H21C	586093	27,579	3K21C	586206	3/8"
1/2"	4H26C		34,473	4K26C		1/2"
3/4"	6H31C		25,510	3K31C		3/4"
1"	8H36C		25,510	8K36C		1"

Stainless Steel HK Series

SIZE FPT	303 STAINLESS STEEL		316 STAINLESS STEEL		Service Press kPa	303 STAINLESS STEEL		316 STAINLESS STEEL		SIZE FPT
	Part No.	Cat. No.	Part No.	Cat. No.		Part No.	Cat. No.	Part No.	Cat. No.	
1/8"	LL1H11	586550	ML1H11	586808	34,473	LL1K11	586601	ML1K11		1/8"
1/4"	LL2H16	586551	ML2H16	586834	25,510	LL2K16	586602	ML2K16	586815	1/4"
3/8"	LL3H21	586552	ML3H21		20,684	LL3K21	586603	ML3K21		3/8"
1/2"	LL4H26	586553	ML4H26	586836	28,957	LL4K26	586604	ML4K26		1/2"
3/4"	LL6H31	586554	ML6H31	586837	18,615	LL6K31	586605	ML6K31		3/4"
1"	LL8H36	586555	ML8H36		11,721	LL8K36	586606	ML8K36		1"
1 1/4"	LL10H41				17,236	LL10K41				1 1/4"
1 1/4"	LL12H41				15,168	LL12K41				1 1/4"
1 1/2"	LL12H46				15,168	LL12K46				1 1/2"
2"	LL20H51				10,342	LL20K51				2"

Couplings

Hansen

Quick Connect Couplings



**one-way
shut-off
couplings**

In many fluid power lines only the supply or pressure end of the line need be shut off when the Coupling is disconnected, particularly in compressed air lines.

Hansen One-way Shut-off Couplings are economically suitable for such service. They are designed for positive single-action connection and easy disconnection with instant automatic shut-off of the socket end of the line.

The Series 3000, 4000, 5000 and 6000 are pin locking type sockets and feature automatic connection. That is the plug is simply pushed into the socket, no retraction of the sleeve is required for connection, but is required for disconnection.

The Series 1000, 400 and 500 however are ball lock couplings and use the ever popular manual retraction of the sleeve to connect or disconnect the plug.

The RL Series Ring Lock couplings also feature automatic connection of the plug, but twist-to-disconnect safety feature.



SOCKETS



PLUGS

SIZE	MANUAL		AUTOMATIC			STEEL		BRASS		SIZE
	Part No.	Cat. No.	Part No.	Cat. No.		Part No.	Cat. No.	Part No.	Cat. No.	
1/8" FTP	800		2800		SERIES 1000 & 3000 1/4" Nominal Size Flow Capacity Ac 28	13	586265			1/8" FTP
1/4" FTP	1000	586068	3000	586023		11	586129	11B	586288	1/4" FTP
3/8" FTP	1200		3200			15				3/8" FTP
1/8" MPT	900		2900			12				1/8" MPT
1/4" MPT	1100	586069	3100	586024		10	586127	B10	586128	1/4" MPT
3/8" MPT	1300	586360	3300			14	586131			3/8" MPT
1/4" H.Stem	1600		3600	586533		16	586133			1/4" H.Stem
5/16" H.Stem	1800	586862	3800	586865		18	586267			5/16" H.Stem
3/8" H.Stem	1700	586501	3700	586534		17	586134	B17	586266	3/8" H.Stem
1/4" FTP	400		4000		SERIES 400 & 4000 3/8" Nominal Size Flow Capacity Ac 45	41				1/4" FTP
3/8" FTP	420		4200	586031		43		B43		3/8" FTP
1/2" FPT	440	586076	4400			45				1/2" FPT
1/4" MPT	410		4100	586030		40		B40		1/4" MPT
3/8" MPT	430		4300			42		B42		3/8" MPT
1/2" MPT	450		4500			44				1/2" MPT
1/4" H.Stem	4004		40400			404				1/4" H.Stem
3/8" H.Stem	4006		40600			406		B406		3/8" H.Stem
1/2" H.Stem	4008		40800			408				1/2" H.Stem
3/8" FTP	500		5000			53				3/8" FTP
1/2" FTP	520	586080	5200		SERIES 500 & 5000 1/2" Nominal Size Flow Capacity Ac 75	55				1/2" FTP
3/4" FTP	540		5400			57	586147			3/4" FTP
3/8" MPT	510		5100			52		B52		3/8" MPT
1/2" MPT	530		5300			54	586144	B54	586216	1/2" MPT
3/4" MPT	550		5500			56				3/4" MPT
3/8" H.Stem	570		5700			59				3/8" H.Stem
1/2" H.Stem	580		5800			60		B60		1/2" H.Stem
3/4" H.Stem	590		5900			61				3/4" H.Stem
1/2" FTP			6200			65A				1/2" FTP
3/4" FTP			6400	586040		67A				3/4" FTP
1" FTP			6600		SERIES 6000 3/4" Nominal Size Flow Capacity Ac 125	69A				1" FTP
1/2" MPT			6300			64A		B64A		1/2" MPT
3/4" MPT			6500			66A		B66A		3/4" MPT
1" MPT			6700			68A				1" MPT
1/2" H.Stem			6800			70A				1/2" H.Stem
3/4" H.Stem			6900			71A		B71A		3/4" H.Stem
1" H.Stem			7000			72A				1" H.Stem

Note: Flow Capacity – Ac Number is the amount of air in SCFM which will flow through a coupling with an inlet pressure of 689 kPa and a pressure drop of 34.5 kPa.



ACTROL Your best Solution...

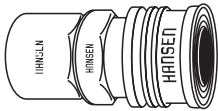
Couplings Hansen

Quick Connect Couplings



one-way shut-off special purpose couplings

SERIES 100



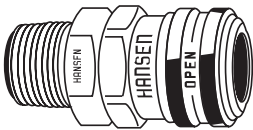
SOCKETS



PLUGS

SIZE	Part No.	Cat. No.	Series 100 Couplings are a 1/4" Nominal Size High Pressure Air Line Coupling. They can be used where non-interchange with other couplings is required. Sockets are brass and manual operation. Plugs are zinc plated steel for durability. Flow Capacity Ac 20	Part No.	Cat. No.	SIZE
1/8" FTP	100			1G2	586185	1/4" FTP
1/4" FTP	102	586059		1G4	586187	3/8" FTP
3/8" FTP	104			1G1		1/8" MPT
1/8" MPT	101			1G3	586186	1/4" MPT
1/4" MPT	103	586060		1G5	586188	3/8" MPT
3/8" MPT	105	586062		1G10	586189	1/4" H.Stem
1/4" H.Stem	110	586063		1G12	586190	3/8" H.Stem
3/8" H.Stem	112	586064				

SERIES RL RING LOCK COUPLINGS



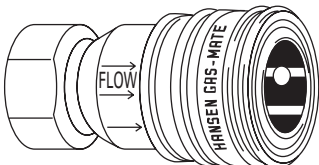
SOCKETS



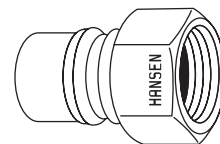
PLUGS

SIZE	SERIES 3RL		Series RL Couplings are a heavy duty Air Line coupling which require the socket sleeve to twisted to obtain disconnection of the plug. Sockets are brass bodies with steel sleeves. Plugs are zinc plated steel. Plugs with bleeder valve prevent hose whip if accidental disconnection occurs. Flow Capacity Ac 80	STD. PLUGS		With Bleeder Valve		SIZE
	Part No.	Cat. No.		Part No.	Cat. No.	Part No.	Cat. No.	
1/4" FTP	3R16			3L16		3L16G		1/4" FTP
3/8" FTP	3R21			3L21		3L21G		3/8" FTP
1/2" FTP	3R26			3L26	586904	3L26G		1/2" FTP
3/4" FTP	3R31			3L31				3/4" FTP
1/4" MPT	3R15			3L15	586231	3L15G	586292	1/4" MPT
3/8" MPT	3R20	586504		3L20	586232	3L20G	586294	3/8" MPT
1/2" MPT	3R25	586543		3L25	586244	3L25G		1/2" MPT
3/4" MPT	3R30	586515		3L30	586235	3L30G	586299	3/4" MPT
3/8" H.Stem	3R22	586516		3L22		3L22G	586295	3/8" H.Stem
1/2" H.Stem	3R27	586517		3L27		3L27G	586297	1/2" H.Stem
3/4" H.Stem	3R32	586514		3L32		3L32G	586300	3/4" H.Stem

GAS MATE COUPLINGS



SOCKETS



PLUGS

SIZE FPT	BRASS		Gas-Mate Series Sockets and Plugs are designed specifically for L.P. and Natural gas applications.	BRASS		SIZE
	Part No.	Cat. No.		Part No.	Cat. No.	
3/8"	100-006			100-506		3/8"
1/2"	100-008			100-508		1/2"
3/4"	100-010			100-510		3/4"
1"	100-012			100-512		1"

Note: Flow Capacity – Ac Number is the amount of air in SCFM which will flow through a coupling with an inlet pressure of 689 kPa and a pressure drop of 34.5 kPa.

Couplings

Hansen



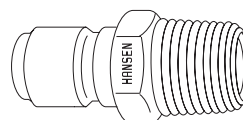
Quick Connect Couplings

Fully unrestricted flow of fluids is achieved when using Straight-Through Couplings. There are no valves in either the socket or plug. The Plug is securely locked in place when connected and is readily released by pulling back the Socket sleeve. A choice of brass, steel or stainless steel in sizes 1/8" to 2-1/2" in male and female pipe threads and hose stem end connections are available.

SERIES ST COUPLINGS



SOCKETS



PLUGS

SIZE	BRASS		STAINLESS STEEL		FLOWRATE		STEEL		BRASS		STAINLESS STEEL		SIZE
	Part No.	Cat. No.	Part No.	Cat. No.	Cv	Ac	Part No.	Cat. No.	Part No.	Cat. No.	Part No.	Cat. No.	
FPT													
1/8"	1S11	586041	LL1S11		1.0	30	1T11		B1T11	586195	LT1T11		1/8"
1/4"	2S16	586043	LL2S16	586640	2.0	62	2T16	586154	B2T16	586157	LL2T16	586740	1/4"
3/8"	3S21	586046	LL3S21	586641	5.3	165	3T21	586160	B3T21	586163	LL3T21	586741	3/8"
1/2"	4S26	586049	LL4S26	586642	7.8	242	4T26		B4T26	286169	LL4T26	586742	1/2"
3/4"	6S31	586052	LL6S31	586643	23.7	740	6T31		B6T31	586175	LL6T31	586743	3/4"
1"	8S36	586055	LL8S36	586644	50	1570	8T36		B8T36	586181	LL8T36	586744	1"
1 1/4"	10S41	586057	LL10S41		66	2060	10T41		B10T41	586649	LL10T41		1 1/4"
1 1/2"	12S46	586056	LL12S46		106	3325	12T46		B12T46	586182	LL12T46		1 1/2"
2"	16S51	586100	LL16S51		172	5475	16T51		B16T51	586183			2"
2 1/2"	20S56				296	9250	20T56		B20T56				2 1/2"
MPT													
1/8"	1S10	586598	LL1S10	586639	1.0	30	1T10		B1T10	586289	LT1T10		1/8"
1/4"	2S15	586042			2.0	62	2T15	586153	B2T15	586156	LL2T15		1/4"
3/8"	3S20	586045	LL3S20		5.3	165	3T20	586159	B3T20	586162	LL3T20	586665	3/8"
1/2"	4S25				7.8	242	4T25		B4T25	586168	LL4T25	586666	1/2"
3/4"	6S30	586051	LL6S30		23.7	740	6T30	586171	B6T30	586174	LL6T30	586667	3/4"
1"	8S35	586054			50	1570	8T35		B8T35	586180	LL8T35	586556	1"
1 1/4"							10T40		B10T40		LL10T40		1 1/4"
1 1/2"							12T45		B12T45				1 1/2"
2"							16T50		B16T50		LL16T50		2"
2 1/2"							20T55		B20T55				2 1/2"
H. Stem													
1/4"	1S17	586047	LL1S17	586646	1.0	30	1T17		B1T17	586378	LT1T17		1/4"
1/4"	2S17				2.0	62	2T17		B2T17				1/4"
3/8"	3S22		LL3S22		5.3	165	3T22		B3T22		LL3T22		3/8"
1/2"	4S27	586050			7.8	242	4T27		B4T27				1/2"
3/4"	6S32	586053	LL6S32		23.7	740	6T32		B6T32	586176	LL6T32		3/4"
1"	8S37		LL8S37		50	1570	8T37		B8T37				1"

Hansen Parts and Accessories

Cv Factor: The quantity of water in IGPM which will flow through the coupling with a pressure drop of 6.9 kPa.

Ac Number: The amount of air in SCFM which will flow through a coupling with an inlet pressure of 689 kPa and a pressure drop of 34.5 kPa.

Cat. No.	Part No.	Description
587002	1 HK 914-1-118	'O' RING SUIT 1HK SOCKET
587008	914-3-118	'O' RING SUIT 2HK SOCKET
587015	3 HK 902-14-118	'O' RING SUIT 3HK SOCKET
587251	902.8	'O' RING SERIES 2ST
587060	W3000	WASHER SUIT 3000 SERIES
587077	CHS-10B	SOCKET 3/8" HOSE STEM
587087	C4P-10B	PLUG 3/8" HOSE STEM
587111	VA2HKA143	VALVE ASSY SUIT 2HK SERIES
587203	VS3000	VALVE SPRING SUIT 3000 SERIES

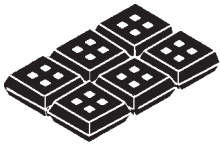
Noise and Vibration Control Products

Mason

SW / MSW Machinery Mounting Pads

Mason SW Pads reduce annoying noise and minor vibration generated by air conditioners, refrigeration equipment, pumps, etc. The higher deflection waffle design with its suction cup action eliminates the need for bolting down. Made of neoprene for longer life and moderate oil resistance SW Pads out perform the obsolete cork and rubber 'sandwich' pads by giving longer life and greater resiliency with consistent and reliable service.

MSW mini Pads have the same design and load capacities as SW Pads but are thinner (9.5mm). They can be used as noise breaks where the added height of the 19mm thick SW is prohibitive. Mini MSW Pads are only made in natural rubber.



Cat. No.	Part No.	Size : mm	Load Ratings ▼		
			Durometer	Load per 50 x 50 mm Square	Rated Deflection : mm
591213	18 x 18 SW	457 x 457 x 19	50	82 kg	2.5
591212	R18 x 18 MSW	457 x 457 x 9.5	40		1.3

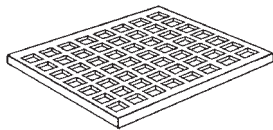
Kajen

Machinery Mounting Pad

The low cost pad for effective reduction of machinery noise, vibration and shock in non-critical applications.

Features

- Neoprene material – resistant to a wide range of oils
- Identical grids on both sides provide maximum contact area, eliminating the need for bolting down of equipment in most installations
- Easily cut to required size on site
- Minimum elevation of equipment



Cat. No.	Nominal Dimensions : mm
594051	450 x 450 x 8
594050	50 x 50 x 10

For more details on noise and vibration control refer to section 8 of catalogue.

Noise and Vibration Control Products

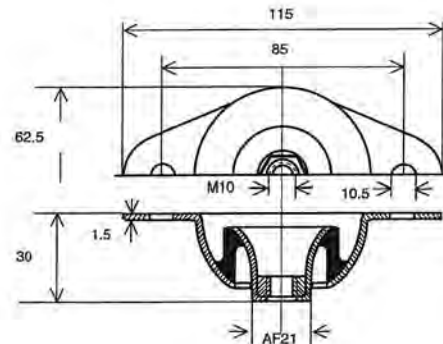
Mackay

Bell Suspension Isolators

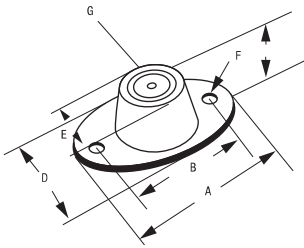
A fail safe suspension isolator for suspension points subject mainly to tensile stress.

Typical applications would include:

- heating / cooling units
- pipe suspension
- acoustic ceilings



Cat. No.	Part No.	Maximum Load: Kg	Deflection @ Max: Load mm
594155	M2799455	50	3.1



Conflex Isolators - Machinery Mounts

Conflex Isolators are designed for both high static deflections and simplified installation. The rubber is loaded in both shear and compression to provide rubber in shear performance as well as overload protection. They are one piece moulded assemblies with skid resistant rubber ridged base plates and circular rubber ridged tops. The complete rubber covering of the metal parts provides corrosion protection in either humid indoor or outdoor service. Conflex Isolators are best when placed under equipment located on ground support concrete slabs, above stiff support walls and columns and rigid upper building spans. Avoid using rubber mounts when equipment is located on wide vibration sensitive spans. Higher deflection spring isolators are generally required there to cancel the effect of the floor span's deflection.

It is not necessary to bolt these mountings to the floor on most installations. They can be used under flat based machines that have no bolt holes in much the same manner as vibration pads. When the equipment has a flush drain pan or tank on the bottom, they may be inverted so that the Elliptical base rubber covered steel baseplate provides support over a large area.

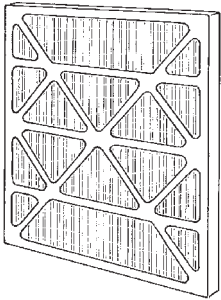
Cat. No.	Part No.	Dimensions : mm							Tightening Torques Nm
		A	B	C	D	E	F	G	
594120	M111145	80	60	29	50	31	8.5	M8	10
594121	M111155								
594122	M111165								
594123	M111245	100	76	32	60	46	8.5	M10	15
594124	M111255								
594125	M111265								

Cat. No.	Part No.	Maximum Load: Kg	Deflection @ Max: Load mm	Colour Code
594120	M111145	40	5	Red
594121	M111155	50	5.5	Yellow
594122	M111165	75	5	White
594123	M111245	110	6	Red
594124	M111255	160		Yellow
594125	M111265	250		White

Air Filtration

Filtratech

Disposable Filters



The Filtratech extended surface, medium efficiency disposable air filters for use in built up filter banks, central air handling systems, or side access housings. These filters contain a highloft, reinforced non woven cotton/synthetic blend media continuously laminated to an expanded metal grid and enclosed in high strength carrier board.

Filters are available in three standard thicknesses: 25mm, 50mm and 100mm nominal.

Typically these filters have an average arrestance (Test Dust No. 4) of around 92% and an average efficiency (Test Dust No. 1) of at least 30%. Minimum efficiency (Test Dust No. 1) exceeds 20%.

Cat. No.	Model No.	Capacity : L/s			Pressure Loss : Pa			Size : mm	Performance rating
		Low	Medium	High	Low	Med	High		
627150	16X20X1	313	523		50	82		394 x 495 x 22	G4
627151	20X20X1	392	655					495 x 495 x 22	
627152	12X24X1	282	472					293 x 595 x 22	
627153	20X24X1	471	787					495 x 595 x 22	
627154	24X24X1	565	945					595 x 595 x 22	
627155	20X25X1	490	819					495 x 622 x 22	
627156	14X20X2	274	458	572	32	65	90	355 x 495 x 48	
627157	16X20X2	313	523	654				394 x 495 x 48	
627158	20X20X2	392	655	818				495 x 495 x 48	
627159	12X24X2	282	472	589				293 x 595 x 48	
627160	18X24X2	423	708	883				445 x 595 x 48	
627161	20X24X2	471	787	982				495 x 595 x 48	
627162	24X24X2	565	945	1179				595 x 595 x 48	
627163	16X25X2	392	655	818				394 x 635 x 48	
627164	20X25X2	490	819	1022	30	50	75	495 x 635 x 48	
627165	16X20X4	313	523	654				394 x 495 x 98	
627166	18X20X4	353	589	736				445 x 495 x 98	
627167	20X20X4	392	655	818				495 x 495 x 98	
627168	12X24X4	282	472	589				293 x 595 x 98	
627169	18X24X4	423	708	883				445 x 595 x 98	
627170	20X24X4	471	787	982				495 x 595 x 98	
627171	24X24X4	565	945	1179				595 x 595 x 98	
627172	16X25X4	392	655	818				394 x 635 x 98	
627173	20X25X4	490	819	1022				495 x 635 x 98	

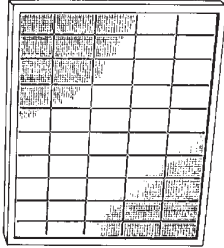
Filtratech filters with F5 Rating are available upon request.

Air Filtration

DX Series Flat Panel Filters

Available in three standard thicknesses with any of the standard range of Actrol or Viledon media. The media pads are enclosed in faces of galvanised mesh held in place by a channelled galvanised frame. They can be manufactured to any height and width.

Media performance per m² area.



Media	Filter Model No.	Average* Arrestance Test Dust No.4	Average* Efficiency Test Dust No.1	Dust Holding gms	Recommended Flow Rate m/s	Pressure Drop Pa
AFM 103 LR	DX-A-25	70%	NA	440	1.8	20
P15/350 S	DX-J-25	85%*	NA	600	1.5	25
PSB/290 S	DX-H-25	91%*	28%	620	1	25
P15/500 S	DX-D-25	94%*	35%	600	1	30
A3/300		97%*	50%	360	0.25	25

*Results derived from EN779 standard test data.

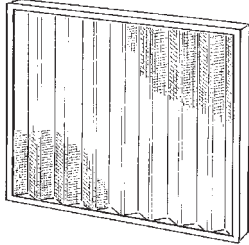
Cat. No.	Model No.	Description	Size: mm
628300	DX-A-25	Flat Panel Filter Media Type A AFM103LR Washable Performance Rating G2	292 x 595 x 22
628301			395 x 495 x 22
628307			395 x 622 x 22
628302			495 x 495 x 22
628303			495 x 622 x 22
628304			495 x 750 x 22
628308			595 x 595 x 22
628309	DX-J-25	Flat Panel Filter Media Type J Viledon P15/350 S Washable Performance Rating G3	292 x 595 x 22
628272			395 x 622 x 22
628310			395 x 495 x 22
628267			495 x 495 x 22
628268			495 x 622 x 22
628269			495 x 750 x 22
628273			595 x 595 x 22
628352	DX-H-25	Flat Panel Filter Media Type H Viledon PSB/290 S Semi-Disposable Performance Rating G4	292 x 595 x 22
628353			395 x 495 x 22
628354			495 x 495 x 22
628358			495 x 750 x 22
628357			595 x 595 x 22
628355			622 x 395 x 22
628356			622 x 495 x 22
628274	DX-D-25	Flat Panel Filter Media Type D Viledon P15/500 S Washable Performance Rating G4	292 x 595 x 22
628345			395 x 495 x 22
628351			395 x 622 x 22
628346			495 x 495 x 22
628347			495 x 622 x 22
628348			495 x 750 x 22
628350			595 x 595 x 22

Air Filtration

DXV Series V-Form Panel Filters

Designed as an economical filter to fit either standard front access or slide into side access filter holding frames. The media is enclosed in V-formed galvanised mesh held in place by a galvanised frame. They can be manufactured to any height and width. V-form filters are designed to be cleaned by washing with water.

Media performance in 50mm V-form per m² face area.



Media	Filter Model No.	Average Arrestance Test Dust No. 4	Average Efficiency Test Dust No. 1	Application Notes
P15/350 S	DXV-J	89.7%	NA	For General Air Conditioning Applications
PSB/290 S	DXV-H	89.5%	22.9%	For New Applications. Exceeds minimum 20% Test Dust No. 1
P15/500 S	DXV-D	97.8%	41.1%	For High Grade Air Filtration. Minimum Test Dust No. 1 is 27%

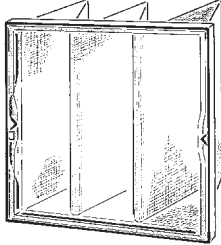
Custom sizes available on request.

Cat. No.	Model No.	Description	Size: mm
628597	DXV-J-50	V/Form Filter Media Type J Viledon P15/350 S Washable Performance Rating G3	292 x 595 x 48
628580			395 x 495 x 48
628581			395 x 622 x 48
628582			495 x 495 x 48
628583			495 x 622 x 48
628584			495 x 750 x 48
628585			595 x 595 x 48
628576	DXV-H-50	V/Form Filter Media Type H Viledon PSB/290 S Semi-Disposable Performance Rating G4	292 x 595 x 48
628570			395 x 495 x 48
628571			395 x 622 x 48
628572			495 x 495 x 48
628573			495 x 622 x 48
628574			495 x 750 x 48
628575			595 x 595 x 48
628380	DXV-D-50	V/Form Filter Media Type D Viledon P15/500 S Washable Performance Rating G4	395 x 495 x 48
628381			395 x 622 x 48
628382			495 x 495 x 48
628383			495 x 622 x 48
628384			495 x 750 x 48
628386			585 x 585 x 48
628385			595 x 595 x 48
628891	DXV-J-100	V/Form Filter Media Type J Viledon P15/350 S Washable Performance Rating G3	395 x 495 x 98
628890			495 x 495 x 98
628894			495 x 750 x 98
628889			595 x 295 x 98
628888			595 x 595 x 98
628892			622 x 395 x 98
628893			622 x 495 x 98
628577	DXV-H-100	V/Form Filter Media Type H Viledon PSB/290 S Semi-Disposable Performance Rating G4	395 x 495 x 98
628579			495 x 495 x 98
628596			495 x 750 x 98
628578			595 x 595 x 98
628586			622 x 395 x 98
628587			622 x 495 x 98
628390	DXV-D-100	V/Form Filter Media Type D Viledon P15/500 S Washable Performance Rating G4	395 x 495 x 98
628393			495 x 750 x 98
628389			595 x 295 x 98
628388			595 x 595 x 98
628391			622 x 395 x 98
628392			622 x 495 x 98

Air Filtration

Tri-Pack Filters

Designed to provide an economically priced, medium efficiency alternative filter to the deeper bag and pocket style filters. Some of the media offered meet the minimum standards set in AS 1668.2. The Tri-Pack filter has a 1.2mm powder coated galvanised steel frame with two integral supporting channels for the filter bag. The sealing gate of 6mm wire holds the filter in place by locking under die cut clips in the sides of the frame. A range of bag types are available in any of the Actrol or Viledon media.



Media Type	Average Arrestance Test Dust No. 4	Average Efficiency Test Dust No. 1	Initial Efficiency Test Dust No. 1	Dust Holding gms	Rec. Flow Rate m/s	Pressure Drop Pa
P15/500 S	89.6%	41.2%	27.3%	708	2.5	37
PSB/290 S	86.8%	33.5%	23.2%	60.5	2.5	30
P15/350 S	87.5%	<20%	<20%	570	2.5	29

Filters are also available in 610 x 305mm frames. Replacement filter bags for both frame sizes are available separately.

Cat. No.	Model No.	Description	Size: mm	Performance Rating
628767	TPK-3350S	TRI-PACK FILTER	610 x 305 x 380	G3
628766	TPK-6350S		610 x 610 x 380	
628765	TPK-3290S		610 x 305 x 380	
628764	TPK-6290S		610 x 610 x 380	G4
628769	TPK-3102		610 x 305 x 380	
628768	TPK-6102		610 x 610 x 380	
628763	TPK-3500S		610 x 305 x 380	
628762	TPK-6500S		610 x 610 x 380	

Tri-Pack replacement bag filters are also available in 600mm depth, and F5 performance rating upon request.

Tri-Pack Filters, Frame and Gate

Cat. No.	Model No.	Description	Size: mm
628759	Tri-Pack Frame	FRAME & GATE	610 x 305
628758	Tri-Pack Frame		610 x 610

Air Filtration

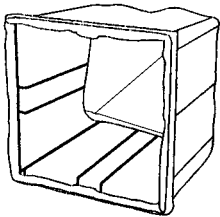
Replacement Bag Filters

Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628690	AEA-6290S	5 Pocket Replacement Bag Filter	610 x 610 x 380	G4
628691	AEA-6290S		610 x 610 x 605	

Twin Peak Filters

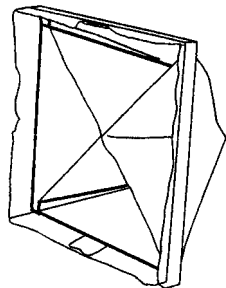
Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628699	ATP-3102	Twin Peak Filter	610 x 305 x 380	G4
628698	ATP-6102		610 x 610 x 380	

Cube Filters



Cube Filter Replacements

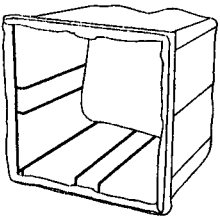
Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628689	APK-3350S	Cube Filter	610 x 305 x 660	G3
628686	APK-6350S		610 x 610 x 660	
628688	APK-3290S		610 x 305 x 660	G4
628685	APK-6290S		610 x 610 x 660	
628683	APK-3102		610 x 305 x 660	
628694	APK-6102		610 x 610 x 660	
	APK-3500S		610 x 305 x 660	
628684	APK-6500S		610 x 610 x 660	



4 Point Filter Replacements

Four Point Filters

Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628682	AFB-3350S	Four Point Filter	610 x 305 x 380	G3
628679	AFB-6350S		610 x 610 x 380	
628681	AFB-3290S		610 x 305 x 380	G4
628678	AFB-6290S		610 x 610 x 380	
628693	AFB-3102		610 x 305 x 380	
628692	AFB-6102		610 x 610 x 380	
628680	AFB-3500S		610 x 305 x 380	
628677	AFB-6500S		610 x 610 x 380	



Cone Filter Replacements

Cone Filters

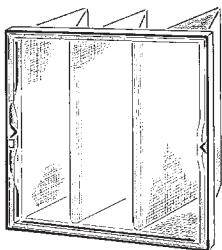
Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628674	APQ-6350S	Cone Filter	610 x 610 x 660	G3
628676	APQ-6290S		610 x 610 x 660	G4
628673	APQ-6102		610 x 610 x 660	
628675	APQ-6500S		610 x 610 x 660	

Note: For half size replacement cone filters please refer to half size cube filters.

Maxiwedge - Miniwedge Replacement Filter Bags

Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628718	AMAW-6102	Maxiwedge Replacement Filter Bag	610 x 610 x 610	G4
628725	AMIW-6102	Miniwedge Replacement Filter Bag	610 x 610 x 290	
628726	AMIW-3020102		762 x 508 x 290	

Multipeak Filters



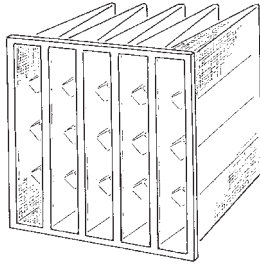
Cat. No.	Model No.	Description	Size: mm	Perf. Rating
628715	AMP-3350S	Multipeak Filter	610 x 305 x 570	G3
628711	AMP-6350S		610 x 610 x 570	
628714	AMP-3290S		610 x 305 x 570	G4
628710	AMP-6290S		610 x 610 x 570	
628716	AMP-3102		610 x 305 x 570	
628712	AMP-6102		610 x 610 x 570	
628717	AMP-3500S		610 x 305 x 570	
628713	AMP-6500S		610 x 610 x 570	

All replacement bag filters are available with an F5 performance rating upon request.

Air Filtration

Viledon

Compact Pocket Filters



Viledon pocket filters are perfectly suited for compliance with minimum filter efficiencies required by AS 1668.2. Viledon pocket filters are a compact range of extended surface air filters for medium to high efficiency applications. Designed to suit air handling units and plants of all types, the Viledon pocket filter uses progressively structured filter media made from unbreakable synthetic organic fibres. Pocket seams are welded together and foamed into a rigid corrosion resistant polyurethane header frame to guarantee leak free operation. Additional use of spacers within the pockets ensures optimum performance and gives added strength to the self supporting pockets.

Type	Average Arrestance* Test Dust No. 4	Average Efficiency Test Dust No. 1	Initial Efficiency Test Dust No. 1	Dust Holding gms	Recommended Flow Rate m/s	Pressure Drop Pa
G 35 S	86%	31.5%	<20%	1180	2.5	20
G 35 SL	87%			2300	3.2	20
F 40	95%	30%	19.8%	1425	3.2	31
F 45 S	95%	43.1%	26.4%	590	2.5	40
F 50	97%	51%	26.8%	1380	3.2	45
T 60	99%	63%	28.0%**	1500**	3.2	65
MF 70	>99%	75.1%	48%	700	3.2	65
MF 90		83.9%	78.8%	550	3.2	120
T 90		85.1%	55.0%	650	3.2	80
MF 95		94%*	82%*	550	3.2	170

*Results derived from EN779 standard test data. Available in 595 x 595mm, 495 x 595mm and 295 x 595 face dimensions. **Estimated test results. Sizing and performance ratings on following page.

Type EP Pocket Filters

Similar to the Viledon compact pocket filters above the EP range are cost effective air filters for use in air conditioning applications.

Type	Average Arrestance* Test Dust No. 4	Average Efficiency* Test Dust No. 1	Recommended Flow Rate m/s	Pressure Drop Pa
EP 45	92%	—	2.7	30
EP 50	98%	65%		50
EP 90	86%	95%		100

*Results derived from EN779 standard test data. Available in 595 x 595mm, 495 x 595mm and 289 x 595mm 300mm & 510mm, 510mm & 650mm.

Applications for Pocket Filters

Viledon G35S, G35SL and EP45 pockets

Filters are used for supply, exhaust and circulating air filtration in all kinds of ventilation systems such as air conditioning applications, industrial ventilation, or as prefilters for fine and ultrafine filters.

Viledon F40, F45S, F50 AND EP50 pockets

Filters are suitable for use in air conditioning and ventilation systems, complying with minimum requirements of AS1668.2 2002, to provide ideal air quality for general ventilation. Also applicable in industrial applications and prefiltration.

Viledon MF70, 90. 95 and EP90

Filters are used where superior air quality is required in high performance air conditioning systems such as hospitals, laboratories, libraries, museums, casinos and office buildings. These filters arrest a high proportion of critical fine particles like bacteria and fungal spores. Also applicable in industrial processes including pharmaceutical, chemical, electronics, optics etc.

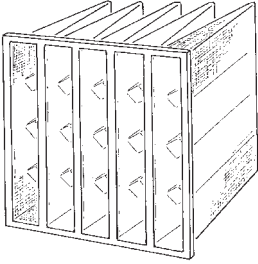
Viledon T60, T90 pocket filters

Designed specifically for filtration of air for turbomachinery, but often used in other harsh industrial applications requiring the utmost strength and durability.

Air Filtration

Viledon

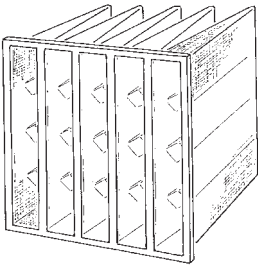
Compact Pocket Filters



Cat. No.	Model No.	Description	Size: mm	Performance Rating
628610	G35S 1/1	COMPACT POCKET FILTERS	592 x 592 x 330	G3
628611	G35S 1/2		289 x 592 x 330	
628600	G35SL 1/1		592 x 592 x 650	
628601	G35SL 1/2		289 x 592 x 650	
628615	F45S 1/1		592 x 592 x 330	G4
628616	F45S 1/2		289 x 592 x 330	
628605	F50 1/1		592 x 592 x 650	F5
628606	F50 1/2		289 x 592 x 650	
628607	F50 1/4		289 x 289 x 650	
628604	F50 5/6		592 x 495 x 650	
628617	MF70 1/1		592 x 592 x 650	F6
628670	T60 1/1		592 x 592 x 650	
628671	T60 1/2		289 x 592 x 650	F7
628620	MF90 1/1		592 x 592 x 650	
628621	MF90 1/2		289 x 592 x 650	
628622	MF90 1/4		289 x 289 x 650	
628668	T90 1/1		592 x 592 x 650	F8
628669	T90 1/2		289 x 592 x 650	
628626	MF95 1/2*		289 x 592 x 650	
628627	MF95 1/4*		289 x 289 x 650	
628625	MF95 1/1*		592 x 592 x 650	

* MF95 Filters reach F9 performance rating at 3400m³/hr. (2.54 m/s)

EP Pocket Type Filters

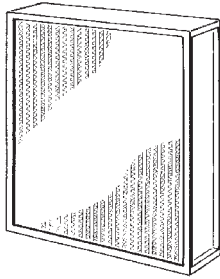


Cat. No.	Model No.	Description	Size: mm	Performance Rating
627100	EP45 1/1	COMPACT ECONOMY POCKET FILTERS	592 x 592 x 330	G4
627104	EP45 1/1		592 x 592 x 510	
627101	EP45 1/2		592 x 289 x 330	
627105	EP45 1/2		592 x 289 x 510	
627103	EP45 1/4		289 x 289 x 330	F5
627107	EP45 1/4		289 x 289 x 510	
627102	EP45 5/6		490 x 592 x 330	
627106	EP45 5/6		490 x 592 x 510	
627108	EP50 1/1		592 x 592 x 330	F7
627112	EP50 1/1		592 x 592 x 510	
627098	EP50 1/1		592 x 592 x 650	
627109	EP50 1/2		592 x 289 x 330	
627113	EP50 1/2		592 x 289 x 510	F8
627099	EP50 1/2		592 x 289 x 650	
627111	EP50 1/4		289 x 289 x 330	
627115	EP50 1/4		289 x 289 x 510	
627110	EP50 5/6		490 x 592 x 330	F9
627114	EP50 5/6		490 x 592 x 510	
627116	EP90 1/1		592 x 592 x 510	
627120	EP90 1/1		592 x 592 x 650	
627117	EP90 1/2		592 x 289 x 510	F10
627121	EP90 1/2		592 x 289 x 650	
627119	EP90 1/4		289 x 289 x 510	
627123	EP90 1/4		289 x 289 x 650	
627118	EP90 5/6		490 x 592 x 510	F11
627122	EP90 5/6		490 x 592 x 650	

Air Filtration

Viledon

HEPA Filters



Designed for high efficiency for areas where a maximum degree of cleanliness is required. Each filter from H13 onwards is individually tested and certified.

Construction: Surround is sturdy halogen free plastic. All joints between media and surround are encapsulated by ABS plastic, microbiologically safe non-corroding lightweight and moisture resistant, with options of aluminum-galvanised steel, the gasket is P.U. Semicircular and foamed onto frame with thermally embossed pleat pack

Filter Class	Overall frame depth	Pleat depth	Face velocity	Nominal volume flow for 610 x 610mm ² element	Pressure drop
H 11	78 mm	50 mm	0.97 m/s	1,300 m ³ /h	160 Pa
	150 mm	100 mm	1.49 m/s	2,000 m ³ /h	160 Pa
	150 mm	135 mm	1.79 m/s	2,400 m ³ /h	160 Pa
	292 mm	200 mm	2.37 m/s	3,000 m ³ /h	160 Pa
	292 mm	280 mm	2.54 m/s	3,400 m ³ /h	160 Pa
H 13	78 mm	50 mm	0.75 m/s	1,000 m ³ /h	250 Pa
	150 mm	100 mm	1.12 m/s	1,500 m ³ /h	250 Pa
	150 mm	135 mm	1.49 m/s	2,000 m ³ /h	250 Pa
	292 mm	150 mm	1.64 m/s	2,200 m ³ /h	250 Pa
	292 mm	200 mm	1.87 m/s	2,500 m ³ /h	250 Pa
H 14	292 mm	280 mm	2.54 m/s	3,400 m ³ /h	250 Pa
	71 mm	50 mm	0.45 m/s	600 m ³ /h	125 Pa
	78mm	50 mm	0.45m/s	600 m ³ /h	125 Pa
	92 mm	70 mm	0.45 m/s	600 m ³ /h	100 Pa
	130 mm	100 mm	0.45 m/s	600 m ³ /h	65 Pa
	190 mm	150 mm	0.45 m/s	600 m ³ /h	50 Pa
	292 mm	280 mm	1.49 m/s	2000 m ³ /h	175 Pa

The integral efficiency for MPPS to EN11822 $\geq 95\%$, $\geq 99.95\%$, $\geq 99.995\%$ Non standard size are available on request. Variations in construction using aluminium, steel or stainless steel to surround the filter as well as variations in gasket positioning are also available on request.

Maxiplate Filters

Cat. No.	Model No.	Description	Size: mm	Performance Rating
628666	MX75 1/1	Maxiplate Filter	592 x 592 x 292	F6
628667	MX75 1/2		592 x 287 x 292	
628660	MX85 1/1		592 x 592 x 292	F9
628665	MX85 1/2		592 x 287 x 292	
628663	MX95 1/1		592 x 592 x 292	F8
628664	MX95 1/2		592 x 287 x 295	
628661	MX98 1/1		592 x 592 x 292	F7
628662	MX98 1/2		592 x 287 x 292	

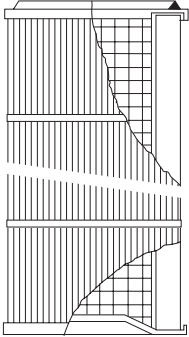
Viledon Maxiplate filters are also available in Hepa class H11 and H12 upon request.

Air Filtration

Viledon

High Temperature Filters

Cat. No.	Model No.	Description	Size: mm
628633	LH1000 1/2	High Temperature Filter	480 x 240 x 14
628636	HT90B		595 x 595 x 292
628635	HT40		595 x 595 x 44
628630	LH 1000		480 x 480
628631	LH 1000	Basis Material Only	480 x 480



Viledon

Cartridge Filters

Viledon dust removal filters are designed to meet the requirements of specific applications from the development of custom-made media through to the finished product and are available upon request.

Actrol

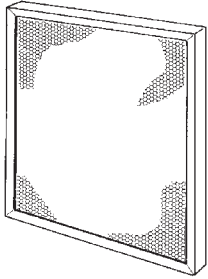
Filter Holding Frames

Cat. No.	Model No.	Description	Size : mm
628526	HEPA HF 610X305	HEPA HOLDING FRAME	610 x 305 x 292
628525	HEPA HF 610/610		610 x 610 x 292
628434	HF-100 610X610	HOLDING FRAME	610 x 610 x 100
628442	HF-125 610X610		610 x 610 x 125
628443	HF-125 610X305		610 x 305 x 125
628407	HF-25 610X305		610 x 305 x 25
628419	HF-50	STANDARD HOLDING FRAMES	305 x 305 x 50
628418	HF-50		610 x 508 x 50
628412	HF-50 508X508		508 x 508 x 50
628414	HF-50 610X610		610 x 610 x 50
628415	HF-50 635X406		635 x 406 x 50
628416	HF-50 635X508		635 x 508 x 50
628417	HF-50 610X305	REMOVABLE MEDIA FRAME & GATE	610 x 305 x 50
628451	RM 508X508		508 x 508
628453	RM 610X305		610 x 305
628452	RM 610X610		610 x 610
628455	RM 635X508		635 x 508
628456	RM 762X508		762 x 508

Filter Retaining Fixtures

Cat. No.	Model No.	Description	Size: mm
628056	P-1	Fastener General Purpose	25
628057	P-2		50
628058	P-3		75
628059	P-4		100
628060	P-5		125
627050	25mm	Fastener to suit Filtratech Holding Frames	25
627051	50mm		50
627052	75mm		75
627053	100mm		100
627054	125mm		125
628054	Retwire Ext	Extended Retaining Wire	
628053	Retwire St	Flat Retaining Wire	

Air Filtration



Grease Filters

The honeycomb grease filter is designed for use in kitchen exhaust systems. The filter media is constructed from 50mm wide strips of folded aluminium. Strips are formed into a system of double compound curves so that, when folded back on themselves, they create a non-nesting system of smooth walled honeycombs. This is encased in an anodised aluminium extrusion.

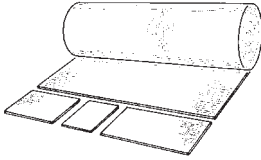
Standard Sizes available.

Cat. No.	Model No.	Size: mm
628470	KF01	495 x 394 x 50
628471	KF02	495 x 495 x 50
628472	KF03	622 x 394 x 50
628473	KF04	622 x 495 x 50
628474	KF05	749 x 495 x 50
628475	KF06	597 x 597 x 50
628476	KF07	455 x 380 x 50

Other sizes available on request.

Viledon

Filter Media



Synthetic non-woven filter media is available in several efficiency grades. All have low air flow resistance as well as high dirt, dust and lint retaining ability.

Filter material is available in cut pads or bulk rolls.

Media Type	Average Arrestance* Test Dust No. 4	Average Efficiency Test Dust No. 1	Dust Holding gms	Recommended Flow Rate m/s	Initial Pressure Drop Pa	Final Pressure Drop Pa
AFM 103 LR	70%	NA	440	1.8	20	250
P15/150 S	67%		380	2	20	
P15/350 S	85%		600	1.5	20	
PSB/290 S	91%	27.6%	620	1	25	200
P15/500 S	94%		600	1	30	250
A3/300	97%*	46%	360	0.25	20	

*Arrestance data derived from EN779 standard test data.

Spraybooth Filter Media

Synthetic non-woven filter medias with bonded scrim specifically designed for use in automotive spray booths.

Type 560G-10

World's leading automotive spray booth media. Highest efficiency air filter designed specifically for use in automotive manufacturers spray booths.

Also used in car repair spray booths where finest quality air is desired.

Rating SO.

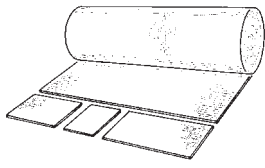
Lancaster

Type GW 'Paintstop' Spraybooth Media

GW Series disposable 'Paintstop' air filter media is manufactured from continuous monofilament A-glass fibres bonded with urea formaldehyde resin. The filter matrix exhibits a progressive increase in density through the sectional depth of the material towards the air exit side that is also accompanied by a progressive decrease in the diameter of the fibres. The resulting characteristics enhance filter efficiency of the product by preventing localised clogging and ensuring controlled deposition through the full depth of the filter to achieve maximum retention and minimum pressure drop. Conforms to EN779 / Eurovent 4/5.

Air Filtration

Filter Media / Roll



Cat. No.	Model No.	Description	Size: mm
628105	198-1	Roll Filter Media	Roll
628850	A3/300S	Filter Media	2000 x 20000
628132	AFM-107		2040 x 30000
628106	BRAWAD60		1420 x 50000
628129	IFM F5		2100 x 20000
628131	IFM-103 LR-grey		2100 x 40000
628134	INF-102		2100 x 20000
628840	P15/150S		2000 x 40000
628880	P15/350S		2000 x 30000
628882	P15/350S		1020 x 30000
628883	P15/350S		510 x 30000
628195	P15/500S		2000 x 20000
628196	P15/500S		1000 x 20000
628197	P15/500S		510 x 20000
628234	PA-560G-10		1600 x 20000
628236	PA-560G-10		1600 x 22000
628235	PA-560G-10		2000 x 20000
628860	PSB/290S		2000 x 20000
628243	L00100245	Polysorb Act. Carbon Media	622 x 30480
628517	10500245-R5277T		622 x 15000

Spray Booth Exhaust Media/Roll

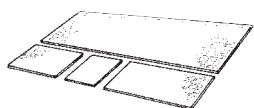
Cat. No.	Model No.	Description	Size: mm
628099	SWH-100D	Overspray Filter	1000 x 10000
628098	SWH-90D		920 x 9200
628090	GW50-500-20	Paintstop Media	500 x 20000
628091	GW50-600-20		610 x 20000
628092	GW50-750-20		750 x 20000
628093	GW50-750-40		750 x 40000
628094	GW50-1000-20		1000 x 20000
628095	GW50-1200-24		1200 x 24000
628096	GW50-1500-20		1500 x 20000
628097	GW50-1800-24		1800 x 24000
628102	GW50-2000-20		2000 x 20000

Evaporative Cooler Pads

Cat. No.	Model No.	Description	Size: mm
630001	7150	Evaporative Cooler Pads	Roll
630025	CEL 013/4		700 x 860
630029	CEL 028/4		900 x 1100
630030	CEL 005/4		950 x 880
630022	C00 005/4		1040 x 1010
630031	BRA 006/6		520 x 980
630020	CEL 025/4		560 x 860
630027	C00 001/3		620 x 740
630026	BRZ 002/4		620 x 840
630024	BON 015/4		760 x 780
630021	BON 009/4		800 x 900
630023	CEL 007/4		950 x 1050
630028	CEL 031/4		950 x 910

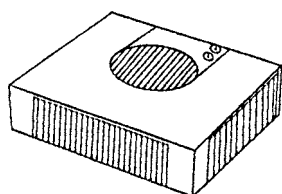
Air Filtration

Filter Media / Cut



Cat. No.	Model No.	Description	Size: mm
628506	RF-1524	FILTER R.A.C. CUT TO SIZE	381 x 609
628155	508X508	FILTER PAD INF-102	508 x 508
628156	610X610		610 x 610
628157	762X508		762 x 508
628158	2450X605		2450 x 605
628133	IFM-103 LR GREY	IFM-103 LR GREY	2040 x Per/metre
628136	INF-102-MTR	INF-102	2100 x Per/metre
628198	P15/500S	P15/500S	2000 x Per/metre
628841	P15/150S	P15/150S	2000 x Per/metre
628861	PSB/290S	PSB/290S	2000 x Per/metre
628881	P15/350S	P15/350S	2000 x Per/metre
628851	A3/300S	A3/300S	2000 x Per/metre
628237	PA-560G-10	PA-560G-10	1600 x Per/metre
628238	PA-560G-10	PA-560G-10	2000 x Per/metre
628176	P15/350S	P15/350S	508 x 406
628199	P15/500S	P15/500S	508 x 406
628177	P15/350S	P15/350S	508 x 508
628200	P15/500S	P15/500S	508 x 508
628206	P15/500S	P15/500S	610 x 305
628181	P15/350S	P15/350S	610 x 610
628204	P15/500S	P15/500S	610 x 610
628242	PA-560G-10	PA-560G-10	610 x 610
628178	P15/350S	P15/350S	635 x 406
628201	P15/500S	P15/500S	635 x 406
628179	P15/350S	P15/350S	635 x 508
628202	P15/500S	P15/500S	635 x 508
628180	P15/350S	P15/350S	762 x 508
628203	P15/500S	P15/500S	762 x 508
628518	R5277T-MTR	Polysorb Act Carbon Media	622 x Per/metre

Aironic Air Purifiers



The AIRONIC is a complete air purifier that combines the effects of ionization with a revolutionary electrostatic filter system that attracts pollution particles like a magnet.

The AIRONIC replaces essential negative ions and removes cigarette smoke, dust particles, bacteria and odours. The result is a clean healthy air flow where ever you go. Now you can reduce the likelihood of flu, coughs and colds and gain instant relief from asthma. Use the AIRONIC in your office or home, it's the ideal companion for both you and your computer. It counteracts the ion depleting effects of air conditioning, circulates stale air, cuts static, dirt and dust. And allows you to stay fresh, alert and productive.

Cat. No.	Model No.	Effective range : m ²	Size : mm
627500	AE2000	100	473 x 416 x 130
627501	AI3000	164	580 x 450 x 182
627502	AC5000	278	700 x 270 x 460
627503	AC8000	200	595 x 595 x 50
Replacement Parts & Filters for Air Purifiers			
627504	AF1	Filter	Filter Suit Air Purifier
627505	AF3	Box of Filters (3)	Suit AI3000
627510	EP1	Emitter Pin	Suit Air Purifier
627506	CF2000	Carbon Filter	Suit CF2000
627507	CF3000		Suit CF3000
627508	CF5000		Suit CF5000
627509	CF8000		Suit CF8000

This image shows a full page of graph paper. The background is a solid light blue color. Overlaid on this background is a uniform grid of thin red lines. The grid consists of small squares that cover the entire area of the page, leaving no margins or other markings.

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Conversion Data

Summary of Common Conversion Factors

Multiply Left Hand Unit by **Factor** to obtain Right Hand Unit. **Divide** Right Hand Unit by **Factor** to obtain Left Hand Unit.

Measurement	Units	Factor
Length	inches ↔ mm	25.4
	feet ↔ metres	0.3048
Area	inch ² ↔ mm ²	645.16
	ft ² ↔ m ²	0.0929
Volume	inch ³ ↔ mm ³	16387
	ft ³ ↔ m ³	0.0283
Volume (Liquid)	gall (Imp) ↔ gall US	1.20095
	gall (Imp) ↔ l	4.5456
	gall (US) ↔ l	3.785
Volume (Flow Rate) Liquid	gall/min (Imp) ↔ l/sec	0.07575
	gall/min (Imp) ↔ l/min	4.5456
	gall/min (Imp) ↔ l/hour	272.736
	gall/min (US) ↔ l/sec	0.06308
	gall/min (US) ↔ l/min	3.785
	gall/min (US) ↔ l/hour	227.1
Volume (Flow Rate) Air	cfm ↔ l/sec	0.472
	cfm ↔ l/min	28.32
	cfm ↔ m ³ /min	42.372
	cfm ↔ m ³ /hour	1.6992
	m ³ /hour ↔ l/sec	0.2778
Power	HP ↔ Watts	746
	HP ↔ kW	0.746

Measurement	Units	Factor
Heat Flow	BTU/hr ↔ Watts	0.29307
	Tons (Refrig) ↔ BTU/hr	12000
	Tons (Refrig) ↔ kW	3.517
	kcal/hr ↔ Watts	1.163
	kcal/hr ↔ Tons (Refrig)	0.000331
Pressure	psi ↔ kPa	6.895
	psi ↔ mPa	0.006895
	psi ↔ bar	0.06895
	psi ↔ Atmos.	0.06895
	In. Wg ↔ Pa	248.6
	In. Wg ↔ kPa	0.249
	Atmos. ↔ kPa	101.325
	in. Hg ↔ Pa	3386
	in. Hg ↔ kPa	3.386
	In. Hg ↔ bar	0.034
	kg/cm ² ↔ psi	14.22
	kg/cm ² ↔ kPa	98.07
Velocity	ft/sec ↔ km/hr	1.609
	ft/sec ↔ m/sec	0.3048
	ft/min ↔ m/sec	0.00508
Weight (Mass)	lbs ↔ kg	0.4536

Conversion Factors

Multiply	By	To Obtain
Atmospheres	29.92	Inches of Mercury
Atmospheres	33.9	Feet of Water
Atmospheres	1.0333	kg/cm ²
Atmospheres	14.696	lbs/in ² (psi)
Atmospheres	762.48	mmHg (torr)
Atmospheres	101.325	kPa
Bars	100	kPa
Bars	14.5	psi
British Thermal Units	0.252	Kilogram-calories
British Thermal Units	777.5	Foot-lbs
British Thermal Units	3.927 x 10 ⁻⁴	Horsepower-hrs
British Thermal Units	107.5	Kilogram-metre
British Thermal Units	2.928 x 10 ⁻⁴	Kilowatt-hrs
B.T.U./min	12.96	Foot-lbs/sec
B.T.U./min	0.02356	Horsepower
B.T.U./min	0.01757	Kilowatts
B.T.U./min	17.57	Watts
B.T.U./hr	0.293	Watts
Centimetres	0.3937	Inches
Centimetres	0.01	Metres
Centimetres	10	Millimetres
Centimetres of Mercury	0.4461	Feet of Water
Centimetres of Mercury	136	kgs/sq. metre
Centimetres of Mercury	0.1934	lbs/sq. inch

Conversion Factors

Multiply	By	To Obtain
Centimetres/second	1.969	Feet/min.
Centimetres/second	0.03281	Feet/sec.
Centimetres/second	0.6	Metres/min.
Cubic Centimetres	3.531 x 10 ⁻⁵	Cubic Feet
Cubic Centimetres	0.06102	Cubic Inches
Cubic Centimetres	10 ⁻⁶	Cubic Metres
Cubic Centimetres	0.001	Litres
Cubic Centimetres	0.001759	Pints (liq.) Imperial
Cubic Centimetres	0.002113	Pints (liq.) US
Cubic Feet	1728	Cubic Inches
Cubic Feet	0.02832	Cubic Metres
Cubic Feet	0.03704	Cubic Yards
Cubic Feet	6.22889	Gallons Imperial
Cubic Feet	7.48052	Gallons US
Cubic Feet	28.32	Litres
Cubic Feet	49.827	Pints (liq.) Imperial
Cubic Feet	59.84	Pints (liq.) US
Cubic Feet/minute	472	Cubic cms/sec.
Cubic Feet/minute	0.1038	Gallons/sec. Imperial
Cubic Feet/minute	0.1247	Gallons/sec. US
Cubic Feet/minute	0.472	Litres/sec.
Cubic Feet/minute	62.43	lbs. of water/min.
Cubic Feet/second	0.5382	Mill. Galls/day Imperial
Cubic Feet/second	0.646317	Mill. Galls/day US
Cubic Feet/second	373.733	Galls/min. Imperial
Cubic Feet/second	448.831	Galls/min. US

Conversion Data

Conversion Factors

Multiply	By	To Obtain
Cubic Inches	16.39	Cubic Centimetres
Cubic Inches	5.787×10^{-4}	Cubic Feet
Cubic Inches	1.639×10^{-5}	Cubic Metres
Cubic Inches	2.143×10^{-5}	Cubic Yards
Cubic Inches	0.0036	Gallons Imperial
Cubic Inches	0.004329	Gallons U.S.
Cubic Inches	0.01639	Litres
Cubic Metres	10^6	Cubic Centimetres
Cubic Metres	35.31	Cubic Feet
Cubic Metres	61026	Cubic Inches
Cubic Metres	1.308	Cubic Yards
Cubic Metres	220	Gallons Imperial
Cubic Metres	264.2	Gallons U.S.
Cubic Metres	1000	Litres
Cubic Yards	27	Cubic Feet
Cubic Yards	46,656	Cubic Inches
Cubic Yards	0.7646	Cubic Metres
Cubic Yards	764.6	Litres
Cubic Yards	1345.6	Pints (liq.) Imperial
Cubic Yards	1616	Pints (liq.) U.S.
Cubic Yards/min.	0.45	Cubic Feet/sec.
Cubic Yards/min.	2.804	Galls/sec. Imperial
Decilitres	0.1	Litres
Decimetres	0.1	Metres
Degrees (angle)	60	Minutes
Degrees (angle)	0.01745	Radians
Degrees (angle)	3600	Seconds
Degrees/sec.	0.01745	Radians/sec.
Degrees/sec.	0.1667	Revolutions/min.
Degrees/sec.	0.002778	Revolutions/sec.
Dekalitres	10	Litres
Dekametres	10	Metres
Feet	30.48	Centimetres
Feet	12	Inches
Feet	0.3048	Metres
Feet	0.3333	Yards
Feet of Water	0.0295	Atmospheres
Feet of Water	0.8826	Inches of Mercury
Feet of Water	0.03048	kgs/sq. cm
Feet of Water	62.43	lbs/sq. ft.
Feet of Water	0.4335	lbs/sq. inch
Feet/minute	0.508	Centimetres/sec.
Feet/minute	0.01667	Feet/sec.
Feet/minute	0.00508	Metres/sec.
Feet/sec.	0.3048	Metres/sec.
Feet/sec./sec.	30.48	cms/sec./sec.
Feet/sec./sec.	0.3048	Metres/sec./sec.
Foot-pounds	1.286×10^{-3}	British Thermal Units
Foot-pounds	5.050×10^{-7}	Horsepower-hrs
Foot-pounds	3.241×10^{-4}	Kilogram-calories
Foot-pounds	0.1383	Kilogram-metres
Foot-pounds	3.766×10^{-7}	Kilowatt-hrs
Foot-pounds/sec.	7.717×10^{-2}	B.T. Units/min.
Foot-pounds/sec.	1.818×10^{-3}	Horsepower
Foot-pounds/sec.	1.945×10^{-2}	kg-calories/min.
Foot-pounds/sec.	1.356×10^{-3}	Kilowatts
Gallons Imperial	0.1606	Cubic Feet
Gallons Imperial	277.4	Cubic Inches
Gallons Imperial	4.5456	Litres
Gallons Imperial	8	Pints Imperial
Gallons Imperial	4	Quarts Imperial

Conversion Factors

Multiply	By	To Obtain
Gallons Imperial	1.20095	Gallons U.S.
Gallons U.S.	0.1337	Cubic Feet
Gallons U.S.	231	Cubic Inches
Gallons U.S.	3.785	Litres
Gallons U.S.	8	Pints U.S.
Gallons U.S.	4	Quarts U.S.
Gallons U.S.	0.83267	Gallons Imperial
Gallons Water Imperial	10.02	Pounds of Water
Gallons Water U.S.	8.3453	Pounds of Water
Gallons/min. Imperial	0.02675	Cubic Feet/sec.
Gallons/min. Imperial	0.07575	Litres/sec.
Gallons/min. Imperial	10.7133	Cubic feet/hr
Gallons/min. U.S.	0.02228	Cubic Feet/sec.
Gallons/min. U.S.	0.06308	Litres/sec.
Gallons/min. U.S.	8.9208	Cubic Feet/hr.
Grams	0.001	Kilograms
Grams	1000	Milligrams
Grams	0.03527	Ounces
Grams/litre	58.417	Grains/gal. U.S.
Grams/litre	8.345	Pounds/100 gals. U.S.
Grams/litre	0.06243	Pounds/cubic foot
Grams/litre	1000	Parts/million
Hectolitres	100	Litres
Hectometres	100	Metres
Hectowatts	100	Watts
Horsepower	42.44	B.T. Units/min.
Horsepower	33,000	Foot-lbs/min
Horsepower	550	Foot-lbs/sec.
Horsepower	1.014	Horsepower (metric)
Horsepower	10.7	kg-calories/min.
Horsepower	0.7457	Kilowatts
Horsepower-hours	2547	British Thermal Units
Horsepower-hours	1.98×10^6	Foot-lbs
Horsepower-hours	641.7	Kilogram-calories
Horsepower-hours	2.737×10^5	Kilogram-metres
Horsepower-hours	0.7457	Kilowatt-hours
Inches	2.54	Centimetres
Inches of Mercury	0.03342	Atmospheres
Inches of Mercury	1.133	Feet of Water
Inches of Mercury	0.03453	kgs/sq. cm
Inches of Mercury	3.39	kPa
Inches of Mercury	0.4912	lbs/sq. inch
Inches of Water	0.002458	Atmospheres
Inches of Water	0.07355	Inches of Mercury
Inches of Water	0.00254	kgs/sq. cm
Inches of Water	0.249	kPa
Inches of Water	5.202	lbs/sq. foot
Inches of Water	0.03613	lbs/sq inch
Kilograms	2.205	Pounds
Kilograms	1000	Grams
Kilograms/metre	0.672	lbs/foot
Kilograms/sq. cm	0.9678	Atmospheres
Kilograms/sq. cm	32.81	Feet of Water
Kilograms/sq. cm	28.96	Inches of Mercury
Kilograms/sq. cm	2048	lbs/sq. foot
Kilograms/sq. cm	14.22	lbs/sq. inch
Kilolitres	1000	Litres
Kilometres	3281	Feet
Kilometres	1000	Metres
Kilometres	0.6214	Miles
Kilometres	1094	Yards

Conversion Data

Conversion Factors

Multiply	By	To Obtain
Kilometres/hour	54.68	Feet/minute
Kilometres/hour	0.5396	Knots
Kilometres/hour	16.67	Metres/minute
Kilometres/hour	0.6214	Miles/hour
Kilometres/hour/sec.	27.78	cm/sec./sec.
Kilometres/hour/sec.	0.9113	ft./sec./sec.
Kilometres/hour/sec.	0.2778	Metres/sec./sec.
Kilowatts	56.92	BTU/minute
Kilowatts	4.425×10^4	Foot-lbs/minute
Kilowatts	737.6	Foot/lbs/second
Kilowatts	1.341	Horsepower
Kilowatts	14.34	kg-calories/minute
Kilowatts	1000	Watts
Kilowatt-hours	3415	British Thermal Units
Kilowatt-hours	2.655×10^6	Foot-lbs
Kilowatt-hours	1.341	Horsepower-hours
Kilowatt-hours	860.5	Kilogram-calories
Kilowatt-hours	3.671×10^6	Kilogram-metres
Litres	1000	Cubic Centimetres
Litres	0.03531	Cubic Feet
Litres	61.02	Cubic Inches
Litres	0.001	Cubic Metres
Litres	0.21997	Gallons Imperial
Litres	0.2642	Gallons U.S.
Litres	1.7597	Pints (liq.) Imperial
Litres	2.113	Pints (liq.) U.S.
Litre/minute	5.886×10^{-4}	Cubic ft/sec.
Litre/minute	0.003666	Gallons/sec. Imperial
Litre/minute	0.004403	Gallons/sec. U.S.
Metres	100	Centimetres
Metres	3.281	Feet
Metres	39.37	Inches
Metres	0.001	Kilometres
Metres	1000	Millimetres
Metres	1.094	Yards
Metres/minute	1.667	Centimetres/second
Metres/minute	3.281	Feet/minute
Metres/minute	0.05468	Feet/second
Metres/minute	0.06	Kilometres/hour
Metres/minute	0.03728	Miles/hour
Metres/second	196.8	Feet/minute
Metres/second	3.281	Feet/second
Metres/second	3.6	Kilometres/hour
Metres/second	0.06	Kilometres/minute
Metres/second	2.237	Miles/hour
Microns	10^{-6}	Metres
Miles	1.609	Kilometres
Miles	1760	Yards
Miles/hour	88	Feet/minute
Miles/hour	1.609	Kilometres/hour
Miles/hour	0.8684	Knots
Miles/hour	26.82	Metres/minute
Miles/minute	60	Miles/hour
Millilitres	0.001	Litres
Millimetres	0.1	Centimetres
Millimetres	0.03937	Inches
Minutes (angle)	2.909×10^{-4}	Radians

Conversion Factors

Multiply	By	To Obtain
Ounces	0.0625	Pounds
Ounces (fluid)	1.805	Cubic Inches
Ounces (fluid)	0.02957	Litres
Pounds	16	Ounces
Pounds	0.4536	Kilograms
Pounds	0.0005	Tons (short)
Pounds of Water	0.01602	Cubic Feet
Pounds of Water	27.68	Cubic Inches
Pounds of Water	0.09976	Gallons Imperial
Pounds of Water	0.1198	Gallons U.S.
Pounds of Water/min.	2.670×10^{-4}	Cubic ft/sec.
Pounds/cubic foot	16.02	kg/cubic metre
Pounds/cubic foot	5.787×10^{-4}	lbs/cubic inch
Pounds/cubic inch	27.68	grams/cubic cm
Pounds/cubic inch	2.768×10^{-4}	kgs/cubic metre
Pounds/cubic inch	1728	lbs/cubic foot
Pounds/foot	1.488	kg/metre
Pounds/foot	178.6	Grams/cm
Pounds/sq. foot	0.01602	Feet of Water
Pounds/sq. foot	4.883×10^{-4}	kgs/sq. cm
Pounds/sq. foot	6.945×10^{-3}	Pounds/sq. inch
Pounds/sq. inch	0.06804	Atmospheres
Pounds/sq. inch	2.307	Feet of Water
Pounds/sq. inch	2.036	Inches of Mercury
Pounds/sq. inch	0.07031	kg/sq. cm
Pounds/sq. inch	6.895	Kilopascals
Temperature (°C) +273	1	Abs. Temp. (°C)
Temperature (°C) + 17.78	1.8	Temperature (°F)
Temperature (°F) +460	1	Abs. Temp. (°F)
Temperature (°F) -32	5/9	Temp. (°C)
Tons (long)	1016	Kilograms
Tons (long)	2240	Pounds
Tons (long)	1.12	Tons (short)
Tonnes	1000	Kilograms
Tonnes	2205	Pounds
Tons Refrig.	3.517	kW
Tons (short)	2000	Pounds
Tons (short)	907.185	Kilograms
Tons (short)	0.893	Tons (long)
Tons (short)	0.90718	Tonnes
Watts	3.412	B.T.U./hour
Watts	0.05692	B.T.U./minute
Watts	44.26	Foot-pounds/minute
Watts	0.7376	Foot-pounds/second
Watts	1.34×10^{-3}	Horsepower
Watts	0.01434	kg-calories/minute
Watts	10^{-3}	Kilowatts
Watt-hours	3.415	British Thermal Units
Watt-hours	2655	Foot-pounds
Watt-hours	1.341×10^{-3}	Horsepower-hours
Watt-hours	0.8605	Kilogram-calories
Watt-hours	367.1	Kilogram-metres
Watt-hours	10^{-3}	Kilowatt-hours



Your best Solution...

Conversion Data

Length

Millimetres	Centimetres	Inches	Feet	Yards	Metres	Kilometres	Miles
1	0.1	0.03937	0.003281	0.0010936	0.001	0.000001	0.000006214
10	1	0.3937	0.032808	0.010936	0.01	0.00001	0.00006214
25.4	2.54	1	0.08333	0.02777	0.0254	0.0000254	0.00001578
304.8	30.48	12	1	0.3333	0.3048	0.0003048	0.0001893
914.4	91.44	36	3	1	0.9144	0.0009144	0.0005682
1000	100	39.37	3.2808	1.0936	1	0.001	0.0006214
1,000,000	100,000	39,370	3280.8	1093.6	1000	1	0.6214
1,609,350	160,935	63,360	5280	1760	1609.35	1.60935	1

Mass

Grams	Ounces	Pounds	Kilograms	U.S. Ton (Short)	Imp. Ton (Long)	Metric Tonne
1	0.03527392	0.00220462	0.001	0.0 ₅ 110231	0.0 ₆ 98426	0.0 ₅ 1
28.3496	1	0.0625	0.0283496	0.0 ₄ 3125	0.0 ₄ 279	0.0 ₄ 283496
453.593	16	1	0.453593	0.0005	0.0 ₃ 44642	0.0 ₃ 453593
1000	35.27392	2.20462	1	0.00110231	0.0 ₃ 984206	0.001
907,186	32,000	2000	907.186	1	0.89285	0.907186
1,016,050	35,840	2240	1016.05	1.12	1	1.01605
1,000,000	35,273.92	2204.62	1000	1.10231	0.984206	1

Energy or Work

Joules (1 Joule = 10 ⁷ Ergs)	Foot – Pounds	Kilogram Metres	Litre – Atmospheres	Horsepower Hours	Kilowatt Hours	Kilogram Calories	British Thermal Units	Lbs Carbon Oxidised with Perfect Efficiency	Lbs Water Evaporated from and at 100°C
1	0.7373	0.101937	0.0098705	0.0 ₆ 3727	0.0 ₆ 278	0.0 ₃ 23795	0.0 ₃ 9486	0.0 ₇ 642	0.0 ₆ 9662
1.3562	1	0.138255	0.013826	0.0 ₆ 505	0.0 ₆ 3766	0.0 ₃ 32396	0.0012861	0.0 ₇ 8808	0.0 ₅ 13256
9.81	7.233	1	0.09677	0.0 ₅ 3653	0.0 ₆ 2724	0.002343	0.009302	0.0 ₆ 63718	0.0 ₅ 95895
101,3667	74,7386	10.333	1	0.0 ₄ 3774	0.0 ₄ 2794	0.0242	0.0961	0.0 ₅ 6583	0.0 ₄ 9907
2,685,443	1,980,000	273,746	26,490.4	1	0.7457	641.477	2546.5	0.174	2.62
3,600,000	2,655,220	367,100	35,526.95	1.341	1	860.238	3415	0.234	3.52
4185.8291	3087.35	426.843	41.309	0.001558	0.0011623	1	3.9683	0.0 ₃ 29909	0.004501
1054.198	778	107.5	10.40277	0.0 ₃ 3927	0.0 ₃ 2928	0.2519	1	0.0 ₆ 685	0.00103
15,387,041.6	11,352,000	1,569,527.5	151,894.66	5.733	4.275	3,677.74	14,600	1	15.05
1,023,000	754,525	104.320	10,096.77	0.3811	0.2841	244.44	970.4	0.066466	1

Volume and Capacity

Cubic Inches	Cubic Feet	Cubic Yards	Litres	US Quarts		US Gallons		Imperial Gallons	US Bushels	Water at Max. Density 4°C	
				Liquid	Dry	Liquid	Dry			Pounds of Water	Kilograms of Water
1	0.0 ₅ 787	0.0 ₄ 2143	0.016384	0.01731	0.01488	0.004329	0.003721	0.0036065	0.0 ₃ 4651	0.0361275	0.0163872
1728	1	0.037037	28.317	29.92208	25.713	7.48052	6.4282	6.2321	0.803564	62.4283	28.317
46,656	27	1	764.56	807.895	694.278	201.974	173.569	168.266	21.6962	1685.56	764.559
61,023.4	35.3145	1.307941	1000	1056.68	908.1	264.17	227.02	220.083	28.38	2204.62	1000
61.0234	0.0353145	0.001308	1	1.05668	0.9081	0.26417	0.22702	0.220083	0.02838	2.20462	1
57.75	0.03342	0.001238	0.94636	1	0.8595	0.25	0.2149	0.20828	0.02686	2.08636	0.94635
67.18	0.03888	0.00144	1.1009	1.1635	1	0.2909	0.25	0.24235	0.03125		
231	0.133681	0.004951	3.78543	4	3.4378	1	0.8595	0.833111	0.10743	8.34545	3.78543
268.75	0.15552	0.00576	4.404	4.654	4	1.1635	1	0.96932	0.125		
277.274	0.160459	0.0059429	4.54374	4.80128	4.1267	1.20032	1.0317	1	0.12896	10.0172	4.54373
2150	1.24446	0.04609	35.238	37.2353	32	9.3088	8	7.81457	1		
27.6798	0.0160184	0.0 ₃ 5929	0.453592	0.4793		0.119825		0.0998281		1	0.453593

Pressure

psi	atms.	ft. Hd. H ₂ O at 20°C	Inches H ₂ O	kg/cm ²	Metres H ₂ O	Inches Hg. at 20°C	mm Hg.	cm Hg.	Bar	Millibar (mb)	kPa
1	0.068	2.31	27.72	0.07	0.704	2.043	51.884	5.188	0.069	68.947	6.895
14.696	1	33.659	407.513	1.033	10.351	30.019	762.48	76.284	1.013	1013	101.325
0.433	0.029	1	12	0.03	0.305	0.884	22.452	2.245	0.03	29.837	2.984
0.036	0.0025	0.833	1	0.0025	0.025	0.074	1.871	0.187	0.0025	2.486	0.249
14.233	0.968	32.867	394.408	1	10.018	29.054	737.959	73.796	0.981	980.662	98.066
1.422	0.097	3.287	39.37	0.099	1	2.905	73.796	7.379	0.098	98.066	9.807
0.489	0.033	1.131	13.575	0.034	0.345	1	25.4	2.54	0.034	33.753	3.375
0.019	0.0013	0.045	0.534	0.0014	0.0136	0.039	1	0.1	0.001	1.329	0.133
0.193	0.0131	0.455	5.34	0.014	0.136	0.393	10	1	0.0133	13.29	1.328
14.503	0.987	33.514	402.164	1.02	10.211	29.625	752.47	75.247	1	1000	100
0.014	0.0009	0.033	0.402	0.001	0.0102	0.029	0.752	0.075	0.001	1	0.1
0.145	0.0098	0.335	4.021	0.01	0.102	0.296	7.525	0.0752	0.01	10	1

Conversion Data

Inch to Millimeter Equivalents

DECIMALS TO MILLIMETERS

Inches	mm	Inches	mm
0.001	0.0254	0.500	12.7000
0.002	0.0508	0.510	12.9540
0.003	0.0762	0.520	13.2080
0.004	0.1016	0.530	13.4620
0.005	0.1270	0.540	13.7160
0.006	0.1524	0.550	13.9700
0.007	0.1778	0.560	14.2240
0.008	0.2032	0.570	14.4780
0.009	0.2286	0.580	14.7320
		0.590	14.9860
0.010	0.2540		
0.020	0.5080		
0.030	0.7620	0.600	15.2400
0.040	1.0160	0.610	15.4940
0.050	1.2700	0.620	15.7480
0.060	1.5240	0.630	16.0020
0.070	1.7780	0.640	16.2560
0.080	2.0320	0.650	16.5100
0.090	2.2860	0.660	16.7640
		0.670	17.0180
0.100	2.5400	0.680	17.2720
0.110	2.7940	0.690	17.5260
0.120	3.0480		
0.130	3.3020		
0.140	3.5560	0.700	17.7800
0.150	3.8100	0.710	18.0340
0.160	4.0640	0.720	18.2880
0.170	4.3180	0.730	18.5420
0.180	4.5720	0.740	18.7960
0.190	4.8260	0.750	19.0500
		0.760	19.3040
0.200	5.0800	0.770	19.5580
0.210	5.3340	0.780	19.8120
0.220	5.5880	0.790	20.0660
0.230	5.8420		
0.240	6.0960		
0.250	6.3500	0.800	20.3200
0.260	6.6040	0.810	20.5740
0.270	6.8580	0.820	21.8280
0.280	7.1120	0.830	21.0820
0.290	7.3660	0.840	21.3360
		0.850	21.5900
0.300	7.6200	0.860	21.8440
0.310	7.8740	0.870	22.0980
0.320	8.1280	0.880	22.3520
0.330	8.3820	0.890	22.6060
0.340	8.6360		
0.350	8.8900		
0.360	9.1440	0.900	22.8600
0.370	9.3980	0.910	23.1140
0.380	9.6520	0.920	23.3680
0.390	9.9060	0.930	23.6220
		0.940	23.8760
0.400	10.1600	0.950	24.1300
0.410	10.4140	0.960	24.3840
0.420	10.6680	0.970	24.6380
0.430	10.9220	0.980	24.8920
0.440	11.1760	0.990	25.1460
0.450	11.4300	1.000	25.4000
0.460	11.6840		
0.470	11.9380		
0.480	12.1920		
0.490	12.4460		

FRACTIONS TO DECIMALS TO MILLIMETERS

Inches	Inches	mm	Inches	Inches	mm
$\frac{1}{64}$	0.0156	0.3969	$\frac{33}{64}$	0.5156	13.0969
$\frac{1}{32}$	0.0312	0.7938	$\frac{17}{32}$	0.5312	13.4938
$\frac{3}{64}$	0.0469	1.1906	$\frac{35}{64}$	0.5469	13.8906
$\frac{1}{16}$	0.0625	1.5875	$\frac{9}{16}$	0.5625	14.2875
$\frac{5}{64}$	0.0781	1.9844	$\frac{37}{64}$	0.5781	14.6844
$\frac{3}{32}$	0.0938	2.3812	$\frac{19}{32}$	0.5938	15.0812
$\frac{7}{64}$	0.1094	2.7781	$\frac{39}{64}$	0.6094	15.4781
$\frac{1}{8}$	0.1250	3.1750	$\frac{5}{8}$	0.6250	15.8750
$\frac{9}{64}$	0.1406	3.5719	$\frac{41}{64}$	0.6406	16.2719
$\frac{5}{32}$	0.1562	3.9688	$\frac{21}{32}$	0.6562	16.6688
$\frac{11}{64}$	0.1719	4.3656	$\frac{43}{64}$	0.6719	17.0656
$\frac{3}{16}$	0.1875	4.7625	$\frac{11}{16}$	0.6875	17.4625
$\frac{13}{64}$	0.2031	5.1594	$\frac{45}{64}$	0.7031	17.8594
$\frac{7}{32}$	0.2188	5.5562	$\frac{23}{32}$	0.7188	18.2562
$\frac{15}{64}$	0.2344	5.9531	$\frac{47}{64}$	0.7344	18.6531
$\frac{1}{4}$	0.2500	6.3500	$\frac{3}{4}$	0.7500	19.0500
$\frac{17}{64}$	0.2656	6.7469	$\frac{49}{64}$	0.7656	19.4469
$\frac{9}{32}$	0.2812	7.1438	$\frac{25}{32}$	0.7812	19.8438
$\frac{19}{64}$	0.2969	7.5406	$\frac{51}{64}$	0.7969	20.2406
$\frac{5}{16}$	0.3125	7.9375	$\frac{13}{16}$	0.8125	20.6375
$\frac{21}{64}$	0.3281	8.3344	$\frac{53}{64}$	0.8281	21.0344
$\frac{11}{32}$	0.3438	8.7312	$\frac{27}{32}$	0.8438	21.4312
$\frac{23}{64}$	0.3594	9.1281	$\frac{55}{64}$	0.8594	21.8281
$\frac{3}{8}$	0.3750	9.5250	$\frac{7}{8}$	0.8750	22.2250
$\frac{25}{64}$	0.3906	9.9219	$\frac{57}{64}$	0.8906	22.6219
$\frac{13}{32}$	0.4062	10.3188	$\frac{29}{32}$	0.9062	23.0188
$\frac{27}{64}$	0.4219	10.7156	$\frac{59}{64}$	0.9219	23.4156
$\frac{7}{16}$	0.4375	11.1125	$\frac{15}{16}$	0.9375	23.8125
$\frac{29}{64}$	0.4531	11.5094	$\frac{61}{64}$	0.9531	24.2094
$\frac{15}{32}$	0.4688	11.9062	$\frac{31}{32}$	0.9688	24.6062
$\frac{31}{64}$	0.4844	12.3031	$\frac{63}{64}$	0.9844	25.0031
$\frac{1}{2}$	0.5000	12.7000	1	1.000	25.4000

Temperature Difference Conversion

K TD ↔ °F TD

The Metric Unit of Temperature Difference is the Kelvin (K). A temperature difference of 1K is identical with a temperature difference of 1° Celcius. Locate the known value to be converted in the shaded column, then read the K equivalent to the left and the °F equivalent to the right.

▼	K	↔	°F	K	↔	°F	K	↔	°F	K	↔	°F	K	↔	°F	K	↔	°F
	0.06	0.1	0.18	3.67	6.6	11.9	7.28	13.1	23.6	10.89	19.6	35.3	14.5	26.1	47	23.9	43	77.4
	0.11	0.2	0.36	3.72	6.7	12.1	7.33	13.2	23.8	10.94	19.7	35.5	14.56	26.2	47.2	24.2	43.5	78.3
	0.17	0.3	0.54	3.78	6.8	12.2	7.39	13.3	23.9	11	19.8	35.6	14.61	26.3	47.3	24.4	44	79.2
	0.22	0.4	0.72	3.83	6.9	12.4	7.44	13.4	24.1	11.06	19.9	35.8	14.67	26.4	47.5	24.7	44.5	80.1
	0.28	0.5	0.9	3.89	7	12.6	7.5	13.5	24.3	11.11	20	36	14.72	26.5	47.7	25	45	81
	0.33	0.6	1.08	3.94	7.1	12.8	7.56	13.6	24.5	11.17	20.1	36.2	14.78	26.6	47.9	25.3	45.5	81.9
	0.39	0.7	1.26	4	7.2	13	7.61	13.7	24.7	11.22	20.2	36.4	14.83	26.7	48.1	25.6	46	82.8
	0.44	0.8	1.44	4.06	7.3	13.1	7.67	13.8	24.8	11.28	20.3	36.5	14.89	26.8	48.2	25.8	46.5	83.7
	0.5	0.9	1.62	4.11	7.4	13.3	7.72	13.9	25	11.33	20.4	36.7	14.94	26.9	48.4	26.1	47	84.6
	0.56	1	1.8	4.17	7.5	13.5	7.78	14	25.2	11.39	20.5	36.9	15	27	48.6	26.4	47.5	85.5
	0.61	1.1	1.98	4.22	7.6	13.7	7.83	14.1	25.4	11.44	20.6	37.1	15.06	27.1	48.8	26.7	48	86.4
	0.67	1.2	2.16	4.28	7.7	13.9	7.89	14.2	25.6	11.5	20.7	37.3	15.11	27.2	49	26.9	48.5	87.3
	0.72	1.3	2.34	4.33	7.8	14	7.94	14.3	25.7	11.56	20.8	37.4	15.17	27.3	49.1	27.2	49	88.2
	0.78	1.4	2.52	4.39	7.9	14.2	8	14.4	25.9	11.61	20.9	37.6	15.22	27.4	49.3	27.5	49.5	89.1
	0.83	1.5	2.7	4.44	8	14.4	8.06	14.5	26.1	11.67	21	37.8	15.28	27.5	49.5	27.8	50	90
	0.89	1.6	2.88	4.5	8.1	14.6	8.11	14.6	26.3	11.72	21.1	38	15.33	27.6	49.7	28.3	51	91.8
	0.94	1.7	3.06	4.56	8.2	14.8	8.17	14.7	26.5	11.78	21.2	38.2	15.39	27.7	49.9	28.9	52	93.6
	1	1.8	3.24	4.61	8.3	14.9	8.22	14.8	26.6	11.83	21.2	38.3	15.44	27.8	50	29.4	53	95.4
	1.06	1.9	3.42	4.67	8.4	15.1	8.28	14.9	26.8	11.89	21.4	38.5	15.5	27.9	50.2	30	54	97.2
	1.11	2	3.6	4.72	8.5	15.3	8.33	15	27	11.94	21.5	38.7	15.56	28	50.4	30.6	55	99
	1.17	2.1	3.78	4.78	8.6	15.5	8.39	15.1	27.2	12	21.6	38.9	15.61	28.1	50.6	31.1	56	100.8
	1.22	2.2	3.96	4.83	8.7	15.7	8.44	15.2	27.4	12.06	21.7	39.1	15.67	28.2	50.8	31.7	57	102.6
	1.28	2.3	4.14	4.89	8.8	15.8	8.5	15.3	27.5	12.11	21.8	39.2	15.72	28.3	50.9	32.2	58	104.4
	1.33	2.4	4.32	4.94	8.9	16	8.56	15.4	27.7	12.17	21.9	39.4	15.78	28.4	51.1	32.8	59	106.2
	1.39	2.5	4.5	5	9	16.2	8.61	15.5	27.9	12.22	22	39.6	15.83	28.5	51.3	33.3	60	108
	1.44	2.6	4.68	5.06	9.1	16.4	8.67	15.6	28.1	12.28	22.1	39.8	15.89	28.6	51.5	33.9	61	109.8
	1.5	2.7	4.86	5.11	9.2	16.6	8.72	15.7	28.3	12.33	22.2	40	15.94	28.7	51.7	34.4	62	111.6
	1.56	2.8	5.04	5.17	9.3	16.7	8.78	15.8	28.4	12.39	22.3	40.1	16	28.8	51.8	35	63	113.4
	1.61	2.9	5.22	5.22	9.4	16.9	8.83	15.9	28.6	12.44	22.4	40.3	16.06	28.9	52	35.6	64	115.2
	1.67	3	5.4	5.28	9.5	17.1	8.89	16	28.8	12.5	22.5	40.5	16.11	29	52.2	36.1	65	117
	1.72	3.1	5.58	5.33	9.6	17.3	8.94	16.1	29	12.56	22.6	40.7	16.17	29.1	52.4	36.7	66	118.8
	1.78	3.2	5.76	5.39	9.7	17.5	9	16.2	29.2	12.61	22.7	40.9	16.22	29.2	52.6	37.2	67	120.6
	1.83	3.3	5.94	5.44	9.8	17.6	9.06	16.3	29.3	12.67	22.8	41	16.28	29.3	52.7	37.8	68	122.4
	1.89	3.4	6.12	5.5	9.9	17.8	9.11	16.4	29.5	12.72	22.9	41.2	16.33	29.4	52.9	38.3	69	124.2
	1.94	3.5	6.3	5.56	10	18	9.17	16.5	29.7	12.78	23	41.4	16.39	29.5	53.1	38.9	70	126
	2	3.6	6.48	5.61	10.1	18.2	9.22	16.6	29.9	12.83	23.1	41.6	16.44	29.6	53.3	39.4	71	127.8
	2.06	3.7	6.66	5.67	10.2	18.4	9.28	16.7	30.1	12.89	23.2	41.8	16.5	29.7	53.5	40	72	129.6
	2.11	3.8	6.84	5.72	10.3	18.5	9.33	16.8	30.2	12.94	23.3	41.9	16.56	29.8	53.6	40.6	73	131.4
	2.17	3.9	7.02	5.78	10.4	18.7	9.39	16.9	30.4	13	23.4	42.1	16.61	29.9	53.8	41.1	74	133.2
	2.22	4	7.2	5.83	10.5	18.9	9.44	17	30.6	13.06	23.5	42.3	16.67	30	54	41.7	75	135
	2.28	4.1	7.38	5.89	10.6	19.1	9.5	17.1	30.8	13.11	23.6	42.5	16.94	30.5	54.9	42.2	76	136.8
	2.33	4.2	7.56	5.94	10.7	19.3	9.56	17.2	31	13.17	23.7	42.7	17.22	31	55.8	42.8	77	138.6
	2.39	4.3	7.74	6	10.8	19.4	9.61	17.3	31.1	13.22	23.8	42.8	17.5	31.5	56.7	43.3	78	140.4
	2.44	4.4	7.92	6.06	10.9	19.6	9.67	17.4	31.3	13.28	23.9	43	17.78	32	57.6	43.9	79	142.2
	2.5	4.5	8.1	6.11	11	19.8	9.72	17.5	31.5	13.33	24	43.2	18.06	32.5	58.5	44.4	80	144
	2.56	4.6	8.28	6.17	11.1	20	9.78	17.6	31.7	13.39	24.1	43.4	18.33	33	59.4	45	81	145.8
	2.61	4.7	8.46	6.22	11.2	20.2	9.83	17.7	31.9	13.44	24.2	43.6	18.61	33.5	60.3	45.6	82	147.6
	2.67	4.8	8.64	6.28	11.3	20.3	9.89	17.8	32	13.5	24.3	43.7	18.89	34	61.2	46.1	83	149.4
	2.72	4.9	8.82	6.33	11.4	20.5	9.94	17.9	32.2	13.56	24.4	43.9	19.17	34.5	62.1	46.7	84	151.2
	2.78	5	9	6.39	11.5	20.7	10	18	32.4	13.61	24.5	44.1	19.44	35	63	47.2	85	153
	2.83	5.1	9.18	6.44	11.6	20.9	10.06	18.1	32.6	13.67	24.6	44.3	19.72	35.5	63.9	47.8	86	154.8
	2.89	5.2	9.36	6.5	11.7	21.1	10.11	18.2	32.8	13.72	24.7	44.5	20	36	64.8	48.3	87	156.6
	2.94	5.3	9.54	6.56	11.8	21.2	10.17	18.3	32.9	13.78	24.8	44.6	20.3	36.5	65.7	48.9	88	158.4
	3	5.4	9.72	6.61	11.9	21.4	10.22	18.4	33.1	13.83	24.9	44.8	20.6	37	66.6	49.4	89	160.2
	3.06	5.5	9.9	6.67	12	21.6	10.28	18.5	33.3	13.89	25	45	20.8	37.5	67.5	50	90	162
	3.11	5.6	10.1	6.72	12.1	21.8	10.33	18.6	33.5	13.94	25.1	45.2	21.1	38	68.4	50.6	91	163.8
	3.17	5.7	10.3	6.78	12.2	22	10.39	18.7	33.7	14	25.2	45.4	21.4	38.5	69.3	51.1	92	165.6
	3.22	5.8	10.4	6.83	12.3	22.1	10.44	18.8	33.8	14.06	25.3	45.5	21.7	39	70.2	51.7	93	167.4
	3.28	5.9	10.6	6.89	12.4	22.3	10.5	18.9	34	14.11	25.4	45.7	21.9	39.5	71.1	52.2	94	169.2
	3.33	6	10.8	6.94	12.5	22.5	10.56	19	34.2	14.17	25.5	45.9	22.2	40	72	52.8	95	171
	3.39	6.1	11	7	12.6	22.7	10.61	19.1	34.4	14.22	25.6	46.1	22.5	40.5	72.9	53.3	96	172.8
	3.44	6.2	11.2	7.06	12.7	22.9	10.67	19.2	34.6	14.28	25.7	46.3	22.8	41	73.8	53.9	97	174.6
	3.5	6.3	11.3	7.11	12.8	23	10.72	19.3	34.7	14.33	25.8	46.4	23.1	41.5	74.7	54.4	98	176.4
	3.56	6.4	11.5	7.17	12.9	23.2	10.78	19.4	34.9	14.39	25.9	46.6	23.3	42	75.6	55	99	178.2
	3.61	6.5	11.7	7.22	13	23.4	10.83	19.5	35.1	14.44	26	46.8	23.6	42.5	76.5	55.6	100	180

Temperature Conversion

°C ↔ °F

Locate the known temperature to be converted in the shaded column, then read the Celsius equivalent to the left or the Fahrenheit equivalent to the right.

Basis: °C = $\frac{5}{9} (°F - 32)$ °F = $(\frac{9}{5} \times °C) + 32$

▼	°C	↔	°F	°C	↔	°F	°C	↔	°F	°C	↔	°F	°C	↔	°F	°C	↔	°F
-268	-450			-56.7	-70	-94	-20.6	-5	23	15.6	60	140	51.7	125	257	87.8	190	374
-262	-440			-56.1	-69	-92.2	-20	-4	24.8	16.1	61	141.8	52.2	126	258.8	88.3	191	375.8
-257	-430			-55.6	-68	-90.4	-19.4	-3	26.6	16.7	62	143.6	52.8	127	260.6	88.9	192	377.6
-251	-420			-55	-67	-88.6	-18.9	-2	28.4	17.2	63	145.4	53.3	128	262.4	89.4	193	379.4
-246	-410			-54.4	-66	-86.8	-18.3	-1	30.2	17.8	64	147.2	53.9	129	264.2	90	194	381.2
-240	-400			-53.9	-65	-85	-17.8	0	32	18.3	65	149	54.4	130	266	90.6	195	383
-234	-390			-53.3	-64	-83.2	-17.2	1	33.8	18.9	66	150.8	55	131	267.8	91.1	196	384.8
-229	-380			-52.8	-63	-81.4	-16.7	2	35.6	19.4	67	152.6	55.6	132	269.6	91.7	197	386.6
-223	-370			-52.2	-62	-79.6	-16.1	3	37.4	20	68	154.4	56.1	133	271.4	92.2	198	388.4
-218	-360			-51.7	-61	-77.8	-15.6	4	39.2	20.6	69	156.2	56.7	134	273.2	92.8	199	390.2
-212	-350			-51.1	-60	-76	-15	5	41	21.1	70	158	57.2	135	275	93.3	200	392
-207	-340			-50.6	-59	-74.2	-14.4	6	42.8	21.7	71	159.8	57.8	136	276.8	93.9	201	393.8
-201	-330			-50	-58	-72.4	-13.9	7	44.6	22.2	72	161.6	58.3	137	278.6	94.4	202	395.6
-196	-320			-49.4	-57	-70.6	-13.3	8	46.4	22.8	73	163.4	58.9	138	280.4	95	203	397.4
-190	-310			-48.9	-56	-68.8	-12.8	9	48.2	23.3	74	165.2	59.4	139	282.2	95.6	204	399.2
-184	-300			-48.3	-55	-67	-12.2	10	50	23.9	75	167	60	140	284	96.1	205	401
-179	-290			-47.8	-54	-65.2	-11.7	11	51.8	24.4	76	168.8	60.6	141	285.8	96.7	206	402.8
-173	-280			-47.2	-53	-63.4	-11.1	12	53.6	25	77	170.6	61.1	142	287.6	97.2	207	404.6
-168	-270	-454		-46.7	-52	-61.6	-10.6	13	55.4	25.6	78	172.4	61.7	143	289.4	97.8	208	406.4
-162	-260	-436		-46.1	-51	-59.8	-10	14	57.2	26.1	79	174.2	62.2	144	291.2	98.3	209	408.2
-157	-250	-418		-45.6	-50	-58	-9.4	15	59	26.7	80	176	62.8	145	293	98.9	210	410
-151	-240	-400		-45	-49	-56.2	-8.9	16	60.8	27.2	81	177.8	63.3	146	294.8	99.4	211	411.8
-146	-230	-382		-44.4	-48	-54.4	-8.3	17	62.6	27.8	82	179.6	63.9	147	296.6	100	212	413.6
-140	-220	-364		-43.9	-47	-52.6	-7.8	18	64.4	28.3	83	181.4	64.4	148	298.4	100.6	213	415.4
-134	-210	-346		-43.3	-46	-50.8	-7.2	19	66.2	28.9	84	183.2	65	149	300.2	101.1	214	417.2
-129	-200	-328		-42.8	-45	-49	-6.7	20	68	29.4	85	185	65.6	150	302	101.7	215	419
-123	-190	-310		-42.2	-44	-47.2	-6.1	21	69.8	30	86	186.8	66.1	151	303.8	102.2	216	420.8
-118	-180	-292		-41.7	-43	-45.4	-5.6	22	71.6	30.6	87	188.6	66.7	152	305.6	102.8	217	422.6
-112	-170	-274		-41.1	-42	-43.6	-5	23	73.4	31.1	88	190.4	67.2	153	307.4	103.3	218	424.4
-107	-160	-256		-40.6	-41	-41.8	-4.4	24	75.2	31.7	89	192.2	67.8	154	309.2	103.9	219	426.2
-101	-150	-238		-40	-40	-40	-3.9	25	77	32.2	90	194	68.3	155	311	104.4	220	428
-96	-140	-220		-39.4	-39	-38.2	-3.3	26	78.8	32.8	91	195.8	68.9	156	312.8	105	221	429.8
-90	-130	-202		-38.9	-38	-36.4	-2.8	27	80.6	33.3	92	197.6	69.4	157	314.6	105.6	222	431.6
-84	-120	-184		-38.3	-37	-34.6	-2.2	28	82.4	33.9	93	199.4	70	158	316.4	106.1	223	433.4
-79	-110	-166		-37.8	-36	-32.8	-1.7	29	84.2	34.4	94	201.2	70.6	159	318.2	106.7	224	435.2
-73.3	-100	-148		-37.2	-35	-31	-1.1	30	86	35	95	203	71.1	160	320	107.2	225	437
-72.8	-99	-146.2		-36.7	-34	-29.2	-0.6	31	87.8	35.6	96	204.8	71.7	161	321.8	107.8	226	438.8
-72.2	-98	-144.4		-36.1	-33	-27.4	0	32	89.6	36.1	97	206.6	72.2	162	323.6	108.3	227	440.6
-71.7	-97	-142.6		-35.6	-32	-25.6	0.6	33	91.4	36.7	98	208.4	72.8	163	325.4	108.9	228	442.4
-71.1	-96	-140.8		-35	-31	-23.8	1.1	34	93.2	37.2	99	210.2	73.3	164	327.2	109.4	229	444.2
-70.6	-95	-139		-34.4	-30	-22	1.7	35	95	37.8	100	212	73.9	165	329	110	230	446
-70	-94	-137.2		-33.9	-29	-20.2	2.2	36	96.8	38.3	101	213.8	74.4	166	330.8	110.6	231	447.8
-69.4	-93	-135.4		-33.3	-28	-18.4	2.8	37	98.6	38.9	102	215.6	75	167	332.6	111.1	232	449.6
-68.9	-92	-133.6		-32.8	-27	-16.6	3.3	38	100.4	39.4	103	217.4	75.6	168	334.4	111.7	233	451.4
-68.3	-91	-131.8		-32.2	-26	-14.8	3.9	39	102.2	40	104	219.2	76.1	169	336.2	112.2	234	453.2
-67.8	-90	-130		-31.7	-25	-13	4.4	40	104	40.6	105	221	76.7	170	338	112.8	235	455
-67.2	-89	-128.2		-31.1	-24	-11.2	5	41	105.8	41.1	106	222.8	77.2	171	339.8	113.3	236	456.8
-66.7	-88	-126.4		-30.6	-23	-9.4	5.6	42	107.6	41.7	107	224.6	77.8	172	341.6	113.9	237	458.6
-66.1	-87	-124.6		-30	-22	-7.6	6.1	43	109.4	42.2	108	226.4	78.3	173	343.4	114.4	238	460.4
-65.6	-86	-122.8		-29.4	-21	-5.8	6.7	44	111.2	42.8	109	228.2	78.9	174	345.2	115	239	462.2
-65	-85	-121		-28.9	-20	-4	7.2	45	113	43.3	110	230	79.4	175	347	115.6	240	464
-64.4	-84	-119.2		-28.3	-19	-2.2	7.8	46	114.8	43.9	111	231.8	80	176	348.8	116.1	241	465.8
-63.9	-83	-117.4		-27.8	-18	-0.4	8.3	47	116.6	44.4	112	233.6	80.6	177	350.6	116.7	242	467.6
-63.3	-82	-115.6		-27.2	-17	1.4	8.9	48	118.4	45	113	235.4	81.1	178	352.4	117.2	243	469.4
-62.8	-81	-113.8		-26.7	-16	3.2	9.4	49	120.2	45.6	114	237.2	81.7	179	354.2	117.8	244	471.2
-62.2	-80	-112		-26.1	-15	5	10	50	122	46.1	115	239	82.2	180	356	118.3	245	473
-61.7	-79	-110.2		-25.6	-14	6.8	10.6	51	123.8	46.7	116	240.8	82.8	181	357.8	118.9	246	474.8
-61.1	-78	-108.4		-25	-13	8.6	11.1	52	125.6	47.2	117	242.6	83.3	182	359.6	119.4	247	476.6
-60.6	-77	-106.6		-24.4	-12	10.4	11.7	53	127.4	47.8	118	244.4	83.9	183	361.4	120	248	478.4
-60	-76	-104.8		-23.9	-11	12.2	12.2	54	129.2	48.3	119	246.2	84.4	184	363.2	120.6	249	480.2
-59.4	-75	-103		-23.3	-10	14	12.8	55	131	48.9	120	248	85	185	365	121.1	250	482
-58.9	-74	-101.2		-22.8	-9	15.8	13.3	56	132.8	49.4	121	249.8	85.6	186	366.8	121.7	251	483.8
-58.3	-73	-99.4		-22.2	-8	17.6	13.9	57	134.6	50	122	251.6	86.1	187	368.6	122.2	252	485.6
-57.8	-72	-97.6		-21.7	-7	19.4	14.4	58	136.4	50.6	123	253.4	86.7	188	370.4	122.8	253	487.4
-57.2	-71	-95.8		-21.1	-6	21.2	15	59	138.2	51.1	124	255.2	87.2	189	372.2	123.3	254	489.2

Continued Next Page

Temperature Conversion

°C ↔ °F

Locate the known temperature to be converted in the shaded column, then read the Celsius equivalent to the left or the Fahrenheit equivalent to the right.

Basis: °C = $\frac{5}{9}$ (°F - 32) °F = ($\frac{9}{5}$ x °C) + 32

▼ °C	↔	°F	°C	↔	°F	°C	↔	°F	°C	↔	°F	°C	↔	°F	°C	↔	°F
123.9	255	491	165.6	330	626	207.2	405	761	248.9	480	896	290.6	555	1031	482	900	1652
124.4	256	492.8	166.1	331	627.8	207.8	406	762.8	249.4	481	897.8	291.1	556	1032.8	488	910	1670
125	257	494.6	166.7	332	629.6	208.3	407	764.6	250	482	899.6	291.7	557	1034.6	493	920	1688
125.6	258	496.4	167.2	333	631.4	208.9	408	766.4	250.6	483	901.4	292.2	558	1036.4	499	930	1706
126.1	259	498.2	167.8	334	633.2	209.4	409	768.2	251.1	484	903.2	292.8	559	1038.2	504	940	1724
126.7	260	500	168.3	335	635	210	410	770	251.7	485	905	293.3	560	1040	510	950	1742
127.2	261	501.8	168.9	336	636.8	210.6	411	771.8	252.2	486	906.8	293.9	561	1041.8	516	960	1760
127.8	262	503.6	169.4	337	638.6	211.1	412	773.6	252.8	487	908.6	294.4	562	1043.6	521	970	1778
128.3	263	505.4	170	338	640.4	211.7	413	775.4	253.3	488	910.4	295	563	1045.4	527	980	1796
128.9	264	507.2	170.6	339	642.2	212.2	414	777.2	253.9	489	912.2	295.6	564	1047.2	532	990	1814
129.4	265	509	171.1	340	644	212.8	415	779	254.4	490	914	296.1	565	1049	538	1000	1832
130	266	510.8	171.7	341	645.8	213.3	416	780.8	255	491	915.8	296.7	566	1050.8	543	1010	1850
130.6	267	512.6	172.2	342	647.6	213.9	417	782.6	255.6	492	917.6	297.2	567	1052.6	549	1020	1868
131.1	268	514.4	172.8	343	649.4	214.4	418	784.4	256.1	493	919.4	297.8	568	1054.4	554	1030	1886
131.7	269	516.2	173.3	344	651.2	215	419	786.2	256.7	494	921.2	298.3	569	1056.2	560	1040	1904
132.2	270	518	173.9	345	653	215.6	420	788	257.2	495	923	298.9	570	1058	566	1050	1922
132.8	271	519.8	174.4	346	654.8	216.1	421	789.8	257.8	496	924.8	299.4	571	1059.8	571	1060	1940
133.3	272	521.6	175	347	656.6	216.7	422	791.6	258.3	497	926.6	300	572	1061.6	577	1070	1958
133.9	273	523.4	175.6	348	658.4	217.2	423	793.4	258.9	498	928.4	300.6	573	1063.4	582	1080	1976
134.4	274	525.2	176.1	349	660.2	217.8	424	795.2	259.4	499	930.2	301.1	574	1065.2	588	1090	1994
135	275	527	176.7	350	662	218.3	425	797	260	500	932	301.7	575	1067	593	1100	2012
135.6	276	528.8	177.2	351	663.8	218.9	426	798.8	260.6	501	933.8	302.2	576	1068.8	599	1110	2030
136.1	277	530.6	177.8	352	665.6	219.4	427	800.6	261.1	502	935.6	302.8	577	1070.6	604	1120	2048
136.7	278	532.4	178.3	353	667.4	220	428	802.4	261.7	503	937.4	303.3	578	1072.4	610	1130	2066
137.2	279	534.2	178.9	354	669.2	220.6	429	804.2	262.2	504	939.2	303.9	579	1074.2	616	1140	2084
137.8	280	536	179.4	355	671	221.1	430	806	262.8	505	941	304.4	580	1076	621	1150	2102
138.3	281	537.8	180	356	672.8	221.7	431	807.8	263.3	506	942.8	305	581	1077.8	627	1160	2120
138.9	282	539.6	180.6	357	674.6	222.2	432	809.6	263.9	507	944.6	305.6	582	1079.6	632	1170	2138
139.4	283	541.4	181.1	358	676.4	222.8	433	811.4	264.4	508	946.4	306.1	583	1081.4	638	1180	2156
140	284	543.2	181.7	359	678.2	223.3	434	813.2	265	509	948.2	306.7	584	1083.2	643	1190	2174
140.6	285	545	182.2	360	680	223.9	435	815	265.6	510	950	307.2	585	1085	649	1200	2192
141.1	286	546.8	182.8	361	681.8	224.4	436	816.8	266.1	511	951.8	307.8	586	1086.8	654	1210	2210
141.7	287	548.6	183.3	362	683.6	225	437	818.6	266.7	512	953.6	308.3	587	1088.6	660	1220	2228
142.2	288	550.4	183.9	363	685.4	225.6	438	820.4	267.2	513	955.4	308.9	588	1090.4	666	1230	2246
142.8	289	552.2	184.4	364	687.2	226.1	439	822.2	267.8	514	957.2	309.4	589	1092.2	671	1240	2264
143.3	290	554	185	365	689	226.7	440	824	268.3	515	959	310	590	1094	677	1250	2282
143.9	291	555.8	185.6	366	690.8	227.2	441	825.8	268.9	516	960.8	310.6	591	1095.8	682	1260	2300
144.4	292	557.6	186.1	367	692.6	227.8	442	827.6	269.4	517	962.6	311.1	592	1097.6	688	1270	2318
145	293	559.4	186.7	368	694.4	228.3	443	829.4	270	518	964.4	311.7	593	1099.4	693	1280	2336
145.6	294	561.2	187.2	369	696.2	228.9	444	831.2	270.6	519	966.2	312.2	594	1101.2	699	1290	2354
146.1	295	563	187.8	370	698	229.4	445	833	271.1	520	968	312.8	595	1103	704	1300	2372
146.7	296	564.8	188.3	371	699.8	230	446	834.8	271.7	521	969.8	313.3	596	1104.8	710	1310	2390
147.2	297	566.6	188.9	372	701.6	230.6	447	836.6	272.2	522	971.6	313.9	597	1106.6	716	1320	2408
147.8	298	568.4	189.4	373	703.4	231.1	448	838.4	272.8	523	973.4	314.4	598	1108.4	721	1330	2426
148.3	299	570.2	190	374	705.2	231.7	449	840.2	273.3	524	975.2	315	599	1110.2	727	1340	2444
148.9	300	572	190.6	375	707	232.2	450	842	273.9	525	977	315.6	600	1112	732	1350	2462
149.4	301	573.8	191.1	376	708.8	232.8	451	843.8	274.4	526	978.8	321.1	610	1130	738	1360	2480
150	302	575.6	191.7	377	710.6	233.3	452	845.6	275	527	980.6	326.7	620	1148	743	1370	2498
150.6	303	577.4	192.2	378	712.4	233.9	453	847.4	275.6	528	982.4	332.2	630	1166	749	1380	2516
151.1	304	579.2	192.8	379	714.2	234.4	454	849.2	276.1	529	984.2	337.8	640	1184	754	1390	2534
151.7	305	581	193.3	380	716	235	455	851	276.7	530	986	343.3	650	1202	760	1400	2552
152.2	306	582.8	193.9	381	717.8	235.6	456	852.8	277.2	531	987.8	348.9	660	1220	766	1410	2570
152.8	307	584.6	194.4	382	719.6	236.1	457	854.6	277.8	532	989.6	354.4	670	1238	771	1420	2588
153.3	308	586.4	195	383	721.4	236.7	458	856.4	278.3	533	991.4	360	680	1256	777	1430	2606
153.9	309	588.2	195.6	384	723.2	237.2	459	858.2	278.9	534	993.2	365.6	690	1274	782	1440	2624
154.4	310	590	196.1	385	725	237.8	460	860	279.4	535	995	371	700	1292	788	1450	2642
155	311	591.8	196.7	386	726.8	238.3	461	861.8	280	536	996.8	377	710	1310	793	1460	2660
155.6	312	593.6	197.2	387	728.6	238.9	462	863.6	280.6	537	998.6	382	720	1328	799	1470	2678
156.1	313	595.4	197.8	388	730.4	239.4	463	865.4	281.1	538	1000.4	388	730	1346	804	1480	2696
156.7	314	597.2	198.3	389	732.2	240	464	867.2	281.7	539	1002.2	393	740	1364	810	1490	2714
157.2	315	599	198.9	390	734	240.6	465	869	282.2	540	1004	399	750	1382	816	1500	2732
157.8	316	600.8	199.4	391	735.8	241.1	466	870.8	282.8	541	1005.8	404	760	1400	843	1550	2822
158.3	317	602.6	200	392	737.6	241.7	467	872.6	283.3	542	1007.6	410	770	1418	871	1600	2912
158.9	318	604.4	200.6	393	739.4	242.2	468	874.4	283.9	543	1009.4	416	780	1436	899	1650	3002
159.4	319	606.2	201.1	394	741.2	242.8	469	876.2	284.4	544	1011.2	421	790	1454	927	1700	3092
160	320	608	201.7	395	743	243.3	470	878	285	545	1013	427	800	1472	954	1750	3182
160.6	321	609.8	202.2	396	744.8	243.9	471	879.8	285.6	546	1014.8	432	810	1490	982	1800	3272
161.1	322	611.6	202.8	397	746.6	244.4	472	881.6	286.1	547	1016.6	438	820	1508	1010	1850	3362
161.7	323	613.4	203.3	398	748.4	245	473	883.4	286.7	548	1018.4	443	830	1526	1038	1900	3452
162.2	324	615.2	203.9	399	750.2	245.6	474	885.2	287.2	549	1020.2	449	840	1544	1066	1950	3542
162.8	325	617	204.4	400	752	246.1	475	887	287.8	550	1022	454	850	1562	1093	2000	3632
163.3	326	618.8	205	401	753.8	246.7	47										

Pressure - Vacuum Conversion

Pressure

▼ bar to psi and kPa			kPa to bar and psi			psi to bar and kPa		
bar	psi	kPa	kPa	bar	psi	psi	bar	kPa
0	0	0	0	0	0	0	0	0
0.1	1.5	10	1	0.01	0.15	1	0.07	6.89
0.2	2.9	20	2	0.02	0.29	1.5	0.1	10.34
0.3	4.4	30	3	0.03	0.44	2	0.14	13.79
0.4	5.8	40	4	0.04	0.58	2.5	0.17	17.24
0.5	7.3	50	5	0.05	0.73	3	0.21	20.68
0.6	8.7	60	6	0.06	0.87	3.5	0.24	24.13
0.7	10.2	70	7	0.07	1.02	4	0.28	27.58
0.8	11.6	80	8	0.08	1.16	4.5	0.31	31.03
0.9	13.1	90	9	0.09	1.31	5	0.35	34.47
1	14.5	100	10	0.1	1.45	5.5	0.38	37.92
1.1	16	110	15	0.15	2.18	6	0.41	41.37
1.2	17.4	120	20	0.2	2.9	6.5	0.45	44.82
1.3	18.9	130	25	0.25	3.63	7	0.48	48.26
1.4	20.3	140	30	0.3	4.35	7.5	0.52	51.71
1.5	21.8	150	35	0.35	5.08	8	0.55	55.16
1.6	23.2	160	40	0.4	5.8	8.5	0.59	58.61
1.7	24.7	170	45	0.45	6.53	9	0.62	62.05
1.8	26.1	180	50	0.5	7.25	9.5	0.66	65.5
1.9	27.6	190	55	0.55	7.98	10	0.69	68.95
2	29	200	60	0.6	8.7	14.5	1	100
2.1	30.5	210	65	0.65	9.43	15	1.03	103.4
2.2	31.9	220	70	0.7	10.15	20	1.38	137.9
2.3	33.4	230	75	0.75	10.88	25	1.72	172.4
2.4	34.8	240	80	0.8	11.6	30	2.07	206.8
2.5	36.3	250	85	0.85	12.33	35	2.41	241.3
2.6	37.7	260	90	0.9	13.05	40	2.76	275.8
2.7	39.2	270	95	0.95	13.78	45	3.1	310.3
2.8	40.6	280	100	1	14.5	50	3.45	344.7
2.9	42.1	290	125	1.25	18.13	55	3.79	379.2
3	43.5	300	150	1.5	21.76	60	4.14	413.7
3.5	50.8	350	175	1.75	25.38	65	4.48	448.2
4	58	400	200	2	29	70	4.83	482.6
4.5	65.3	450	225	2.25	32.63	75	5.17	517.1
5	72.5	500	250	2.5	36.26	80	5.52	551.6
5.5	79.8	550	275	2.75	39.89	85	5.86	586.1
6	87	600	300	3	43.51	90	6.21	620.5
7	101.5	700	350	3.5	50.76	95	6.55	655
8	116	800	400	4	58.02	100	6.89	689.5
9	130.5	900	450	4.5	65.27	110	7.58	758.4
10	145	1000	500	5	72.52	120	8.27	827.4
11	159.5	1100	550	5.5	79.77	130	8.96	896.3
12	174	1200	600	6	87.02	140	9.65	965.3
13	185.5	1300	650	6.5	94.27	150	10.34	1034.2
14	203.1	1400	700	7	101.5	160	11.03	1103.2
15	217.6	1500	750	7.5	108.8	170	11.72	1172.1
16	232.1	1600	800	8	116	180	12.41	1241.1
17	246.6	1700	850	8.5	123.3	190	13.1	1310
18	261.1	1800	900	9	130.5	200	13.79	1379
19	275.6	1900	950	9.5	137.8	225	15.51	1551.3
20	290.1	2000	1000	10	145	250	17.24	1723.7
21	304.6	2100	1250	12.5	181.3	275	18.96	1896.1
22	319.1	2200	1500	15	217.6	300	20.68	2068.4
23	333.6	2300	1750	17.5	253.8	325	22.41	2240.8
24	348.1	2400	2000	20	290.1	350	24.13	2413.2
25	362.6	2500	2250	22.5	326.3	375	25.85	2585.5
26	377.1	2600	2500	25	362.6	400	27.58	2757.9
27	391.6	2700	2750	27.5	398.8	425	29.3	2930.3
28	406.1	2800	3000	30	435.1	450	31.03	3102.6
29	420.6	2900	3250	32.5	471.4	475	32.75	3275
30	435.1	3000	3500	35	507.6	500	34.47	3447.4
1 bar = 14.5038 psi 1 bar = 100 kPa			1 kPa = 0.01 bar 1 kPa = 0.14504 psi			1 psi = 0.06895 bar 1 psi = 6.8948 kPa		

Vacuum

“Hg to -bar and -kPa			-bar to “Hg and -kPa		
“Hg	-bar	-kPa	-bar	“Hg	-kPa
0	0	0	0	0	0
1	-0.034	-3.39	-0.01	0.295	-1
1.5	-0.051	-5.08	-0.025	0.738	-2.5
2	-0.068	-6.77	-0.05	1.48	-5
2.5	-0.085	-8.47	-0.075	2.21	-7.5
3	-0.102	-10.16	-0.1	2.95	-10
3.5	-0.119	-11.85	-0.125	3.69	-12.5
4	-0.135	-13.55	-0.15	4.43	-15
4.5	-0.152	-15.24	-0.175	5.17	-17.5
5	-0.169	-16.93	-0.2	5.91	-20
5.5	-0.186	-18.63	-0.225	6.64	-22.5
6	-0.203	-20.32	-0.25	7.38	-25
6.5	-0.22	-22.01	-0.275	8.12	-27.5
7	-0.237	-23.7	-0.3	8.86	-30
7.5	-0.254	-25.4	-0.325	9.6	-32.5
8	-0.271	-27.09	-0.35	10.34	-35
8.5	-0.288	-28.78	-0.375	11.07	-37.5
9	-0.305	-30.48	-0.4	11.81	-40
9.5	-0.322	-32.17	-0.425	12.55	-42.5
10	-0.339	-33.86	-0.45	13.29	-45
10.5	-0.356	-35.56	-0.475	14.03	-47.5
11	-0.373	-37.25	-0.5	14.77	-50
11.5	-0.389	-38.94	-0.525	15.5	-52.5
12	-0.406	-40.64	-0.55	16.24	-55
12.5	-0.423	-42.33	-0.575	16.98	-57.5
13	-0.44	-44.02	-0.6	17.72	-60
13.5	-0.457	-45.72	-0.625	18.46	-62.5
14	-0.474	-47.41	-0.65	19.19	-65
14.5	-0.491	-49.1	-0.675	19.93	-67.5
15	-0.508	-50.8	-0.7	20.67	-70
15.5	-0.525	-52.49	-0.725	21.41	-72.5
16	-0.542	-54.18	-0.75	22.15	-75
16.5	-0.559	-55.88	-0.775	22.89	-77.5
17	-0.576	-57.57	-0.8	23.62	-80
17.5	-0.593	-59.26	-0.825	24.36	-82.5
18	-0.61	-60.95	-0.85	25.1	-85
18.5	-0.626	-62.65	-0.875	25.84	-87.5
19	-0.643	-64.34	-0.9	26.58	-90
19.5	-0.66	-66.03	-0.925	27.32	-92.5
20	-0.677	-67.73	-0.95	28.05	-95
20.5	-0.694	-69.42			
21	-0.711	-71.11			
21.5	-0.728	-72.81	-0.975	28.79	-97.5
22	-0.745	-74.5	-1	29.53	-100
22.5	-0.762	-76.19			
23	-0.779	-77.89	Vacuum Conversions based on: 1" Hg = 3.386,383,7 kPa 1" Hg = 0.033,863,837 bar 1 bar = 100 kPa 1 bar = 29.530,026,38" Hg 1 kPa = 0.01 bar 1 kPa = 0.295,300,263,8" Hg		
23.5	-0.796	-79.58			
24	-0.813	-81.27			
24.5	-0.83	-82.97			
25	-0.847	-84.66			
25.5	-0.864	-86.35			
26	-0.88	-88.05			
26.5	-0.897	-89.74			
27	-0.914	-91.43			
27.5	-0.931	-93.13			
28	-0.948	-94.82			
28.5	-0.965	-96.51			
29	-0.982	-98.21			
29.5	-0.999	-99.9			
29.53	-1	-100			

Design Temperature/Pressure

Australian Standards include minimum recommended design temperatures/pressures for different refrigerants and applications. When selecting components for use in a refrigeration system, care should be taken to ensure the minimum design pressure of the component selected is suitable for its intended use. This is especially important in R410A systems as the required pressure ratings are significantly higher than that required on systems using most other common refrigerants.

Recommended Minimum Design Temperature/Pressure for Fixed Refrigeration Systems

System Type	Temperature °C	Pressure kPa				
		R22	R134a	R404A	R410A	R507
High Pressure Side Air Cooled Condenser	59	2295	1533	2743	3635	2796
High Pressure Side Water Cooled or Evaporative Condenser	46	1688	1083	2018	2686	2063
Low Pressure Side	43	1567	995	1873	2496	1917

Minimum design temperature as per AS1677, Part 2: 1998

Flare Nut Torque Data

Dimensional and Torque Data Standard for Flare Nuts

Flare Nut Size	Thread Sizes UNF	Across Flats (AF) Dimension		Recommended Tightening Torque N.m		
		Heldon Standard Flare Nuts	Heldon R410A Flare Nut	*ARI Heldon Std. Flare Nut	Heldon R410A Flare Nut	R410A Torque Wrench Setting
1/4	7/16 - 20	15.9	n/a	11 - 14	n/a	n/a
5/16	1/2 - 20	19.0	19.1		14 - 18	16
3/8	5/8 - 18	20.6	22.3	20 - 30	33 - 42	42
1/2	3/4 - 16	23.8	25.4	34 - 47	50 - 62	50
5/8	7/8 - 14	27.0	28.7	54 - 75	63 - 77	65
3/4	1 1/8 - 14	33.3	36.0	68 - 81	n/a	n/a
7/8	1 1/4 - 12	41.0	41.0	n/a	n/a	n/a

Courtesy of Heldon Products

A Guide to Replacement Refrigerants

Old Refrigerant	Brand Name	ASHRAE No.	Wholesale Availability ¹	Compatible with Mineral Oil	Non Flammable	Manufacturers Endorsement	Multiple Manufacturers ²	Notes
R12	Interim blends (low ODP)							
	FX56	R409A	✓	✓	✓	✓	✓	No oil change required
	FX57	R409B	✓	✓	✓	✓	✓	No oil change required
	MP39	R401A	✓	✓	✓	✓	✓	Requires 50% AB oil
	MP52	R401C	✓	✓	✓	✓	✓	For automotive applications
	MP66	R401B	✓	✓	✓	✓	✓	Requires 50% AB oil mix
	R406A	R406A	✓	✓	-	✓	-	No oil change required
	FR12	-	✓	-	-	✓	✓	
	Long term replacements (zero ODP)							
	134a	R134A	✓	✓	✓	✓	✓	Requires POE oil
	Isceon49	R413A	✓	✓	✓	✓	✓	Uses 3% HC to carry mineral oil
	Care 30	-	✓	✓	✓	✓	✓	Hydrocarbon blend
	SP 34	-	-	✓	-	✓	✓	R134a plus Hydrocarbon
	34 M	-	✓	✓	✓	✓	✓	R134a plus additives
	ER 12	-	-	✓	✓	✓	✓	Hydrocarbon blend

R502	Interim blends (low ODP)							
	FX10	R408A	✓	✓	✓	✓	✓	No oil change required
	HP80	R402A	✓	✓	✓	✓	✓	Requires 50% AB oil
	HP81	R407B	✓	✓	✓	✓	✓	Requires 50% AB oil
	Isceon69L	R403A	✓	✓	✓	✓	✓	
	Long term replacements (zero ODP)							
	FX70/HP62	R404A	✓	✓	✓	✓	✓	Requires POE oil
	AZ50	R507	✓	✓	✓	✓	✓	Requires POE oil
	Klea61	R407B	✓	✓	✓	-	✓	Requires POE oil
	Care50	-	✓	✓	✓	✓	✓	Hydrocarbon blend

Old Refrigerant	Brand Name	ASHRAE No.	Wholesale Availability ¹	Compatible with Mineral Oil	Non Flammable	Manufacturers Endorsement	Multiple Manufacturers ²	Notes
R11	Interim blends (low ODP)							
	R123	R123	✓	✓	✓	✓	✓	Only replacement available
	Long term replacements (zero ODP)							
	?	-	-	-	-	-	-	Possible future Alternatives?

R22	Interim blends (low ODP)							
	R22	R22	✓	✓	✓	✓	✓	Still available
	Long term replacements (zero ODP)							
	Klea66	R407C	✓	✓	✓	✓	✓	First alternative on the market
	FX220	-	✓	✓	✓	✓	✓	Not available yet
	AZ20	R410A	✓	✓	✓	✓	✓	New equipment only
	Care 50	-	✓	✓	✓	✓	✓	Hydrocarbon blend
	Isceon59	R417A	✓	✓	✓	-	✓	Requires POE oil
	FX90	R419A	✓	✓	✓	-	✓	Requires POE oil
	22LT	-	✓	✓	✓	✓	✓	Requires POE oil

NOTES:

1. Wholesale availability refers to the availability of the refrigerant from more than one wholesale group
2. Multiple manufacturers indicates whether the refrigerant is supplied by more than one manufacturer
3. ODP refers to Ozone Depletion Potential

R410A The Refrigerant of the Future

Why Change?

In compliance with the requirements written in the Montreal Protocol the developed world has been preparing to move away from HCFC Refrigerants, the most commonly used being R22.

When reviewing the alternatives to R22, R410A had a better thermodynamic performance than other alternatives.

Why 410A?

R410A has a higher volumetric cooling capacity compared to R22 and has better thermal exchange properties. This results in overall performance gains in terms of efficiency. The greater density of the vapour in R410A permits higher system velocities, reduces pressure drop losses and allows smaller diameter tubing to be used. In laymen's terms a smaller unit can be developed using a smaller displacement compressor, less coil and less refrigerant while maintaining system efficiencies comparable to current day R22 equipment. Therefore OEM's have a low cost solution to meet specific equipment requirements.

According to some major compressor manufacturers, R410A units can reach the industry's highest efficiency levels and, coupled with R410A's low global warming rating, result in an overall improved choice for residential air conditioning applications.

R410A Properties

R410A is a blended refrigerant using HFC 32 and HFC 125 in an equal mix. It is a near azeotropic blend with a negligible glide (0.1%). As a HFC refrigerant, R410A requires the use of polyolester oils (POE). R410A is classified A1/A1 by ASHRAE Standard 34 meaning it is non flammable and non toxic. But the biggest difference to R22 is the pressure levels generated which are more than 50% higher. Although operating pressures of R410A are significantly higher than those of R22, the R410A system actually runs slightly cooler than a comparable R22 system due to the higher vapour heat capacity of the refrigerant.

Higher Pressures Mean What?

The system pressures of R410A make it necessary for all equipment to be specifically made to work at these levels. R410A was **never** designed for retrofitting existing R22 systems. Newly designed R410A equipment generally employ thicker walled tubing, newly developed compressors, and use componentry capable of withstanding these high pressures.

Oils Ain't Oils

R410A is a blend of HFC refrigerants. The great majority of systems using HFC refrigerants contain polyolester oils (POE). POE oils are required because other oils, like mineral oil, are not miscible with HFC refrigerants. Miscibility is a measure of the ability of a liquid refrigerant to mix with the oil. When replacing oil in any system always check the manufacturers recommendations. Care should be taken to avoid exposure of the POE oil to air as it readily absorbs moisture (often referred to as being highly hygroscopic). Preference is always to use a fresh unopened tin of oil and perform the task with minimum exposure to air.

Controlling Moisture

The use of hygroscopic POE oils increases the chances of introducing water to the refrigeration system. POE oils hydrolyse to form acids at 75ppm. It is therefore essential that a good drier developed for use with HFC refrigerants and POE oils is used. Moisture indicators should therefore also have a sensitivity level below 75ppm when used.

What About Glide

Glide is best described as follows: During the boiling process for a refrigerant, the temperature at which liquid refrigerant begins to boil is the saturated liquid temperature (bubble point). The temperature at which the last drop of liquid has boiled is the saturated vapour temperature (dew point). During the condensing process the dew point is the temperature when the vapour first starts to condense, the bubble point when all has condensed. At constant pressure the difference between the dew point and bubble point is referred to as temperature glide. Single component refrigerants like R22 have no glide but blended refrigerants generally have some measurable glide. Put in simple terms, in a blended refrigerant one component begins to boil before the other. The glide for R410A is around 0.1°C which is very small. For field service purposes this glide can be neglected and the refrigerant treated as you would a single component refrigerant. In line with good practice, it is suggested you still liquid charge systems, as you should for any blended refrigerant.

Continues next page

R410A The Refrigerant of the Future

R410A Applications

R410A is ideal for residential and light commercial unitary air conditioning systems. Most world renowned manufacturers are now producing or have planned production of air conditioning units using R410A as suitable componentry is now widely available as a result of compliance with the phase out of HCFC's. Conversely R410A pricing may change as demand continues to increase.

What Happens when the System Leaks?

System leaks have always raised concern when the refrigerant used is a blend as the composition of the remaining refrigerant may have altered due to the difference in the volatility of the components in the blend (glide). As stated earlier the glide of R410A is only around 0.1°C and results in no meaningful change in composition during a leak or when charging a system.

Servicing a R410A System

In general R410A is handled the same as R22. You will require some specific tools that are rated for the higher pressures. These include gauges and manifolds, reclaimers, and correctly rated gas bottles with appropriate valves. As well as this it is recommended that flaring and swaging tools with an eccentric action be used as they provide a smoother flare surface.

Replacement parts must also be chosen bearing in mind that the system works under higher pressure. Items like driers, valves and even copper tube **must** be approved for use with R410A

Leak Detection

Any electronic detector capable of detecting HFC refrigerants can be used. Halide torches are not capable. Soap solutions will detect larger leaks. UV sensitive dyes can also be used effectively.

Safety and Handling

As said above, R410A generally is handled the same as R22. Always minimise the personal exposure to refrigerant gas. All refrigerants are heavier than air and will displace oxygen which can lead to asphyxiation.

Mixtures of refrigerants and air can become combustible under pressure. Never use mixtures of refrigerant to leak test. Always use dry nitrogen or other inert gas instead of air. Never braze on a system containing refrigerant. All refrigerant cylinders can become over pressurised in high temperature conditions. Never allow refrigerant cylinders to exceed 60°C. Never store cylinders unprotected in direct sunlight. Always use cylinders with the correct pressure rating and frequently check the condition of the cylinder you are using. Minimum rating for R410A cylinders is 5.2MPa. Never over-fill the cylinder with refrigerant.

Only use R410A in equipment specifically designed and constructed for R410A. Do not retrofit R22 units with R410A.

Ensure that correct replacement parts are used when servicing an R410A system and always use equipment and tools designed for R410A service work. For further safety information obtain a Material Safety Data Sheet available wherever the refrigerant is sold.

In Summary

R410A is a HFC refrigerant for use in specifically designed air conditioning systems. It is not designed to retrofit existing R22 systems. Although running at much higher pressures R410A is a far more economical refrigerant allowing equipment manufacturers to design smaller yet highly efficient air conditioning systems. R410A is proven to be safe and reliable providing the correct tools and equipment are used.

Pressure-Temperature Data for Refrigerants

Shaded figures under kPa are minus kilo Pascals. Shaded figures under psig are inches of Mercury

°C	R11		R12		R13		34M		R22		22LT		R123		R134a		R401A MP 39		R401B MP 66		°C
	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	
-70			-89	26.3	81	11			-81	23.9											-70
-66			-85	25.1	115	17			-75	22.2											-66
-62			-81	23.9	156	23			-68	20.1											-62
-58			-76	22.4	200	29			-60	17.7											-58
-54			-69	20.4	254	37			-48	14.2											-54
-50			-62	18.3	314	46			-37	10.9			-100	29.4							-50
-46			-54	16	384	56			-22	6.5			-99	29.3	-64	19					-46
-42	-97	28.6	-43	12.7	459	67			-6	1.8			-98	29	-55	16.3					-42
-38	-95	28.1	-32	9.5	541	78	-40.2	-5.8	10	1.5	-7	1	-97	28.7	-45	13.2	-4.2	12.4	-37	10.8	-38
-34	-93	27.5	-18	5.3	634	92	-26.6	-3.8	32	4.6	14	2	-96	28.4	-32	9	-29	8.6	-23	6.7	-34
-30	-91	26.9	-1	0.3	739	107	-10.7	-1.5	63	9.1	37	5	-95	27.9	-17	5	-14	4.1	-6	1.8	-30
-28	-90	26.6	5	0.7	790	115	-1.84	-0.2	80	12	50	7	-94	27.7	-9	2.6	-6	1.8	3	0.4	-28
-26	-89	26.3	11	1.6	848	123	7.7	1	91	13	64	9	-93	27.4	0.3	0.1	3	0.4	13	1.9	-26
-24	-88	26	21	3	906	131	18	2	108	16	80	12	-92	27.1	10	1.4	13	1.9	23	3.4	-24
-22	-87	25.7	32	4.6	965	140	29	4	126	18	96	14	-91	26.8	20	2.9	24	3.5	35	5	-22
-20	-85	25.1	44	6.4	1034	150	41	5	145	21	113	16	-90	26.5	31	4.5	35	5.1	47	6.8	-20
-18	-83	24.5	56	8.1	1110	161	53	7	165	24	128	19	-88	26.1	43	6.3	47	6.8	59	8.6	-18
-16	-81	23.9	70	10	1145	166	67	9	186	27	147	21	-87	25.7	56	8.1	59	8.6	73	11	-16
-14	-79	23.3	85	12	1255	182	81	11	207	30	168	24	-85	25.2	69	10	73	11	88	13	-14
-12	-77	22.7	103	15	1331	193	97	14	231	33	190	28	-84	24.7	84	12	88	13	106	15	-12
-10	-75	22.1	116	17	1414	205	113	16	254	37	213	31	-81	24	99	14	103	15	120	17	-10
-8	-73	21.6	131	19	1490	216	130	18	284	41	238	34	-79	23.5	115	17	119	17	137	20	-8
-6	-71	21	150	22	1583	230	149	21	310	45	264	38	-77	22.8	133	19	137	20	156	23	-6
-4	-68	20.1	165	24	1673	243	168	24	334	48	291	42	-75	22.2	151	22	155	22	176	25	-4
-2	-65	19.2	184	27	1768	256	189	27	361	52	321	47	-72	21.3	171	25	175	25	196	28	-2
0	-61	18	207	30	1869	271	211	30	398	58	352	51	-69	20.4	191	28	195	28	218	32	0
2	-57	16.8	224	32	1968	285	234	34	430	62	385	56	-65	19.3	213	31	217	31	242	35	2
4	-53	15.7	248	36	2069	300	259	37	465	67	419	61	-62	18.3	236	34	240	35	266	39	4
6	-49	14.5	270	39	2175	315	285	41	504	73	455	66	-58	17.2	260	38	264	38	292	42	6
8	-45	13.3	292	42	2290	332	312	45	542	79	494	72	-54	16	286	41	290	42	319	46	8
10	-41	12.1	323	47	2420	351	341	49	584	85	534	77	-50	14.8	313	45	316	46	348	50	10
12	-36	10.6	344	50	2530	368	371	53	622	90	576	84	-45	13.4	341	49	429	62	462	67	12
14	-30	8.9	372	54	2659	386	402	58	668	97	621	90	-41	12	371	54	462	67	496	72	14
16	-25	7.4	402	58	2799	406	436	63	716	104	668	97	-36	10.7	402	58	496	72	533	77	16
18	-19	5.6	432	63	2941	426	471	68	769	112	717	104	-31	9.2	434	63	532	77	571	83	18
20	-13	3.8	465	67	3092	448	507	73	814	118	768	111	-26	7.8	469	68	570	83	611	89	20
22	-6	1.8	497	72	3230	468	546	79	866	126	822	119	-22	6.4	505	73					22
24	0	0	531	77	3376	490	586	85	917	133	878	127	-15	4.5	543	79					24
26	9	1.3	571	83	3530	512	628	91	975	141	937	136	-9	2.5	582	84					26
28	19	2.8	605	88			672	97	1040	151	999	145	-1	0.3	623	90					28
30	30	4.4	644	93			718	104	1107	161	1063	154	7	1	666	97	784	114	837	121	30
32	40	5.8	683	99			765	111	1165	169	1131	164	15	2.2	711	103					32
34	50	7.3	724	105			815	118	1230	178	1201	174	24	3.5	758	110					34
36	58	8.4	765	111			867	125	1300	189	1274	185	31	4.5	807	117					36
38	62	9	824	120			921	133	1378	200	1350	196	41	6	858	124					38
40	76	11	860	125			978	141	1448	210	1430	207	52	7.5	911	132	1046	152	112	161	40
42	88	13	912	132			1036	150	1525	221	1512	219	62	9	966	140					42
44	99	17	962	140			1097	159	1610	233	1599	232	70	10	1024	148					44
46	111	16	1010	146			1161	168	1688	245	1688	245	86	12	1083	157					46
48	124	18	1060	154			1227	178	1770	257	1782	258	99	14	1145	166					48
50	140	20	1118	162			1295	187	1855	269	1879	272	114	16	1210	175	1361	197	1443	209	50
52	152	22	1172	170			1367	198	1950	283	1979	287	127	18	1277	185					52
54	170	25	1236	179			1440	208	2050	297	2084	302	139	20	1347	195					54
56	182	26	1300	189			1517	220	2140	310	2193	318	155	22	1419	206					56
58	200	29	1362	198			1596	231	2245	326	2306	334	169	24	1494	217					58
60	212	31	1428	207			1678	243	2345	340	2423	351	182	26	1571	228	1736	252	1836	266	60
70													276	40	2004	291	2177	316	2299	333	70
80													384	57	2520	365					80
90													524	76	3133	454					90
100													675	98							100
120													1074	156							120
140													1597	232							140
160													2260	328							160
180													3073	446							180

Pressure-Temperature Data for Refrigerants

Shaded figures under kPa are minus kilo Pascals. Shaded figures under psig are inches of Mercury

°C	R402A HP80		R402B HP81		R403B ISCEON 69L		R404A FX70 HP 62		R406A		R407B KLEA 61		R407C KLEA 66		R408A FX 10		R409A FX 56		°C
	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	
-70																			-70
-66																			-66
-62																			-62
-58					-27	8													-58
-54					-15	4.4													-54
-50			-23	6.7	1	0.1	-18	5.4							-26	7.5	-71	20.9	-50
-46					24	3.5	-0.8	0.2							-9	2.7	-63	18.7	-46
-42					47	6.8	20	2.9							10	1.4	-54	16	-42
-38	52	7.5	38	5.1	73	10.6	43	6.3	-37	10.8	41	5.9			32	4.6	-44	12.9	-38
-34	81	12	65	9.4	104	15	71	10	-24	7.1	68	9.9			57	8.3	-31	9.1	-34
-30	114	17	95	14	138	20	102	15	-9	2.7	100	15	37	5.4	87	13	-16	4.8	-30
-28	132	19	112	16	157	23	119	17	0	0	118	17	50	7.3	103	15	-8	2.3	-28
-26	152	22	130	19	178	26	137	20	9	1.3	136	20	64	9.3	120	17	0.7	0.1	-26
-24	172	25	149	22	199	29	157	23	19	2.8	156	23	79	11	138	20	10	1.4	-24
-22	194	28	169	25	220	32	178	26	29	4.2	177	26	96	14	157	23	20	2.9	-22
-20	217	31	191	28	243	35	199	29	40	5.8	200	29	113	16	177	26	31	4.5	-20
-18	242	35	214	31	267	39	223	32	52	7.5	224	32	131	19	199	29	43	6.2	-18
-16	268	39	238	35	295	43	247	36	65	9.4	249	36	151	22	222	32	55	8	-16
-14	295	43	263	38	320	46	273	40	78	11	276	40	172	25	246	36	68	9.9	-14
-12	324	47	290	42	348	50	301	44	92	13	304	44	194	28	272	39	86	12	-12
-10	355	51	318	46	382	55	330	48	107	16	334	48	218	31	299	43	97	14	-10
-8	387	56	348	50	412	60	361	52	123	18	365	53	243	35	328	48	113	16	-8
-6	420	61	380	55	446	65	393	57	140	20	398	58	269	39	358	52	131	19	-6
-4	456	66	413	60	483	70	427	62	158	23	433	63	297	43	389	56	148	21	-4
-2	493	72	447	65	520	75	463	67	177	26	470	68	327	47	423	61	167	24	-2
0	532	77	484	70	560	81	500	73	197	29	509	74	358	52	458	66	187	27	0
2	573	83	522	76	603	87	540	78	217	31	550	80	392	57	494	72	209	30	2
4	616	89	562	82	644	93	581	84	240	35	592	86	426	62	533	77	231	33	4
6	661	96	604	88	689	100	625	91	263	38	637	92	463	67	573	83	255	37	6
8	709	103	648	94	732	106	670	97	287	42	684	99	502	73	616	89	280	41	8
10	758	110	695	101	783	114	718	104	313	45	733	106	543	79	660	96	306	44	10
12	839	122	778	113	831	120	768	111	340	49	784	114	585	85	706	102	334	48	12
14	893	130	830	120	886	128	820	119	368	53	838	122	630	91	755	109	363	53	14
16	950	138	883	128	942	137	874	127	397	58	894	130	677	98	806	117	394	57	16
18	1009	146	939	136	998	145	931	135	428	62	953	138	727	105	858	124	426	62	18
20	1071	155	997	145	1057	153	990	143	461	67	1010	147	778	113	913	132	460	67	20
22					1113	161	1052	153	495	72	1080	156	832	121	971	141	495	72	22
24					1179	171	1117	162	530	77	1140	166	889	129	1031	150	532	77	24
26					1244	180	1184	172	567	82	1210	176	948	137	1093	159	571	83	26
28					1313	190	1254	182	605	88	1290	187	1010	146	1158	168	611	89	28
30	1418	206	1325	192	1388	201	1326	192	645	94	1360	198	1074	156	1226	178	654	95	30
32					1462	212	1402	203	687	100	1440	209	1141	165	1296	188	698	101	32
34					1540	223	1481	215	730	106	1520	221	1211	176	1369	199	744	108	34
36					1620	235	1562	226	775	112	1610	233	1284	186	1445	210	792	115	36
38					1700	246	1647	239	822	119	1700	246	1360	197	1523	221	842	122	38
40	1837	266	1720	249	1784	259	1735	252	871	126	1790	259	1440	209	1605	233	895	130	40
42					1872	271	1826	265	922	134	1880	273	1522	221	1689	245	950	138	42
44					1964	285	1920	278	974	141	1980	287	1607	233	1777	258	1007	146	44
46					2057	298	2018	293	1029	149	2080	302	1696	246	1868	271	1066	155	46
48					2151	312	2119	307	1085	157	2190	318	1789	259	1962	285	1127	163	48
50	2338	339	2192	318	2250	326	2224	323	1144	166	2300	333	1885	273	2060	299	1191	173	50
52					2358	342	2332	338	1204	175	2410	350	1984	288	2160	313	1258	182	52
54					2464	357	2445	355	1267	184	2530	368	2087	303	2265	328	1327	192	54
56					2569	373	2561	371	1331	193	2654	385	2194	318	2373	344	1399	203	56
58					2682	389	2681	389	1398	203	2780	403	2305	334	2484	360	1473	214	58
60	2928	425	2749	399	2795	405	2805	407	1468	213			2420	351	2600	377	1550	225	60
70			3399	493															70

Note:

Measurement of Static Pressures may vary slightly from tabulated figures for R400 series blends.
Blend pressures shown at Saturated Vapour (Dew) Temperatures.



Your best Solution...

Pressure–Temperature Data for Refrigerants

Shaded figures under kPa are minus kilo Pascals. Shaded figures under psig are inches of Mercury

▼ °C	R409B FX 57		R410A AZ 20		R413A ISCEON 49		R419A FX 90		R507 AZ 50		R508B SUVA 95		R717 Ammonia		°C
	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	kPa	psig	
-70											144	21	-90	26.6	-70
-66											200	29	-87	25.7	-66
-62											260	37.7	-82	24.2	-62
-58									-43	12.7	320	46.5	-76	22.4	-58
-54									-29	8.6	409	59.4	-69	20.4	-54
-50	-68	20			-50	14.8	-52	15.3	-13	3.8	455	66	-60	17.7	-50
-46	-59	17.6			-39	11.5	-40	11.8	5	0.7	602	87.4	-50	14.8	-46
-42	-50	14.7			-27	8	-26	7.7	27	3.9	689	100	-37	10.9	-42
-38	-38	11.2			-12	3.5	-9	2.8	52	7.5	813	118	-22	6.5	-38
-34	-24	7.1			4	0.6	10	1.4	81	12	917	133	-4	1.2	-34
-30	-8	2.4	173	25	24	3.5	32	4.7	113	16	1089	158	18	2.6	-30
-28	0.5	0.1	196	28	34	4.9	45	6.6	131	19	1185	172	30	4.4	-28
-26	10	1.4	220	32	45	6.5	58	8.4	150	22	1254	182	46	6.7	-26
-24	20	2.9	245	35	57	8.2	73	11	170	25	1323	192	60	8.7	-24
-22	31	4.5	272	39	70	10.1	88	13	192	28	1420	206	76	11	-22
-20	43	6.2	301	44	84	12	105	15	214	31	1516	220	89	13	-20
-18	55	8	331	48	98	14	122	18	238	35	1606	233	105	15	-18
-16	69	10	364	53	114	17	141	20	264	38	1709	248	124	18	-16
-14	83	12	398	58	130	19	160	23	291	42	1806	262	145	21	-14
-12	98	14	434	63	147	21	181	26	319	46	1923	279	165	24	-12
-10	115	17	472	68	165	24	203	29	349	51	2047	297	190	28	-10
-8	132	19	512	74	184	27	227	33	380	55	2171	315	215	31	-8
-6	150	22	554	80	204	30	252	37	414	60	2275	330	241	35	-6
-4	169	24	599	87	226	33	278	40	448	65	2413	350	269	39	-4
-2	190	28	646	94	248	36	306	44	485	70	2530	367	299	43	-2
0	211	31	695	101	272	39	336	49	524	76	2688	390	328	48	0
2	234	34	747	108	297	43	367	53	564	82	2854	414	362	53	2
4	258	37	801	116	323	47	400	58	606	88	2992	434	397	58	4
6	284	41	858	124	350	1	434	63	651	94	3150	457	433	63	6
8	310	45	918	133	379	55	471	68	697	101	3302	479	473	69	8
10	339	49	980	142	409	59	509	74	746	108	3474	504	513	74	10
12	368	53	1046	152	441	64	549	80	797	116	3640	528	555	81	12
14	399	58	1114	161	474	69	591	86	850	123			605	88	14
16	432	63	1186	172	508	74	636	92	905	131			654	95	16
18	466	68	1260	183	544	79	682	99	963	140			704	102	18
20	502	73	1338	194	582	84	731	106	1023	148			755	110	20
22	540	78	1419	206	621	90	783	113	1086	157			811	118	22
24	579	84	1504	218	662	96	835	121	1151	167			868	126	24
26	621	90	1592	231	705	102	891	129	1219	177			930	135	26
28	664	96	1684	244	750	109	948	138	1290	187			995	144	28
30	709	103	1779	258	796	115	190	146	1364	198			1065	154	30
32	756	110	1878	272	844	122	1072	155	1440	209			1130	164	32
34	805	117	1981	287	895	130	1139	165	1520	220			1203	174	34
36	856	124	2088	303	947	137	1206	175	1602	232			1277	185	36
38	910	132	2199	319	1001	145	1279	186	1688	245			1369	199	38
40	966	140	2315	336	1057	153	1352	196	1777	258			1449	210	40
42	1023	148	2434	353	1115	162	1431	208	1869	271			1543	224	42
44	1064	157	2558	371	1176	171	1510	219	1964	285			1630	236	44
46	1147	166	2686	389	1238	180	1596	231	2063	299			1722	250	46
48	1212	176	2819	409	1303	189	1681	244	2165	314			1820	264	48
50	1280	186	2956	429	1370	199	1773	257	2271	329			1914	278	50
52	1350	196	3099	449	1440	209	1865	271	2381	345			2005	291	52
54	1423	206	3245	470	1512	219	1965	285	2494	362			2110	319	54
56	1499	217	3397	492	1586	230	2064	299	2612	379			2229	323	56
58	1578	229	3554	515	1663	241	2171	315	2733	396			2366	343	58
60	1659	241	3716	539	1742	253	2278	330	2858	414			2515	365	60

Note:

Measurement of Static Pressures may vary slightly from tabulated figures for R400 series blends.

Blend pressures shown at Saturated Vapour (Dew) Temperatures.

Properties of Refrigerants

Refrigerant	R11	R12	R13	R13B1	R14	R22	R23	R113	R114	R115	R123	R134a
Boiling Point at 101 kPa °C	23.8	-29.8	-81.4	-57.7	-127.9	-40.8	-80.1	47.6	3.6	-39.1	27.9	-26.1
Temp. Glide at 101 kPa K	0	0	0	0	0	0	0	0	0	0	0	0
Critical Temperature °C	198	111.8	28.8	67.1	-45.7	96.2	26.3	214.1	145.7	79.9	183.7	101.1
Critical Pressure kPa	4467	4120	3870	3960	3750	4990	4833	3437	3250	3150	3670	4060
Latent Heat of Vapourisation at 101 kPa kJ/kg	180.3	165.4	149.7	119.1	136	233.8	238.8	146.8	136.3	126.3	171.6	216.1
Vapour Pressure at 25°C kPa	1.056	651.3	3550	1619.6	3280	1043.7	4732	44	213.4	911.1	91.4	664
Liquid Density at 25°C kg/m³	1476	1310	1290	1537.82	1320	1193.8	870	1580	1456.3	1284	1462.3	1206.3
Vapour Density at 101 kPa kg/m³	5.794	6.248	6.857	8.611	7.72	4.645	4.62	7.38	7.737	8.271	6.336	5.213
Ozone Depletion Potential (ODP)	1	1	1	12	0	0.04	0	0.09	0	0.4	0.014	0
Global Warming Potential (GWP) (CO ₂ =1)	4000	8500	11700	5600	6500	1700	11700	5000	9200	9320	93	1300
Flammability Limit at 25°C	None	None	None	None	None	None	None	None	None	None	None	None

Refrigerant	R141B	R142b	R152a	R290 Propane	R401A MP39	R401B MP66	R402A HP80	R402B HP81	R403B ISCEON 69L	R404A FX70 HP62	R406A	R407B KLEA 61
Boiling Point at 101 kPa °C	32.2	-9.1	-24	-42.1	-33.1	-34.7	-49.2	-47.4	-49.5	-46.5	-32.4	-43.7
Temp. Glide at 101 kPa K	0	0	0	0	6.4	6	1.6 - 2	1.6 - 2	2.6	0.5	9.4	4.4
Critical Temperature °C	204.4	137.2	113.3	125.2	108	106.1	75.5	82.6	90	72.1	114.5	75.8
Critical Pressure kPa	4250	4120	4520	4250	4600	4680	4130	4450	5090	3730	4584	4160
Latent Heat of Vapourisation at 101 kPa kJ/kg	224.3	223	337.7	428.1	228.3	229.8	190.8	207.9	185.5	200.3	244.9	201.3
Vapour Pressure at 25°C kPa	78.5	337.7	614.3	924.1	697.8	749.1	1394.1	1277	1274	1236.6	542	1168.6
Liquid Density at 25°C kg/m³	1234.9	1108.5	899.2	439.7	1195.2	1193.91	1156.28	1160.4	1150.6	1043.9	1085.6	1171.07
Vapour Density at 101 kPa kg/m³	4.765	4.785	3.315	2.368	4.777	4.734	5.639	5.182	5.682	5.342	4.425	5.512
Ozone Depletion Potential (ODP)	0.1		0	0	0.03	0.032	0.018	0.026	0.027	0	0.041	0
Global Warming Potential (GWP) (CO ₂ =1)	630	2000	140	3	1120	1230	2380	2080	2640	3850	1700	2300
Flammability Limit at 25°C	Liquid None Vapour in Air by Vol. 5.6/17.7	9.6%	4.8%	2.4%	None	None	None	None	None	None	Worst case of Fraction-ation flammable	None

Properties of Refrigerants

Refrigerant	R407C KLEA 66	R408A FX10	R409A FX56	R409B FX57	R410A AZ20	R413A ISCEON 49	R500	R502	R503	R507 AZ50	R600a Butane	R717 Ammonia
Boiling Point at 101 kPa °C	-43.6	-43.5	-34.2	-36.6	-51.4	-35	-33.5	-45.4	-88.7	-46.7	-11.8	-33.3
Temp. Glide at 101 kPa K	7.2	0.7	7.1	7.7	0	7.1	0	0	0	0	0	0
Critical Temperature °C	87.3	83.5	107	116	84.9	101.3	105.5	82.2	19.5	70.9	135	133
Critical Pressure kPa	4820	4340	4500	4700	4950	4110	4420	4075	4340	3793	3631	11417
Latent Heat of Vapourisation at 101 kPa kJ/kg	250.1	227.2	220.2	220.3	271.6	214.6	201	172	179.4	196.1	355.2	
Vapour Pressure at 25°C kPa	1002.8	1147.9	644	692	1646.9	717.1	770	1160	4290	1286	351.8	
Liquid Density at 25°C kg/m ³	1139.22	1062.1	1215.9	1228.4	1083.8	1169.6	1160	1220	1230	1041.6	552.3	
Vapour Density at 101 kPa kg/m ³	4.507	4.712	4.91	4.881	4.064	5.272	5.3	4.79	6.03	5.449	4.392	
Ozone Depletion Potential (ODP)	0	0.019	0.04	0.039	0	0	0.605	0.224	0.599	0	0	0
Global Warming Potential (GWP) (CO ₂ =1)	1370	3060	1530	1510	1300	1510	5210	5590	11700	3900	3	1
Flammability Limit at 25°C	None	None	None	None	None	Worst case of Fractionation flammable	None	None	None	None	1.7%	15%

Variation in Composition of Blended Refrigerants in Case of Leakage

In the following, we make the distinction between:

- Non azeotropic mixtures (having a high temperature glide* typically higher than 3K)
- Near azeotropic mixtures (having a low temperature glide typically lower than 3K)
- Azeotropic mixtures (having a temperature glide equal to zero K)

R404A and R408A are near azeotropic mixtures with a glide lower than 1 K.

The composition of the mixtures does not change when a leak occurs in a homogeneous phase. That is the case at the evaporator outlet (superheated vapour) or at the condenser outlet (subcooled liquid).

By contrast, marked differences of behaviour appear between the different types of mixtures during a leak in the two phase region equilibrium.

For non-azeotropic mixtures, the 'more volatile' components escape in preceding order, altering to a great extent the composition of the mixture remaining in the installation, resulting in change of performance.

For near azeotropic or real azeotropic mixtures, leak rates of all components of the mixture are very close; thus during a leakage, composition of refrigerant remaining in the installation is not affected significantly.

For all blended refrigerants it is stated by some manufacturers that after a leakage of 50% of the initial charge, changes in composition are less than 3% by weight.

Blended refrigerants must always be introduced in the liquid phase in the installation. Introduction in the gas phase, at the compressor suction, may increase the charging time of the installation and may alter performance of the mixture charged.

*For a non-azeotropic mixture the change process liquid $\longleftrightarrow$ vapour occurs over a range of temperatures (glide).

Properties of Refrigerants

General Rules for Handling Fluorocarbon Refrigerants

Legislation

All purchasers and users of refrigerants should be aware of, and conversant with, the requirements of the Ozone Protection and Synthetic Greenhouse Gas Management Regulations and/or any other state or federal legislation.

Safety Equipment

Goggles or face shields, gloves and safety footwear must be worn when filling cylinders, coupling up storage vessels and/or handling bulk fills so as to prevent eye damage or burns should a coupling give way or a line burst.

Store Cylinders Upright

Store cylinders in a cool, dry place, away from direct sources of heat. A well ventilated area will ensure that no build up of gas can occur should a cylinder leak or relief valve unseat.

Do Not Force Connections

Cylinder connections should fit easily and snugly. Never force them. Use correct tools. Stripped threads can cause leaks and possible loss of refrigerant.

Handle Cylinders Carefully

Cylinders should not be used for 'rollers' or supports. Cuts and abrasions may result. Care in handling cylinders will prolong their life.

Read Labels

Because colour of cylinders cannot be relied upon for positive identification, labels should always be read carefully. Colour blindness might interfere with proper identification. If still in doubt, other methods of identification are available from the manufacturer/supplier.

Visual Examination

Each time a cylinder is returned or delivered for re-charging, it should be carefully examined for evidence of corrosion, cuts, dents, bulges, condition of threads, valves, etc, to ensure suitability for further service. State Codes also provide for examination and testing of cylinders to ensure their continued use.

Never Transfer

Refrigerant cylinders are labelled and identified for a particular refrigerant. Never put a different refrigerant into a cylinder labelled for another refrigerant.

Keep Away from Fire

No part of any cylinder should ever be subjected to direct flame, steam or temperatures exceeding 50°C. If necessary to warm cylinder to promote more rapid discharge, extreme caution should be taken – an easy and safe way is to place bottom part of cylinder in a container of warm or hot water not over 50°C.

Ventilation

Since many materials such as soldering flux, oil, dirt and all refrigerants decompose at the flame temperatures used in soldering, the area in which repair is carried out should be properly ventilated to remove the products of decomposition and combustion of all materials. An adequately ventilated work area is good practice at any time, but especially when an open flame of a leak detector or welding torch is to be used in the presence of 'fluorocarbon' refrigerants.

Check Pressure

The pressure within the cylinder must be greater than in the system to cause the refrigerant to flow into the system. Pressure should be checked before charging.

Refrigerant Line Sizing

Pipe Sizing Criteria

Pipe sizing choices for refrigeration typically represent a compromise between conflicting objectives. Minimisation of pressure drops in suction and discharge vapour piping is important since these translate directly to losses in system cooling capacity. Such pressure losses also necessitate higher thermodynamic lifts at the compressor with consequent C.O.P. penalties. Pressure losses in liquid lines can result in loss of subcooling, formation of vapour bubbles and potentially erratic and damaging impacts on the smooth functioning of the system. Piping must thus be sized generously enough to limit frictional flow losses.

On the other hand, sizes must simultaneously be sufficiently small to maintain adequate flow velocities to physically entrain oil droplets in the refrigerant stream. This reduces the risk of oil trapping and slugging and assures a positive supply of lubricant in the compressor crankcase. Other incentives for pipe size limitation include a minimum refrigerant charge and reduction of first cost.

Courtesy of Allied Signal.

R22 – Suction Line

Refrigeration Capacity: kW	Evaporating Temperature: °C																			
	4				-7				-18				-29				-40			
	Equivalent Length: Metres																			
	7.5	15	30	45	7.5	15	30	45	7.5	15	30	45	7.5	15	30	45	7.5	15	30	45
0.88	3/8	3/8	3/8	1/2	3/8	3/8	1/2	1/2	1/2	1/2	5/8	5/8	1/2	5/8	5/8	3/4	5/8	3/4	7/8	7/8
1.76	3/8	1/2	1/2	5/8	1/2	1/2	5/8	5/8	5/8	5/8	3/4	7/8	5/8	3/4	7/8	7/8	3/4	7/8	1 1/8	1 1/8
2.64	1/2	1/2	5/8	5/8	1/2	5/8	5/8	3/4	3/4	3/4	7/8	7/8	3/4	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 3/8
3.52	1/2	5/8	5/8	3/4	5/8	5/8	3/4	3/4	3/4	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8
5.28	5/8	3/4	3/4	7/8	3/4	3/4	7/8	7/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 5/8	1 5/8
7.03	5/8	3/4	7/8	7/8	3/4	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8
8.79	3/4	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
10.55	3/4	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8
12.3	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	2 1/8
14.07	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8
15.83	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8
17.59	7/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8
21.1	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	2 5/8	2 5/8
26.38	1 1/8	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	2 5/8	2 1/8	2 1/8	2 5/8	3 1/8
35.17	1 1/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 1/8	2 5/8	3 1/8	3 1/8
43.96	1 3/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	3 1/8
52.76	1 3/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 5/8	2 5/8	2 1/8	2 5/8	2 5/8	3 1/8	2 5/8	3 1/8	3 5/8	3 5/8
61.55	1 3/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	3 1/8	2 5/8	3 1/8	3 5/8	3 5/8
70.34	1 5/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 5/8	2 5/8	3 1/8	2 5/8	2 5/8	3 1/8	3 1/8	3 1/8	3 1/8	3 5/8	4 1/8
87.93	1 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 1/8	2 5/8	3 1/8	3 1/8	2 5/8	3 1/8	3 1/8	3 5/8	3 1/8	3 5/8	4 1/8	5 1/8

Data based on 1.1K maximum pressure drop equivalent.

R22

Refrigeration Capacity: kW	Discharge Line				Liquid Line				Hot Gas Line **			
	Equivalent Length: Metres											
	7.5	15	30	45	7.5	15	30*	45	7.5	15	30	45
0.88	3/8	3/8	3/8	3/8	1/4	1/4	1/4	1/4	3/8	3/8	1/2	1/2
1.32	3/8	3/8	1/2	1/2	1/4	1/4	3/8	3/8	1/2	1/2	1/2	5/8
1.91	3/8	1/2	1/2	1/2	1/4	1/4	3/8	3/8	1/2	1/2	5/8	5/8
2.49	3/8	1/2	1/2	5/8	1/4	3/8	3/8	3/8	1/2	5/8	3/4	3/4
3.52	1/2	1/2	5/8	5/8	3/8	3/8	3/8	1/2	5/8	5/8	3/4	7/8
5.28	1/2	5/8	3/4	3/4	3/8	3/8	1/2	1/2	5/8	3/4	7/8	1 1/8
7.03	5/8	5/8	3/4	7/8	3/8	3/8	1/2	1/2	3/4	7/8	1 1/8	1 1/8
8.79	5/8	3/4	7/8	7/8	3/8	1/2	1/2	5/8	3/4	7/8	1 1/8	1 1/8
10.55	5/8	3/4	7/8	7/8	1/2	1/2	5/8	5/8	7/8	1 1/8	1 1/8	1 1/8
12.3	3/4	3/4	7/8	1 1/8	1/2	1/2	5/8	5/8	7/8	1 1/8	1 1/8	1 3/8
14.07	3/4	7/8	1 1/8	1 1/8	1/2	5/8	5/8	3/4	1 1/8	1 1/8	1 3/8	1 3/8
15.83	3/4	7/8	1 1/8	1 1/8	1/2	5/8	5/8	3/4	1 1/8	1 1/8	1 3/8	1 3/8
17.59	3/4	7/8	1 1/8	1 1/8	1/2	5/8	3/4	3/4	1 1/8	1 1/8	1 3/8	1 3/8
21.1	7/8	1 1/8	1 1/8	1 1/8	5/8	5/8	3/4	3/4	1 1/8	1 3/8	1 3/8	1 5/8
26.38	7/8	1 1/8	1 1/8	1 3/8	5/8	3/4	7/8	7/8	1 1/8	1 3/8	1 5/8	1 5/8
35.17	1 1/8	1 1/8	1 3/8	1 3/8	3/4	3/4	7/8	1 1/8	1 3/8	1 5/8	1 5/8	2 1/8
43.96	1 1/8	1 3/8	1 3/8	1 5/8	3/4	7/8	1 1/8	1 1/8	1 3/8	1 5/8	2 1/8	2 1/8
52.76	1 1/8	1 3/8	1 5/8	1 5/8	7/8	7/8	1 1/8	1 1/8	1 5/8	1 5/8	2 1/8	2 1/8
61.55	1 3/8	1 3/8	1 5/8	1 5/8	7/8	7/8	1 1/8	1 1/8				
70.34	1 3/8	1 5/8	1 5/8	2 1/8	7/8	1 1/8	1 3/8	1 3/8				
87.93	1 3/8	1 5/8	2 1/8	2 1/8	1 1/8	1 1/8	1 3/8	1 3/8				

* Line sizes are suitable for Condenser to Receiver Application.

**For suction Temperatures less than -29°C, the next larger line size must be used.

Copper tube sizes are: OD in inches.

Refrigerant Line Sizing

R134a

Refrigeration Capacity: kW	SUCTION LINE Sizes to Limit Pressure Drop to 1.1K Equivalent									DISCHARGE LINE Sizes for 0.56K Equivalent			LIQUID LINE Sizes for 0.56K Equivalent		
	4°C Evap.			-18°C Evap.			-40°C Evap.								
	Equivalent Length: Metres														
	7.5	15	30	7.5	15	30	7.5	15	30	7.5	15	30	7.5	15	30
0.88	3/8	1/2	1/2	1/2	5/8	3/4	3/4	7/8	11/8	3/8	3/8	3/8	3/8	3/8	3/8
1.76	1/2	5/8	5/8	5/8	3/4	7/8	11/8	11/8	13/8	3/8	1/2	1/2	3/8	3/8	3/8
2.64	5/8	5/8	3/4	3/4	7/8	11/8	11/8	13/8	15/8	1/2	1/2	5/8	3/8	3/8	3/8
3.52	5/8	3/4	3/4	7/8	11/8	11/8	13/8	13/8	15/8	1/2	5/8	5/8	3/8	3/8	3/8
5.28	3/4	7/8	7/8	11/8	11/8	13/8	13/8	15/8	21/8	5/8	5/8	3/4	3/8	3/8	1/2
7.03	3/4	7/8	11/8	11/8	13/8	15/8	15/8	21/8	21/8	5/8	3/4	7/8	3/8	3/8	1/2
10.55	7/8	11/8	11/8	13/8	13/8	15/8	21/8	21/8	25/8	3/4	7/8	7/8	1/2	1/2	5/8
17.59	11/8	13/8	13/8	15/8	15/8	21/8	21/8	25/8	31/8	7/8	11/8	11/8	1/2	5/8	3/4
26.38	13/8	13/8	15/8	15/8	21/8	25/8	25/8	31/8	35/8	11/8	11/8	13/8	5/8	3/4	3/4
35.17	13/8	15/8	21/8	21/8	21/8	25/8	31/8	31/8	35/8	11/8	13/8	13/8	5/8	3/4	7/8
52.76	15/8	21/8	21/8	21/8	25/8	31/8	35/8	35/8	51/8	13/8	13/8	15/8	3/4	7/8	11/8
70.34	21/8	21/8	25/8	25/8	31/8	31/8	35/8	41/8	51/8	13/8	15/8	21/8	7/8	11/8	11/8
87.93	21/8	21/8	25/8	25/8	31/8	35/8	41/8	51/8	51/8	15/8	21/8	21/8	7/8	11/8	11/8
105.5	21/8	25/8	25/8	31/8	31/8	35/8	41/8	51/8	61/8	15/8	21/8	21/8	11/8	11/8	13/8
140.7	25/8	25/8	31/8	31/8	35/8	41/8	51/8	61/8	61/8	21/8	25/8	25/8	11/8	13/8	13/8

Data based on 49°C condensing.

Courtesy of Allied Signal

Copper tubing sizes are: OD in inches.

R404A and R507

Refrigeration Capacity: kW	SUCTION LINE Sizes to Limit Pressure Drop to 1.1K Equivalent									DISCHARGE LINE Sizes for 0.56K Equivalent			LIQUID LINE Sizes for 0.56K Equivalent		
	4°C Evap.			-18°C Evap.			-40°C Evap.								
	Equivalent Length: Metres														
	7.5	15	30	7.5	15	30	7.5	15	30	7.5	15	30	7.5	15	30
0.88	3/8	3/8	1/2	1/2	1/2	1/2	5/8	5/8	3/4	3/8	3/8	3/8	1/4	1/4	1/4
1.76	3/8	1/2	1/2	1/2	5/8	3/4	3/4	7/8	1 1/8	3/8	3/8	1/2	1/4	3/8	3/8
2.64	1/2	1/2	5/8	5/8	3/4	3/4	7/8	1 1/8	1 1/8	3/8	1/2	1/2	3/8	3/8	3/8
3.52	1/2	5/8	3/4	3/4	3/4	7/8	1 1/8	1 1/8	1 3/8	1/2	1/2	5/8	3/8	3/8	3/8
5.28	5/8	5/8	3/4	3/4	7/8	1 1/8	1 1/8	1 3/8	1 3/8	1/2	5/8	5/8	3/8	3/8	1/2
7.03	3/4	3/4	7/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 5/8	5/8	5/8	3/4	3/8	1/2	1/2
10.55	3/4	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8	2 1/8	5/8	3/4	7/8	1/2	1/2	5/8
17.59	7/8	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	3/4	7/8	1 1/8	1/2	5/8	5/8
26.38	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	7/8	1 1/8	1 1/8	5/8	5/8	3/4
35.17	1 1/8	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	3 1/8	1 1/8	1 1/8	1 3/8	5/8	3/4	7/8
52.76	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	2 5/8	3 1/8	3 5/8	1 1/8	1 3/8	1 5/8	3/4	7/8	1 1/8
70.34	1 5/8	1 5/8	2 1/8	2 1/8	2 5/8	2 5/8	3 1/8	3 1/8	3 5/8	1 3/8	1 3/8	1 5/8	7/8	1 1/8	1 1/8
87.93	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	3 1/8	3 1/8	3 5/8	4 1/8	1 3/8	1 5/8	2 1/8	7/8	1 1/8	1 1/8
105.5	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	3 1/8	3 5/8	3 5/8	4 1/8	1 5/8	1 5/8	2 1/8	1 1/8	1 1/8	1 3/8
140.7	2 1/8	2 5/8	2 5/8	2 5/8	3 1/8	3 5/8	3 5/8	4 1/8	5 1/8	1 5/8	2 1/8	2 1/8	1 1/8	1 3/8	1 3/8

Data based on 49°C condensing.

Courtesy of Allied Signal

Copper tubing sizes are: OD in inches.

Equivalent Length of Pipe: Metres – For Valves and Fittings

Line Size Outside Dia. Inches	1/2	5/8	7/8	1 1/8	1 3/8	1 5/8	2 1/8	2 5/8	3 1/8	3 5/8	4 1/8	5 1/8	6 1/8	8 1/8	10 1/8	12 1/8
Globe Valve (Open)	4.3	4.9	6.7	8.5	11	12.8	17.4	21	25.3	30.2	36	42.1	51.2	68.6	85.3	102
Angle Valve (Open)	2.1	2.7	3.7	4.6	5.5	6.4	8.5	10.4	12.8	14.9	17.4	21.3	25.3	35.7	42.7	50.3
Standard Elbow 90°	0.3	0.6	0.6	0.9	1.2	1.2	1.5	2.1	2.4	3	3.7	4.3	4.9	6.1	7.9	9.4
Standard Elbow 45°	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.9	1.2	1.5	1.8	2.1	2.4	3	4	4.9
Standard Tee (Through Side Out.)	0.9	1.2	1.5	1.8	2.4	2.7	3.7	4.3	5.2	6.1	6.7	8.5	10.4	13.4	17.1	19.8

Values shown are average.

Copper Tube - Safe Working Pressures

Australian Standard AS/NZS 1571 Copper
Seamless Tubes for Air-conditioning and Refrigeration
Standard sizes and data for straight copper tubes

Outside Diameter (mm)	Wall Thickness (mm)	Imperial Equivalent O.D. and swg	Nominal Weight (kg/m)	Form	Temper	Safe Working Pressure (kPa) at service temperature				
						50°C	55°C	60°C	65°C	70°C
6.35	0.91	1/4" x 20	0.139	6m straight	H	12142	11431	10907	10528	10256
9.53	0.91	3/8" x 20	0.220	6m straight	H	7710	7258	6925	6685	6512
12.70	0.91	1/2" x 20	0.301	6m straight	1/2H	5653	5322	5078	4901	4774
12.70	1.02	1/2" x 19	0.335	6m straight	1/2H	6389	6015	5739	5540	5396
15.88	0.91	5/8" x 20	0.383	6m straight	1/2H	4459	4198	4006	3866	3766
15.88	1.02	5/8" x 19	0.426	6m straight	1/2H	5031	4737	4519	4362	4249
19.05	0.91	3/4" x 20	0.464	6m straight	1/2H	3684	3468	3309	3194	3111
19.05	1.02	3/4" x 19	0.517	6m straight	1/2H	4152	3909	3729	3600	3507
19.05	1.22	3/4" x 18	0.611	6m straight	1/2H	5015	4722	4505	4349	4236
22.23	0.91	7/8" x 20	0.545	6m straight	1/2H	3137	2953	2818	2720	2649
22.23	1.22	7/8" x 18	0.720	6m straight	1/2H	4261	4011	3827	3694	3599
22.23	1.63	7/8" x 16	0.943	6m straight	H	5794	5455	5204	5024	4894
25.40	0.91	1" x 20	0.626	6m straight	H	2732	2572	2454	2369	2308
25.40	1.22	1" x 18	0.829	6m straight	H	3705	3488	3328	3212	3129
25.40	1.63	1" x 16	1.088	6m straight	H	5026	4732	4515	4358	4245
28.57	0.91	1 1/8" x 20	0.707	6m straight	H	2420	2278	2174	2098	2044
28.57	1.22	1 1/8" x 18	0.937	6m straight	H	3277	3086	2944	2842	2768
28.57	1.83	1 1/8" x 15	1.374	6m straight	H	5016	4723	4506	4350	4237
31.75	0.91	1 1/4" x 20	0.788	6m straight	H	2171	2044	1950	1883	1834
31.75	1.22	1 1/4" x 18	1.046	6m straight	H	2937	2765	2639	2547	2481
31.75	2.03	1 1/4" x 14	1.694	6m straight	H	5007	4714	4497	4341	4229
34.92	0.91	1 3/8" x 20	0.869	6m straight	H	1969	1854	1769	1708	1663
34.92	1.22	1 3/8" x 18	1.155	6m straight	H	2662	2506	2391	2308	2248
34.92	2.03	1 3/8" x 14	1.875	6m straight	H	4527	4262	4067	3925	3824
38.10	0.91	1 1/2" x 20	0.951	6m straight	H	1801	1696	1618	1562	1522
38.10	1.22	1 1/2" x 18	1.264	6m straight	H	2433	2291	2186	2110	2055
41.27	0.91	1 5/8" x 20	1.032	6m straight	H	1660	1563	1491	1440	1402
41.27	1.22	1 5/8" x 18	1.372	6m straight	H	2241	2110	2013	1943	1893
41.27	2.41	1 5/8" x 12.5	2.630	6m straight	H	4549	4282	4086	3944	3842
44.45	0.91	1 3/4" x 20	1.113	6m straight	H	1539	1449	1383	1335	1300
44.45	1.22	1 3/4" x 18	1.481	6m straight	H	2077	1955	1866	1801	1754
50.80	0.91	2" x 20	1.275	6m straight	H	1344	1265	1207	1165	1135
50.80	1.22	2" x 18	1.699	6m straight	H	1812	1705	1627	1571	1530
50.80	1.63	2" x 16	2.251	6m straight	H	2438	2296	2190	2114	2060
53.97	0.91	2 1/8" x 20	1.356	6m straight	H	1264	1190	1135	1096	1067
53.97	1.22	2 1/8" x 18	1.807	6m straight	H	1703	1603	1530	1477	1438
53.97	1.63	2 1/8" x 16	2.396	6m straight	H	2291	2157	2058	1987	1935
66.68	1.22	2 5/8" x 18	2.243	6m straight	H	1373	1293	1233	1190	1160
66.68	1.63	2 5/8" x 16	2.978	6m straight	H	1845	1737	1657	1599	1558
76.20	1.63	3" x 16	3.414	6m straight	H	1610	1515	1446	1396	1360
101.60	1.63	4" x 16	4.577	6m straight	H	1201	1131	1079	1042	1015

Denotes R410A rated tube

Courtesy of Crane Enfield Metals Pty Ltd

Copper Tube - Safe Working Pressures

Australian Standard AS/NZS 1571 Copper

Seamless Tubes for Air-conditioning and Refrigeration

Standard sizes and data for annealed coil copper tubes

Outside Diameter (mm)	Wall Thickness (mm)	Imperial Equivalent O.D. and swg	Nominal Weight (kg/m)	Form	Temper	Safe Working Pressure (kPa) at service temperature				
						50°C	55°C	60°C	65°C	70°C
4.76	0.56	$\frac{3}{16}$ " x 24	0.066	30m Coil	0	9711	9142	8723	8420	8202
4.76	0.71	$\frac{3}{16}$ " x 22	0.081	30m Coil	0	12715	11971	11422	11025	10739
4.76	0.91	$\frac{3}{16}$ " x 20	0.098	30m Coil	0	17041	16043	15308	14776	14393
6.35	0.56	$\frac{1}{4}$ " x 24	0.091	30m Coil	0	7069	6656	6350	6130	5971
6.35	0.71	$\frac{1}{4}$ " x 22	0.112	30m Coil	0	9175	8638	8242	7955	7749
6.35	0.91	$\frac{1}{4}$ " x 20	0.139	30m Coil	0	12142	11431	10907	10528	10256
6.35	1.22	$\frac{1}{4}$ " x 18	0.176	30m Coil	0	17143	16140	15400	14864	14480
7.94	0.56	$\frac{5}{16}$ " x 24	0.116	30m Coil	0	5558	5232	4993	4819	4694
7.94	0.71	$\frac{5}{16}$ " x 22	0.144	30m Coil	0	7177	6757	6447	6223	6062
7.94	0.91	$\frac{5}{16}$ " x 20	0.180	30m Coil	0	9431	8879	8472	8177	7966
9.53	0.56	$\frac{3}{8}$ " x 24	0.141	18m Coil	0	4579	4311	4113	3970	3867
9.53	0.71	$\frac{3}{8}$ " x 22	0.176	18m Coil	0	5893	5548	5294	5110	4978
9.53	0.91	$\frac{3}{8}$ " x 20	0.220	18m Coil	0	7710	7258	6925	6685	6512
12.70	0.56	$\frac{1}{2}$ " x 24	0.191	18m Coil	0	3389	3190	3044	2938	2862
12.70	0.71	$\frac{1}{2}$ " x 22	0.239	18m Coil	0	4344	4090	3903	3767	3669
12.70	0.81	$\frac{1}{2}$ " x 21	0.270	18m Coil	0	4994	4701	4486	4330	4218
12.70	0.91	$\frac{1}{2}$ " x 20	0.301	18m Coil	0	5653	5322	5078	4901	4774
15.88	0.56	$\frac{5}{8}$ " x 24	0.241	18m Coil	0	2688	2530	2414	2331	2270
15.88	0.71	$\frac{5}{8}$ " x 22	0.303	18m Coil	0	3438	3237	3088	2981	2904
15.88	0.81	$\frac{5}{8}$ " x 21	0.343	18m Coil	0	3945	3715	3544	3421	3332
15.88	0.91	$\frac{5}{8}$ " x 20	0.383	18m Coil	0	4459	4198	4006	3866	3766
15.88	1.02	$\frac{5}{8}$ " x 19	0.426	18m Coil	0	5031	4737	4519	4362	4249
19.05	0.71	$\frac{3}{4}$ " x 22	0.366	18m Coil	0	2846	2679	2557	2468	2404
19.05	0.91	$\frac{3}{4}$ " x 20	0.464	18m Coil	0	3684	3468	3309	3194	3111
19.05	1.22	$\frac{3}{4}$ " x 18	0.611	18m Coil	0	5015	4722	4505	4349	4236
22.23	0.91	$\frac{7}{8}$ " x 20	0.545	18m Coil	0	3137	2953	2818	2720	2649

Pair Coil Specifications

Outside Diameter (mm)	Wall Thickness (mm)	Imperial Equivalent O.D. and swg	Nominal Weight (kg/m)	Form	Temper	Safe Working Pressure (kPa) at service temperature				
						50°C	55°C	60°C	65°C	70°C
6.35	0.81	$\frac{1}{4}$ " x 21	0.126	20m Coil	0	10635	10012	9553	9221	8982
9.52	0.81	$\frac{3}{8}$ " x 21	0.198		0	6800	6402	6108	5896	5743
6.35	0.81	$\frac{1}{4}$ " x 21	0.126	20m Coil	0	10635	10012	9553	9221	8982
12.70	0.81	$\frac{1}{2}$ " x 21	0.270		0	4994	4701	4486	4330	4218
6.35	0.81	$\frac{1}{4}$ " x 21	0.126	20m Coil	0	10635	10012	9553	9221	8982
15.88	1.02	$\frac{5}{8}$ " x 19	0.426		0	5031	4737	4519	4362	4249
9.52	0.81	$\frac{3}{8}$ " x 21	0.198	20m Coil	0	6800	6402	6108	5896	5743
15.88	1.02	$\frac{5}{8}$ " x 19	0.426		0	5031	4737	4519	4362	4249
9.52	0.81	$\frac{3}{8}$ " x 21	0.198	20m Coil	0	6800	6402	6108	5896	5743
19.05	1.22	$\frac{3}{4}$ " x 18	0.611		0	5015	4722	4505	4349	4236
12.70	0.81	$\frac{1}{2}$ " x 21	0.270	20m Coil	0	4994	4701	4486	4330	4218
19.05	1.22	$\frac{3}{4}$ " x 18	0.611		0	5015	4722	4505	4349	4236

Interpolation of allowable design stress as defined by table D7 of AS4041 for below temperatures

Temperature (°C)	50.0	55.0	60.0	65.0	70.0	75.0
S _D (MPa)	41.0	38.6	36.83	35.55	34.63	34.0

Working Pressures

Safe working pressures for copper tube are calculated on the basis of annealed temper tube with the maximum allowable outside diameter and minimum wall thickness, thus allowing for softening of the tube due to brazing or heating. All safe working pressures are based on the following formula:

$$P_{sw} = \frac{2000 \times S_D \times t_m}{D - t_m}$$

Where:

P_{sw} = safe working pressure (MPa)

S_D = maximum allowable design stress for annealed copper (MPa)

t_m = minimum wall thickness of tube (mm)

D = outside diameter or tube (mm)

Denotes R410A rated tube

Courtesy of Crane Enfield Metals Pty Ltd

Capillary Tubing Selection

L'Unite Hermetique Engineering Recommendations

R404A – Low Temperature Applications

Evap. Temp. °C	-40				-35				-30				-25			
Ambient °C	25		32		25		32		25		32		25		32	
LUH Model	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm
AE 1417 Z CAE 2417 Z	1.4	0.8	2.25	0.8	1	0.8	1.65	0.8			1.2	0.8			0.9	0.8
AE 1420 Z CAE 2420 Z					2.2	1	3.2	1	1.6	1	2.1	1	1.2	1	1.55	1
CAE 2424 Z	2.5	1			1.75	1	2.35	1	1.25	1	1.65	1	0.9	1	1.25	1
CAJ 2428 Z					2.4	1			1.55	1	2.05	1	1 3.5	1 1.2	1.4	1
CAJ 2432 Z	2.05	1			1.4	1	1.9	1	0.95 3	1 1.2	1.3	1	1.8	1.2	0.9 2.8	1 1.2
CAJ 2446 Z					1.85	1.2			1.1	1.2	1.65	1.2			0.95	1.2
CAJ 2464 Z	2.1	1.2			1.25	1.2	1.95	1.2	2.8	1.5	1.2	1.2	1.35	1.5	2.3	1.5
FH 2480 Z	1.2	1.2	2	1.2	1.8	1.5	1	1.2	0.95	1.5	1.55	1.5				

R134a – Medium / High Temperature Applications

Evap. Temp. °C	-10				-5				0				5			
Ambient °C	25		32		25		32		25		32		25		32	
LUH Model	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm
AZ 4414 Y	2.1	0.8	2.8	0.8	1.55	0.8	1.95	0.8	1.1	0.8	1.45	0.8			1	0.8
AZ 4419 Y	1.1 2.2	0.8 1	1.6	0.8	1.55	1	0.95 1.95	0.8 1	1.1	1	1.4	1			1.05	1
AEZ 4425 Y	1.5	1	1.9	1	1.05	1	1.4	1			1	1				
AEZ 4430 Y	1	1	1.3	1	2.7	1.2	0.9	1	1.95	1.2	2.45	1.2	1.55	1.2	1.85	1.2
CAE 4440 Y	1.9	1.2	2.55	1.2	1.4	1.2	1.75	1.2	1	1.2	1.3	1.2			0.9	1.2
CAE 4448 Y	1.7	1.2			1.25	1.2	1.55	1.2	0.9	1.2	1.15	1.2				
CAJ 4452 Y	1.5	1.2	1.9	1.2	1.05	1.2	1.3	1.2			0.95	1.2				
CAJ 4461 Y	1.2	1.2	1.5	1.2	2.85	1.5	1.1	1.2	2	1.5	2.6	1.5	1.45	1.5	1.85	1.5
CAJ 4492 Y	1.4	1.5	1.7	1.5	1.05	1.5	1.3	1.5			0.95	1.5				
CAJ 4511 Y	1.05 1.4	1.5 2x1.2	1.35 1.3	1.5 2x1.2			0.9 0.95	1.5 2x1.2								
FH 4518 Y	2.7 1.55	2 2x1.5	3.4 1.9	2 2x1.5	1.85 1.1	2 2x1.5	2.4 1.4	2 2x1.5	1.3	2	1.65 1	2 2x1.5			1.15	2
FH 4525 Y	1.25 1.1	2.2 2x1.5	1.6 1.45	2.2 2x1.5			1.1 1.05	2.2 2x1.5								

R22 – Medium / High Temperature Applications

Evap. Temp. °C	-20				-15				-10				-5				0				5			
Ambient °C	25		32		25		32		25		32		25		32		25		32		25		32	
LUH Model	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm	L m	Dia. mm
AEZ 4425 E					2.1	0.8			1.3	0.8	1.9	0.8	0.9	0.8	0.35	0.8			0.95	0.8				
AEZ 4430 E	1.85	0.8	2.5	0.8	1.3	0.8	1.8	0.8	0.9 3.2	0.8 1	1.25	0.8	2.2	1	0.9 3.25	0.8 1	1.65	1	2.25	1	2.25	1	1.7	1
AEZ 4440 E			1.2	0.8			0.9	0.8	1.8	1	2.4	1	1.3	1	1.65	1	0.9	1	1.2	1				
CAE 4450 E					1.75	1			1.2	1	1.7	1	2.2	1.2	1.15	1	1.6	1.2	2.2	1.2	1.15	1.2	1.6	1.2
CAE 9460 T	1.95	1			1.3 3.5	1 1.2	1.85	1	2.5	1.2	1.25 3.5	1 1.2	1.75	1.2	2.35	1.2	1.2	1.2	1.7	1.2			1.2	1.2
CAJ 9480 T	2.6	1.2			1.65	1.2	2.2	1.2	1.2	1.2	1.55	1.2	0.9 2.7	1.2 1.5	1.15	1.2	2	1.5	2.7	1.5	1.45	1.5	1.95	1.5
CAJ 9510 T	1.65	1.2			1.2	1.2	1.6	1.2	2.95	1.5	1.2	1.2	2.05	1.5	2.8	1.5	1.5	1.5	2	1.5	1.05	1.5	1.5	1.5
CAJ 9513 T	1.4	2x12	1.8	2x12	1	2x12	1.35	2x12	2.2	1.5	1	2x12	1.6	1.5	2.15	1.5	1.15	1.5	1.6	1.5			1.2	1.5

Accurate sizing of capillary tube to suit a refrigeration system is very difficult and selection tables usually only provide a preliminary tube length and inside diameter. Actual testing of the refrigeration system and adjustment of the selected capillary tube sizes may be required to obtain optimum system performance.

Capillary Tube - Conversion Chart

This Conversion Chart is designed to enable users of capillary tubing to use the standard sizes which are readily available through refrigeration wholesalers. While many original equipment manufacturers and condensing unit manufacturers recommend specific lengths and diameters of capillary tubing for their units, these tube sizes are not always readily available, except on special order.

This chart enables the user to translate the recommended length into that of a tube diameter that can be readily obtained. In using the chart, it is recommended that conversions be made using factors falling in the shaded area. In addition, it is highly recommended that the minimum length of capillary used be 1 metre.

To Use Chart:

1. Located 'Recommended Cap. Tube ID' in left hand column.
2. Read across and find conversion factor under 'Possible Capillary Tube ID' sizes.
3. Multiply the given length of the recommended tube by the conversion factor of the possible tube.
4. The resultant length of tube will give the same flow characteristics as the original recommended tube.

Example: Recommended capillary tube 2 metres of 1.02mm. Locate 1.02mm in left hand column and reading across gives the following conversion factors: For 0.91mm ID Tubing - Factor 0.62. For 1.1mm ID tubing - Factor 1.55.

Multiply the recommended capillary tube length of 2 metres by the conversion factors, which give the following results: 1.24m of 0.91mm ID and 3.1m of 1.1mm ID. Either of these capillary tubes will give the same results as the original.

Recommended Tube ID		Possible Tube ID – mm (inches)											
mm	Inches	0.66 (0.026)	0.8 (0.031)	0.91 (0.036)	1.1 (0.044)	1.27 (0.05)	1.4 (0.055)	1.5 (0.059)	1.62 (0.064)	1.78 (0.07)	1.9 (0.075)	2.04 (0.08)	2.3 (0.09)
0.61	0.024	1.44											
0.64	0.025	1.2											
0.66	0.026	1	2.24										
0.71	0.028	0.72	1.59										
0.76	0.03	0.52	1.16										
0.8	0.031	0.45	1	2									
0.81	0.032		0.86	1.75									
0.84	0.033		0.75	1.54									
0.86	0.034		0.65	1.35									
0.89	0.035		0.58	1.16									
0.91	0.036		0.5	1									
0.94	0.037		0.45	0.9	2.22								
0.97	0.038		0.39	0.8	1.92								
0.99	0.039		0.35	0.71	1.75								
1.02	0.04		0.31	0.62	1.55								
1.04	0.041		0.28	0.56	1.38	2.5							
1.07	0.042		0.25	0.5	1.24	2.23							
1.09	0.043		0.23	0.45	1.11	1.98							
1.1	0.044		0.2	0.39	1	1.79							
1.14	0.045			0.35	0.9	1.6							
1.17	0.046			0.32	0.82	1.47	2.27						
1.19	0.047				0.74	1.31	2.06						
1.22	0.048				0.67	1.2	1.87						
1.24	0.049				0.61	1.09	1.69						
1.27	0.05				0.56	1	1.56	2.14					
1.3	0.051				0.51	0.93	1.44	1.96					
1.32	0.052				0.47	0.85	1.32	1.78					
1.35	0.053				0.43	0.78	1.2	1.64					
1.37	0.054				0.39	0.7	1.09	1.52	2.18				
1.4	0.055				0.36	0.64	1	1.38	2				
1.42	0.056					0.6	0.94	1.27	1.85				
1.45	0.057					0.55	0.87	1.17	1.72				
1.47	0.058					0.51	0.8	1.07	1.56				
1.5	0.059					0.47	0.73	1	1.44	2.18			
1.52	0.06					0.43	0.67	0.93	1.33	2.04			
1.62	0.064					0.32	0.5	0.69	1	1.5	2.07		
1.78	0.07						0.33	0.46	0.67	1	1.37	1.84	
1.9	0.075								0.48	0.73	1	1.37	
2.04	0.08									0.54	0.74	1	1.71
2.16	0.085										0.57	0.76	1.29
2.3	0.09										0.43	0.62	1
2.41	0.095											0.46	0.79
2.54	0.1												0.62
2.67	0.105												0.49

Pressure Regulating Valve Selection Guide

General Definition

A device for regulating the flow of refrigerant, whether liquid or vapour in refrigeration and air conditioning systems.

This Selection Guide briefly describes the main types, their common names and application. It should be remembered that due to the wide variety of control systems in use, one type of regulator/valve may perform several functions, and when coupled with other types of control valves (Solenoid Valves, Check Valves etc.) their application may be extended. Therefore only the more common applications are detailed below.

Capacity Regulator

Also known as: Hot Gas By-Pass Regulator/Valve, Discharge By-Pass Regulator/Valve, Discharge Pressure Regulator/Valve. Often abbreviated to HGBP Regulator/Valve.

Description: Used to control the compressor capacity and prevent suction pressure from falling to objectionably low levels. May be used in systems with one or more evaporators where compressor itself has no capacity regulation or can extend compressor capacity reduction below the last step of cylinder unloading.

Application: By-Pass to Suction Line – piped so that discharge gas is admitted to the suction line to flow against the direction of the suction gas. To prevent overheating of the compressor, a liquid injection valve is sometimes required for de-superheating.

By-Pass to Evaporator Inlet – usually fitted between the TX valve and the refrigerant distributor. The advantage of this method is that the artificial load imposed on the evaporator causes the TX valve to respond to the increase in superheat, thus eliminating the need for the liquid injection valve. This type of system must be equipped with a Venturi-Flo Refrigerant Distributor (i.e. no restrictor orifice). It is recommended that a solenoid valve be installed ahead of the by-pass regulator permitting the system to operate on an automatic pump-down cycle and also guarding against leakage during the 'off-cycle'.

Also used for: By-Pass Control Valve for air-cooled condensers.

Crankcase Pressure Regulating Valve

Also known as: Hold Back Valve, Suction Pressure Regulator, Starting Regulator, Outlet Regulator, Downstream Regulator. Often abbreviated to CPRV.

Description: A valve which regulates the suction pressure to a pre-determined maximum in order to prevent the compressor motor overloading, which may be due to any or all of the following: High load on start up, high suction pressure at termination of defrosting cycle, surges in suction pressure, prolonged operation at excessive suction pressures, low voltage and high suction pressure conditions.

Application: Installed in the suction line ahead of the compressor, the valve establishes the maximum pressure at the compressor inlet, thus providing overload protection for the compressor motor. May be used with one or more evaporators, either direct expansion or flooded evaporator designs.

Also used for: High to low side by-pass, by-pass control for air cooled condensers.

Evaporator Pressure Regulating Valve

Also known as: Back Pressure Regulator / Valve, Constant Pressure Valve*, Upstream Regulator, Inlet Pressure Regulator, Suction Line Regulator. Often Abbreviated to: EPR or EPRV.

*Sometimes referred to as a Constant Pressure Regulator, but should not be confused with the same 'general' term applied to an automatic expansion valve.

Description: Used to maintain a constant evaporating pressure and hence a constant evaporator temperature plus protection against too low an evaporating pressure since the regulator closes when the pressure in the evaporator falls below the setting.

Application: Installed in the suction line near the evaporator outlet. Available in two main types: Direct operated and pilot operated. Pilot operated regulators may be integral types, or remote pilot actuated either by pressure or temperature.

Also used for: Freeze-up or frost protection, maintaining evaporator pressure during a defrost, providing a safety or pressure relief function.

Condenser Pressure Regulator For Water Cooled Condensers

Also known as: Pressure Controlled Water Valve, Temperature Controlled Water Valve.

Description: The water valve is used for regulating the quantity of water in refrigeration systems with water cooled condensers. Use of the water valve results in modulating regulation of the condensing pressure so that it is kept almost constant during operation.

Condenser Pressure Regulator For Air Cooled Condensers

Also known as: Head Pressure Control Valve.

Description: To maintain a constant and sufficiently high condensing pressure in air cooled condensers at low ambient temperatures. The valve must maintain liquid subcooling and prevent liquid line flash-gas and also provide adequate pressure at the inlet side of the TX valve to obtain sufficient pressure drop across the valve port.

Application: Dependent on the type of control circuit employed or recommended by the air cooled condenser manufacturer, the control may be either a single three-way modulating type valve or two separate valves to achieve the same function.

Thermostatic Injection Valve

Also known as: Liquid Injection Valve.

Description: Used to prevent compressor overheating and high discharge temperatures when: An R717 compressor operates either at low suction pressures or at high condensing temperatures. A compressor operates both at low suction pressures and at high condensing temperatures, especially with R22. A compressor operates with By-pass to suction line hot gas by-pass.

Application: Liquid injected into a gas to be de-superheated should be injected in a manner which provides homogeneous mixing of the liquid and superheated gas. Preferred method is to pipe the hot gas and liquid injection into a Tee to permit good mixing before it enters the suction line. A good mix with the suction gas may be gained by injecting the liquid/hot gas mixture into the suction line at approximately a 45° angle against the flow of suction gas to the compressor.

Air Cooled Condenser Selection

The selection of an air cooled condenser is based on the heat rejection capacity at the condenser rather than net refrigeration effect at the evaporator because the refrigerant gas absorbs additional energy in the compressor. This additional energy, the heat of compression, varies appreciably with the operating conditions of the system and with compressor design, whether open or suction cooled hermetic type.

Some compressor manufacturers publish heat rejection figures as part of their compressor ratings. Since heat rejection varies with compressor designs, it is recommended that the compressor manufacturer's data be used whenever available in selecting an air cooled condenser. If the compressor manufacturer does not publish heat rejection ratings, factors from Table A and B may be used to estimate total heat rejection (THR).

Heat Rejection Factors

Open Compressors

TABLE A

Evap. Temp. °C	Condensing Temperature °C						
	30	35	40	45	50	55	60
-35	1.37	1.4	1.44	1.5	*	*	*
-30	1.32	1.36	1.4	1.44	1.5	*	*
-25	1.28	1.31	1.35	1.39	1.44	1.49	*
-20	1.24	1.27	1.31	1.35	1.39	1.44	1.49
-15	1.21	1.24	1.28	1.31	1.35	1.39	1.44
-10	1.18	1.21	1.24	1.27	1.31	1.35	1.39
-5	1.15	1.18	1.21	1.24	1.28	1.31	1.35
0	1.12	1.15	1.18	1.2	1.24	1.27	1.31
5	1.1	1.13	1.15	1.17	1.2	1.24	1.27
10	1.08	1.11	1.13	1.15	1.18	1.2	1.24

*Outside of normal limits for single stage compression application.

Suction Cooled Hermetic Compressors

TABLE B

Evap. Temp. °C	Condensing Temperature °C						
	30	35	40	45	50	55	60
-35	1.56	1.6	1.65	1.71	*	*	*
-30	1.49	1.52	1.56	1.62	1.68	*	*
-25	1.43	1.46	1.49	1.54	1.6	1.68	*
-20	1.37	1.4	1.45	1.48	1.54	1.6	1.65
-15	1.32	1.35	1.39	1.43	1.47	1.53	1.58
-10	1.28	1.31	1.33	1.37	1.42	1.47	1.52
-5	1.24	1.26	1.29	1.33	1.37	1.41	1.46
0	1.2	1.22	1.25	1.28	1.32	1.36	1.41
5	1.16	1.19	1.22	1.24	1.27	1.31	1.35
10	1.13	1.15	1.18	1.21	1.24	1.26	1.29

Condenser Capacity (THR) = Compressor Capacity x Heat Rejection Factor

Selection Example:

Given:

- Compressor Capacity 38600 Watts
- Evaporating Temperature 5°C
- Refrigerant R22
- Ambient Air 35°C
- Maximum Condensing Temperature 50°C
- Suction Cooled Hermetic Compressor

Procedure

- Assuming the compressor manufacturers heat rejection data is not available, determine the heat rejection factor for the specified conditions using Table B (Suction Cooled Hermetic Compressors) = 1.27
- Multiply the compressor capacity by the heat rejection factor to estimate the required condenser capacity
(Total Heat Rejection, THR) $38600 \times 1.27 = 49022$ Watts THR
- Divide required THR by the specified temperature difference (KTD) between condensing temperature and the ambient air,
 $50^\circ - 35^\circ\text{C} = 15\text{ K TD}$. $\frac{49022\text{ Watts THR}}{15\text{ K TD}} = 3268\text{ Watts / K TD}$
- Select condenser from manufacturers capacity tables, based on R22 and 1K temperature difference. Select a model that has this capacity, if the model selected is oversized the condenser will balance the compressor heat rejection at less than the maximum condensing temperature of 50°C.

Thermostatic Expansion Valve Selection Data

Thermostatic Expansion Valve and Orifice Selection Data for Buffalo Trident BR Series Evaporator Coils

Medium Temperature

R404A Capacities: Watts @ 6 KTD and -4°C sst

Buffalo Trident	Watts	Valve Cat No.	Valve Model No.	Orifice Cat No.	Orifice No.		
BR16	1719	106026 OR 106028	TIE-SW OR TISE-SW	106008	1		
BR19	1979						
BR21	2228						
BR27	2889			106009	2		
BR32	3438						
BR37	3959						
BR42	4456			106010	3		
BR49	5157						
BR56	5938						
BR60	6379			106011	4		
BR62	6544						
BR63	6683						
BR66	6953			106012	5		
BR71	7498						
BR75	7917						
BR84	8911			106013	6		
BR93	9817						
BR98	10430						
BR106	11247			106198	BAES 4 SC	Fixed Orifice	
BR123	13089						
BR131	13906						
BR141	14996						
BR154	16361						
BR164	17383						
BR177	18745						

Low Temperature

R404A Capacities: Watts @ 6 KTD and -24°C sst

Buffalo Trident	Watts	Valve Cat No.	Valve Model No.	Orifice Cat No.	Orifice No.				
BRLE12	1223	106030	TIE-SW75 (MOP)	106008	1				
BRLE13	1417								
BRLE15	1585			106009	2				
BRLE19	2049								
BRLE23	2446			106032	TISE-SW75 (MOP)	106010	3		
BRLE27	2833								
BRLE30	3169	OR	OR			106011	4		
BRLE35	3669								
BRLE40	4250	106026	TIE-SW					106012	5
BRLE43	4537								
BRLE44	4685			106028	TISE-SW			106013	6
BRLE45	4754								
BRLE47	4979					106208	BAES 4 SZ	Fixed Orifice	
BRLE51	5368								
BRLE53	5667								
BRLE60	6338								
BRLE66	7027	106208	BAES 4 SZ	Fixed Orifice					
BRLE70	7468								
BRLE76	8052								
BRLE88	9370	106208	BAES 4 SZ	Fixed Orifice					
BRLE94	9958								
BRLE101	10737								
BRLE110	11712	106208	BAES 4 SZ	Fixed Orifice					
BRLE117	12447								
BRLE127	13421								

TX Valve Selection Based on: M/T at 46C condensing temperature; L/T at 42C condensing temperature

Comparison Data

Induced Draught Evaporators

Medium Temperature R404A @ 6KTD and -4°C SST

Buffalo Trident	Watts	Kirby	Watts	LU-VE	Watts	Bohn	Watts
BR16	1719	KCR16	1670			MUC200ZR	1730
BR19	1979	KCR19	2000				
BR21	2228	KCR21	2340	S2HC49N50	2244		
		KCR24	2640			MUC285ZR	2610
BR27	2889	KCR25	2680	S2HC71N50	2802	MUC320ZR	2875
BR32	3438	KCR32	3370	S3HC73N50	3156		
		KCR36	3780			MUC420ZR	3700
BR37	3959	KCR27	4040	S3HC106N50	3954	MUC520ZR	4420
BR42	4456	*KCR45	4870	S2HC107N50	4248		
BR49	5157	KCR47	5040	S3HC133N50	4722		
		KCR51	5370			MUC620ZR	5375
		KCR56	5970	S2HC142N50	5550	SK06ZR	5710
BR56	5938	*KCR58	6030	SHDN169-32	5754		
BR60	6379	KCR63	6490	S3HC145N50	6372		
*BR62	6544						
BR63	6683	*KCR65	6740				
*BR66	6953						
*BR71	7498	*KCR70	7440				
BR75	7917	KCR75	8070	S3HC215N50	7968		
BR84	8911	*KCR82	8790	SHDN253-32	8796	**MUC780ZR	9000
*BR93	9817	*KCR94	10250			+SK10ZR	9880
*BR98	10430	*KCR100	10670	S3HC272N50	10890	+MUC960ZR	10250
*BR106	11247	*KCR115	11650	SHDN338-32	11454	+SK12ZR	11825
*BR123	13089	*KCR129	13290	S3HC323N50	12588		
*BR131	13906			SHDN423-32	13632		
*BR141	14996	*KCR147	15290	S3HC362N50	14622	+SK16ZR	14900
*BR154	16361			S3HC430N50	16914		
*BR164	17383	*KCR160	16950			+SK19ZR	17630
*BR177	18745	*KCR190	20130			+SK24ZR	22860

Low Temperature R404A @ 6KTD and -24°C SST

Buffalo Trident	Watts	Kirby	Watts	LU-VE	Watts	Bohn	Watts
		KFR10	1030	S2HC36E50	1104		
BRLE12	1223	KFR12	1250			LUC155ZE	1215
BRLE13	1417			SHA41E50	1410		
BRLE15	1585	KFR15	1580	S2HC49E50	1788	LUC210ZE	1575
		KFR16	1750	SHA53E50	1740		
BRLE19	2049	KFR19	2020	S2HC71E50	2232	LUC295ZE	2300
		KFR20	2130				
BRLE23	2446	KFR24	2550			LUC350ZE	2595
BRLE27	2833			SHA79E50	2706		
BRLE30	3169	KFR30	3280	S2HC107E50	3384	LUC440ZE	3395
BRLE35	3669	*KFR35	3630	SHA106E50	3594		
		KFR37	3860				
BRLE40	4250	KFR41	4410			LUC550ZE	4165
BRLE43	4537			S2HC142E50	4416		
*BRLE44	4685	*KFR43	4600				
BRLE45	4754					LUC650ZE	4870
*BRLE47	4979	KFR49	5160				
*BRLE51	5368					SK06ZE	5270
BRLE53	5667	*KFR55	5870				
BRLE60	6338	*KFR62	6650				
*BRLE66	7027	*KFR66	6850				
*BRLE70	7468	*KFR74	7550			**LUC840ZE	7920
*BRLE76	8052					+SK09ZE	8665
*BRLE88	9370	*KFR87	9190	NHI1267E4	9120		
*BRLE94	9958					+LUC1030ZE	9085
*BRLE101	10737	*KFR104	10950			+SK11ZE	10765
*BRLE110	11712						
*BRLE117	12447						
*BRLE127	13421	*KFR130	13510	NHI336E4	13290	+SK13ZE	13100
				NHI534E4	18180	+SK16ZE	16240
				NHI504E4	21042	+SK21ZE	20110
				NHI801E4	27318		
				NHI1068E4	36906		

* 350mm diameter fans.
 ** 400mm diameter fans.
 + 450mm diameter fans.



Your best Solution...

Comparison Data

Air Cooled Condensers

R404A Capacities: Watts at 10 KTD

Buffalo Trident	Watts	Kirby	Watts	Muller	Watts	LU-VE	Watts	Bohn	Watts
				MAC0500E	4760	SHVN9/4	5800		
RC009C	6362	KRC62	6340	MAC0700E	6700	SHVN10/2	6300	BAC95	6340
		KRC72	7400					BAC110	7390
RC12C	8159	KRC85	8640	MAC0900E	8700			BAC130	8630
RC13C	9251								
		KRC106	10840						
		KRC108	10990	MAC1150E	10940			BAC165	10980
		KRC115	11760			SHVN19/0	11700	BAC176	11760
RC18C	12216	KRC122	12500			SHVN20/4	12600	BAC188	12500
		KRC133	13560	MAC1400E	13570			BAC203	13560
RC23C	15545	KRC145	14780			SHVN23/2	15400	BAC222	14780
RC25C	17684	KRC170	17350	MAC1850E	17590	SHVN28/5	17500	BAC260	17350
RC19C	12823								
RC24C	16582								
RC28C	18997	KRC187	19090	MAC2100E	20040	SHVN30/6	18900	BAC286	19090
RC30C	21058	KRC213	21730					BAC326	21720
RC34C	24012			MAC2400E	23600	SHVN38/0	23400		
		KRC247	25200			SHVN40/8	25200	BAC378	25200
RC37C	26278			MAC2900E	27730				
		KRC290	29520			SHVN46/5	30800	BAC443	29520
RC47C	33163	KRC318	32440	MAC3400E	32350	SHVN57/0	35000	BAC487	32440
RC54C	38080	KRC357	36410	MAC3900E	37940	SHVN61/2	37700	BAC546	36410
		KRC411V	41970	MAC4500E	42790			BAC630V	41970
RC62C	43659	KRC456V	46480			SHVN76/0	46700	BAC697V	46480
RC74C	51575	KRC512V	52190	MAC5200E	50010	SHVN81/6	50300	BAC783V	52200
RC82C	56989	KRC536V	54660	MAC5900E	56930			BAC820V	54660
		KRC580V	59040	MAC6300E	60450				
		KRC608V	62050			SHVN98	62100	BAC930V	62050
RC93C	65489	KRC636V	64880					BAC1025V	68340
RC100C	70251	KRC670V	68340			SHVN110	69600	BAC1077V	71770
RC109C	75984	KRC704V	71770					BAC1093V	72830
		KRC714V	72830						
RC115C	80350	KRC823V	83950					BAC1260V	83950

Buffalo Trident Condensers

Based on -4°C SST, 40°C Condensing and 2K Subcooling.

Comparison Data

Thermostatic Expansion Valves

Valve Body (Less Orifice)

Refrigerant	Flow Controls	Danfoss	Sporlan
Internal Equaliser 3/8 flare inlet 1/2 flare outlet			
R22	TI-HC	TX2	QV
R134a	TI-MC	TN2	QJ
R404A	TI-SC	TS2	QS
External Equaliser 3/8 flare inlet 1/2 flare outlet			
R22	TIE-HC	TEX2	QVE
R134a	TIE-MC	TEN2	QJE
R404A	TIE-SC	TES2	QSE
Internal Equaliser 3/8 flare inlet 1/2 solder outlet			
R22	TIS-HC		
R134a	TIS-MC	TN2	
R404A	TIS-SC	TS2	
External Equaliser 3/8 flare inlet 1/2 solder outlet			
R22	TIES-HC	TEX2	
R134a	TIES-MC	TEN2	
R404A	TIES-SC	TES2	

NOTE: Sporlan "Q" Series valves are sold as components: eg, body, power element and orifice.

Refrigerant	Flow Controls	Danfoss	Sporlan
R404A	TER22SC		MSE20C
	TER22SZ		MSE20Z
	TER28SC		MSE25C
	TER28SZ		MSE25Z
			MSE30C
			MSE30Z
	TIR39SC	TES55-37	VSE38C
	TIR39SZ		VSE38Z
	THR50SC	TES55-56	VSE50C
	THR50SZ		VSE50Z
R134a	THR60SC		VSE70C
	THR60SZ		VSE70Z
	TCLE 1/4MC		
	TCLE 3/4MC		
	TCLE 1-1/2MC		
	TCLE 2-1/2MC		SJE 2-1/2C
	TCLE 3-1/2MC	TEN5-3.7	SJE 3C
	TCLE 5-1/2MC	TEN5-5.4	SJE 5C
	TCLE 7-1/2MC		SJE 6C
	TCLE 9MC	TEN5-8.3	SJE 10C
	TJLE 9MC		HJE 8C
	TJLE 11MC	TEN5-11.2	
	TJRE 11MC	TEN12-11.4	
	TJRE 13MC		HJE 12C
	TER 16MC	TEN12-15	MJE 15C
	TER 19MC	TEN20-18	MJE 20C
	TER 25MC		MJE 25C
	TER 31MC		VJE 35C
	TIR 45MC	TEN55-41	VJE 45C
	THR 55MC		VJE 55C
	THR 68MC	TEN55-62	

NOTE: Some TX valves sold by component, check catalogue for details.

Comparisons shown are nearest equivalents at nominal capacity, check catalogue or manufacturers capacity tables for exact details.

Bi-Flow Thermostatic Expansion Valves

Refrigerant	Flow Controls	Danfoss TUAE Orifice No	
		Model	Orifice
R22	BAE 1HCA	TUAE	5
	BAE 1 1/2HCA	TUAE	6
	BAE 2HCA	TUAE	7
	BAE 2 1/2HCA		
	BAE 3HCA	TUAE	8
	BAE 4HCA	TUAE	9
	BAE 5HCA		
	BAE 6HCA		

Thermostatic Expansion Valves with interchangeable power elements.

Refrigerant	Flow Controls	Danfoss	Sporlan
R404A	TCLE 1/4SC		EGSE 1/4C
	TCLE 1/4SZ		EGSE 1/4Z
	TCLE 1/2SC		EGSE1/2C
	TCLE 1/2SZ		EGSE1/2Z
	TCLE 1SC		EGSE 1C
	TCLE 1SZ		EGSE 1Z
	TCLE 2SC		SSE 2C
	TCLE2SZ		SSE 2Z
	TCLE 3SC	TES5-3.7	SSE 3C
	TCLE 3SZ		SSE 3Z
			SSE 4C
			SSE 4Z
			SSE 4ZP
	TCLE 5SC	TES5-5.0	
	TCLE 5SZ		
	TCLE 6-1/2SC		SSE 6C
	TCLE 6-1/2SZ		SSE 6Z
			SSE 6ZP
	TJLE 7SC	TES5-7.2	SSE 7C
	TJLE 7SZ		SSE 7Z
R22			SSE 7ZP
	TCLE 8SC		
	TCLE 8SZ		
	TCLE 9SC		SSE 10C
	TCLE 9SZ		SSE 10Z
			SSE 10ZP
	TJRE 9SC	TES5-10.3	HSE 9
	TJRE 9SZ		HSE 9Z
	TJRE 11SC		HSE 12C
	TJRE 11SZ		HSE 12Z
	TER 14SC	TES12-13.4	MSE 15C
	TER 14SZ		MSE 15Z
	TCLE 1/2HC		EGV 1/2C
	TCLE 1HC		EGVE 1C
	TCLE 2HC		SVE 2C
	TCLE3HC	TEX5-3	SVE 3C
			SVE 3CP100
			SVE 4C
			SVE 4CP100
	TCLE 5HC	TEX5-4.5	SVE 5C
			SVE 5CP100
	TCLE 1/2HC	TEX5-7.5	SVE 8C
			SVE 8CP100
	TCLE10HC	TEX5-12	SVE 10C
			SVE 10CP100
	TCLE 12HC	TEX12-12	
	TJLE 11HC		HVE 11C
	TJLE 14HC		SVE 15C
			SVE 15CP100
	TJRE 14HC		SVE15C
	TJRE18HC	TEX12-18	HVE 20C
	TER 22HC	TEX20-30	MVE 21C
	TER 26HC		MVE 26C
	TER 35HC		MVE 34C
	TER 45HC	TEX55-50	MVE 42C
	TIR 65HC	TEX55-85	VVE 52C
	THR 75HC		VVE 70C
	THR 100HC		VVE 100C

Motor Types

L'Unite Hermetique



SINGLE PHASE MOTORS WITH START WINDING

P.T.C.S.I.R During start-up, the start winding is fed through the P.T.C. which changes the resistance of the P.T.C. with the change in temperature.

ELECTRICAL COMPONENTS:

- 1 P.T.C.
- 1 External overload protector fitted on the compressor.
- 1 Earth connection

R.S.I.R. During start-up, the start winding is energised through an electromagnetic relay.

ELECTRICAL COMPONENTS:

- 1 Electromagnetic relay
- 1 External overload protector fitted on the compressor
- 1 Earth connection

C.S.I.R. During start-up, the start winding is energised through an electromagnetic relay and a start capacitor.

ELECTRICAL COMPONENTS:

- 1 Electromagnetic relay
- 1 External overload protector fitted on the compressor
- 1 Start capacitor
- 1 Earth connection

SINGLE PHASE MOTORS WITH PERMANENT SPLIT CAPACITOR

P.T.C.S.R During start-up, the start winding is fed through the P.T.C. which changes the resistance of the P.T.C. with the change in temperature.

ELECTRICAL COMPONENTS:

- 1 P.T.C.
- 1 External overload protector fitted on the compressor
- 1 Run capacitor
- 1 Earth connection

P.S.C. The start winding of such a motor remains in circuit through a permanent split capacitor.

ELECTRICAL COMPONENTS:

- 1 External overload protector fitted on the compressor
- 1 Run capacitor
- 1 Earth connection

C.S.R. During start-up, the start winding is energised through an electromagnetic potential relay and a start capacitor. This winding remains in circuit and is supplied through a permanent split capacitor.

ELECTRICAL COMPONENTS:

- 1 External overload protector fitted on the compressor
- 1 Electrical box containing:
 - 1 Electromagnetic potential relay
 - 1 Start capacitor fitted with a discharge pressure
- 1 Terminal block
- 1 Earth connection
- 1 External run capacitor with fixing bracket

Model Designation L'Unite Hermetique

Unit designation

Compressor designation

T AJ T 4 5 19 Z H R

No letter = with valves or brazed
Letter "R" = with receiver

H = High inlet pressure (-15°C to +15°C)
B = Low inlet pressure (-40°C to -10°C)
M = Medium and high inlet pressure (-25°C to +15°C)

A, B, C or D = Refrigerant R12
C = Refrigerant R407C (Air conditioning)
E, F, G or H = Refrigerant R22
M = Refrigerant R600a
T = Refrigerant R22 or R502
Y = Refrigerant R134a
Z = Refrigerant R404A or R407B or R507

Corresponds to the two first figures of the refrigerating capacity expressed in BTU/h at 60Hz depending on test conditions.
Example: 19 preceded by the figure 5 means 19000 BTU/h

Number of figures composing the refrigerating capacity.
Example 19000 BTU/h

Applications

1 = Low back pressure. Motor with normal starting torque.
2 = Low back pressure. Motor with high starting torque.
3 = High back pressure. Motor with normal starting torque.
4 = High back pressure. Motor with high starting torque.
5 = Air conditioning
9 = Medium and high back pressure. Motor with high starting torque.
0 = Medium and high back pressure. Motor with normal starting torque.

T = HTA condensing unit
C = Compact condensing unit
L = Low profile condensing unit

Families : THB-AZ-AEZ-AE-AJ-FH-AH-AG-HGA-RGA-RK
The letter P designates compressors designed to be mounted in parallel.
Ex: TAHP, TFHP, TAGP.
The letter D designates compressors intended for dual operation.
The letter S designates single fan condensing units.

C or no letter = single-phase
T = three phase

Coolroom Design Data

Product Load

Product placed in a refrigerated room at a temperature higher than the storage temperature will lose heat until it reaches the storage temperature. The product load will be affected by one or more of the following factors:

- Specific Heat
- Latent Heat of Fusion
- Heat of Respiration

Specific Heat is the amount of heat required to change the temperature of 1kg of product 1K. It has two values, one above freezing, the other below freezing due to the change in state which occurs.

Latent Heat of Fusion is the amount of heat removal required to freeze 1kg of product. It should be noted that the latent heat has a definite relationship to the water content of a product. Most food products have a freezing temperature in the range of -3°C to -0.5°C. If the exact freezing temperature is unknown, it may be assumed to be -2°C.

Heat of Respiration is the amount of heat given off by products such as fresh fruits and vegetables during storage. Since the products are alive, they continually undergo a change in which energy is released in the form of heat. The amount of heat liberated varies with the type and temperature of the product.

Miscellaneous- All electrical energy dissipated by lights, motors, heaters etc. located in the refrigerated area must be included in the heat load. An item often overlooked is the fan motor on a unit cooler. Heat equivalents of electric motors vary as to size of motor.

Balancing the System

For the general purpose coolroom, holding meats, vegetables and dairy products, it is common procedure to balance the low side to the condensing unit at a 6K to 7K temperature difference; that is, they are balanced to maintain a temperature difference between the refrigerant in the coil and the air of 6K to 7K. It has been learned by experience that, if this is done, one may expect to maintain in a cooler 80% to 85% relative humidity, which is a good range for general storage.

A coil which is selected for a wide temperature difference will maintain a lower relative humidity in service, whereas one which is selected for too close temperature difference will produce relative humidities which are higher than required for practical operation and surface sliming may result on stored meat products during winter periods when loads are reduced and compressor running time falls off. Heat may have to be added to the room for about 6 hours/day compressor operation. On straight vegetable coolers where higher humidities are desired, the coil should be selected to balance the compressor at a 4K to 6K

temperature difference, as such will produce an average relative humidity of 90% within the refrigerated space. The same recommendation applies to florists' display rooms and in both cases, the maintenance of a high relative humidity in long term storage is beneficial whereas some exception with reference to meat products is noted above.

On low temperature units, if one stops to consider that the amount of dehumidification is in proportion to the temperature difference, it is obvious that the closer the temperature difference, the less frost accumulation. It is strongly recommended that coils for low temperature work be selected to balance the condensing unit at a 6K temperature difference or less.

Selection of T.X. Valves

The selection and installation of thermostatic expansion (T.X.) valves is of utmost importance for best coil performance. Valve capacity must be at least equal to the coil load rating and never more than twice that value. Any valve which is substantially oversized will tend to be erratic in operation and this will penalise both coil performance and rated capacity output. Liquid line strainers should always be installed ahead of all T.X. valves.

T.X. valves are nominally rated with R22 refrigerant at 4°C evaporator temperature, 5.6K superheat and 690 kPa (100 psi) differential (pressure at valve inlet minus pressure at valve outlet). For capacities at other differentials or when used with other refrigerants, the valve manufacturer's ratings must be consulted and closely followed in reference to Capacity Correction Factors.

Although it is frequently assumed that when thermostatic expansion valves are used in low temperature applications, some increased capacity results due to a higher pressure differential, this is not always true because of variations in valve design. It is always advisable under wide range conditions to secure the valve manufacturer's recommendations.

As a further precautionary note, the power element charges of all T.X. valves must be properly selected for operating temperature ranges and the type of refrigerant used in the system.

T.X. valves should be located as close as possible to evaporator inlet and bulbs attached or inserted at a point where refrigerant will not trap in the suction line. Keep bulbs away from tees in common suction lines so that one valve will not affect any other valve.

Externally equalised valves should be used on all multi-circuited evaporators. In general, internally equalised valves are applied with single circuited coils except when excessive pressure drops are encountered.

Coolroom Design Data

Selection of Coolroom / Freezer Equipment

When requesting quotations for coolroom equipment, please supply the following information where applicable, as this will assist Actrol Technical Staff to advise on the selection of suitable unitary equipment for your particular application. Tick boxes where applicable.

Client: Date:

Contact Name: Phone No.

Address: Fax No.

..... Account No:

1. Application

2. Room Dimensions: (L) (W) (H) Internal ☐ External ☐

3. Insulation Thickness and Type

Walls:

Ceiling:

Floor:

4. Storage Room Temperature:

5. Ambient or Surrounding Air Temperature:

6. a) Type of Product

b) If Packaged, Type of Packaging

c) Weight of Product Entering Room Per Day

d) Temperature of Product Entering Room

e) Product Pull Down Time Required

7. Whenever possible, supply all information for Question 6, however for small general purpose storage rooms with unknown product load, indicate type of usage: Average ☐ Heavy ☐

8. Number and Size of Glass Doors

9. Room Lighting: Watts Hours/Day

10. Number of People Working in Room Hours/Day

11. Fork Lift Operating in Room: Yes ☐ No ☐ Hours/Day

12. For fruit and vegetable rooms only, give Total Weight of product stored in room:

13. Sun Effect: Are any areas of the room exposed directly to the sun? Yes ☐ No ☐

If Yes, provide details

14. Electrical Power Supply Available: 240V 1PH 50Hz ☐ 415V 3PH 50Hz ☐

15. Any additional data available:

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Actrol can only base their selection advice on the information supplied above and are not responsible if this information is incorrect, changed without notice or if assumptions need to be made due to lack of information.

Form Completed By: Client's Signature:

Coolroom Design Data

Storage Requirements of Perishable Products

Product	Storage Temperature °C	Relative Humidity %	Specific Heat kj / kg • K		Latent Heat kj / kg	Approx. Freezing Point °C	Approx. Storage Life	Water Content %
			Above Freezing	Below Freezing				
Fruits and Melons								
Apples	-1 to 4	90 to 95	3.65	1.89	280	-1.1	3 to 8 months	84
Apricots	0	90 to 95	3.68	1.9	284	-1.1	1 to 2 weeks	85
Avocados – Green	7 to 10	85 to 90	3.01	1.65	217	-0.3	2 to 4 weeks	65
Bananas		85 to 95	3.35	1.78	250	-0.8		75
Blackberries	0	90 to 100	3.68	1.9	284	-0.8	2 to 3 days	85
Blueberries	0	90 to 100	3.58	1.86	274	-1.6	2 weeks	82
Cantaloupe (Rock Melon)	2 to 4	90	3.92	1.99	307	-1.2	5 to 15 days	92
Casaba Melons	7 to 10	85 to 95	3.95	2	310	-1.1	4 to 6 weeks	93
Cherries	-1 to 0	95	3.51	1.84	267	-1.8	2 to 3 weeks	80
Coconuts	0 to 2	80 to 85	2.41	1.43	157	-0.9	1 to 2 months	47
Cranberries	2 to 4	90 to 95	3.75	1.93	290	-0.9	2 to 4 months	87
Currents	-0.5 to 0	90 to 95	3.68	1.9	284	-1	10 to 14 days	85
Dates – Cured	-18 or 0	75 or less	1.5	1.09	67	-16	6 to 12 monthly	20
Dew Berries	0	90 to 95	3.68	1.9	284	-1.3	3 days	85
Figs – Dried	0 to 4	50 to 60	1.61	1.12	77		9 to 12 months	23
– Fresh	-1 to 0	85 to 90	3.45	1.81	260	-2.4	7 to 10 days	78
Frozen Fruits	-23 to -18	90 to 95					6 to 12 months	
Gooseberries	0	90 to 95	3.82	1.95	297	-1.1	1 to 2 weeks	89
Grapefruit	14 to 16	85 to 90	3.82	1.95	297	-1.1	4 to 6 weeks	89
Grapes	-1 to 0	95 to 100	3.58	1.86	274	-2	3 to 6 months	82
Honeydew Melons	7 to 10	90	3.95	2	310	-0.9	3 to 4 weeks	93
Lemons	15 to 18	85 to 90	3.82	1.95	297	-1.4	1 to 6 months	89
Limes	9 to 10	85 to 90	3.72	1.92	287	-1.6	6 to 8 weeks	86
Mangoes	13	85 to 90	3.55	1.85	270	-0.9	2 weeks	81
Nectarines	0	90	3.58	1.86	274	-0.9	1 to 2 weeks	82
Olives – Fresh	7 to 10	85 to 90	3.35	1.78	250	-1.4	4 to 6 weeks	75
Oranges	5	85 to 90	3.75	1.93	290	-0.8	3 to 12 weeks	87
Orange Juice	-1 to 2		3.82	1.95	297		3 to 6 weeks	89
Papaw	13	90	3.88	1.98	304	-0.8	1 to 3 weeks	91
Peaches	0	90 to 95	3.82	1.95	297	-0.9	2 to 3 weeks	89
Pears	-1.6 to 0	90 to 95	3.61	1.88	277	-1.6	2 to 6 months	83
Persian Melons	7 to 10	90 to 95	3.95	2	310	-0.8	2 weeks	93
Persimmons	-1	90	3.45	1.81	260	-2.2	3 to 4 months	78
Pineapples	20	85 to 90	3.68	1.9	284	-1	1 to 4 weeks	85
Plums	-0.5 to 0	90 to 95	3.72	1.92	287	-0.8	1 to 4 weeks	86
Pomegranates	0	90	3.58	1.86	274	-3	2 to 4 months	82
Prunes – Fresh	-1 to 0	90 to 95	3.72	1.92	287	-0.8	2 to 4 weeks	86
– Dried	0 to 4	55 to 60	1.77	1.19			5 to 8 months	28
Quinces	-1 to 0	90	3.68	1.9	284	-2	2 to 3 months	85
Raspberries	0	90 to 100	3.55	1.85	270	-1.1	2 to 3 days	81
Strawberries	0	90 to 100	3.85	1.97	300	-0.8	5 to 7 days	90
Tangerines	0	90 to 95	3.75	1.93	290	-1.1	2 to 4 weeks	87
Watermelons	5 to 10	85 to 90	3.95	2	310	-0.4	2 to 3 weeks	93

Coolroom Design Data

Storage Requirements of Perishable Products

Product	Storage Temperature °C	Relative Humidity %	Specific Heat kj / kg • K		Latent Heat kj / kg	Approx. Freezing Point °C	Approx. Storage Life	Water Content %
			Above Freezing	Below Freezing				
Vegetables								
Artichokes – Globe	0	95 to 100	3.65	1.89	280	-1.2	2 weeks	84
– Jerusalem	0	90 to 95	3.47	1.84	267	-2.5	5 months	80
Asparagus	0 to 2	95 to 100	3.95	2	310	-0.6	2 to 3 weeks	93
Beans – Green	7 to 10	95 to 100	3.82	1.95	297	-0.7	7 to 10 days	89
Beetroot – Bunch	0	95 to 100				-0.4	1 to 2 weeks	
– Topped	0	95 to 100	3.78	1.94	294	-0.9	2 to 5 months	88
Broccoli	0	95 to 100	3.85	1.97	300	-0.6	10 to 14 days	90
Brussels Sprouts	0	95 to 100	3.68	1.9	284	-0.8	3 to 5 weeks	85
Cabbage	0	98 to 100	3.92	1.99	307	-0.9	1 to 4 months	92
Carrots – Topped, Immature	0	98 to 100	3.78	1.94	294	-1.4	4 to 6 weeks	88
– Topped, Mature	0	98 to 100	3.78	1.94	294	-1.4	4 to 5 months	88
Cauliflower	0	95 to 100	3.92	1.99	307	-0.8	2 to 4 weeks	92
Celery	0	95 to 100	3.98	2.02	314	-0.5	1 to 2 months	94
Corn – Sweet	0	95 to 98	3.31	1.76	247	-0.6	4 to 8 days	74
Cucumbers	10	95 to 100	4.05	2.04	320	-0.5	10 to 14 days	96
Eggplant	7 to 10	90 to 95	3.95	2	310	-0.8	7 days	93
Endive (Escarole)	0	90 to 100	3.95	2	310	-0.1	2 to 3 weeks	93
Frozen Vegetables	-23 to -18						6 to 12 months	
Garlic – Dry	0	65 to 70	2.88	1.6	203	-0.8	6 to 7 months	61
Horseradish	0	95 to 100	3.35	1.78	250	-1.8	10 to 12 months	75
Kale	0	95	3.75	1.93	290	-0.5	3 to 4 weeks	87
Kohlrabi	0	90 to 100	3.85	1.97	300	-1	2 to 4 weeks	90
Leeks – Green	0	95	3.68	1.9	284	-0.7	1 to 3 months	85
Lettuce – Head	0	95 to 100	4.02	2.03	317	-0.2	2 to 3 weeks	95
Mushrooms	0	95	3.88	1.98	304	-0.9	3 to 4 days	91
Onions – Dry	0	65 to 70	3.78	1.94	294	-0.8	1 to 8 months	88
Parsley	0	95 to 100	3.68	1.9	284	-1.1	1 to 2 months	85
Parsnips	0	98 to 100	3.48	1.83	264	-0.9	2 to 6 months	79
Peas – Green	0	95 to 98	3.31	1.76	247	-0.6	1 to 2 weeks	74
– Dried	10	70	1.24	0.99			6 to 8 months	12
Peppers – Sweet	7 to 13	90 to 95	3.92	1.99	307	-0.7	2 to 3 weeks	92
– Dry, Chilli	0 to 10	60 to 70	1.24	0.99			6 months	12
Potatoes – Cullinary	7	90 to 95	3.45	1.81	260	-0.7		78
– Sweet	13 to 16	85 to 90	3.15	1.7	230	-1.3	4 to 6 months	69
Pumpkins	13	85 to 90	3.88	1.98	304	-0.8	2 to 3 months	91
Radishes – Topped	0	90 to 95	4.02	2.03	317	-0.7	3 to 4 weeks	95
Rhubarb	0	95	4.02	2.03	317	-0.9	2 to 4 weeks	95
Rutabaga	0	90 to 95	3.82	1.95	297	-1.1	2 to 4 months	89
Silverbeet (Spinach)	0	95 to 98	3.95	2	310	-0.3	1 to 2 weeks	93
Squash – Button	7	95 to 100	3.98	2.02	314	-0.5	1 to 3 weeks	94
– Hard Shell	13	85 to 90	3.68	1.9	284	-0.8	1 to 3 months	85
Tomatoes – Firm, Ripe	5 to 7	90 to 95	3.98	2.02	313	-0.5	4 to 7 days	94
– Mature, Green	13	90 to 95	3.95	2	310	-0.6	1 to 2 weeks	93
Turnips	0	95	3.92	1.99	307	-1.1	4 to 5 months	92
Yams	16	85 to 90	3.31	1.76	247		3 to 6 months	74

Coolroom Design Data

Storage Requirements of Perishable Products

Product	Storage Temperature °C	Relative Humidity %	Specific Heat kj / kg • K		Latent Heat kj / kg	Approx. Freezing Point °C	Approx. Storage Life	Water Content %
			Above Freezing	Below Freezing				
Meat – Fish – Shellfish								
Bacon – Medium Fat	3 to 5	80 to 85	1.47	1.07	63		2 to 3 weeks	19
– Frozen	-23 to -18	90 to 95					2 to 4 months	
Beef – Fresh, Average	0 to 1	88 to 92	2.9 to 3.4	1.6 to 1.8	206 to 257	-2.2 to -2.7	1 to 6 weeks	62 to 77
– Liver	0	90	3.18	1.71	233	-1.7	5 days	70
– Veal	0 to 1	90	3.05	1.66	220		1 to 7 days	66
– Frozen	-23 to -18	90 to 95					6 to 12 months	
Ham – 74% Lean	0 to 1	80 to 85	2.71	1.54	187	-1.7	3 to 5 days	56
– Light Cure	3 to 5	80 to 85	2.74	1.55	190		1 to 2 weeks	57
– Country Cure	10 to 15	65 to 70	2.24	1.36	140		3 to 5 months	42
– Frozen	-23 to -18	90 to 95					6 to 8 months	
Lamb – Fresh, Average	0 to 1	85 to 90	2.8 to 3.2	1.6 to 1.7	200 to 233	-2.2 to -1.7	5 to 12 days	60 to 70
– Frozen	-23 to -18	90 to 95					8 to 12 months	
Pork – Fresh, Average	0 to 1	85 to 90	1.9 to 2.3	1.2 to 1.4	107 to 147	-2.2 to -2.7	3 to 7 days	32 to 44
– Frozen	-23 to -18	90 to 95					4 to 8 months	
– Sausage	0 to 1	85	2.11	1.31	127		1 to 7 days	38
Poultry – Fresh, Average	-2 to 0	85 to 90	3.31	1.76	247	-2.8	1 week	74
– Frozen	-23 to -18	90 to 95					8 to 12 months	
Rabbits – Fresh	0 to 1	90 to 95	3.11	1.69	227		1 to 5 days	68
Fish – Fresh, Average	-1 to 1	95 to 100	2.91 to 3.55	1.61 to 1.85	207 to 270	-2.2	5 to 14 days	62 to 81
– Frozen	-29 to -18	90 to 95					6 to 12 months	
Scallops – Meat	0 to 1	95 to 100	3.51	1.84	267	-2.2	12 days	80
Shrimp	-1 to 1	95 to 100	3.38	1.79	254	-2.2	12 to 14 days	76
Oysters, Clams – Meat and Liquid	0 to 2	100	3.75	1.93	290	-2.2	5 to 8 days	87
Oysters – In Shell	5 to 10	95 to 100	3.51	1.84	267	-2.8	5 days	80
Shellfish – Frozen	-29 to -18	90 to 95					3 to 8 months	
Miscellaneous								
Beer – Bottles & Cans	2 to 4	65 or less	3.85	1.97	300	-2.2	3 to 6 months	90
Bread – Frozen	-18		1.99	1.27	106 to 123	-9 to -7	3 to 13 weeks	32 to 37
Butter	0 to 4	75 to 85	1.37	1.04	53	-20 to -0.6	1 month	16
Butter – Frozen	-23	70 to 85					12 Months	
Cheese – Cheddar	0 to 1	65	2.07	1.3	123	-13	12 months	37
– Cheddar	4.4	65	2.07	1.3	123	-13	6 months	37
Chocolate – Milk	-18 to 1	40	0.87	0.85	3.3		6 to 12 months	1
Coffee – Green	2 to 3	80 to 85	1.17 to 1.34	0.96 to 1.03	33 to 50		2 to 4 months	10 to 15
Eggs – Whole	-2 to 0	80 to 85	3.05	1.66	220	-2.2	5 to 6 months	66
– Whole	10 to 13	70 to 75	3.05	1.66	220	-2.2	2 to 3 weeks	66
– Frozen, Whole	-18 or less		3.31	1.76	247		1 year plus	74
Furs and Fabrics	1 to 4	45 to 55					Several years	
Honey	Below 10		1.4	1.05	57		1 year plus	17
Hops	-2 to 0	50 to 60					Several months	
Milk – Whole, Pasteurised	0 to 1		3.75	1.93	290	-0.6		87
Nuts	0 to 10	65 to 75	0.94 to 1.04	0.88 to 0.91	10 to 20		8 to 12 months	3 to 6
Oleomargarine	2	60 to 70	1.37	1.04	53		1 year plus	16
Popcorn – Unpopped	0 to 4	85	1.17	0.96	33		4 to 6 weeks	10

Coolroom Design Data

Heat of Respiration: Watts / Tonne

Product	Storage Temperature : °C				
	0	5	10	15	20
Fruits and Melons					
Apples	6 – 10	13 – 20		35 – 80	45 – 95
Apricots	16 – 17	19 – 27	33 – 56	63 – 102	87 – 155
Avocados – Green		53 – 80		160 – 415	195 – 915
Blackberries	47 – 68	85 – 136	155 – 281	209 – 432	388 – 582
Blueberries	7 – 31	27 – 36		101 – 183	154 – 259
Cantaloupe (Rock Melon)		26 – 30	46	100 – 114	132 – 192
Cherries – Sweet	12 – 16	28 – 42		74 – 133	83 – 95
Cranberries		12 – 14			33 – 54
Figs – Fresh		33 – 39	66 – 68	146 – 188	169 – 282
Gooseberries	20 – 26	36 – 40		65 – 96	
Grapefruit				38	52
Grapes	4 – 6	8 – 16		26 – 31	
Honeydew Melons			24	35 – 47	59 – 71
Lemons				47	67
Limes			8 – 17	17 – 31	20 – 55
Mangoes				133	223 – 449
Olives – Fresh				65 – 116	114 – 145
Oranges	5 – 13	10 – 19		35 – 60	60 – 90
Papaw		11 – 16		40 – 60	
Peaches	12 – 19	19 – 27		98 – 126	176 – 304
Pears	8 – 15	18 – 39	23 – 59	76 – 155	101 – 231
Persimmons		18		35 – 42	59 – 71
Pineapples		4 – 6		35 – 50	65 – 105
Plums	6 – 9	12 – 27	27 – 34	35 – 37	53 – 77
Raspberries	52 – 74	92 – 114	82 – 165	244 – 301	340 – 727
Strawberries	36 – 52	49 – 98	146 – 281	211 – 274	303 – 581
Watermelons			22		51 – 74

Coolroom Design Data

Heat of Respiration: Watts / Tonne

Product	Storage Temperature : °C				
	0	5	10	15	20
Vegetables					
Artichokes – Globe	67 – 133	95 – 178	162 – 292	229 – 430	404 – 692
Asparagus	81 – 238	162 – 404	318 – 904	472 – 971	809 – 1484
Beans – Green		101 – 104	162 – 173	252 – 276	351 – 386
Beetroot – Topped	16 – 21	27 – 28	35 – 40	50 – 69	
Broccoli	55 – 64	102 – 475		515 – 1008	825 – 1011
Brussels Sprouts	46 – 71	96 – 144	187 – 251	283 – 317	267 – 564
Cabbage - White	15 – 40	22 – 64	36 – 98	58 – 170	
Carrots – Topped	46	58	93	117	209
Cauliflower	53	61	100	137	238
Celery	20	30		100	170
Corn – Sweet	126	230	332	483	855
Cucumbers			68 – 86	71 – 98	92 – 143
Garlic – Dry	9 – 32	18 – 29	27 – 29	33 – 81	30 – 54
Horseradish	24	32	78	97	132
Kohlrabi	30	49	93	146	
Leeks – Green	28 – 49	58 – 86	159 – 202	245 – 347	
Lettuce – Head	27 – 50	40 – 59	81 – 119	114 – 121	178
Mushrooms	83 – 130	210			782 – 939
Onions – Dry	9	10	21	33	50
Parsley	98 – 137	196 – 252	389 – 487	427 – 662	582 – 757
Parsnips	34 – 46	26 – 52	61 – 78	96 – 127	
Peas – Green	90 – 139	163 – 227		530 – 600	728 – 1072
Peppers – Sweet			43	68	130
Potatoes – Immature		35	42 – 62	42 – 92	54 – 134
– Mature		18 – 20	20 – 30	20 – 35	20 – 47
Radishes – Topped	16 – 18	23 – 24	45	82 – 97	142 – 146
Rhubarb – Topped	24 – 39	33 – 54		92 – 135	119 – 169
Rutabaga	6 – 8	14 – 15		32 – 47	
Silverbeet (Spinach)		136	328	531	682
Tomatoes – Coloured and Ripe		16		65 – 75	65 – 115
– Mature, Green		13 – 22		43 – 75	75 – 110
Turnips – Roots	26	28 – 30		64 – 71	71 – 74

Coolroom Design Data

Heat Load Tables

2°C Coolrooms

Based on:

35°C Ambient Temperature
75mm Polystyrene Insulation
Product Specific Heat: 3.4 kJ/kg K

Product Pull Down Time: 24 hours
16 hours/day Compressor Operation
Heavy Usage = Average Air Changes x 2

External Dimensions : m		Volume m ³	Heat Load – Watts					
			Product Load Per Day (Product Entering at 12°C)					
Height = 2.4			150 kg		350 kg		700 kg	
Length	Width		Average Usage	Heavy Usage	Average Usage	Heavy Usage	Average Usage	Heavy Usage
1.8	1.2	3.9	930	1280	1070	1420		
1.8	1.8	6.13	1120	1560	1260	1690		
1.8	2.4	8.35	1300	1800	1440	2010		
1.8	3	10.58	1470	2100	1610	2240		
2.4	2.4	11.39	1510	2150	1650	2290	1890	2530
2.4	3	14.43	1710	2420	1840	2550	2080	2800
2.4	3.6	17.47	1900	2660	2030	2800	2270	3040
2.4	4.2	20.5			2220	3040	2460	3280
3	3	18.28			2060	2850	2310	3090
3	3.6	22.12			2280	3130	2520	3370
3	4.2	25.97			2490	3390	2730	3630
3.6	3.6	26.78			2520	3440	2760	3680
3.6	4.2	31.44			2750	3730	3060	4040
4.2	4.2	36.91			3070	4120	3310	4370

-18°C Freezers

Based on:

35°C Ambient temperature
150mm Polystyrene insulation
Product Specific Heat above freezing: 3.3 kJ/kg K

Product Specific Heat below freezing: 1.5 kJ/kg K
Product Latent Heat: 247 kJ/kg
Product pull down time: 24 hours
18 hours/day compressor operation

External Dimensions : m		Volume m ³	Storage Only – No Product Freezing	Heat Load – Watts		
Height = 2.4				Product Freezing Load Per Day (Product Entering at 5°C)		
Length	Width			150 kg	350 kg	700 kg
1.8	1.2	2.84	740	1480	2550	
1.8	1.8	4.72	930	1660	2730	
1.8	2.4	6.61	1100	1820	2900	
1.8	3	8.51	1250	2040	3050	
2.4	2.4	9.26	1300	2080	3090	4910
2.4	3	11.91	1490	2260	3260	5090
2.4	3.6	14.55	1670	2430	3430	5260
2.4	4.2	17.2	1840	2590	3600	5420
3	3	15.31	1710	2460	3470	5290
3	3.6	18.71	1910	2650	3660	5480
3	4.2	22.11	2170	2840	3840	5670
3.6	3.6	22.87	2200	2870	3870	5700
3.6	4.2	27.03	2420	3080	4150	5910
4.2	4.2	31.94	2650	3310	4380	6140

We recommend that the above information be used as a guide only and that each particular application be referred to Actrol for selection advice. See Page 411.



Your best Solution...

Thermostatic Expansion Valve Superheat

A vapour is superheated whenever its temperature is higher than the saturation temperature corresponding to its pressure. The amount of the superheat equals the amount of temperature increase above the saturation temperature at the existing pressure.

For example, a refrigeration evaporator is operating with Refrigerant 22 at 465 kPa suction pressure (See Figure 1). The Refrigerant 22 saturation temperature at 465 kPa is 4°C. As long as any liquid exists at this pressure, the refrigerant temperature will remain 4°C as it evaporates or boils off in the evaporator.

As the refrigerant moves along in the coil, the liquid boils off into a vapour, causing the amount of liquid present to decrease. All of the liquid is finally evaporated at point B because it has absorbed sufficient heat from the surrounding atmosphere to change the refrigerant liquid to a vapour. The refrigerant gas continues along the coil and remains at the same pressure (465 kPa) however, its temperature increases due to continued absorption of heat from the surrounding atmosphere. When the refrigerant gas reaches the end of the evaporator (Point C), its temperature is 10°C. This refrigerant gas is now superheated and the amount of superheat is 6°C or 6K (10° – 4°). The degree to which the refrigerant gas is superheated depends on the amount of refrigerant being fed to the evaporator by the T.X. valve and the heat load to which the evaporator is exposed.

Adjustment of Superheat

The function of a T.X. valve is to control the superheat of the suction gas leaving the evaporator in accordance with the valve setting. A T.X. valve which is performing this function within reasonable limits can be said to be operating in a satisfactory manner.

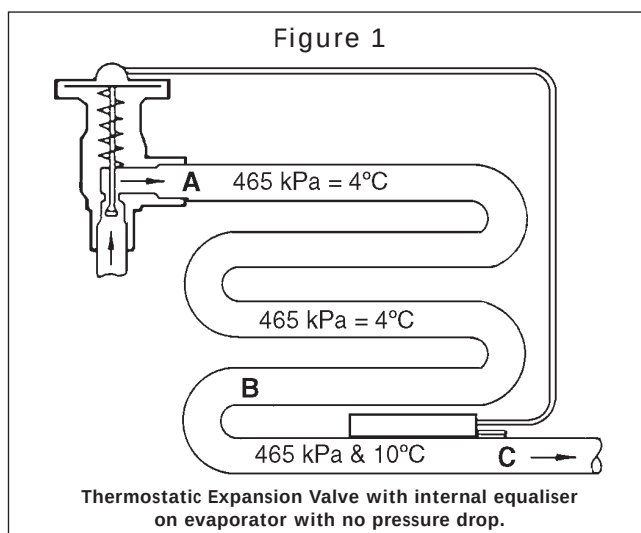
Good superheat control is the criterion of T.X. valve performance. It is important that this function be measured as accurately as possible, or in the absence of accuracy, to be aware of the magnitude and direction of whatever error is present.

Superheat has been previously defined as the temperature increase of the refrigerant gas above the saturation temperature at the existing pressure. Based on this definition, the pressure and temperature of the refrigerant suction gas passing the T.X. valve remote bulb are required for an accurate determination of superheat.

Thus, when measuring superheat, the recommended practice is to install a calibrated pressure gauge in a gauge connection at the evaporator outlet. In the absence of a gauge connection, a tee installed in the T.X. valve external equaliser line can be used just as effectively.

A refrigeration type pocket thermometer with appropriate bulb clamp may be used, or more effective is the use of a service type potentiometer (electric thermometer) with thermocouples (leads and probes).

The temperature element from your Temperature Meter should be clamped to the suction line at the point of remote bulb location and must be insulated against the ambient. Temperature elements of this type, as well as thermometers, will give an average reading of suction line and ambient if not insulated. Assuming an accurate gauge and Temperature Meter, this method will provide sufficiently accurate superheat readings for all practical purposes.



On installations where a gauge connection is not available and the valve is internally equalised there are two alternate methods possible. Both of these methods are approximations only and their use is definitely not recommended.

The first of these is the two temperature method which utilises the difference in temperature between the evaporator inlet and outlet as the superheat. This method is in error by the temperature equivalent of the pressure drop between the two points of temperature.

Where the pressure drop between the evaporator inlet and outlet is 7 kPa or less, the two temperature method will yield fairly accurate results. However, evaporator pressure drop is usually an unknown and will vary with the load. For this reason, the two temperature method cannot be relied on for absolute superheat readings. It should be noted that the error in the two temperature method is negative and always indicates a superheat lower than the actual figure.

The other method commonly used to check superheat involves taking the temperature at the evaporator outlet and utilising the compressor suction pressure as the evaporator saturation pressure. The error here is obviously due to the pressure drop in the suction line between the evaporator outlet and the compressor suction gauge.

On self-contained equipment, the pressure drop and resulting error are usually small. However, on large built-up systems or systems with long runs of suction line, considerable discrepancies will usually result.

Since estimates of suction line pressure drop are usually not accurate enough to give a true picture of the superheat, this method cannot be relied on for absolute values. It should be noted that the error in this instance will always be positive and the superheat resulting will be higher than the actual value.

Restating, the only method of checking superheat that will yield an absolute value involves a pressure and temperature reading at the evaporator outlet.

Other methods employed will yield a fictitious superheat that can prove misleading when used to analyse T.X. valve performance. By realising the limitations of these approximate methods and the direction of the error, it is often possible to determine that the cause of a trouble call is due to the use of improper methods of instrumentation rather than any malfunction of the valve.

Silver Brazing

Inert Gas Prevents Copper Oxide Formation

The purpose of this article on silver brazing is to enlarge on one serious after-effect if proper procedures are not used during silver brazing operations.

The use of high melting point alloys has increased considerably in recent years particularly in supermarkets, processing plants, air conditioning or wherever a large number of joints are used. The inherent mechanical strength of the joint and the reduction of leak possibilities have made this a desirable type of joint. In addition, code requirements in some areas have forced the use of these alloys.

In order for brazing alloys to melt and flow properly, 620 to 790°C is required. Copper will react with the oxygen in air at these temperatures to form a scale of copper oxide on the inner walls of tubing, pipe and fittings. The scale is broken off into flakes by the turbulence of flowing liquid refrigerant. The flakes quickly break up into a fine powder which plugs driers, strainers and capillary tubes.

Copper oxide is so finely divided that a filter bed of other materials is usually required in driers before the filtration system in the drier can remove it, thus accounting for the approximately 48 hours needed to remove this material. This assumes that the original drier does not plug. If it does, longer will be required.

Driers are sometimes returned as defective because they have shown an undesirable pressure drop on a new system. In conjunction with other dirt, a substantial accumulation of copper oxide is often the explanation. Chemical analysis readily confirm the condition. The drier is not defective, on the contrary, it has done exactly what it was designed to do - take out the 'dirt'.

If the air in the line being brazed is replaced with an inert gas such as dry nitrogen, the formation of copper oxide can be eliminated. The line should be purged thoroughly and a slow steady flow of nitrogen maintained by means of a pressure reducing valve.

High pressure gas (nitrogen) should never be connected directly to a system but must be metered through a pressure reducing valve for the protection of the user. Too high a rate of flow is undesirable because of the cooling effect of the gas.

The inert gas method will keep the inside of the copper lines and fittings clean and bright. When it is not completely successful, the trouble is usually attributed to applying heat before all of the air has been displaced.

On large copper pipe, the end of the tubing should be covered with some type of elastic material such as a rubber balloon and a small slit made in the rubber to provide an escape valve. In this manner the line can be kept full of nitrogen without use of excessive quantities.

The inert gas method, wherever practical, is recommended for repair work. The nitrogen clears the line of refrigerant vapour preventing acid formation due to refrigerant breakdown as well as preventing copper oxide formation.

Note

Cadmium bearing brazing alloys present a dangerous toxic hazard. Extreme care in providing adequate ventilation during brazing operations is an absolute necessity. Inhalation of cadmium fumes may produce extreme illness or could be fatal.

Trouble Shooting Tips

A list of Do's and Don'ts for Commercial Refrigeration

Do	Don't
- Check suction gas superheat at the compressor. High superheats cause high discharge temperatures and shorten compressor life. - Check expansion valve superheat using the temperature pressure method (refer to Page 418). Set to equipment manufacturer's specification. - Replace filter-driers or drier cores when opening the system for service. - Maintain test instruments in workable calibrated condition. - Use an accurate liquid line moisture indicator to ensure system dryness. - Read and observe installation and safety instructions included with a product. - Familiarise yourself with the operation of a control before attempting to make adjustments or repairs. - Remember that a thermostatic expansion valve is not a temperature or pressure control.	- Select solenoid valves by line size or port size. Select based on valve capacity. - Rely on sight or touch for temperature measurements. Use an accurate thermometer. - Be a 'parts changer'. Analyse the problem and determine the cause of failure before making adjustments or repairs. - Attempt to re-use driers or drier blocks once they have been removed from the system. - Energise a solenoid coil with it removed from a valve. It will burn out in a matter of minutes.

Refrigeration Terminology

Temperature

Indicates level of heat energy

Centigrade Scale °C (Celsius)

Absolute Temperature °K (Kelvin) = °C + 273°

Measurement

The quantity of heat energy is measured in kilojoules (kJ).

The heat required to raise or lower the temperature of 1kg of water 1K is 4.19 kilojoules. (kJ/sec = kw)

States of Matter

Solid, liquid and gas

Change of State

The change from one state of matter to another by the addition or the removal of heat at constant temperature.

Change of state can also be referred to as change of phase.

Sensible Heat

Heat added to or subtracted from a substance without a change of state (only a change in temperature).

Specific Heat

The amount of sensible heat required to raise the temperature of 1kg of a substance 1K or the ratio of the heat capacity of the substance to that of water. (kJ/kg K)

Latent Heat

Quantity of heat added or removed from a unit weight of a substance during change of state or phase at constant temperature. (kJ/kg•K)

1. Latent Heat of Fusion:

Melting of a solid or freezing of a liquid.

2. Latent Heat of Evaporation:

Change from a liquid to a gas.

3. Latent Heat of Condensation:

Change from a gas to a liquid.

Total Heat (Enthalpy) Heat Capacity

The sum total of sensible and latent heat quantities. kJ/kg•K, usually referenced to -40° at which point the Total Heat (Enthalpy) is taken as 0 kJ/kg•K with negative values below -40°. When all heat has been extracted from a substance, it is said to be at Absolute Zero 0°K (Kelvin).

Note: Enthalpy referenced to 0°C for air.

Pressure

Expressed in Pascals (Pa) or Kilopascals (kPa) Gauge or absolute.

1. **Atmospheric Pressure:** At sea level is 101.325 kPa absolute (deduct approx. 3.447 kPa or 25.4mm of mercury for every 304.8 metres increase in elevation above sea level).
2. **Gauge Pressure:** = Calibrated Gauge to read zero at atmospheric pressure.
3. **Absolute Pressure:** = true or total pressure. Therefore if the pressure is greater than the atmospheric pressure the atmospheric pressure must be added to the gauge pressure. But if the pressure is less than atmospheric pressure the atmospheric pressure must be subtracted from the gauge pressure.
4. **Vacuum:** Pressures below atmospheric pressure are measured in millimetres of mercury (vacuum) (50.8 millimetres of mercury can be equal to 6.89 kPa). A perfect vacuum (0 kPa) being equal to 25.4 millimetres of mercury (mmHg) or 760mm, at sea level. Measurements are sometimes expressed in microns (1,000,000 microns in a metre).
5. **Vapour Pressure:** Equilibrium Pressure between a liquid and its saturated vapour. As long as vapour and liquid are both present there will be only one vapour pressure for each level of temperature.
6. **Gas Pressure:** In the absence of liquid the pressure of a gas is proportional to Absolute gas temperature and to gas density (perfect gas laws).

Saturated Vapour and Liquid

When gas and liquid exist in equilibrium there will be only one vapour pressure for each level of temperature.

1. **Subcooled Liquid:** If additional heat is removed from saturated liquid in the absence of vapour, its temperature is reduced at constant pressure and it becomes subcooled.
2. **Superheated Gas:** If additional heat is added to saturated vapour in the absence of liquid, it becomes superheated vapour or gas.

Fundamentals of Dehydrating a Refrigeration System

Two Questions Commonly asked by Air Conditioning and Refrigeration Service Technicians are:

“What size vacuum pump should be used to properly evacuate a system?”

“How long should the pump be left on the system to assure complete moisture removal?”

To give specific answers to these questions, you need to know the cubic capacity of the system to be evacuated, amount of moisture both visible and invisible present in the system, inside diameter and length of the connecting line as well as the restrictions within the system itself (capillary tubes, valves, etc) which might cause back pressures.

Rather than supplying fast, pat answers to these important questions and then trying to justify them, it would be best to cover basic fundamentals of moisture removal from, or 'dehydrating', a refrigeration system and the factors relating to vacuum.

Moisture in a Refrigeration System

While it is important to realise that moisture in a refrigeration system is directly or indirectly the real cause of more problems and complaints than all other causes combined, it is equally important to learn why.

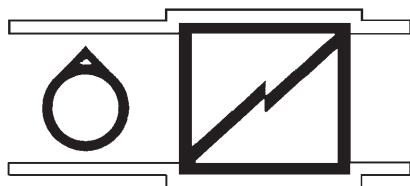
Basically, moisture can be classified as visible and invisible. Occasionally, liquid water is found in systems, but this is rather unusual. Invisible moisture, or water vapour, is found everywhere, in all solids, liquids and gases. In the air, water vapour content is expressed in terms of relative humidity. It is this invisible moisture which causes the greatest trouble in refrigeration and air conditioning systems.



SINGLE DROP OF WATER

A single drop of water may look harmless, but to a refrigeration system, it is a monster, the number one enemy of service technicians. And what makes it so formidable an enemy is the fact that moisture enters a system easily and is hard to remove. Here is what it does to a system.

First of all, it creates 'freeze-ups' in a refrigeration system. Moisture will be picked up by the refrigerant and be transported through the refrigerant line in a fine mist from which ice crystals form at the point of expansion (expansion valve).

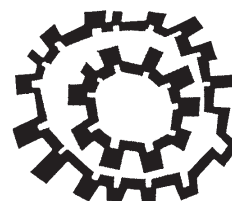


MOISTURE TO ICE CRYSTALS

Ice Crystals retard or stop the flow of the refrigerant, causing a reduction or complete loss of cooling. As the expansion valve warms, due to the lack of refrigerant, the ice melts and passes through the expansion valve. The refrigerant will then start to flow again until the moisture returns to the expansion valve and once more builds a formation of ice crystals. The result is intermittent cooling.

Whether a 'freeze-up' actually occurs depends primarily upon the amount of water and the size of the ice particles formed.

But a 'freeze-up' is not the only problem caused by moisture. It can also cause corrosion, which can present serious trouble. Often the effects of corrosion are not apparent until the real damage has occurred.



MOISTURE FORMS CORROSION

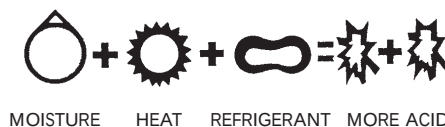
For example, moisture alone in the form of water can cause corrosion after a period of time. However, moisture mixed with refrigerant creates much more corrosion trouble. Refrigerants containing chlorine, will slowly hydrolyse with water and form hydrochloric acids. This acid greatly increases the corrosion of metals and could possibly cause copper plating.

Heat increases the rate of corrosion due to acids because at higher temperatures the acid-forming process accelerates.



MOISTURE TO ACIDS

This acid attacks all the materials it contacts, the rate of corrosion of the individual materials being determined by their corrosion-resistant qualities. Steel will generally corrode at lower moisture levels than copper or brass.

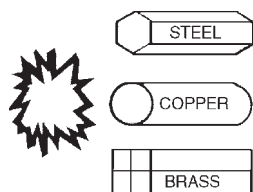


INCREASING ACID DUE TO HEAT

Refrigerant oil presents another problem caused by moisture. Refrigerant oil is an exception to the rule that 'oil and water don't mix'. In fact, refrigerant oil has an attraction for moisture and will absorb it rapidly if left open to the atmosphere. Water formed acid mixes with refrigerant oil, the two forming a closely bonded mixture of fine globules. The effect is called 'sludging' and greatly reduces the lubricating ability of the oil.

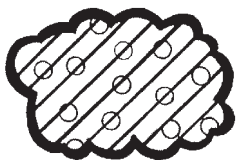
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Fundamentals of Dehydrating a Refrigeration System



ACID EFFECTS ON METALS

Corrosion becomes troublesome from the operating standpoint when metallic surfaces are eaten away and a solid, detachable product is formed. This formation is also known as a 'sludge'. Sludge exists as slimy liquids, fine powders, granular solids or sticky solids and can cause a variety of problems. Sludge will plug fine strainers, expansion valves and capillary tubes. And because it usually contains acids, sludge will corrode whatever it clings to, accelerating system damage.



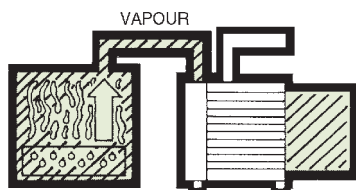
MOISTURE TO SLUDGE

The most effective way to eliminate moisture from a system is with good high vacuum pump.

Effects of Pressure and Temperature on the Boiling Point of Water

A high vacuum pump is capable of removing all moisture from a hermetic system by reducing internal system pressures to the boiling point of water at normal temperatures.

For those being introduced here to high vacuum work, it should be stated that a vacuum pump does not 'suck out' the liquid moisture, but rather causes it to boil into a vapour state at which time it can be harmlessly removed from the system and exhausted through the vacuum pump.



WATER TO VAPOUR

The planet earth is surrounded by matter in the gaseous state composed of about 78% nitrogen, 21% oxygen and 1% a mix of rare gases. Together they form our atmosphere, which extends approximately 965 kilometres above the earth and is held to the earth by gravity. Being a gas, the atmosphere has weight, and that weight is measured, as in any fluid whether liquid or gas in pressure (Pa) Pascals or (kPa) Kilopascals.

The pressure exerted on the earth at sea level is 101.35kPa. This is called **atmospheric pressure**. Any pressure above atmospheric pressure is referred to as **gauge pressure**.

Pressures below are referred to as **vacuum**.

ATMOSPHERIC PRESSURE

Atmospheric pressure decreases at higher elevations. As stated, 965km of atmosphere at sea level is equivalent to 101.35kPa and/or 760mm column of mercury (hg). Going above sea level to the summit of Mt Whitney, for example, eliminates some of the 965km of atmosphere and consequently, some of the pressure.

Atmospheric pressure, therefore, governs the boiling point of water. At sea level where atmospheric pressure is 101.35kPa (760mm Hg), water boils at 100°C, but on Mt. Whitney where atmospheric pressure is 57.36kPa (429.2mm Hg), water boils at only 84.4°C. The lower the atmospheric pressure is, the lower the boiling point of water. Therefore, if we can significantly reduce the atmospheric pressure inside a sealed refrigerant system, we can vapourise (or boil) moisture at even -68°C. This principle is illustrated in the chart on the following page.

Three ways exist for eliminating moisture from a refrigerant system by the boiling process:

1. Transport the system to a higher elevation where the ambient temperature is sufficient to boil water at the existing psi.
2. Apply heat to the system causing the moisture to boil.
3. Employ a high vacuum pump to reduce the pressure and boiling point of water.

The first two choices are impractical and must be discarded. Thus, a high vacuum pump is an essential service aid to every service technician.

The purpose of a vacuum pump is to reduce the internal system pressure of a refrigeration/air conditioning system so moisture and other contaminants can be removed. Before we explore the different types of vacuum pumps available for service work, it may be helpful to clarify the concepts of 'high vacuum' and 'deep vacuum'.

The following chart shows the relationship between these two concepts.

Remember that:

PERFECT VACUUM = 759.968mm Hg at sea level (a perfect vacuum exists only in theory).

PERFECT VACUUM	= 0 MICRONS
HIGH VACUUM	= LOW MICRONS
DEEP VACUUM	= LOW MICRONS

The term 'high vacuum' describes a condition where the internal system pressure is extremely low, or close to a perfect vacuum. The **higher** the vacuum is in a system, the closer the micron reading is to 0 microns. Deep vacuum can be thought of in the same way. The deeper a vacuum is, the closer the micron reading is to 0 microns.

'High vacuum' and 'deep vacuum' actually describe the same condition inside a closed system. For refrigeration/air conditioning service applications, we will think in terms of **high vacuum = good vacuum**, or a low micron reading on the system.

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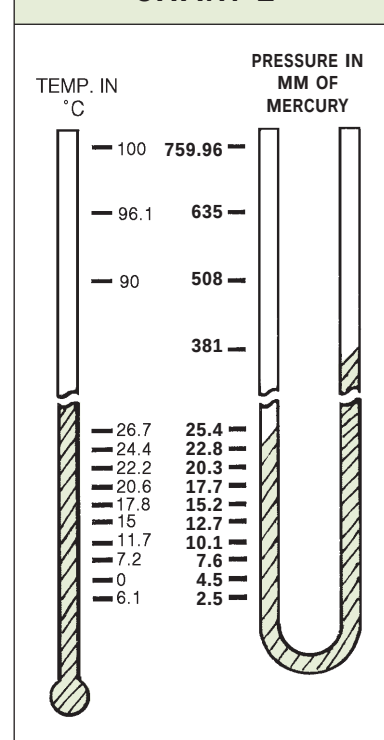
Fundamentals of Dehydrating a Refrigeration System

CHART 1 – Boiling Temperatures of Water at Converted Pressures

Temperature oC	Millimetres of Vacuum	Microns*	kPa (Pressure)
100	0	759,968	101.325
96.1	124.96	535,000	84.660
90	234.44	525,526	70.064
80	404.87	355,092	47.339
70	526.28	233,680	31.157
60	610.61	149,352	19.91
50	667.51	92,456	12.327
40	704.85	55,118	7.349
30	728.21	31,750	4.233
26.7	734.56	25,400	3.385
24.4	737.10	22,860	3.047
22.2	739.64	20,320	2.709
20.6	742.18	17,780	2.371
17.8	744.72	15,240	2.033
15	747.26	12,700	1.696
11.7	749.80	10,160	1.351
7.2	752.34	7,620	1.013
0	755.39	4,572	0.606
-6.1	757.42	2,540	0.337
-14.4	758.69	1,270	0.168
-31.1	759.71	254	0.033
-37.2	759.84	127	0.016
-51.1	759.94	25.4	0.003
-56.7	759.95	12.7	0.001
-67.8	759.96	2.54	0.0003

*Remaining pressure in system in microns 1,000 microns = 1mm

CHART 2



Selecting High Vacuum Pumps

To make the following discussion easier to understand, it would be best from this point on to think of pressure (kPa) as the amount of mercury it will support. Eg: atmospheric pressure at 759.968mm Hg instead of 101.3kPa. This will permit us to use Chart 2 as a visual aid when determining the vacuum which must be attained to boil water under various ambient temperatures.

Chart 2 shows a vacuum pump capable of eliminating all but 25.4 millimetres of mercury. It is able to remove moisture at an ambient temperature of 27°C or over. While any pump pulling within one inch of atmospheric pressure can eliminate moisture, it must also be capable of holding that vacuum throughout the dehydration process. In addition, it must pull that vacuum on the entire system and not simply at the intake of the pump.

Before considering the variables affecting a high vacuum pump's performance, we should first review some general classifications of vacuum pumps relative to their ability to remove moisture by the boiling process.

Vacuum Pumps – Air Compressor Type

Air compressors were designed to remove large volumes of air rather than to remove all but a small amount of pressure. This type of vacuum pump will not eliminate any moisture by the boiling method. At best, it cannot pull more than 711.2 millimeters of mercury and consequently should not be considered suitable for high vacuum work.

Fundamentals of Dehydrating a Refrigeration System

Vacuum Pumps – Compressor Type

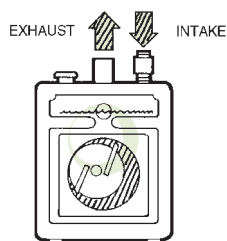
For clarification, compressor type vacuum pumps should be separated into two categories: piston type and rotary vane type.

Under ideal conditions, a piston type compressor might pull a vacuum of 736.6mm of mercury which will boil water at an ambient temperature of 27°C or over. But it is questionable whether or not it can hold this vacuum once moisture condenses into its oil. Quite a number of these vacuum pumps have been sold as evacuators and are used in conjunction with a true high vacuum pump. By themselves, they cannot remove moisture by the boiling method under normal ambient conditions.

A rotary-type compressor can pull a vacuum as high as 752.60mm. This vacuum will remove moisture by the boiling method. However, because of their limited litres/min capacity, these pumps should be limited to refrigerator and freezer service work. They are also used in the automotive air conditioning service field.

High Vacuum Pumps – Single Stage

Single stage high vacuum pumps are desirable for several reasons. First, they are almost always smaller and lighter in weight than two stage pumps of equal capacity in l/min. Second, single stage pumps are generally less expensive than two stage pumps. These advantages make single stage pumps a good choice for students and technicians just beginning refrigeration/air conditioning service work. A single stage high vacuum pump is also a good choice for a second pump among more experienced servicemen.



SINGLE STAGE VACUUM PUMP

There are single stage vacuum pumps available which can pull down to about 50 microns under ideal laboratory conditions. Single stage pumps discharge directly into the atmosphere, and due to the higher discharge pressure, higher vacuums are not possible at the intake of the pump. A gas ballast feature will help single stage pumps to keep the oil free of moisture and other contaminants for a longer period of time than similar units without. Most single stage pumps with the gas ballast open will pull down to about 1000 microns. There are however, single stage pumps with the gas ballast and high internal temperatures that reduce oil contamination and are therefore able to pull a system to a respectable micron level for most service applications.

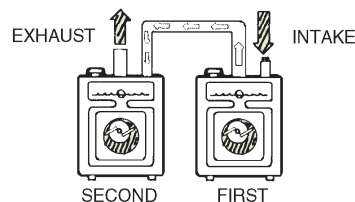
High Vacuum Pumps – Two Stage

The majority of refrigeration/air conditioning service technicians use a two stage high vacuum pump for the bulk of their service jobs. A two stage pump is usually larger and weighs a little more than a single stage pump of equal l/min capacity.

A two stage pump features a second pumping chamber to enable the pump to reach a higher ultimate vacuum than a

single stage model. In a two stage pump, the exhaust of the first pumping stage is discharged into the intake of the second pumping stage, rather than to atmospheric pressure.

The second stage begins pumping at a lower pressure and therefore pulls a higher vacuum on the system than the first stage is capable of on its own.



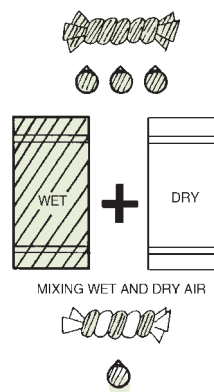
TWO STAGE VACUUM PUMP

Compound two stage vacuum pumps are capable of pulling down to an extremely high vacuum such as 1 micron. While they will seldom pull down to this point under field conditions, two stage high vacuum pumps can continuously pull down to 20 microns for prolonged periods of time. For this reason a two stage high vacuum pump is well suited for refrigeration/air conditioning service.

The higher ultimate vacuum capability of a two stage vacuum pump will help to ensure that all moisture and non-condensables are removed from a system. It is important to achieve the highest vacuum possible before recharging a system with refrigerant.

Gas Ballast or Vented Exhaust

The gas ballast or vented exhaust feature is a valving arrangement which permits relatively dry air from the atmosphere to enter the second stage of the pump. This air reduces the compression in the final stage, which helps to prevent the moisture from condensing into a liquid and mixing with the vacuum pump oil.



This may sound complex, but actually it is relatively simple. A comparison should help explain it. Imagine a damp towel being twisted until water drops out. This can be compared to a high vacuum pump which is not equipped with a gas ballast.

Moisture being pulled from a wet refrigerant system is compressed internally in the vacuum pump and condenses into a liquid. Now imagine that same damp towel entwined with a dry towel and then twisted. It would take a considerable amount of twisting before any water would drop out. Thus the process of the gas ballast arrangement. It permits the moisture laden air passing through the pump to mix with relatively dry air to such a degree that compression does not cause condensation.

Continued on following page

Fundamentals of Dehydrating a Refrigeration System

The damp towel comparison also illustrates why this valving feature cannot handle large amounts of moisture. If the towel is almost saturated with water, even the introduction of the completely dry towel will not prevent some of the water from dropping out when the two are compressed. Because of this, some pumps are designed to run with both high internal temperatures (to reduce moisture condensation in the oil) and a gas ballast.

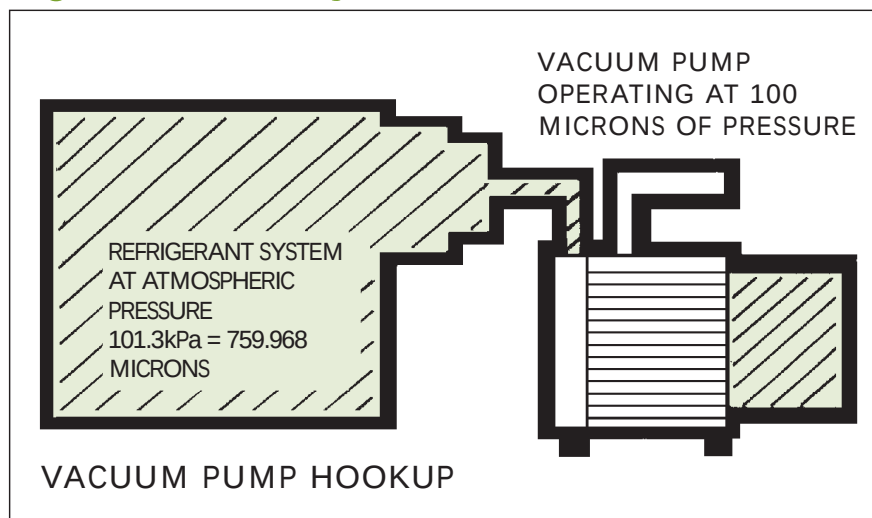
Due to the 'severe' application of a vacuum pump when used to 'boil water', it is necessary to select a quality two stage model equipped with gas ballast and high internal running temperatures to achieve adequate performance over a long period of time. It should be emphasised, however, that even with the best pump available, regular maintenance has to be performed.

Frequent oil changes should be anticipated and considered as the single most important factor in a preventative maintenance program. As stated previously, even a pump equipped with gas ballast cannot handle large amounts of moisture without some being condensed into the oil. If allowed to remain inside the pump, this moisture will attack the metal components and result in lock ups or loss of efficiency and/or capacity. Normally, oil changes will not be required during a single dehydration job. But it would be well to change oil after each major pump down. This is especially critical when pumping down a system known to be wet or the result of a compressor burn-out.

Factors affecting the Speed at which a Pump can Dehydrate a Refrigerant System

Several factors influence the 'pumping speed' of a high vacuum pump, and thus the time required to remove all moisture from a refrigerant system. Some of the most important are: the cubic capacity of the system itself; the amount of moisture (both visible and invisible) contained within the system; the ambient temperature present; internal restrictions within the system; external restrictions between the system and the vacuum source; and the size of the pump.

The original equipment manufacturers determine the cubic capacity of the system and the internal restrictions. Malfunctions and inefficiencies result from the presence of moisture. And Mother Nature controls the ambient temperature of the day. Consequently,



the only factors under the control of the service technician are the external restrictions between the system and the vacuum pump. Nevertheless, this one factor is very important and warrants more discussion.

Let us assume that all other variable factors affecting pump down time are equal. Also for the sake of simplicity, we shall use the illustration above to show a pump hookup to a system.

Within a system, variable pressures attempt to equalise one another. In this equalisation, the higher pressure 'flows' toward the lower pressure. The above hypothetical illustration shows variable pressure creating a vacuum of 100 microns and the system at atmospheric pressure. The higher pressure in the system will flow toward the vacuum pump until it is reduced or equal to the 100 microns of pressure. The speed at which it will flow is controlled by the inside diameter and length of the connecting line.

Laboratory tests show that pump-down time can be significantly reduced by use of larger diameter hoses. For optimum pumping speed, keep access lines as short in length and as large in diameter as possible.

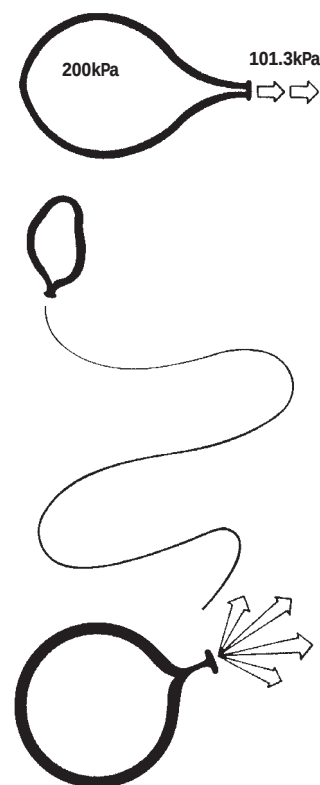
All of us have released an inflated balloon, allowing the escaping air pressure to propel it on a wild course. At other times you have inflated a balloon and stretched its stem, allowing the air to escape with a squealing sound. You controlled the pitch of the squeal and its duration with the amount of stretch on the stem.

In effect, you were controlling the connecting inside diameter as in the above illustration and, in turn, controlling the time it took to release all of its pressure.

The principal is identical: the higher pressure is trying to move toward the lower pressure.

The illustrations stress the importance of eliminating all external restrictions whenever possible. It is realised that this is almost impossible because of the size of valves, manifolds and lines commonly used in our industry today.

Higher Pressure moves toward Lower Pressure



Continued on following page

Fundamentals of Dehydrating a Refrigeration System

It is perfectly acceptable to use a 118 litres/minute or larger vacuum pump on small systems. Using too small a pump on a large system. Eg: a 35 l/min vacuum pump on a 140 kW unit could cause the pump to operate in 'free air' condition for an extended period of time, thus risking premature pump wear.

When determining the size of pump needed, use the formula:
$$\frac{\text{Pump capacity in litres/min}}{\text{Factor 1.15}} = \text{Maximum System Size (kW)}$$

For example: a 118 Litres/min vacuum pump, when applied to the formula:

$$\frac{118 \text{ litres/min}}{1.15} = 102.6 \text{ kW Maximum system size}$$

On systems larger than the pump's capacity, it is recommended to use either a larger pump or two or more pumps to achieve the correct pump rate.

Size of Pump

Chart 3 will give you a reasonable idea of what capacity pump you need for various applications. These are suggested minimum litres/min. Larger capacity high vacuum pumps can easily be used on smaller systems.

How Vacuum can be Measured

In the refrigeration industry, vacuum is measured with a standard compound gauge, closed end manometer or an electronic thermistor vacuum gauge. Keeping in mind that it is a vacuum and its relationship to the boiling points of water we are attempting to measure, we can refer back to Chart 1 to see the relationship between pressure in terms of millimetres of Hg, and microns.

A standard Bourdon tube compound gauge is a rugged type designed to read low pressures in inches of vacuum. It is

suitable for reading vacuums. Eg: -kPa. However, it cannot be expected to read millimetres or microns and because of this, is not suitable for use with high vacuum pumps.

A closed end U tube mercury manometer can be read with good accuracy in millimeters. With one millimeter equal to 1000 microns, it is possible to read 500 microns with this gauge. It is however a fairly delicate instrument, making it more suitable for laboratory or shop work rather than for field service.

Electronic thermistor vacuum gauges are specifically designed for use with high vacuum pumps and can be accurately read as low as 1 micron. Through the use of a sensing tube mounted at some point in the vacuum line, an electronic circuit provides an output calibrated in microns. This output can be an analogue meter scale, a digital display or LED sequence display. One positive effect from a thermistor gauge is that the tube reads total vapour pressure as a function of the thermal conductivity of a gas. It is sensitive to water vapour and other condensables and can give a good indication of the actual vacuum level within a system. A thermistor vacuum gauge is considered essential as a companion instrument for high vacuum dehydration of a refrigerant system. Although developed as a laboratory instrument, there are electronic thermistor vacuum gauges on the market that are rugged and reliable enough for field service work.

When reading vacuum, you should remember that the location of the vacuum gauge tube will affect the reading. The closer to the vacuum source, the lower will be the reading.

When reading the vacuum created in a refrigeration system, you should isolate the vacuum pump with a good vacuum valve and allow the pressure in the system to equalise before taking a final reading.

If the pressure will not equalise, it is an indication of a leak. If it does equalise at a pressure which is too high, it is an indication of moisture and more pumping time is required.

CHART 3

System Size	Suggested High Vacuum Pump Size
Up to 30kW	35 l/min
Up to 75kW	85 l/min
Up to 123kW	140 l/min
Up to 246kW	280 l/min
Up to 370kW	425 l/min

Noise and Vibration

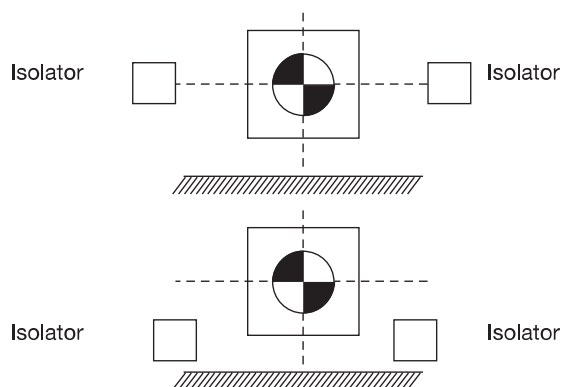
Selection Principles:

Temperature

Extremes of temperature can affect the service life of rubber isolators. Generally, operating temperature should not exceed 60 degrees C but occasional temperatures of up to 80 degrees C can be accommodated.

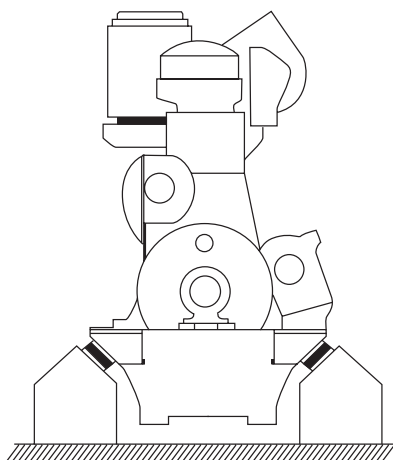
Protection

While most rubber compounds deteriorate if in constant contact with oil or grease, experience has shown that small amounts of oil will not cause a reduction in the mechanical properties of elastomers. It is advisable where oil or grease is prevalent to install isolators so that contact is avoided.



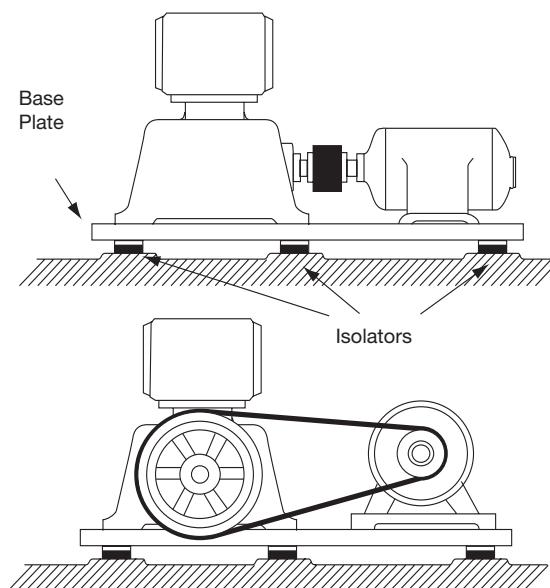
Mount Positioning

The stability of a resiliently supported mechanism is greatest when the isolators are in a horizontal plane passing through the centre of gravity of the mechanism or where the isolators are placed far away from the centre of gravity. Most machines, because of their design, require mounting below the centre of gravity which tends towards instability. For this reason, a small percentage of the isolators efficiency must be sacrificed for the sake of mechanical stability.



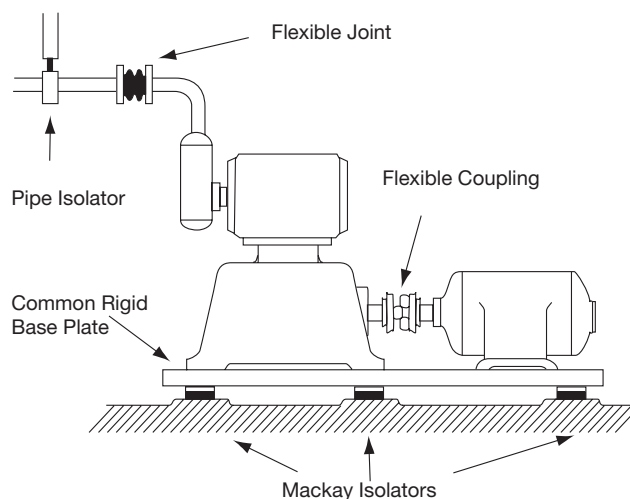
Stability

To maintain stability and relative positions between the drive and belt driven units, install both on a common rigid baseplate and then resiliently support the baseplate.



Flexible Couplings

The efficiency of a resilient isolator under a mechanism can be seriously impaired by the rigidity of the connecting members, such as water and steam pipes, conduit etc. For best performance, it is essential all connecting members be joined as flexibly as possible using Mackay flexible couplings and flexible joints.



Selection

The main consideration is to select the isolator to carry the load as shown in the load rating charts, giving preference to the top end of the ratings, and then choosing the one to suit your specific fitting requirements. Mackay isolators have each been engineered to specific requirements of deflections under working conditions and providing the disturbing or forced frequencies above 15Hz, selection is simple.

Courtesy of Mackay Consolidated Industries Pty Ltd

Noise and Vibration

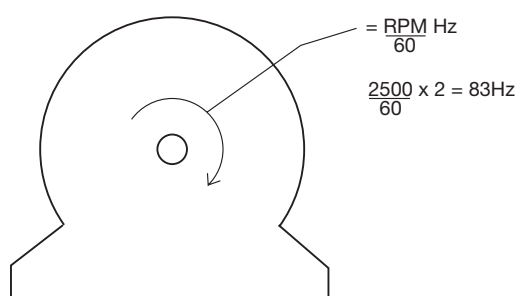
Low Frequency Selection

When frequencies under 15Hz are encountered or when there are HEAVY impact loads imposed on the isolator, consult with Mackay's technical division for advice. For normal purposes, the disturbing frequency can be considered as the revolutions per second of the offending item; i.e. $\frac{\text{R.P.M.}}{60}$

Multi-cylinder Engines

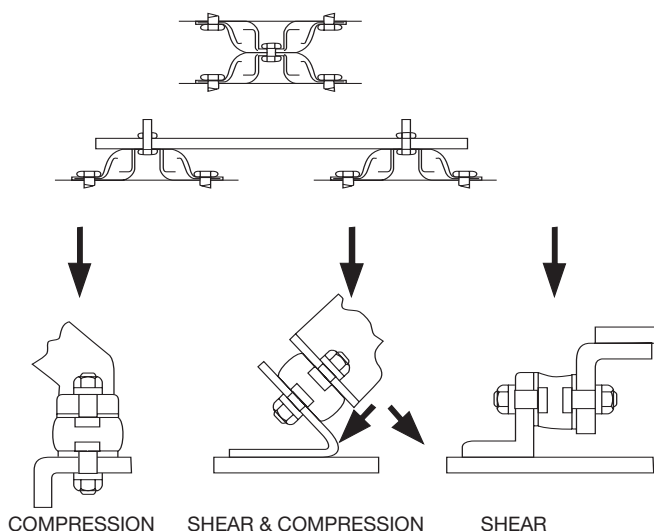
In multi-cylinder engines it is usually the number of working impulses per revolution which constitutes the disturbing frequency.

e.g. Two cylinder engine direct drive operating at 2500 r.p.m. = Disturbing Frequency of 83 Hz.



Series and Parallel Assemblies

The isolation efficiency of low disturbing frequencies can be increased by using two isolators in series. This effectively doubles the deflection obtained with one isolator of the same load carrying capacity - by placing them in parallel, you double the load rating at the same deflection.



Calculating Deflections

If the isolator selected has a higher load carrying rating than required, the deflection of your actual loading can be calculated approximately by using this formula;

$$\frac{\text{Rated Deflection} \times \text{Actual Load}}{\text{Rated Load}}$$

and then referring to the graph illustrated on the next page, the isolation efficiency can be ascertained (should always exceed 70% under normal operating conditions).

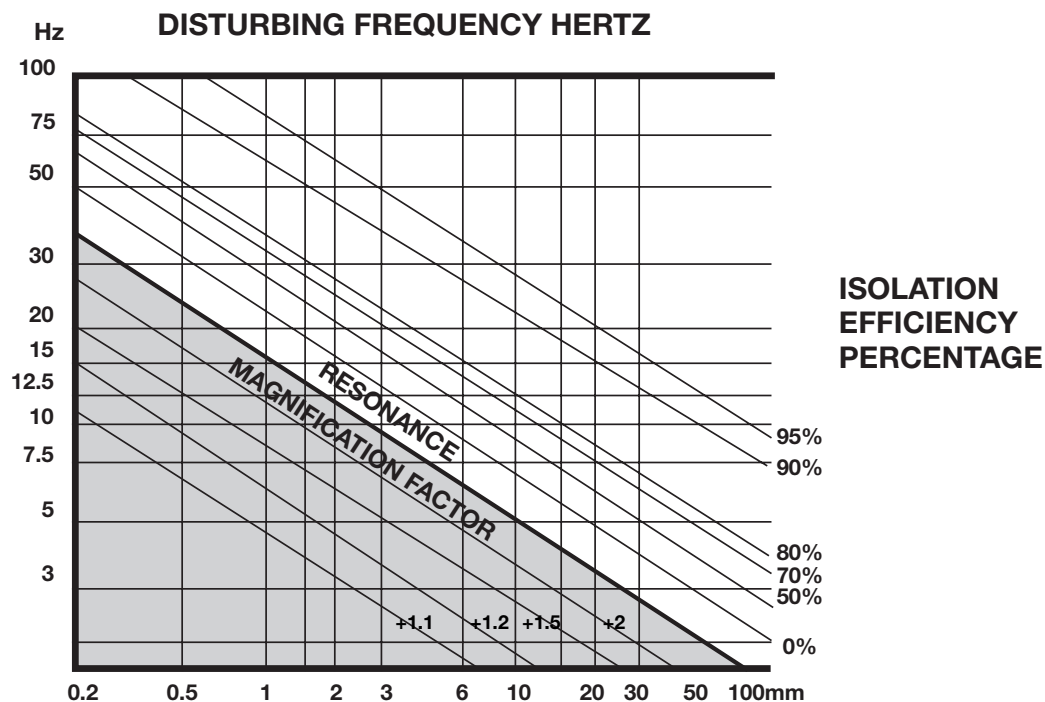
Disturbing Frequencies and Deflections

The graph illustrates the percentage of vibration isolation that is possible to obtain for simple linear vibration in a resiliently mounted assembly with various combinations of static deflection and disturbing frequencies.

The area (shaded) below the resonance line indicates the region of magnification of the vibration that occurs when the ratio of the disturbing frequency to the natural frequency of the mounted assembly is less than the square root of 2. The area above the resonance line shows the percentage of the vibratory forces that are prevented from reaching the supporting structure when correct isolators are selected. For example; with a disturbing frequency of 5Hz and a deflection of 30mm you will obtain an isolating efficiency of 50%, while with a deflection of 3mm your vibration will magnify by a factor of 1.5.

Courtesy of Mackay Consolidated Industries Pty Ltd

Noise and Vibration



To assist you in selecting the correct isolator from the Mackay range we have listed the isolation efficiency that should be used under normal conditions of operation. The isolation efficiency at any given deflection and disturbing frequencies can be obtained by using the simple graph above.

Suggested Isolation Efficiency Guide			
	Factories, Schools, Dept. Stores Isolation Efficiency		Hospitals, Theatres, Libraries Isolation Efficiency
Air Handling Units		80%	94%
Axial Flow Fans	Up to 8kW	70%	90%
	8kW to 38kW	75%	94%
	More than 38kW	80%	96%
Centrifugal Compressors		94%	99.5%
Centrifugal Fans	Up to 4kW	70%	94%
	4kW to 18kW	80%	96%
	More than 18kW	90%	98%
Fan Coil Units	Hung	80%	90%
	Supported	90%	96%
Pipes	Hung	70%	90%
Pumps	Up to 2 kW	70%	94%
	2kW to 4kW	80%	96%
	More than 4kW	90%	98%
Reciprocating Compressors	Up to 8kW	70%	94%
	8kW to 38kW	80%	96%
	More than 38kW	90%	98%
Unit Air Conditioners	Hung	80%	90%
	Supported	90%	96%

Noise and Vibration

Sound, Noise and Refrigeration Equipment

Sound is vital in everyday life for communication, safety and enjoyment. Noise is usually defined as unwanted sound, and this includes noise from mechanical plant such as refrigeration equipment, air conditioners, pumps and various other items of equipment.

The type and location of equipment can influence the noise impact and annoyance to owners, adjacent properties and neighbours.

This brochure is a guide to some of the DO's and DON'T's and helps explain the noise impact of refrigeration equipment installations. This brochure is a guide only and advice should be sought from a qualified acoustic consultant for more detailed advice and assessments.

Noise Limits and Regulations

The acceptable or allowable noise limits from refrigeration and other equipment from one property to a neighbouring property is generally enforced by local councils or police based on State or Territory legislation. The Reference List at the end of this brochure is a starting point for identifying the appropriate noise legislation for each State and Territory.

The guideline limits may depend on the zoning of the surrounding area, whether the noise is intermittent or tonal, time of day etc. A typical requirement is that the equipment noise should not exceed the background noise by more than 5 dBA. In most cases nuisance and annoyance may be avoided if a noise goal of 35 to 40 dBA at the boundary is achieved.

Item	Typical Sound Pressure Level (dBA)	Subjective Evaluation
Threshold of Pain	130	Intolerable
Heavy Rock Concert / Grinding on Steel / Ambulance Sirens / Chainsaw	110 - 120	Extremely Noisy
Loud Car Horn / Jackhammer / Construction Site with Pneumatic Hammering	90 - 100	Very Noisy
Curbside of a Busy Street / Loud Radio or TV / Lawn Mower / Electric Drill	70 - 80	Loud
Normal Conversation / Department Store / General Office	50 - 60	Moderate to Quiet
Inside a Private Office / Inside a Quiet House	30 - 40	Quiet to Very Quiet
Unoccupied Recording Studio / Quiet Day in the Country	20	Almost Silent
Threshold of Hearing	0	Completely Silent

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Measurement of Sound - the dBA

The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure which the ear responds to is ten million times greater than the softest. In order to simplify and reduce such a large range, a logarithmic scale, called the decibel, or dBA is used.

The human ear also responds differently to the frequency of sound. For example, the human ear is more sensitive at mid frequencies (500 to 1000 Hz), and less sensitive at very high and very low frequencies, hence, sound level meters incorporate a filter which approximately corresponds to that of human hearing. This filter is the 'A-Weighted' filter.

So the 'dBA' or 'dB(A)' is the A-Weighted sound level in decibels. This is the most commonly used measurement parameter for sound.

Sound Pressure Level (SPL) and Sound Power Level (SWL)

Refrigeration equipment and items of plant sometimes have a label displaying the total Sound Power Level (referred to as SWL or L_w), or the Sound Pressure Level (referred to as SPL or L_p), in dBA. If the equipment does not have a label indicating the noise level then the supplier should be able to provide this data.

The SPL or SWL indicate how noisy the equipment is, the lower the number, the quieter the equipment.

The SWL is a measure of how much acoustic power is produced by the equipment. The SPL is the resulting noise level from the operation of the equipment. The SPL depends on the location of the sound source, how many reflecting surfaces are nearby (how reverberant the space is) and the distance between the equipment and the receiver.

The SWL is an intrinsic property of the equipment where as the SPL depends on the SWL and the environment. For example, the SWL maybe thought of as the Watts of a light bulb, while the SPL is similar to the overall brightness - it depends on the environment (e.g. size of room, colour of walls) as well as the power of the light bulb.

Generally, the SPL is lower than the SWL. In a 'Free Field' with no reflecting surfaces such as walls nearby, the SPL is approximately 8 dBA lower than the SWL at one metre from the equipment (assuming source is on a hard surface).

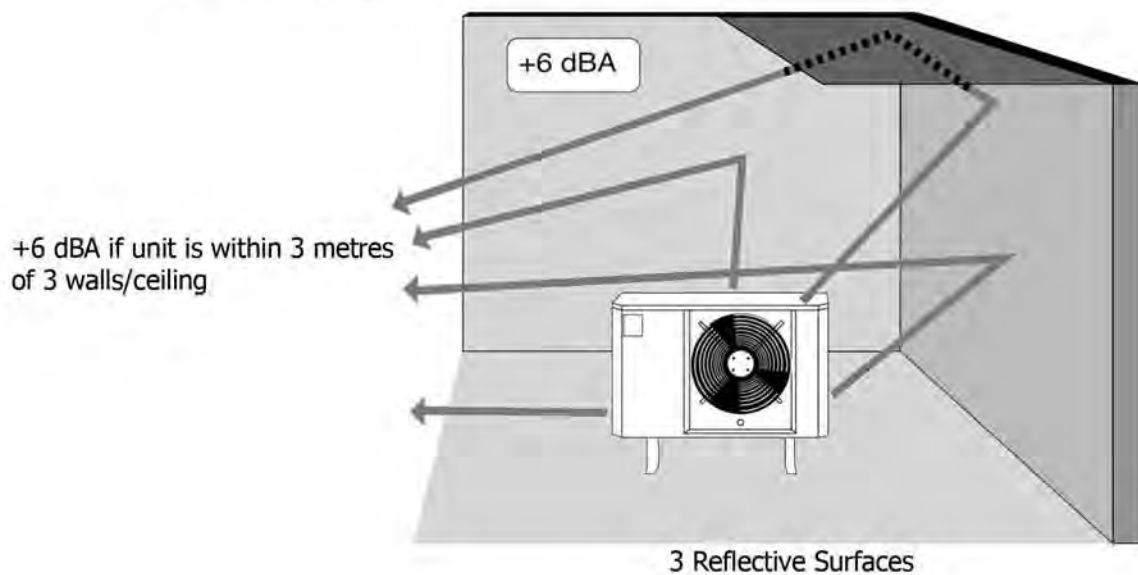
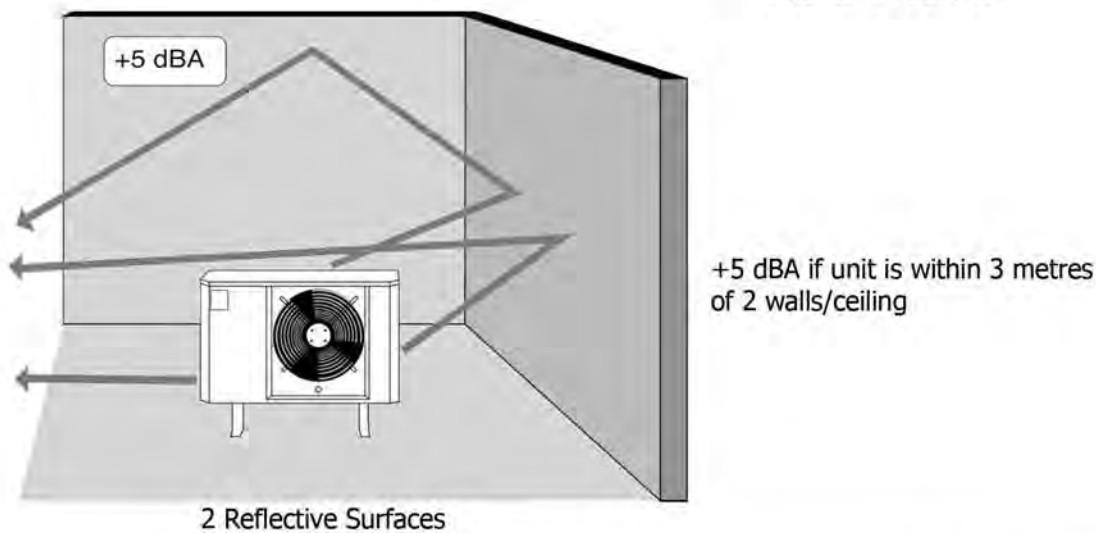
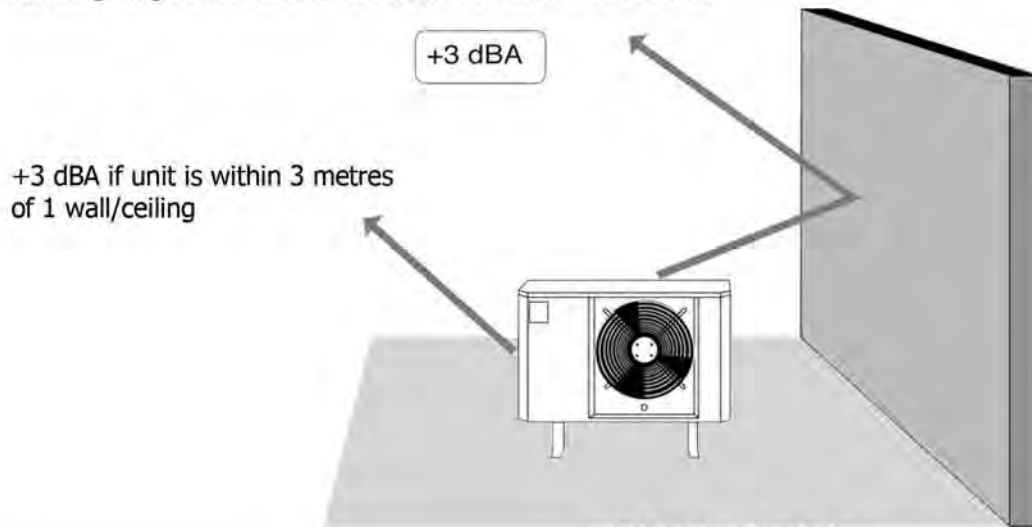
Reduction of Sound Pressure Level (SPL)									
Distance (m)	1	2	3	4	5	6	7	8	10
Reduction (dBA)	8	14	17	20	22	23	25	26	28

Continued on following page

Noise and Vibration

Sound Pressure Level and Reflective Surfaces

Reflective surfaces such as walls or a ceiling near the noise source can increase the resulting Sound Pressure Level (SPL). The following diagrams illustrate the effect of reflective surfaces.



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Addition of dB Levels

The decibel scale is a logarithmic scale so $2 + 2$ does not equal 4. A doubling of the sound pressure levels results in an increase of 3 dBA. The following table shows the result of adding two SPL's or SWL's together. The first column shows the difference between the two SPL's and the second column shows resulting dBA increase - the level that should be added to the higher of the two SPL's to obtain your result.

Example: Two units both at 50 dBA. The difference is zero, so 3 dBA is added to the noisier unit (either one in this case) to give an overall noise level of 53 dBA.

Example: One unit is 50 dBA, the other is 46 dBA. The difference is 4 dBA - the table says you should add 1.5 dBA to the noisier unit - so the overall level is 51.5 dBA.

As you can see, because the addition of dBA levels is logarithmic, the level may not increase very much but it is always controlled by the noisier item of equipment - the best approach is to use the quietest equipment possible to begin with!

Difference between SPL's (dB)	Result - amount to add to the higher SPL
0	3
1	2.5
2	2.1
3	1.8
4	1.5
5	1.2
6	1
7	0.8
8	0.6
9	0.5
10	0.4

Vibration

Vibration from plant and equipment may result in regenerated noise and you could end up with more noise than you expected. In addition, the vibration may adversely affect the owner / user of the equipment. The vibration from the equipment may be transmitted through various support structures and end up in a lightweight structure which could radiate noise.

The following provides some guidance with regard to vibration control:

- Use at least 1 layer of waffle pad, not less than 8mm thick, under equipment in all areas
- Ensure that the waffle pad is not bypassed by a rigid connection. The units should be sitting on the waffle pad under their own weight, not bolted to the structure through the pad. If the unit must be bolted then ensure that a rubber isolating washer and sleeve is used.
- Install equipment on a concrete slab at ground level if possible
- Install equipment on a platform above lightweight structures if possible
- Do not locate equipment above particularly sensitive spaces (e.g. bedrooms or private offices in commercial situations), also try to keep the equipment as far away as possible from all adjacent receivers.
- When units are installed on a lightweight structure or over (or near) a sensitive area, the use of waffle rubber may not be sufficient - consider a double thickness of rubber pads or the use of springs. It is best to obtain professional advice in this situation as the extent of vibration isolation required depends on a number of factors such as the rpm of the equipment, the weight of the equipment, the structure construction etc.

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Barriers

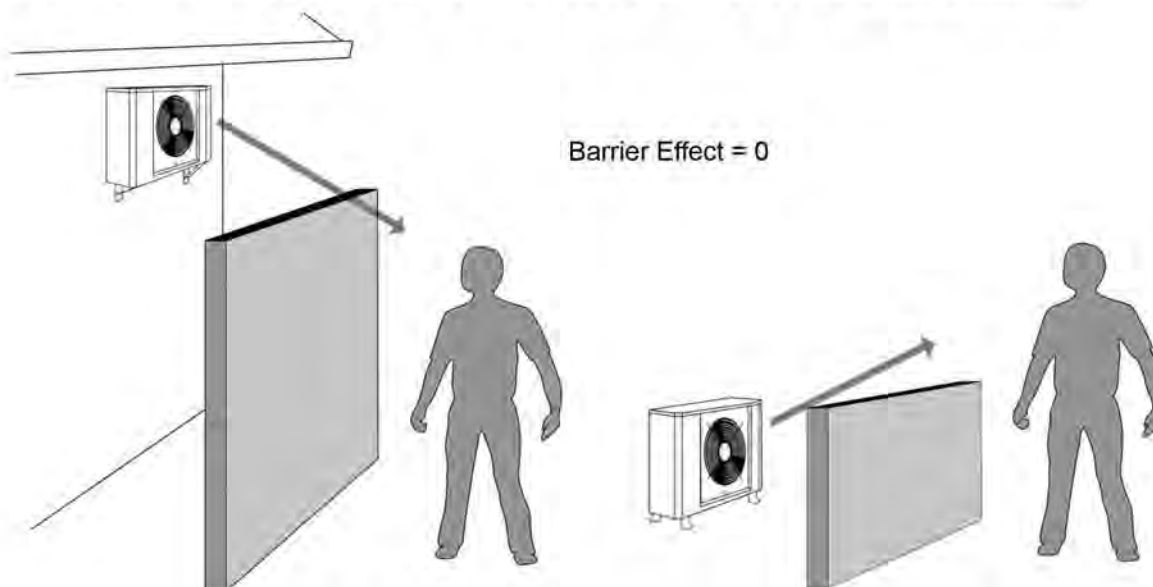
Barriers can be an effective method for reducing noise, however, the barrier must be a solid material with no gaps or penetrations. The material should have a surface density of not less than 5 kg/m².

Effective Barriers

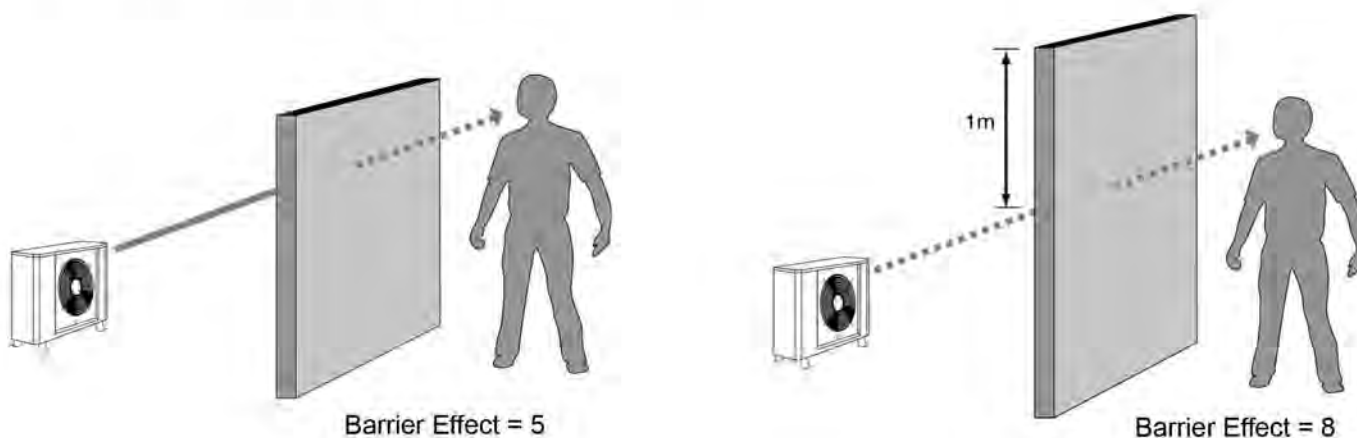
Solid timber fence (e.g. double lapped fence)
Solid masonry fence (brick, concrete block, aerated concrete)
Solid colourbond, sheetmetal, or corrugated iron fence
Other solid material (e.g. plywood, cement sheet, particleboard)

Ineffective Barriers

Trees, bushes or shrubs
Fences with holes in them (e.g. missing planks, decorative openings, picket fences, lattices etc.)



A barrier, even an effective barrier, can only work if it screens the noise source from the receiver. If the barrier is too short and the receiver can see the noise source, then the Barrier Effect is insignificant. If the barrier screens the line of sight so the receiver cannot see the noise source then the Barrier Effect is approximately 5 dBA. If the barrier is very high (e.g. higher than 1m above the line of sight) then the Barrier Effect is 8 dBA.



Continued on following page

Noise and Vibration

A Guide to Calculating Noise Levels

Step 1 - SWL of Unit

Enter the sound Power Level (SWL) of the proposed equipment at the top of the table.

Step 2 - Distance Factor

Determine the shortest distance between the location of the proposed unit and the receiver position (e.g. neighbour). For simplicity the distance between the unit and the boundary may be acceptable. Circle the corresponding Distance Factor in Column 1.

Step 3 - Barrier Effect

Determine the type of barrier - if any between the proposed unit and the receiver position. Check the section on 'Barriers' to determine the situation you have. Remember that an 'Ineffective Barrier' is one where there is no barrier or the barrier or fence has holes in it which allows the noise to pass through it (e.g. picket fences, missing planks, decorative openings etc.). Circle the corresponding Barrier Factor in Column 2.

Step 4 - Reflection Factor

Determine the number of reflective surfaces that are within 3 metres of the proposed unit, such as walls and large eaves (do not include the ground). Circle the corresponding Reflection Factor in Column 3.

Step 5 - Resultant Noise Level

Determine the estimated Resultant Noise Level by:

Noise Level = SWL of Proposed Unit - Distance Factor - Barrier Effect + Reflection Factor

Sound Power Level (SWL) of Proposed Unit - dBA

Column 1		Column 2		Column 3	
Shortest straight line distance from Unit to Receiver position (m)	Distance Factor	Barrier	Barrier Effect	Reflection	Reflection Factor
1	8	Ineffective Barrier	0	No reflecting surfaces within 3 m	0
2	14	Effective Barrier		One reflecting surface within 3 m (one wall)	3
3	17			Two reflecting surfaces within 3 m (two walls)	5
4	20	Line of sight to unit not blocked	0	Three reflecting surfaces within 3 m (two walls and large eaves)	6
5	22	Blocks line of sight to unit	5		6
6	23	High barrier blocks line of sight of unit by more than 1 m	8		6
7	25				
8	26				
10	28				

SWL

-

Distance Factor

-

Barrier Effect

+

Reflection Factor

= Resultant Sound Pressure Level (SPL)

8

Continued on following page



Your best Solution...

Noise and Vibration

Do's and Dont's

As you can see from the Guide to Calculating Noise Levels, one of the most important factors is the Sound Power Level (SWL) of the proposed unit.

DO



Use the quietest unit to begin with - it may be the difference between an acceptable or unacceptable noise level for a given location.

DON'T



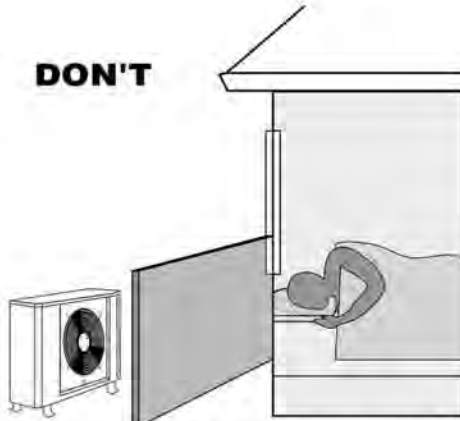
Don't necessarily use the cheapest unit - it may be the noisiest - check the SWL.

DO



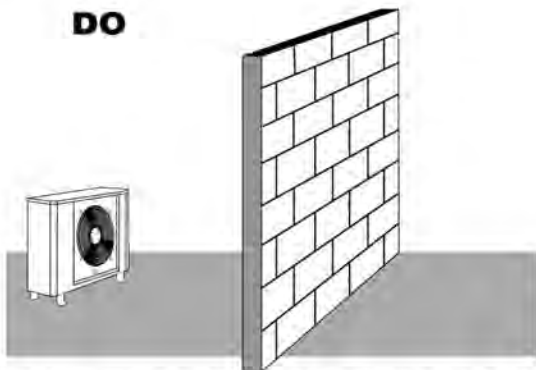
Install the unit as far from the boundary as possible - the further it is from neighbours, the lower the noise level. Place the unit facing the back fence or the furthest fence if possible,

DON'T



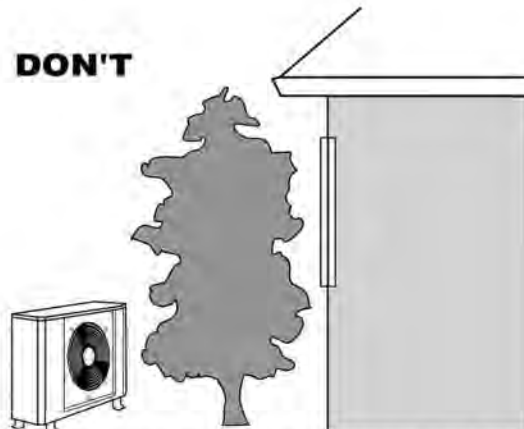
Don't install the unit near a boundary, especially if it is near a window or worst of all - near a bedroom window!

DO



Make sure that any fences or barriers are Effective Barriers, with no holes, gaps or missing planks.

DON'T



Don't assume any tree or bush is an Effective Barrier - it is not and it won't provide any protection from the noise.

Continued on following page

Noise and Vibration

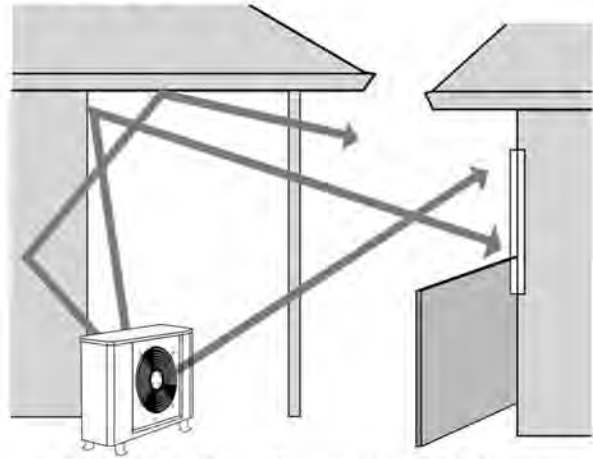
Do's and Dont's

DO



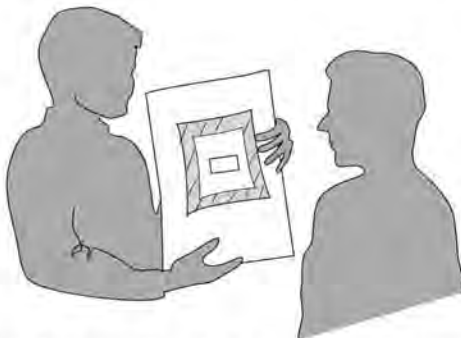
Try and locate the unit away from any reflecting surfaces.

DON'T



Don't place the unit near corners or in very reverberant spaces such as carports or alcoves.

DO



Ask for acoustic advice from a professional qualified acoustic consultant. Even if the expected noise level is too high a consultant will be able to design an enclosure or advise on how to reduce the noise level.

DON'T



Don't assume the problem will go away - it won't. Act now before it is a problem and you will have a happy client, not an ongoing and possibly expensive complaint.

State Acts, Regulations and Guidelines

The following Acts, Regulations and Guidelines are applicable for the respective States and Territories, but may not be limited to these.

If a detailed assessment is required or the expected noise level is excessive, you should consult a qualified Acoustic Consultant.

New South Wales:

Protection of the Environment Operations (Noise Control) Regulations 2000 (Section 52)
Noise Control (Miscellaneous Articles) Regulation 1995

Victoria:

Environment Protection (Residential Noise) Regulations 1997

Queensland:

Environment Protection (Noise) Policy 1997
Environment Protection Act 1994
Environment Protection Regulation 1998

South Australia:

Environment Protection (Machine Noise) Policy 1994
Environment Protection Act 1995

Western Australia:

Environment Protection (Noise) Regulations 1997
Environment Protection Act 1986
Noise Abatement (Noise Labeling of Equipment) Regulations (No. 2) 1985

Tasmania:

Environment Protection (Noise) Amendment Regulations 2000, Statutory Rules 2000, No. 186

Australian Capital Territory:

Environment Protection Policy 1998 (Noise)
Environment Protection Act 2000
Environment Protection Regulations 1997

Field Service Instructions for Reversing Valves

These Field Service Instructions will aid recognition of a malfunctioning Heat Pump System equipped with a reversing valve

Field Problems Simplified

Heat pump equipment usually includes a reversing valve (added to a refrigerating system to create an "all season" heat pump) which is easily identified and blamed for many failures of the system.

Valves have been needlessly replaced without correcting the original trouble in the system, principally due to inadequate testing and erroneous quick decisions.

A tabulated chart follows these instructions on Valve Troubles which are so listed to be quickly analysed by "Touch" testing for "possible causes" with suggested "corrections", to simplify testing procedures and cut testing time.

Operation of the Valve

The Solenoid Coil on the 3-WAY PILOT VALVE forces the needles of the pilot valve to OPEN and CLOSE two port openings at the INSTANT of reversing operations for the 4-WAY MAIN VALVE.

Operating Sequence

1. An ENERGISED COIL (in the heating phase) forces two opposing pilot valve needles, "back needle" and "plunger needle", separated with stainless steel pins, to simultaneously CLOSE the "back" port and to KEEP OPEN the "front" port.

Notes: (a) The "outlet" port is the center bleeder tube (called "common capillary") which is brazed into the suction line tube and is a common bleed path for each outside port ("front" and "back" capillaries).
(b) The "inlet" tubes, called "back" and "front capillary" and each from its pilot port, are operating paths to the opposite end chambers of the main valve cylinder. These paths conduct the gas which bleeds through a monel screen from "bleeder holes" located in each piston as gas pressure changes occur within the end chambers.

2. Gas flows out of the RIGHT end chamber, decreasing in pressure there. High pressure gas from the system immediately builds up within the LEFT end chamber since no path is open for escape which was first closed by the needle valve at the pilot "back port".

Note: At the end of each stroke, one of the operating gas paths is closed to the pilot valve.

3. Difference in pressures between the two end chambers aids the "slide bracket" assembly to move instantly to the RIGHT by the pistons from the pressure differential of the system.

Note: In reversing operation, the "slide" port straddles one or the other of two openings (in section views "E" and "C" tubing schematically piped through the illustrated circled figures 3 and 4 respectively) as directed. The "suction tube" between "E" and "C" is always OPEN to the low pressure side of the system.

4. While in and during the operating phase of heating,

both end chambers EQUALISE in pressure until the "solenoid coil" is DE-ENERGISED (into cooling or de-icing phase) when the opposite operation in reversing takes place within the PILOT and MAIN VALVES.

Notes: (a) During the transfer period, there is sufficient by-pass to prevent overloading the compressor due to an excessive head pressure.
(b) The valve reverses against running pressures with no mechanical or impact noises from the "slide", "slide bracket" or pistons; however, there is an instant of hissing gas as pressures equalise in both end chambers.

System troubles that affect the reversing valve

Any trouble in a heat pump, which will materially affect the normal operating pressures, may prevent the valve from shifting properly. For example, (1) a leak in the system resulting in a loss of charge, (2) a compressor which is not pumping properly, (3) a leaking check valve, (4) defective electrical system or (5) mechanical damage to the valve itself, each will indicate an apparent malfunction of the valve.

Make the following checks on the system and its components before attempting to diagnose any valve trouble by making the "Touch Test" method of analysis.

1. Make a physical inspection of the valve and solenoid coil for dents, deep scratches and cracks.
2. Check the electrical system. This is readily done by having the electrical system in operation so that the solenoid coil is energised.

In this condition, remove the lock nut to free the solenoid coil. Slide it partly off the stem and notice a magnetic force attempting to hold the coil in its normal position.

By moving the coil farther off the stem, a clicking noise will indicate the return of the "plunger" to its non-energised position. When returning the coil to its normal position on the stem, another clicking noise indicates that the "plunger" responded to the energised coil.

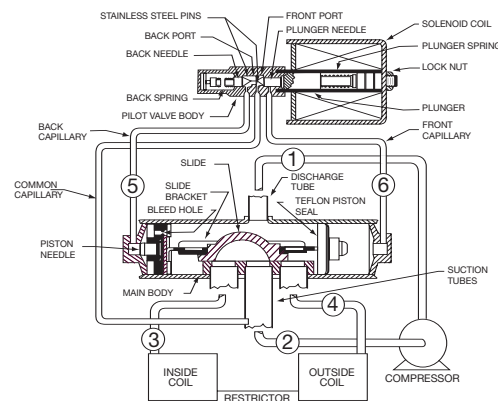
If these conditions have not been satisfied, other components of the electrical system are to be checked for possible trouble.

3. Check the heat pump refrigeration system for proper operation as recommended by the manufacturer of the equipment.

After all of the previous inspections and checks have been made and determined correct, then perform the "Touch Test" on the reversing valve according to chart on the following page.

This test is simply performed by feeling the temperature relationships of the six (6) tubes on the valve and compare the temperature differences. Refer to the chart after the comparative temperatures have been determined for the "possible cause" and suggested "corrective action" to be taken.

Touch Test Chart



Valve Operating Condition	Disch. Tube from Compr.	Suction Tube to Compr.	Tube to Inside Coil	Tube to Outside Coil	LEFT Pilot Back Capill. Tube	Right Pilot Back Capill. Tube		
	1	2	3	4	5	6	Possible Causes	Corrections
Normal Operation of Valve								
Normal Cooling	Hot	Cool	Cool as (2)	Hot at (1)	*TVB	*TVB		
Normal Heating	Hot	Cool	Hot as (1)	Cool as (2)	*TVB	*TVB		
Malfunction of Valve								
Valve will not shift from Cool to Heat	Check electrical curcuit and coil						No voltage to coil.	Repair electrical circuit.
							Defective coil.	Replace coil.
	Check refrigeration charge						Low charge.	Repair leak, recharge system.
							Pressure differential too high.	Recheck system.
	Hot	Cool	Cool as (2)	Hot as (1)	*TVB	Hot	Pilot valve OK. Dirt in one bleeder hole.	De-energise solenoid, raise head pressure, re-energise solenoid to break dirt loose. If unsuccessful, remove valve, wash out. Check on air before installing. If no movement, replace valve, add strainer to discharge tube, mount valve horizontally
							Piston cup leak.	Stop unit. After pressures equalize, restart with solenoid energized. If valve shifts, re-attempt with compressor running. If still no shift, replace valve.
	Hot	Cool	Cool as (2)	Hot as (1)	*TVB	*TVB	Clogged pilot tubes.	Rasie head pressure, operate solenoid to free. If still no shift, replace valve.
	Hot	Cool	Cool as (2)	Hot as (1)	Hot	Hot	Both ports of pilot open. (Back seat ort did not close)	Raise head pressure, operate solenoid to free partially clogged port. If still no shift, replace valve.
	Warm	Cool	Cool as (2)	Warm as (1)	*TVB	Warm	Defective Compressor.	
	Start to shift but does not complete reversal	Hot	Warm	Warm	Hot	*TVB	Hot	Not enough pressure differential at start of stroke or not enough flow to maintain pressure differential.
							Body damage.	Replace valve.
Hot		Warm	Warm	Hot	Hot	Hot	Both ports of Pilot open.	Raise head pressure, operate solenoid. If no shift, replace valve.
							Body damage.	Replace valve.
Hot		Hot	Hot	Hot	*TVB	Hot	Valve hung up at mid-stroke. Pumping volume of compressor not sifficient to maintain reversal.	Raise head pressure, operate solenoid. If no shift, use valve with smaller ports.
Apparent leak in heating	Hot	Hot	Hot	Hot	Hot	Hot	Both ports of Pilot open.	Raise head pressure, operate solenoid. If no shift, replace valve.
	Hot	Cool	Hot as (1)	Cool as (2)	*TVB	**WVB	Piston needle on end of slide leaking.	Operate valve several times then recheck. If excessive lek, replace valve.
	Hot	Cool	Hot as (1)	Cool as (2)	**WVB	**WVB	Pilot needle and piston needle leaking	Operate valve several times then recheck. If exessive leak, replace valve.
	Will not shift from heat to cool	Hot	Cool	Hot as (1)	Cool as (2)	*TVB	*TVB	Pressure differential too high.
							Clogged Pilot tube.	Raise head pressure, operate solenoid to free dirt. If still no shift, replace valve.
Hot		Cool	Hot as (1)	Cool as (2)	Hot	*TVB	Dirt in bleeder hole.	Raise head pressure, operate solenoid. Remove valve and wash out. Check on air before reinstalling if no movement, replace valve. Add strainer to discharge tube. Mount valve horizontally.
Hot		Cool	Hot as (1)	Cool as (2)	Hot	*TVB	Piston cup leak.	Stop unit, after pressures equalise, restart with solenoid de-energised. If valve shifts, re-attempt with compressor running. ?if it still will not reverse while running, replace valve.
Hot		Cool	Hot as (1)	Cool as (2)	Hot	Hot	Defective Pilot.	Replace Valve.
Warm		Cool	Warm as (1)	Cool as (2)	Warm	*TVB	Defective Compressor.	

NOTES: *Temperature of Valve Body. **Warmer than Valve Body.

VALVE OPERATED SATISFACTORILY PRIOR TO COMPRESSOR MOTOR BURN OUT - caused by dirt and small greasy particles inside the valve. To **CORRECT:** Remove valve, thoroughly wash it out. Check on air before reinstalling, or replace valve. Add strainer and filter-dryer to discharge tube between valve and compressor.

8

Air Filter Selection & Service Guide

Air Filter Standards

As a general guide, Australian Standards are useful information tools that provide minimum performance standards. Care should be taken when applying minimum standards that may not adequately service the air quality needs of the building.

Relevant Australian standards and specifications commonly referred to are;

AS1324 (Air Filters for use in general ventilation and air-conditioning)

AS1668 (The use of mechanical ventilation and air-conditioning in buildings), and

AS3666 (Air Handling and Water Systems of Buildings)

Filter Classification - Performance Ratings

The following performance table is commonly used internationally. It classifies the filter by efficiency from test results carried out in an appropriate air filter-testing laboratory. The following table is found in AS1324 Part 1.2001

For most air-handling and air conditioning applications, testing with Test Dusts No.1 and No.4 is to be used to define the performance of an air filter. These test requirements are consistent with tests carried out to US and European standards ASHRAE 52.1 and EN779.

The benefit of using No.1 dust is to determine the efficiency of the air filter to catch particles of submicrometre nature. The benefit of No.4 dust is to evaluate the arrestance and likely service life of an air filter. ASHRAE 52.2 Removal Efficiency by Particle Size standard provides a useful method of evaluating filtering applications given the particle size of the contaminant.

Air Filter Selection Chart

Filter Class	Average Arrestance AS1324.2 Dust No.4 ASHRAE 52.1 Eurovent 4/5 EN779 Gravimetric	Average Efficiency AS1324.2 Dust No.1 ASHRAE 52.1 Eurovent 4/5 EN779 Atmospheric	Maximum Final Resistance Pa
G1	$A < 65$		250
G2	$65 \leq A < 80$		250
G3	$80 \leq A < 90$		250
G4	$90 \leq A$		250
F5		$40 \leq E < 60$	450
F6		$60 \leq E < 80$	450
F7		$80 \leq E < 90$	450
F8		$90 \leq E < 95$	450
F9		$90 \leq E$	450

*Note: Filters which are tested with a minimum efficiency of less than 20% shall only be rated as G type arrestance filters.

Air-handling systems with airflow rates equal to or greater than 1500l/s require air filtration with the following efficiencies:

- Test dust No. 1: 20% (minimum) @ 250Pa.
- Test dust No. 1: 20% to 40% (average) @ 250Pa.

AS1324 Filter Types

Type 1

- Dry, eg. Woven or non-woven fabrics, which when unused feel dry.

Type 2

- Viscous impingement, eg. Woven or non-woven oil or gel coated fabrics, including metal-viscous filters.

Type 3

- Electrostatic precipitators

Information courtesy of AREMA

Air Filter Selection & Service Guide

AS1324 Filter Classes

Class A

- Fully disposable (entire cell replaced, including frame)

Class B

- Reusable media (reusable frame)

Class C

- Reusable media and frame (after cleaning)

Class D

- Self-renewable (in respect of media advancement and cleaning)

Example: Supply Type 1, Class B multi pocket bag filter.

Labelling

It is a requirement of AS1324 that all air filters are labelled with a filter performance rating together with the manufacturers/distributors details.

Testing

In order to ensure compliance to the filter performance rating of any product AS1324 recommended that all products are tested at least every five years and that the air filter media used be tested at least every year. No laboratory test older than five years should be accepted as proof of filter performance rating.

Filter Selection

The following table is the AREMA recommended filter classification for building grades to match Property Council of Australia 1999 Benchmarks Handbook. The table sets the benchmark air cleaning standard.

BOMA Grade*	A.R.E.M.A. Min. recommended filter classification
Premium	F7
A	F7
B	F6
C	F5
D	G4

* Property Council of Australia Benchmarks Handbook

Filter Selection Steps

When selecting air filters using the above classification table, you should also consider:

- Air flow capacity of system
- Clean and final resistance of your filter system
- Arrestance dust holding capacity
- Filter life
- Comparison of filters should be made at the same final pressure drop ie 250, 375 or 450 pascals.

Other important considerations when selecting your air filter system include:

- Use of prefilters to extend final filter life
- Optimising the surface area of the filter system
- Access for filter replacement and routine service
- Suitability of filter materials and construction for conditions encountered

Information courtesy of AREMA

Air Filter Selection & Service Guide

Installation

Filter banks should be sealed between filters and frames to prevent leakage and should be suitably stiffened to prevent flexing.

When filters are installed in a slide access, filter and service doors need to be sealed to prevent air leakage and fitted with sash clamp type catches.

General: Provide a permanent notice fixed to the wall identifying the filter type and performance rating.

Plinth: Where possible, provide a 100mm high plinth below the filter bank.

Manometers

Provide a measure of differential pressure across each filter bank.

Differential pressure gauge unit - 100mm dial type diaphragm gauge including pipework, termination and fittings necessary for correct operation and maintenance.

Gauge scale - Mark in suitable divisions with full-scale deflection no more than twice the maximum dirty filter condition. Locate gauge outside unit casing in a readily readable location.

Maintenance

Servicing

- Ensure suitable and safe access is provided for air filter inspection & replacement
- All food preparation areas should be located away from filter service points
- Air conditioning plant located at height require Work Cover approved ladders, platforms and harness points.
- Only licensed companies with a registered wastewater treatment facility are to service washable filters. A copy of the Trade Waste Agreement should be kept on file to mitigate off site liability under the Environment Operations Act 1997.

Cleaning

- Before start-up, ensure that the installation is clean, and inspect filter banks and plenums to ensure integrity of the installation.

Temporary pre-filters

- Remove temporary media at completion of commissioning.

Operation and maintenance manual

- Each different filter bank should have an operation and maintenance manual which includes information on performance ratings, replacement filter part numbers and sizes.

Washing of Filters on Site

The Clean Waters Act (Part 4) prohibits anyone from washing a filter in a manner that could pollute a waterway. Filters can only be washed by someone who holds a licence to operate an approved washing facility. Many filter service companies are licenced and will remove the filters from site and wash them in their premises.

Information courtesy of AREMA

Notes

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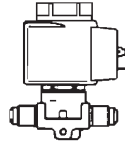
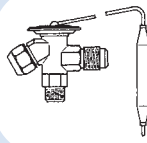
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Quick Reference Index

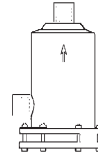
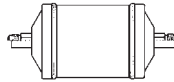
1

- Controls: Air and Liquid Flow, Electronic, Humidity, Liquid Level, Oil Protection, Pressure, Pump, Temperature, Time
- Valves: Float Control, Hot Gas, Regulating, Reversing, Solenoid, Thermostatic Expansion (TX)
- Thermostats: A/C, Domestic, Commercial, Electronic



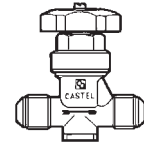
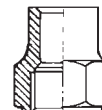
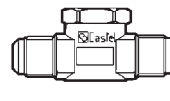
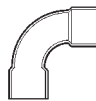
2

- Filter-Driers: Liquid, Suction, Bi-Flow, Oil
- Service Aids: Cleaners • Drying Agents
- Liquid Leak Detectors • Solvents
- Oil: Mineral, Synthetic, Vacuum
- Refrigerants, Flushing Agents
- Water Treatment / Cooling Tower Products



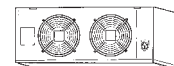
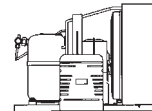
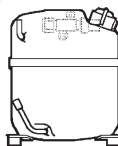
3

- Brass and Copper Fittings • Copper Tube
- Insulation: Pipe, Sheet and Tape
- Liquid and Moisture Indicators • Pipe Ducts
- Pipe Supports • Sight Glasses • Valves: Ball, Check, Line, Angle, Relief, Rotalock, Schrader/Access
- Vibration Eliminators



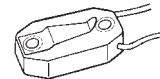
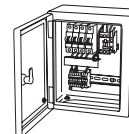
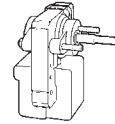
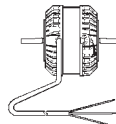
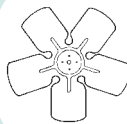
4

- Air Curtains • Beverage Cooler Parts
- Cabinet Accessories and Hardware
- Compressors • Condensers • Condensing Units
- Door Gaskets • Drop-In Units • Foam Insulation
- Induced Draught / Unit Coolers • Pressure Vessels
- Sealants • Tapes • V-Belts



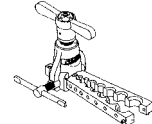
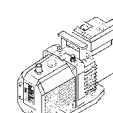
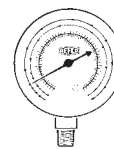
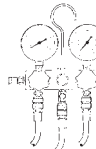
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- Batteries • Books • Capacitors
- Electrical Products • Fan Blades and Motors
- Fuses • Heater Cable
- Motor Starters / Contactors • Overloads and Relays
- Switchboards



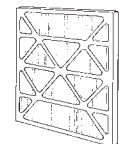
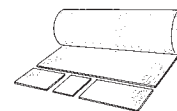
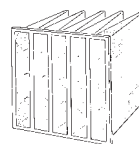
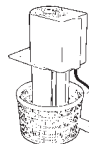
6

- Charging/Recovery Equipment
- Cylinders • Gauges • Leak Detectors
- Solder and Brazing Equipment
- Test Instruments • Thermometers
- Tools • Tubing Tools • Vacuum Pumps



7

- Air Filters and Filter Media
- Hydronic System Accessories
- Noise and Vibration Control Products
- Pumps: Condensate, Evaporative Cooler, Submersible
- Quick Connect Couplings



8

- Engineering and Technical Data

Main Index and Trade / Brand Name Index on Following Pages