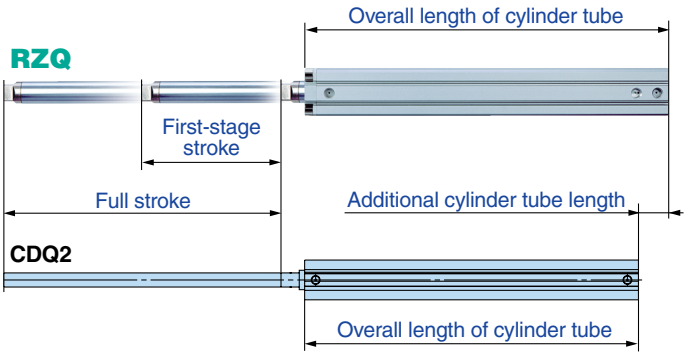
3 Position Cylinder

Provides intermediate stop mechanism

Series RZQ

ø32, ø40, ø50, ø63

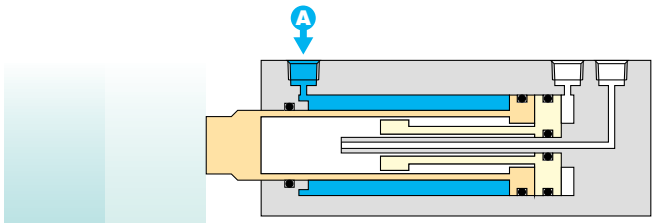
- **2-stage stroke enabled with a small increase in length**



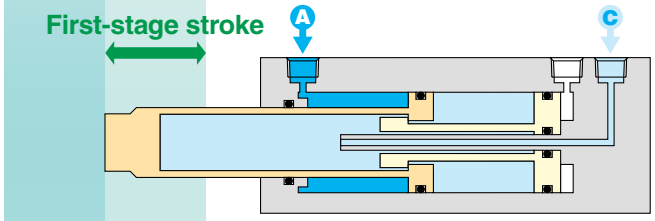
Comparison of cylinder tube overall length (mm)

Full stroke = 300 mm (150 + 150 = 300 mm in case of CG1BN)

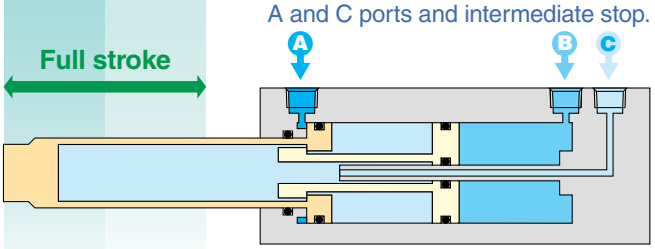
Bore Size (mm)	RZQA□-300-150	CDQ2A□-300D	RZQ-CDQ2 Additional cylinder tube length	CG1BN□-150+150-XC11 Dual stroke cylinder
32	382.5	345.5	37	591
40	392	355	37	606
50	396.5	355.5	41	631
63	402	357.5	44.5	631



①A port pressurization at initial (retracted) position.



②First-stage extension by pressurizing A and C ports and intermediate stop.



③Entire stroke extension by pressurizing A, B and C ports.

- **First-stage stroke can be specified without changing the overall length.**
- **±0.02 or less repeatability in intermediate stop positioning**
  High accuracy is achieved by an intermediate stop method of pressing metallic components against each other
- **First-stage stroke can be freely specified.**
  Standard: Available in 5 mm increments
  Optional: Available in 1 mm increments
- **Large bore tube rod to withstand lateral load**
  Use of a tube rod with a large bore which is 70% the piston diameter
- **Wide variations in mounting**
  Direct mounting: Mounting taps of the same dimensions as those of Series CQ2.
  Through holes are also available for full strokes of 75 mm or less.
  Static mounting: Foot type, Front flange type
  Rotation bracket: Double clevis

3 Position Cylinder

Series RZQ

ø32, ø40, ø50, ø63

How to Order

RZQ | **A** | **32** | | — **200** — **100** — **F9N** | |

Mounting

A	Both ends tapped
B	Through hole
L	Foot
F	Front flange
G	Rear flange
D	Double clevis

Bore size

32	32mm
40	40mm
50	50mm
63	63mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Full stroke
Refer to the standard stroke table.
∗ Full stroke is 75 mm or less in case of RZQB (through hole type).

First-stage stroke
Refer to the standard stroke table.

Auto switch type

Nil	Without auto switch (built-in magnet cylinder)

∗ Refer to the table below for auto switch models.
∗ Auto switch is shipped unmounted (except for D-P5DWL).

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Mounting Bracket Part No.

Bore size (mm)	Foot Note 1)	Flange	Double clevis Note 2)
32	RZQ-L032	RZQ-F032	RZQ-D032
40	RZQ-L040	RZQ-F040	RZQ-D040
50	RZQ-L050	RZQ-F050	RZQ-D050
63	RZQ-L063	RZQ-F063	RZQ-D063

Note 1) When ordering foot brackets, order two pieces per cylinder.
Note 2) The following parts are included with each mounting bracket.
Foot, Flange/Body mounting bolts
Double clevis/Clevis pins, C-type snap ring for axis, Body mounting bolts

Applicable auto switches/Refer to page 5.3-2 of Best Pneumatics Vol. 2 for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage DC	Load voltage AC	Rail mount Perpendicular	Rail mount In-line	Direct mount Perpendicular	Direct mount In-line	Lead wire length∗ (m) 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN)	—	5V	—	—	**A76H**	**A96V**	**A96**	●	●	—	—	—	IC circuit	—
				2-wire	—	—	200V	**A72**	**A72H**	—	—	●	●	—	—	—	—	Relay, PLC
					24V	12V	100V	**A73**	**A73H**	—	—	●	●	●	—	—		
								—	—	**A93V**	**A93**	●	●	—	—	—		
		Connector					—	**A73C**	—	—	—	●	●	●	●	—		
	Diagnostic indication (2-color indicator)	Grommet				—	—	**A79W**	—	—	—	●	●	—	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V,12V	—	**F7NV**	**F79**	**F9NV**	**F9N**	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				**F7PV**	**F7P**	**F9PV**	**F9P**	●	●	○	—	○		
				2-wire		12V		**F7BV**	**J79**	**F9BV**	**F9B**	●	●	○	—	○	—	
		Connector						**J79C**	—	—	—	●	●	●	●	—		
	Diagnostic indication (2-color indicator)	Grommet		3-wire (NPN)		5V,12V		**F7NWV**	**F79W**	**F9NWV**	**F9NW**	●	●	○	—	○	IC circuit	
				3-wire (PNP)				—	**F7PW**	**F9PWV**	**F9PW**	●	●	○	—	○		
				2-wire		12V		**F7BWV**	**J79W**	**F9BWV**	**F9BW**	●	●	○	—	○	—	
	Water resistant (2-color indicator)							—	**F7BA**	—	**F9BA**	—	●	○	—	○		
								F7BAV	—	—	—	—	●	○	—	—		
	With diagnostic output (2-color display)			4-wire (NPN)		5V,12V		—	**F79F**	—	—	●	●	○	—	○	IC circuit	
	Latch type with diagnostic output (2-color display)					—		—	**F7LF**	—	—	●	●	○	—	○	—	
	Magnetic field resistant (2-color display)			2-wire				—	**P5DW**	—	—	—	●	●	—	○		

∗ Auto switches marked with a "○" symbol are produced upon receipt of order.

∗ Lead wire length symbols: 0.5m ..... Nil (Example) A73C
3m ..... L A73CL
5m ..... Z A73CZ
None ..... N A73CN

• D-P5DWL is available in sizes ø40 to ø63.
• In addition to the models in the above table, there are some other auto switches that are applicable. For more information, refer to page 13.

Specifications

Bore size (mm)	32	40	50	63
Action	Double acting single rod			
Fluid	Air			
Proof pressure	1.5MPa			
Maximum operating pressure	1.0MPa			
Minimum operating pressure	0.1MPa			
Ambient and fluid temperature	–10 to 60°C (with no freezing)			
Lubrication	Non-lube			
Operating piston speed	50 to 300mm/s			
Stroke length tolerance	+1.0 0			
Cushion	Rubber bumper			
Thread tolerance	JIS class 2			
Port size (Rc,NPT,G)	1/8		1/4	

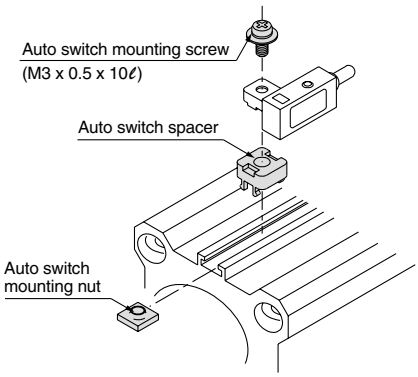
Auto switch mounting bracket/Part No. (Rail mount)

Bore size (mm)	Mounting Bracket Part No.	Note
32, 40 50, 63	BQ-2	• Switch mounting screws (M3 x 0.5 x 10ℓ) • Switch spacer • Switch mounting nut

Applicable switch	
Reed switch	Solid state switch
D-A7□, A80 D-A73C, A80C D-A7□H, A80H D-A79W	D-F7□, J79 D-F7□V D-J79C D-F7□W, J79W D-F7□WV D-F7BAL D-F7□F D-F7NTL

[Stainless steel mounting screw kit]
Use the following stainless steel mounting screw kit (including nuts) if the operating environment requires. (Auto switch spacer must be ordered separately.)
BBA2: D-A7/A8/F7/J7

The above stainless steel screw kit is used for water resistant auto switch type D-F7BAL when they are shipped mounted on a cylinder.
Also, BBA2 is included when an auto switch alone is shipped.



Standard Strokes

Full stroke Note 1)	25, 50, 75, 100, 125, 150, 175, 200, 250, 300
First-stage stroke Note 2)	5 mm to "Full stroke" –5 mm

Note 1) RZQB (through hole type) is only available for full strokes 25, 50 and 75.
Note 2) Available in 1 mm increments.

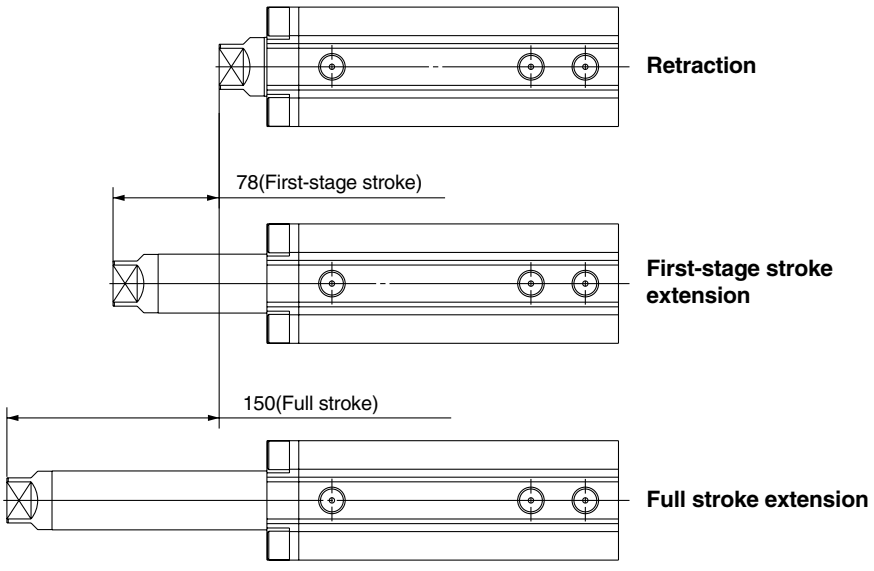
Manufacture of intermediate strokes

Method	Spacers installed in standard stroke body.
Ordering	Refer to standard part number and ordering on page 1.
Description	Strokes are available in 5 mm increments by installing spacers in standard stroke cylinders.
Stroke range	Only available for full strokes of 5 to 295 mm
Example	Part number: RZQA50-135-50 A 15 mm spacer is installed in a standard cylinder RZQA50-150-50. The B dimension is 246.5 mm.

How to order strokes

RZQA32-150-78

- First-stage stroke
- Full stroke



∗ Consult SMC for intermediate strokes of a full stroke.

Theoretical Output

Theoretical Output Table 1

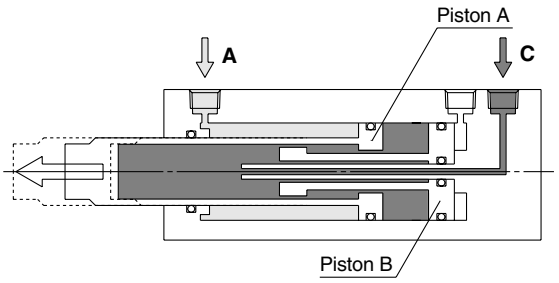
[N]

Bore size (mm)	Piston area [mm²]				Air pressure [MPa] (with same air pressure applied to each port)											
					First stage						Second stage					
	Piston A		Piston B		Extension			Retraction			Extension			Retraction		
	Front side ①*	Rear side ②*	Front side ③*	Rear side ④*	0.3	0.5	0.7	0.3	0.5	0.7	0.3	0.5	0.7	0.3	0.5	0.7
32	410	804	792	792	118	197	276	123	205	287	118	197	276	119	199	279
40	641	1257	1244	1244	185	308	431	192	321	449	185	308	431	188	314	440
50	1001	1963	1935	1935	289	481	673	300	501	701	289	481	673	292	487	681
63	1527	3117	3067	3067	477	795	1113	458	764	1069	477	795	1113	443	739	1034

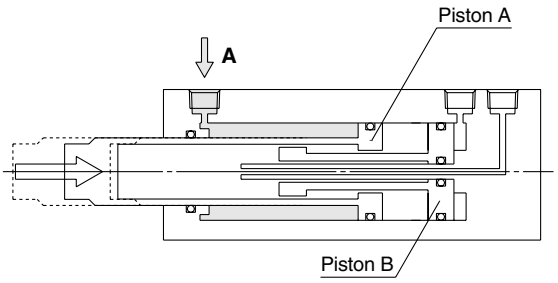
Theoretical Output

Action	First stage			Second stage				
	Extension		Retraction	Extension			Retraction	
Pressure port	A	C	A	A	B	C	A	C
Air pressure [MPa]	P_A	P_C	P_A	P_A	P_B*	P_C*	P_A	P_C
Formula for theoretical output F[N]	F=-① x P_A+② x P_C		F=① x P_A	F=-① x P_A+④ x P_B+(②-③) x P_C			F=① x P_A+(③−①) x P_C	

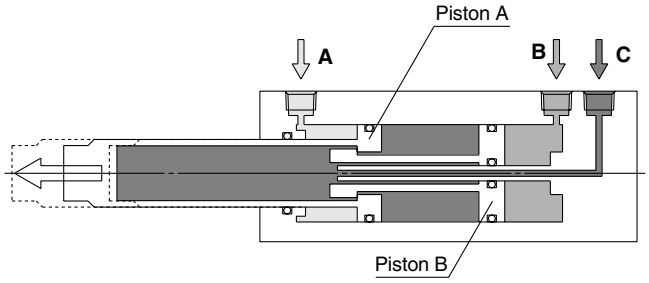
* ①, ② and ③ are piston areas. (Refer to Table 1.)
* Assume $P_B \leqq P_C$.



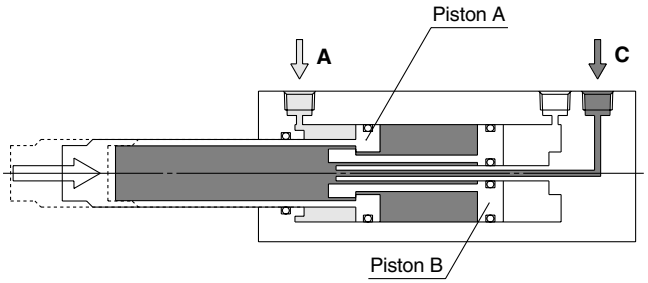
First-stage extension



First-stage retraction



Second-stage extension



Second-stage retraction

Weight

Weight Table

Unit: kg

Bore size (mm)	Cylinder stroke									
	25-5	**50-5**	**75-5**	**100-5**	**125-5**	**150-5**	**175-5**	**200-5**	**250-5**	**300-5**
32	0.81	0.88	0.94	1.01	1.07	1.13	1.20	1.26	1.39	1.52
40	1.19	1.27	1.35	1.43	1.50	1.58	1.66	1.73	1.89	2.04
50	1.80	1.92	2.04	2.16	2.28	2.40	2.52	2.64	2.89	3.13
63	2.53	2.71	2.87	3.04	3.20	3.36	3.53	3.69	4.02	4.35

Note) Calculate the first-stage stroke referring to the values for "10 mm increase" in the Additional Weight Table 2 below.

Additional Weight Table 2

Unit: kg

Item	Model	Bore size (mm)			
		32	**40**	**50**	**63**
10 mm increase of first-stage stroke	**RZQ□**	3	3	6	15
Foot type (including bolts)	**RZQL**	143	155	243	324
Flange type(including bolts)	**RZQG,RZQF**	165	198	348	534
Double clevis type (including bolts, pins and snap ring)	**RZQD**	151	196	393	554

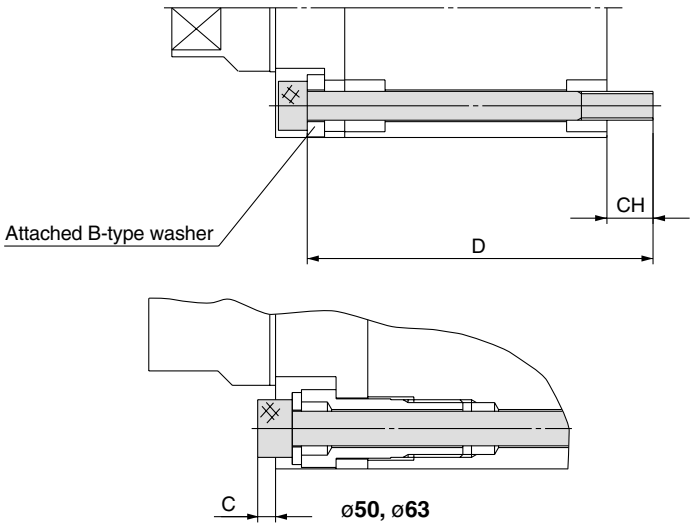
Note) Add the weight in Table 2 to those in Weight Table.

RZQ Mounting Bolt

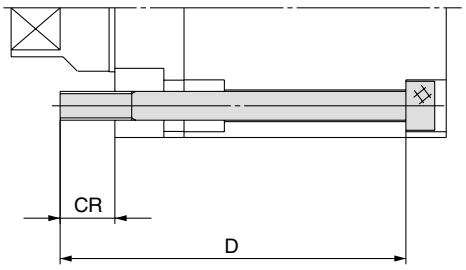
Mounting / Mounting bolts for the through hole type RZQB are available.
How to order: Add "Bolt" in front of the bolts to be used.

(Example) Bolt M5 x 110ℓ
(Two bolts are necessary per cylinder)

Head side mounting



Rod side mounting



Note) Use the attached washer when inserting the bolt from the rod side.

RZQ mounting bolt

Model	CH	CR	C	D	Mounting bolt
RZQB32-25-□	8	9.5	–	110	M5 x 110ℓ
RZQB32-50-□				135	M5 x 135ℓ
RZQB32-75-□				160	M5 x 160ℓ
RZQB40-25-□	8.5	10	–	120	M5 x 120ℓ
RZQB40-50-□				145	M5 x 145ℓ
RZQB40-75-□				170	M5 x 170ℓ
RZQB50-25-□	11.5	16.5	3	130	M6 x 130ℓ
RZQB50-50-□				155	M6 x 155ℓ
RZQB50-75-□				180	M6 x 180ℓ
RZQB63-25-□	12.5	17.5	3.5	135	M8 x 135ℓ
RZQB63-50-□				160	M8 x 160ℓ
RZQB63-75-□				185	M8 x 185ℓ

Model Selection

Selection chart for pneumatic circuit and selection graph

Select the pneumatic circuit and selection graph according to the following chart.

1) Transfer direction of load

Vertical movement / Horizontal movement → **Circuit A, Graph 1**

(* Load is received by guide.)

2) Cylinder orientation

Up / Down → **Circuit A, Graph 2**

3) Cylinder load ratio

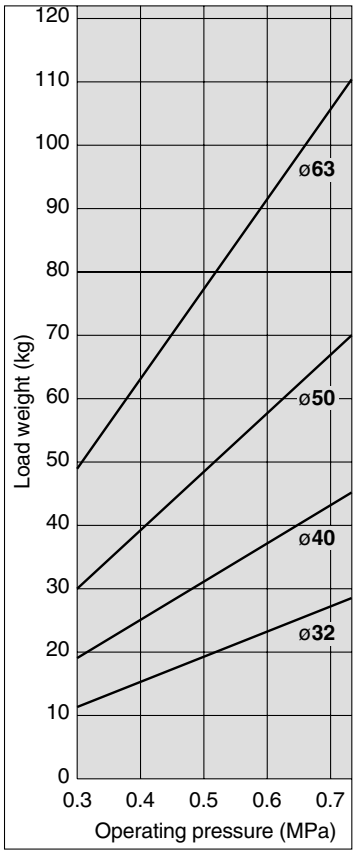
0.25 to 0.5 / Less than 0.25 → **Circuit B, Graph 2**

Circuit C, Graph 1, Minimum load weight = Graph 2

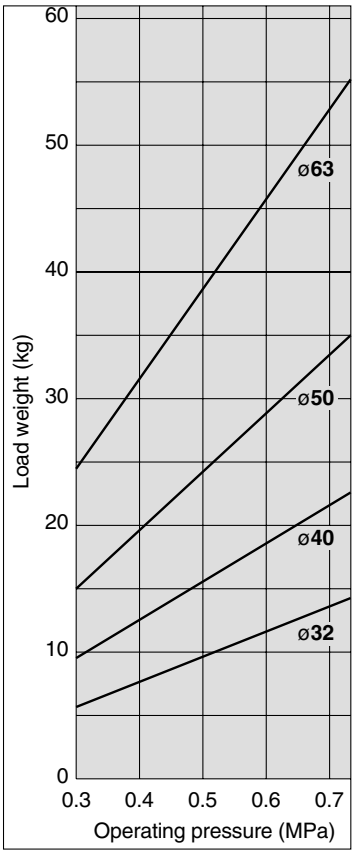
Selection graph

The optimum size is determined from the intersection of the operating pressure and load weight.

Graph 1



Graph 2



Selection example

Selection conditions: Transfer direction: Vertical movement
Cylinder orientation: Down
Load weight: 15 kg
Operating pressure: 0.4 MPa

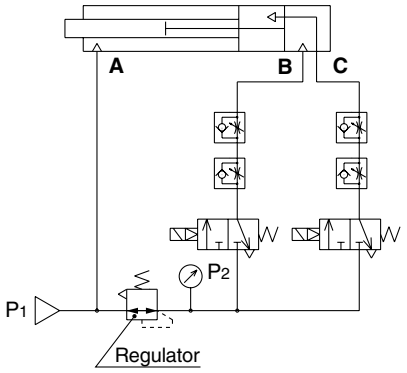
→ Circuit A and Graph 2 are selected according to the chart.

Find the intersection of an operation pressure of 0.4 MPa and load weight of 15 kg in Graph 2.

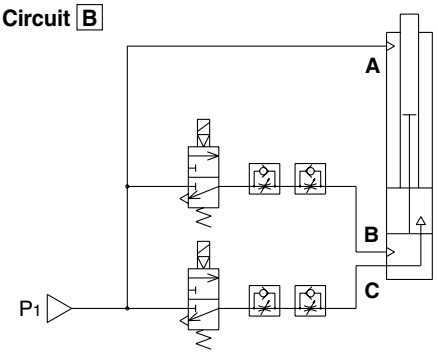
→ ø50 is selected.

Pneumatic circuit

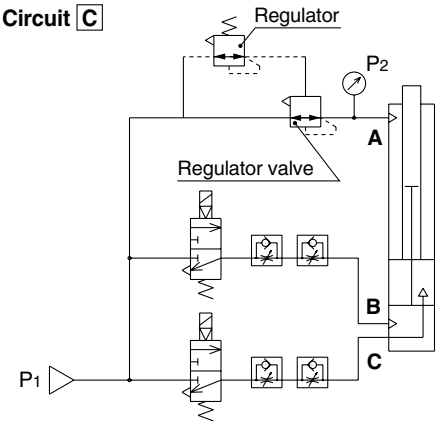
Circuit A



Circuit B



Circuit C



Confirmation of allowable kinetic energy

Confirm the internal stopper strength at extension and retraction ends in the graph on page 7.

Pneumatic Circuit Adjustment

Regulator set pressure

Set the pressures of circuit A and circuit C regulators at values found by the formula in the following table.

Circuit	Orientation	Bore size (mm)	**P_2 [MPa]**
A	Horizontal	–	$0.75P_1$
A	Down	32	$0.75P_1-0.012m$
		40	$0.75P_1-0.0078m$
		50	$0.75P_1-0.0050m$
		63	$0.75P_1-0.0031m$
C	Up	32	$1.5P_1-0.024m$
		40	$1.5P_1-0.016m$
		50	$1.5P_1-0.010m$
		63	$1.5P_1-0.0063m$

P_1: Operating pressure [MPa], m: Load weight [kg]

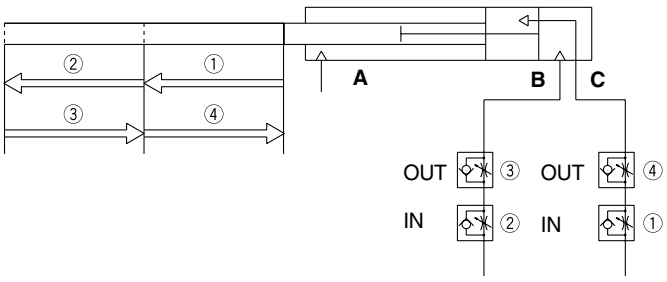
∗ In cases with load fluctuations, substitute the median value of the weight.

Example) Assume circuit C with an operating pressure of 0.5 MPa, load weight of 10 kg, fluctuation to 20 kg and a cylinder bore of 32 mm.

→ $P_2 = 1.5 \times 0.5-0.024 \times 15 = 0.39$ MPa

Speed Adjustment

The data below illustrates the strokes controlled by the respective speed controllers. Gradually increase from a low speed to the desired speed setting.



OUT: Meter-out
IN: Meter-in

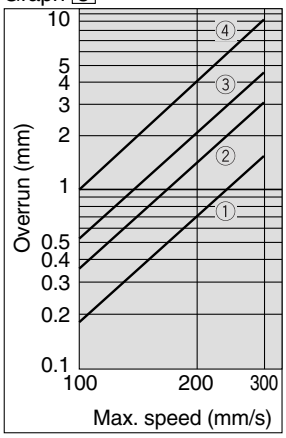
Overrun at intermediate stop

When stopping at an intermediate point, the cylinder first moves the piston past the intermediate point and then returns it. To confirm this distance of an extra travel (overrun) in Graph 3, Lines ① to ④ can be selected from the following table.

Circuit	Orientation	Movement	Line
A	Horizontal	Extension	③
		Retraction	④
A	Down	Extension	③
		Retraction	③
B	Up	Extension	①
		Retraction	③
C	Up	Extension	②
		Retraction	④

∗ The above values are for cases where the maximum payload found by the selection method is loaded.

Graph 3



Change of the return point at the time of power failure

At the time of power failure, circuits A to C return the piston to the retraction end.
To return the piston to the intermediate point at the time of power failure, add changes to the 3 port valve on the cylinder rear side so that it will be normally open.
To return the piston to the extension end at the time of power failure, add changes to both 3 port valves so that they will be normally open.

Change to motion holding circuit

To hold the present motion at the time of power failure instead of performing a return to the specified stop point, change both 3 port valves to 5 port double valves and plug A or B port, whichever is open.

Series RZQ
Specific Product Precautions

Be sure to read before handling.

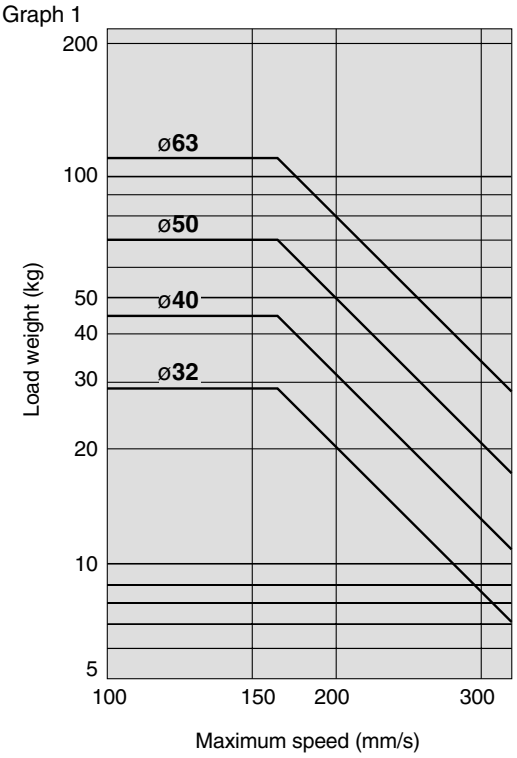
Selection

⚠ Caution

1. Keep the relation between the load weight and the maximum speed below the limit lines in Graph 1. If it exceeds the limit line, receive the load with an external stopper.

Operation beyond the limiting lines will cause damage to machinery.

Graph 1



2. Use the cylinder in applications in which the overrun will not cause any problem.

When stopping at an intermediate point, this cylinder first moves the piston past the intermediate point and then returns it. Confirm this distance of an extra travel (overrun) in Graph 3 on page 6 and use the cylinder in applications in which the overrun will not cause any problem.

3. In cases where a positioning repeatability of 0.1 mm or less is required at the retraction and extension ends, use an external stopper for stops.

Use of an internal stopper will result in approximately 0.1 mm of displacement due to changes in the operating pressure and external forces.

4. Use an external guide to receive a moment or torque which can generate a load.

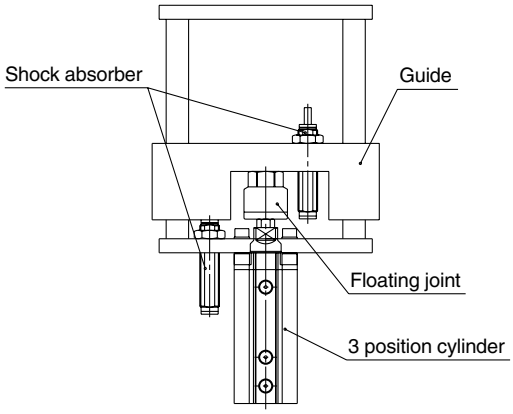
If a moment or torque directly acts on the cylinder, it will lead to reduced service life or damage to machinery.

Selection

5. To connect a direct acting guide, use floating joints in the following table.

If the direct acting guide is directly connected in operation, it may lead to malfunction or reduced service life.

Model	Applicable floating joint
RZQ□32	JB40-8-125
RZQ□40,50	JB63-10-150
RZQ□63	JB80-16-200



Maintenance

⚠ Caution

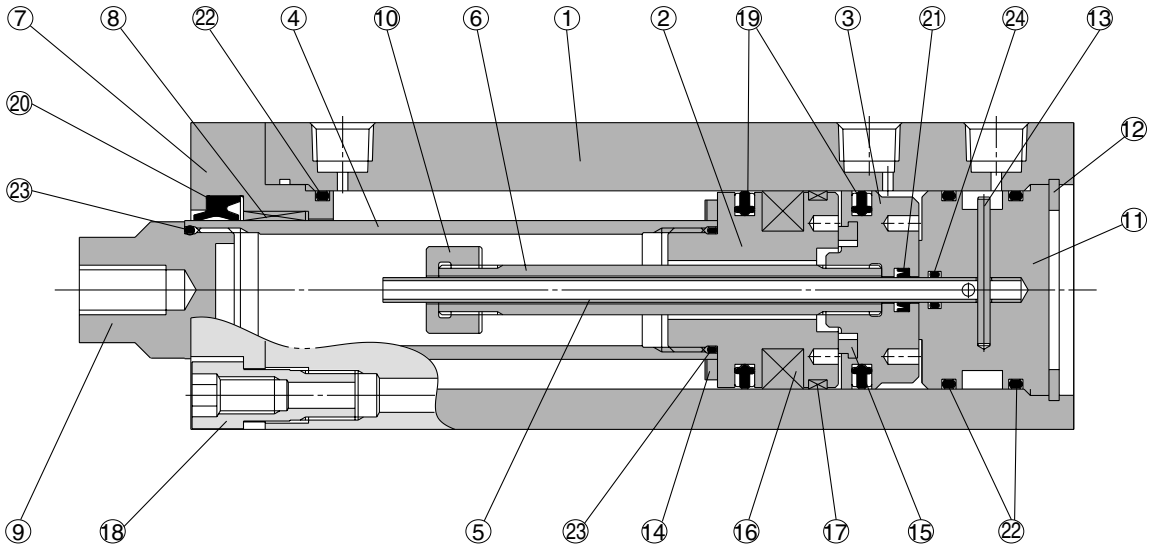
1. If reapplication of grease is needed, apply grease specifically provided for this purpose:

Grease: Product name: Grease pack
Part No.: 10 g GR-L-010
150 g GR-L-150

2. When dynamic seals are replaced, use a seal kit provided for each bore size.

Dedicated seal kit: Refer to Construction on page 8.

Construction



Parts list

No.	Description	Material	Note
1	**Cylinder tube**	Aluminum alloy	Hard anodized
2	**Piston A**	Aluminum alloy	Chromated
3	**Piston B**	Aluminum alloy	Chromated
4	**Tube rod**	Carbon steel	Hard chrome plated
5	**Inner pipe**	Stainless steel	
6	**Outer pipe**	Carbon steel	Zinc chromated
7	**Rod cover**	Aluminum alloy	White hard anodized
8	**Bushing**	Special friction lining	
9	**Tube rod cover**	Carbon steel	Electroless nickel plated
10	**Nut**	Carbon steel	Zinc chromated
11	**Head cover**	Aluminum alloy	Colorless chromated
12	**Snap ring**	Carbon tool steel	Phosphate coated

No.	Description	Material	Note
13	**Parallel pin**	Carbon steel	
14	**Bumper A**	Polyurethane	
15	**Bumper B**	Polyurethane	
16	**Magnet**	Synthetic rubber	
17	**Wear ring**	Resin	
18	**Fitting bolt**	Carbon steel	Nickel plated
19	**Piston seal**	NBR	
20	**Rod seal A**	NBR	
21	**Rod seal B**	NBR	
22	**Gasket A**	NBR	
23	**Gasket B**	NBR	
24	**Gasket C**	NBR	

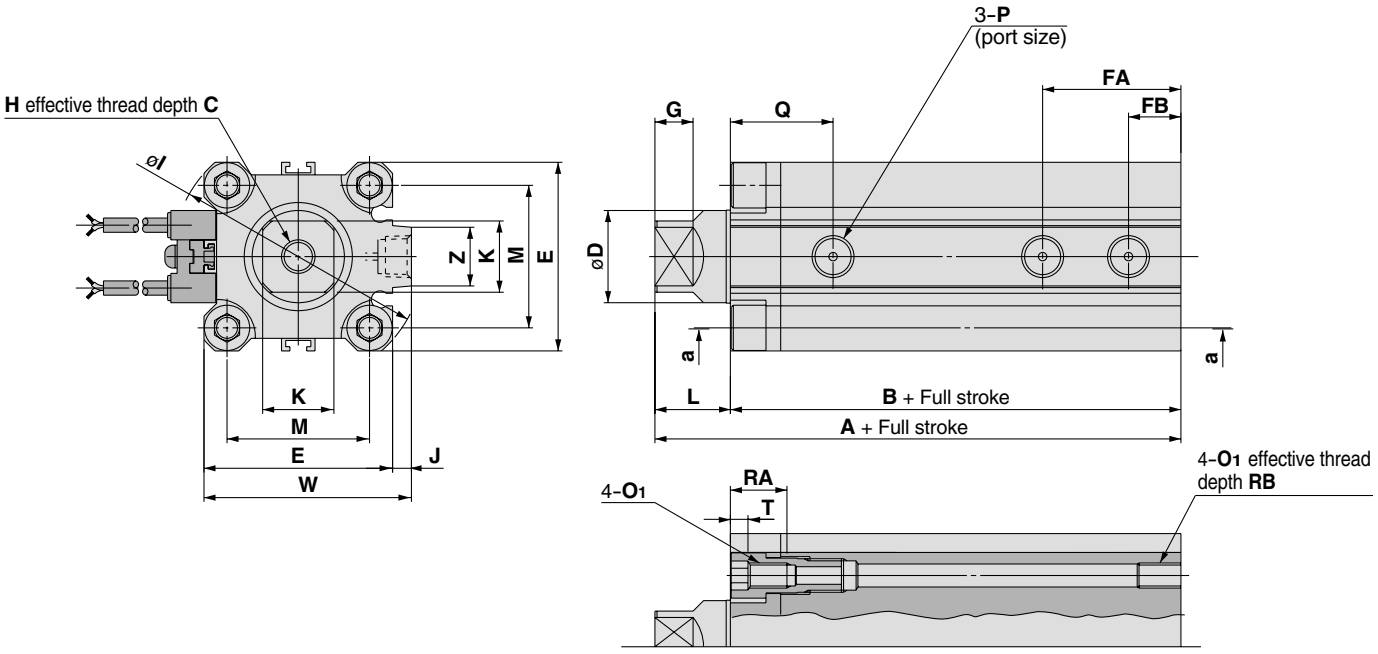
Replacement parts list/Seal kits

Bore size (mm)	Seal kit No.	Contents
32	**RZQ32-PS**	A set of Nos. 19, 20, 21, 22 and 24 from the table above
40	**RZQ40-PS**	
50	**RZQ50-PS**	
63	**RZQ63-PS**	

∗ Seal kits are sets consisting of items 19, 20, 21, 22 and 24 and can be ordered using the seal kit number for each cylinder bore size.

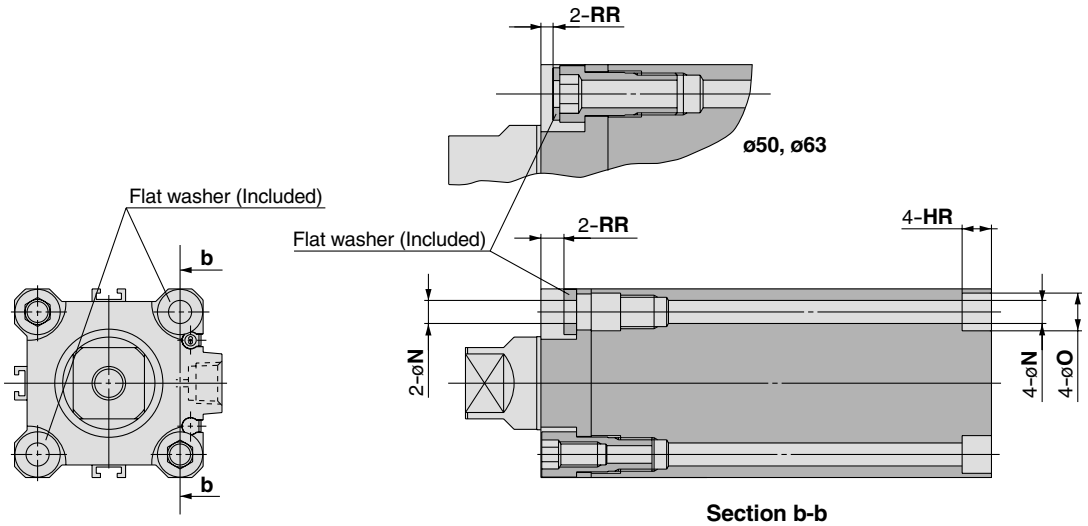
Dimensions

Standard type (Double end tapped type)/RZQA



Section a-a

Standard type (Through hole type)/RZQB

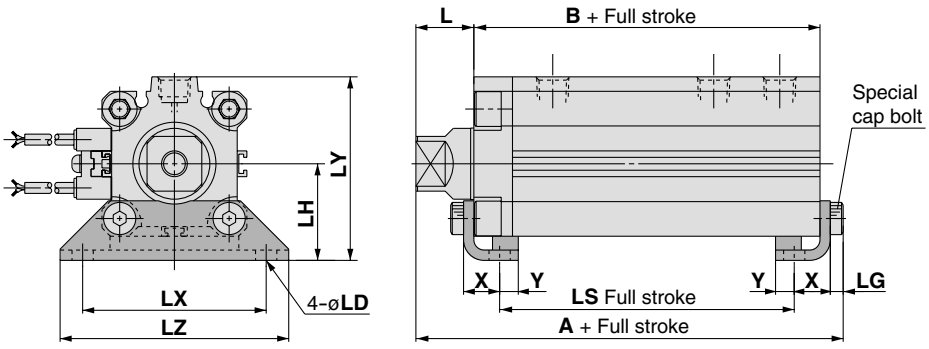


Section b-b

(mm)

Bore size (mm)	A	B	C	D	E	FA	FB	G	H	I	J	K	L	M	N	O1	O	P	Q	RA	RB	RR	RH	T	W	Z
32	100.5	82.5	14	22.4	45	33	12.5	9	M8 x 1.25	60	4.5	17	18	34	5.5	M6 x 1.0	9	Rc1/8	24.5	14	10	5.5	7	4.5	49.5	14
40	110	92	16	28	52	35	14	9	M10 x 1.5	69	5	24	18	40	5.5	M6 x 1.0	9	Rc1/8	26	14	10	5.5	7	4.5	57	14
50	118.5	96.5	16	35	64	37	14	12	M10 x 1.5	86	7	30	22	50	6.6	M8 x 1.25	11	Rc1/4	30	17	14	3	8	5.5	71	19
63	130	102	21	45	77	39.5	16.5	15	M16 x 2.0	103	7	36	28	60	9	M10 x 1.5	14	Rc1/4	36.5	21.5	18	4.5	10.5	6.5	84	19

Foot type/RZQL

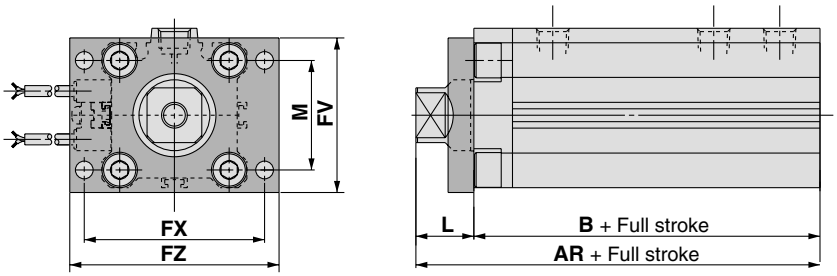


Foot type (mm)

Bore size (mm)	A	B	L	LD	LG	LH	LS
32	107.7	82.5	18	6.6	4	30	66.5
40	117.2	92	18	6.6	4	33	76
50	126.7	96.5	22	9	5	39	73.5
63	138.2	102	28	11	5	46	76

Bore size (mm)	LX	LY	LZ	X	Y
32	57	57	71	11.2	5.8
40	64	64	78	11.2	7
50	79	78	95	14.7	8
63	95	91.5	113	16.2	9

Front flange type/RZQF

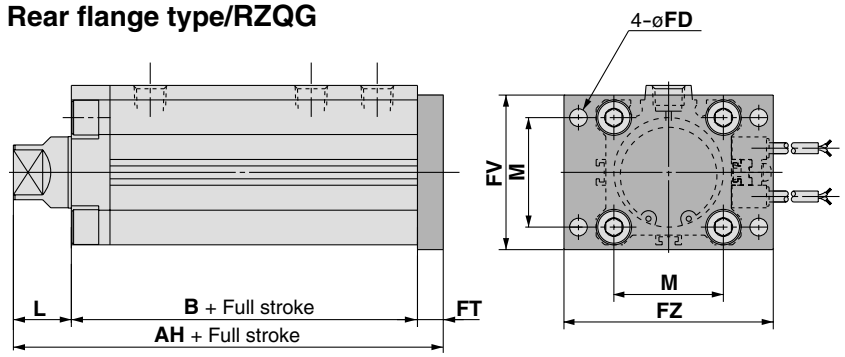


Flange (mm)

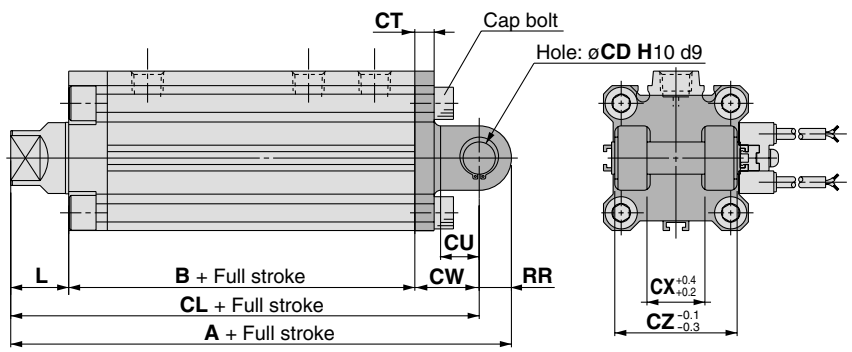
Bore size (mm)	AR	AH	B	FD	FT	FV	FX
32	100.5	108.5	82.5	5.5	8	50	56
40	110	118	92	5.5	8	56	62
50	118.5	127.5	96.5	6.6	9	67	76
63	130	139	102	9	9	90	92

Bore size (mm)	FZ	L	M
32	65	18	34
40	72	18	40
50	90	22	50
63	108	28	60

Rear flange type/RZQG



Double clevis type/RZQD



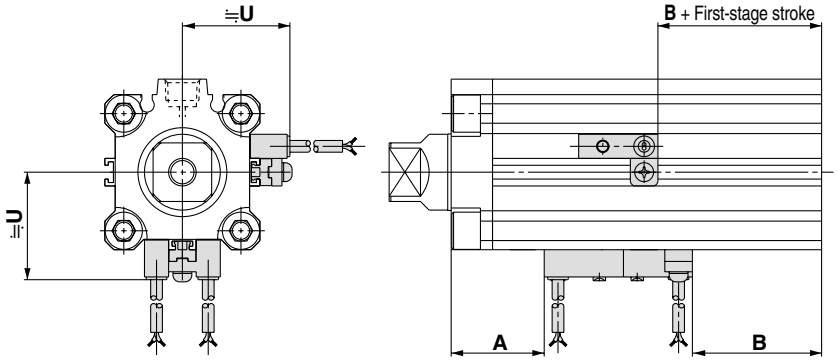
Double clevis (mm)

Bore size (mm)	A	B	CD	CL	CT	CU	CW
32	112.5	82.5	10	102.5	5	14	20
40	124	92	10	114	6	14	22
50	134.5	96.5	14	124.5	7	20	28
63	146	102	14	132	8	20	30

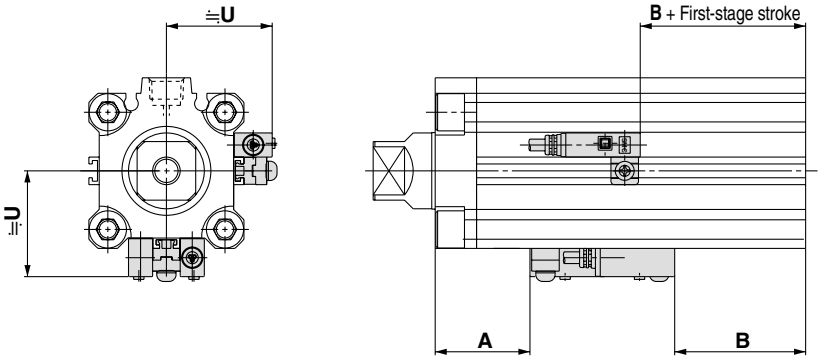
Bore size (mm)	CX	CZ	RR
32	18	36	10
40	18	36	10
50	22	44	14
63	22	44	14

Auto Switches Proper Mounting Position(For Detection of Piston A Stop Position) and Mounting Height

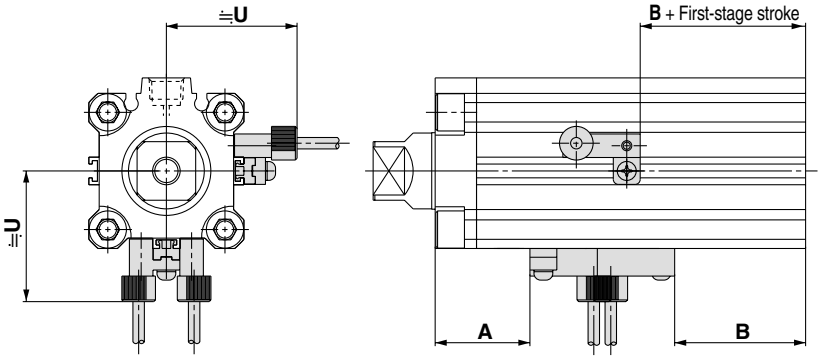
D-A7□
D-A80



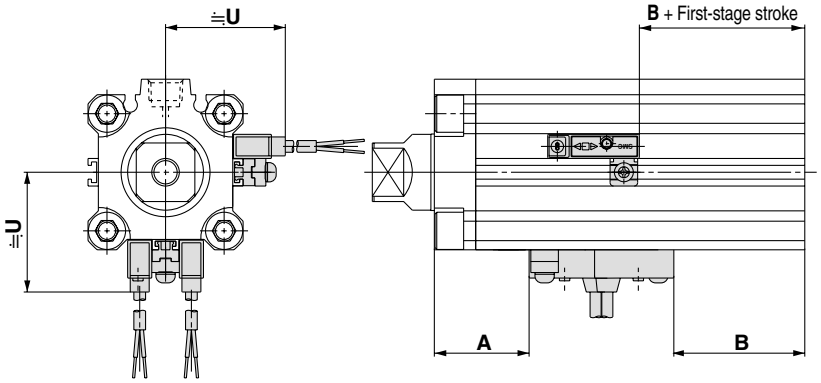
D-A7□H
D-A80H
D-F7□
D-J79
D-F7□W
D-J79W
D-F7□F
D-Y7NTL
D-F7BAL



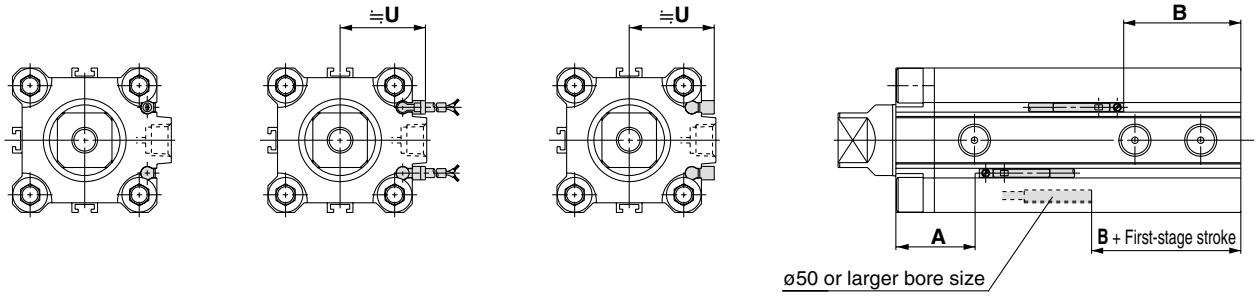
D-A73C
D-A80C
D-J79C



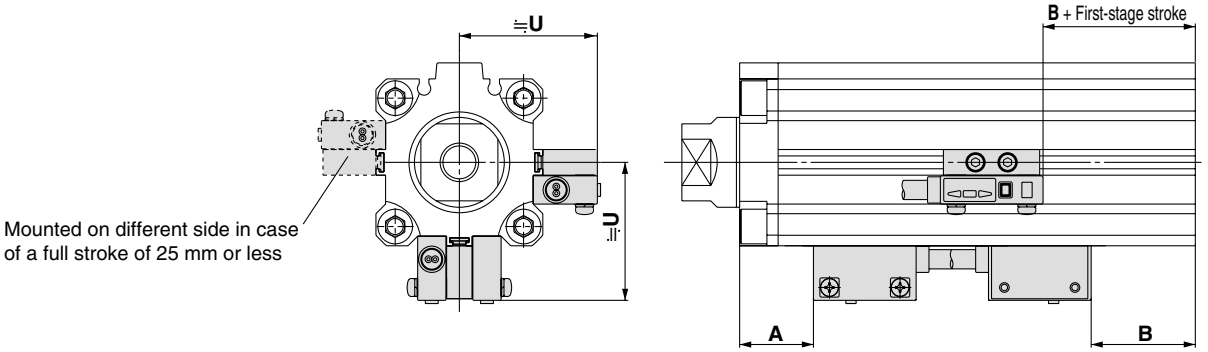
D-A79W
D-F7□WV
D-F7□V
D-F7BAVL



D-A9□ **D-A9□V** **D-F9BAL**
D-F9□ **D-F9□V**
D-F9□W **D-F9□WV**



D-P5DW
ø40, 50, 63



Proper mounting position

[mm]

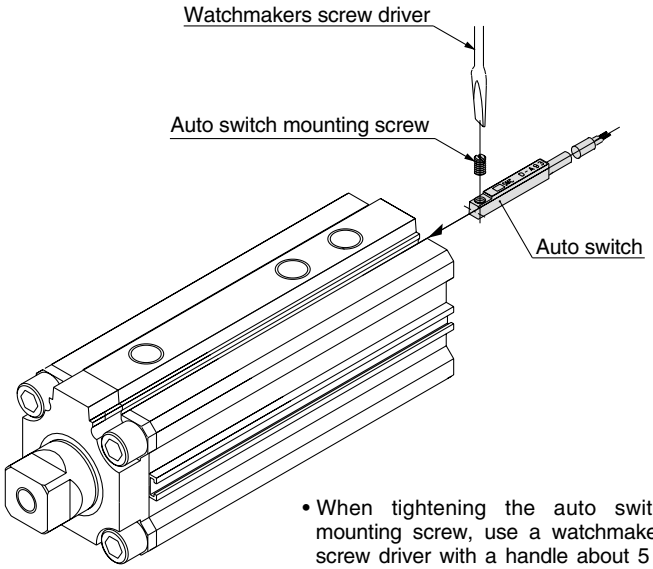
Bore size (mm)	D-A7□,A80		D-A7□H,A80H D-A73C,A80C D-F7□,J79,J79W D-F7□V,J79C D-F7□W,F7□WV D-F7BAL,F7BAVL D-F79F		D-A79W		D-F7LF		D-A9□ D-A9□V		D-F9□ D-F9□V D-F9□W D-F9□WV		D-F9BAL		D-P5DWL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
32	27	37.5	27.5	38	24.5	35	31.5	42	26	36.5	30	40.5	29	39.5	—	—
40	31	43	31.5	43.5	28.5	40.5	35.5	47.5	30	42	34	46	33	45	27	39
50	33.5	44	34	44.5	31	41.5	38	48.5	32.5	43	36.5	47	35.5	46	29.5	40
63	37	47	37.5	47.5	34.5	44.5	41.5	51.5	36	46	40	50	39	49	33	43

Bore size (mm)	D-A7□,A80	D-A7□H,A80H D-F7□,D-F7□F D-J79,J79W D-F7□W D-F7BAL D-F7NTL	D-A73C D-A80C	D-F7□V D-F7□WV D-F7BAVL	D-J79C	D-A79W	D-A9□V	D-F9□V D-F9□WV	D-F9BAL	D-P5DWL
	U	U	U	U	U	U	U	U	U	U
32	31.5	32.5	38.5	35	38	34	27	29	26.5	—
40	35	36	42	38.5	41.5	37.5	30.5	32.5	30	44
50	41	42	48	44.5	47.5	43.5	36.5	38.5	36	50
63	47.5	48.5	54.5	51	54	50	40	42	39.5	56.5

Auto Switch Mounting

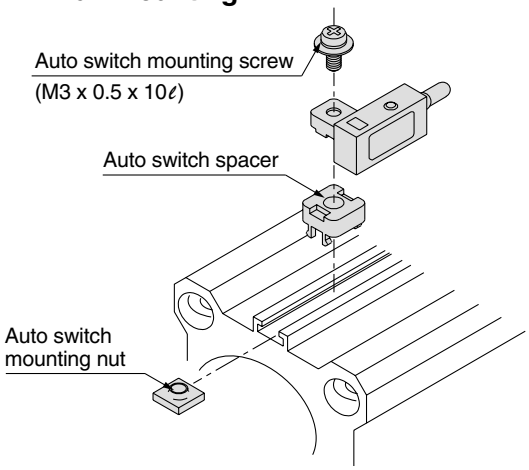
Follow the procedures below to mount auto switches.

Direct mounting



- When tightening the auto switch mounting screw, use a watchmakers screw driver with a handle about 5 to 6mm in diameter. Tighten with a torque of 0.10 to 0.20N·m.

Rail mounting



- Apply a tightening torque of 0.5 to 0.7N·m to the auto switch mounting screw.

* Auto switch mounting brackets are included with a cylinder with built-in magnet.

In addition to the models listed in "How to Order" the following auto switches can be mounted.
Refer to page 5.3-2 of Best Pneumatics Vol. 2 for detailed specifications.

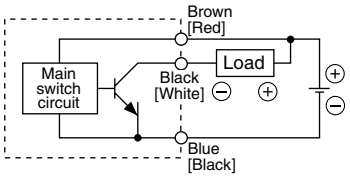
Auto switch type	Part No.	Electrical entry	Features	Applicable bore size
Reed switch	D-A80	Grommet (perpendicular)	Without indicator light	ø12 to ø160
	D-A80H	Grommet (in-line)		
	D-A80C	Connector (perpendicular)		
	D-Z80	Grommet (in-line)		ø125 to ø200
	D-A90	Grommet (in-line)		ø32 to ø100
	D-A90V	Grommet (perpendicular)		
Solid state switch	D-F7NTL	Grommet (in-line)	With timer	ø12 to ø160

* D-F7NTL is also available with pre-wired connector.
* Normally closed type (NC = b contact) solid state auto switches are also available (D-F9G, F9H, Y7G, Y7H)

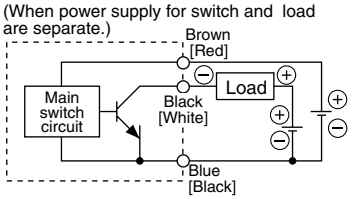
Series RZQ
Auto Switch Connections and Examples

Basic Wiring

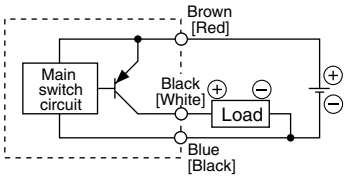
Solid state 3-wire, NPN



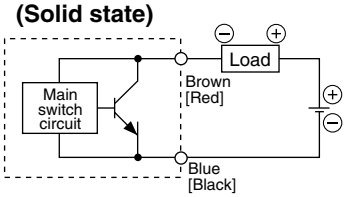
(When power supply for switch and load are separate.)

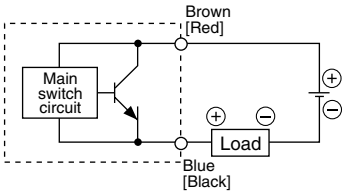


Solid state 3-wire, PNP

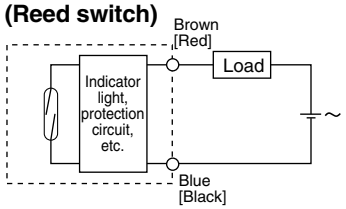


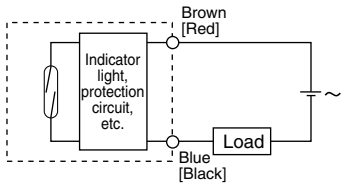
2-wire (Solid state)





2-wire (Reed switch)

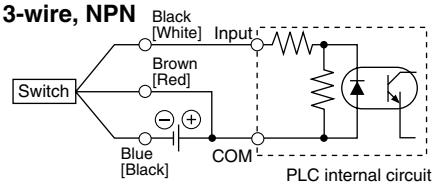




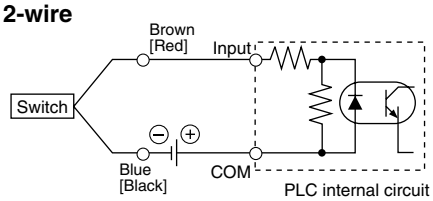
Examples of Connection to PLC

Sink input specifications

3-wire, NPN

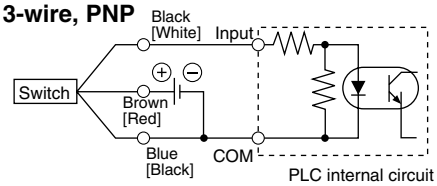


2-wire

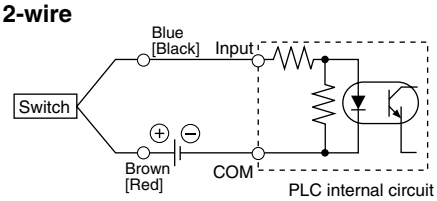


Source input specifications

3-wire, PNP



2-wire

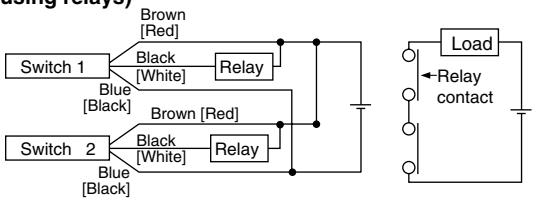


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

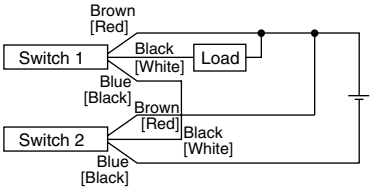
Connection Examples for AND (Series) and OR (Parallel)

3-wire

AND connection for NPN output (using relays)

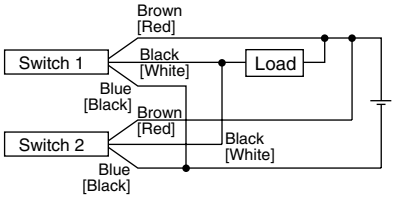


AND connection for NPN output (performed with switches only)

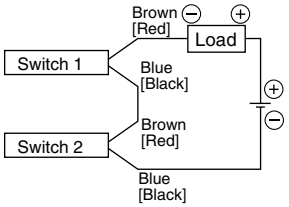


The indicator lights will light up when both switches are turned ON.

OR connection for NPN output



2-wire with 2 switches 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 if both of the switches are in the ON state.

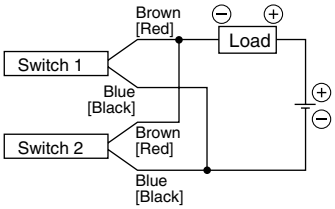
$$\text{Load voltage at ON} = \frac{\text{Power supply voltage}}{} - \frac{\text{Residual voltage}}{} \times 2 \text{ pcs.}$$

$$= 24\text{V} - 4\text{V} \times 2 \text{ pcs.}$$

$$= 16\text{V}$$

Example: Power supply is 24VDC
Voltage decline in switch is 4V

2-wire with 2 switches OR connection



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

$$\text{Load voltage at OFF} = \frac{\text{Leakage current}}{} \times 2 \text{ pcs.} \times \frac{\text{Load impedance}}{}$$

$$= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}\Omega$$

$$= 6\text{V}$$

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

(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 get dark or not light up, because of dispersion and reduction of the current flowing to the switches.

Series RZQ
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 a label 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: Pneumatic system axiom

⚠ 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 catalog information with a view to giving due consideration to any possibility of equipment failure when constructing a system.

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

Compressed air can be dangerous if handled incorrectly. 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 after confirmation of safe locked-out control positions.
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. (Bleed air into the system gradually to create back pressure.)

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, 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 RZQ
Actuator Precautions 1

Be sure to read before handling.

Design

⚠ Warning

1. There is a danger of sudden action by air cylinders if sliding parts of machinery are twisted, etc. and changes in forces occur.

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. Conduct adjustment to ensure smooth movement of the machine and plan a design to avoid human injury.

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

If a driven object or moving parts of the cylinder pose a danger of personal injury, 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.

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

4. A deceleration circuit or shock absorber, etc., may be required.

When a driven object is operated at a high speed or the load is heavy, the cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact. In this case, the rigidity of the machinery should also be examined.

5. Consider a possible drop in operating pressure due to a power outage, etc.

When a cylinder is used in a clamping mechanism, there is a danger of work pieces dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and/or human injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

6. Consider a possible loss of power source.

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

7. Design circuitry to prevent sudden lurching of driven objects.

When a cylinder is driven by an exhaust center type directional control valve or when it starts-up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will shoot out at a high speed if pressure is applied to one side of the cylinder because of the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits designed to prevent sudden shoot-outs because, there is a danger of human injury and/or damage to equipment when this occurs.

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.

Selection

⚠ Warning

1. Confirm the specifications.

The products advertised in this catalog are designed according to use in industrial compressed air systems. If the products are used in conditions where pressure, temperature, etc., are out of specifications, damage and/or malfunction may be caused. Do not use in these conditions. (Refer to specifications.)

Consult SMC if you use a fluid other than compressed air.

⚠ Caution

1. Operate within the limits of the maximum usable stroke.

The piston rod will be damaged if operated beyond the maximum stroke. Refer to the air cylinder model selection procedure for the maximum useable stroke.

2. Operate the piston within a range such that collision damage will not occur at the stroke end.

Operate within a range such that damage will not occur when the piston, having inertial force, stops by striking the cover at the stroke end. Refer to the cylinder model selection procedure for the range within which damage will not occur.

3. Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.

Mounting

⚠ Caution

1. Be certain to match the rod shaft center with the direction of the load and movement when connecting.

When not properly matched, problems may arise with the rod and tube, and damage may be caused due to friction on areas such as the inner tube surface, bushings, rod surface and seals.

2. When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.

3. Do not scratch or gouge the sliding parts of the cylinder tube or tube rod, etc., by striking or grasping them with other objects.

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause malfunction. Also, scratches or gouges, etc., in the tube rod may lead to damaged seals and cause air leakage.

4. Prevent the seizure of rotating parts.

Prevent the seizure of rotating parts (pins, etc.) by applying grease.

Series RZQ
Actuator Precautions 2

Be sure to read before handling.

Mounting

⚠ Caution

5. Do not use until you can verify that equipment can operate properly.

Verify correct mounting by suitable function and leakage inspections after compressed air and power are connected following mounting, maintenance or conversions.

6. Instruction manual

The product should be mounted and operated after thoroughly reading the manual and understanding its contents.

Keep the instruction manual where it can be referred to as needed.

Piping

⚠ Caution

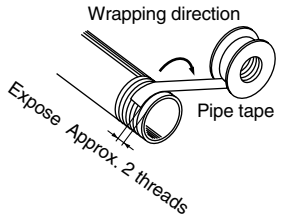
1. Preparation before piping

Before piping is connected, 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 in pipes and fittings, etc., be certain that chips from the pipe threads and sealing material will not ingress inside the piping.

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



Lubrication

⚠ Caution

1. Lubrication of non-lube type cylinder

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

Air Supply

⚠ Warning

1. Use clean air.

If compressed air includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., it can cause damage or malfunction.

⚠ Caution

1. Install air filters.

Install air filters at the upstream side of valves. The filtration degree should be 5μm or finer.

Air Supply

2. Install an after cooler, air dryer or water separator (Drain Catch), etc.

Air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an after cooler, air dryer or water separator (Drain Catch).

3. Use the product within the specified range of fluid and ambient temperature.

Take measures to prevent freezing, since moisture in circuits will be frozen under 5°C, and this may cause damage to seals and lead to malfunction.

Refer to SMC's Best Pneumatics catalog Vol.4 for further details on compressed air quality.

Operating Environment

⚠ Warning

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

2. In dusty locations or where water, oil, etc. splash on the equipment, take suitable measures to protect rod.

3. When using auto switches, do not operate in an environment with strong magnetic fields.

Maintenance

⚠ Warning

1. Maintenance should be performed according to the procedure indicated in the instruction manual.

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

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

When equipment is removed, first take measures to prevent dropping of driven objects and run-away of equipment, etc. Then cut off the supply pressure and electric power, and exhaust all compressed air from the system.

When machinery is restarted, proceed with caution after confirming measures to prevent cylinder lurching.

⚠ Caution

1. Drain flushing

Remove drainage from air filters regularly.

Series RZQ
Auto Switch Precautions 1

Be sure to read before handling.

Design and Selection

⚠ Warning

1. Confirm 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 for current load, voltage, temperature or impact.

2. Take precautions when multiple cylinders are used close together.

When two or more auto switch cylinders are lined up in close proximity with each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder interval of 40 mm.

3. Pay attention to the length of time that a switch is ON at an intermediate stroke position.

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:

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

If the piston operates at a high speed, the load movement time can be extended with the use of an auto switch (D-F7NT) with built-in off-delay timer (approx. 200 ms).

4. Keep wiring as short as possible.

<Reed switches>

As the length of the wiring to a load becomes 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.)

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

<Solid state switches>

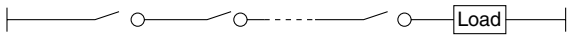
Although wire length should not affect switch function, use a wire that is 100m or shorter.

5. Pay attention to the internal voltage drop of the switch.

<Reed switches>

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

- 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" pieces of auto switches are connected.]
  Even though the auto switch operates normally, the load may not operate.



- In the same way, when operating under a specified voltage, although the auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

  Supply voltage − Internal voltage drop of switch > Minimum operating voltage of load

2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Models D-A80, A80H, A90, A90V).

<Solid state switches>

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

   Also, note that a 12VDC relay is not applicable.

6. Pay attention to 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.

Operating current of load (OFF condition) > Leakage current

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

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

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

<Reed switches>

When 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 and confirm proper operation.

9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

Series RZQ
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 (300m/s^2 or more for reed switches and 1000m/s^2 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 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.

If a switch is tightened beyond the range of tightening torque, the mounting screws or switch may be damaged.

On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position. (Refer to page 12 for switch mounting and tightening torque.)

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 the switch is ON). (The mounting position shown in the catalog indicates the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), 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 containing auto switches may malfunction due to noise from these other lines.

Wiring

⚠ Warning

5. Do not allow short circuit 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>

D-F9□(V), D-F9□W(V) and all models of PNP output type switches do not have built-in short circuit protection circuits.

Note that if a load is short circuited, the switch will be instantly damaged as in the case of reed switches.

∗ Take special care 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 24VDC switch with indicator light has polarity. The brown (red) lead wire is (+), and the blue (black) 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 larger than that specified will damage a light emitting diode and it will no longer operate.

   Applicable models: D-A73, A73H, A73C type
   D-A93, A93V type

2) Special precautions must be taken in case of a 2-color display auto switch (D-A79W) because if connections are reversed, the switch will stay in an ON state.

<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 if a load short circuits 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 color changes

Lead wire colors of SMC switches and related products have been changed in order to meet NECA (Nippon Electric Control Equipment Industries Association) 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 colors still coexist with the new colors.

2-wire

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

3-wire

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black

Solid state with diagnostic output

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

Solid state with latch type diagnostic output

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

Series RZQ
Auto Switch Precautions 3

Be sure to read before handling.

Operating Environment

⚠ Warning

1. Never use in an atmosphere of explosive gases.

The structure of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Consult SMC regarding the availability of a magnetic field resistant auto switch.)

3. Do not use in an environment where the auto switch will be continually exposed to water.

Although switches satisfy IEC standard IP67 construction (JIS C 0920: watertight 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 an environment with oil or chemicals.

Consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, 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, malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Consult SMC if switches are used where there are temperature cycles other than normal temperature changes, as there may be adverse effects inside the switches.

6. Do not use in an environment where there is excessive impact shock.

<Reed switches>

When excessive impact (300m/s^2 or more) is applied to a reed switch during operation, the contact point will malfunction and generate or cut off a signal momentarily (1ms or less). Consult SMC regarding the need to use a solid state switch depending upon the environment.

7. Do not use in an area where surges are generated.

<Solid state switches>

When there are units (solenoid type lifter, high frequency induction furnace, motor, 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 switch. Avoid sources of surge generation and disorganized lines.

8. Avoid accumulation of iron waste or close contact with magnetic substances.

When a large amount of iron waste 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 switch to malfunction due to a loss of the magnetic force inside the cylinder.

Maintenance

⚠ Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

1) Secure and tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

3) Confirm the lighting of the green light on the 2 color indicator type switch.

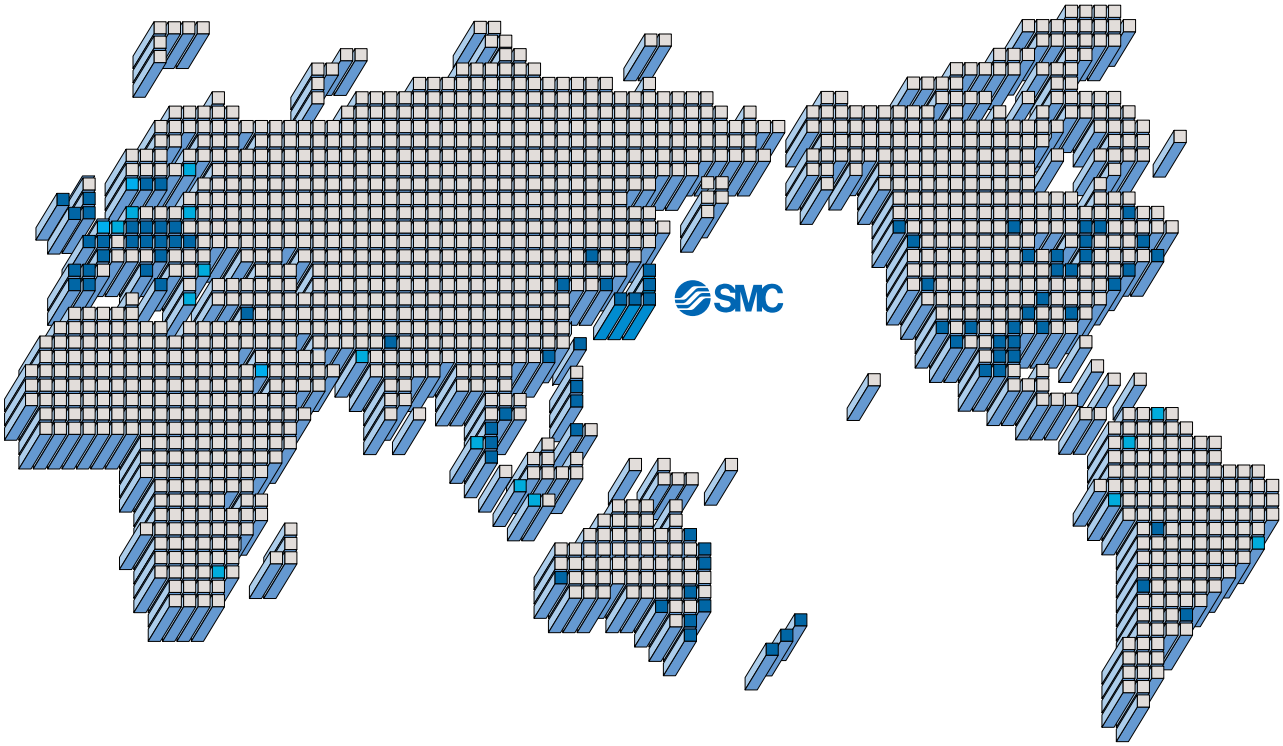
Confirm that the green LED is ON when stopped at the set position. If the red LED is ON when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

Other

⚠ Warning

1. Consult SMC concerning water resistance, elasticity of lead wires, and usage at welding sites, etc.

SMC'S GLOBAL MANUFACTURING, DISTRIBUTION AND SERVICE NETWORK



EUROPE

AUSTRIA
SMC Pneumatik GmbH

CZECH
SMC Industrial Automation CZ s.r.o.

DENMARK
SMC Pneumatik A/S

FINLAND
SMC Pneumatiikka Oy

FRANCE
SMC Pneumatique SA

GERMANY
SMC Pneumatik GmbH

HUNGARY
SMC Ipari Automatizálási Kft.

IRELAND
SMC Pneumatics (Ireland) Ltd.

ITALY
SMC Italia S.p.A.

LATVIA
SMC Pnuematics Latvia SIA

NETHERLANDS
SMC Pneumatics BV.

NORWAY
SMC Pneumatics Norway A/S

POLAND
SMC Industrial Automation Polska Sp.z.o.o.

ROMANIA
SMC Romania s.r.l.

RUSSIA
SMC Pneumatik LLC.

SLOVAKIA
SMC Priemyselná Automatizáciá, s.r.o.

SLOVENIA
SMC Industrijska Avtomatika d.o.o.

SPAIN/PORTUGAL
SMC España, S.A.

SWEDEN
SMC Pneumatics Sweden AB

SWITZERLAND
SMC Pneumatik AG.

UK
SMC Pneumatics (U.K.) Ltd.

ASIA

CHINA
SMC (China) Co., Ltd.

HONG KONG
SMC Pneumatics (Hong kong) Ltd.

INDIA
SMC Pneumatics (India) Pvt. Ltd.

INDONESIA
PT. SMC Pneumatics Indonesia

MALAYSIA
SMC Pneumatics (S.E.A.) Sdn. Bhd.

PHILIPPINES
SMC Pneumatics (Philippines), Inc.

SINGAPORE
SMC Pneumatics (S.E.A.) Pte. Ltd.

SOUTH KOREA
SMC Pneumatics Korea Co., Ltd.

TAIWAN
SMC Pneumatics (Taiwan) Co., Ltd.

THAILAND
SMC Thailand Ltd.

NORTH AMERICA

CANADA
SMC Pneumatics (Canada) Ltd.

MEXICO
SMC Corporation (Mexico) S.A. de C.V.

USA
SMC Corporation of America

SOUTH AMERICA

ARGENTINA
SMC Argentina S.A.

BOLIVIA
SMC Pneumatics Bolivia S.R.L.

BRAZIL
SMC Pneumaticos Do Brazil Ltda.

CHILE
SMC Pneumatics (Chile) S.A.

VENEZUELA
SMC Neumatica Venezuela S.A.

OCEANIA

AUSTRALIA
SMC Pneumatics (Australia) Pty. Ltd.

NEW ZEALAND
SMC Pneumatics (N.Z.) Ltd.

SMC Corporation

1-16-4 Shimbashi, Minato-ku, Tokyo 105-8659 JAPAN
Tel: 03-3502-2740 Fax: 03-3508-2480
URL http://www.smcworld.com

1st printing January, 2003 D-DN P-80 (YG)
This catalog is printed on recycled paper with concern for the global environment.