Compact Cylinder with Air Cushion and Lock

RLQ Series

ø32, ø40, ø50, ø63

Prevents dropping when air supply is cut off.

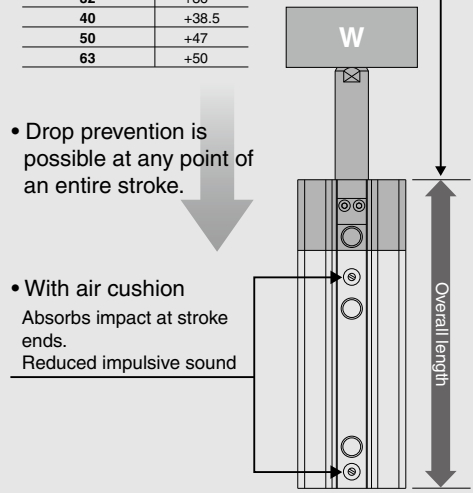
Air cushion and lock unit are built inside compact cylinder.

• Compact overall length

36 to 50 mm increase in length compared to compact cylinders CDQ2 series.

(mm)

Bore size (mm)	Extension
32	+36
40	+38.5
50	+47
63	+50



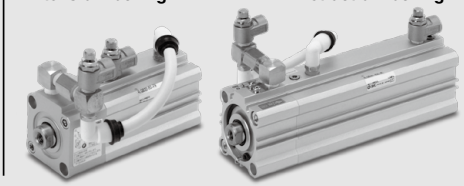
• Drop prevention is possible at any point of an entire stroke.

• With air cushion

Absorbs impact at stroke ends.
Reduced impulsive sound

Bypass piping is standardized.

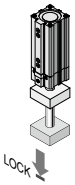
Extension locking **Retraction locking**



Application

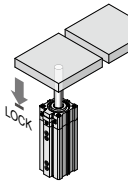
Prevents press fit fixtures from dropping.

Extension locking



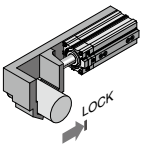
Prevents lifter from dropping.

Retraction locking



Retains clamp condition.

Retraction locking



Series Variations

Series	Mounting	Locking direction	Bore size (mm)	Standard stroke (mm)						
				20	25	30	40	50	75	100
RLQ	Through-hole	Extension lock	32	●	●	●	●	●	●	●
			40	●	●	●	●	●	●	●
	Both ends tapped	Retraction lock	50			●	●	●	●	●
			63			●	●	●	●	●

Compact Cylinder with Air Cushion and Lock

RLQ Series

ø32, ø40, ø50, ø63

How to Order

RLQ **B** **32** □ – **50** **M** – **F** □ – □

With auto switch **RDLQ** **B** **32** □ – **50** **M** – **F** □ – **M9BW** □ – □

With auto switch (Built-in magnet)

Mounting type

B	Through-hole (Standard)
A	Both ends tapped type
L	Foot type
F	Rod flange type
G	Head flange type
D	Double clevis type

Note 1) Mounting brackets are shipped together (not assembled).
Note 2) Cylinder mounting bolts are not included. Order them separately referring to "Mounting Bolt for RLQ" on page 879.

Bore size

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

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to "Standard Stroke" on page 877.

Body option

Nil	Standard (Rod end female thread)
M	Rod end male thread

Locking direction

F	Extension locking
B	Retraction locking

Auto switch

Nil	Without auto switch

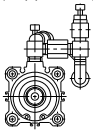
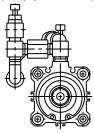
∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

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

Made to Order
For details, refer to page 877.

Bypass piping

Nil	R	L
None (Emergency stop)	With bypass piping, right-hand piping (Drop prevention) 	With bypass piping, left-hand piping (Drop prevention) 

∗ The right and left indicate the piping directions viewed from the front.
∗ When no by-pass piping is used (when the product is used for emergency stops), solenoid valves for unlocking are necessary.
∗ For detailed information, please refer to "Pneumatic Circuit" in Specific Product Precautions on page 897.

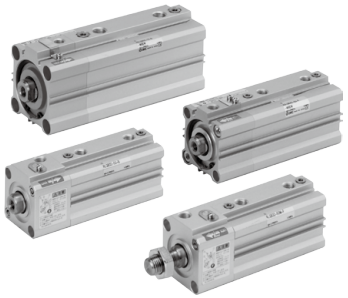
Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) RDLQL40-50-B

Applicable Auto Switches/Refer to pages 1341 to 1435 for detailed auto switch specifications.

Type	Special function	Electrical entry direction	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead-wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
		Connector					J79C	—	●	—	●	●	●	—		
	Diagnostic indication (2-color indicator)	Grommet		3-wire (NPN)	5 V, 12 V	—	M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NAV∗1	M9NA∗1	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV∗1	M9PA∗1	○	○	●	○	—	○		
				2-wire	12 V		M9BAV∗1	M9BA∗1	○	○	●	○	—	○	—	
	With diagnostic output (2-color indicator)			4-wire	5 V, 12 V		—	F79F	●	—	●	○	—	○	IC circuit	
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		—	P3DWA∗∗	●	—	●	●	—	○	—	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
				2-wire		—	200 V	A72	A72H	●	—	●	—	—	—	—	Relay PLC
					24 V	12 V	100 V	A93V∗2	A93	●	●	●	●	—	—		
			No			5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	
		Connector	Yes			12 V	—	A73C	—	●	—	●	●	●	—	—	
			No			5 V, 12 V	24 V or less	A80C	—	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indicator)	Grommet	Yes			—	—	A79W	—	●	—	●	—	—	—	—	

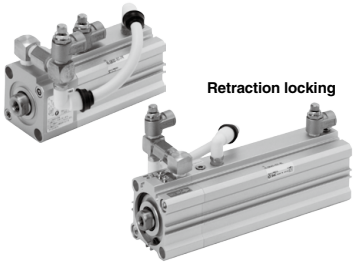
∗1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.
∗2 1 m type lead wire is only applicable to D-A93.
∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ
None ····· N (Example) J79CN
∗ Solid state auto switches marked with a "○" are produced upon receipt of order.
∗ Besides the models in the above table, there are some other auto switches that are applicable. For more information, refer to page 895.
∗ Refer to pages 1410 and 1411 for the details of auto switches with a pre-wired connector.
∗ When mounting D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V) types on a side other than the port side as for bore 32 to 50, order auto switch mounting brackets separately. Refer to page 894 for details.
∗ When mounting brackets (foot/head side flange/double clevis type) are used, then in some cases auto switches cannot be retrofitted.



With bypass piping

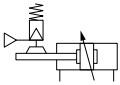
Extension locking

Retraction locking



Symbol

Air cushion



Cylinder Specifications

Bore size (mm)	32	40	50	63
Fluid	Air			
Proof pressure	1.5 MPa			
Maximum operating pressure	1.0 MPa			
Minimum operating pressure	0.2 MPa Note)			
Ambient and fluid temperature	Without auto switch: –10 to 70°C (with no freezing) With auto switch: –10 to 60°C (with no freezing)			
Lubrication	Non-lube			
Stroke length tolerance	$^{+1.0}_{0}$ mm			
Piston speed	50 to 500 mm/s			
Port size (Rc, NPT, G)	1/8		1/4	

Note) The minimum operating pressure of the cylinder is 0.1 MPa when the cylinder and lock are connected to separate ports.

Lock Specifications

Bore size (mm)		32	40	50	63
Locking action		Spring locking (Exhaust locking)			
Unlocking pressure		0.2 MPa or more			
Locking pressure		0.05 MPa or less			
Locking direction		One direction (Either extension locking or retraction locking)			
Maximum operating pressure		1.0 MPa			
Unlocking port Port size	**Rc**	1/8			
	NPT				
	G	M5 x 0.8			
Holding force N (Maximum static load) Note)		402	629	982	1559

Note) The holding force (max. static load) shows the maximum capability and does not show the normal holding capability. So, select an appropriate cylinder while referring to page 896.

Standard Stroke

Bore size (mm)	Standard stroke (mm)
32, 40	20, 25, 30, 40, 50, 75, 100
50, 63	30, 40, 50, 75, 100

Manufacture of Intermediate Stroke

Method	Exclusive body	
Ordering	Please refer to "How to Order" for standard part no. (page 876).	
Description	Available in stroke increments of 1 mm, using an exclusive body for the specified stroke.	
Stroke range	Bore size (mm)	Stroke range (mm)
	32, 40	21 to 99
	50, 63	31 to 99
Example	Part no. : RLQB32-47-B A special tube is manufactured for a 47 mm stroke.	

Effective Cushion Length

Bore size (mm)	32	40	50	63
Effective cushion length (mm)	6.6	6.6	7.1	7

Allowable Kinetic Energy

For the allowable kinetic energy, please refer to "Selection" from page 896.

Made to Order

Click here for details

Symbol	Specifications
-XC87	Heavy duty (ø40 to 63 only)

Refer to pages 893 to 895 for cylinders with auto switches.

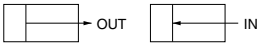
- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Metal Bracket Part No.

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

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

Theoretical Output



Unit: N

Bore size (mm)	Operating direction	Operating pressure (MPa)		
		0.3	0.5	0.7
32	IN	181	302	422
	OUT	241	402	563
40	IN	317	528	739
	OUT	377	628	880
50	IN	495	825	1150
	OUT	589	982	1370
63	IN	841	1400	1960
	OUT	935	1560	2180

Weight

Basic Weight: Mounting/Through-hole (Type B)

Unit: g

Bore size (mm)	Standard strokes (mm)						
	20	25	30	40	50	75	100
32	531	552	575	620	665	779	889
40	675	698	721	768	814	929	1044
50	—	—	1200	1272	1344	1525	1705
63	—	—	1603	1683	1763	1961	2159

Basic Weight: Mounting/Both Ends Tapped (Type A)

Unit: g

Bore size (mm)	Standard strokes (mm)						
	20	25	30	40	50	75	100
32	531	552	576	622	669	788	901
40	708	734	759	810	861	993	1120
50	—	—	1258	1338	1416	1621	1819
63	—	—	1756	1849	1941	2183	2412

Additional Weight

Unit: g

Bore size (mm)		**32**	**40**	**50**	**63**
Magnet		11	13	14	22
Rod end male thread	Thread	26	27	53	53
	Nut	17	17	32	32
Foot type (including mounting bolt)		137	149	221	288
Rod flange type (including mounting bolt)		174	208	351	523
Head flange type (including mounting bolt)		159	192	326	498
Double clevis type (including pin, retaining ring, bolt and flat washer)		145	190	373	518
With bypass piping		149	149	263	263

Calculation (example) **RDLQD32-20M-B**
- Basic weight: RLQA32-20-□ ..... 531 g
- Additional weight: Magnet ..... 11 g
  Rod end male thread ..... 43 g
  Double clevis ..... 145 g

730 g

When auto switches are mounted, add the weight of the auto switch and auto switch mounting bracket multiplied by the quantity.

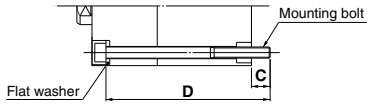
Auto Switch Mounting Bracket Weight

Auto switch mounting bracket part no.	Bore size	Weight (g)
BQ-2	ø32 to ø63	1.5
BQ2-012	ø32 to ø63	5

Mounting Bolt for R□LQB

Mounting/Mounting bolts are available for the through hole type RILQB.
Refer to the following for ordering procedures.
Order the actual number of bolts that will be used.

Example) CQ-M5 x 90L 2 pcs.

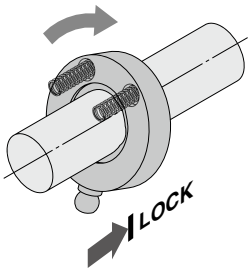


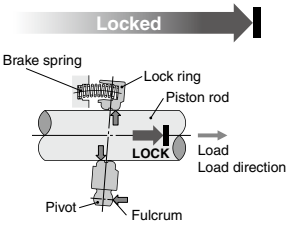
Note) When mounting ø50 to ø63 cylinders from the rod side, be sure to use the attached flat washers because the bearing surface is limited.

R□LQB

Cylinder model	C	D	Mounting bolt part no.
R□LQB32-20	8	90	CQ-M5 x 90L
R□LQB32-25		95	x 95L
R□LQB32-30		100	x 100L
R□LQB32-40		110	x 110L
R□LQB32-50		120	x 120L
R□LQB32-75		145	x 145L
R□LQB32-100		170	x 170L
R□LQB40-20	9	100	CQ-M5 x 100L
R□LQB40-25		105	x 105L
R□LQB40-30		110	x 110L
R□LQB40-40		120	x 120L
R□LQB40-50		130	x 130L
R□LQB40-75		155	x 155L
R□LQB40-100		180	x 180L
R□LQB50-30	13.5	120	CQ-M6 x 120L
R□LQB50-40		130	x 130L
R□LQB50-50		140	x 140L
R□LQB50-75		165	x 165L
R□LQB50-100		190	x 190L
R□LQB63-30	12.5	125	CQ-M8 x 125L
R□LQB63-40		135	x 135L
R□LQB63-50		145	x 145L
R□LQB63-75		170	x 170L
R□LQB63-100		195	x 195L

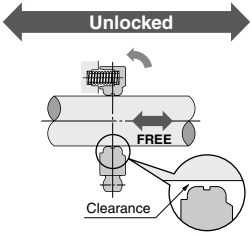
Working Principle





Unlocking port: Air exhausted

① The lock ring is tilted by the brake spring force.
② The tilting is increased by the load and the piston rod is securely locked.

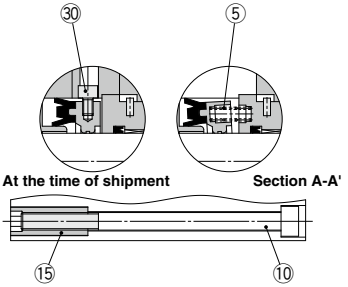


Unlocking port: Air supplied

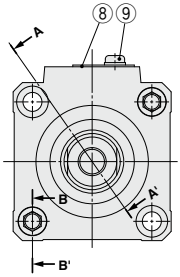
① The lock ring becomes perpendicular to the piston, creating clearance between the piston rod and lock ring, which allows the piston rod to move freely.

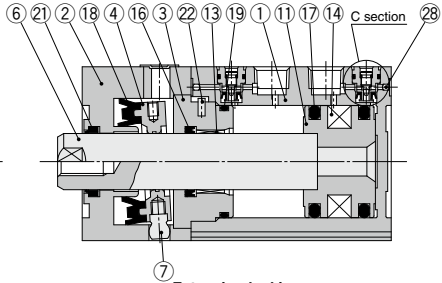
Construction

ø32

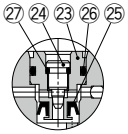


Section B-B' (Through-hole)

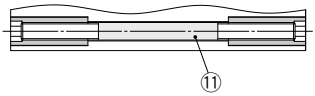




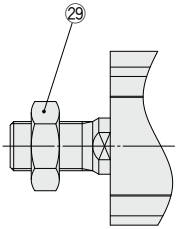
Extension locking



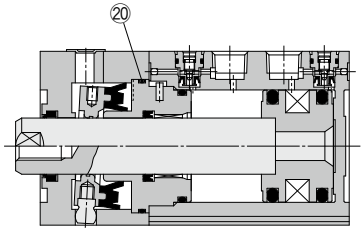
Detailed figure of C section



Section B-B' (Both ends tapped)



Rod end male thread



Retraction locking

Component Parts

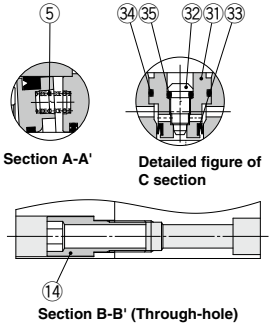
No.	Description	Material	Note
1	**Cylinder tube**	Aluminum alloy	Hard anodized
2	**Lock body**	Aluminum alloy	Hard anodized
3	**Intermediate collar**	Aluminum alloy	Extension locking, Chromated Retraction locking, Hard anodized
4	**Lock ring**	Carbon steel	Heat treated
5	**Brake spring**	Steel wire	Zinc chromated
6	**Piston rod**	Carbon steel	Hard chrome plated
7	**Pivot**	Chromium molybdenum steel	Electroless nickel plated
8	**Dust cover**	Stainless steel	
9	**Dust cover holding bolt**	Carbon steel	
10	**Hexagon socket head cap screw**	Chromium molybdenum steel	
11	**Tie-rod**	Rolled steel	Zinc chromated
12	**Piston**	Aluminum alloy	
13	**Bushing**	Bearing alloy	
14	**Magnet**	—	
15	**Tie-rod nut**	Carbon steel	Nickel plated

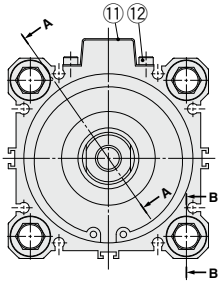
Component Parts

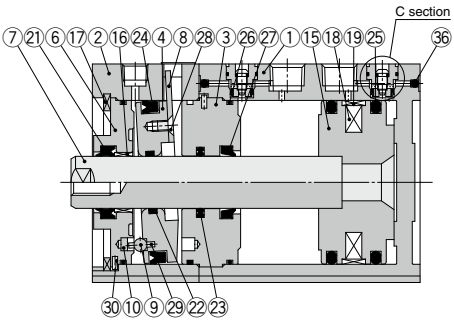
No.	Description	Material	Note
16	**Rod seal**	NBR	
17	**Piston seal**	NBR	
18	**Lock ring seal**	NBR	
19	**Tube gasket A**	NBR	
20	**Tube gasket B**	NBR	
21	**Scraper**	NBR	
22	**Parallel pin**	Stainless steel	
23	**Check seal retainer**	Brass	
24	**Cushion needle**	Stainless steel	
25	**Check seal**	NBR	
26	**Check gasket**	NBR	
27	**Needle gasket**	NBR	
28	**Steel ball**	High carbon chrome bearing steel	
29	**Rod end nut**	Carbon steel	
30	**Unlocking bolt**	Chromium molybdenum steel	

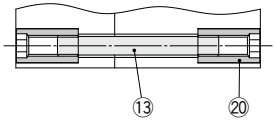
Construction

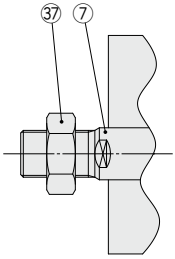
ø40 to ø63

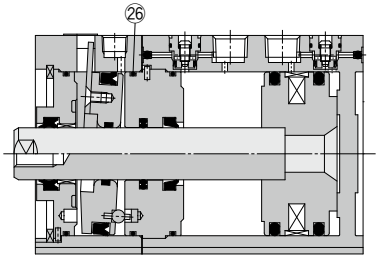












Component Parts

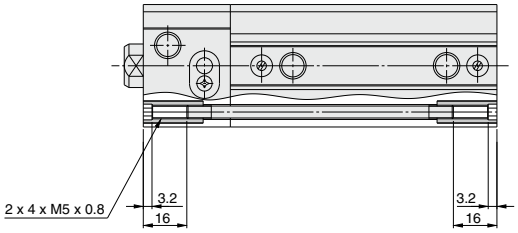
No.	Description	Material	Note
1	**Cylinder tube**	Aluminum alloy	Hard anodized
2	**Lock body**	Aluminum alloy	Hard anodized
3	**Intermediate collar**	Aluminum alloy	Chromated
4	**Lock ring**	Carbon steel	Heat treated
5	**Brake spring**	Steel wire	Zinc chromated
6	**Collar**	Aluminum bearing alloy	ø40, Hard anodized
		Aluminum alloy casted	ø50, 63, Chromated, painted
7	**Piston rod**	Carbon steel	Hard chrome plated
8	**Lever**	Stainless steel	
9	**Pivot pin**	Carbon steel	Zinc chromated
10	**Pivot key**	Carbon steel	Zinc chromated
11	**Dust cover**	Rolled steel	ø40, Nickel plated
		Stainless steel	ø50,63
12	**Dust cover holding bolt**	Chromium molybdenum steel	Nickel plated
13	**Tie-rod**	Carbon steel	Zinc chromated
14	**Unit holding bolt**	Carbon steel	Nickel plated
15	**Piston**	Aluminum alloy	
16	**Bushing**	Bearing alloy	ø50, 63
17	**Retaining ring**	Carbon tool steel	Phosphate coated
18	**Magnet**	—	

Component Parts

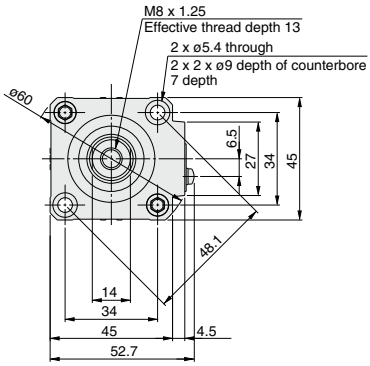
No.	Description	Material	Note
19	**Wear ring**	Resin	
20	**Tie-rod nut**	Carbon steel	ø40, Nickel plated
			ø50, 63, Zinc chromated
21	**Rod seal A**	NBR	
22	**Rod seal B**	NBR	
23	**Rod seal C**	NBR	
24	**Piston seal A**	NBR	
25	**Piston seal B**	NBR	
26	**Tube gasket**	NBR	
27	**Scraper**	NBR	
28	**Hexagon socket flat countersunk head screw**	Chromium molybdenum steel	
29	**Spring pin**	Carbon steel	
30	**Parallel pin**	Stainless steel	
31	**Check seal retainer**	Brass	
32	**Cushion needle**	Stainless steel	
33	**Check seal**	NBR	
34	**Check gasket**	NBR	
35	**Needle gasket**	NBR	
36	**Steel ball**	High carbon chrome bearing steel	
37	**Rod end nut**	Carbon steel	

Dimensions: ø32 (Emergency stop)

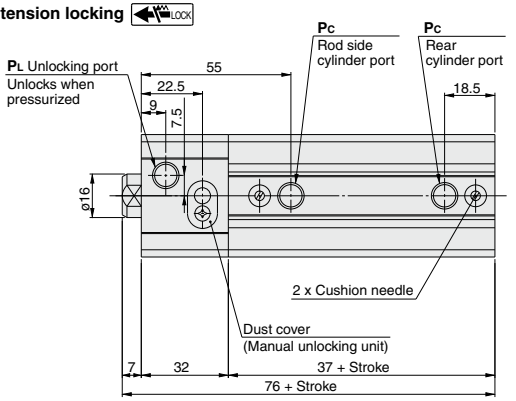
Both ends tapped type: R□LQA32



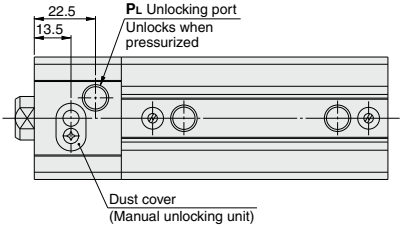
Basic type (Through-hole): R□LQB32



Extension locking

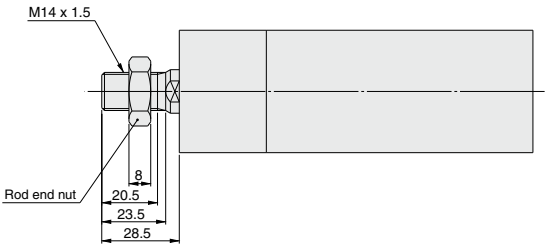


Retraction locking



Port thread type	PC	PL
Rc	1/8	1/8
NPT		
G		M5 x 0.8

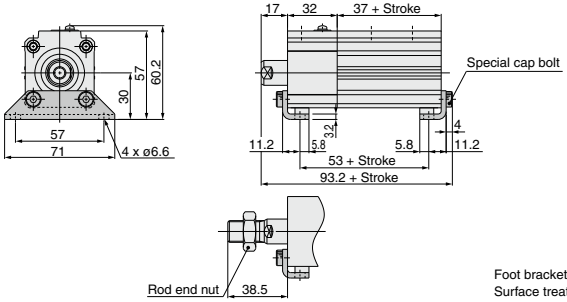
Rod end male thread



∗ Refer to page 891 for details of rod end nuts and accessory brackets.

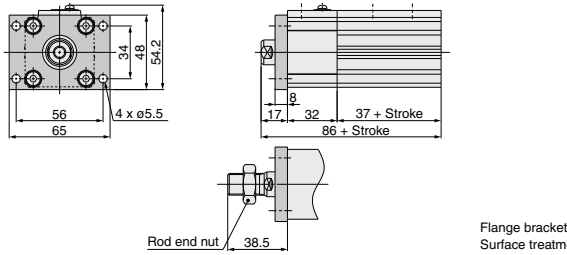
Dimensions: ø32 (Emergency stop)

Foot type: R□LQL32



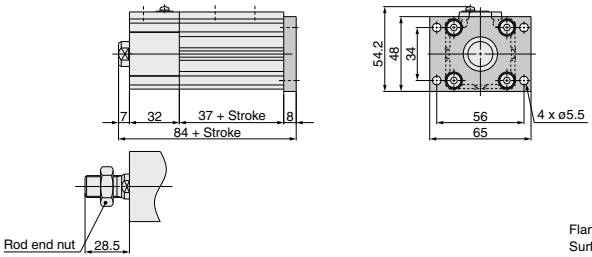
Foot bracket material: Carbon steel
Surface treatment: Nickel plated

Rod flange type: R□LQF32



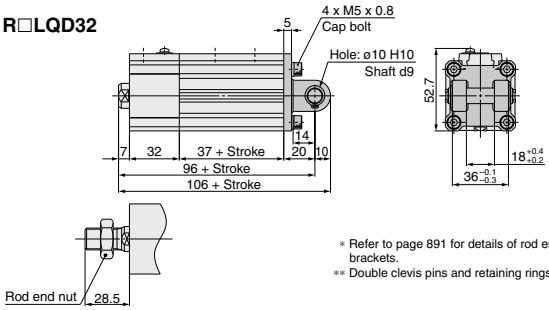
Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Head flange type: R□LQG32



Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Double clevis type: R□LQD32

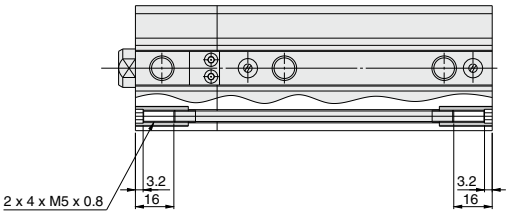


∗ Refer to page 891 for details of rod end nuts and accessory brackets.
∗∗ Double clevis pins and retaining rings are included.

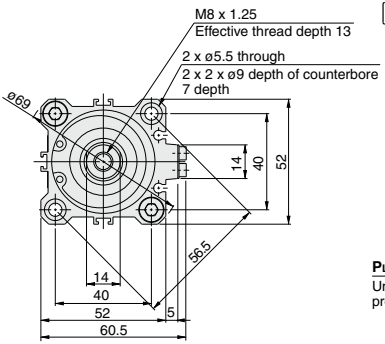
Double clevis bracket material: Cast iron
Surface treatment: Painted

Dimensions: ø40 (Emergency stop)

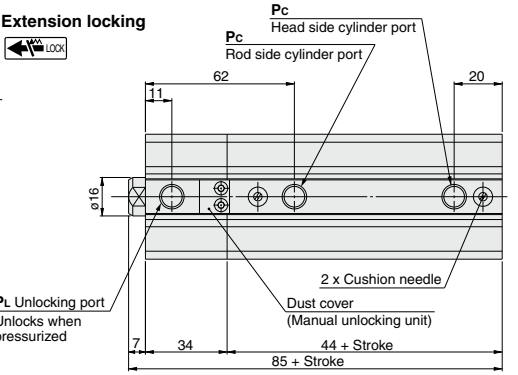
Both ends tapped type: R□LQA40



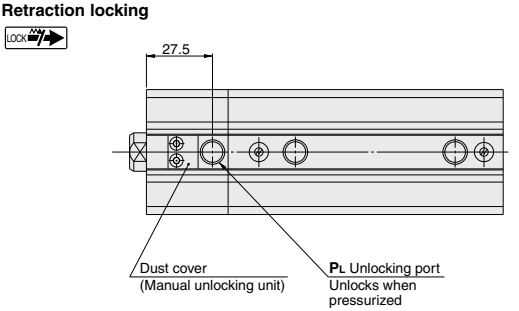
Basic type (Through-hole): R□LQB40



Extension locking

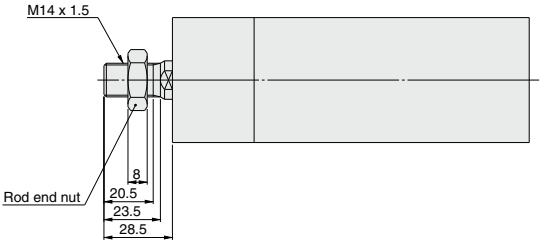


Retraction locking



Port thread type	Pc	PL
Rc	1/8	1/8
NPT		
G		M5 x 0.8

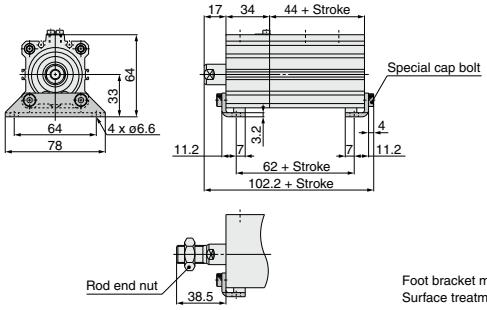
Rod end male thread



∗ Refer to page 891 for details of rod end nuts and accessory brackets.

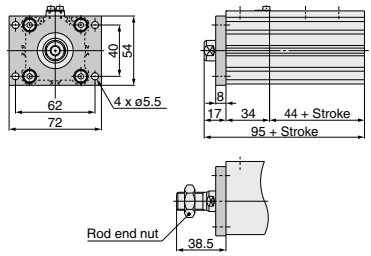
Dimensions: ø40 (Emergency stop)

Foot type: R□LQL40



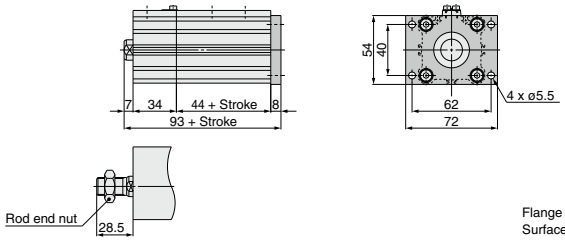
Foot bracket material: Carbon steel
Surface treatment: Nickel plated

Rod flange type: R□LQF40



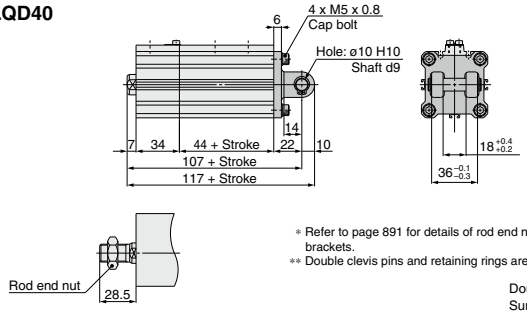
Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Head flange type: R□LQG40



Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Double clevis type: R□LQD40

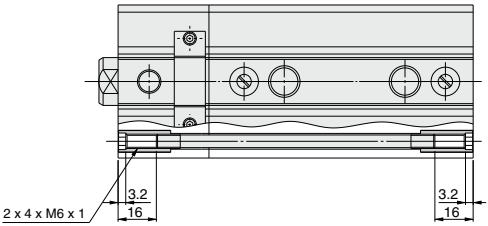


∗ Refer to page 891 for details of rod end nuts and accessory brackets.
∗∗ Double clevis pins and retaining rings are included.

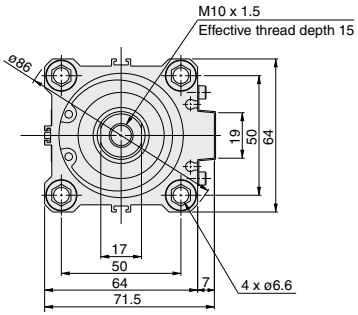
Double clevis bracket material: Cast iron
Surface treatment: Painted

Dimensions: ø50 (Emergency stop)

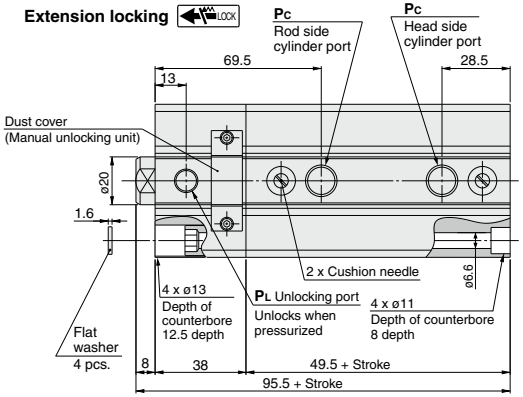
Both ends tapped type: R□LQA50



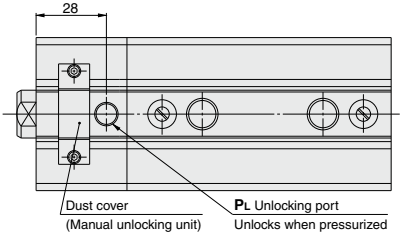
Basic type (Through-hole): R□LQB50



Extension locking

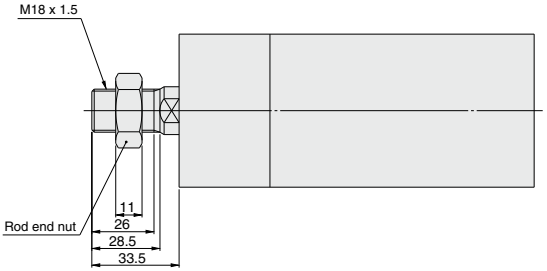


Retraction locking



Port thread type	Pc	PL
Rc	1/4	1/8
NPT		
G		M5 x 0.8

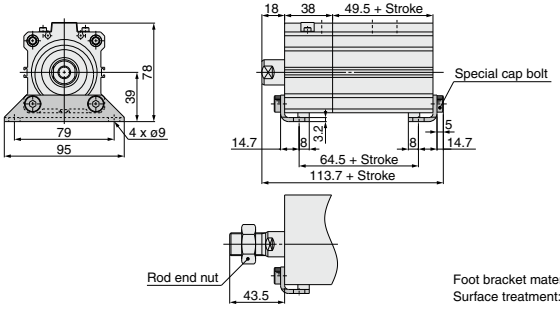
Rod end male thread



∗ Refer to page 891 for details of rod end nuts and accessory brackets.

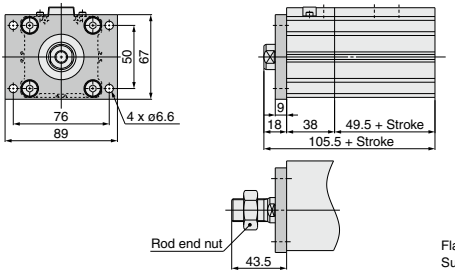
Dimensions: ø50 (Emergency stop)

Foot type: R□LQL50



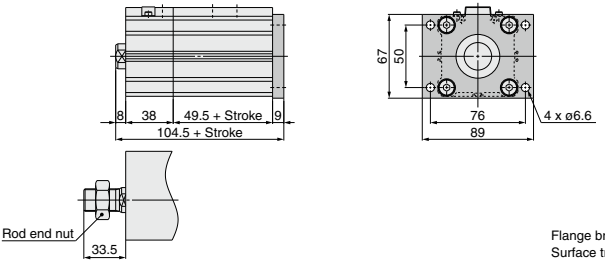
Foot bracket material: Carbon steel
Surface treatment: Nickel plated

Rod flange type: R□LQF50



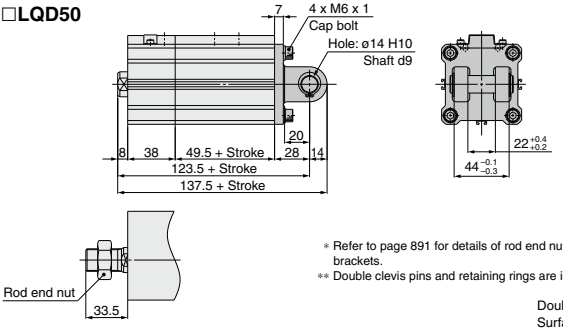
Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Head flange type: R□LQG50



Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Double clevis type: R□LQD50

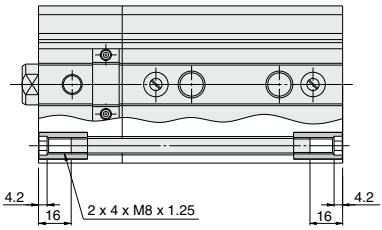


∗ Refer to page 891 for details of rod end nuts and accessory brackets.
∗∗ Double clevis pins and retaining rings are included.

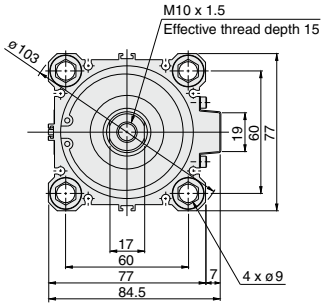
Double clevis bracket material: Cast iron
Surface treatment: Painted

Dimensions: ø63 (Emergency stop)

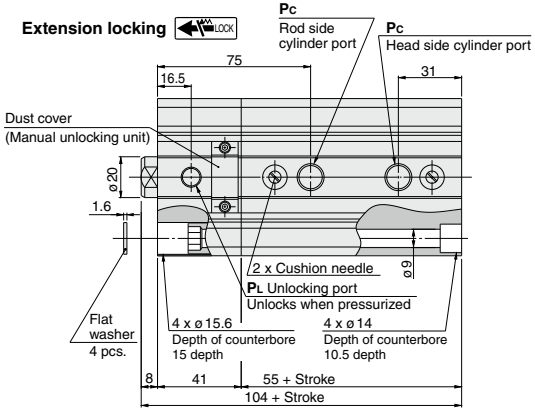
Both ends tapped type: R□LQA63



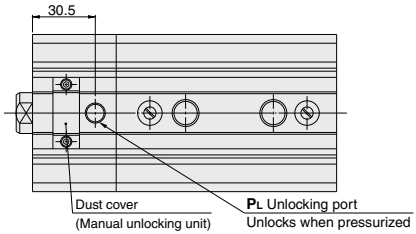
Basic type (Through-hole): R□LQB63



Extension locking

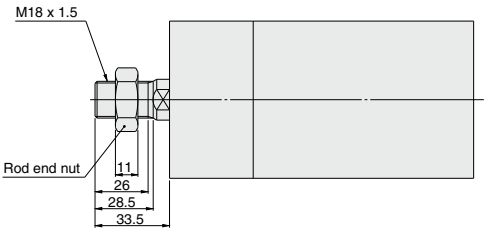


Retraction locking



Port thread type	Pc	PL
Rc	1/4	1/8
NPT		
G		M5 x 0.8

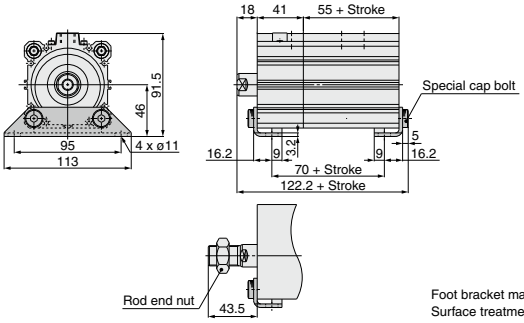
Rod end male thread



∗ Refer to page 891 for details of rod end nuts and accessory brackets.

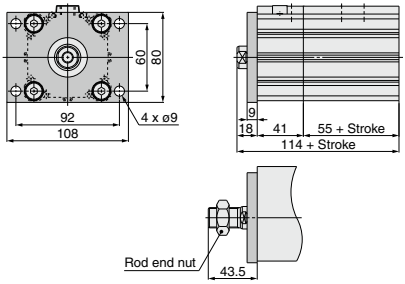
Dimensions: ø63 (Emergency stop)

Foot type: R□LQL63



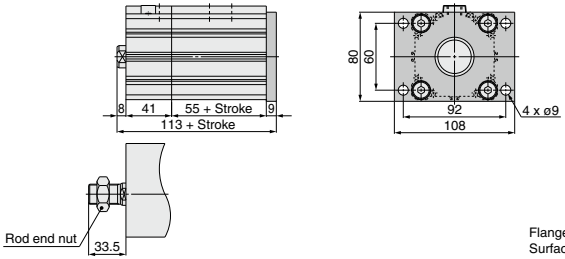
Foot bracket material: Carbon steel
Surface treatment: Nickel plated

Rod flange type: R□LQF63



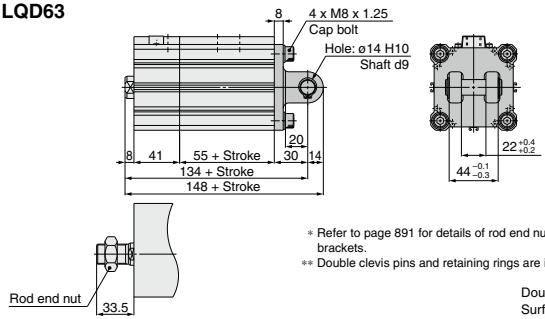
Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Head flange type: R□LQG63



Flange bracket material: Carbon steel
Surface treatment: Nickel plated

Double clevis type: R□LQD63



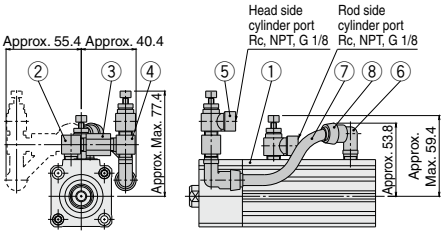
∗ Refer to page 891 for details of rod end nuts and accessory brackets.
∗∗ Double clevis pins and retaining rings are included.

Double clevis bracket material: Cast iron
Surface treatment: Painted

Dimensions: Cylinder with Bypass Piping

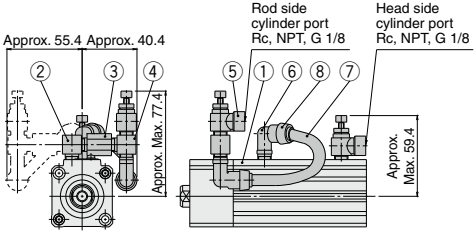
R□LQB32-F□

Extension locking, Right-hand piping
(The dotted lines illustrate the left-hand piping.)



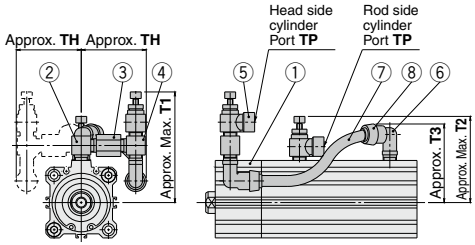
R□LQB32-B□

Retraction locking, Right-hand piping
(The dotted lines illustrate the left-hand piping.)



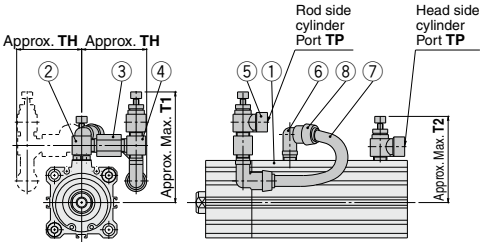
R□LQB40/50/63-F□

Extension locking, Right-hand piping
(The dotted lines illustrate the left-hand piping.)



R□LQB40/50/63-B□

Retraction locking, Right-hand piping
(The dotted lines illustrate the left-hand piping.)



Description	T1	T2	T3	TH	TP
RLQ40	81.4	63.4	57.8	47.9	Rc, NPT, G 1/8
RLQ50	93.3	73.8	67.8	57.3	Rc, NPT, G 1/4
RLQ63	99.8	80.3	74.3	57.3	Rc, NPT, G 1/4

∗ Dimensions not shown are the same as standard type.

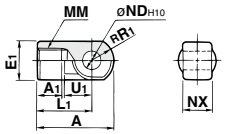
Cylinder with Bypass Piping Component Parts

No.	Description	Qty.	Part no.
1	Compact Cylinder with Air Cushion and Lock	1	
2	**PT elbow**	1	
3	**Restrictor**	1	
4	**PT tee**	1	
5	**Metal speed controller**	2	ø32, 40: AS2200-(N, F)01-S ø50, 63: AS2200-(N, F)02-S
6	**Male elbow**	2	ø32, 40: KRL06-01SW2 ø50, 63: KRL06-02SW2
7	**Bypass tubing**	1	TRB0604W
8	**Spatter cover**	2	KR-06C

Accessory Bracket Dimensions 1

Single Knuckle Joint

I-G04, I-G05



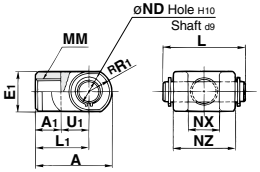
Material: Cast iron
Surface treatment: Nickel plated

(mm)

Part No.	Applicable cylinder bore size (mm)	A	A1	E1	L1	MM	RR1	U1	ND	NX
I-G04	32, 40	42	14	ø22	30	M14 x 1.5	12	14	$10^{+0.058}_{0}$	$18^{-0.3}_{-0.5}$
I-G05	50, 63	56	18	ø28	40	M18 x 1.5	16	20	$14^{+0.070}_{0}$	$22^{-0.3}_{-0.5}$

Double Knuckle Joint

Y-G04, Y-G05



Material: Cast iron
Surface treatment: Nickel plated

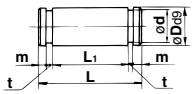
(mm)

Part No.	Applicable cylinder bore size (mm)	A	A1	E1	L1	MM	RR1	U1	ND
Y-G04	32, 40	42	16	ø22	30	M14 x 1.5	12	14	$10^{+0.058}_{0}$
Y-G05	50, 63	56	20	ø28	40	M18 x 1.5	16	20	$14^{+0.070}_{0}$

Part No.	Applicable cylinder bore size (mm)	NX	NZ	L	Applicable pin part no.
Y-G04	32, 40	$18^{+0.5}_{+0.3}$	36	41.6	IY-G04
Y-G05	50, 63	$22^{+0.5}_{+0.3}$	44	50.6	IY-G05

∗ Knuckle pin and retaining ring are included.

Knuckle Pin (Common with double clevis pin)



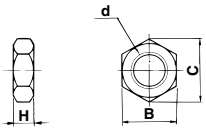
Material: Carbon steel

(mm)

Part No.	Applicable cylinder bore size (mm)	D	L	d	L1	m	t	Applicable retaining ring
IY-G04	32, 40	$10^{-0.040}_{-0.076}$	41.6	9.6	36.2	1.55	1.15	C type 10 for shaft
IY-G05	50, 63	$14^{-0.050}_{-0.093}$	50.6	13.4	44.2	2.05	1.15	C type 14 for shaft

∗ Retaining rings are included.

Rod End Nut



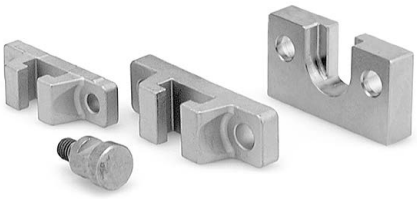
Material: Carbon steel

(mm)

Part No.	Applicable cylinder bore size (mm)	d	H	B	C
NT-04	32, 40	M14 x 1.5	8	22	25.4
NT-05	50, 63	M18 x 1.5	11	27	31.2

Accessory Bracket Dimensions 2

Simple Joint: ø32 to ø63



Joint and Mounting Bracket (Type A, Type B) Part No.

YA – **03**

Applicable air cylinder bore

03	ø32, ø40
05	ø50, ø63

Mounting bracket

YA	Type A mounting bracket
YB	Type B mounting bracket
YU	Joint

Bore size (mm)	Joint	Applicable mounting bracket	
		Type A mounting bracket	Type B mounting bracket
32, **40**	YU-03	YA-03	YB-03
50, **63**	YU-05	YA-05	YB-05

Allowable eccentricity

(mm)

Bore size	32	40	50	63
Eccentricity tolerance	±1			
Backlash	0.5			

<Ordering>

• Joints are not included with the A or B type mounting brackets. Order them separately.

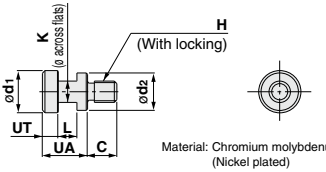
(Example)

Bore size ø40 Part no.

• Type A mounting bracket part number YA-03

• Joint YU-03

Joint

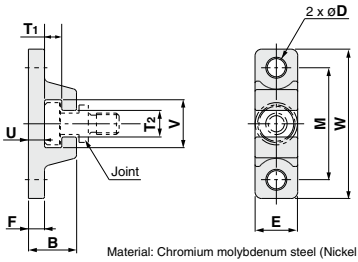


Material: Chromium molybdenum steel (Nickel plated)

(mm)

Part No.	Applicable bore size (mm)	UA	C	d1	d2	H	K	L	UT	Weight (g)
YU-03	**32, 40**	17	11	15.8	14	M8 x 1.25	8	7	6	25
YU-05	**50, 63**	17	13	19.8	18	M10 x 1.5	10	7	6	40

Type A Mounting Bracket



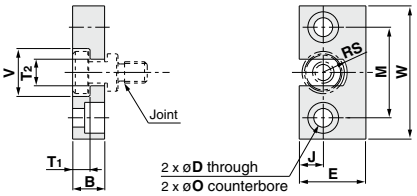
Material: Chromium molybdenum steel (Nickel plated)

(mm)

Part No.	Bore size (mm)	B	D	E	F	M	T1	T2
YA-03	**32, 40**	18	6.8	16	6	42	6.5	10
YA-05	**50, 63**	20	9	20	8	50	6.5	12

Part No.	Bore size (mm)	U	V	W	Weight (g)
YA-03	**32, 40**	6	18	56	55
YA-05	**50, 63**	8	22	67	100

Type B Mounting Bracket



Material: Stainless steel

(mm)

Part No.	Bore size (mm)	B	D	E	J	M	O
YB-03	**32, 40**	12	7	25	9	34	11.5 depth 7.5
YB-05	**50, 63**	12	9	32	11	42	14.5 depth 8.5

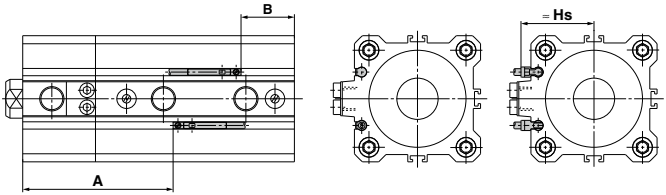
Part No.	Bore size (mm)	RS	T1	T2	V	W	Weight (g)
YB-03	**32, 40**	9	6.5	10	18	50	80
YB-05	**50, 63**	11	6.5	12	22	60	120

Auto Switch Mounting 1

Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

D-M9□
D-M9□W
D-M9□A
D-A9□

D-M9□V
D-M9□WV
D-M9□AV
D-A9□V



Proper Auto Switch Mounting Position (mm)

Auto switch type / Bore size	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-A9□ D-A9□V	
	A	B	A	B
32	48.5	8.5	44.5	4.5
40	55	11	51	7
50	59	16.5	55	12.5
63	64.5	19.5	60.5	15.5

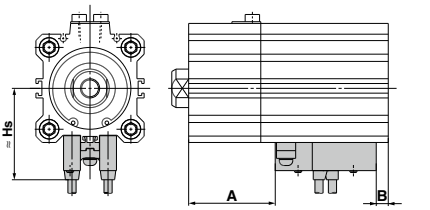
Auto Switch Mounting Height (mm)

Auto switch type / Bore size	D-M9□V D-M9□WV D-M9□AV	D-A9□V
	Hs	Hs
32	29	27
40	32.5	30.5
50	38.5	36.5
63	42	40

D-A73C
D-A80C
D-J79C
D-A79W
D-F7□WV
D-F7□V
D-F7□BAV

D-A7□
D-A80
D-A7□H
D-A80H
D-F7□
D-J79
D-F7□W

D-J79W
D-F79F
D-F7NT
D-F7BA



Proper Auto Switch Mounting Position (mm)

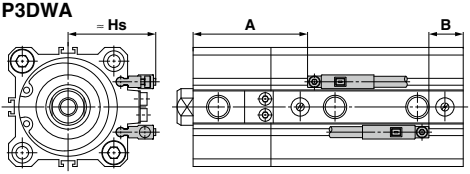
Auto switch type / Bore size	D-A73 D-A80		D-A72/A7□H D-A80H/A73C D-A80C/F7□ D-F7□V/F79F D-J79/J79C D-F7□W/F7□WV D-J79W/F7BA D-F7BAV		D-A79W		D-F7NT	
	A	B	A	B	A	B	A	B
32	45.5	5.5	46	6	43	3	51	11
40	52	8	52.5	8.5	49.5	5.5	57.5	13.5
50	56	13.5	56.5	14	53.5	11	61.5	19
63	61.5	16.5	62	17	59	14	67	22

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height (mm)

Auto switch type / Bore size	D-A7□ D-A80	D-A7□H D-A80H D-F7□ D-J79 D-F7□W D-J79W D-F7BA D-F79F D-F7NT	D-A73C D-A80C	D-F7□V D-F7□WV D-F7BAV	D-J79C	D-A79W
	Hs	Hs	Hs	Hs	Hs	Hs
32	31.5	32.5	38.5	35	38	34
40	35	36	42	38.5	41.5	37.5
50	41	42	48	44.5	47.5	43.5
63	47.5	48.5	54.5	51	54	50

P3DWA



(mm)

Auto switch type / Bore size	D-P3DWA		
	A	B	Hs
32	44	4	35.5
40	50.5	6.5	39
50	54.5	12	45
63	60	15	48.5

Note) For bore sizes ø32 to ø50, the D-P3DWA is mountable only on the port side.

Minimum Auto Switch Mounting Stroke

(mm)

Number of auto switches	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV D-A9□ D-A9□V	D-A7□/A80 D-A73C/A80C D-A7□H/A80H D-A79W D-F7□V/J79C D-F7□WV/F7BAV D-F7□/J79 D-F7□W/J79W D-F7BA/F7NT D-F79F	D-P3DWA
1 pc.	20	20	15
2 pcs.	20	20	15

Auto Switch Mounting 2

Operationg Range

(mm)

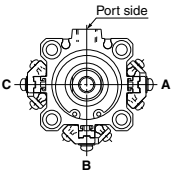
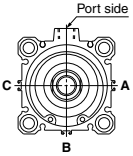
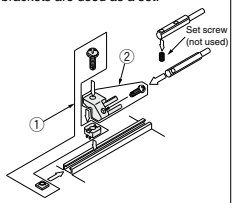
Auto switch type	Bore size			
	32	40	50	63
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	5.5	5	5.5	7
D-A9□/A9□V	9.5	9.5	9.5	11.5
D-A7□/A7□H D-A73C D-A80/A80H D-A80C	12	11	10	12

(mm)

Auto switch type	Bore size			
	32	40	50	63
D-A79W	13	14	14	16
D-F7□/F7□V D-J79/J79C D-F7□W/F7□WV D-J79W D-F7BA/F7BAV D-F7NT/F79F	6	6	6	6.5
D-P3DWA	5	5	5.5	7.5

* The operating ranges are provided as guidelines including hysteresis and are not guaranteed values (assuming approximately ±30% variations). They may vary significantly with ambient environments.
* Auto switch mounting brackets BQ2-012 are not used for sizes over ø32 of D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V) types. The above values indicate the operating range when mounted with the current auto switch installation groove.

Auto Switch Mounting Bracket Part No.

Auto switch mounting surface / Auto switch type	Bore size (mm)		
	ø32, ø40, ø50		ø63
			
	Auto switch mounting surface		Auto switch mounting surface
	Port side	A, B, C sides	Port, A, B, C sides
D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV D-A9□ D-A9□V	Auto switch mounting brackets are not required.	①BQ-2 ②BQ2-012 Two kinds of auto switch mounting brackets are used as a set. 	Auto switch mounting brackets are not required.
D-P3DWA		—	

Note 1) For each cylinder series, when a compact auto switch is mounted on the three sides (A, B and C above) other than the port side of bore sizes ø32 to ø50, the auto switch mounting brackets above are required. Order them separately from cylinders.
(It is the same as when mounting compact cylinders with an auto switch mounting rail, but not with ø63 compact auto switch installation groove.)
Example order:
RDLQB32-50-M9BW ····· 1 unit
BQ-2 ····· 2 pcs.
BQ2-012 ····· 2 pcs.

Note 2) When shipping cylinders, auto switch mounting brackets and auto switches are shipped together.

Auto switch type	Bore size (mm)			
	32	40	50	63
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-F7BA/F7BAV D-F79F/F7NT	BQ-2			

Note 3) Auto switch mounting brackets and auto switches are shipped together with cylinders.

[Mounting screw set made of stainless steel]

The following set of mounting screws made of stainless steel (including nuts) is available. Use it in accordance with the operating environment. (Please order BQ-2 separately, since auto switch spacers (for BQ-2) are not included.)
BBA2: For D-A7/A8/F7/J7 types
Water resistant auto switches, D-F7BA/D-F7BAV are set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA2 is attached.

Note 4) Refer to page 1443 for the details of BBA2.

Note 5) When mounting D-M9□A(V) on a port other than the ports for ø32, ø40 and ø50, order auto switch mounting brackets BQ2-012S, BQ-2 and stainless steel screw set BBA2 separately.

Auto Switch Mounting Bracket Weight

Auto switch mounting bracket part no.	Weight (g)
BQ-2	1.5
BQ2-012	5

Other than the applicable auto switches listed in “How to Order”, the following auto switches can be mounted. For detailed specifications, refer to pages 1341 to 1435.

Auto switch type	Model	Electrical entry direction	Features
Reed	D-A73	Grommet (perpendicular)	—
	D-A80		Without indicator light
	D-A73H, A76H	Grommet (in-line)	—
	D-A80H		Without indicator light
Solid state	D-F7NV, F7PV, F7BV	Grommet (perpendicular)	—
	D-F7NWV, F7BWV		Diagnostic indication (2-color indicator)
	D-F7BAV		Water resistant (2-color indicator)
	D-F79, F7P, J79	Grommet (in-line)	—
	D-F79W, F7PW, J79W		Diagnostic indication (2-color indicator)
	D-F7BA		Water resistant (2-color indicator)
	D-F7NT		With timer

* For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1410 and 1411.
* Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)) are also available. Refer to page 1360 for details.

RLQ Series
Specific Product Precautions 1

Be sure to read this before handling the products.
Refer to page 9 for safety instructions and pages 10 to 19 for actuator and auto switch precautions.

Selection

⚠ Warning

1. The holding force (max. static load) indicates the maximum capability to hold a static load without vibration and impact. The maximum load (workpiece mass) should be below 50% of the holding force (max. static load). Refer to 7 and 9 below when the kinetic energy of the workpiece is absorbed at the cylinder end or eccentric load is applied.

2. Do not use for intermediate cylinder stops while the cylinder is operating.

This cylinder is designed for locking against inadvertent movement from a stationary condition. Intermediate stops during operation with the locking mechanism may damage the cylinder, greatly shorten the service life or cause unlocking malfunction.

3. Select the correct locking direction, as this cylinder does not generate holding force opposite to the locking direction.

The extension lock does not generate holding force in the cylinder's retracting direction, and the retraction lock does not generate holding force in the cylinder's extension direction.

4. Even when locked, there may be a stroke movement of approximately 1 mm in the locking direction due to external forces, such as the workpiece mass.

Even when locked, if air pressure drops, a stroke movement of approximately 1 mm may be generated in the locking direction of the lock mechanism due to external forces such as the workpiece mass.

5. When locked, do not apply impact loads, stroke vibration or rotational force, etc.

This may damage the locking mechanism, shorten the service life or cause unlocking malfunction.

6. When an air cushion is used, operate the cylinder to the stroke end.

If the stroke is restricted by an external stopper or a clamp work piece, the cushioning and silencing mechanisms may not take sufficient effect.

7. Strictly observe the limiting ranges of the load mass and the maximum speed (in Graph (1)). These limiting ranges presuppose that the cylinder is operated to the stroke end and the cushion needle is properly adjusted.

If the cylinder is used outside the limiting ranges, excessive impact may result to cause damage to the machinery.

8. Adjust the cushion needle so that sufficient kinetic energy will be absorbed during a cushion stroke and no excessive kinetic energy will remain when the piston collides at the stroke end.

If the piston collides at the stroke end with immoderate kinetic energy (exceeding levels indicated in Table (1) due to insufficient adjustment, excessive impact may result to cause damage to the machinery.

Table (1) Allowable kinetic energy at the time of piston collision

Unit: [J]

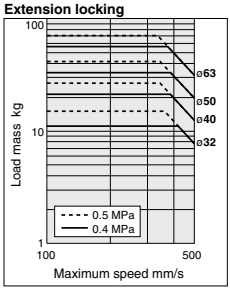
Bore size (mm)	32	40	50	63
Piston speed	50 to 500 mm/s			
Allowable kinetic energy	0.15	0.26	0.46	0.77

9. Strictly observe the limiting ranges of the lateral load to the piston rod (in Graph (2)).

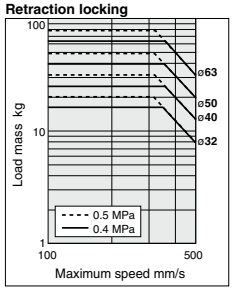
If the cylinder is used outside the limiting ranges, it may lead to a reduced service life or cause damage to the machinery.

Allowable kinetic energy (Graph (1), Energy absorbable at the cylinder end)

Extension locking

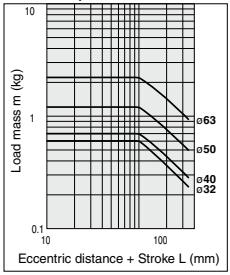


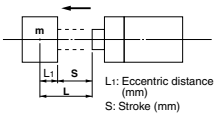
Retraction locking



Allowable load mass (Graph (2))

Horizontal (With and without switch)





Cushion Needle Adjustment

⚠ Warning

1. Readjust using the cushion needle.

When the product is shipped, the cushion needle is open 1/4 to 1/2 turn from the fully closed position. Readjust the position depending on the load or operating speed before using.

Note that the needle must be fully closed first, and then gradually reopened when adjusting.

2. Keep the cushion needle adjustment range between the fully closed position and the rotation given below.

Bore size	Rotations
ø**32** to ø**63**	2.5 rotations or less

To adjust a cushion needle, use a 3 mm flat head watchmaker's screwdriver. Keep the cushion needle adjustment range between the fully closed position and the open position in the table above. Though the retaining mechanism prevents the cushion needle from coming out, it may still spring out during operation if rotated beyond the range given above.

3. For cylinders with a bypass pipe, adjust the cushion needle to keep the cushion stroke time in the lock free direction not longer than one second.

If the cushion stroke time is too long, it may cause malfunction or lead to reduced service life.

RLQ Series
Specific Product Precautions 2

Be sure to read this before handling the products.
Refer to page 9 for safety instructions and pages 10 to 19 for actuator and auto switch precautions.

Pneumatic Circuit

⚠ Warning

• Drop prevention circuit

1. Use cylinders with a bypass pipe with the circuit example 1.

Special restrictors for RLQ series are installed on cylinders with bypass piping. Failure to install these restrictors will lead to malfunction or a reduced service life.

2. For cylinders with a bypass pipe, be aware that there is a time lag before being in the locked state. (Circuit example 1)

After operating a stroke in the lock free direction, it may take several seconds to shift from unlocked condition to locked condition. Special precautions must be taken when the cylinder is used at a high pressure since it will take some time to achieve the locked condition.

3. Be careful of reverse exhaust pressure flow from a common exhaust type valve manifold. (Circuit example 1)

Since the lock may be released due to reverse exhaust pressure flow, use an individual exhaust type manifold or single type valve.

4. Do not use 3 position valves with the circuit example 1.

The lock may be released due to inflow of the unlocking pressure.

5. Be sure to release the lock before operating the cylinder. (Circuit example 2)

When the lock release delays, a cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction. Even when a cylinder moves freely, be sure to release the lock and operate the cylinder.

6. Be aware that the locking action may be delayed due to the piping length or the timing of exhaust. (Circuit example 2)

The locking action may be delayed due to the piping length or the timing of exhaust, which also makes the stroke movement toward the lock larger. Install the solenoid valve for locking closer to the cylinder than the cylinder drive solenoid valve.

• Emergency stop circuit

1. Perform emergency stops with the pneumatic circuit. (Circuit examples 3 and 4)

This cylinder is designed for locking against inadvertent movement from a stationary condition. Do not perform emergency stops while the cylinder is operating, as this may cause unlocking malfunction or shorten the service life. Emergency stops must be performed with the pneumatic circuit, and workpieces must be held with the locking mechanism after the cylinder fully stops.

2. When restarting the cylinder from the locked state, remove the workpiece and exhaust the residual pressure in the cylinder. (Circuit examples 3 and 4)

A cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction.

3. Be sure to release the lock before operating the cylinder. (Circuit example 4)

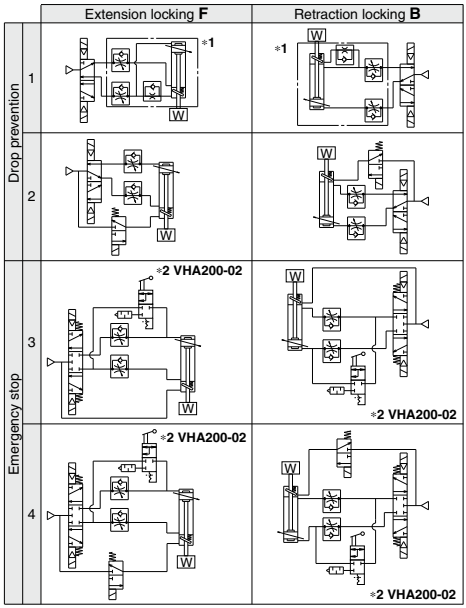
When the lock release delays, the cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction. Even when the cylinder moves freely, be sure to release the lock and operate the cylinder.

• Drop prevention circuit, Emergency stop circuit

1. If installing a solenoid valve for a lock unit, be aware that repeated supply and exhaustion of air may cause condensation. (Circuit examples 2 and 4)

The lock unit operating stroke is very small and so the pipe is long. If supplying and exhausting air repeatedly, condensation, which occurs by adiabatic expansion, accumulates in the lock unit. This may then cause air leakage and an unlocking malfunction due to corrosion of internal parts.

Circuit example



∗ The symbol for the cylinder with lock in the basic circuit uses SMC original symbol.
∗1 A cylinder with bypass piping is shown in the area within the dashed lines in circuit example 1.
∗2 The VHA200-02 is a residual pressure release valve that is suitable for environments with welding spatter due to its metal body.
In normal environments, a residual pressure release valve with One-touch fittings (KE series) can also be used.

Mounting

⚠ Caution

1. Be sure to connect the load to the rod end with the cylinder in an unlocked condition.

If this is done in a locked condition, it may cause damage to the lock mechanism.

2. Mount auto switches from the head side

The lock body and cylinder tube exterior have the same shape for cylinder bore sizes ø40 to ø63, but auto switches may not be mountable from the rod side. For the head side flange or double clevis types, install mounting brackets after mounting auto switches and auto switch mounting brackets from the head side.

RLQ Series
Specific Product Precautions 3

Be sure to read this before handling the products.
Refer to page 9 for safety instructions and pages 10 to 19 for actuator and auto switch precautions.

Preparing for Operation

⚠ Warning

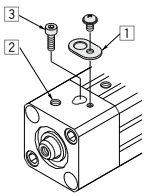
1. To start operation from the locked position, be sure to restore air pressure to the B line in the pneumatic circuit.

When pressure is not applied to the B line, the load may drop or the cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause unlocking malfunction.

2. Size ø32 are shipped in the unlocked condition maintained by the unlocking bolt. Be sure to remove the unlocking bolt following the procedure below before operation.

The locking mechanism will not be effective without the removal of the unlocking bolt.

ø32 only



1) Confirm that there is no air pressure inside the cylinder, and remove dust cover 1.
2) Supply air pressure of 0.2 MPa or more to unlocking port 2 shown in the drawing on the left.
3) Use a hexagon wrench (width across flats: 2.5) to remove unlocking bolt 3.

Since the holding function for the unlocked condition is not available for sizes ø40 through ø63, they can be used as shipped.

Manually Unlocking

⚠ Warning

1. Do not unlock the cylinder while an external force such as a load or spring force is applied.

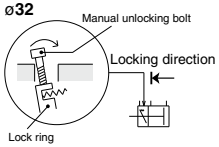
This is very dangerous because the cylinder will move suddenly. Release the lock after preventing cylinder movement with a lifting device such as a jack.

2. After confirming safety, operate the manual release following the steps shown below.

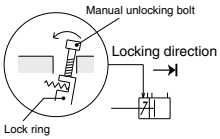
Confirm that there is no personnel inside the load movement range, etc., and that there is no danger even if the load moves suddenly.

Manually unlocking

ø32



Extension locking
1) Remove the dust cover.
2) Screw a manual unlocking bolt (a bolt of M3 x 0.5 x 15 L or more on the market) into the lock ring threads as shown above, and lightly push the bolt in the direction of the arrow (rear side) to unlock.

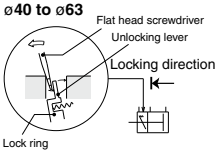


Retraction locking
1) Remove the dust cover.
2) Screw a manual unlocking bolt (a bolt of M3 x 0.5 x 15 L or more on the market) into the lock ring threads as shown above, and lightly push the bolt in the direction of the arrow (front side) to unlock.

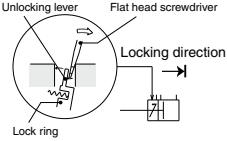
Manually Unlocking

⚠ Warning

ø40 to ø63



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



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

Maintenance

⚠ Caution

1. In order to maintain good performance, operate with clean unlubricated air.

If lubricated air, compressor oil or drainage, etc., enters the cylinder, there is a danger of sharply reducing the locking performance.

2. Do not apply grease to the piston rod.

There is a danger of sharply reducing the locking performance.

3. Never disassemble the lock unit.

It contains a heavy duty spring which is dangerous. There is also a danger of reducing the locking performance.

4. Never remove the pivot seal and disassemble the internal unit.

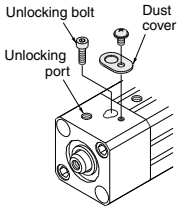
ø32 has a silver seal (pivot seal) of ø12 applied on one side of the lock body (opposite side from the unlocking port). The seal is applied for dust prevention, but there will be no functional problem even if the seal is removed. However, never disassemble the internal unit.

Holding the Unlocked State

⚠ Warning

1. ø32 can hold the unlocked condition.
<Holding the unlocked condition>

1) Remove the dust cover.
2) Supply air pressure of 0.2 MPa or more to the unlocking port, and set the lock ring to the perpendicular position.
3) Screw the unlocking bolt which is included (hexagon socket head cap screw / M3 x 10 L) into the lock ring to hold the unlocked condition.



2. To use the locking mechanism again, be sure to remove the unlocking bolt.

The locking mechanism will not function with the unlocking bolt screwed-in. Remove the unlocking bolt according to the procedures described in the section “Preparing for Operation”.

Specific Product Precautions 4

Be sure to read this before handling the products.
Refer to page 9 for safety instructions and pages 10 to 19 for actuator and auto switch precautions.

Adjustment

⚠ Warning

1. Use the hexagon wrenches shown below when replacing mounting brackets.

Bore size (mm)	Mounting bracket bolt width across flats (mm)	Tightening torque (N·m)
32, 40	4	2.8 to 5.1
50	5	9.0 to 12.0
63	6	11.4 to 22.4

2. When replacing the mounting bracket, the tie-rod nut on the cylinder body will also loosen. Be sure to retighten it with the proper tightening torque.
After retightening the tie-rod nut at the proper tightening torque, install the mounting bracket.

Bore size (mm)	Tie-rod nut width across flats (mm)	Tightening torque (N·m)
32, 40	5	2.8 to 5.1
50	6	9.0 to 12.0
63	8	11.4 to 22.4