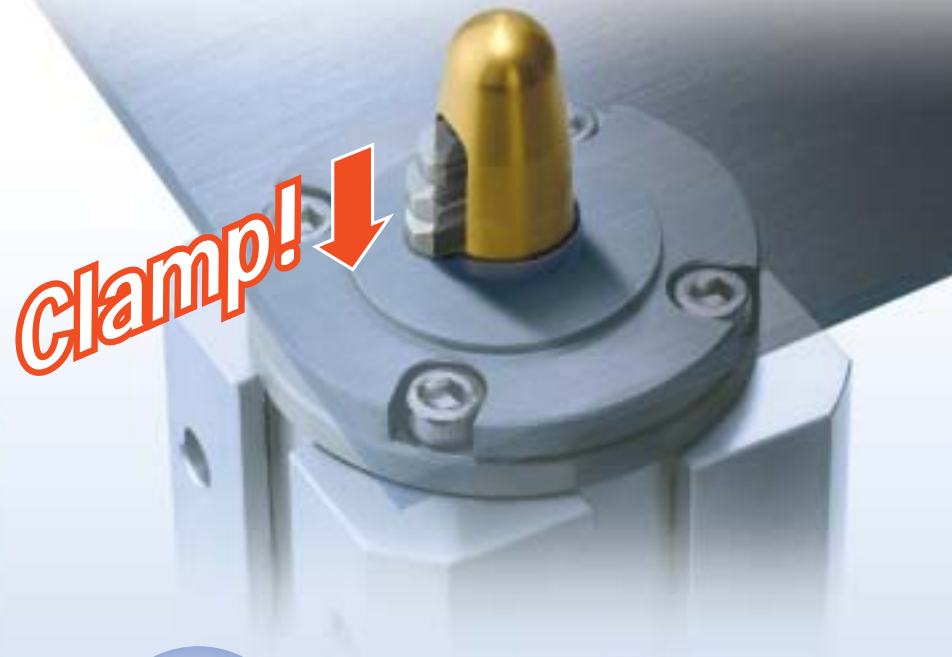
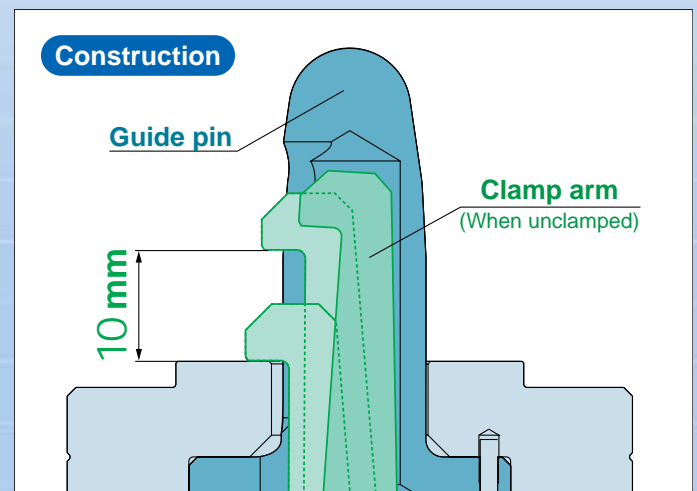


Pin Clamp Cylinder



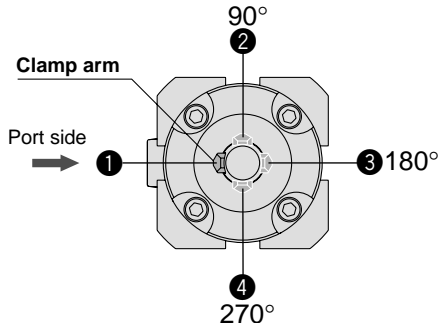
**Positioning and
clamping at one time!**



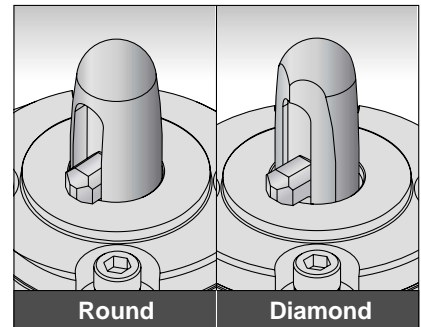
Series CKQ/CLKQ

Multiple combinations are possible.

Clamp arm position can be selected from 4 different positions, depending on the installation condition.

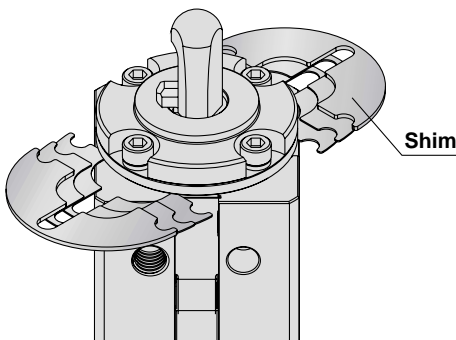


2 types of guide pins are available.



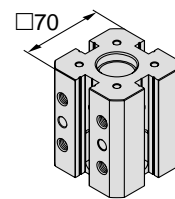
Clamp position height can be adjusted by selecting an appropriate **shim**.

Adjustable from 0.5 to 2 mm

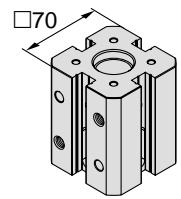


One 1 mm and two 0.5 mm shims are attached.
(single side: 3 shims/both sides: 6 shims)

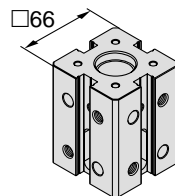
4 body shape options are available which offer extensive installation flexibility.



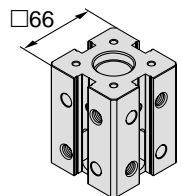
Mounting tap: M10
Pin hole: $\varnothing 8H7$



Mounting tap: M10
Pin hole: $\varnothing 8H7$

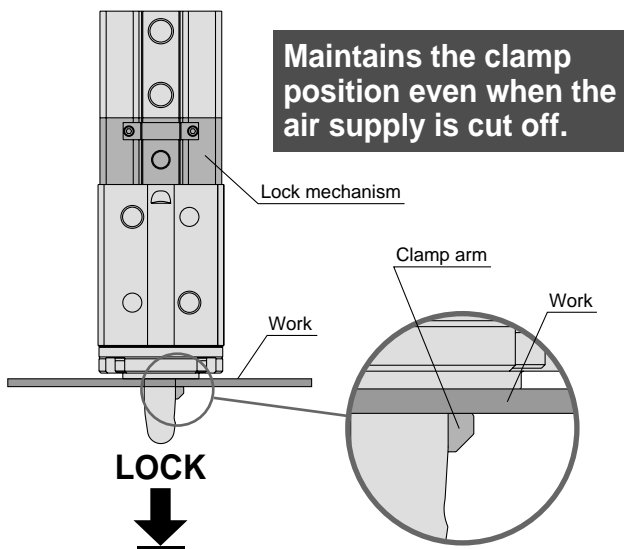


Mounting tap: M10
Pin hole: $\varnothing 10H7$



Mounting tap: M12
Pin hole: $\varnothing 10H7$

Possible to select the lock mechanism



Pin Clamp Cylinder Series CKQ/CLKQ $\varnothing 50$

Pin Clamp Cylinder

Series CKQ/CLKQ

ø50

How to Order

Without lock CKQ SF 50 177 R B P5DWL S

With lock CLKQ SF 50 177 R B P5DWL S

With a lock at the clamp side

Body shapes and mounting positions (Note)

① Body shape		② Mounting side position (From top)	
Symbol	Dimension (mm)	Body shapes and mounting	Mounting positions
C	□70	Mounting tap: M10 Pin diameter: ø8H7 ○: Mounting tap ●: Pin diameter Mounting hole: 6 points Mounting side: 2 sides	A Parallel side to port Port → Mounting side
		B Port Front side to port Mounting side → Mounting side	
T	□70	Mounting tap: M10 Pin diameter: ø8H7 ○: Mounting tap ●: Pin diameter Mounting hole: 4 points Mounting side: 2 sides	A Parallel side to port Port → Mounting side
		B Port Front side to port Mounting side → Mounting side	
S	□66	Mounting tap: M10 Pin diameter: ø10H7 ○: Mounting tap ●: Pin diameter Mounting hole: 4 points Mounting side: 2 sides	C a side → b side Port → b side
		D b side → a side Port → a side	
		E b side → b side Port → b side	
		F a side → a side Port → a side	
		G a side → b side Port → b side	
		H b side → a side Port → a side	
E	□66	Mounting tap: M12 Pin diameter: ø10H7 ○: Mounting tap ●: Pin diameter Mounting hole: 4 points Mounting side: 2 sides	C a side → b side Port → b side
		D b side → a side Port → a side	
		E b side → b side Port → b side	
		F a side → a side Port → a side	
		G a side → b side Port → b side	
		H b side → a side Port → a side	

Port thread type

Nil	Rc
TN	NPT
TF	G

Guide pin shapes

R	Round
D	Diamond*

* The diamond shape is for pin diameter of 17.5 or over.

Auto switch type

Nil	Without auto switch (Cylinder built-in magnet)
S	1 (Unclamp side)

* Select an applicable auto switch model from the table below.
* Auto switch is not mounted and are supplied loose.

Number of auto switches

Nil	2
S	1 (Unclamp side)

* D-P5DW□□ type are mounted on different sides. (Refer to page 15.)

Shim

Nil	No shim
S	With 2 mm shims

* When a model includes shims, one 1mm shim and two 0.5 mm shims are attached.

Guide pin diameter

Symbol	Guide pin diameter	Hole diameter of the work	Pin shape
125	12.5	For ø13	Round (R)
127	12.7		
145	14.5	For ø15	
147	14.7		
155	15.5	For ø16	Round (R) Diamond (D)
157	15.7		
175	17.5	For ø18	
177	17.7		
195	19.5	For ø20	
197	19.7	For ø25	
245	24.5		
247	24.7		

* Contact SMC for diamond shaped models with a guide pin of ø12.5 to ø15.7
* Contact SMC for models with guide pins that are different from those shown above.

Clamp arm position (clockwise from top)

A	Same direction as port Port → Clamp arm → Guide pin	C	180° from port Port → Guide pin → Clamp arm
B	90° from port Port → Clamp arm → Guide pin	D	270° from port Port → Guide pin → Clamp arm

Note To compose a model number, combine the body shape symbol and the mounting side position symbol. (Example) CKQSF50-177RB-P5DWLS

Applicable Auto Switch / Refer to Best Pneumatics for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage	Model	Lead wire length (m)		Prewired connector	Applicable load
					DC	Rail mounting	3 (L)	5 (Z)		
Solid state switch	Magnetic field resistant (2-colour display)	Grommet (In-line)	Yes	2-wire	24 V	P5DW	●	●	○	Relay, PLC
						P5DWSC	—	—	— (Note)	

(Note) Prewired connector for P5DWSC is standard.

* Lead wire length symbol 3 m L (Example) P5DWL (P5DW only) 5 m Z (Example) P5DWZ

* For details about auto switches with pre-wire connector, refer to pages of Best Pneumatics.

* Auto switch for CDQ2□50 except above auto switches can be mounted.

* Besides the models in the above table, there are some other auto switches that are applicable. For more information, refer to page 15.

* Solid state switches marked with "○" are produced upon receipt of order.



Series CKQ/CLKQ



Basic Specifications

Action	Double acting	
Bore size mm	50	
Fluid	Air	
Proof pressure	1.5 MPa	
Maximum operating pressure	1.0 MPa	
Minimum operating pressure	CKQ: 0.1 MPa	CLKQ (With lock): 0.15 MPa*
Ambient and fluid temperature	-10 to 60°C (No freezing)	
Cushion	None	
Lubrication	Non-lube	
Piston speed (Clamp speed)	50 to 300 mm/sec	
Port size	1/4 (Rc, NPT, G)	

* Minimum operating pressure when cylinder part and locking part use same piping is 0.2 MPa.

Lock Specifications

Locking action	Spring locking (Exhaust locking)
Unlocking pressure	0.2 MPa or more
Lock starting pressure	0.05 MPa or less
Locking direction	Lock at extended direction (unclamp direction)
Maximum operating pressure	1.0 MPa
Unlocking port size	1/8 (Rc, NPT, G)
Holding force (N) (Maximum static load)	982

Clamp Specifications

Clamp stroke	Without shim	With shim
	10 ⁰ _{-0.5} mm	10 mm to 12 mm
Clamp arm	1 pc.	
Guide pin shape	Round, Diamond	

Refer to "Selection" in page 22 regarding detailed specifications of the clamping force, etc.

Weight

CKQ (without lock) type

Unit: kg

Model Guide pin diameter (mm)	CKQC	CKQE	CKQS	CKQT
ø12.5	1.88	1.78	1.79	1.89
ø12.7	1.88	1.78	1.79	1.89
ø14.5	1.89	1.78	1.79	1.90
ø14.7	1.89	1.78	1.79	1.90
ø15.5	1.89	1.78	1.79	1.90
ø15.7	1.89	1.78	1.80	1.90
ø17.5	1.90	1.79	1.80	1.91
ø17.7	1.90	1.78	1.81	1.91
ø19.5	1.91	1.80	1.81	1.92
ø19.7	1.91	1.80	1.81	1.92
ø24.5	1.92	1.82	1.83	1.94
ø24.7	1.92	1.82	1.83	1.94

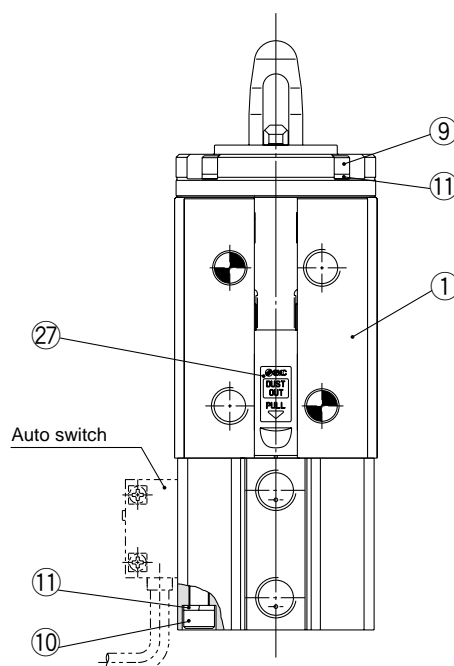
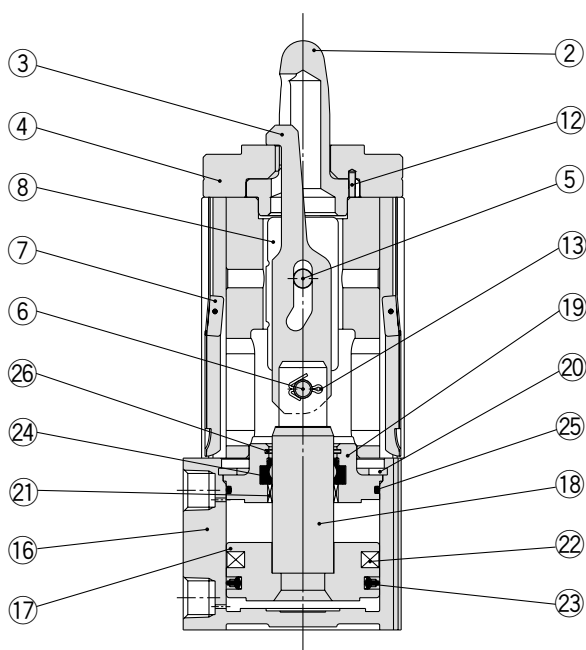
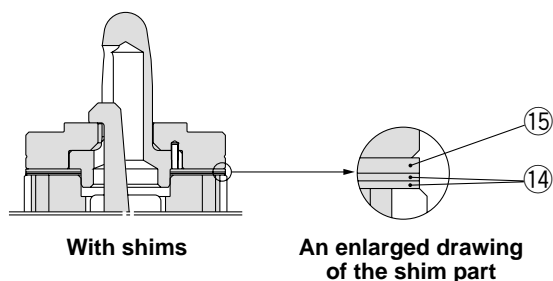
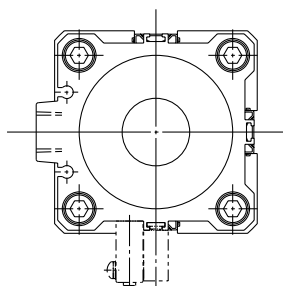
CLKQ (with lock) type

Unit: kg

Model Guide pin diameter (mm)	CLKQC	CLKQE	CLKQS	CLKQT
ø12.5	2.40	2.29	2.31	2.41
ø12.7	2.40	2.29	2.31	2.41
ø14.5	2.40	2.30	2.31	2.42
ø14.7	2.40	2.30	2.31	2.42
ø15.5	2.40	2.30	2.31	2.42
ø15.7	2.41	2.30	2.31	2.42
ø17.5	2.41	2.31	2.32	2.43
ø17.7	2.41	2.31	2.32	2.43
ø19.5	2.42	2.32	2.33	2.44
ø19.7	2.42	2.32	2.33	2.44
ø24.5	2.44	2.34	2.35	2.45
ø24.7	2.44	2.34	2.35	2.46

Construction

CKQ□□50



Parts List

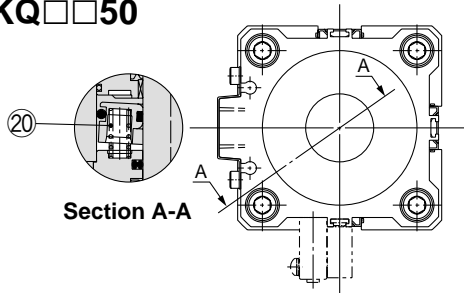
No.	Description	Material
1	Body	Aluminum alloy
2	Guide pin	Stainless steel
3	Clamp arm	Carbon steel
4	Seat	Structural steel
5	Pin A	Carbon steel
6	Pin B	Carbon steel
7	Cover assembly	Stainless steel
8	Spatter cover	Copper
9	Hexagon socket head cap screw	Structural steel
10	Hexagon socket head cap screw	Structural steel
11	Spring washer	Steel wire
12	Spring pin	Tool steel
13	Cotter pin	Stainless steel
14	Shim A	Stainless steel
15	Shim B	Stainless steel

No.	Description	Material
16	Cylinder tube	Aluminum alloy
17	Piston	Aluminum alloy
18	Piston rod	Stainless steel
19	Collar	Aluminum alloy
20	Type C snap ring	Tool steel
21	Bushing	Lead-bronze casted
22	Plastic magnet	Magnet
23	Piston seal	NBR
24	Rod seal	NBR
25	Tube gasket	NBR
26	Coil scraper	Bronze
27	Seal	PET

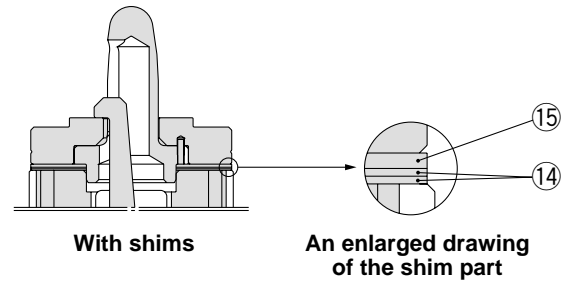
Series CKQ/CLKQ

Construction

CLKQ□□50

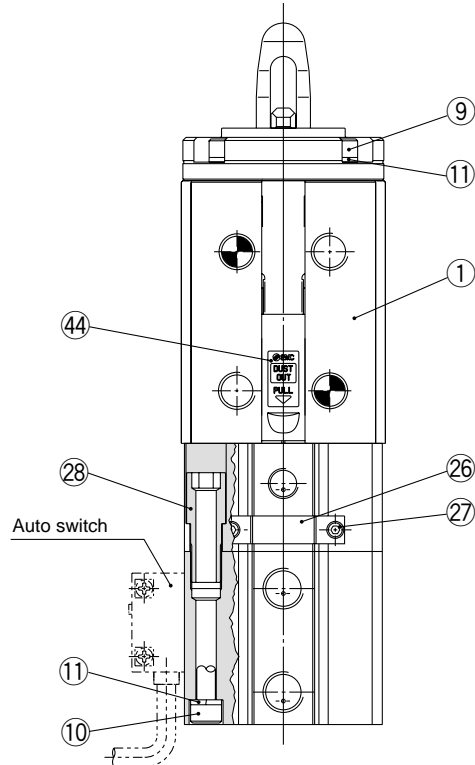
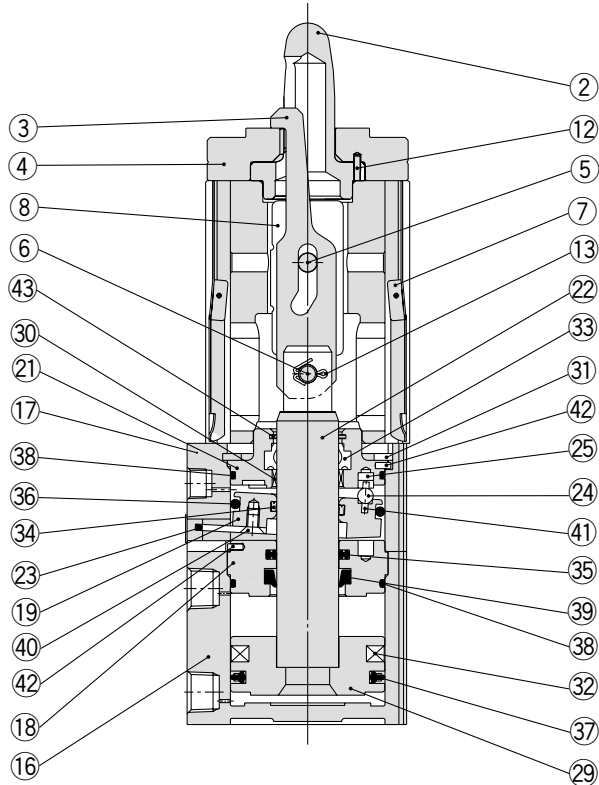


Section A-A



With shims

An enlarged drawing of the shim part



Parts List

No.	Description	Material
1	Body	Aluminum alloy
2	Guide pin	Stainless steel
3	Clamp arm	Carbon steel
4	Seat	Structural steel
5	Pin A	Carbon steel
6	Pin B	Carbon steel
7	Cover assembly	Stainless steel
8	Spatter cover	Copper
9	Hexagon socket head cap screw	Structural steel
10	Hexagon socket head cap screw	Structural steel
11	Spring washer	Steel wire
12	Spring pin	Tool steel
13	Cotter pin	Stainless steel
14	Shim A	Stainless steel
15	Shim B	Stainless steel
16	Cylinder tube	Aluminum alloy
17	Lock body	Aluminum alloy
18	Intermediate collar	Aluminum alloy
19	Lock ring	Tool steel
20	Brake spring	Steel wire
21	Collar	Aluminum alloy
22	Piston rod	Stainless steel

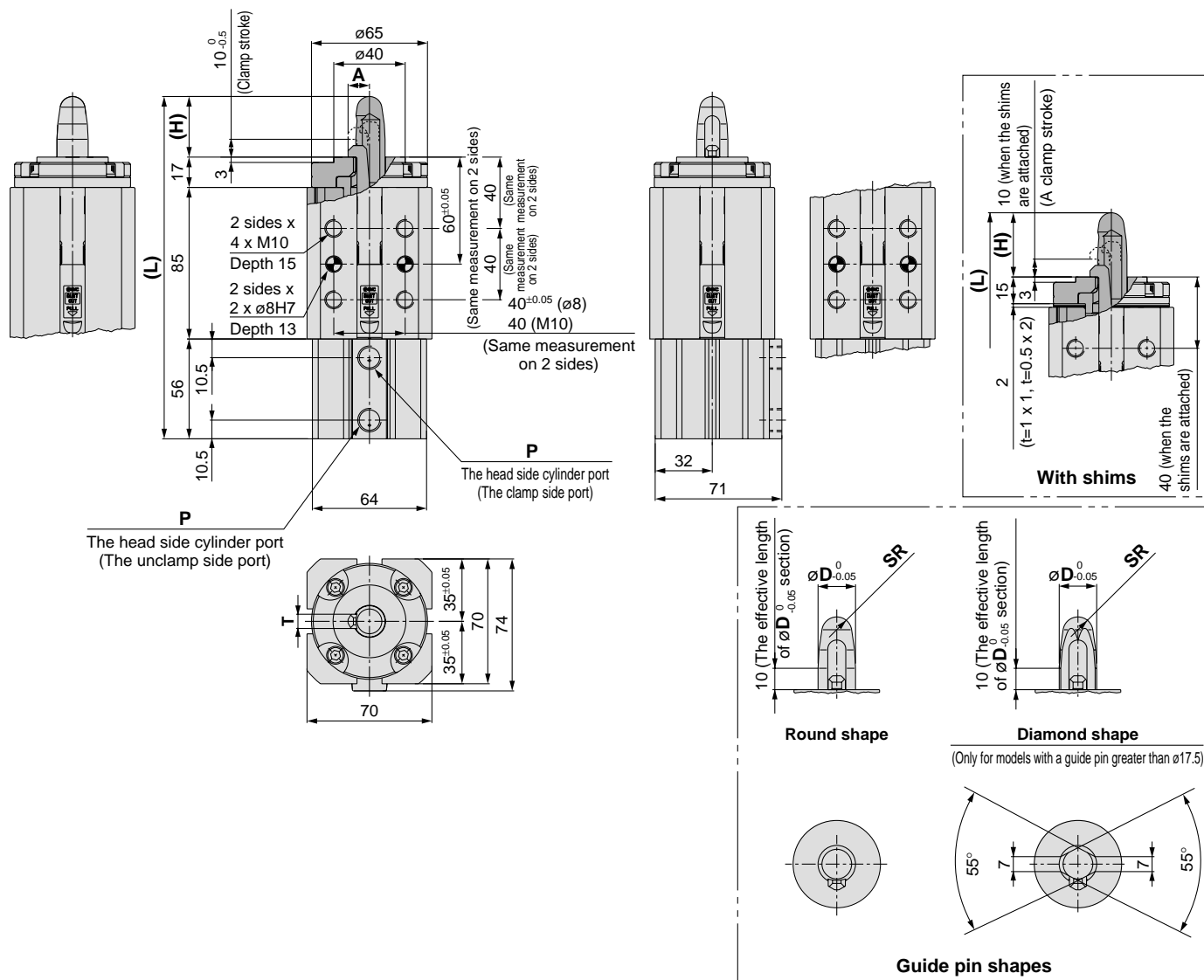
No.	Description	Material
23	Lever	Stainless steel
24	Pivot pin	Carbon steel
25	Pivot key	Carbon steel
26	Dust cover	Steel wire
27	Dust cover holding bolt	Structural steel
28	Unit holding bolt	Carbon steel
29	Piston	Aluminum alloy
30	Bushing	Lead-bronze casted
31	Type C snap ring	Tool steel
32	Plastic magnet	Magnet
33	Rod seal A	NBR
34	Rod seal B	NBR
35	Rod seal C	NBR
36	Piston seal A	NBR
37	Piston seal B	NBR
38	Tube gasket	NBR
39	Scraper	NBR
40	Hexagon socket countersunk head screw	Structural steel
41	Spring pin	Tool steel
42	Parallel pin	Stainless steel
43	Coil scraper	Bronze
44	Seal	PET

Dimensions

CKQCB50

CKQCA50 (The angle of the cylinder port position against the mounting side is 90°)

* Refer to "How to Order" on page1 for the mounting side and a port position relationship.




Applicable hole diameter	ØD (Guide pin diameter)	SR (The radius of the tip of the guide pin)	H (Pin height)		A (Arm length)	T (Arm thickness)	L (Total length)	
			Without shims	With shims			Without shims	With shims
Ø13	Ø12.5	4.5	29	31	9	6	187	189
	Ø12.7	4.6						
Ø15	Ø14.5	5.5	29	31	11	7	187	189
	Ø14.7	5.6						
Ø16	Ø15.5	6	29	31	11	7	187	189
	Ø15.7	6.1						
Ø18	Ø17.5	7	34	36	12	8	192	194
	Ø17.7	7.1						
Ø20	Ø19.5	8.5	34	36	13	8	192	194
	Ø19.7	8.6						
Ø25	Ø24.5	10.5	34	36	15.5	8	192	194
	Ø24.7	10.6						


P (Port thread size)		
Nil	TF	TN
Rc1/4	G1/4	NPT1/4

Dimensions

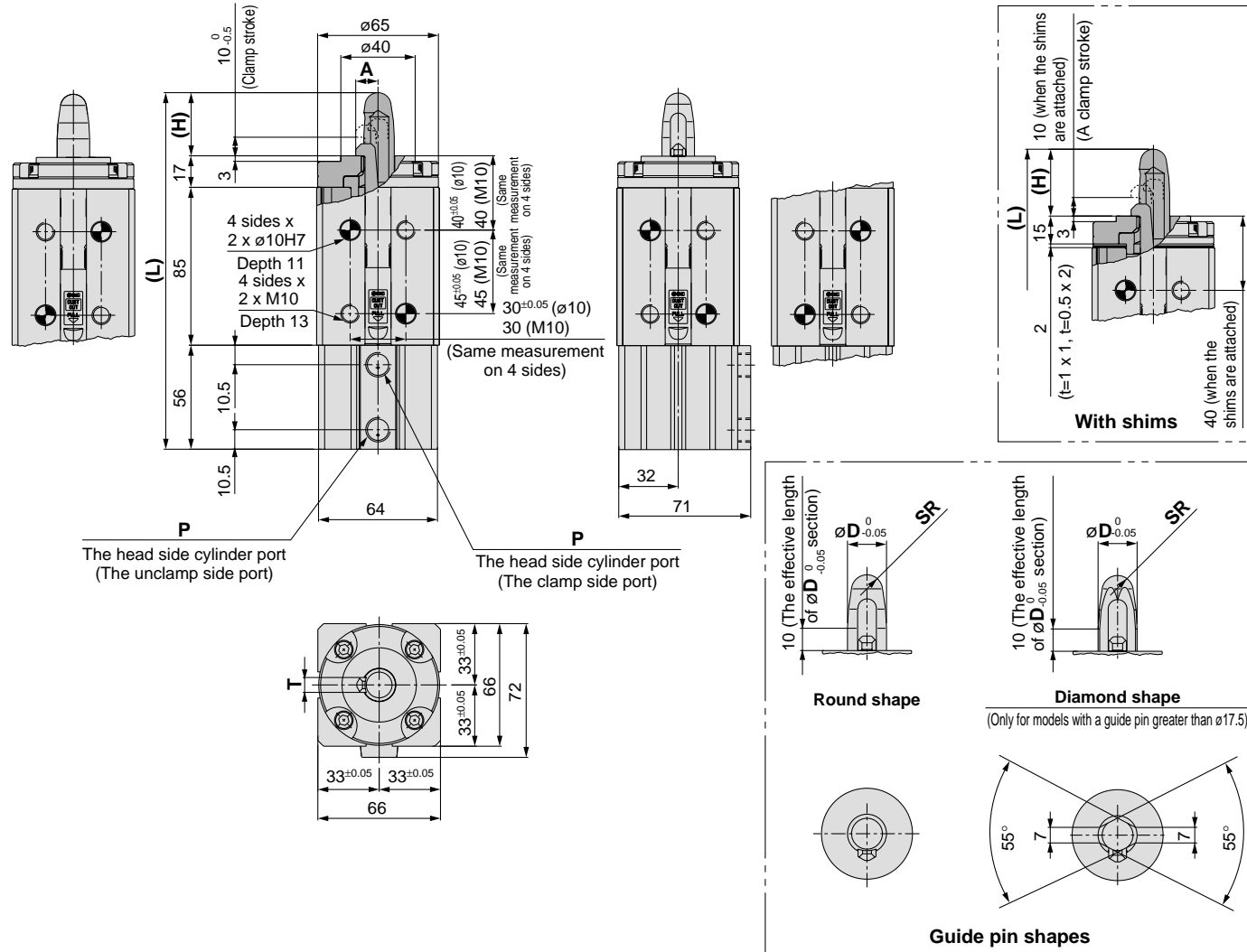
CKQSC50

(The mounting side and the port position of **CKQSD50** is .)

(The mounting side and the port position of **CKQSE50** is .)

(The mounting side and the port position of **CKQSF50** is 

* Refer to "How to Order" on page1 for the mounting side and a port position relationship.



Applicable hole diameter	ØD (Guide pin diameter)	SR (The radius of the tip of the guide pin)	H (Pin height)		A (Arm length)	T (Arm thickness)	L (Total length)	
			Without shims	With shims			Without shims	With shims
Ø13	Ø12.5	4.5	29	31	9	6	187	189
	Ø12.7	4.6						
Ø15	Ø14.5	5.5	29	31	11	7	187	189
	Ø14.7	5.6						
Ø16	Ø15.5	6	29	31	11	7	187	189
	Ø15.7	6.1						
Ø18	Ø17.5	7	34	36	12	8	192	194
	Ø17.7	7.1						
Ø20	Ø19.5	8.5	34	36	13	8	192	194
	Ø19.7	8.6						
Ø25	Ø24.5	10.5	34	36	15.5	8	192	194
	Ø24.7	10.6						

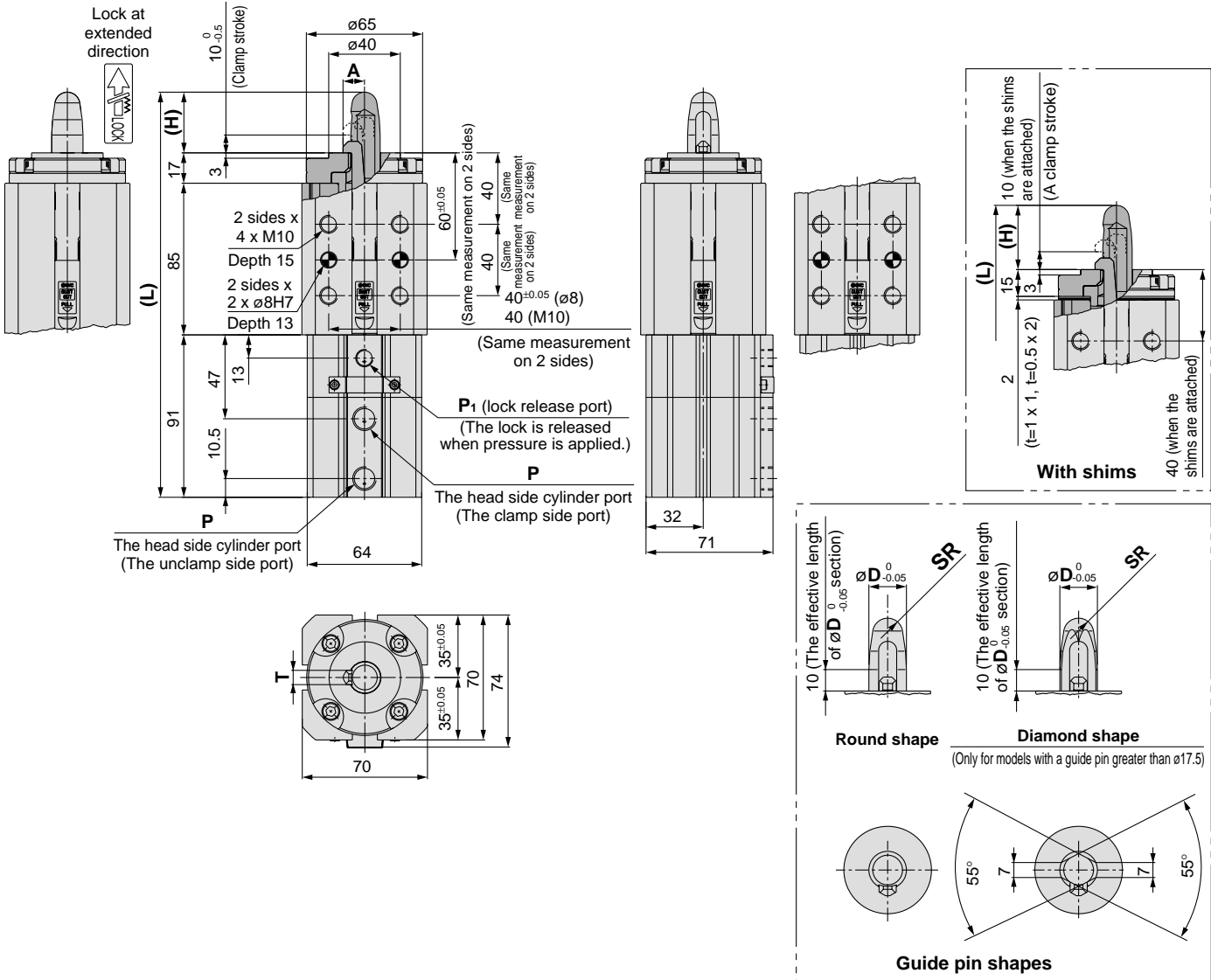
P (Port thread size)		
Nil	TF	TN
Rc1/4	G1/4	NPT1/4

Dimensions

CLKQCB50

CLKQCA50 (The angle of the cylinder port position against the mounting side is 90°)

* Refer to “How to Order” on page1 for the mounting side and a port position relationship.



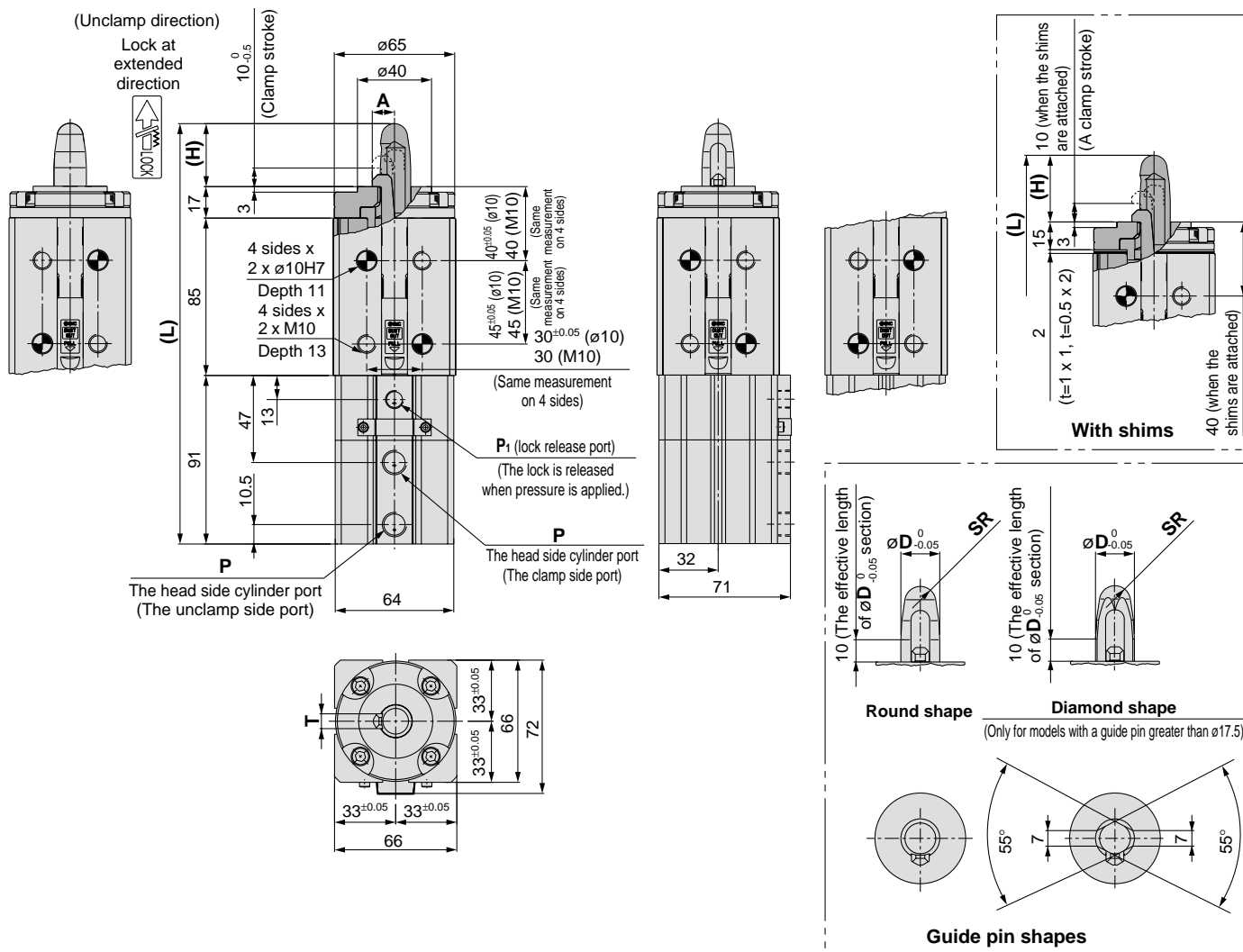
Applicable hole diameter	øD (Guide pin diameter)	SR (The radius of the tip of the guide pin)	H (Pin height)		A (Arm length)	T (Arm thickness)	L (Total length)	
			Without shims	With shims			Without shims	With shims
ø13	ø12.5	4.5	29	31	9	6	222	224
	ø12.7	4.6						
ø15	ø14.5	5.5	29	31	11	7	222	224
	ø14.7	5.6						
ø16	ø15.5	6	29	31	11	7	222	224
	ø15.7	6.1						
ø18	ø17.5	7	34	36	12	8	227	229
	ø17.7	7.1						
ø20	ø19.5	8.5	34	36	13	8	227	229
	ø19.7	8.6						
ø25	ø24.5	10.5	34	36	15.5	8	227	229
	ø24.7	10.6						

P (Port thread size)			P ₁ (Lock release port thread size)		
Nil	TF	TN	Nil	TF	TN
Rc1/4	G1/4	NPT1/4	Rc1/8	G1/8	NPT1/8

CLKQSC50

(The mounting side and the port position of **CLKQSE50** is .)

* Refer to "How to Order" on page1 for the mounting side and a port position relationship.



Applicable hole diameter	ØD (Guide pin diameter)	SR (The radius of the tip of the guide pin)	H (Pin height)		A (Arm length)	T (Arm thickness)	L (Total length)	
			Without shims	With shims			Without shims	With shims
Ø13	Ø12.5	4.5	29	31	9	6	222	224
	Ø12.7	4.6						
Ø15	Ø14.5	5.5	29	31	11	7	222	224
	Ø14.7	5.6						
Ø16	Ø15.5	6	29	31	11	7	222	224
	Ø15.7	6.1						
Ø18	Ø17.5	7	34	36	12	8	227	229
	Ø17.7	7.1						
Ø20	Ø19.5	8.5	34	36	13	8	227	229
	Ø19.7	8.6						
Ø25	Ø24.5	10.5	34	36	15.5	8	227	229
	Ø24.7	10.6						

P (Port thread size)			P ₁ (Lock release port thread size)		
Nil	TF	TN	Nil	TF	TN
Rc1/4	G1/4	NPT1/4	Rc1/8	G1/8	NPT1/8

How to Mount the Auto Switches

(1) For D-A7□, D-A80, D-F7□ and D-J79 models

Slide a mounting nut into the auto switch groove and align it to where the auto switch will be mounted. Insert a spacer into the auto switch groove directly on top of the mounting nut. Align the auto switch's mounting bracket with the depressed part of the spacer until both parts interlock. Insert a mounting screw into the auto switch's mounting bracket and loosely tighten the screw. Slide the auto switch to the desired detection position and securely tighten the auto switch with the screw. When tightening the mounting screw, use a watchmaker's screwdriver with a 5 to 6 mm handle diameter and tighten with a torque of 0.5 to 0.7 N·m. (Refer to Figure 1.)

Mounting bracket kit number	Items and number of each item
BQ-2	<ul style="list-style-type: none"> • Switch mounting screw x 1 • Switch spacer x 1 • Switch mounting nut x 1

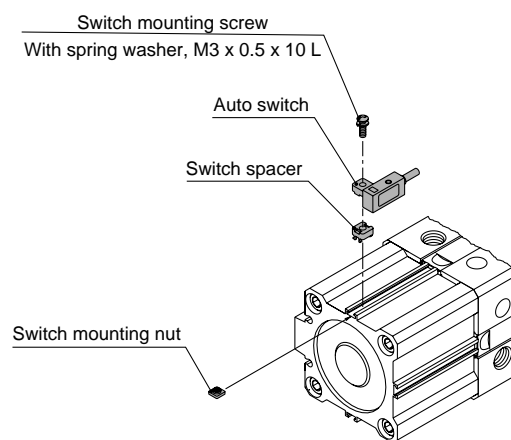


Figure 1

(2) For D-A9□, D-F9□W and D-M9□ models

Insert the front of the auto switch into the auto switch groove and slide the switch to the desired detection position. Securely tighten the mounting screw on the auto switch. When tightening the mounting screw, use a watchmaker's screwdriver with a 5 to 6 mm handle diameter and tighten with a torque of 0.10 to 0.20 N·m. As a guide, an acceptable tightening level is reached by tightening the screw an additional 90 degrees (1/4 turn) from the point at which the screw is snug. (Refer to Figure 2.)

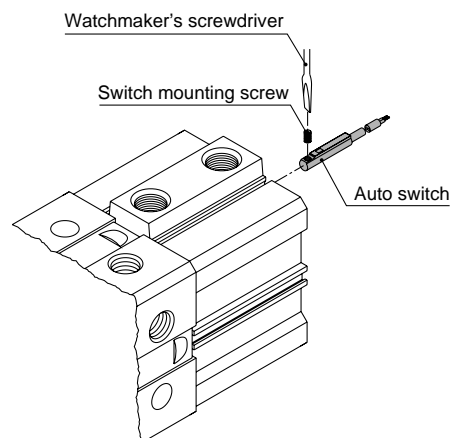


Figure 2

(3) For D-P5DW□□ models

Insert the front side of the auto switch into the auto switch groove and slide the switch to the desired detection position. Securely tighten the mounting screw on the auto switch. When tightening the mounting screw, use a watchmaker's screw driver with a 5 to 6 mm handle diameter and tighten with a torque of 0.10 to 0.20 N·m. As a guide, an acceptable tightening level is reached by tightening the screw an additional 90 degrees (1/4 turn) from the point at which the screw is snug. (Refer to Figure 3.)

Mounting bracket kit number	Items and number of each item
BQP1-050	<ul style="list-style-type: none"> • Switch mounting bracket x 1 • Switch mounting nut x 1 • Round head Phillips screw x 1 • Hexagon socket head cap screw x 2 • Spring washer x 4

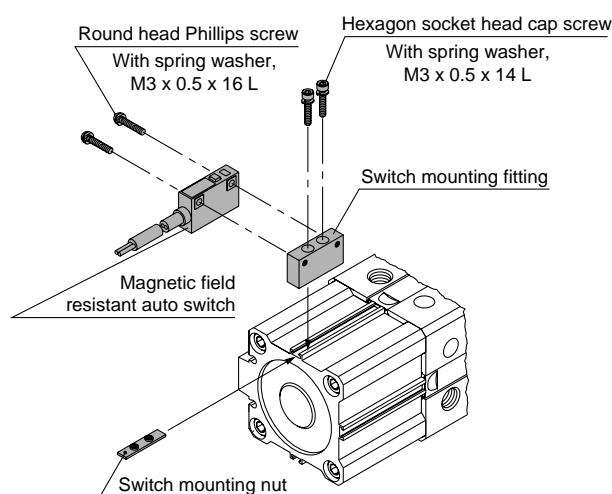


Figure 3

Series CKQ/CLKQ

Proper Auto Switch Mounting Position and Its Mounting Height

Proper Auto Switch Mounting Position

Atmosphere	General use																				Welding	
Mounting	Rail mounting										Direct mounting										Rail mounting	
Model	D-A79W		D-A72		D-A73 D-A80		D-A7□H-D-A80H D-A73C-D-A80C D-F7□WV D-F7BAL D-F7BAVL D-F7□W-D-J79W D-F7NTL,D-F79F		D-F7□V D-J79C D-F7□ D-J79		D-A9□ D-A9□V		D-F9□W D-F9□WV		D-F9BAL		D-M9□V		D-M9□		D-P5DWL D-P5DWSC	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
CKQ	8.5		11		11		11.5		11.5		10		14		13		14		14		7	
CLKQ	43.5	33 or more	46	27 or more	46	28 or more	46.5	27 or more	46.5	22 or more	45	30 or more	49	22 or more	48	—	49	17 or more	49	54 or more	42	52 or more

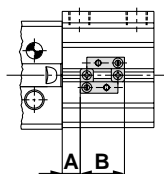
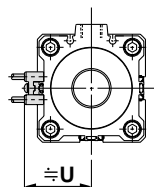
Auto Switch Mounting Height

Atmosphere	General use										Welding
Mounting	Rail mounting					Direct mounting					Rail mounting
Model	D-A79W	D-A7□ D-A80	D-A7□H D-A80H D-F7BAL D-F7□W D-J79W D-F7NTL D-F79F D-F7□D-J79	D-A73C D-A80C	D-F7□WV D-F7BAVL D-F7□V	D-J79C	D-A9□V	D-F9□WV D-F9□V D-M9□V	D-F9BAL		D-P5DWL D-P5DWSC
	≒U										
C(L)KQ	43.5	41	42	48	44.5	47.5	36.5	38.5	36		50

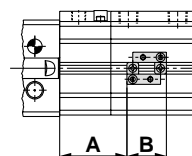
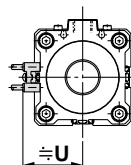
Rail mounting type

· Applicable auto switch: D-A79W · D-A7□ · D-A80 · D-A7□H · D-A80H · D-A73C · D-A80C · D-F7□WV · D-F7BAL · D-F7BAVL · D-F7□W · D-J79W · D-F7NTL · D-F79F · D-F7□V · D-J79C · D-F7□ · D-J79

[For CKQ]



[For CLKQ]

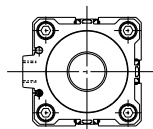


Direct mounting type

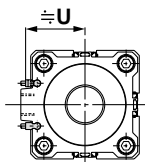
· Applicable auto switch: D-A9□ · D-A9□V · D-F9□WV · D-F9BAL · D-M9□V · D-F9□W

[For CKQ]

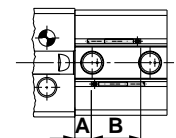
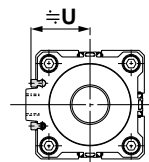
D-A9□, D-F9□W



D-A9□V, D-M9□V
D-F9□WV

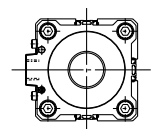


D-F9BA

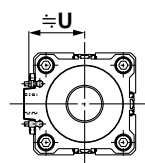


[For CLKQ]

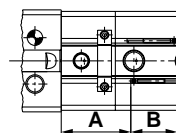
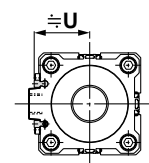
D-A9□, D-F9□W



D-A9□V, D-M9□V
D-F9□WV



D-F9BA

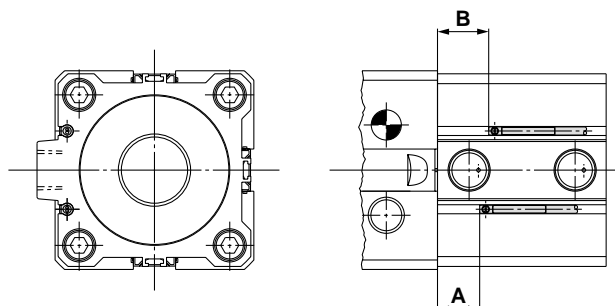


Proper Auto Switch Mounting Position and Its Mounting Height

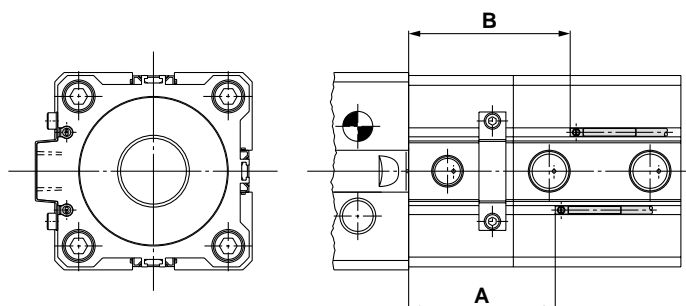
Direct mounting type

· Applicable auto switch: **D-M9**□

[For CKQ]



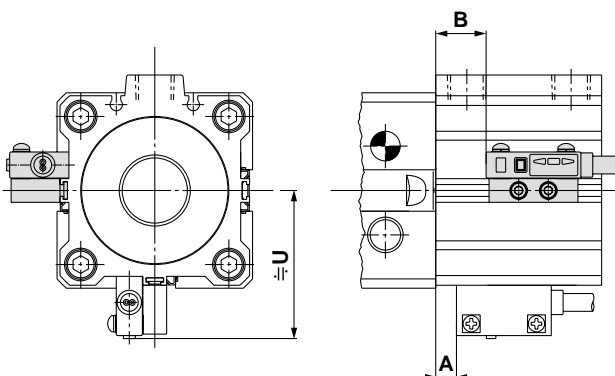
[For CLKQ]



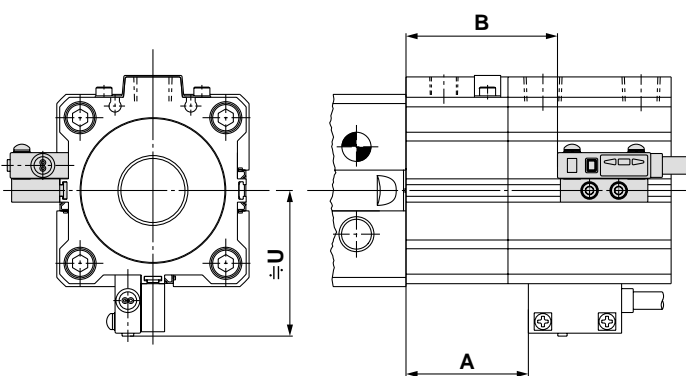
Rail mounting type

· Applicable auto switch: **D-P5DWL** · **D-P5DWSC** (Different side)

[For CKQ]



[For CLKQ]



Besides the models listed in “How to Order,” the following auto switches are applicable.
Refer to Best Pneumatics for detailed auto switch specifications.

Auto switch type	Model	Electrical entry	Features
Reed switch	D-A7 □	Grommet (Perpendicular)	With indicator light
	D-A7 □ H	Grommet (In-line)	With indicator light
	D-A73C	Connector (Perpendicular)	With indicator light
	D-A80	Grommet (Perpendicular)	Without indicator light
	D-A80H	Grommet (In-line)	Without indicator light
	D-A80C	Connector (Perpendicular)	With indicator light
	D-A90	Grommet (In-line)	Without indicator light
	D-A93	Grommet (In-line)	With indicator light
	D-A96	Grommet (In-line)	With indicator light
	D-A90V	Grommet (Perpendicular)	Without indicator light
	D-A93V	Grommet (Perpendicular)	With indicator light
	D-A96V	Grommet (Perpendicular)	With indicator light
	D-A79W	Grommet (Perpendicular)	2-colour display

Auto switch type	Model	Electrical entry	Features
Solid state switch	D-F7 □	Grommet (In-line)	With indicator light
	D-F7 □ V	Grommet (Perpendicular)	With indicator light
	D-F7 □ W	Grommet (In-line)	2-colour display
	D-F79F	Grommet (In-line)	2-colour display
	D-J79	Grommet (In-line)	With indicator light
	D-J79C	Grommet (Perpendicular)	With indicator light
	D-J79W	Grommet (In-line)	2-colour display
	D-F7 □ WV	Grommet (Perpendicular)	2-colour display
	D-F7BAL	Grommet (In-line)	With indicator light
	D-F7BALV	Grommet (Perpendicular)	With indicator light
	D-F7NTL	Grommet (In-line)	With timer
	D-F9 □ W	Grommet (In-line)	With indicator light
	D-F9 □ WV	Grommet (Perpendicular)	With indicator light
	D-F9BAL	Grommet (In-line)	2-colour display
	D-M9 □	Grommet (In-line)	With indicator light
	D-M9 □ V	Grommet (Perpendicular)	With indicator light

Series CKQ/CLKQ Auto Switch Specifications

Auto Switches Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100 μ A or less, 2-wire: 0.8 mA or less
Operating time	1.2 ms	1 ms or less ²⁾
Impact resistance	300 m/s ²	1000 m/s ²
Insulation resistance	50 M Ω or more at 500 M VDC (Between lead wire and case)	
Withstand voltage	1500 VAC for 1 minute ¹⁾ (Between lead wire and case)	1000 VAC for 1 minute (Between lead wire and case)
Ambient temperature	-10 to 60°C	
Enclosure	IEC529 Standard IP67, Immersible construction (JIS C 0920)	

Note 1) Electrical entry: Connector type (A73C/A80C) and A9/A9□V type: 1000 VAC/min. (Between lead wire and the case)

Note 2) Except magnetic resistant 2-colour indication type solid state switch (D-P5DWL/P5DWSC).

Lead Wire Length

Lead wire length indication

(Example) **D-M9P****L**

Lead wire length

Nil	0.5 m
L	3 m
Z	5 m
N*	None

* Applicable for the connector type (D-□□C) only.

Note 1) Applicable auto switch with 5 m lead wire ("Z")

Reed switch: D-A73(C)(H)/A80C

Solid state switch: Manufactured upon receipt of order as standard.

Note 2) Lead wire lengths of 3 m and 5 m are standard for magnetic field resistant 2-colour indication type solid state switches. (0.5 m is not available.)

Note 3) For solid state switches with flexible wire specification, add "-61" at the end of the lead wire length.

(Example)

D-F9PWL-61

Flexible lead wire specifications

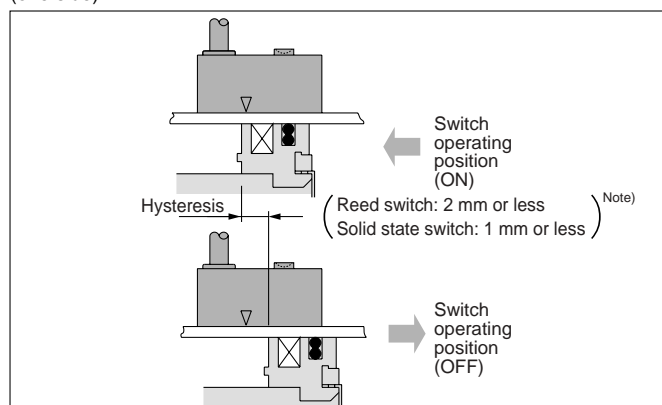
Part No. of Lead Wires with Connectors

(Applicable only for connector type)

Model	Lead wire length
D-LC05	0.5 m
D-LC30	3 m
D-LC50	5 m

Auto Switch Hysteresis

Hysteresis is the distance between the position at which piston movement operates an auto switch to the position at which reverse movement turns the switch off. This hysteresis is included in part of the operating range (one side).



Note) Hysteresis may fluctuate due to the operating environment. Please contact SMC if hysteresis causes an operational problem.

Contact Protection Box: CD-P11, CD-P12

<Applicable switch types>

D-A9/A9□V, and D-A7□(H) type, D-A80□(H)·(C)

The above auto switches do not have internal contact protection circuits.

1. Operating load is an inductive load.
2. The length of wiring to the load is 5 m or more.
3. The load voltage is 100 or 200 VAC.

A contact protection box should be used in any of the above conditions. Unless using a contact protection box, the contact life may be shortened. (Due to permanent energising conditions.)

D-A72(H) must be used with the contact protection box regardless of load styles and lead wire length.

Contact Protection Box Specifications

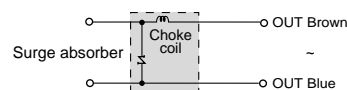
Part no.	CD-P11		CD-P12
Load voltage	100 VAC	200 VAC	24 VDC
Max. load current	25 mA	12.5 mA	50 mA

* Lead wire length — Switch connection side 0.5 m
Load connection side 0.5 m

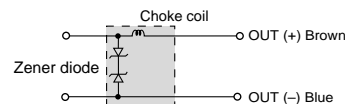


Contact Protection Box Internal Circuit

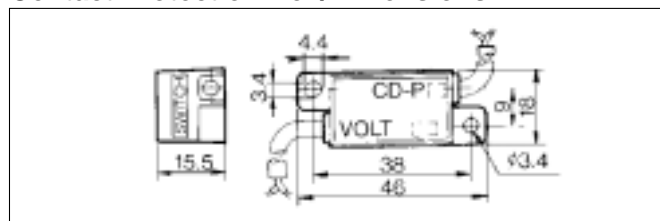
CD-P11



CD-P12



Contact Protection Box/Dimensions



Contact Protection Box Connection

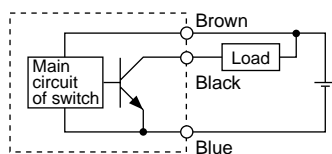
To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 meter.

Series CKQ/CLKQ

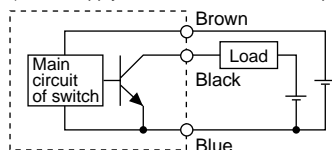
Auto Switches Connection and Example

Basic Wiring

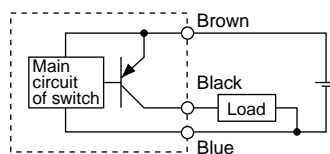
Solid state 3-wire, NPN



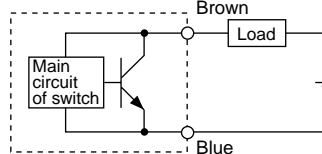
(Power supply for switch and load are separate)



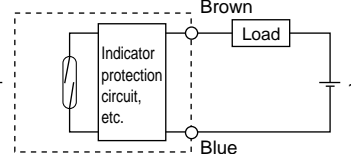
Solid state 3-wire, PNP



Solid state 2-wire

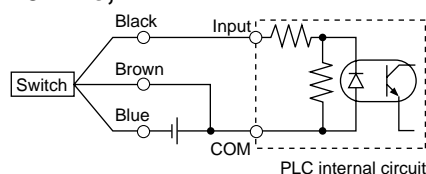


Reed switch 2-wire

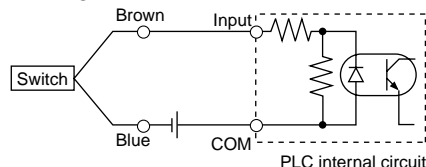


Example of Connection with PLC (Programmable Logic Controller)

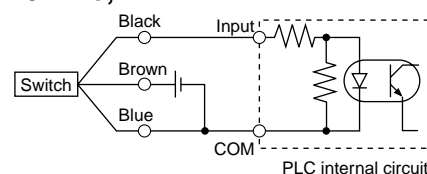
• Sink input specifications 3-wire, NPN



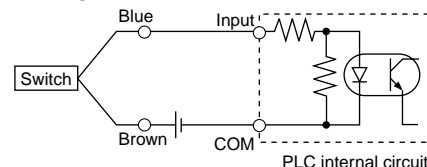
2-wire



• Source input specifications 3-wire, PNP



2-wire

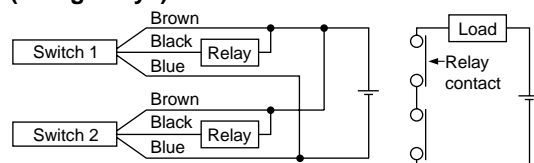


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

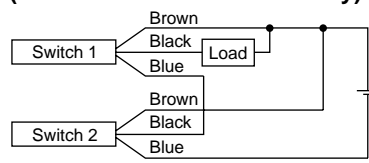
Example of AND (Series) and OR (Parallel) Connection

• 3-wire

AND connection for NPN output (Using relays)

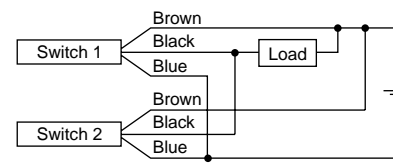


AND connection for NPN output (Performed with switches only)

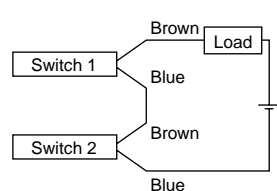


The indicator lights will light up when both switches are turned ON.

OR connection for NPN output



2-wire with 2-switch AND connection

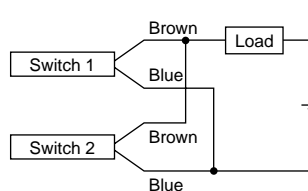


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up when both of the switches are in the ON state.

Load voltage at ON = Power supply voltage – Internal voltage drop x 2 pcs.
= 24 V – 4 V x 2 pcs.
= 16 V

Example: Power supply is 24 VDC
Internal voltage drop in switch is 4 V.

2-wire with 2-switch OR connection



(Solid state switch)
When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

Load voltage at OFF = Leakage current x 2 pcs. x Load impedance
= 1 mA x 2 pcs. x 3 kΩ
= 6 V

Example: Load impedance is 3 kΩ.
Leakage current from switch is 1 mA.

(Reed switch)
Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes grow dim or not light up, due to the dispersion and reduction of the current flowing to the switches.

Magnetic Field Resistant 2-colour Indication Type Solid State Switch: Rail Mounting Style D-P5DWL



For details about certified products conforming to international standards, visit us at www.smcworld.com.

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-P5DW (With indicator light)	
Auto switch model	D-P5DWL
Wiring type	2-wire (non-polar)
Applicable load	24 VDC relay, PLC
Load voltage	24 VDC (20 to 28 VDC)
Load current	6 to 40 mA or less
Internal voltage drop	5 V or less
Leakage current	1 mA or less at 24 VDC
Operating time	40 ms or less
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.

- Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 6$, 0.5 mm², 2 cores (Brown, Blue), 3 m
- Note 1) Regarding the common specifications of the solid state switches, refer to page 16.
Note 2) Regarding the lead wire length, refer to page 16.

Weight

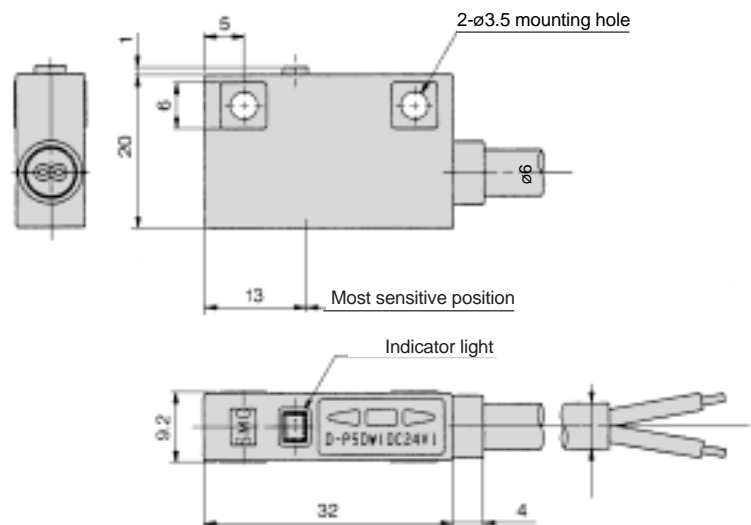
Unit: g

Auto switch model	D-P5DW	
Lead wire length (m)	0.5	—
	3	150
	5	244

Magnetic Field Resistance

If the current of the AC welding machine is 16,000 A or lower, the switch can be used, even if the distance between the welding conductor (gun cable) and the cylinder or switch is 0 mm. Contact SMC when the AC welding current exceeds 16,000 A.

Dimensions



Grommet

It is possible to use in an environment which generates a magnetic field disturbance (AC magnetic field).

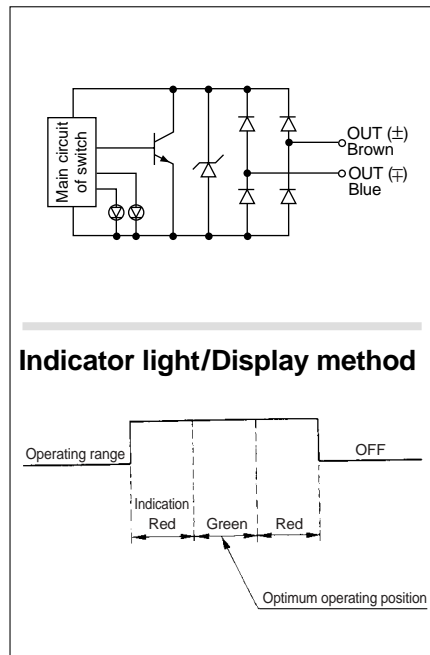


Caution

Precautions

For single-phase AC welding machines
Not applicable for DC inverter welding machines (including rectifying type), arc welding, and or condenser type welding.

Auto Switch Internal Circuit



Magnetic Field Resistant 2-colour Indication Type Solid State Switch: Rail Mounting Style D-P5DWSC



For details about certified products conforming to international standards, visit us at www.smcworld.com.

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-P5DW (With indicator light)	
Auto switch model	D-P5DWSC
Applicable load	24 VDC relay, PLC
Load voltage	24 VDC (20 to 28 VDC)
Load current	6 to 40 mA or less
Internal voltage drop	5 V or less
Leakage current	1 mA or less at 24 VDC
Operating time	40 ms or less
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.

- Lead wire — Flexible fluorine resin heavy-duty cable, $\phi 6$, 0.5mm², 2 cores, 300 mm
- Impact resistance — Switch part : 1000 m/s², Connector part : 300 m/s²
- Insulation resistance — 50 M Ω or more at 500 VDC (between lead wire and case)
- Withstand voltage — 1000 VAC for 1 minute (between lead wire and case)
- Ambient temperature — -10 to 60°C
- Enclosure IEC529 standard IP67, JIS 0920 Watertight structure

Grommet

It is possible to use in an environment which generates a magnetic field disturbance (AC magnetic field).



Caution

Precautions

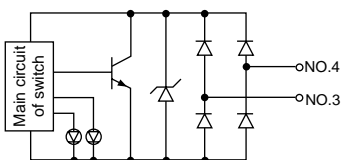
For single-phase AC welding machines
Not applicable for DC inverter welding machines (including rectifying type), arc welding, and or condenser type welding.

Magnetic Field Resistance

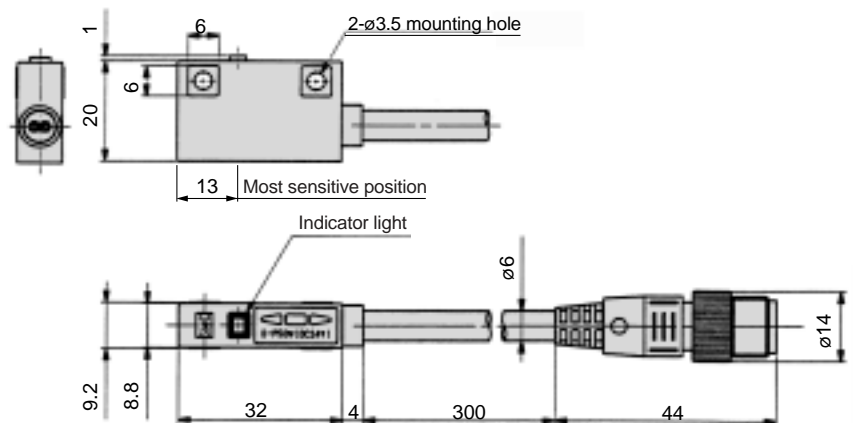
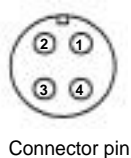
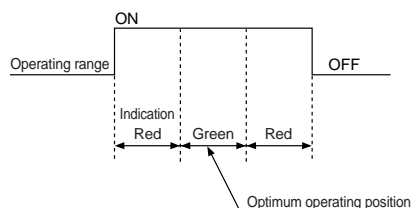
If the current of the AC welding machine is 16,000 A or lower, the switch can be used, even if the distance between the welding conductor (gun cable) and the cylinder or switch is 0 mm.
Contact SMC when the AC welding current exceeds 16,000 A.

Dimensions

Auto Switch Internal Circuit



Indicator light/Display method








Series **CKQ/CLKQ**

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 ^{Note 1)}, JIS B 8370 ^{Note 2)} and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power--General rules relating to systems.

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Series CKQ/CLKQ

Specific Product Precautions 1

Be sure to read before handling.

Caution on Design

Warning

1. There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.

In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

2. A protective cover is recommended to minimize the risk of personal injury.

If a stationary object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

3. Securely tighten all stationary parts and connected parts so that they will not become loose.

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

4. Design the equipment so that the maximum theoretical force is not applied to the cylinder.

If the cylinder becomes damaged there is a danger of human injury and or equipment damage.

5. Select the mounting base by taking into consideration its rigidity because the cylinder applies a large amount of force.

Otherwise there is a danger of human injury and or equipment damage.

6. Please consider the possibility of a decrease in circuit pressure when power is turned off.

If the cylinder is used for a clamping application there is a danger of the workpiece being released since the circuit pressure decreases when the power is turned off. Install safety equipment to prevent human injury and damage to machine and or equipment. The same consideration should be given for hanging or lift applications to prevent dropping of a workpiece.

7. Consider a possible loss of power source.

Measures should be taken to protect against bodily injury and equipment damage in the event that there is a loss of power to equipment controlled by pneumatics, electricity, or hydraulics.

8. Consider emergency stops.

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

9. Consider the action when operation is restarted after an emergency stop or abnormal stop.

Design the machinery so that human injury or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the starting position, install manual safety equipment.

10. About intermediate stop

In the case of 3 position closed center of a valve, it is difficult to make a piston stop at the required position as accurately and precisely as with hydraulic pressure due to compressibility of air.

Furthermore, since valves and cylinders, etc. are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Please contact SMC in the case it is necessary to hold a stopped position for an extended period. Do not intermediately stop the CLKQ cylinder during a locking operation because it will shorten the life of the cylinder.

Selection

Warning

1. Confirm the specifications.

The products featured in this catalogue are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunctions may occur. Do not use in these conditions. (Refer to the specifications.)

Please consult with SMC if you use a fluid other than compressed air.

2. Do not use for applications other than clamping.

Since the cylinder performs both positioning and clamping simultaneously, any other application may cause an accident or damage to the cylinder.

3. Do not modify the cylinder.

Do not modify the cylinder because it may cause damage to it, shorten the protect life, and or cause an accident.

4. Keep the work piece thickness being clamped at 10 mm or less.

Since the regulated clamp stroke of the cylinder is 10 mm or less, do not clamp anything thicker than this. * A cylinder ordered with shims can clamp a work piece up to 12 mm thick, when all shims are removed.

5. Clamp only the flat side of a work piece.

6. If a work piece is transferred three dimensionally and at high speed by a robot after it is clamped, the work weight must be 1/10 of the theoretical thrust (clamping force) or less, or stoppers should be installed as a preventive measure for the movement of the work piece.

7. Do not clamp without setting the work piece on a work surface.

If the clamp arm makes contact with the seat surface without clamping a work piece, the surface flatness condition of the seat surface and the clamp arm (the clamping surface) will be adversely effected.

8. Do not apply an impact load, strong vibrations or rotating force to the product.

Since the cylinder is composed of precisely manufactured parts, they may be damaged and the life may be shortened if a strong impact load, strong vibration or rotating force are applied.



Series CKQ/CLKQ

Specific Product Precautions 2

Be sure to read before handling.

Selection

Warning

[For only CLKQ series]

9. Do not use for intermediate cylinder stops.

This cylinder is designed to lock in a clamped condition to prevent unwanted movement. Do not perform any intermediate stops while the cylinder is operating, since it will shorten the product life.

10. Select the correct locking position since this cylinder does not generate a holding force opposite to the locking direction.

The forwarded lock type (F type) clamp does not generate a holding force in the opposite direction (Clamping direction). In addition the locking direction can not be changed.

11. Even when locked, there may be a stroke movement of approximately 1 mm in the locking direction due to external forces, such as the weight of the work piece.

Even when locked, if air pressure drops, a stroke movement of approximately 1 mm may occur in the locking direction. This is cau-

Applied guide pin diameters

Guide pin type	Round type						Round/Diamond type					
Hole diameter of the work	For the ø13 hole	For the ø15 hole	For the ø16 hole	For the ø18 hole	For the ø20 hole	For the ø25 hole	For the ø13 hole	For the ø15 hole	For the ø16 hole	For the ø18 hole	For the ø20 hole	For the ø25 hole
Guide pin diameter (mm)	12.5	12.7	14.5	14.7	15.5	15.7	17.5	17.7	19.5	19.7	24.5	24.7

Clamping force

(N)

Model	Operating pressure MPa								
	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
CKQ	164.9	329.8	494.7	659.6	824.5	989.4	1154.3	1319.2	1484.1
CLKQ	82.4	247.3	412.2	577.1	742.0	906.9	1071.8	1236.7	1401.6

Note1) When designing a circuit with an operating pressure that exceeds 0.75 MP, consider the holding force of the lock since the holding force for the CLKQ lock is 982 N. The cylinder should be used below the maximum theoretical holding force because damage, shortening of life, and or an accident may occur due to friction in the lock section or damage from a load which exceeds the lock holding force.

Note2) Design a circuit taking into consideration that it takes approximately 0.3 seconds from the time an unclamped cylinder starts to operate to the time that the clamping force is generated.

Note3) Take into consideration the durability of a work piece because it may be damaged if the clamping force is too great.

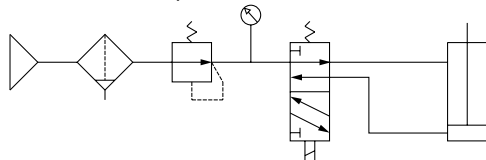
Caution

1. To adjust the cylinder speed, attach a speed controller and begin to adjust the speed by setting it to a low speed first. Gradually increase the set speed till the required speed is reached.

Pneumatic Circuit

1. Recommended pneumatic pressure circuit for the CKQ series models.

The following is an example of a basic meter-out control circuit for operating a cylinder using an air filter, a regulator, a solenoid valve and a speed controller.



A recommended pneumatic pressure circuit

Warning

2. Recommended pneumatic pressure circuit for the CLKQ series model

1) Do not use a positioning valve (closed center, perfect valve, exhaust center or pressure center types) for any application because the lock may fail due to unlocking pressure.

Warning

- 2) Install speed controllers for meter-out control.
If it is used in meter-in control, it may result in malfunction.
- 3) Be careful of reverse exhaust pressure flow from a common exhaust type manifold.
Since the lock may be released due to reverse exhaust pressure flow, use an individual exhaust type manifold or single type valve.
- 4) Branch off of the compressed air piping for the lock unit between the cylinder and the speed controller.
Branching off of another part may shorten the product life.
- 5) Construct piping so that the piping length from the branched point to the lock unit is short. If it is long, unlocking may not function well, and it may shorten product life of the lock.



Series CKQ/CLKQ

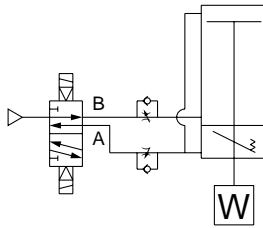
Specific Product Precautions 3

Be sure to read before handling.

Pneumatic pressure circuit

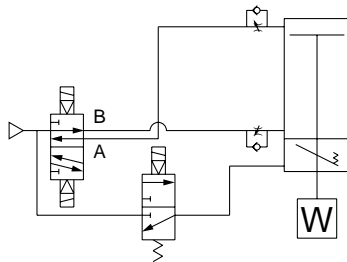
Warning

- 6) SMC recommends using a 2-position double solenoid valve.



Recommended pneumatic pressure circuit

- 7) It is possible to use the pneumatic pressure circuit shown below, however unlock the cylinder before operating. Also, unlock the cylinder first before operating the cylinder in any direction.
In the event that unlocking is initially delayed, it will cause product damage and drastic shortening of product life. It is also highly dangerous because there is possibility of the cylinder lurching at high speed. The cylinder must be unlocked before operating it in free direction, as well.
- 8) When the pneumatic pressure circuit indicated below is used, please remember that the response time of the lock is dependant on the pipe length from the locking head port to the valve and the exhaust time. The activation of the locking mechanism can therefore be delayed. This delay can cause the work piece to be displaced considerably in the direction of the extending piston rod.



Mounting

Caution

1. Do not use the cylinder until it is confirmed that the equipment is operating correctly.

After installation, maintenance or replacement, connect the compressed air or electricity and verify that the installation is correct by performing appropriate function and or leakage tests.

2. Do not dent the cylinder tube or the guide pin parts.

Slight deformation will cause a malfunction since the tube I.D. is manufactured with a tight tolerance. Excessive impact will cause damage to the guide pin because it is heat treated.

Mounting

Caution

3. Please prevent any foreign materials, such as machining chips, from entering into internal cylinder from the air supply port.

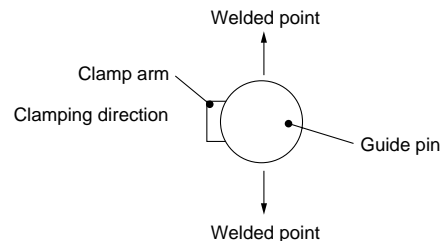
When the mounting holes for the cylinder are made, machined chips may enter the cylinder from the air supply port if the cylinder is left near the installation site. Please prevent the machining chips from entering into the cylinder.

4. The opening part of a guide pin should not face in the same direction as oncoming spatter.

If the spatter enters the cylinder from the opening part of the guide pin, it will shorten the product life and cause a malfunction.

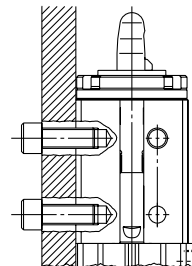
5. Consider the welding point of the guide pin when determining the direction of the clamp arm setting.

The clamp arm will be damaged if clamping is performed at the welded point of the guide pin. Therefore, set the clamping direction as illustrated below, so that the welded point is not effected by clamping.



6. When assembling and adjusting the product, begin the task by applying pressure only to the unlocking port (for CLKQ series models).

7. When attaching a cylinder to the equipment, use the tightening torque specified in the table below.



Thread size	Tightening torque (N·m)
M10	20 to 25
M12	35 to 42

8. Check the auto switch operation when the product is used where welding is performed.

Select an auto switch with a high anti-magnetic characteristic, such as the D-P5DW.



Series CKQ/CLKQ

Specific Product Precautions 4

Be sure to read before handling.

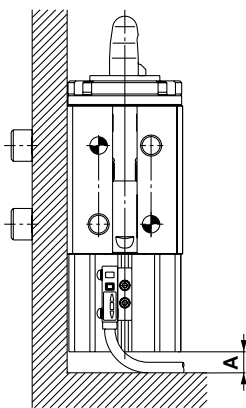
Mounting

⚠ Caution

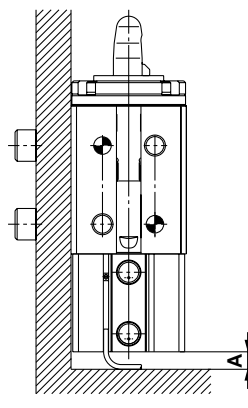
9. When installing a cylinder with an auto switch, locate it away from the floor.

Place a cylinder away from a surface at a minimum height equal to the minimum bending radius of the lead wire.

Applicable auto switch	(mm) A
D-F7□, D-J79, D-F7NTL	4 or more
D-A7□H, D-A80	5 or more
D-F7BA, D-F7□W, D-J79, D-F79F	9 or more
D-A9□, D-F9□, D-M9□	10 or more
D-F9□W	15 or more
D-F9BAL	19.5 or more
D-P5DWL, D-P5DWSC	32.5 or more
Perpendicular type	0



D-P5DW□



Models except for
D-P5DW□

10. Instruction manual

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

Wiring

⚠ Caution

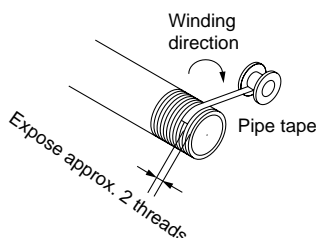
1. Before piping

Before piping, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not get inside the piping.

Also, when the pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Piping

⚠ Caution

3. Piping length should be short.

If the piping to the cylinder is too long, the volume of water vapor in the internal tubing increases beyond that of the internal cylinder due to the generation of water vapor by adiabatic expansion. Since the water vapor stays inside of the tubing without being released into the air, repeated operation results in the generation of water. Grease in the cylinder is drained out as it flows away with the water. This action lowers the smoothness in the cylinder, resulting in air leakage due to worn out seals, and or malfunction due to increased friction resistance. Please do the following to prevent this problem:

- 1) Tubing from a solenoid valve to a cylinder should be as short as possible to assure the evacuation of the generated water vapor into the air.
As a guide, the air capacity in the cylinder, which when converted to atmospheric pressure, should be $\geq 70\%$ of the piped tubing capacity.
- 2) Pipe a speed exhaust controller ASV and a quick exhaust valve to a cylinder to exhaust the exhaust pressure directly to the air.
- 3) Piping port should face downward so that the generated moisture inside tubing does not easily return to the cylinder.

Lubrication

⚠ Caution

1. Lubrication for the CKQ cylinder

The cylinder is lubricated at the factory, and can be used without further lubrication.

In the event that lubricant is used, install a lubricator in the circuit and use Class 1 turbine oil (without additives) ISO VG32. A malfunction can occur due to loss of the original lubricant if lubrication is stopped in the future. Therefore, once lubrication is applied, it must be used continuously.

2. Lubrication for the CLKQ cylinder

Do not lubricate because it may considerably lower the locking performance.

Air Supply

⚠ Warning

1. Use air

Use regulated and filtered air processed by our AF and AR series of products.

2. Use clean air

Do not use compressed air that includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.



Series CKQ/CLKQ

Specific Product Precautions 5

Be sure to read before handling.

Air Supply

⚠ Caution

1. Install an air filter.

Install an air filter upstream, near the valve. Select an air filter with a filtration degree of 5 μm or finer.

2. Take countermeasures to ensure air quality, such as by installing an aftercooler, air dryer, or drain catch.

Air that includes much drainage can cause malfunction of valves and other pneumatic equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or drain catch.

3. Use the cylinder within the operating and ambient temperature specifications.

Take measures to prevent freezing if the temperature is under 5°C, since the moisture in the product will freeze and cause the seals to become damaged and malfunction.

For compressed air quality, contact SMC.

Operating Environment

⚠ Warning

1. Do not use in an environment where there is a danger of corrosion.

For information on the cylinder material, please refer to its construction information.

2. Avoid storing the cylinder in an environment with a high humidity.

Maintenance

⚠ Warning

1. Perform maintenance procedures as shown in the instruction manual.

If it is handled improperly, malfunction or damage of machinery or equipment may occur.

2. Removal of equipment, and supply/exhaust of compressed air

When equipment is serviced, first confirm that measures are in place to prevent dropping of workpieces and run-away of equipment, etc. Then cut the supply pressure and power, and exhaust all compressed air from the system.

When the equipment is to be started again after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc., and then confirm that the equipment is operating normally.

⚠ Caution

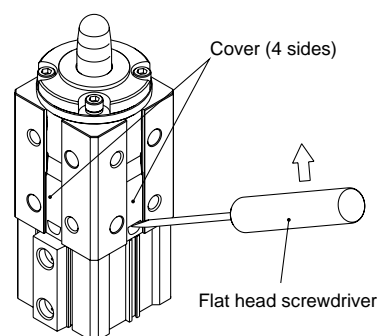
1. If spatter enters the cylinder body, remove it by first detaching the covers. Do not scratch or make dents on the sliding parts of the piston rod by striking it with other objects or grasping them with other objects.

Since the outside diameter of a piston rod is manufactured with a tight tolerance, even a slight deformation can cause an operation malfunction.

Any scratches and dents on the sliding parts of the piston rod can cause damage to the seals, resulting in air leakage.

2. To release the cover, insert a flat head screwdriver in the notch on the cover and apply force.

If a finger is used to remove the cover, the edge of the cover's notch may injure the finger.



3. Drain flushing

Remove drainage from air filters regularly. (Refer to the specifications.)



Series CKQ/CLKQ

Specific Product Precautions 6

Be sure to read before handling.

Operation

Warning

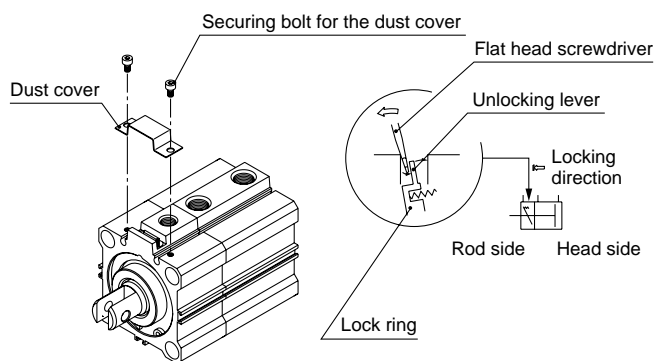
1. Do not unlock when an external force, such as a load or spring force is being applied.

This is very dangerous because the cylinder will move suddenly. Take the following steps.

- 1) Restore the air pressure in the B line of the pneumatic circuit to operating pressure. Once restored, gradually let the air pressure drop.
- 2) If air pressure cannot be used, prevent cylinder movement with a lifting device such as a jack, then release the lock.

2. After all safety precautions have been confirmed, perform the manual release by following the steps shown below.

Carefully confirm that no one is inside the load movement range, that there is no danger even if the load moves suddenly, etc.



How to unlock manually

- 1) Remove the dust cover.
- 2) Insert a flat head screwdriver on the rod side of the manual unlocking lever as shown in the figure above, and lightly push the screwdriver in the direction of the arrow (rod side) to unlock.



Series CKQ/CLKQ

Auto Switch/Precautions 1

Be sure to read before handling.

Design and Selection

⚠ Warning

1. Check the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications of load current, voltage, temperature or impact.

2. Use caution when multiple cylinders are used and close to each other.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40 mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

3. Use caution to the ON time of a switch at the intermediate position of stroke.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great, the operating time will be shortened and the load may not operate properly.

The maximum detectable piston speed is:

$$V \text{ (mm/s)} = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

4. Wiring should be kept as short as possible.

<Reed switches>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

- 1) Use a contact protection box when the wire length is 5 m or longer.

<Solid state switches>

- 2) Although wire length should not affect switch function, use a wire 100 m or shorter.

5. Use caution to the internal voltage drop of a switch.

<Reed switches>

- 1) Switches with an indicator light (Except D-A96/A96V/D-A76H)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



- Similarly, when operating below a specified voltage, it is possible that the load may be ineffective even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator for right. (Model A90/A90V/A80(H)-(C))

<Solid state switches>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also note that a 12 VDC relay is not applicable.

6. Use caution to the leakage current.

<Solid state switches>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

$$\text{Operating current of load (Input OFF current in case of a controller)} > \text{Leakage current}$$

If the condition given in the above formula is not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Reed switches>

If driving a load such as a relay that generates a surge voltage, use a contact protection box.

<Solid state switches>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also perform periodic maintenance inspections and confirm proper operation.

9. Ensure sufficient space for maintenance activities.

When designing an application, be sure to allow sufficient space for maintenance and inspection.



Series CKQ/CLKQ Auto Switch/Precautions 2

Be sure to read before handling.

Mounting and Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (300 m/s² or more for reed switches and 1000 m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of fastening torque, the mounting screws or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position.

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalogue indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), the operation will be unstable.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to the lead wires.

2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned on when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits including auto switches may malfunction due to noise from these other lines.

Wiring

5. Do not allow short circuiting of loads.

<Reed switches>

If the power is turned on with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switches>

Model D-M9□ and all models of PNP output switches do not have built-in short circuit prevention circuits. If loads are short circuited as reed switch, the switches will be instantly damaged.

Use caution to avoid reverse wiring with the brown [red] power supply line and the black [white] output line on 3-wire type switches.

6. Avoid incorrect wiring.

<Reed switches>

A 24 VDC switch with indicator light has polarity. The brown lead wire is (+), and the blue lead wire is (–).

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also note that a current greater than the maximum specified one will damage a light emitting diode and make it inoperable.

Applicable models:

D-A93/A93V/A73/A73H/A73C

<Solid state switches>

1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

2) If connections are reversed (power supply line (+) and power supply line (–) on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue (black) wire and the power supply line (–) is connected to the black (white) wire, the switch will be damaged.

* Lead wire colour changes

Lead wire colours of SMC switches have been changed in order to meet NECA Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided.

Special care should be taken regarding wire polarity during the time that the old colours still coexist with the new colours.

2-wire

	Old	New
Output (+)	Red	Brown
Output (–)	Black	Blue

3-wire

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

Solid state with diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

Solid state with latch type diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange



Series CKQ/CLKQ Auto Switch/Precautions 3

Be sure to read before handling.

Operating Environment

⚠ Warning

- 1. Never use in the presence of explosive gases.**
The construction of our auto switches does not make them explosion-proof. Never use them in the presence of an explosive gas, as this may cause a serious explosion.
- 2. Do not use in an area where a magnetic field is generated.**
Please use magnetic field resistant auto switch.
- 3. Do not use in environments where the auto switches will be constantly exposed to water.**
Although switches satisfy the IEC standard IP67 structure (JIS C 0920: anti-immersion structure), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.
- 4. Do not use in environments with oil or chemicals.**
Please consult with SMC if auto switches will be used in an environment with coolants, cleaning solvents, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.
- 5. Do not use in an environment with temperature cycles.**
Please consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.
- 6. Do not use in environments where there is excessive impact shock.**
<Reed switches>
When excessive impact (300 m/s² or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1 ms or less). Please consult with SMC regarding the need to use a solid state switch depending on the environment.
- 7. Do not use in locations where surges are generated.**
<Solid state switches>
When there are units (solenoid type lifters, high frequency induction furnaces, motors, etc.) which generate a large amount of surge in the area around cylinders with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.
- 8. Avoid accumulation of iron debris or close contact with magnetic substances.**
When a large amount of ferrous debris such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.

Maintenance

⚠ Warning

- 1. Periodically perform the following maintenance to prevent the possible danger resulting from an unexpected auto switch malfunction.**
 - 1) Securely tighten switch mounting screws.
If the screws become loose or the mounting position shifts, readjust the mounting position and retighten the screws.
 - 2) Confirm that the lead wires are not damaged.
If a damaged lead wire is discovered, either replace the switch, or repair the lead wire to prevent faulty wire insulation.
 - 3) Confirm that the green LED on the 2 colour indicator type switch is on.
When the switch is on the set position, confirm that the green LED is on. If the red LED is on, the mounting position is not appropriate. Therefore, readjust the mounting position until the green LED turns on.

Other

⚠ Warning

- 1. Please consult with SMC concerning water resistance, elasticity of lead wires, and use at welding sites.**



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