

ISO21287 Standard Cylinder SCWS Series



ISO21287 STANDARD CYLINDER SCWS SERIES

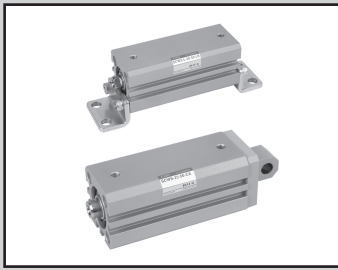
New

CKD SCWS
SCWS-25-50-CA
8514 G

CKD SCWS
SCWS-L-20-50-LB
8514 G

CKD SCWS
SCWS-40-50
8514 G

- T type switch mounted on 3 faces** Visible switch by 3 faces of direct mounting on
- Beautiful appearance** cylinder body is anodized
- Interchangeable** mounting dimensions comply with ISO21287 standard
- Built-in cushion** available with or without magnet



ISO21287 Standard Cylinder SCWS Series

● Bore size: ϕ 20/ ϕ 25/ ϕ 32/ ϕ 40/ ϕ 50/ ϕ 63/ ϕ 80/ ϕ 100

Symbol:



Specifications

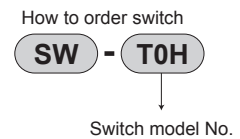
Description		SCWS							
Bore size	mm	ϕ 20	ϕ 25	ϕ 32	ϕ 40	ϕ 50	ϕ 63	ϕ 80	ϕ 100
Actuation		Double acting							
Working fluid		Compressed air							
Max. working pressure	MPa	1							
Min. working pressure	MPa	0.1				0.05			
Withstanding pressure	MPa	1.6							
Ambient temperature	°C	-10 to 60 (no freezing)							
Port size		M5				G1/8			
Stroke tolerance	mm	+1.5 0				+2.0 0			
Working piston speed	mm/s	50 to 500				50 to 300			
Cushion		Rubber cushion							
Lubrication		Not required (when lubrication, use turbine oil Class 1 ISOVG32)							
Allowable absorption energy	J	0.16	0.40	0.63	0.98	1.56	2.51	3.92	

Stroke length

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke (mm)
ϕ 20	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 80, 100, 125, 150	150	1
ϕ 25			
ϕ 32			
ϕ 40			
ϕ 50			
ϕ 63			
ϕ 80			
ϕ 100			

Min. stroke length of types with switch (1 or 2 pcs. included)

Bore size (mm)	T0H/V & T5H/V	T2H/V & T3H/V
ϕ 20	5	5
ϕ 25		
ϕ 32		
ϕ 40		
ϕ 50		
ϕ 63		
ϕ 80		
ϕ 100		



Note: For types with 2-color display, off-delay type, strong magnetic field, T1* and T8* switches. The stroke length less than 10mm is not available.

Switch specifications (T-type switch)

- One color/bi-color indicator/strong magnetic field

Description	Proximity 2-wire				Proximity 3-wire			
	T1H · T1V	T2H·T2V · T2JH · T2JV	T2YH · T2YV	T2WH · T2WV	T3H · T3V	T3PH · T3PV (Custom orders)	T3YH · T3YV	T3WH · T3WV
Applications	Programmable controller, relay and small solenoid valve	Programmable controller			Programmable controller, relay			
Output mode	-				NPN output	PNP output	NPN output	NPN output
Power voltage	-				DC10~28V			
Load voltage	AC85~265V	DC10~30V		DC24V±10%	DC30V or less			
Load current	5~100mA	5~20mA (note 1)			100mA or less		50mA or less	
Light	LED (On lighting)	LED (On lighting)	Red/green LED (On lighting)	Red/green LED (On lighting)	LED (On lighting)	Green LED (On lighting)	Red/green LED (On lighting)	Red/green LED (On lighting)
Leaking current	1mA or less at AC 100 V 2mA or less at AC 200 V	1mA or less			10µA or less			

Description	reed 2-wire							Proximity 2-wire
	T0H · T0V		T5H · T5V		T8H · T8V			T2YD
Applications	Programmable controller, relay		Programmable controller, relay IC loop (No indicator)		Programmable controller, relay			Programmable controller, relay
Output mode	-							
Power voltage	-							
Load voltage	DC12/24V	AC110V	DC5/12/24V	AC110V	DC12/24V	AC110V	AC220V	DC24V±10%
Load current	5~50mA	7~20mA	50mA以下	20mA以下	5~50mA	7~20mA	7~10mA	5~20mA
Light	LED (On lighting)		No indicator light		LED (On lighting)			Red/green LED (On lighting)
Leaking current	0mA							1mA or less

Note1: Max load current 20mA above is the value at 25°C. When ambient temperature is higher than 25°C, the value is lower than 20mA.(5 to 10mA at 60°C).

Cylinder weight (weight with switch is the value when two cylinder switches are installed) (unit:g)

Bore size (mm)	Product weight with 0mm stroke	Additional weight per 50mm stroke	Additional weight with accessory				Switch weight (for each T0H)	Additional weight with option "N"
			Axial foot (LB)	Rod eye (CA)	Rod side flange (FA)	Head side flange (FB)		
φ20	104	128	87	104	132	132	18	20
φ25	147	157	93	119	164	164		20
φ32	198	231	125	-	-	-		26
φ40	288	254	140	-	-	-		26
φ50	439	382	286	-	-	-		50
φ63	526	457	348	-	-	-		50
φ80	1006	644	670	-	-	-		78
φ100	1741	869	900	-	-	-		78

How to order

Without switch

SCWS - **20** - **10** - **N** - **LB**

With switch

SCWS-L - **20** - **10** - **T0H3** - **R** - **N** - **LB**

A Model No.

B Bore size

C Stroke length

D Cushion

E Switch model

F Switch quantity
Note 3

G Option

H Mounting style
Note 2

A Model No.	
SCWS	Double acting/single rod
SCWS-L	Double acting/single rod/with switch

B Bore size (mm)	
20	φ 20
25	φ 25
32	φ 32
40	φ 40
50	φ 50
63	φ 63
80	φ 80
100	φ 100

C Stroke length (mm)			
Bore size (mm)	Standard stroke (mm)	Stroke range (mm)	Custom stroke length
20	5, 10, 15, 20,	1 to 150	Per 1mm
25			
32			
40	25, 30, 35, 40,		
50	45, 50, 60, 80,		
63	100, 125, 150		
80			
100			

D Cushion	
Blank	Rubber cushion

E Switch model No.				
Axial lead wire	Radial lead wire	Contact	Display	Lead wire
T0H *	T0V *	Reed	1-color indicator	2-wire
T5H *	T5V *		No indicator	
T8H *	T8V *		1-color indicator	
T1H *	T1V *	Proximity	1-color indicator	2-wire
T2H *	T2V *		1-color indicator (PNP output)	3-wire
T3H *	T3V *			2-color indicator
T3PH *	T3PV *		2-wire	
T2WH *	T2WV *			
T2YH *	T2YV *		2-wire	
T3WH *	T3WV *			3-wire
T3YH *	T3YV *		Switch for strong magnetic field	2-wire
T2YD *	-			Off-delay type
T2YDT *	-			
T2JH *	T2JV *			

* Lead wire length	
Blank	1m (standard)
3	3 m (option)
5	5m (option)

F Switch quantity	
R	One on rod side
H	One on head side
D	Two

G Option	
Blank	Rod end female thread
N	Rod end male thread
M	Piston rod material (stainless steel) Note 1

H Mounting style									
Symbol	Mounting bracket	Bore size (mm)							
		20	25	32	40	50	63	80	100
LB	Axial foot	●	●	●	●	●	●	●	●
FA	Rod side flange	●	●						
FB	Head side flange	●	●						
CA	Rod eye type	●	●						

⚠ Precautions for model selection

Note 1: Standard material of piston rod for φ 20 and φ 25 cylinders is stainless steel.

Material of C-type snap ring is changed from steel to stainless steel.

Nuts for rod end male thread type are made of stainless steel.

Note 2: Mounting bracket is attached at Shipment.
Note 3: Switches are attached at shipment. Contact CKD when assembly is required at shipment.

[Example of model number]

SCWS-L-20-10-T0H3-R-N-LB

Model: ISO21287 standard cylinder

A Model : Double acting/single rod/with switch

B Bore size : 20mm

C Stroke length : 10mm

E Switch model No. : Reed switch T0H, lead wire length 3 m

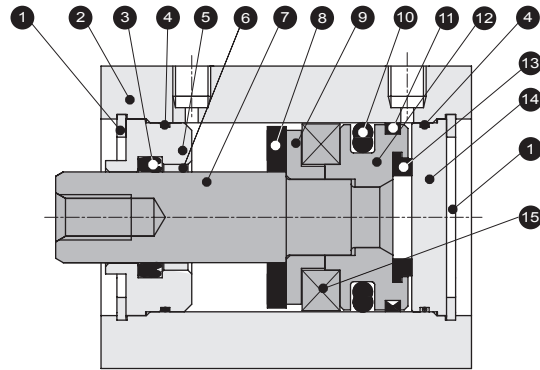
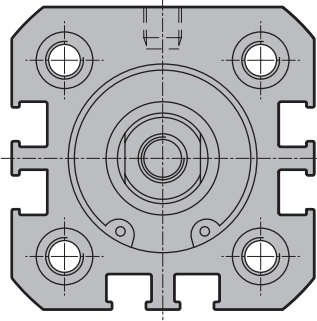
F Switch quantity : One on rod side

G Option : Rod end male thread

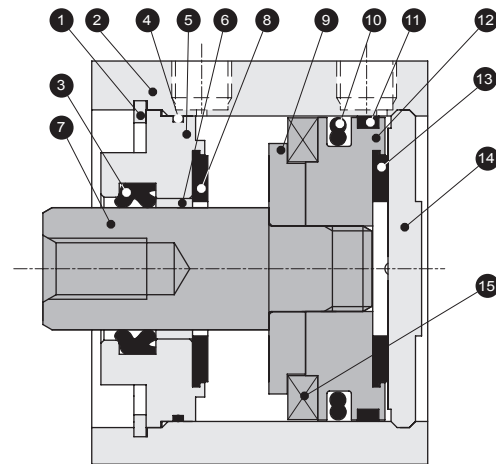
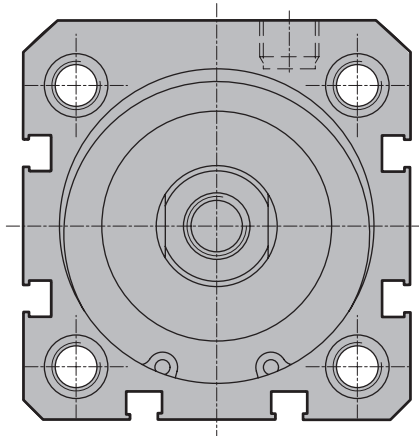
H Mounting bracket : Axial foot

Internal structure and parts list

● $\phi 20, \phi 25$



● $\phi 32$ to $\phi 100$



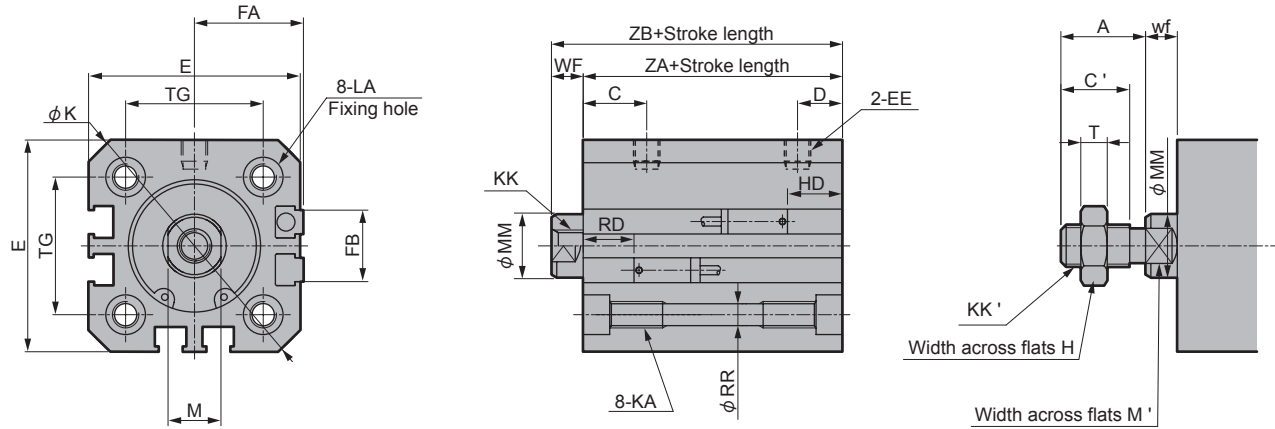
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	C type snap ring	Steel	Phosphate coating	9	Spacer	Aluminum alloy	Chromate
2	Main body	Aluminum alloy	Hard alumite disposal	10	Piston packing seal	Nitrile rubber	
3	Rod packing seal	Nitrile rubber		11	Wear ring	Acetar resin	
4	Rod metal gasket	Nitrile rubber		12	Piston	Aluminum alloy	Chromate
5	Rod bushing	Aluminum alloy	$\phi 20$ to $\phi 25$: Alumite $\phi 32$ to $\phi 100$: Chromate	13	Cushion rubber (H)	Urethane rubber	
6	Bush	DU dry bearing		14	cover	Aluminum alloy	Alumite
7	Piston rod	$\phi 20$ to $\phi 25$: Stainless steel $\phi 32$ to $\phi 100$: Steel	Industrial chrome plated	15	Piston magnet	Plastic magnet	For L-type only
8	Cushion rubber (R)	Urethane rubber					

Repair parts list

Bore size (mm)	Kit number	Repair parts number
$\phi 20$	SCWS-20K	3, 4, 8, 10, 11, 13
$\phi 25$	SCWS-25K	
$\phi 32$	SCWS-32K	
$\phi 40$	SCWS-40K	
$\phi 50$	SCWS-50K	
$\phi 63$	SCWS-63K	
$\phi 80$	SCWS-80K	
$\phi 100$	SCWS-100K	

Dimensions

● $\phi 20$, $\phi 25$



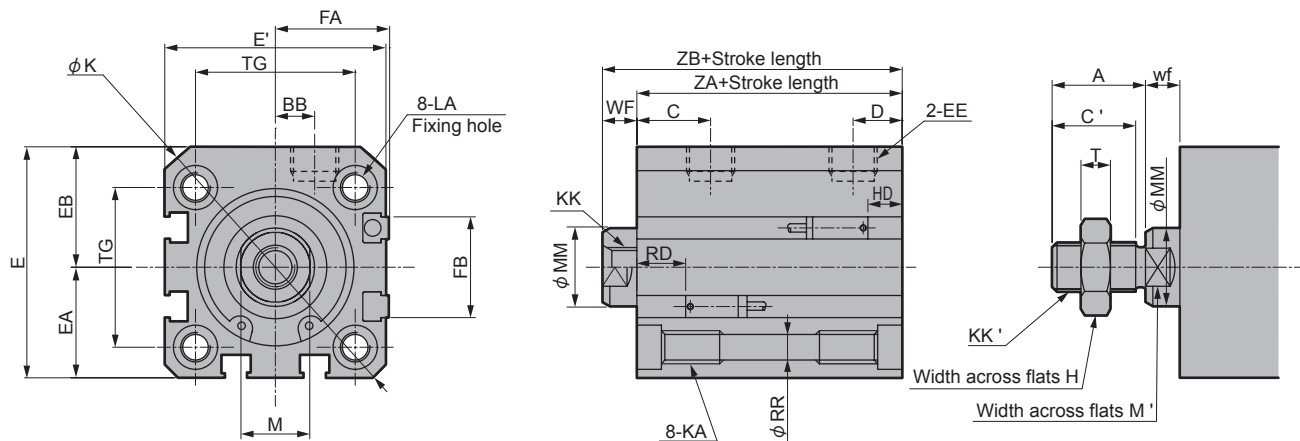
Symbol	With switch and common dimensions																
Bore size (mm)	ZB	ZA	C	D	EE	E	FA	FB	RR	LA	K	KA	KK	M	MM	TG	WF
$\phi 20$	43	37	10.5	7.5	M5	36	18.5	12.5	4.3	$\phi 7.5$ spot face depth 5	47	M5 depth 10	M6 depth 12	8	10	22	6
$\phi 25$	45	39	12	8.5	M5	40	20.5	13.5	4.3	$\phi 7.5$ spot face depth 5	51	M5 depth 10	M6 depth 12	10	12	26	6

Symbol	Reed T0H/T0V, T5H/T5V		Proximity T2H/T2V, T3H/T3V		Proximity T2WH/T2WV, T3WH/T3WV	
Bore size (mm)	HD	RD	HD	RD	HD	RD
$\phi 20$	9.9	8.2	9.9	8.2	11.9	10.2
$\phi 25$	10.4	9.6	10.4	9.6	12.4	11.6

Rod end male thread part

Symbol	A	C'	H	KK'	M'	MM	T	wf
$\phi 20$	16	13	13	M8	8	10	5	6
$\phi 25$	16	13	13	M8	10	12	5	6

● $\phi 32$ to $\phi 50$



Symbol	With switch and common dimensions																				
Bore size (mm)	ZB	ZA	C	D	EE	E	E'	EA	EB	BB	FA	FB	RR	LA	K	KA	KK	M	MM	TG	WF
$\phi 32$	51	44	15	10	G1/8	47	45	22.5	24.5	8	23	20.5	5.5	$\phi 9$ spot face depth 5	60	M6 depth 11	M8 depth 13	14	16	32.5	7
$\phi 40$	52	45	16	9	G1/8	55	52	26	29	10	26.5	27.5	5.5	$\phi 9$ spot face depth 5	69	M6 depth 11	M8 depth 13	14	16	38	7
$\phi 50$	53	45	18	10	G1/8	66	64	32	34	12	32.5	28.5	6.9	$\phi 10.5$ spot face depth 5	86	M8 depth 11	M10 depth 17	17	20	46.5	8

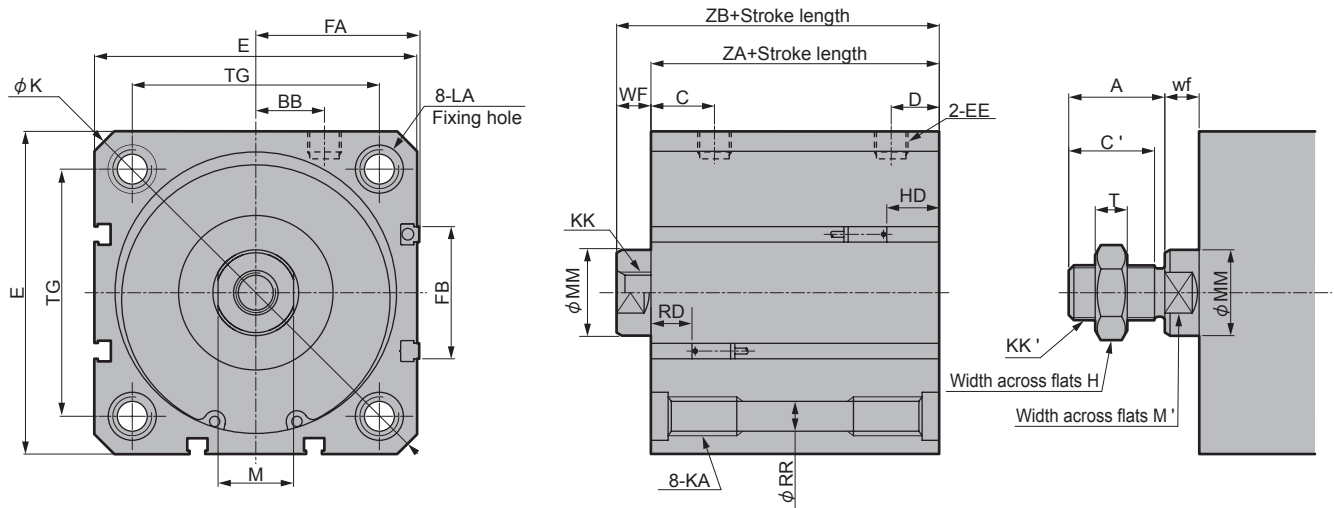
Symbol	Reed T0H/T0V, T5H/T5V		Proximity T2H/T2V, T3H/T3V		Proximity T2WH/T2WV, T3WH/T3WV	
Bore size (mm)	HD	RD	HD	RD	HD	RD
$\phi 32$	9	13.6	9	13.6	11	15.6
$\phi 40$	9	13.6	9	13.6	11	14
$\phi 50$	10	16.5	10	16.5	11.5	18

Rod end male thread part

Symbol	A	C'	H	KK'	M'	MM	T	wf
$\phi 32$	19	17	17	M10	14	16	6	7
$\phi 40$	19	17	17	M10	14	16	6	7
$\phi 50$	22	19	18	M12	17	20	6	8

Dimensions

- $\phi 63$ to $\phi 100$



Symbol	With switch and common dimensions																	
Bore size (mm)	ZB	ZA	C	D	EE	E	BB	FA	FB	RR	LA	K	KA	KK	M	MM	TG	WF
$\phi 63$	57	49	18	12	G1/8	77	17	39	28.5	6.9	$\phi 10.5$ spot face depth 5	103	M8 depth 11	M10 depth 17	17	20	56.5	8
$\phi 80$	64	54	18.5	14	G1/8	94	20	47.5	38.5	8.7	$\phi 14$ spot face depth 5	125	M10 depth 15	M12 depth 21	22	25	72	10
$\phi 100$	77	67	24	19	G1/8	112.8	22	56.9	45.7	8.7	$\phi 14$ spot face depth 5	150	M10 depth 15	M12 depth 21	27	30	89	10

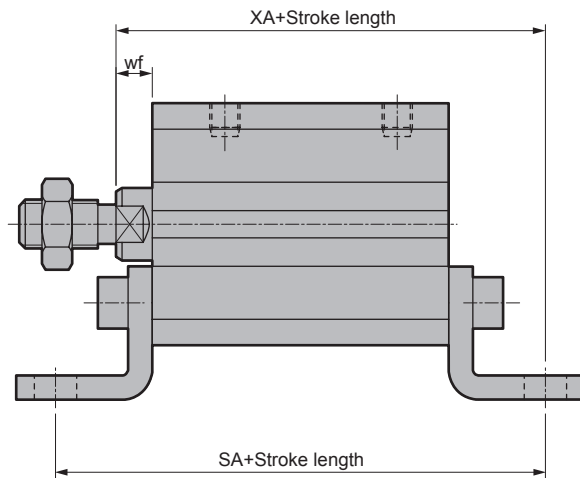
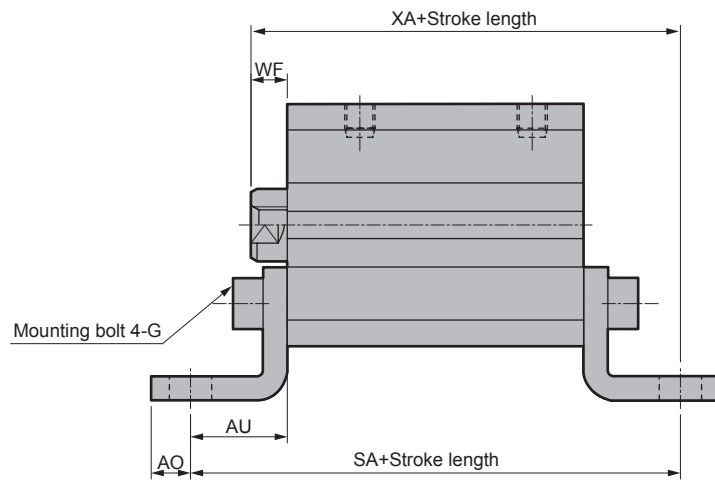
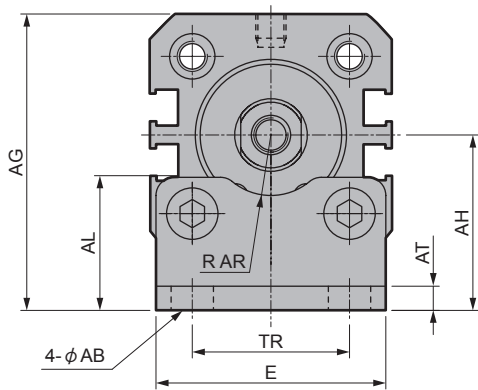
Symbol	Reed T0H/T0V, T5H/T5V				Proximity T2H/T2V, T3H/T3V				Proximity T2WH/T2WV, T3WH/T3WV			
Bore size (mm)	HD		RD		HD		RD		HD		RD	
$\phi 63$	17.5		14		17.5		14		19		15.5	
$\phi 80$	15.5		21		15.5		21		22.5		17	
$\phi 100$	26		20.5		26		20.5		27.5		22	

Rod end male thread part

Symbol	A	C'	H	KK'	M'	MM	T	wf
Bore size (mm)								
$\phi 63$	22	19	18	M12	17	20	6	8
$\phi 80$	28	25	24	M16	22	25	10	10
$\phi 100$	28	25	24	M16	27	30	10	10

Dimensions with accessories

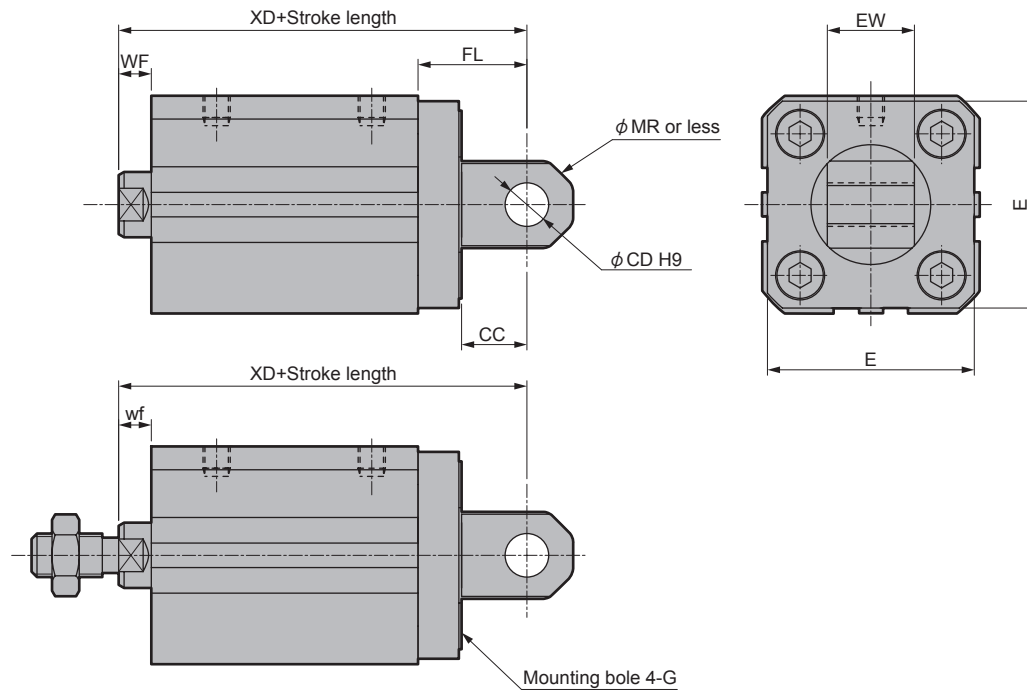
● Axial foot type (LB)



Mounting model No.	Bore size (mm)	AB	AL	AR	AG	TR	E	AT	AH	AO	AU	WF	wf	XA	SA	G
SCWS-LB-20	φ20	7	22	8	45	22	36	4	27	6.5	16	6	6	59	69	M5×16
SCWS-LB-25	φ25	7	22	10	49	26	38	4	29	6.5	16	6	6	61	71	M5×16
SCWS-LB-32	φ32	7	24.5	15	58	32	45	4	33.5	6	16	7	7	67	76	M6×16
SCWS-LB-40	φ40	10	26	17.5	67	36	50	4	38	8	18	7	7	70	81	M6×16
SCWS-LB-50	φ50	10	31	20	79	45	62	5	45	8	21	8	8	74	87	M8×20
SCWS-LB-63	φ63	10	31	22.5	88.5	50	75	5	50	8	21	8	8	78	91	M8×20
SCWS-LB-80	φ80	12	40.5	—	110	63	92	6	63	10	26	10	10	90	106	M10×20
SCWS-LB-100	φ100	14.5	47	—	130.4	75	112	6	74	12	27	10	10	104	121	M10×20

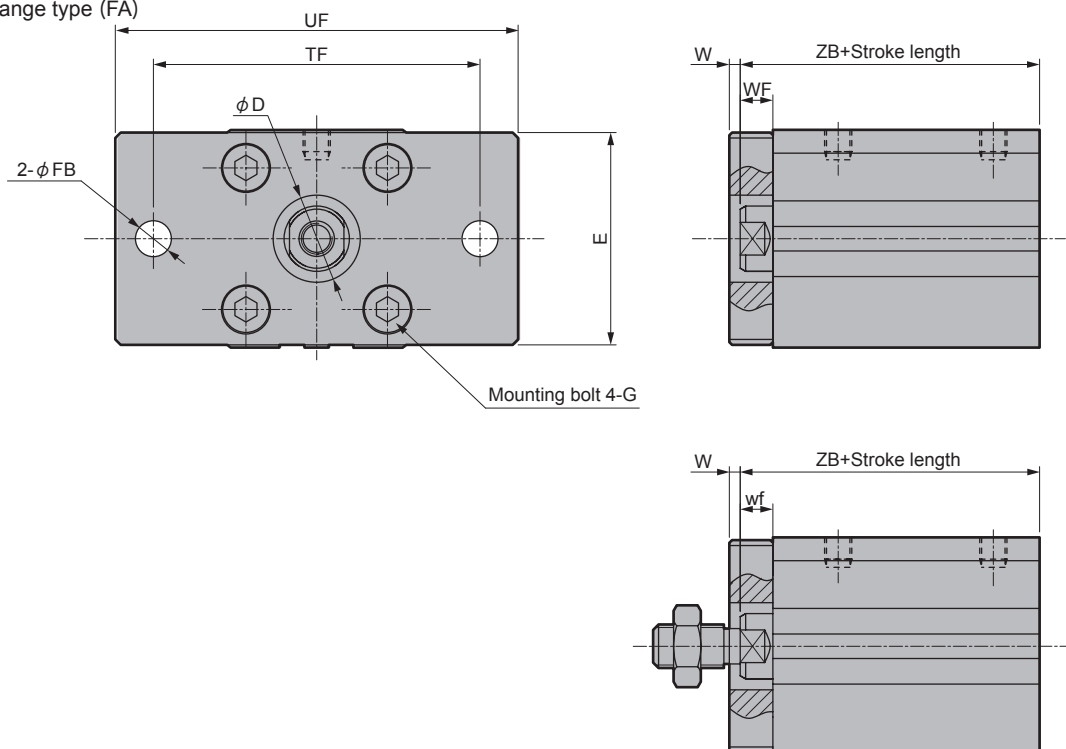
Dimensions with accessories

● Rod eye type (CA)



Mounting model No.	Bore size (mm)	E	CC	EW	FL	CD	MR	WF	wf	XD	G
SCWS-CA-20	φ 20	35	12	16	20	8	18	6	6	63	M5 × 16
SCWS-CA-25	φ 25	38	12	16	20	8	18	6	6	65	M5 × 16

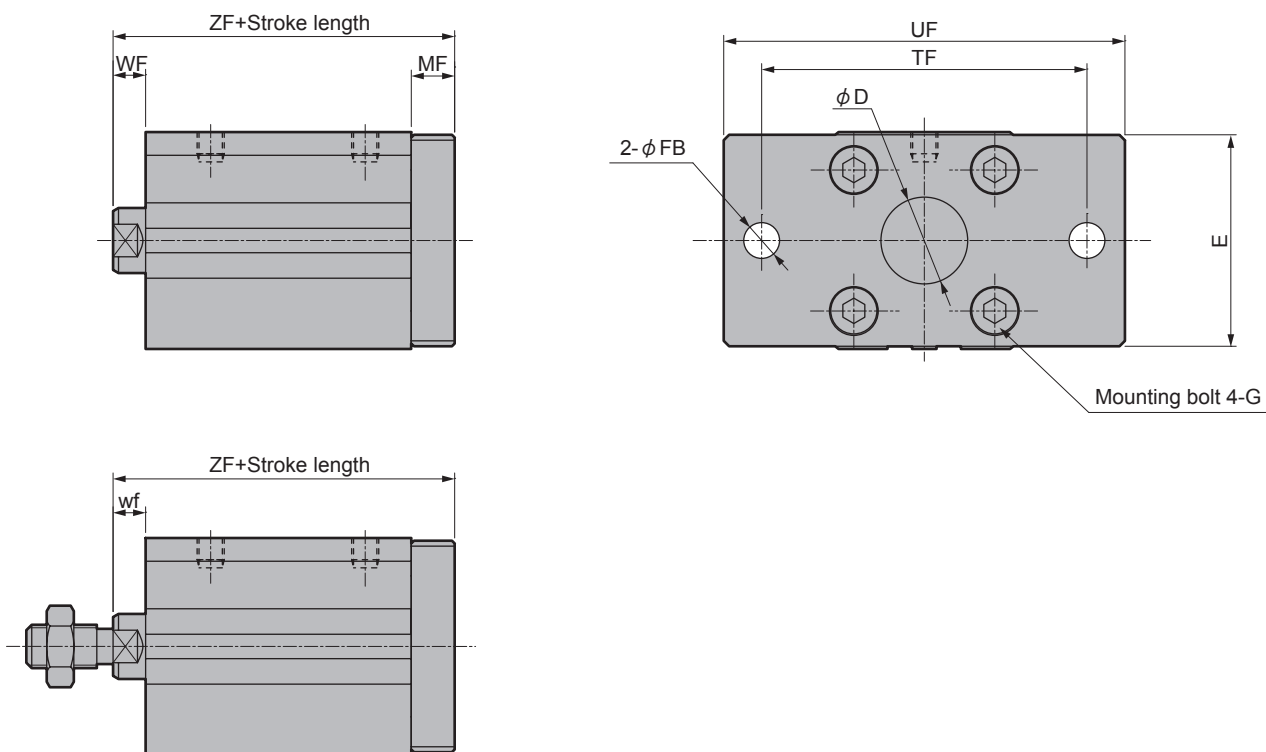
● Rod side flange type (FA)



Mounting model No.	Bore size (mm)	E	D	UF	TF	FB	W	WF	wf	ZB	G
SCWS-FA-20	φ 20	35	16	68	55	6.6	2	6	6	43	M5 × 16
SCWS-FA-25	φ 25	39	16	74	60	6.6	2	6	6	45	M5 × 16

Dimensions with accessories

- Head side flange type (FB)



Mounting model No.	Bore size (mm)	E	D	UF	TF	FB	MF	WF	wf	ZF	G
SCWS-FB-20	$\phi 20$	35	16	68	55	6.6	8	6	6	51	M5 × 16
SCWS-FB-25	$\phi 25$	39	16	74	60	6.6	8	6	6	53	M5 × 16



Safety Precautions

Be sure to read this section before use.


When designing and manufacturing equipment using CKD products, the manufacturer is obligated to ensure that the safety of the mechanism, pneumatic control circuit and/or water control circuit and the system that runs the electrical controls are secured. It is important to select, use, handle, and maintain CKD products appropriately to ensure their safe usage. Observe warnings and precautions, etc. to ensure device safety. Check that device safety is ensured, and manufacture a safe device.

WARNING

- 1 This product is designed and manufactured as a general industrial machine part. Therefore, it must be handled by an operator with sufficient knowledge and experience.**
 - 2 Use the product within the specifications range.**
Use the product within the specifications range.
This product must be used within its stated specifications. In addition, never modify or additionally machine this product. This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors or for use under the following conditions or environments.
(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to the CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)
 - Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
 - Use for applications where life or assets could be significantly affected, and special safety measures are required. Check that device safety is ensured, and manufacture a safe device.
 - 3 Observe industrial standards and legal regulations, etc., pertaining to the safety of equipment design and management.**
ISO4414, JIS B 8370 (General Rules for Pneumatic Systems)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, body standards and regulations, etc.
 - 4 Do not operate, pipe, or remove devices before confirming safety.**
 - Inspect and service the machine and devices after confirming the safety of all systems related to this product.
 - Note that there may be hot or charged sections even after operation is stopped.
 - When inspecting or servicing the device, turn OFF the energy source (gas supply or water supply), turn OFF power to the facility, and discharge any compressed air and fluid from the system to avoid gas leakage and leakage of electricity.
 - When starting or restarting a machine or device that incorporates pneumatic components, make sure to secure system safety, such as pop-out prevention measures.
 - 5 Observe the following warnings and cautions to prevent accidents.**
- Precautions are ranked as "DANGER", "WARNING", and "CAUTION" in this section.

 **Danger:**
(DANGER)

In the case where mishandled product operation may lead to fatalities or serious injuries, and the urgency of a dangerous situation is high.

 **Warning:**
(WARNING)

A dangerous situation may occur if handling is mistaken, leading to fatal or serious injuries.

 **Caution:**
(CAUTION)

A dangerous situation may occur if handling is mistaken, leading to minor injuries or property damage.

Note that some items indicated with "CAUTION" may lead to serious results depending on the conditions. All items contain important information and must be observed.

Disclaimer regarding shipping

- 1 Warranty period**
This warranty is valid for one (1) year after delivery to the customer's designated site.
- 2 Scope of warranty**
In case any defect clearly attributable to CKD is found during the warranty period, CKD shall, at its own discretion, repair the defect or replace the relevant product in whole or in part and at no cost, according to its own judgment.
Note that the following failures are excluded from the warranty scope:
 - ① When used outside of conditions/environment described in product specifications.
 - ② Failures resulting from factors other than the delivered product.
 - ③ When used not for the intended purposes.
 - ④ Failures resulting from modification or repair not related to CKD.
 - ⑤ Failures caused by matters that could not be predicted with the technologies in practice when the product was delivered.
 - ⑥ Failures resulting from natural disasters for which CKD is not liable.
 As well, the warranty described herein is limited to the delivered product itself, and does not cover damages incurred due to abnormality of the delivered product.
- 3 Compatibility check**
The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines, and equipment.



Pneumatic Components Safety Precautions

Be sure to read this section before use.

Product-specific cautions: ISO21278 standard cylinder SCWS series

Design/selection

1. Specification Confirmation

⚠ WARNING

■ Use the product within the specifications range.

The products described in this catalog are designed to be used solely in compressed air systems. Do not use the products beyond the specified range of working pressure or ambient temperature, or it can lead to damage or abnormal operation. (Refer to Specifications).

When using working fluids other than compressed air and low-pressure oil, please consult with CKD.

2. Safety Design

⚠ WARNING

■ If the cylinder working force changes due to torsion of machine's sliding part, there is a risk that the piston rod may pop out.

This may cause personal injuries such as hands or feet pinching or damages to machinery. Therefore, the machine shall be designed to be adjustable to ensure its smooth operation and avoid human body injuries.

■ If there is a risk of endangering your personal safety, please mount the protection guard.

If the cylinder actuator may endanger your personal safety, please mount the protection guard. Please adopt a structure that prevents access to cylinder actuation area or direct contact with human body.

■ Please take into account the voltage sag condition due to power failure.

When the cylinder is used as a clamping unit, the clamping force will be reduced if there is a voltage sag caused by power failure or other reasons, thus making the work piece come loose and drop. Please install a safety device that will not cause personal injuries or damages to the unit. The hoisting device and lifter should have anti-drop design as well.

■ Please take into account the possibility of power source failures.

Please optimize the design of devices that utilize pneumatic, hydraulic and electric power control, so that physical injuries or machinery damages will be avoided in case of power source failure.

■ Please use an anti-pop out design for the circuit.

When the cylinder is actuated through a directional control valve with central venting or start-up operation is performed after circuit residue pressure is relieved, the actuated object will pop out at high speed if the single side of piston is pressurized in case of cylinder air evacuation. This may cause personal injuries such as hands or feet pinching or damages to machinery. Therefore, design a circuit with anti-popout feature.

■ Please take into account the operation status during emergency stop.

Please adopt a reasonable design, so that the safety device can be actuated to stop the machine in case of system abnormalities (such as emergency stop and power failure) and personal injuries or system and equipment damages due to cylinder operations can be avoided.

■ Please take into account the operation status when the cylinder is restarted after emergency stop or abnormal stop.

Please adopt a reasonable design to prevent personal injuries or equipment damages due to restart operation. If the cylinder needs to be restored to start position, please design a control device that ensures safety.

■ Please take necessary precautions to avoid negative impacts on humans and properties caused by product failures.

⚠ CAUTION

■ Please operate the product within the specified working range, so that the piston will not be damaged due to collision when reaching the stroke end.

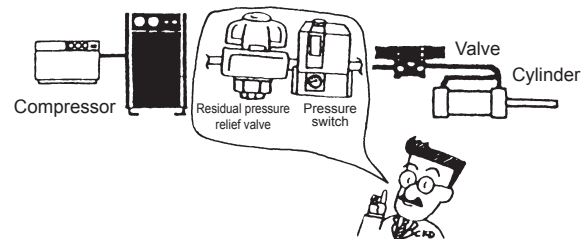
If the piston collides with the cylinder lid at the stroke end and stops due to the inertia effect, please operate the product within the allowable absorbed energy.

■ Please mount a speed regulation valve on the cylinder.

Please operate within the working piston speed of each cylinder.

■ Please mount a "pressure switch" and "residual pressure relief valve" on the compressed air supply side of the unit.

- The pressure switch should be set so that the product will not operate until the set pressure is reached. The residual pressure relief valve will evacuate residual compressed air from the pneumatic circuit, thus preventing accidents caused by pneumatic element movement due to residual pressure.



3. Design by Purpose

⚠ WARNING

■ When a deceleration circuit or buffer device is required

If the actuated object moves at a high speed or is relatively heavy, the cylinder cannot absorb shocks effectively alone. Therefore, please design a circuit that decelerate the actuated object timely, or use an external buffer device to reduce shocks. In this case, please fully consider the rigidity of mechanical units.

■ When inertia force or vibration is generated

If the cylinder is mounted on a moving component (such as X-axis module and pallet), the moving component will generate inertia force or vibration when stopped. Please consider these factors during design.

■ About middle-position stop

When using a 3-position directional control valve (center closed type) to perform middle-position stop of cylinder piston, precise stop under low oil pressure cannot be achieved due to air compressibility reasons. In addition, since the valve or cylinder cannot ensure complete air tightness, the piston may not be kept in the stop position for a long time. If you require that the piston be kept in the stop position for a long time, please consult with CKD.

4. Usage Environment

⚠ WARNING

■ **Never mount the product in locations where it may be exposed to rain, water splash, direct sunlight and high humidity.**

■ **Never use the product in environments where it is prone to corrosion.**

Otherwise it may result in product damages or abnormal operations. In addition, even if some cylinder components (such as piston rod and pull rod) would undergo electroplating process, their manufactured parts (thread face along its width, cutting face) are not electroplated. Therefore, the cylinder may rust under normal conditions. Please take preventive measures when necessary.

■ **If the product is to be mounted in locations where it may be exposed to heavy dust and splashes of water or oil, cutting fluid and coolant, please use devices such as protection guard.**

In dusty locations, please use products equipped with powerful scraper. Under liquid splashing environments, please use products that provide excellent resistance against cutting fluid.

■ **When the ambient temperature drops below 5°C, the remaining moisture within the circuit may freeze, thus resulting in abnormal operations or other failures. Therefore, please remove residual moisture to prevent the circuit from freezing.**

5. Durability

⚠ WARNING

■ The durability may vary depending on the working conditions and product variation characteristics.

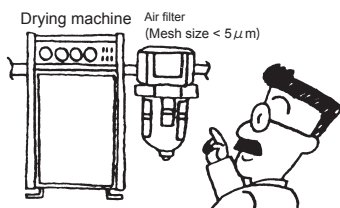
6. Air Supply

⚠ WARNING

■ **Please use clean and dry air to create compressed air.**
The compressed air must be free of synthetic oil (including chemicals and organic solvents), salt and corrosive gas, or it may lead to product damages or abnormal operations.

⚠ CAUTION

■ **Please use dry compressed air that will not cause condensation within the piping.**



- Temperature drop within air compressor piping and pneumatic elements may create condensate.
- If the piping volume is larger than the cylinder volume (converted under atmospheric pressure), the compressed air within the cylinder will not be completely evacuated each time the solenoid performs switchover, and dew will be formed and accumulated within the cylinder, thus generating condensate.
- The condensate may come into the air flow path within the pneumatic elements and lead to instantaneous congestion, thus causing abnormal operations.
- The condensate may cause rusts and eventually lead to pneumatic element failures.
- The condensate may be blended with the lubricant and eventually lead to poor lubrication.

■ **Ultra-dry air supply is not intended for standard pneumatic elements. Please only use pneumatic elements designed for such air supply.**

- Ultra-dry compressed air will shorten the service life of pneumatic elements.
- Please use DC type solenoid valves.

■ **Please use compressed air that is free of oxidized air compressor oil, tar and carbon black.**

- Oxidized oil, tar or carbon may come into and get affixed on the interiors of pneumatic elements, add resistance to the sliding part and lead to abnormal operation.
- Oxidized oil, tar or carbon may be blended with the lubricant and cause the sliding part of pneumatic elements to wear down.

■ **Please use compressed air that is free of solid foreign matters.**

- If the solid foreign matters come into pneumatic elements, they may wear down the sliding part and get affixed on it. Please mount air filters with mesh size of 5 μm or smaller.
- Please perform regular maintenance checks to air compressors.

7. How to Use

⚠ CAUTION

■ **The product has been initially lubricated and operates well under a self-lubricating condition. Use turbine oil ISO VG32 (without additives) if necessary for lubrication. If the lubrication operation is interrupted, lack of initial lubricant volume will cause abnormal operation. Be sure to lubricate the product continuously.**

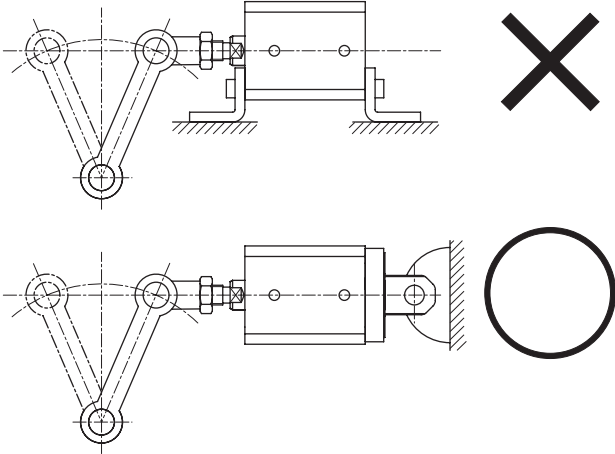
You need to decide whether to adopt self-lubricating method or perform manual lubrication for the pneumatic device, and implement strict management on the selected lubricating method.

■ **Avoid simultaneous operation of multiple cylinders if possible.**

Otherwise, the piston rod may be twisted when the simultaneous operation fails, thus leading to abnormal operations. If simultaneous operation of multiple cylinders is required, please mount an additional guiding device with high rigidity.

■ **Before mounting the rod eye, please check that the cylinder can freely rotate without any intervention across the whole stroke length.**

- Please use a swing cylinder (with rod eye) that can rotate by some degree when the load's movement direction changes with the cylinder operation. Also, mount the cylinder so that the rod-end connecting piece is in parallel with the movement direction of cylinder body.
- Do not use a fixed type cylinder with a mechanical arm that makes circular motion. In this case, please use a swing cylinder.



- To prevent piston rod-end thread damage, shaft sleeve wear and burning, etc., please use a universal joint or simple universal joint to connect piston rod end and load. This will also prevent torsion at any position across the stroke length.
- If the clearance between the rod eye and corresponding bearing is too large, a bending force will be exerted on pins or shafts. Therefore, excessive clearance must be avoided. (Recommended fit: H10/e8)
- A tiny amount of oil may leak from the sliding part, sealing elements and gaskets of the cylinder. In locations that should be oil-free, please use the cylinder with caution.

8. Ensure Space

⚠ CAUTION

- Please ensure that there is sufficient space around the cylinder for mounting, disassembly, wiring and piping work.

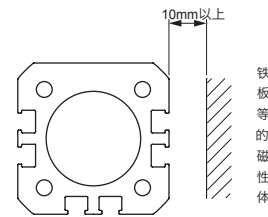
9. Precautions in the User Manual

⚠ CAUTION

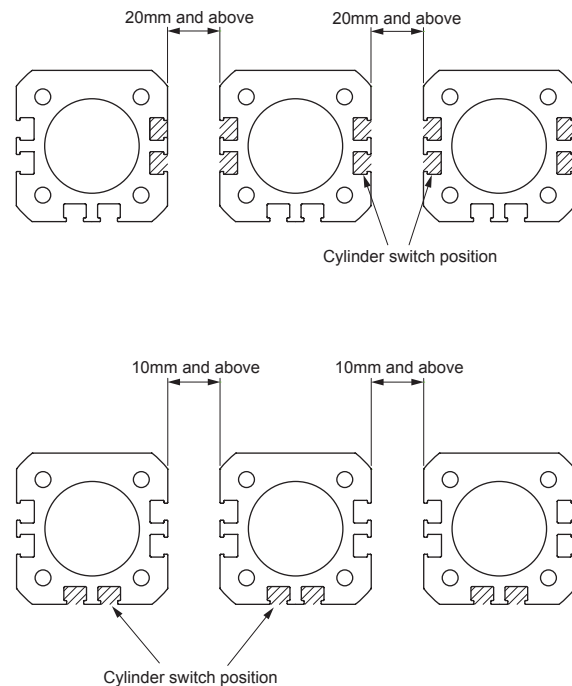
- Please specify maintenance conditions of the unit in the User Manual.
 - Under certain usage conditions or operating environments and by using certain maintenance approaches, noteworthy degradation of product functionality may occur and product safety cannot be ensured. Proper maintenance will maximize the product functionality.

⚠ CAUTION

- The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. Please maintain a distance of at least 10mm from the cylinder surface. (Same for all bore sizes)



- The cylinder switch may malfunction if installed adjacently to another cylinder. Please maintain a safe distance shown as follows from the cylinder surface. (Same for all bore sizes)



1. Mounting

⚠ WARNING

- When mounting the cylinder, please take protective measures to prevent the load from dropping or tipping over.

⚠ CAUTION

- Prior to piping work, do not remove the packing bag from the cylinder or the dust-proof seal from the pipe end.
 - Otherwise, foreign matters may come into the cylinder through the pipe end and lead to failures or malfunctions.
- If the cylinder mass exceeds 15kg, please use a lifting sling.
- Do not place any object on the cylinder body and sliding part of the piston rod, and collision with other objects should be avoided to prevent damages and dents.

The bore size tolerance is rather tight. Therefore, even slight deformation could cause abnormal operations.

In addition, damages or dents on the sliding part of the piston rod may cause damages to sealing elements, thus leading to air leakage.

- If the load movement direction is not in parallel with the piston rod axis, the piston rod and cylinder body may be twisted, causing the piston rod to pop out. This may even cause burns and damages to the piston rod. Make sure that the piston rod axis is in parallel with the load movement direction.

- Please take measures to prevent burns to the rotating parts.

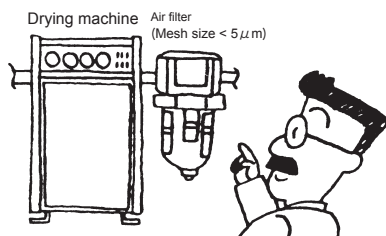
Grease the rotating parts (such as pins) to prevent burns.

2. Air Supply

⚠ CAUTION

- Prior to the use of pneumatic element circuit, please mount the air filter.

- Please mount the air drying machine and filter to remove moisture from the piping. In addition, mount the filter near the directional control valve (on the primary side) to remove rusts, foreign matters and condensate.



- When supplying the compressed air after piping connection, do not apply high supply pressure abruptly.

- If the piping joint comes loose or the piping flies off, it will lead to accidents.

- If the compressed air is supplied too slowly, sealing pressure may probably not be generated due to effect of internal sealing mechanism of solenoid valve, thus leading to air leakage.
- The cylinder may operate drastically.

3. Piping

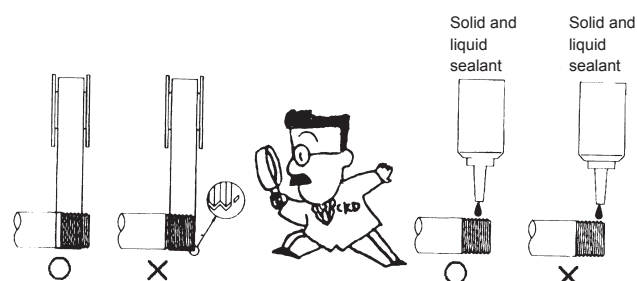
⚠ CAUTION

- Please refer to the User Manual during piping work and never connect the wrong port.

- Otherwise, it may lead to malfunctions.

- How to wind the sealing tape during piping connection: wind the sealing tape clockwise, starting from an inside position more than 2 threads away from the front end of piping threaded portion.

- If the sealing tape extends beyond the front end of piping threaded portion, screw-in operation will cause the sealing tape to break off and tape residues will be left inside to cause failures.



- Try to prevent the piping connected to the cylinder from falling off due to vibration, loosening and tensile load.

- If the piping on the exhaust side of the pneumatic circuit falls off, the cylinder speed will be out of control.
- In case of using jaw clamping mechanism, the jaw may be opened and this will lead to dangers.

- When using nylon or polyurethane pipes, please pay attention to the following items.

- In areas where spatters are present, please use fire-retardant or metal pipes.

- Please use galvanized pipes, stainless steel pipes, nylon pipes, rubber pipes or other pipes made of anti-corrosion piping materials.

■ **During piping connection, tighten the pipes with the proper tightening torque.**

- This can prevent air leakage and damages to threads.
- To prevent damages to threads, firstly screw in the pipe manually, and then tighten the pipe with a tool.

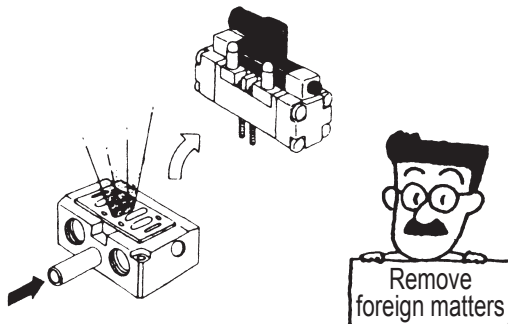


For reference values, please refer to the User Manual.

Piping thread	Tightening torque(N·m)
M3	0.3 to 0.6
M5	1 to 1.5
Rc 1/8	3 to 5
Rc 1/4	6 to 8
Rc 3/8	13 to 15
Rc 1/2	16 to 18
Rc 3/4	19 to 40
Rc 1	41 to 70

■ **During piping work, be sure to perform air purge to the pipes before connecting to the pneumatic elements.**

- During piping work, be sure to keep foreign matters inside the pipes from coming into the pneumatic elements.



4. Pre-operation Checks

⚠ WARNING

- **Prior to operation, please check whether the attached and tightened parts of load and cylinder come loose or show signs of abnormality.**
- **Make sure that all elements operate normally before using the product.**
After mounting, repair or retrofit work, connect the product to compressed air and power supply, check for proper functioning and possible leaks and confirm whether the product is mounted correctly.
- **Check for interferences on the machine and possible abnormalities of the operating system.**
- **Confirm whether the pressure regulation element operates abnormally, increase the pressure gradually and then make settings.**
- **If the cylinder is actuated with the exhaust side under atmospheric pressure, there is a risk that the piston rod would pop out. Be sure to actuate the cylinder when the cylinder chamber on the exhaust side is pressurized.**

⚠ CAUTION

■ **When supplying the compressed air after piping connection, be sure to check that all piping joints show no sign of air leakage.**

- Please use a brush to apply some leak detection fluid on piping joints and check for air leakage.

■ **Be sure to read the User Manual.**

Please read and understand all sections carefully before using the product. Keep the manual properly for future reference.

5. Adjustments

⚠ WARNING

■ **When using a speed regulation valve to adjust the speed, open the needle valve gradually from its closed state to make adjustments. If the adjustment is made directly when the valve is open, there is risk that the piston rod would pop out.**

■ **Cushion level of cylinders with air cushion has been factory-adjusted. Please use the cushion needle valve to make readjustment depending on the load and piston speed.**

Open the needle valve gradually from its closed state to adjust cushion level. If the needle valve gets too loose, the cushion effect will no longer exist and the needle valve may fall off.

After the adjustment, tighten the nut (Hexagon nut) on the needle valve.

Please use the valve within the allowable kinetic energy range.

Otherwise it may result in product damages.

■ **When actuating the cylinder, never reach into or put your hands in its actuation range.**

Use and maintenance

1. Maintenance checks

⚠ WARNING

- Please carefully perform maintenance checks referring to the User Manual.

Malfunctions will cause damages to elements and units or abnormal operations.

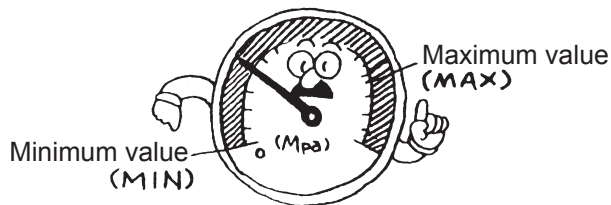
⚠ CAUTION

- Manage your maintenance work properly and perform scheduled checks on a routine and regular basis.

- Improper maintenance management will lead to severe degradation of product functionality, shortened service life, product damages, malfunctions and other failures or accidents.

① Management of compressed air supply pressure

- Does compressed air supply reach the set pressure?
During unit operation, does the pressure gauge show the set pressure?



② Management of air filters

- Can we drain the condensate normally?
Is the soiling level of filter bowl and screen acceptable?

③ Compressed air leakage management on piping joints

- Do the joints of moving parts, in particular, function normally?

④ Operation status management of solenoid valve

- Does the solenoid valve operate sluggishly? Is the exhaust condition acceptable?

⑤ Operation status management on pneumatic actuation element

- Does the element operate smoothly?
Does the element stop normally at end of travel?
Does the part connected with load function normally?

⑥ Lubricator management

- Is the lubricant dose adjusted properly?

⑦ Lubricant management

- Does the refilled lubricant meet the specifications?

- If increased air leakage or abnormal element operation is detected, stop using the product.

- After repair or retrofit work, connect the product to compressed air and power supply, check for proper functioning and possible leaks and confirm whether the product operates normally.

- If the product has been left unused for a long time, check whether it operates normally after being restarted.

- During regular check, replace all wear parts that have an expired service life with new ones.

Never use any wear part that has been stored for over 5 years.

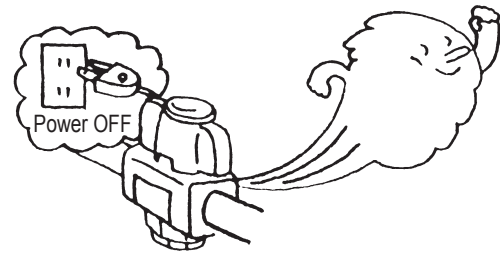
- Store wear parts in a cool and dry place, and not exposed to direct sunlight.

2. Removal

⚠ WARNING

- Removal of elements and compressed air supply and evacuation

Check that measures have been taken to prevent the actuated object from dropping or getting out of control. Then, disconnect air supply and power supply, evacuate compressed air from the system and remove the elements. When restarting the product, check whether the anti-pop out measures are in place and operate with caution.



- Before removing the cylinder, please take protective measures to prevent the load from dropping or tipping over.

3. Disassembly and assembly

⚠ WARNING

- Disassemble the cylinder only after it is removed from the unit.

- Disassembly and assembly work can only be performed by qualified operators.

After disassembling and reassembling the cylinder, perform leakage and operation tests. After everything turns out to be normal, mount the cylinder on the unit.

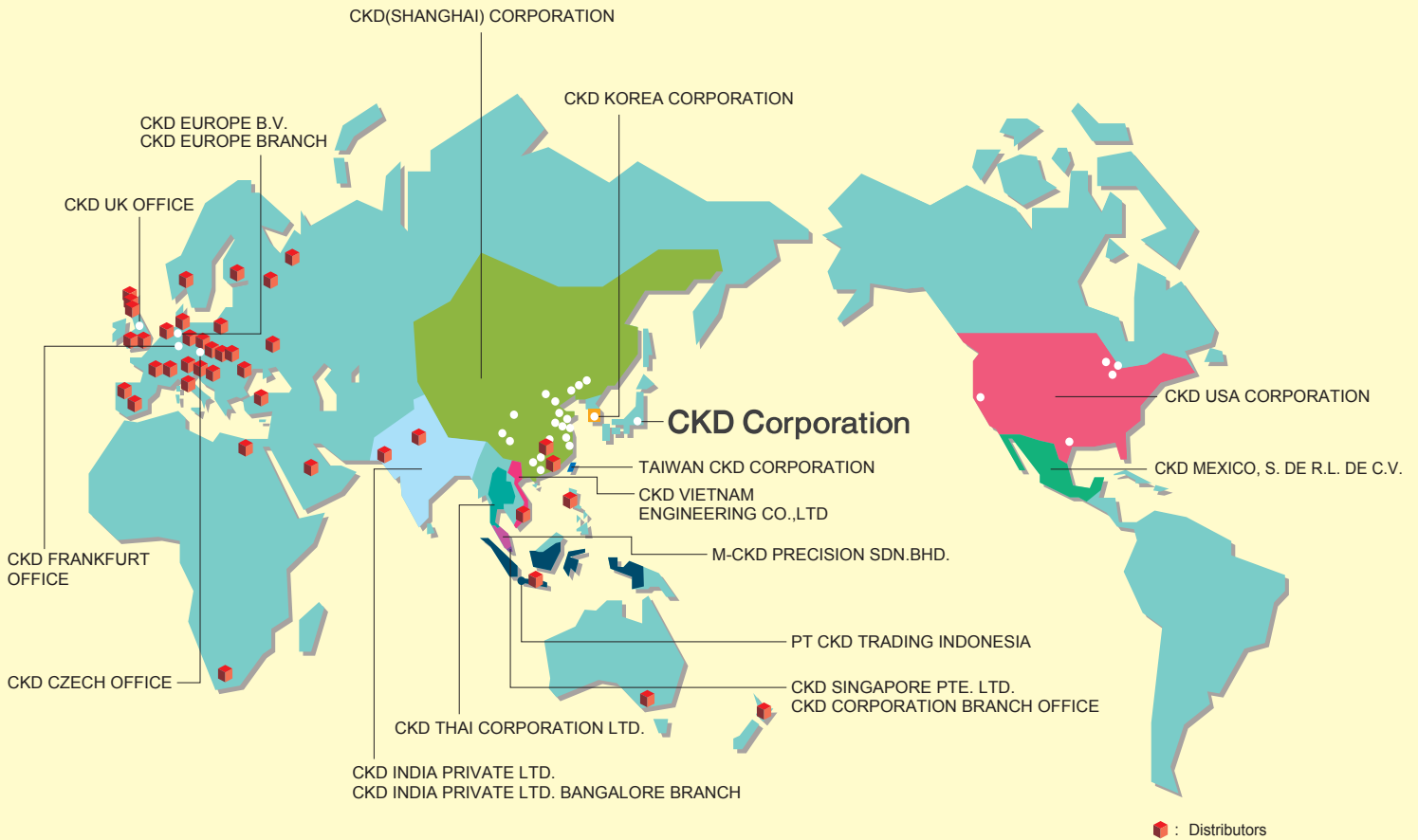
- For mounting and removal of front end cover, please use an appropriate pair of pliers (tool for mounting C type snap ring).

- When the appropriate pair of pliers (tool for mounting C type snap ring) is used, the snap ring may also fall off or pop out from the tip of pliers, resulting in personal injuries and damages to surrounding elements. Please use it with caution.

In addition, before supplying the air, check that the retaining ring has been firmly inserted into the slot.

⚠ CAUTION

- When performing maintenance work (such as wear part replacement), please assemble and disassemble the product on a test table in a dust-free and clean environment, and check element functionality to confirm whether it operates normally.



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