Rotary Evaporator

Models 78820-XX, 78830-XX, 78840-XX, 78850-XX

INSTRUCTION MANUAL

78925, Rev. D / ECO 9448
Printed in U.S.A.

TABLE OF CONTENTS

PREFACE

Thank you for displaying confidence in us by selecting a Labconco Rotary Evaporator. Our design engineers, assemblers and inspectors have utilized their skills and years of experience to ensure that your Labconco Rotary Evaporator meets our high standards of quality and performance.

IMPORTANT NOTICE

This manual should be read carefully by all the end users in order to become familiar with the operation of the Rotary Evaporator. Recommendations are made within the manual to help you obtain maximum performance and life from your product.

We have included sections on initial set up, operation, maintenance and troubleshooting to provide you with all the tools necessary to achieve maximum performance.

If you have questions or concerns, do not hesitate to call us at 800-821-5525 or 816-333-8811 for assistance.

Components Shipped

Carefully check the contents of the carton for damage that might have occurred in transit. Do not discard the carton or packing material until all components have been checked against the following component list and the equipment has been installed and tested.

As shipped, the carton should contain the following:

Catalog No.	Base Assembly 115V – 78892-00	Base Assembly 230V – 78892-01	Water Bath Assembly 115V – 79902-00	Water Bath Assembly 230V – 79902-01	Oil Bath Assembly 115V – 79656-00	Oil Bath Assembly 230V – 79656-01	Diagonal Glassware – 78914-00	Diagonal Glassware – Polyethylene Coated – 78914-01	Vertical Glassware – 78915-00	Vertical Glassware – Polyethylene Coated – 78915-01	Reflux Glassware – 78916-00	Reflux Glassware – Polyethylene Coated – 78916-01	Dewar Glassware – 78917-00	Dewar Glassware – Teflon Coated 78917-01	Pivot Knob – 78873-00	Power Cord 115V – 13345-00	Power Cord 230V – 13341-00	Manual – 7892500
78820-00	X		X				X								X	X		X
78820-01		X		X			X								X		X	X
78820-02	X		X					X							X	X		X
78820-03		X		X				X							X		X	X
78820-04	X				X		X								X	X		X
78820-05		X				X	X								X		X	X
78830-00	X		X						X						X	X		X
78830-01		X		X					X						X		X	X
78830-02	X		X							X					X	X		X
78830-03		X		X						X					X		X	X
78830-04	X				X				X						X	X		X
78830-05		X				X			X						X		X	X
78840-00	X		X								X				X	X		X
78840-01		X		X							X				X		X	X
78840-02	X		X									X			X	X		X
78840-03		X		X								X			X		X	X
78840-04	X				X						X				X	X		X
78840-05		X				X					X				X		X	X
78850-00	X		X										X		X	X		X
78850-01		X		X									X		X		X	X
78850-02	X		X											X	X	X		X
78850-03		X		X										X	X		X	X
78850-04	X				X								X		X	X		X
78850-05		X				X							X		X		X	X

See pages 28 through 35 to identify specific parts in Glassware Kits.

INTRODUCTION

General Description

The Labconco Rotary Evaporator is designed for effective evaporation of solvents. The evaporating flask rotates in the bath at a controlled speed, causing the liquid to form a thin film on the interior surface of the flask. Evaporation from the film is rapid under vacuum and gives a concentration of the solute. The combination of increased surface area and vacuum means that the solvent evaporates at lower temperatures. Heat-sensitive materials, such as biochemicals, pharmaceuticals and reactive mixtures can be evaporated rapidly without damage. There are several varieties of glassware depending upon your application. Should you need assistance in selecting other glassware accessories, call 800-821-5525 or 816-333-8811. A Rotary Evaporator with diagonal glassware is shown below.

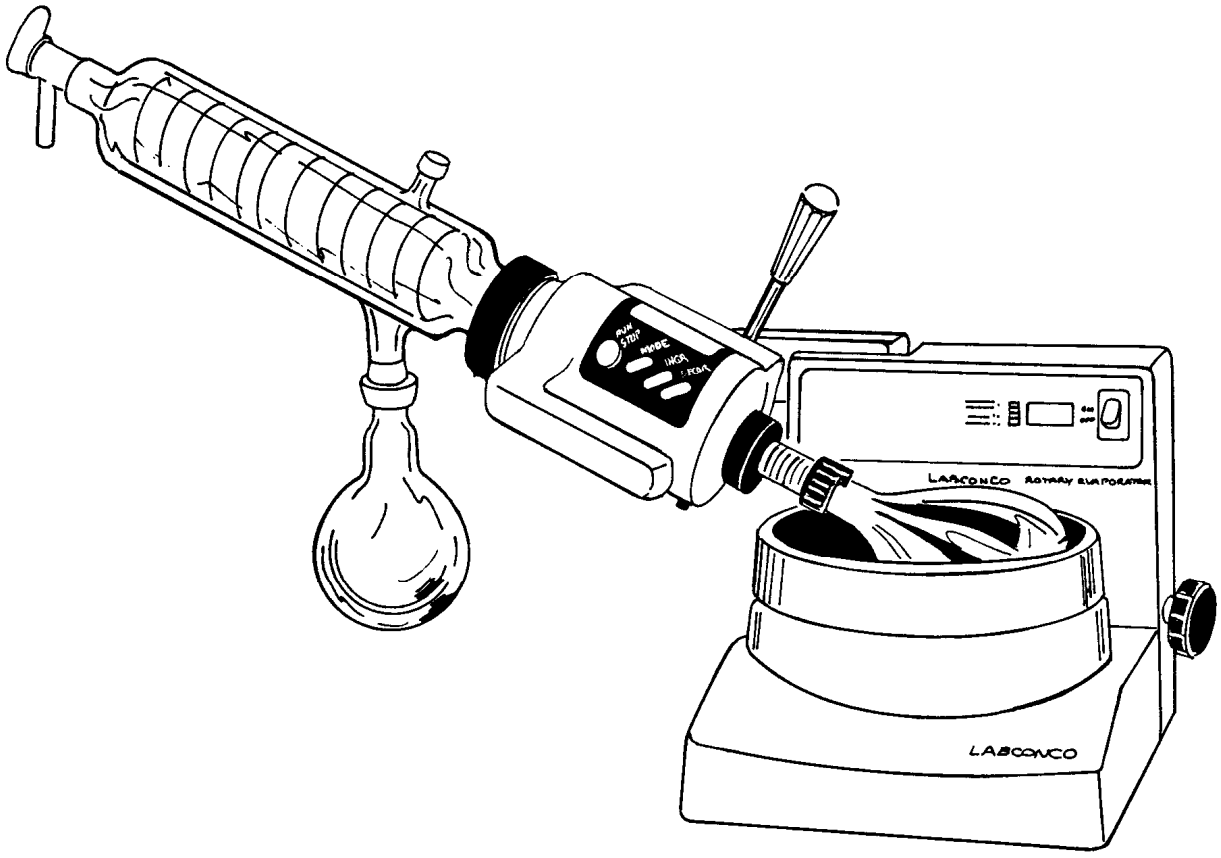


Figure 1

Component Identification

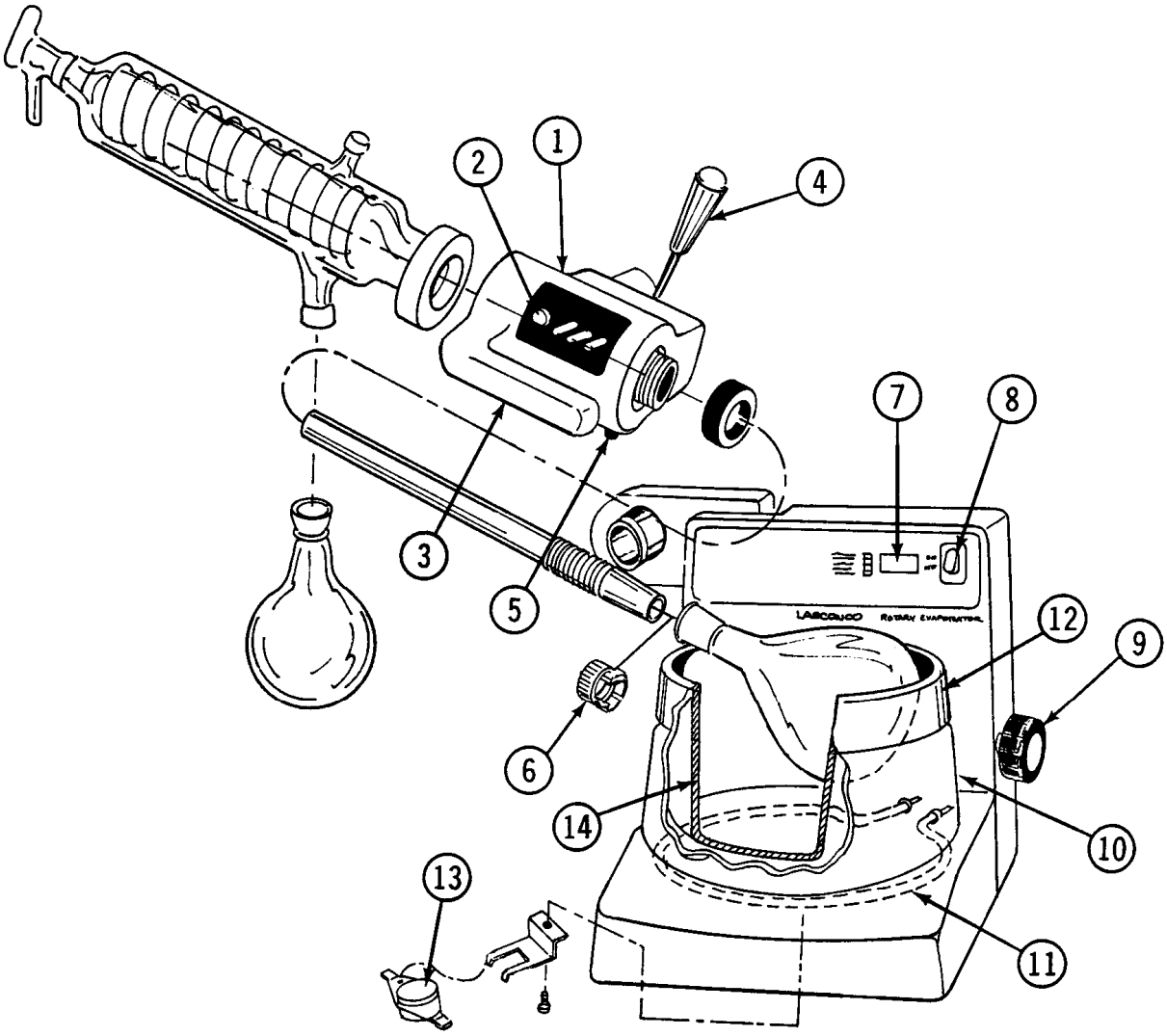


Figure 2

Component Identification

(1) **Motor Drive Housing.** This housing contains a sparkless variable speed motor which powers the vapor duct drive shaft through a double belt system.

(2) **Soft Touch Key Pad.** These control the speed of the glassware rotation and bath temperature, and select which parameter is monitored on the digital display.

(3) **Height Adjustment Handle.** The drive head can be raised or lowered by squeezing the trigger on the up-front handle and manually adjusting the height.

(4) **Pivot Adjustment Knob.** The angle of the drive head can be adjusted by loosening the knob and manually rotating the assembly.

(5) **Drive Lock.** Pressing the button locks the glassware drive so the vapor duct nut can be loosened.

(6) **Vapor Duct Extractor.** The vapor duct can be removed from the drive head by installing the evaporating flask clamp backwards on the duct and then tightening it against the drive housing.

(7) **Digital Display.** LED displays flask rotational speed, bath set point temperature and bath actual temperature and optional vapor temperature. The dot in the lower right hand corner illuminates when the heater is on.

(8) **Power Switch.** Electrical power to the entire unit is controlled with this switch. The bath heater is controlled by the power switch.

(9) **Counterbalance Adjustment Knob.** Rotating this knob varies the force of the counterbalance mechanism so the weight of various style glassware sets and a wide range of sample sizes can be precisely counterbalanced resulting in ease of height adjustment. Rotating the knob clockwise decreases the counterbalance force.

(10) **Bath Housing.** The entire heated surface is covered to prevent contact with hot surfaces.

(11) **Heater.** The heater is mounted below the bath to facilitate cleaning.

(12) **Rubber Trim Ring.** The top of the bath is covered with a rubber trim ring to provide protection for glassware if it should be bumped on the bath and to protect a user from touching a hot surface.

(13) **High Temperature Cutout Switch.** Should the bath run dry, an over-temperature protection device will turn off the power to the heater. When the bath cools, the protection switch on the underside of the bath must be manually reset. (The optional oil bath has an automatic reset switch which resets itself when it cools.)

(14) **Bath.** Heat is efficiently transferred to the bath liquid through the walls of the stainless steel pot. The bath is separate from the drive so it may be positioned as needed to accommodate different size flasks and for cleaning. The bath temperature is accurately controlled and monitored because the temperature sensor is positioned inside the bath in contact with the bath liquid.

Location

The Rotary Evaporator should be located within a fume hood if hazardous or flammable solvents are used. In all cases, regardless of the solvent used, it is strongly recommended that the vacuum pump is located or vented in a fume hood.

Utility Connections

Models 78820-00, 78820-02, 78820-04, 78830-00, 78830-02, 78830-04, 78840-00, 78840-02, 78840-04, 78850-00, 78850-02, 78850-04, should be connected to a utility power receptacle rated at 115 volt, 60 Hz, single phase, 15 amps.

Models 78820-01, 78820-03, 78820-05, 78830-01, 78830-03, 78830-05, 78840-01, 78840-03, 78840-05, 78850-01, 78850-03, 78850-05, should be connected to a utility power receptacle rated at 230 volt, 50 Hz, single phase, 10 amps.

General Assembly

Remove all parts from packages and compare these to the parts described in the list of components shipped:

1. Put base assembly on a flat, stable surface near an electrical outlet.
2. Install pivot adjustment knob into drive housing in the upper right hand hole.
3. Position the heating bath in front of the base.
4. Plug the electrical cords that protrude from the bottom of the bath into the sockets on the front of the base. The small round connector is keyed and must be aligned and seated properly. It has a lock collar built into it. Grasp the boot. Gently push into the receptacle and rotate until the keys align. Push all the way in. Push in and rotate the lock collar clockwise to secure it in place.
5. Plug the line cord into the socket at the rear of the base and into an electrical outlet.
6. Grasp the height adjustment handle and while squeezing the trigger raise the lift to its uppermost position in order to mount the glassware.
7. Refer to the appropriate glassware instructions on the following pages.
8. If the optional vapor temperature sensor is used, the tubular glass portion inserts into the side of the condenser that is normally capped. Tighten the nut until snug. The connector attaches to the receptacle on the rear side of the housing behind the drive assembly.

Assembly of Diagonal Glassware

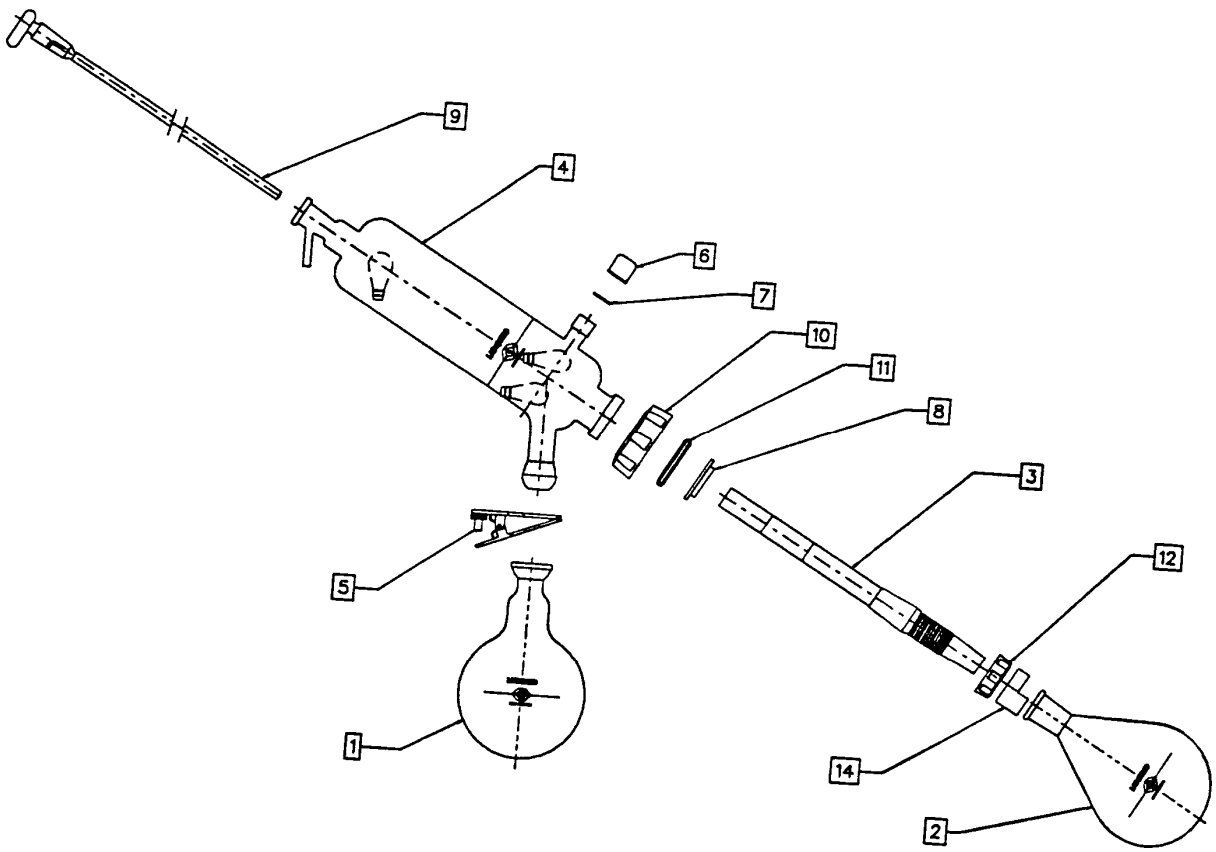


Figure 3

Assembly of Diagonal Glassware

1. Insert the vapor duct (3) into the right side of the motor drive housing. Remove the red evaporating flask clamp (14).
2. Install the small vapor duct nut (12). Press in the drive lock located under the motor drive housing and tighten the nut onto the motor drive.
3. Push the seal (8), with the shoulder toward the motor drive housing, onto the vapor duct from the large collar side (left side), until it rests firmly on the end face of the condenser mounting flange. **DO NOT USE VACUUM GREASE!!**
4. Place the large condenser nut (10), then the condenser spring (11) over the flange of the condenser (4).
5. Fit the flange of the condenser over the vapor duct and tighten the large condenser nut on the left side of the motor drive housing. Position the condenser so that the spherical joint faces down.
6. Insert the addition stopcock with feed tube (9) into the open end of the condenser and through the vapor duct. Cut Teflon™ tubing to desired length.
7. Attach the receiving flask (1) to the condenser at the spherical joint with the metal clamp (5). Tighten the clamp with the screw adjustment.
8. Slip the red evaporating flask clamp (14) over the lip of the flask. Insert the flask onto the taper of the vapor duct. Holding the drive lock in, tighten the clamp.
9. Install cap (6) and seal (7) to vapor temperature sensor port if optional sensor is not used.
10. Attach the water hoses to the condenser. Circulating water connections are made at the bottom end of the condenser. Water may circulate in either direction. The vacuum connection is made near the top.

    A condensate trap built into the condenser helps prevent condensate from coming in contact with the vacuum seal.

    All hose barb fittings are for .38" (9.5 mm) I.D. hose. Route hoses to prevent kinks.

Assembly of Vertical Glassware

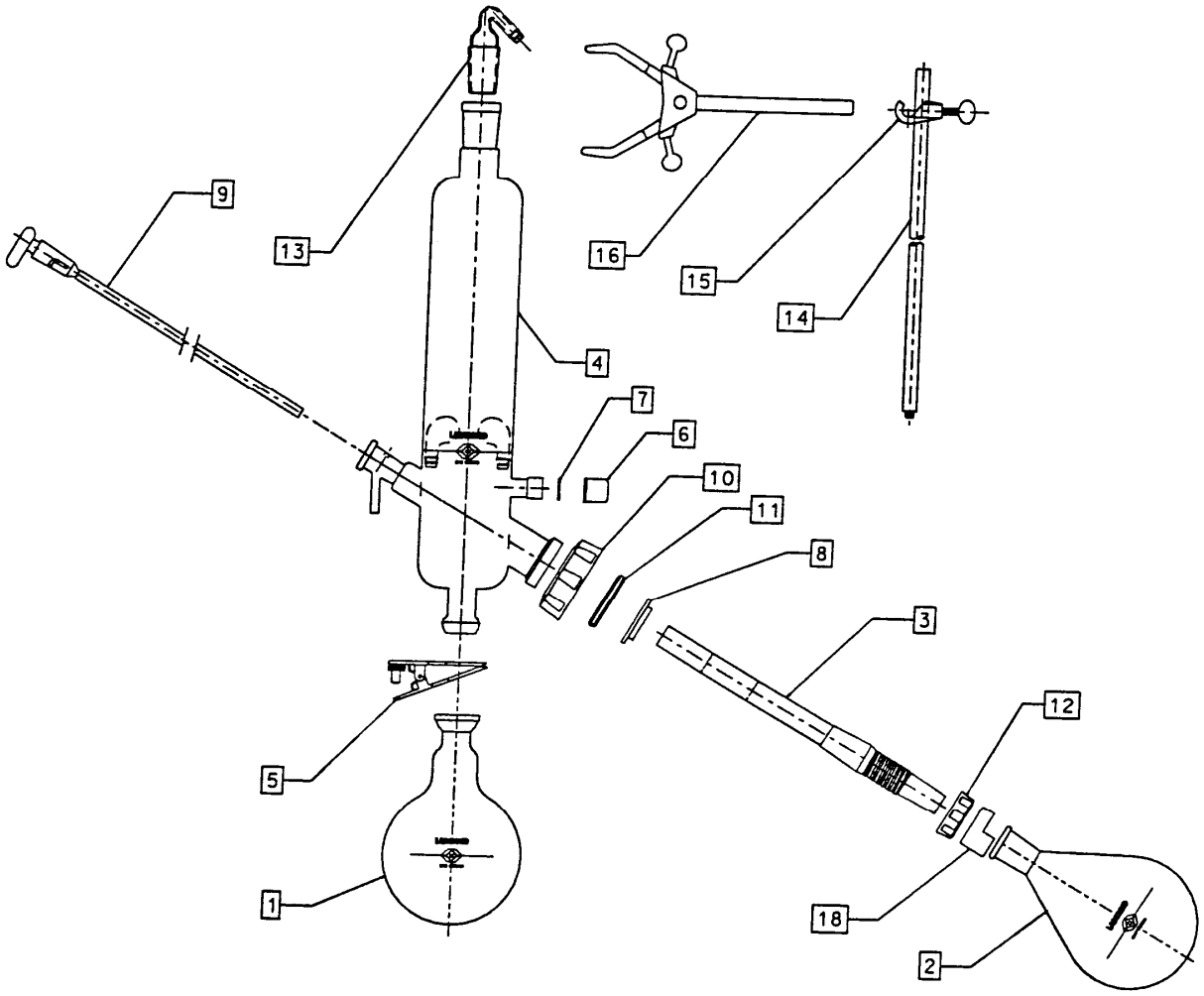


Figure 4

Assembly of Vertical Glassware

1. Insert the vapor duct (3) into the right side of the motor drive housing. Remove the red evaporating flask clamp (18).
2. Install the small vapor duct nut (12). Press in the drive lock on the underside of the motor drive housing and tighten the nut onto the motor drive.
3. Screw the support rod (14) onto the top of the motor drive housing adjacent to the pivot adjusting knobs.
4. Push the seal (8), with the shoulder toward the motor drive housing, onto the vapor duct from the large collar side (left side), until it rests firmly on the end face of the condenser mounting flange. **DO NOT USE VACUUM GREASE!!**
5. Place the large condenser nut (10), then the condenser spring (11) over the flange of the condenser (4).
6. Fit the flange of the condenser in place over the vapor duct and tighten the large collar (10) on the left side of the motor drive housing.
7. Position the rod clamp (15) on the support rod. At the same time attach the condenser clamp (16) to the rod clamp and around the condenser. Tighten thumb screw.
8. Insert the addition stopcock with feed tube (9) into the open end of the condenser and through the vapor duct. Cut Teflon™ tube to desired length.
9. Attach the receiving flask (1) to the condenser at the spherical joint with the metal clamp (5). Tighten the clamp with the screw adjustment.
10. Slip the red evaporating flask clamp (18) over the lip of the flask (2). Insert the flask onto the taper of the vapor duct. Holding the drive lock in, tighten the clamp.
11. Install cap (6) and seal (7) to vapor temperature sensor port if optional sensor is not used.
12. Attach the water hoses to the condenser. Circulating water connections are made on the side of the condenser. Place the vacuum adapter (13) into the top of the condenser. The vacuum hose is connected to the vacuum adapter.

    A condensate trap built into the condenser helps prevent condensate from coming in contact with the vacuum seal.

    All hose barb fittings are for .38" (9.5 mm) I.D. hose. Route hoses to prevent kinks.

Assembly of Dewar Glassware

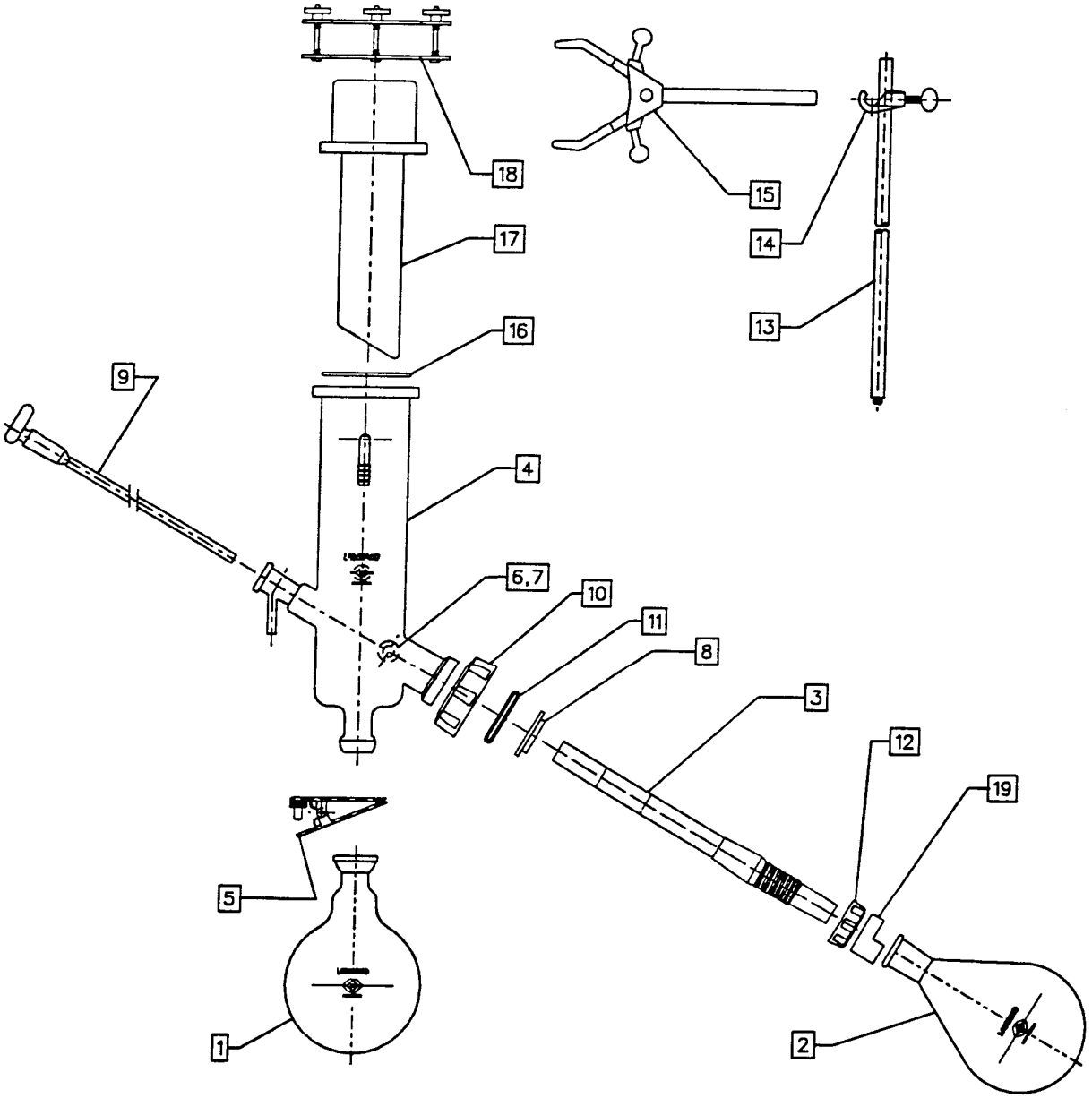


Figure 5

Assembly of Dewar Glassware

1. Insert the vapor duct (3) into the right side of the motor drive housing. Remove the red evaporating flask clamp (19).
2. Install the small vapor duct nut (12). Press in the drive lock on the underside of the motor drive housing and tighten the nut onto the motor drive.
3. Screw the support rod (13) into the top of the motor drive housing adjacent to the pivot adjusting knobs.
4. Push the seal (8), with the shoulder toward the motor drive housing, onto the vapor duct from the large collar side (left side), until it rests firmly on the end face of the condenser mounting flange. **DO NOT USE VACUUM GREASE!!**
5. Place the large condenser nut (10), then the condenser spring (11) over the flange of the condenser (4).
6. Fit the flange of the condenser in place over the vapor duct and tighten the large collar on the left side of the motor drive housing. Position the condenser so that the spherical joint faces down.
7. Position the rod clamp (14) on the support rod. At the same time attach the condenser clamp (15) to the rod clamp and around the condenser. Tighten thumb screw.
8. Insert the addition stopcock with feed tube (9) into the open end of the condenser and through the vapor duct. Cut Teflon™ tube to desired length.
9. Attach the receiving flask (1) to the condenser at the spherical joint with the metal clamp (5). Tighten the clamp with the screw adjustment.
10. Place the O-ring (16) on the top of the condenser. Insert the cooling trap (17) into the condenser ensuring that the O-ring is positioned properly between the condenser and the trap. Place clamp (18) over the lips of the condenser and trap. Secure the trap to the condenser by tightening the three nuts on the clamp. Be careful not to over tighten.
11. Slip the red evaporating flask clamp (19) over the lip of the flask (2). Insert the flask onto the taper of the vapor duct. Holding the drive lock in, tighten the clamp.
12. Install cap (6) and seal (7) to vapor temperature sensor port if optional sensor is not used.
13. The vacuum connection is found near the top of the condenser. Connect the vacuum hose to this connection. The hose barb fitting is for .38" (9.5 mm) I.D. hose. Route hoses to prevent kinks.
14. Dry ice or a cold finger can now be placed into the condenser. Fill the condenser with solvent such as alcohol or acetone up to a level below clamp (18).

    CAUTION: If the trap is overfilled too full, solvent will spill over the top when the evaporation process begins.

Assembly of Reflux Glassware

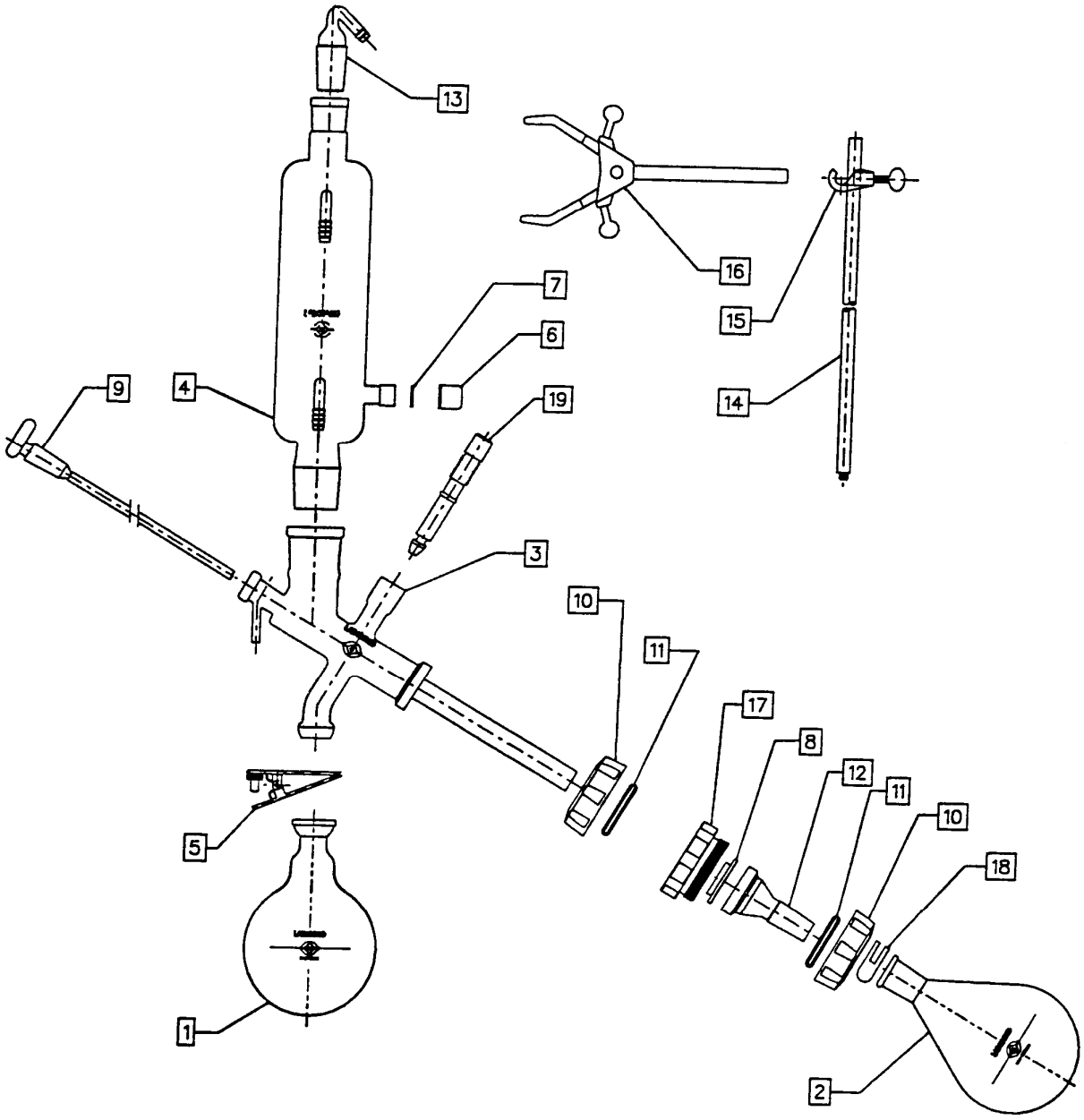


Figure 6

Assembly of Reflux Glassware

1. Screw the support rod (14) into the top of the motor drive housing located adjacent to the pivot adjusting knob.
2. Place the condenser nut (10), then the condenser spring (11) over the flange of the distribution head (3).
3. Place the distribution head vapor duct into the motor drive housing form the left side. Position the flange of the distribution head against the motor drive housing and tighten the condenser nut. Position the spherical joint downward.
4. Attach the flange adapter (17) to the right side of the motor drive housing. Press in the drive lock on the underside of the motor drive housing and tighten the flange adapter securely.
5. Push the seal (8), over the end of the distribution head vapor duct, with the shoulder toward the motor drive housing, until it rests securely in the flange adapter. **DO NOT USE VACUUM GREASE!!**
6. Place the condenser spring (11) and then the condenser nut (10) over the flask adapter (12) and screw the nut onto the flange adapter.
7. Slide the evaporating flask (2) onto the taper of the flask adapter and secure it in place by pressing the clamp (18) over the joint.
8. Attach the receiving flask (1) to the distribution head and secure with clamp (5). Tighten the clamp with the screw adjustment.
9. Place the condenser (4) into the distribution head.
10. Attach the rod clamp (15) to the support rod. Attach the condenser clamp (16) to the rod clamp and the condenser.
11. Insert the addition stopcock with feed tube (9) into the open end of the distribution head. Cut Teflon™ tube to desired length.
12. Install the plug valve (19) into the distribution head and tighten slightly.
13. Attach the water hoses to the condenser. Circulating water connections are made on the side of the condenser. Place the vacuum adapter (13) to the top of the condenser. The vacuum hose is connected to the vacuum adapter.

SAFETY PRECAUTIONS

Exercise extreme care when working with flammable vapors. The motor is sparkless, but the instrument is not explosion proof. It has been designed with safety as a primary consideration and should be used in a prudent manner using "good laboratory practices." The motor drive unit and the heating bath should be turned off when the evaporator is not in use and before unplugging the unit.

CAUTION: Wear safety goggles and protective clothing when using this or any glassware under vacuum.

Solvents used in the Rotary Evaporator may be flammable or hazardous. Use extreme caution and keep sources of ignition away from the solvents. When using flammable or hazardous solvents, both the Rotary Evaporator and the vacuum pump should be operated inside a fume hood.

Hazardous materials such as strong acids or bases, radioactive substances and volatile organics, must be handled carefully and promptly cleaned up if spilled.

WARNING: The disposal of substances used in connection with this equipment may be governed by various federal, state or local regulations. All users of this equipment are urged to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials in or upon water, land or air and to comply with such regulations. Labconco is not responsible for illegal dumping of any chemicals or materials.

WARNING: Use extreme caution if a solvent spill occurs in the area of the Rotary Evaporator. Solvents with a low auto ignition temperature could be hazardous. In normal operation of the water bath the surface temperature of the heater located below the bath is approximately 210°C when the water is boiling. If the bath is allowed to operate dry, the heater element surface temperature can reach at least 475°C until the over temperature cutout switch automatically turns the heater off.

Similarly, in normal operation of the oil bath, the surface temperature of the heater located below the bath is approximately 460°C when the oil is 180°C. If the bath is allowed to operate dry, the heater element surface temperature can reach at least 612°C until the over temperature cutout switch automatically turns the heater off.

WARNING: If the equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

1. Adjust the angle of the drive unit by first loosening the pivot adjustment knob located on the top of the drive motor housing. Place the drive at the desired angle (normally about 30° from horizontal) and then tighten knob to hold in position.
2. Lower the motor drive housing until the evaporating flask is positioned inside the bath. To raise or lower the motor drive housing, grasp the height adjustment handle and squeeze the trigger. The assembly can then be manually raised or lowered. If the motor drive housing is difficult to raise or lower, the force of the counterbalance can be precisely set by rotating the counterbalance adjustment knob on the right side of the lift housing. Rotating the knob clockwise decreases the counterbalance force.
3. Add water to the heating bath. If the optional oil bath is used, add suitable heat transfer fluid to the bath. Be sure that a substantial portion of the evaporating flask is submerged. Lift the flask out of the bath until you are ready to begin evaporation.

> **CAUTION:** Always make sure there is liquid in the bath before turning on the power switch.
>
> **NOTE:** The bath heater operates any time the power switch is on.

4. Turn the unit on with the power switch. Set the bath temperature by pressing the MODE button on top of the motor drive housing until the lamp next to the words "Bath Set °C" on the lift housing illuminates. Then set the desired bath temperature using the INCREASE and DECREASE buttons. The actual bath temperature can be monitored by pressing the MODE button until the "Bath Temp °C" lamp is illuminated. The operation of the bath can be monitored by watching the digital display. The dot in the lower right hand corner will illuminate when the heater is energized.
5. Remove the evaporating flask. Pour the sample to be evaporated into the flask and reattach the flask to the vapor duct.
6. Allow cooling water to run through the condenser.
7. Wait for the heating bath to reach the appropriate temperature before beginning evaporation. See Applications Guide on page 17.
8. Set the rotational speed of the evaporating flask by first pressing the MODE button until the "Speed RPM" lamp illuminates. Adjust the speed by pressing the INCREASE or DECREASE button. Rotation is then controlled with the RUN/STOP button.
9. Lower the rotating evaporating flask into the bath by grasping the height adjusting lever, squeezing the trigger and manually moving the motor drive housing. The evaporating flask and bath must be positioned so the flask does not contact the heating bath.
10. Apply vacuum slowly. If bumping or rapid boiling occurs, reduce vacuum and/or bath temperature. The evaporation process has begun.
11. When the optional vapor temperature sensor is employed, the actual vapor temperature may be monitored on the digital display by pressing the MODE button until the lamp next to the "Vapor Temp °C" is illuminated.
12. As evaporation proceeds, adjustments may be required to the bath temperature, flask rotation speed, or the vacuum. Three parameters – bath temperature, rotational speed and

vapor temperature may be monitored while the rotary evaporator is in use by pressing the MODE button until the appropriate LED is lit and the value is displayed. Make the required adjustments.

13. When the process is complete, stop rotation of the flask by pressing RUN/STOP button. Lift the flask out of the bath using the height adjustment handle.
14. Break the vacuum by admitting air slowly through the feed tube. Do this by slowly turning the stopcock. Remove the flask.
15. Turn off the vacuum pump, coolant source and the Rotary Evaporator

CAUTION: THE FLASK MAY BE HOT! USE GLOVES WHEN REMOVING THE FLASK!

Addition of Sample after an evaporation has started

Solution may be added during the process by using the feed tube.

1. Connect one end of a length of tubing to the glass inlet pipe (located next to the opening for the addition stopcock with feed tube).
2. Put the other end of the tubing into a container with the sample to be added.
3. When more sample is to be added, slowly open the stopcock and the vacuum in the system will act as a suction to draw in the sample.
4. To break the vacuum when the evaporation process is complete, pull the tube out of the container and slowly turn the stopcock to admit air into the system.

Applications Guide

To obtain the best evaporating rate and the best solvent recovery, the following are suggested:

1. The heating bath temperature should be 20°C (36°F) above the boiling point (at operating pressure) of the liquid to be evaporated.
2. The coolant circulating in the condenser should be 20°C (36°F) below the boiling point (at operating pressure) of the liquid to be evaporated.

The chart and nomogram that follow serve as a guide in your selection of these settings or the boiling point may be calculated for any desired operating temperature.

If conditions for optimum evaporation are exceeded, vapor production may exceed the condenser's capacity to condense the vapors and solvent may escape through the vacuum source. This could be hazardous and could damage the vacuum pump. If this situation should occur, the vacuum source will need to be protected with a trap.

Calculating the Boiling Point

The operating pressure corresponding to the desired boiling point temperature may be calculated for any solvent using the following formula:

$$\text{Log } P = 2.8811 - \left[\frac{Ta - T}{(b)(T)} \right]$$

Where…
P = Vacuum (mm Hg)
Ta = Boiling Point Temperature at Atmospheric Pressure (°K)
T = Desired Boiling Point Temperature (°K)
b = Constant from Table

Useful conversion factors:

mBar = (1.33) (mmHg)
°K = °C + 273

Using the Nomogram

To use this graph, three facts must be known about a given solvent:

1. Boiling point at normal atmospheric pressure (1 Bar).
2. Constant b.
3. Either operating temperature or operating pressure.

NORMAL OPERATION

To determine the desired boiling point at a given pressure:

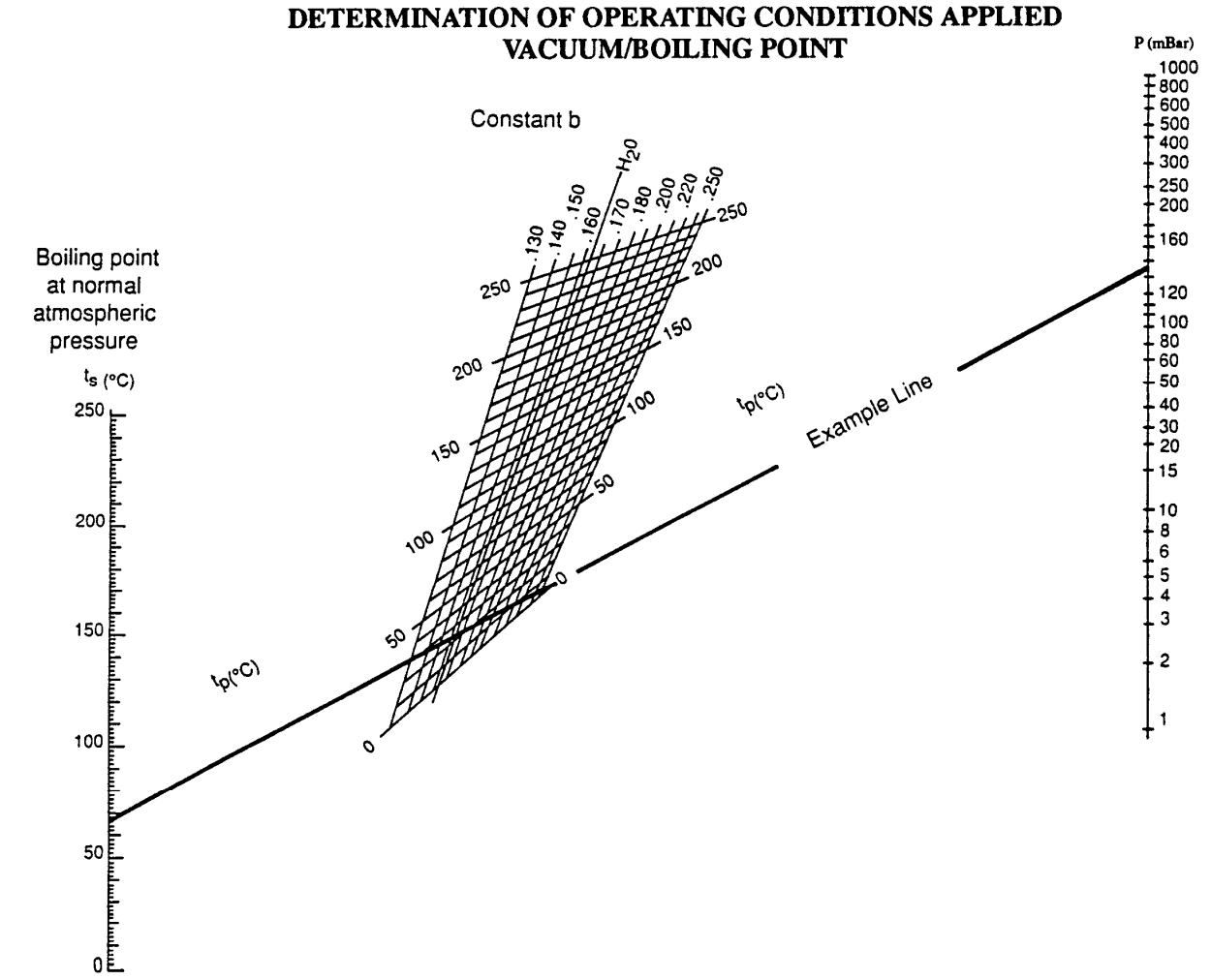
1. Find the boiling point at normal atmospheric pressure (1Bar) on the left side of the graph.
2. Find the operating pressure on the right side of the graph.
3. Draw a straight line linking these two points.
4. Find "Constant b" for the solvent on the top of the grid. Follow that line until it intersects with the line as drawn between the two points. This point represents the boiling point at the given pressure and the temperature is read off the left or right side of the grid (0-250°C).

To determine the operating pressure necessary to achieve a given boiling point:

1. Find the boiling point at normal atmospheric pressure (1Bar) on the left side of the graph.
2. Find the "Constant b" and follow this line to the desired boiling point on the grid (0-250°C).
3. Draw a straight line linking these two points and extrapolate on the right hand scale to find the operating pressure.

Physical Constants

SOLVENT	BOILING PT (°C)	DENSITY (g/cm^3)	HEAT OF VAPORIZATION (Kcal/Kg)	CONSTANT b	VACUUM FOR BOILING POINT AT 40°C (MBAR)
Acetone	56	.790	125	0.196	556
Acetonitrile	82	.786	178	0.195	208
Acetylene tetrachloride	147	1.602	53	0.200	20
Benzene	80	0.879	93	0.202	236
Butyl alcohol	118	0.810	120	0.156	26
Carbon tetrachloride	77	1.594	45	0.206	271
Chlorobenzene	132	1.110	90	0.202	36
Chloroform	61	1.480	59	0.203	474
1.2 Dichloroethane	83	1.235	126	0.201	210
Dichloroethylene	55	1.250	41	0.200	584
Diproplyether	68	0.726	76	0.207	375
Dioxide	111	1.034	98	0.195	70
Ethyl acetate	77	0.900	102	0.189	240
Ethyl alcohol	78	0.791	205	0.159	175
Ethylene dichloride	85	1.256	78	0.200	194
Heptane	98	0.680	74	0.200	120
Hexane	69	0.659	85	0.206	360
Iso-amyl alcohol	132	0.800	120	0.160	15
Iso-butyl alcohol	108	0.803	120	0.160	44
Isopropyl alcohol	82	0.785	160	0.158	136
Methyl alcohol	65	0.792	267	0.167	337
Methylene chloride	40	1.325	41	0.194	1013
Methyl ethyl ketone	80	0.810	113	0.206	243
N-Amyl alcohol	137	0.814	142	0.158	11
Pentachloroethane	159	1.700	45	0.207	15
Pentane	36	0.626	85	0.214	1013
Propyl alcohol	97	0.804	165	0.154	67
Tert, Butanol	83	0.787	141	0.154	130
1,1,2,2, Tetrachloroethane	146	1.603	60	0.198	20
Tetrachloroethylene	121	1.624	50	0.202	53
Toluene	111	0.867	86	0.202	76
1,1,1, Trichloroethane	74	1.346	76	0.206	301
Trichloroethylene	87	1.462	57	0.202	183
Water	100	1.000	540	0.167	72
Xylene	140	0.870	82	0.199	25



t_s = Boiling point at 1 bar (normal pressure)
t_p = Boiling point at P mBar (operating pressure)
p = Operating pressure in mBar

Example methyl alcohol:

1. Boiling point at normal (1 bar) atmospheric pressure = 65°C.
2. Constant b = 0.160
3. Operating pressure = 130 mBar
4. Boiling point at 130 mBar pressure = 24°C

Constant b	Groups
0.200	Aliphatic hydrocarbons Aliphatic halogenated hydrocarbons
0.195	Aromatic hydrocarbons Aromatic halogenated hydrocarbons Ketones Ethers Nitriles Heterocyclic compounds
0.190	Aldehydes Esters
0.185	Amines
0.180	Phenols
0.165	Acids
0.160	Alcohols

Under normal operation, the Rotary Evaporator requires little maintenance. The following maintenance schedule is recommended:

Weekly

If the accessory vacuum pump contains oil, check the condition and level. If the oil level is low, then add oil. If the oil contains excessive amounts of moisture, detected by a cloudiness in the oil, it will be necessary to change the oil. For further information regarding procedures for changing the vacuum pump oil, refer to the vacuum pump manufacturer's instructions. To expel small amounts of water that may have accumulated in the pump oil, periodically operate the vacuum against a dry, leak-tight system. The gas ballast must be open.

Monthly

The effective life of rubber parts depends upon both their usage and the surrounding environment. Check all rubber hoses and replace any that show signs of hardening, permanent set or deterioration.

As Needed

Whenever the bath becomes dirty or if a spill has occurred in it, the bath should be emptied and cleaned. Do not use abrasive cleaners which could scratch the surface. Mild soap and water is recommended for normal cleaning. Tougher stains can be removed using stainless steel cleaners.

If the cooling coils should become discolored due to algae build up, the algae can be removed by passing the dilute solution of a fungicide such as chlorine bleach through the coil.

SPECIFICATIONS

Electrical Data:

MODEL	ELECTRICAL REQUIREMENTS
78820-00	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78820-02	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78820-04	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78830-00	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78830-02	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78830-04	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78840-00	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78840-02	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78840-04	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78850-00	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78850-02	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78850-04	115 VAC – 50/60 Hz – 1 Phase – 12 Amp
78820-01	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78820-03	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78820-05	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78830-01	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78830-03	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78830-05	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78840-01	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78840-03	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78840-05	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78850-01	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78850-03	230 VAC – 50/60 Hz – 1 Phase – 6 Amp
78850-05	230 VAC – 50/60 Hz – 1 Phase – 6 Amp

Motor Assembly:

Drive:	Sparkless D.C. Motor
Input voltage:	30 VDC
Speed range:	0-250 rpm
Speed control:	Push buttons on drive housing
Vacuum seal:	PTFE with polymer fill
Fastening of vapor duct:	Taper joint

Heating Bath:

Heating capacity:	1200 Watts
Temperature range:	Water Bath 20-100°C (68-212°F) Oil Bath 20-180°C (104-356°F)
Temperature input:	Push button on drive housing
Bath:	Stainless Steel
Accuracy of control:	± 2°C
Accuracy of display:	± 2°C
Display resolution:	1°C
Max. capacity:	5 Liters (1.3 gallons)
Working capacity:	4 Liters (1 gallons)
Diameter	230 mm (9.0 inches)

Glassware:

Size of Supplied Flasks:	1 Liter
Maximum Size of Flasks:	3 Liter
Cooling Surface Area-	
Diagonal Condenser	1500 CM^2
Vertical Condenser	1500 CM^2
Reflux Condenser	1600 CM^2
Dewar Condenser	570 CM^2
Evaporating Flask Joint Size:	24/40 Taper Joint
Receiving Flask Joint Size:	35/20 Spherical Joint

TROUBLESHOOTING

WARNING: Before servicing, turn the Rotary Evaporator off. Allow the bath and glassware to cool sufficiently to handle without gloves. Disconnect all hoses and tubing, dismantle the glassware, empty the heating bath, disconnect the main power source and separate the part to be serviced from the evaporator.

Servicing the Drive:

Drive does not run	Main switch has not been turned on	Turn main switch on
	Run button not pushed	Push Run button
	Seal dirty	Check and clean the seal
	Vacuum grease on seal	Replace seal and vapor duct
	Belt broken	Replace belt
	Printed board assembly defective	Exchange and readjust
	Speed sensor defective	Adjust or replace
	Motor defective	Exchange motor
Drive stops under vacuum and is hot	Seal dirty	Check and clean the seal – replace if necessary

Servicing the Heating Bath:

Heating bath does not heat	Switch has not been turned on	Turn switch on
	High temperature limiter has tripped	Reset by pressing button on bottom of bath
	Main connection plug not plugged into base assembly	Plug in
Digital Display indicates "---"	Sensor not connected or defective	Connect or exchange

Servicing the Lift:

Lift difficult to operate	Gas cylinder defective	Replace
	Counterbalance not properly adjusted	Adjust knob on right side of lift housing

Servicing the Glassware:

Poor Vacuum	Defective joint connection	Clean or replace
	Defective seal	Clean or replace
	Defective tubing	Replace tubing
	Defective vacuum pump	Repair or replace

Servicing the Electronics:

Vapor temperature indicates "---"	Sensor not connected or defective	Connect or replace
Noisy Seal	Deposits built up on seal and or vapor duct	Remove seal and vapor duct – clean thoroughly

REPLACEMENT PARTS

	ITEM	QTY	PART #	DESCRIPTION
DRIVE				
	1	1	7886200	Motor
	2	1	7885400	Speed Sensor Assembly
	3	2	7887500	Belt
	4	1	7888600	Switch PCB
	5	1	7887600	Latch Cable
	6	1	7888100	Trigger
	7	2	7969100	Mount-Vibration
	8	1	7887300	Pivot Knob
LIFT				
	9	1	7895300	Gas Cylinder
	10	1	7896800	Lift Cable
	11	3	1861400	Pulley
	12	1	7882500	Latch
	13	1	1931601	Latch Spring
	14	1	7885800	Control PCB
	15	1	7885802	Display PCB
	16	1	1302300	Switch-Power
	17	1	1344400	Fuse (115V) – 15A
	17A	2	1344401	Fuse (230V) – 10A
	18	2	1864200	Bearing-Linear
	19	2	1864300	Retaining Ring
	20	1	1952801	Knob
	21	1	7886700	Transformer Assembly (115V)
	21A	1	7886701	Transformer Assembly (230V)
	22	1	1292600	Triac
	23	1	1292500	IEC Power Connector
	24	1	1292800	Fuse Drawer (115V)
	24A	1	1292700	Fuse Drawer (230V)
	25	1	1334500	Power Cord (115V)
	25A	1	1334100	Power Cord (230V)
	26	3	1666100	Foot
BATH				
	28	1	7988900	Bath with Heater
	29	1	7884900	Temperature Sensor
	30	1	7968301	High Temperature Cut Out Switch
	31	1	7892900	Temperature Sensor Housing
	32	1	1647100	O-Ring
	33	1	7883700	Trim Ring
	34	1	7964700	Power Cord – Bath
	35	4	7819600	Foot

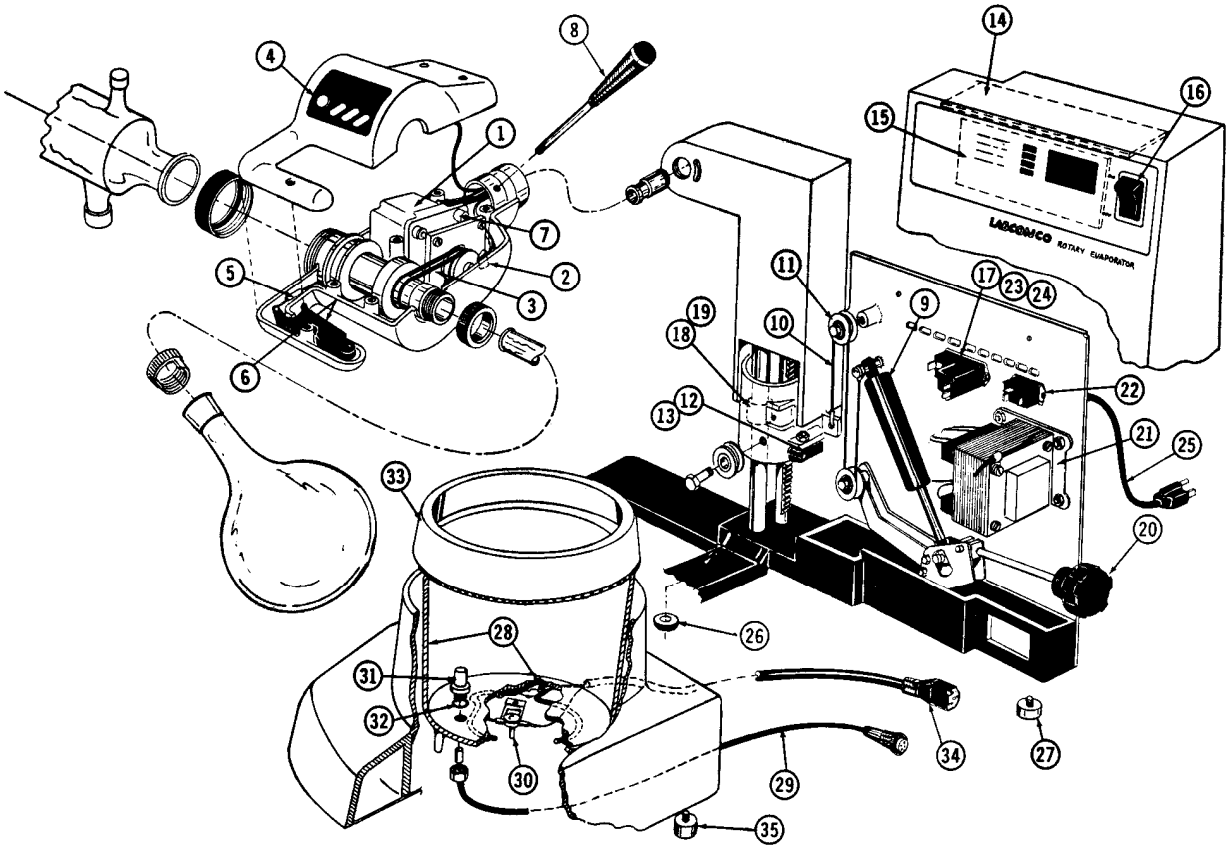

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35

Figure 7

Replacement Parts – Diagonal Glassware

ITEM	QTY	PART #	DESCRIPTION
1	1	7891200	Receiving Flask 1000 ml – SJ35/20 (Uncoated)
1A	1	7891201	Receiving Flask 1000 ml – SJ35/20 (Plastic Coated)
2	1	7891300	Evaporating Flask 1000 ml – ST24/40 (Uncoated)
2A	1	7891301	Evaporating Flask 1000 ml – ST24/40 (Plastic Coated)
3	1	7882100	Vapor Duct Assembly (includes item 14)
4	1	7883200	Condenser, Diagonal (Uncoated)
4A	1	7883201	Condenser, Diagonal (Plastic Coated)
5	1	7891800	Clamp, SJ35/20, Receiving Flask
6	1	7890100	Cap, Temperature Sensor
7	1	7893800	Seal – Cap, Temperature Sensor
8	1	7890200	Seal, Vapor
9	1	7892000	Introduction Assembly
10	1	7887100	Nut, Condenser
11	1	7890300	Spring, Condenser
12	1	7887000	Nut, Vapor Duct
14	1	7891900	Clamp, Evaporating Flask

Replacement Parts – Diagonal Glassware

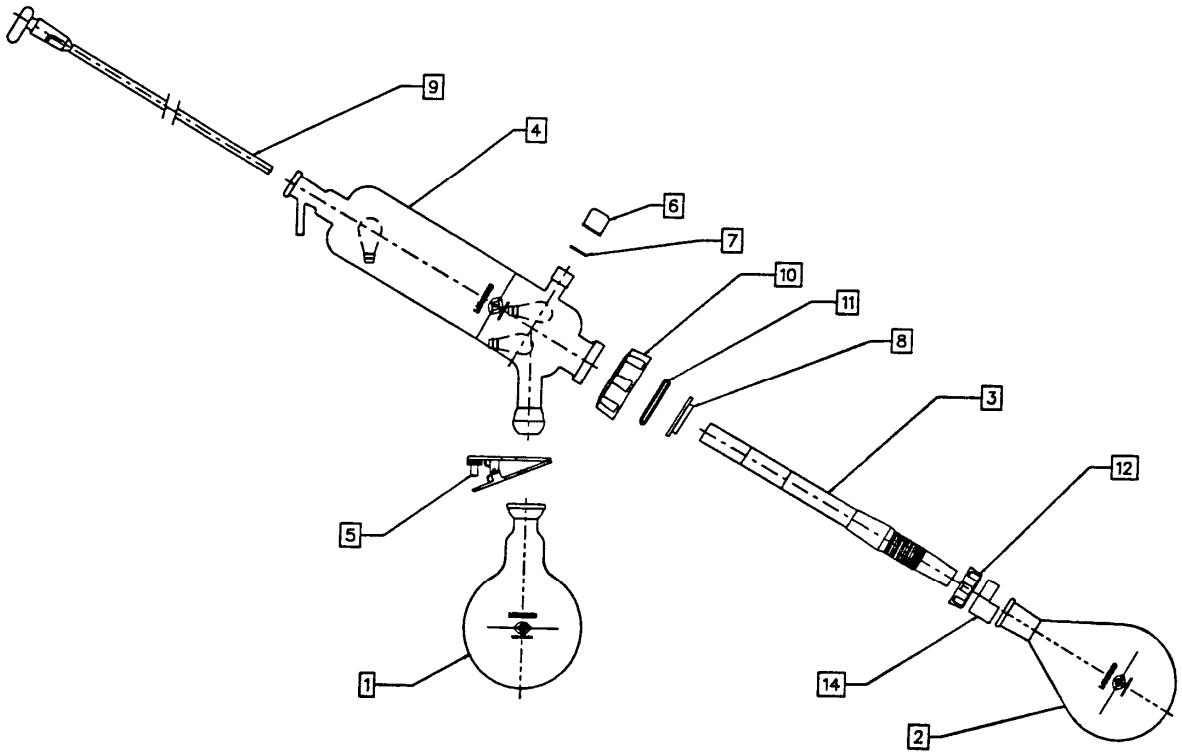


Figure 8

Replacement Parts – Vertical Glassware

ITEM	QTY	PART #	DESCRIPTION
1	1	7891200	Receiving Flask 1000 ml – SJ35/20 (Uncoated)
1A	1	7891201	Receiving Flask 1000 ml – SJ35/20 (Plastic Coated)
2	1	7891300	Evaporating Flask 1000 ml – ST24/40 (Uncoated)
2A	1	7891301	Evaporating Flask 1000 ml – ST24/40 (Plastic Coated)
3	1	7882100	Vapor Duct Assembly (includes item 18)
4	1	7883100	Condenser, Vertical (Uncoated)
4A	1	7883101	Condenser, Vertical (Plastic Coated)
5	1	7891800	Clamp, SJ35/20, Receiving Flask
6	1	7890100	Cap, Temperature Sensor
7	1	7893800	Seal – Cap, Temperature Sensor
8	1	7890200	Seal, Vapor
9	1	7892000	Introduction Assembly
10	1	7887100	Nut, Condenser
11	1	7890300	Spring, Condenser
12	1	7887000	Nut, Vapor Duct
13	1	7890400	Vacuum Adapter
14	1	7893200	Rod, Support
15	1	7893300	Clamp, Rod
16	1	7893400	Clamp, Condenser
18	1	7891900	Clamp, Evaporating Flask

Replacement Parts – Vertical Glassware

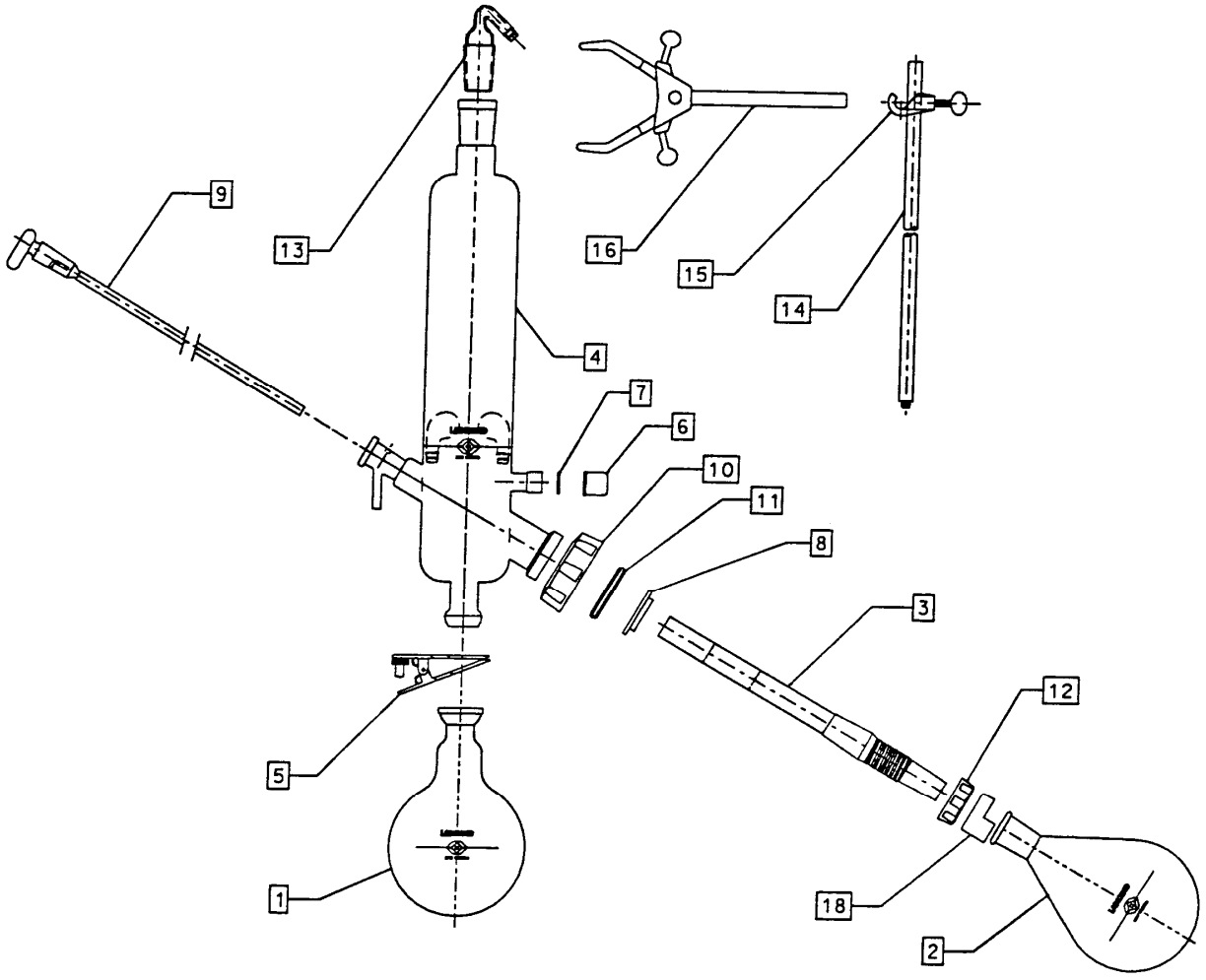


Figure 9

Replacement Parts – Reflux Glassware

ITEM	QTY	PART #	DESCRIPTION
1	1	7891200	Receiving Flask 1000 ml – SJ35/20 (Uncoated)
1A	1	7891201	Receiving Flask 1000 ml – SJ35/20 (Plastic Coated)
2	1	7891300	Evaporating Flask 1000 ml – ST24/40 (Uncoated)
2A	1	7891301	Evaporating Flask 1000 ml – ST24/40 (Plastic Coated)
3	1	7890700	Reflux Distribution Head (Uncoated)
3A	1	7890701	Reflux Distribution Head (Plastic Coated)
4	1	7892200	Condenser, Reflux (Uncoated)
4A	1	7892201	Condenser, Reflux (Plastic Coated)
5	1	7891800	Clamp, SJ35/20, Receiving Flask
6	1	7890100	Cap, Temperature Sensor
7	1	7893800	Seal – Cap, Temperature Sensor
8	1	7890200	Seal, Vapor
9	1	7892000	Introduction Assembly
10	2	7887100	Nut, Condenser
11	2	7890300	Spring, Condenser
12	1	7890500	Flask Adapter
13	1	7890400	Vacuum Adapter
14	1	7893200	Rod, Support
15	1	7893300	Clamp, Rod
16	1	7893400	Clamp, Condenser
17	1	7890600	Flange Adapter
18	1	7893600	Clamp, Evaporating Flask
19	1	7893500	Plug, with O-Ring Assembly
19A	2	1644006	O-Ring

Replacement Parts – Reflux Glassware

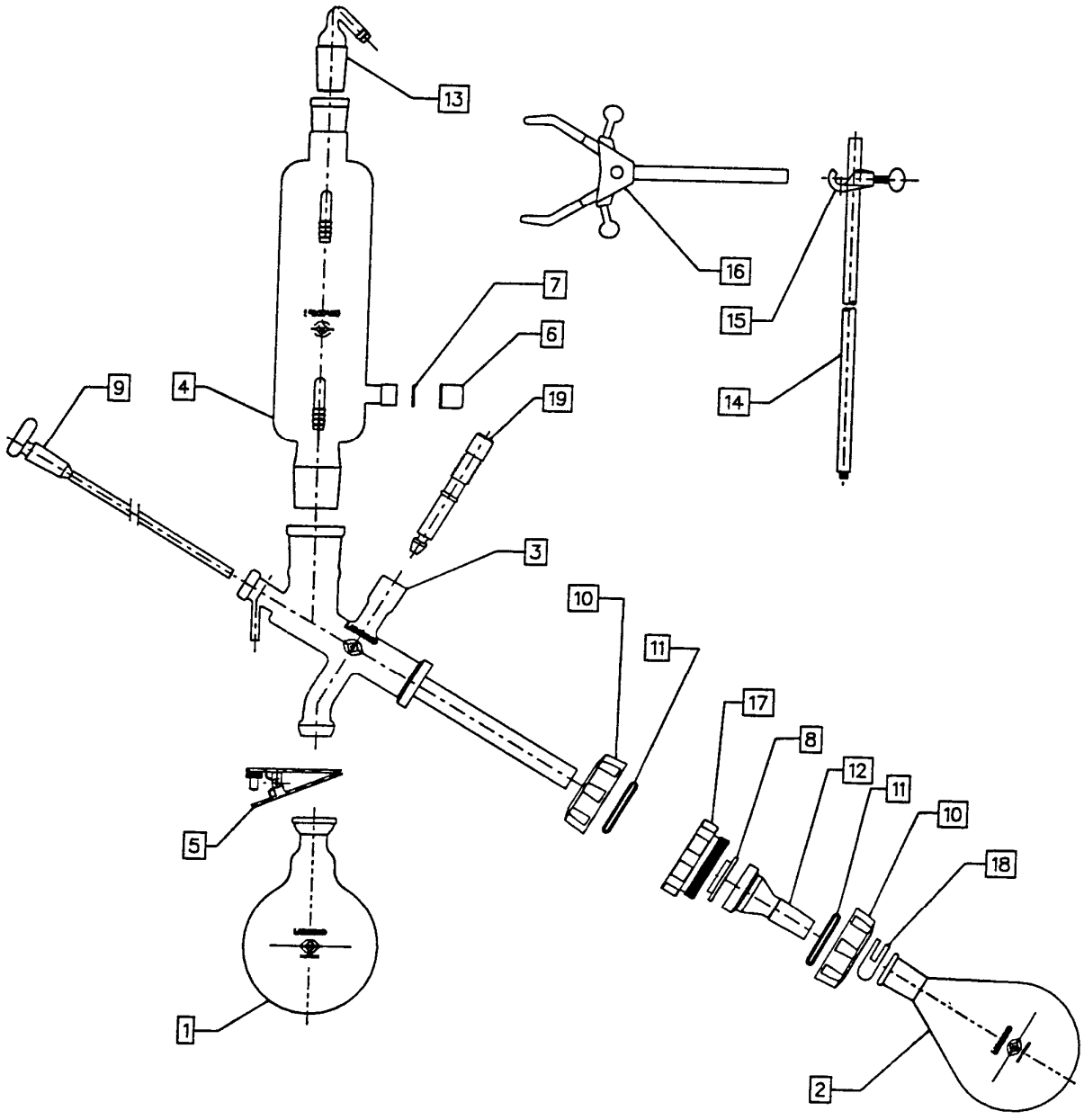


Figure 10

Replacement Parts – Dewar Glassware

ITEM	QTY	PART #	DESCRIPTION
1	1	7891200	Receiving Flask 1000 ml – SJ35/20 (Uncoated)
1A	1	7891202	Receiving Flask 1000 ml – SJ35/20 (Teflon Coated)
2	1	7891300	Evaporating Flask 1000 ml – ST24/40 (Uncoated)
2A	1	7891302	Evaporating Flask 1000 ml – ST24/40 (Teflon Coated)
3	1	7882100	Vapor Duct Assembly (Includes item 19)
4	1	7891100	Condenser, Dewar (Uncoated)
4A	1	7891101	Condenser, Dewar (Teflon Coated)
5	1	7891800	Clamp, SJ35/20, Receiving Flask
6	1	7890100	Cap, Temperature Sensor
7	1	7893800	Seal – Cap, Temperature Sensor
8	1	7890200	Seal, Vapor
9	1	7892000	Introduction Assembly
10	1	7887100	Nut, Condenser
11	1	7890300	Spring, Condenser
12	1	7887000	Nut, Vapor Duct
13	1	7893200	Rod, Support
14	1	7893300	Clamp, Rod
15	1	7893400	Clamp, Condenser
16	1	1644004	O-Ring
17	1	7890800	Cooling Trap, Dewar (Uncoated)
17A	1	7890801	Cooling Trap, Dewar (Teflon Coated)
18	1	7890900	Clamp Assembly, Cooling Trap – Dewar
19	1	1891900	Clamp, Evaporating Flask

Replacement Parts – Dewar Glassware

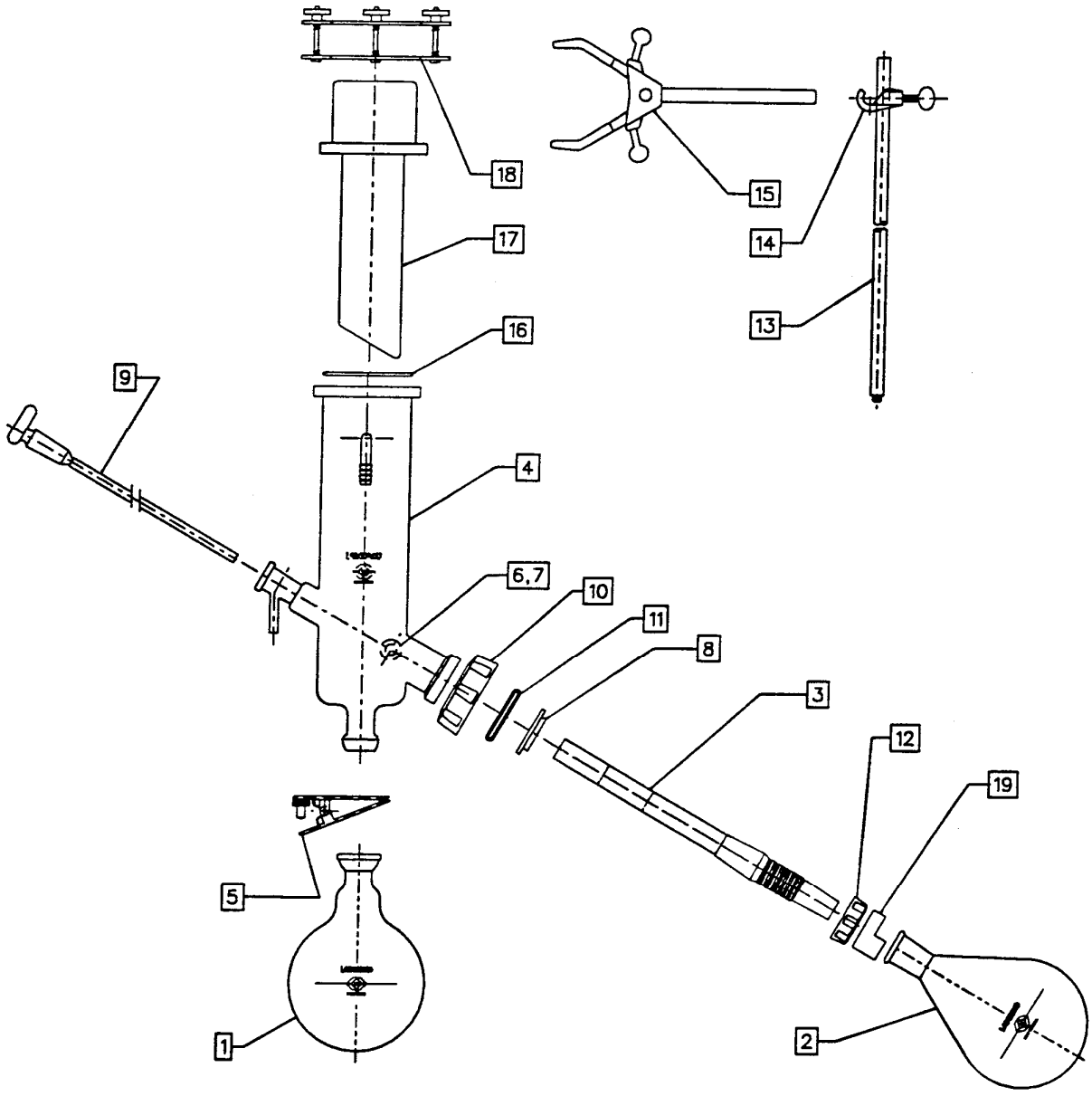


Figure 11

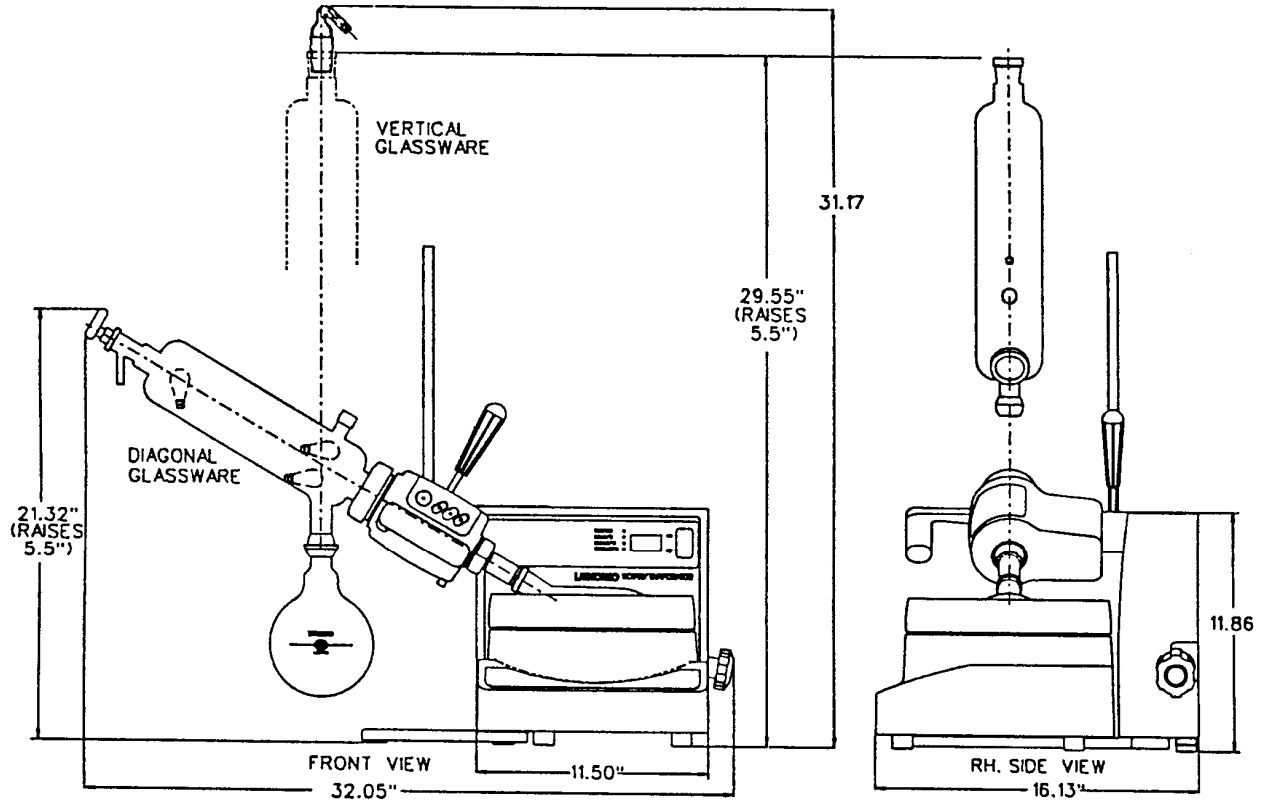
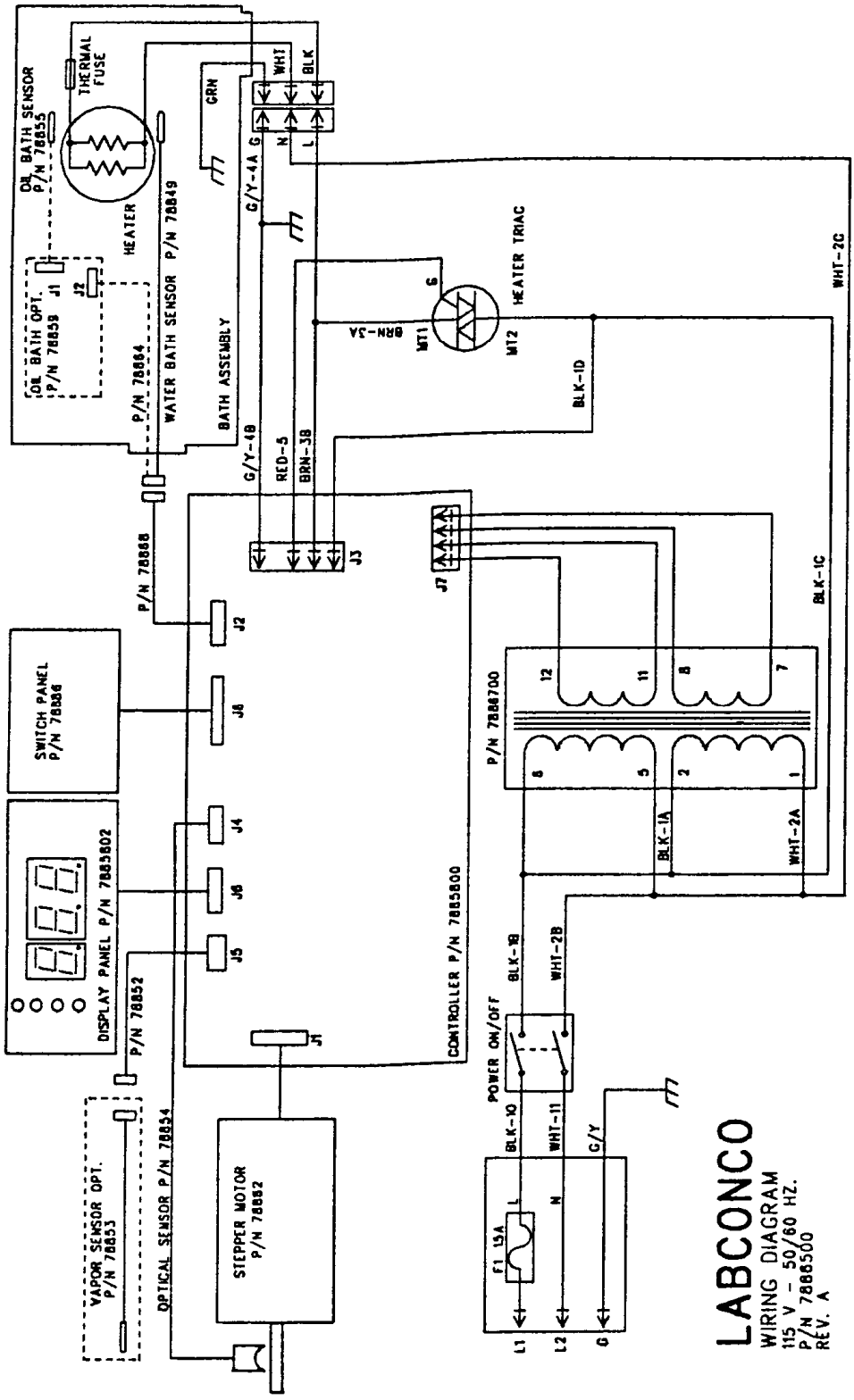

VERTICAL
GLASSWARE
31.17
29.55"
(RAISES
5.5")
DIAGONAL
GLASSWARE
21.32"
(RAISES
5.5")
11.86
FRONT VIEW
11.50"
32.05"
RH. SIDE VIEW
16.13"

Figure 12

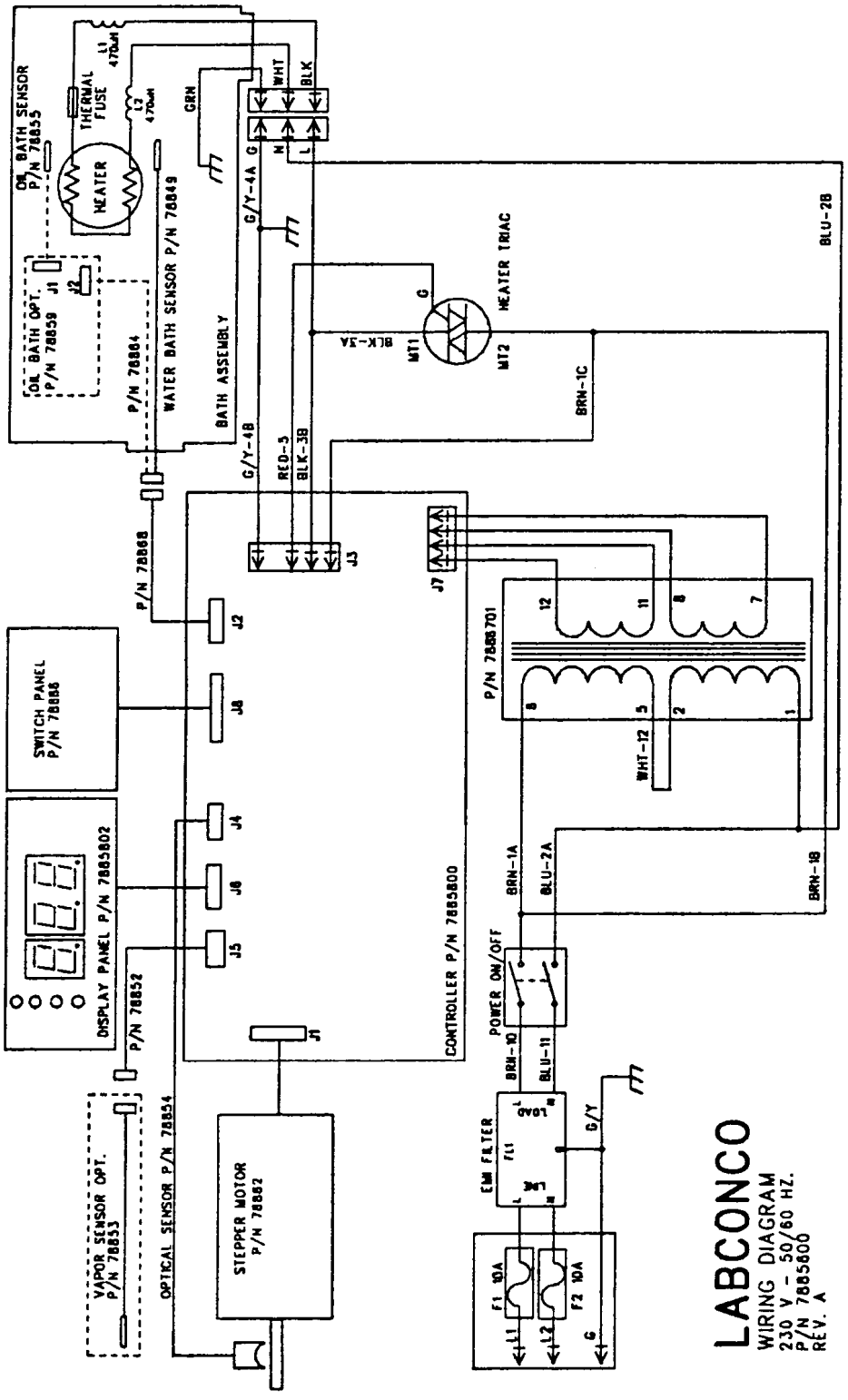
The Rotary Evaporator is designed to operate safely under the following conditions:

- Indoor use
- Altitude up to 2000M (6562 Ft.)
- Ambient Temperature 5°C to 40°C (41°F to 104°F)
- Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F)
- Main supply voltage fluctuations not to exceed ±10% of the nominal voltage
- Transient over-voltages according to installation category II (over-voltage categories per IEC 1010)
- Pollution degrees 2 (Normally only non-conductive foreign matter, solid, liquid or gaseous (ionized gasses), that may produce a reduction of dielectric strength or surface resistivity occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected) in accordance with IEC 664

115V Models


OIL BATH SENSOR P/N 78855
THERMAL FUSE
HEATER
OIL BATH OPT. P/N 78859
P/N 78864
WATER BATH SENSOR P/N 78849
BATH ASSEMBLY
GRN
WHT
BLK
G/Y-4A G
N
L
G/Y-4B
RED-5
BRN-3B
J3
J7
HEATER TRIAC
G
MT1
MT2
BRN-3A
WHT-2C
BLK-1D
BLK-1C
P/N 78868
J2
SWITCH PANEL P/N 78886
J8
J4
J6
J5
DISPLAY PANEL P/N 7885802
P/N 78852
J1
CONTROLLER P/N 7885800
P/N 7888700
12
11
8
7
6
5
2
1
BLK-1A
WHT-2A
POWER ON/OFF
BLK-1B
WHT-2B
BLK-10
WHT-11
G/Y
F1 1.5A
L
N
L1
L2
G
VAPOR SENSOR OPT. P/N 78853
OPTICAL SENSOR P/N 78854
STEPPER MOTOR P/N 78882
LABCONCO
WIRING DIAGRAM
115 V ~ 50/60 HZ.
P/N 7886500
REV. A

230V Models


OIL BATH SENSOR P/N 78855
THERMAL FUSE
L1 470uH
L2 470uH
HEATER
GRN
WHT
BLK
G/Y-4A
N
L
OIL BATH OPT. P/N 78859
J1
J2
P/N 78864
WATER BATH SENSOR P/N 78849
BATH ASSEMBLY
G/Y-4B
RED-5
BLK-3B
G
BLK-3A
MT1
MT2
HEATER TRIAC
BLU-2B
BRN-1C
P/N 78868
J3
J7
J2
J8
J4
J6
J5
J1
SWITCH PANEL P/N 78886
DISPLAY PANEL P/N 7885802
P/N 78852
P/N 7885701
12
11
8
7
5
2
1
WHT-12
BRN-1A
BLU-2A
BRN-1B
POWER ON/OFF
BRN-10
BLU-11
CONTROLLER P/N 7885800
EMI FILTER
FI1
G/Y
VAPOR SENSOR OPT. P/N 78853
OPTICAL SENSOR P/N 78854
STEPPER MOTOR P/N 78882
F1 10A
F2 10A
L1
L2
G
LABCONCO
WIRING DIAGRAM
230 V - 50/60 HZ.
P/N 7885800
REV. A

WARRANTY

We are committed to providing our customers with quality equipment and service after the sale. Part of this objective involves keeping you informed of changes and new product additions. We, therefore, request that you take a moment to fill out the product registration card so we many know your location as well as some of the reasons that prompted you to purchase our product.

Labconco provides a warranty on all parts and factory workmanship. The warranty includes areas of defective material and workmanship, provided such defect results from normal and proper use of the equipment.

The warranty for all Labconco products will expire one year from date of installation or two years from date of shipment from Labconco, whichever is sooner, except the following:

- Purifier® Delta® Series Biological Safety Cabinets carry a three-year warranty from date of installation or four years from date of shipment from Labconco, whichever is sooner.
- Carts carry a lifetime warranty.
- Glassware is not warranted from breakage when dropped or mishandled.

This limited warranty covers parts and labor, but not transportation and insurance charges. In the event of a warranty claim, contact Labconco Corporation or the dealer who sold you the product. If the cause is determined to be a manufacturing fault, the dealer or Labconco Corporation will repair or replace all defective parts to restore the unit to operation. Under no circumstances shall Labconco Corporation be liable for indirect, consequential, or special damages of any kind. This statement may be altered by a specific published amendment. No individual has authorization to alter the provisions of this warranty policy or its amendments. Lamps and filters are not covered by this warranty. Damage due to corrosion or accidental breakage is also not covered.

WARNING: The disposal and/or emission of substances used in connection with this equipment may be governed by various federal, state or local regulations. All users of this equipment are urged to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials in or upon water, land or air and to comply with such regulations.

If shipment is received in visibly damaged condition, be certain to make a notation on the delivering carrier's receipt and have his agent confirm the damage on your receipt. Otherwise, the damage claim may be refused.

If concealed damage or pilferage is discovered, notify the carrier immediately and retain the entire shipment intact for inspection. Interstate Commerce Commission rules require that the claim be filed with the carrier within 15 days after delivery.

NOTE: Do not return goods. Goods returned without prior authorization will not be accepted. Labconco Corporation and its dealers are not responsible for shipping damage. Claims must be filed directly with the freight carrier by the recipient. If authorization has been received to return this product, by accepting this approval, the user assumes all responsibility and liability for biological and chemical decontamination and cleansing. Labconco reserves the right to refuse delivery of any products which do not appear to have been properly cleaned and/or decontaminated prior to return.

7965600	Oil Bath, 115V – Max Temperature 180°C
7965601	Oil Bath, 230V – Max Temperature 180°C
7964200	Receiving Flask 2000 ml – Uncoated
7964201	Receiving Flask 2000 ml – Plastic Coated
7964300	Evaporating Flask 2000 ml – Uncoated
7964301	Evaporating Flask 2000 ml – Plastic Coated
7964400	Receiving Flask 3000 ml – Uncoated
7964401	Receiving Flask 3000 ml – Plastic Coated
7964500	Evaporating Flask 3000 ml – Uncoated
7964501	Evaporating Flask 3000 ml – Plastic Coated
7964600	Bump Tube (Trap) – Uncoated
7964601	Bump Tube (Trap) – Plastic Coated Installed between the evaporating flask and vapor duct to prevent "bumped" solvent from entering the condenser. Recommended for volatile solvents.
7885300	Vapor Temperature Sensor Installed in the condenser just above the vapor duct to monitor the vapor temperature of the solvent being evaporated. Recommended to optimize the evaporation process and to monitor the separation of solvent mixtures.
7889500	Safety Shield Bath Dome-shaped safety shield fits securely over the bath to protect you from splashes from the bath or possible flask implosion. A side opening allows you to raise and lower the glassware without removing the shield. Polycarbonate construction is shatter-proof and corrosion-resistant.
7554800	Two Piece Evaporating Flask with Rubber Seal 500 ml
7554900	Two Piece Evaporating Flask with Rubber Seal 750 ml The unique wide-mouth design of the Two-Piece Evaporating Flask helps you easily load and recover samples. It consists of a borosilicate glass top and bottom and a silicone rubber seal. The bottom is flat for stability and to reduce the possibility of spills. The taper joint of 24/40 STJ connects to the vapor duct. Available in 500 ml and 750 ml volumes.

If you have any questions that are not addressed in this manual or if you need technical assistance, please contact Labconco's Customer Service Department at 1-800-821-5525, Labconco's Product Service Department at 1-800-522-7658 or either department at 1-816-333-8811, between the hours of 7:00 a.m. and 6:00 p.m. Central Standard Time.

Labconco's mailing address is:

Labconco Corporation
8811 Prospect Avenue
Kansas City, Missouri 64132-2696

Visit Labconco through the Internet at:

http://www.labconco.com
or
e-mail: labconco@labconco.com

DECLARATION OF CONFORMITY

Application Council Directive(s): 73/23/EEC, 89/336/EEC

Standard(s) to which conformity is declared: EN61010, EN55014, EN55104

Manufacturer's Name: Labconco Corporation

Manufacturer's Address: 8811 Prospect Avenue
Kansas City, MO 64132 USA

Importer's Name: See Shipping/Customs Documents*

Importer's Address: See Shipping/Customs Documents for your equipment

Type of Equipment: Laboratory Equipment – Sample Preparation

Model No.: Rotary Evaporator 230V 78820-XX
78830-XX
78840-XX
78850-XX
Micro Rotary Evaporator 230V 78860-XX

Serial No.: Various – See Individual Declaration

Year of Manufacture: 1996 and Subsequent

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

See individual Declaration of Conformity which will be signed by the importer for your country.

Place: _____
(Signature)

Date: _____
(Full Name)

_____
(Position)

*An individual version of this declaration is included with your shipping/customs documentation.

Labconco P/N 36960-09 REV. A ECO B296