



Operation Manual

PRODUCT NAME

Series MLGP

MODEL / Series / Product Number

Compact Guide Cylinder with Lock

SMC Corporation

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Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

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

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218-1992: Manipulating industrial robots -Safety.

etc.



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

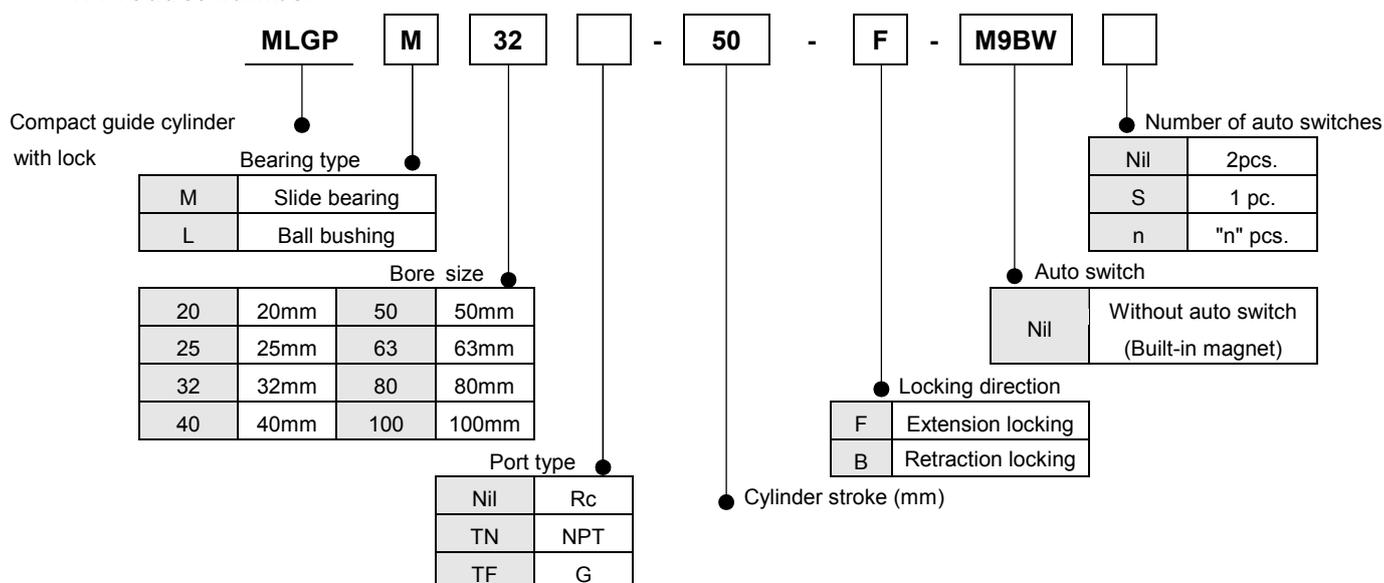
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

1. Product number



2. Specification

2-1. Cylinder specifications

Bore size (mm)	20	25	32	40	50	63	80	100
Action	Double acting							
Fluid	Air							
Proof pressure	1.5MPa							
Maximum operating pressure	1.0MPa							
Minimum operating pressure	0.2MPa *							
Ambient and fluid temperature	-10 to 60°C (No freezing)							
Piston speed	50 to 400mm/s							
Cushion	Rubber bumper on both ends							
Lubrication	Not required (non-lube)							
Stroke length tolerance	$^{+1.5}_0$ mm							
Port size (Rc, NPT, G)	1/8			1/4		3/8		

*When the unlocking air and cylinder operating air are not common, the minimum operating pressure is 0.15MPa. (The minimum operating pressure for the cylinder alone is 0.15MPa.)

2-2. Lock specifications

Bore size (mm)	20	25	32	40	50	63	80	100
Lock operation	Spring locking (Exhaust locking)							
Unlocking pressure	0.2 MPa or more							
Lock starting pressure	0.05 MPa or less							
Locking direction	One direction (Extension locking, Retraction locking)							
Maximum operating pressure	1.0MPa							
Unlocking port size (Rc, NPT, G)	M5 x 0.8			1/8			1/4	
Holding force (Maximum static load)(N)*	157	245	402	629	982	1559	2513	3927

* The holding force (max. static load) shows the maximum capability and does not show the normal holding capability.

3. Standard stroke

3-1. Standard stroke table

Bore size (mm)	Standard stroke (mm)
20,25	20,30,40,50,75,100,125,150,175,200,250,300,350
32 to 80	25,50,75,100,125,150,175,200,250,300,350
100	50,75,100,125,150,175,200,250,300,350

3-2. Manufacture of intermediate stroke

Description	Spacer installation type Spacers are installed in the standard stroke cylinders. ø20 to 32: Stroke can be modified by the 1mm interval. ø40 to 100: Stroke can be modified by the 5mm interval.	
Part no.	Refer to "Product number" for standard model numbers.	
Applicable stroke (mm)	ø20, ø25, ø32	1 to 349
	ø40 to ø80	5 to 345
	ø100	25 to 345
Example	Part no.: MLGPM20-39-F A 1mm spacer is installed in MLGPM20-40-F. Dimension C is 77mm.	

4. Allowable kinetic energy

Bore size (mm)	20	25	32	40	50	63	80	100
Allowable kinetic energy (J)	0.11	0.18	0.29	0.52	0.91	1.54	2.71	4.54

1J= 0.102kgf·m



Caution

The cylinder will be damaged if kinetic energy exceeds the allowable kinetic energy. Select an appropriate cylinder while referring to the table above. The kinetic energy of the load is calculated by the formula below.

$$E_k = \frac{M + m}{2} V^2 \quad V = V_a \times 1.4$$

E_k : Kinetic energy (J) M : Mass of object being transported (kg)

m : Mass of moving parts of cylinder (kg) V : Maximum speed (m/s)

V_a : Average speed (m/s)

Mass of moving parts of cylinder

(kg)

Bore size (mm)	model	Standard stroke (mm)													
		20	25	30	40	50	75	100	125	150	175	200	250	300	350
20	MLGPM20	0.40	-	0.42	0.45	0.47	0.59	0.65	0.71	0.77	0.83	0.89	1.08	1.20	1.31
	MLGPL20	0.36	-	0.38	0.42	0.44	0.49	0.53	0.61	0.65	0.70	0.75	0.85	0.95	1.05
25	MLGPM25	0.65	-	0.69	0.73	0.77	0.97	1.08	1.18	1.28	1.38	1.48	1.80	2.00	2.20
	MLGPL25	0.58	-	0.61	0.67	0.70	0.78	0.85	0.97	1.04	1.11	1.19	1.37	1.52	1.67
32	MLGPM32	-	1.28	-	-	1.44	1.63	1.79	1.95	2.12	2.28	2.44	2.95	3.28	3.61
	MLGPL32	-	0.97	-	-	1.09	1.26	1.38	1.56	1.68	1.80	1.92	2.22	2.46	2.70
40	MLGPM40	-	1.36	-	-	1.52	1.71	1.87	2.03	2.20	2.36	2.52	3.04	3.36	3.69
	MLGPL40	-	1.05	-	-	1.17	1.34	1.46	1.64	1.76	1.88	1.99	2.30	2.54	2.77
50	MLGPM50	-	2.51	-	-	2.76	3.11	3.36	3.62	3.87	4.12	4.38	5.22	5.73	6.24
	MLGPL50	-	2.03	-	-	2.21	2.50	2.69	2.97	3.15	3.34	3.53	4.03	4.40	4.77
63	MLGPM63	-	2.89	-	-	3.14	3.48	3.74	3.99	4.25	4.50	4.75	5.59	6.10	6.61
	MLGPL63	-	2.39	-	-	2.58	2.87	3.05	3.33	3.52	3.70	3.89	4.39	4.76	5.13
80	MLGPM80	-	4.91	-	-	5.29	5.96	6.33	6.71	7.08	7.46	7.83	9.14	9.89	10.7
	MLGPL80	-	4.33	-	-	4.78	5.30	5.59	5.88	6.17	6.46	6.75	7.58	8.16	8.73
100	MLGPM100	-	-	-	-	8.65	9.58	10.1	10.7	11.2	11.7	12.3	14.0	15.1	16.2
	MLGPL100	-	-	-	-	7.72	8.51	8.92	9.34	9.75	10.2	10.6	11.7	12.6	13.4

5. Precautions on model selection

Warning

1) **Holding force (maximum static load) is the capacity that the product can hold the static load without vibration or impact applied. The maximum load (weight of the work piece) when locking must be set to 50% or less of the holding force (maximum static load).**

For the mass selection in unlocked conditions, refer to point 6).

2) **Do not use the locking function on this product to stop a moving piston rod.**

The locking mechanism on this cylinder is intended to lock and hold the position of the piston rod when it is in a static state. Using this function as a stop or a break whilst the piston rod is moving may cause damage and shorten the life of the product, resulting in unlocking failure.

3) **This cylinder does not generate a holding force in the reverse direction of locking. Ensure that a model with the correct locking direction is selected.**

The holding force will not be generated in the reverse direction to the specified locking direction. The extended locking type locks the movement only in the extended direction, and the retracted locking type locks only in the retracted direction. Locking direction cannot be changed.

4) **When the lock is activated, the piston rod can move 1mm maximum in the locking direction due to forces generated by the mass of the workpiece.**

When the lock is activated, the piston rod can move 1mm maximum in the locking direction due to forces generated by the mass of the workpiece under low air pressure conditions in the locking mechanism.

5) **Do not apply impact loads, strong vibration or rotational force while the lock mechanism is activated.**

This will cause damage to the lock mechanism, reduced product life, or cause unlocking failure.

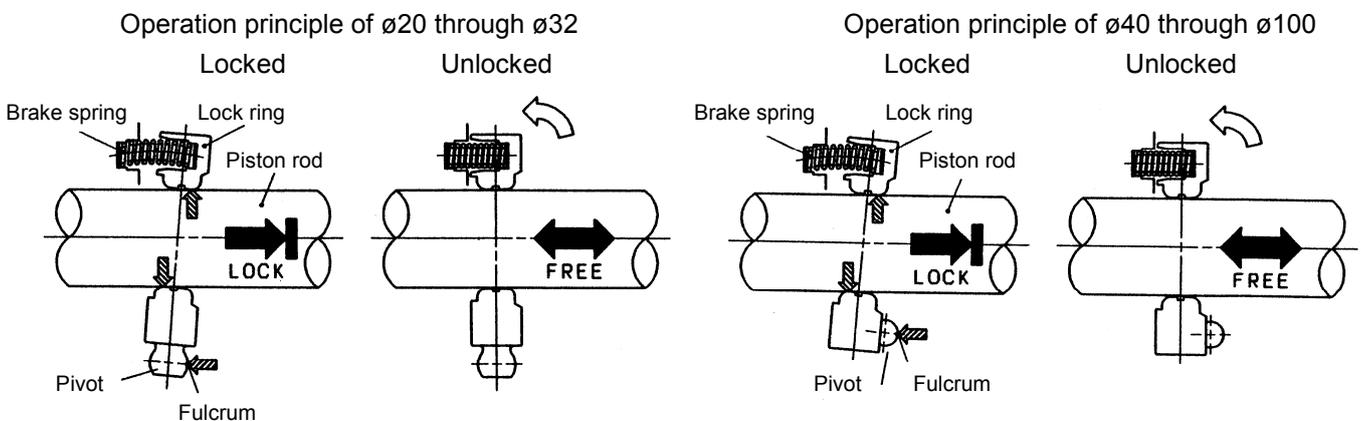
6) **Operate so that load mass, cylinder speed and eccentric distance are within the limiting ranges in the specifications and model selection graphs.**

If the products are used beyond the limiting range, it may lead to a reduced service life or cause damage to the machinery.

Refer to SMC catalogue for specifications and model selection,

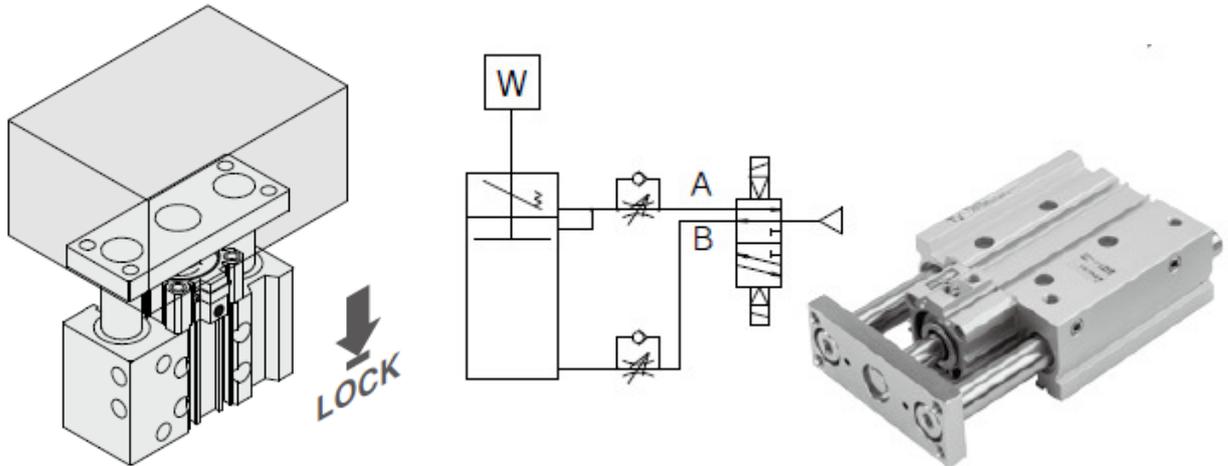
6. Operation principle

Compact Guide Cylinder with Lock locks the position of the piston rod by the lock ring which is tilted by the brake spring. The tilting is increased by the load and the piston rod is securely locked.



6-2. Retraction locking (type B) --- Drop Prevention for vertical mounting. (Holding of position)

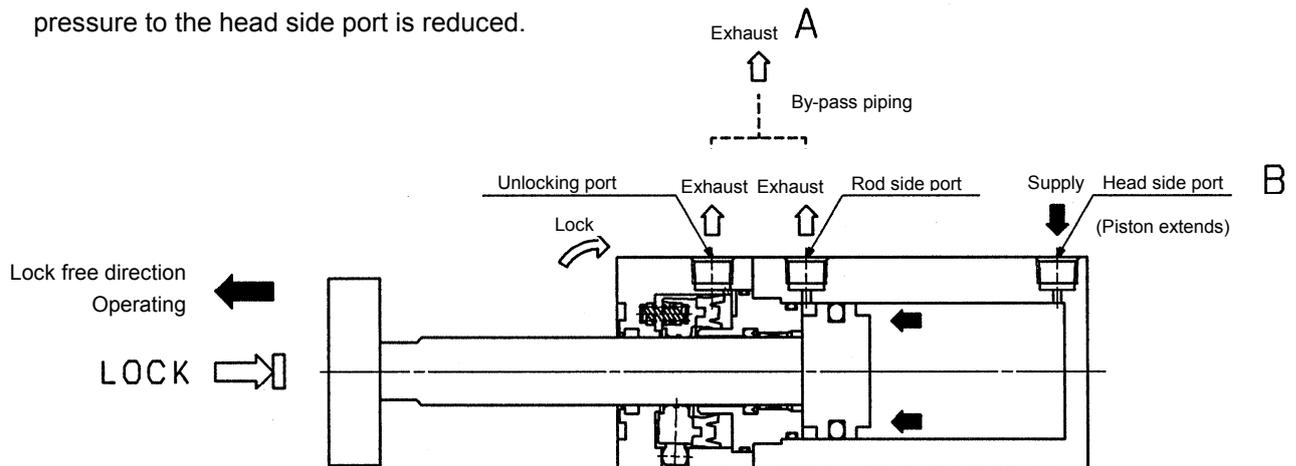
The locking mechanism will hold the clamped state of the cylinder in the extension direction if there is a sudden loss of air supply and will prevent any slippage caused by the weight of fixtures.



MLGP□-□-B: Retraction locking

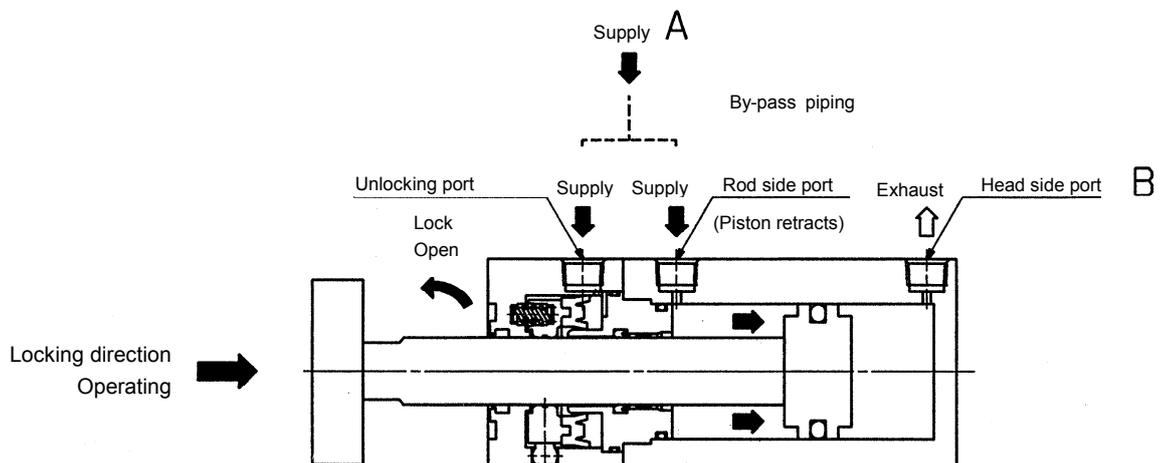
(1) Locked position

When air pressure is supplied to head side port B, the cylinder operates (in lock free direction) with the lock ring raised by exhaust pressure (state of release) from the port on the rod side. This movement is but when the piston rod stops at the stroke end, the back pressure will be exhausted completely, and the spring force tilts the lock ring to lock the piston rod. The piston rod will be kept locked even if the air pressure to the head side port is reduced.



(2) Unlocking

Air pressure is simultaneously supplied to the unlocking port and rod side port via bypass piping A. When pressurised, the lock ring becomes perpendicular and the lock is released. At the same time, air pressure is supplied to the rod side of the piston, making the piston rod retract.



7. Installation

7-1. Air supply

Caution

1) Use dry air

If water enters inside the cylinder, the grease in the cylinder will be washed away, reducing lubrication performance which leads to air leakage or operation failure. Install air purification equipment such as an air drier or water separator to provide dry air.

2) The air supplied to the product should be filtered using SMC AF series air filter and regulated to the specified operating pressure using SMC AR series regulator.

3) This is a non-lube type cylinder. Lubrication is not needed.

This is a non-lube type cylinder. Lubrication is not needed. Do not introduce oil in lubricated air as this may reduce locking performance significantly.

7-2. Piping

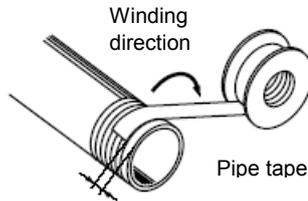
Caution

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 piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Expose approx. 2 threads

7-3. Operating environment

Warning

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

Refer to the construction drawings regarding materials of each part of the cylinder.

2) Install a cover over the cylinder if it is used in an area that is dusty, or in an environment in which water or oil splashes on the cylinder.

Caution

1) Operate within the specified operating temperature range.

The allowable temperature range of the cylinder is -10°C to 60°C. Operation at temperature out of this range will lead to abnormal wearing or air leakage due to the hardening of the seal or the lubricant does not realize its required performance, shortening the life of the product.

8) Depending on the operating condition, change the position of plugs for the piping port.

- M5 types

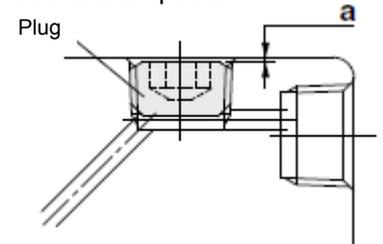
After tightening the fitting by hand, use a wrench to tighten the fitting an additional 1/6 to 1/4 turn.

- Tapered thread

Tighten with the proper torque shown below. Use the seal tape on the plug. With regard to the sunk dimension of a plug (dimension "a" in the figure), use the stipulated figures as a guide and confirm the air leakage before operation.

* If plugs on the top mounting port are tightened with more than the proper tightening torque, they will be screwed too deeply and the air passage will be constricted, resulting in limited cylinder speed.

Connection thread (plug) size	Applicable tightening torque (N·m)	a dimension
1/8	7 to 9	0.5mm or less
1/4	12 to 14	1mm or less
3/8	22 to 24	1mm or less

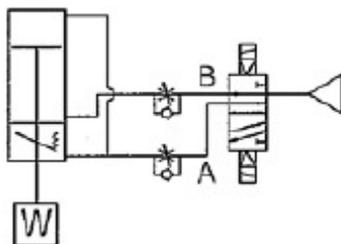


7-5. Preparation before operation

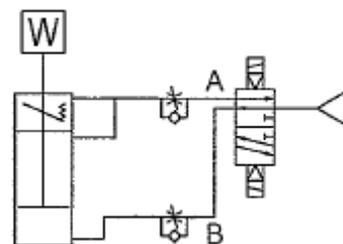
Warning

1) Make sure to reapply air pressure to the port B shown in the figure below before restarting the cylinder from the lock position.

When pressure is not applied to the B port, 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. When applying pressure to the B port, be sure to confirm whether the environment is safe, since workpieces may move.



MLGP□-□-F: Extension locking

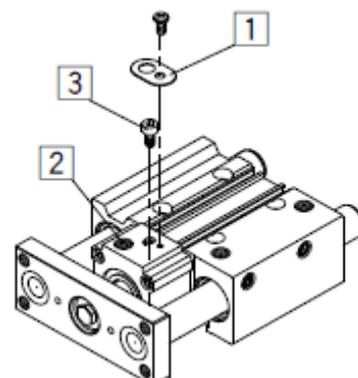


MLGP□-□-B: Retraction locking

2) Since size ø20 through ø32 are shipped in an unlocked condition maintained by the unlocking bolt, be sure to remove the unlocking bolt following the steps below. Since a holding function for the unlocked state is not available for sizes ø40 through ø100, they can be used as shipped.

If the cylinder is used without removing the unlocking bolt, the lock mechanism will not function.

- Step 1) Confirm that there is no air pressure inside the cylinder, and remove the dust cover [1]
- Step 2) Supply air pressure of 0.2 MPa or more to the unlocking port shown in [2] in the figure on the right.
- Step 3) Remove the unlocking bolt [3] with a hexagon wrench (width across flats 2.5).



8. Pneumatic circuit



Warning

- Drop prevention circuit

1) Do not use a 3-position valve for the circuit example 1.

The lock may be released as the lock releasing pressure enters the cylinder.

2) Use a speed controller with a meter-out circuit. (Circuit example 1)

When they are not installed or they are used under meter-in control, it may cause malfunctions, it may cause operation failure.

3) Branch off the compressed air piping for the lock unit between the cylinder and the speed controller. (Circuit example 1)

Note that branching off in another section can cause a reduction in service life.

4) Perform piping so that the side going from the piping junction to the lock unit is short. (Circuit example 1)

If the lock release port side is longer than another side from the piping junction, this may cause unlocking malfunction or shorten the service life.

5) Be aware of reverse exhaust pressure flow from common exhaust type valve manifolds. (Circuit example 1)

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

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

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

7) 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 example 3 and 4)

This cylinder is designed for locking against inadvertent movement from a stationary condition. Do not perform intermediate 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 example 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 unlocking malfunction.

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

When the lock release delays, a cylinder may eject at the high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause unlocking malfunction. Even when a 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 example 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 cause air leakage and an unlocking malfunction due to corrosion of internal parts.

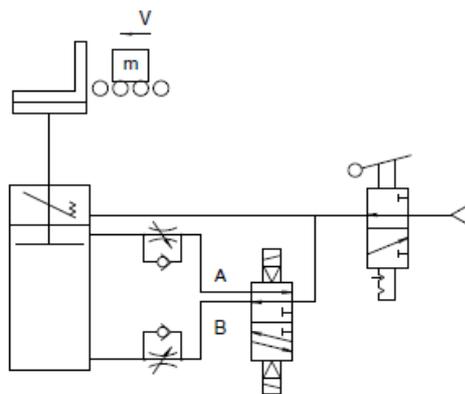
Circuit Example

		Extension locking F	Retraction locking B
Drop prevention	1		
	2		
Emergency stop	3		
	4		

- Stopper Circuit

1) When used as a stopper, be careful that the cylinder in a workpiece does not collide with the cylinder in a locked condition. Use the guide cylinder with the circuit below.

If the workpiece were bumped into the cylinder in the locked stated, it could be unlocked by shock or the locking mechanism and the piston rod could be damaged, that could shorten its service life substantially or result in breakage.



MLGPM-□-B: When used as stopper

9. Manual unlocking

Warning

1) Do not perform unlocking while an external force such as a load or spring force is being applied.

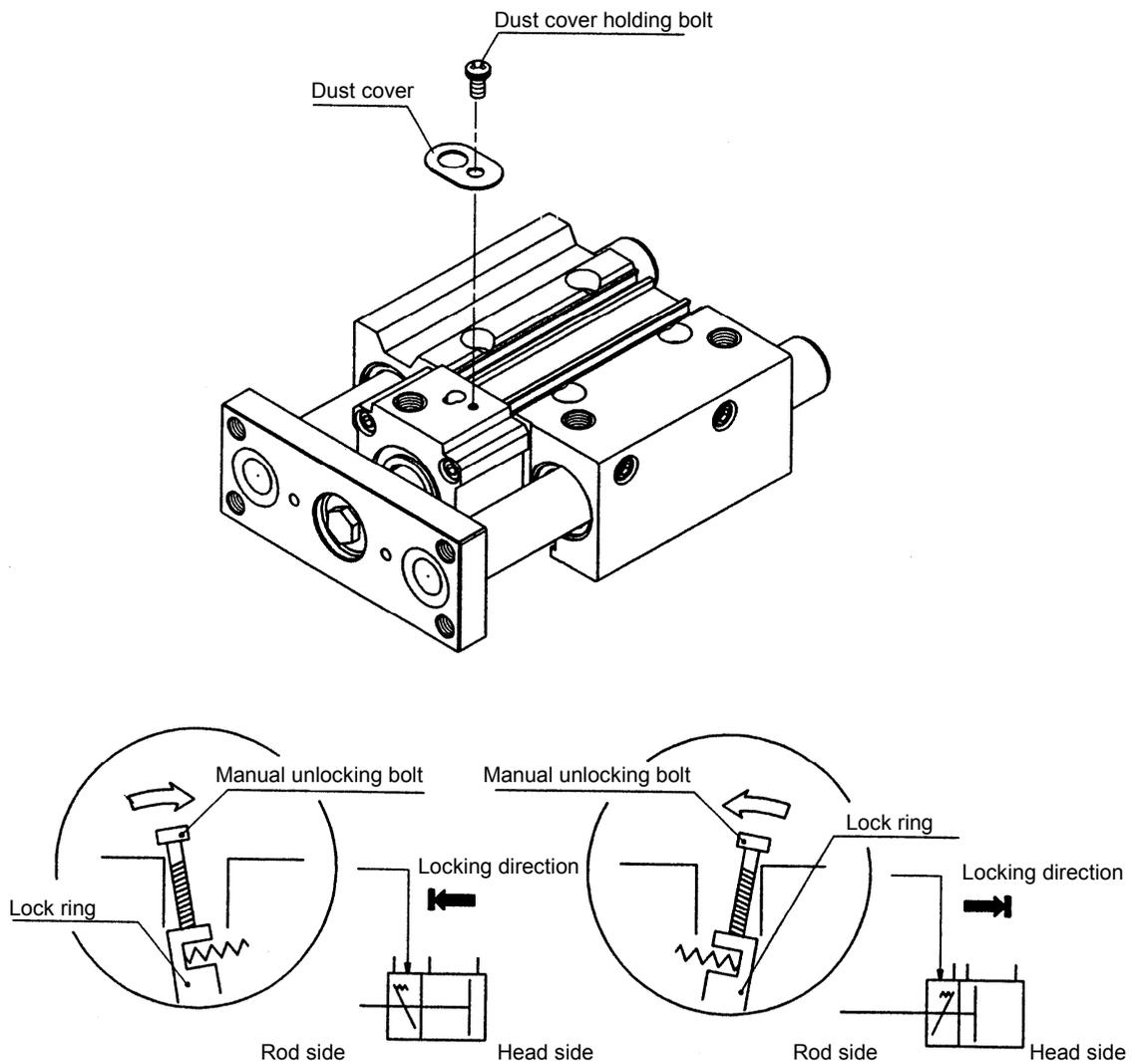
This is very dangerous because the cylinder will move suddenly. Release the lock after preventing cylinder movement with a lifting device such as a jack.

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

Carefully confirm that personnel are not inside the lock movement range, etc, and that there is no danger even if the load moves suddenly.

Manually unlocking

For $\varnothing 20$ to $\varnothing 32$



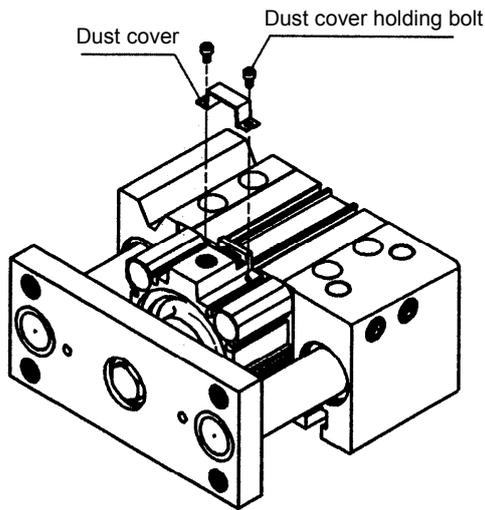
MLGP□-□-F: Extension locking

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

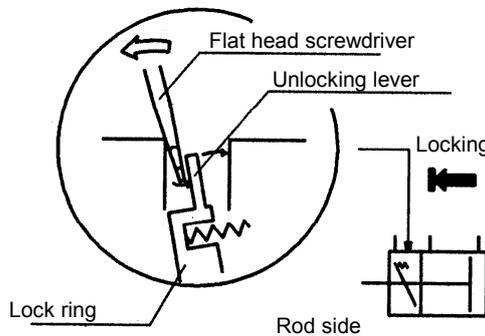
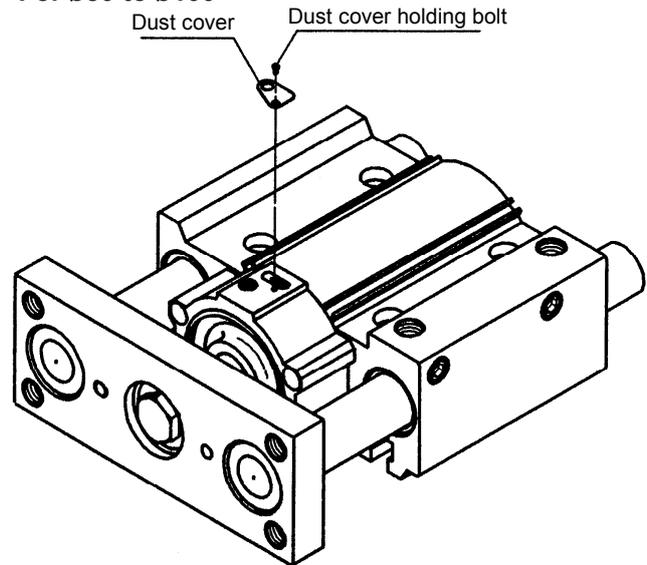
MLGP□-□-B: Retraction locking

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

For $\varnothing 40$ to $\varnothing 63$

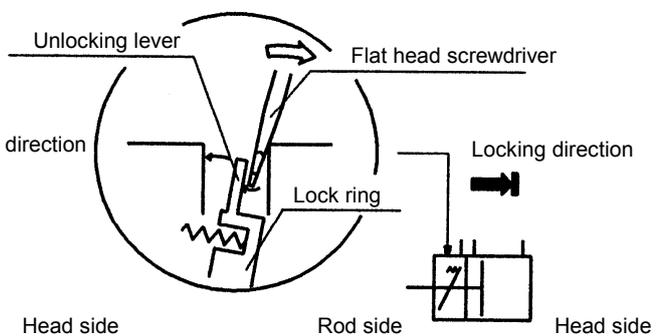


For $\varnothing 80$ to $\varnothing 100$



MLGP□-□-F: Extension locking

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



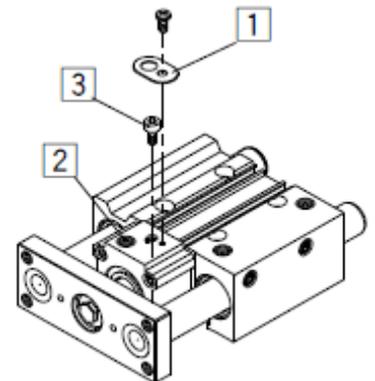
MLGP□-□-B: Retraction locking

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

! Caution

1. In order to hold the locked state, be sure to follow the steps below after confirming safety.

- Step 1) Remove the dust cover 1.
- Step 2) Supply air pressure of 0.2 MPa or more to unlocking port [2] shown below and unlock.
- Step 3) Screw the attached hexagon socket head cap bolt [3] ($\varnothing 20, \varnothing 25$: M3×0.5×5L $\varnothing 32$: M3×0.5×10L), into the lock ring to hold the unlock condition.



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

When the unlocking bolt is screwed in, the lock mechanism does not function. Remove the unlocking bolt according to the steps prescribed in the section of "Preparing for Operation".

10. Maintenance

10-1. Disassembly/ Replacement



Warning

1) Do not disassemble the product.

It contains a heavy duty spring which is dangerous. Incorrect assembly will deteriorate the lock performance, and the function will not be satisfied. (Consult SMC when disassembly or parts replacement is necessary)

10-2. Maintenance



Caution

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

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

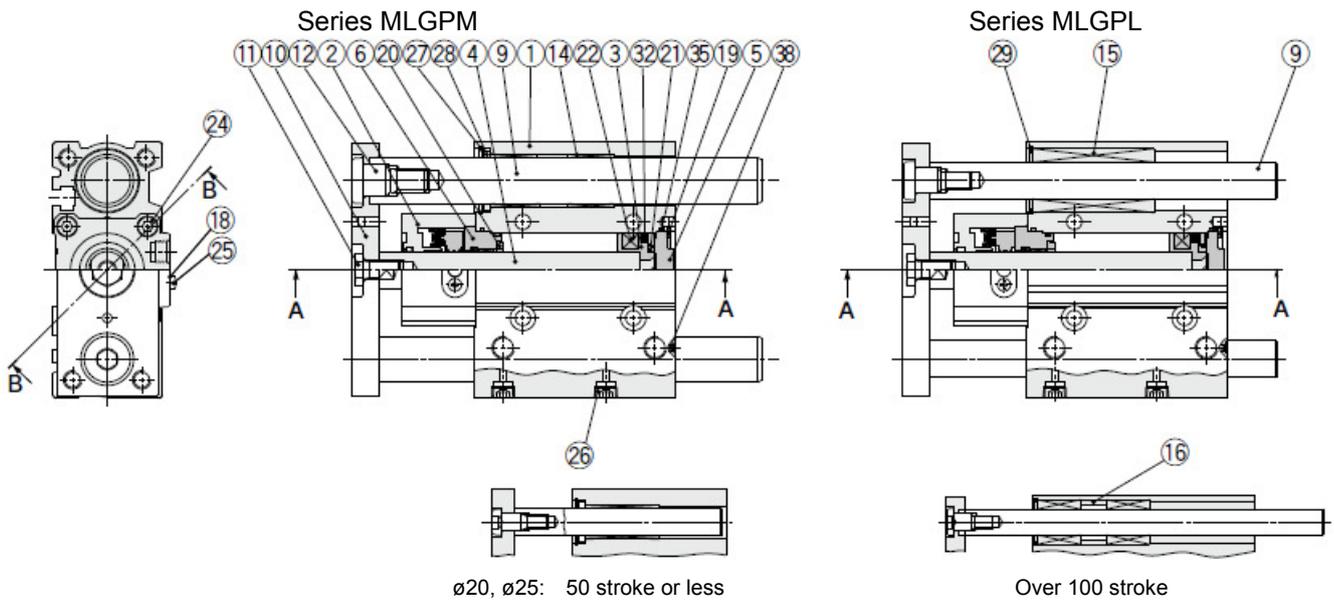
2) Do not apply grease to the piston rod.

There is a danger of sharply reducing the locking performance.

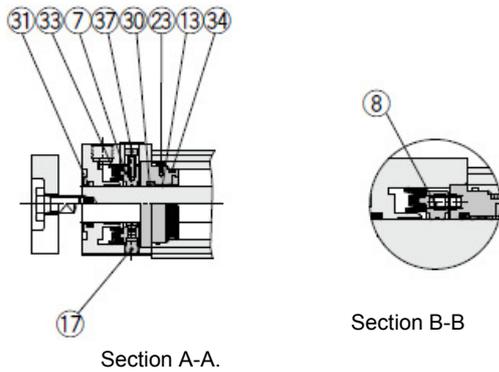
3) $\varnothing 20$ to $\varnothing 32$, a $\varnothing 12$ silver seal is labeled on the one surface of the lock body (on the surface opposite from the unlocking port). The seal is meant for dust prevention, but even if it is peeled off, there would be no problem functionally.

10-3. Construction

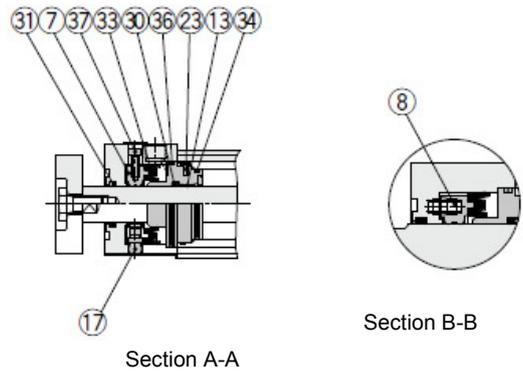
ø20・ø25・ø32



Type F (Extension locking)



Type B (Retraction locking)



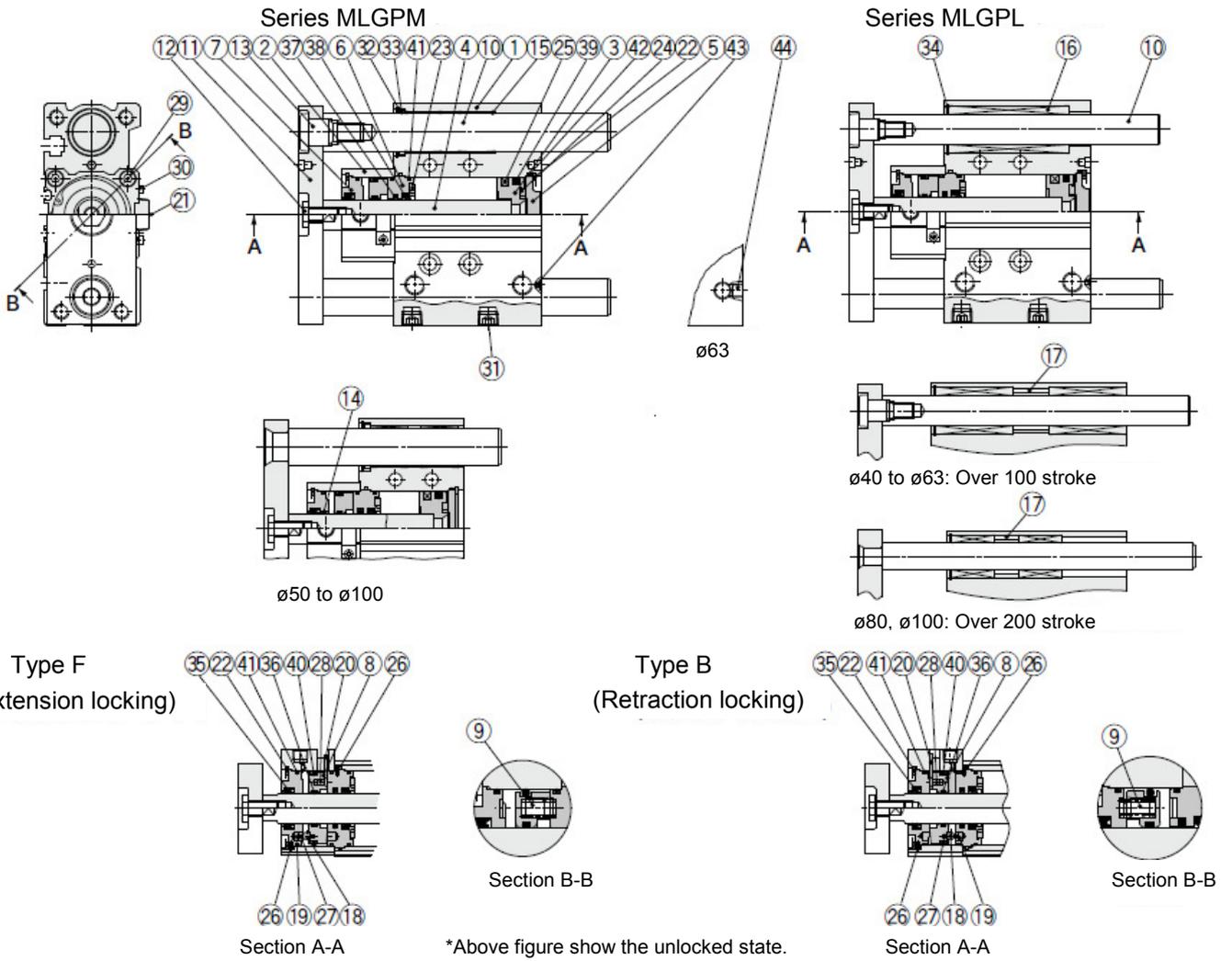
*Above figure show the unlocked state.

No.	Description	Note
1	Body	
2	Lock body	
3	Piston	
4	Piston rod	
5	Head cover	
6	Intermediate collar	
7	Lock ring	
8	Brake spring	
9	Guide rod	
10	Plate	
11	Plate mounting bolt	
12	Guide bolt	
13	Bushing	
14	Bushing	MLGPM
15	Ball bushing	MLGPL

No.	Description	Note
16	Spacer	MLGPL
17	Pivot	
18	Dust cover	
19	Type C retaining ring for hole	
20	Bumper A	
21	Bumper B	
22	Magnet	
23	Parallel pins	
24	Hexagon socket head cap screw	
25	Dust cover holding bolt	
26	Hexagon socket head plug	
27	Holder	MLGPM
28	Felt	MLGPM
29	Type C retaining ring for hole	MLGPL
30	Rod seal	

No.	Description	Note
31	Scraper	
32	Piston seal	
33	Lock ring seal	
34	Gasket A	
35	Gasket B	
36	Lock body gasket	
37	Unlocking bolt	
38	Steel ball	

ø40 to ø100



*Above figure show the unlocked state.

No.	Description	Note
1	Body	
2	Lock body	
3	Piston	
4	Piston rod	
5	Head cover	
6	Intermediate collar	
7	Collar	
8	Lock ring	
9	Brake spring	
10	Guide rod	
11	Plate	
12	Plate mounting bolt	
13	Guide bolt	ø40
14	Bushing	ø50 to 100
15	Bushing	MLGPM

No.	Description	Note
16	Ball bushing	MLGPL
17	Spacer	MLGPL
18	Pivot pin	
19	Pivot key	
20	Lever	
21	Dust cover	
22	Type C retaining ring for hole	
23	Bumper A	
24	Bumper B	
25	Magnet	
26	Parallel pin	
27	Spring pin	
28	Hexagon socket countersunk head screw	
29	Hexagon socket head cap screw	
30	Dust cover holding bolt	

No.	Description	Note
31	Hexagon socket head plug	
32	Holder	MLGPM
33	Felt	MLGPM
34	Type C retaining ring for hole	MLGPL
35	Rod seal A	
36	Rod seal B	
37	Rod seal C	
38	Scraper	
39	Piston seal	
40	Brake piston seal	
41	Gasket A	
42	Gasket B	
43	Steel ball	ø40, ø50
44	Plug	ø63 to 100

11. Auto switch

11-1. Applicable auto switches

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state auto switch	-	Grommet	Yes	3-wire (NPN)	24V	5V,12V	-	M9NV	M9N	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
	Diagnostic indication (2-color indication)			2-wire	5V,12V	-	M9BV	M9B	●	●	●	○	○	-		
				3-wire (NPN)			M9NWV	M9NW	●	●	●	○	○	IC circuit		
	Water resistant (2-color indication)			3-wire (PNP)	5V,12V	-	M9PWV	M9PW	●	●	●	○	○	IC circuit		
				2-wire			M9BWB	M9BW	●	●	●	○	○	-		
	Magnetic field resistant (2-color indication)			3-wire (NPN)	-	-	*1 M9NAV	*1 M9NA	○	○	●	○	○	IC circuit		
				3-wire (PNP)			*1 M9PAV	*1 M9PA	○	○	●	○	○	IC circuit		
				2-wire			*1 M9BAV	*1 M9BA	○	○	●	○	○	-		
				2-wire (Non-polar)			-	** P3DW(A)	●	-	●	●	○	-		
Reed auto switch	-	Grommet	Yes	3-wire (NPN equivalent)	-	5V	-	A96V	A96	●	-	●	-	-	IC circuit	
				2-wire	24V	12V	100V	*2 A93V	A93	●	●	●	●	-	-	-
							100V or less	A90V	A90	●	-	●	-	-	-	IC circuit

*1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.

*Lead wire length symbols

0.5m... Nil (Example) N9NW

1m... M (Example) M9NWM

3m... L (Example) M9NWL

5m... Z (Example) M9NWZ

*1m lead wire is available only for D-A93.

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

*D-P4DW can be mounted on the bore sizes $\phi 32$ to $\phi 100$.

** D-P3DW(A) can be mounted on the bore sizes $\phi 25$ to $\phi 100$.

* Since there are other applicable auto switches than listed, refer to the catalogue.

* Auto switches are shipped together (not assembled).

11-2. Minimum auto switch mounting stroke (mm)

Auto switch model	Number of auto switch mounted	Bore size (mm)							
		$\phi 20$	$\phi 25$	$\phi 32$	$\phi 40$	$\phi 50$	$\phi 63$	$\phi 80$	$\phi 100$
D-A9□(V)	1 pc.	5							
D-M9□(V)	2 pcs.	10							
D-M9□W(V)	1 pc.	5 ^{Note2)}							
D-M9□AV	2 pcs.	10							
D-M9□A	1 pc.	5 ^{Note2)}							
	2 pcs.	10 ^{Note2)}							
D-Z7□/D-Z80	1 pc.	5 ^{Note1)}		5					
D-Y59□/D-Y7P	2 pcs.	10							
D-Y69□	1 pc.	5							
D-Y7PV	2 pcs.	5							
D-Y7□W(V)	1 pc.	5 ^{Note2)}							
D-Y7BA	2 pcs.	10 ^{Note2)}							
D-P3DW(A)	1 pcs.	-	15						
	2 pcs.	-	15						
D-P4DW	1 pc.	-	5 ^{Note2) Note4)}						
	2pcs. Different surfaces	-	10 ^{Note2) Note4)}						
	2pcs. Same surface	-	75						

Note 1) Confirm that it is possible to secure the minimum bending radius of 10mm of the auto switch lead wire before use.

Note 2) Confirm that it is possible to securely set the auto switch(es) within the range of indicator green light ON range before use. For in-line entry type, please also consider Note 1) shown above.

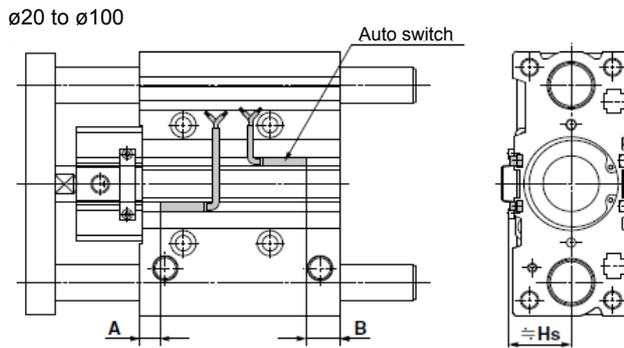
Note 3) The D-P3DW(A) can be mounted on bore sizes $\phi 25$ to $\phi 100$.

Note 4) The minimum bending radius of the D-P4DW is 25mm.

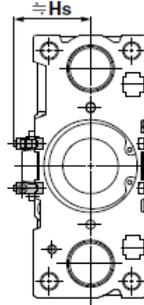
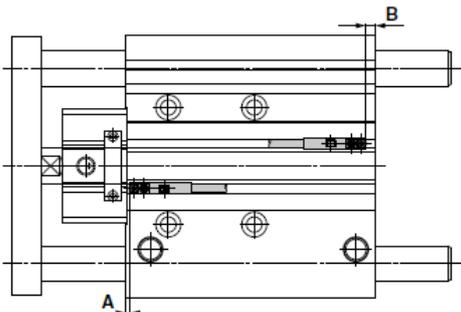
Note 5) The D-P4DW can be mounted on bore sizes $\phi 32$ to $\phi 100$.

11-3. Auto switch proper mounting position (detection at stroke end) and its mounting height

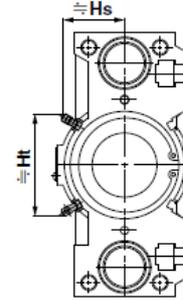
- D-A9□ D-Z7□
- D-A9□V D-Z80
- D-M9□ D-Y59□
- D-M9□V D-Y69□
- D-M9□W D-Y7P
- D-M9□WV D-Y7PV
- D-M9□A D-Y7□W
- D-M9□AV D-Y7□WV
- D-Y7BA



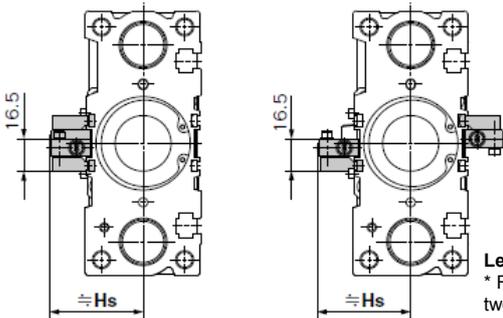
D-P3DW (*Cannot be mounted on bore size ø20.)
ø25 to ø63



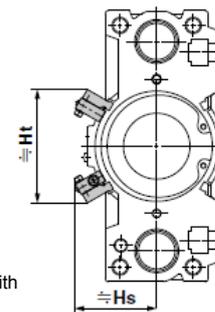
ø80, ø100



D-P4DW (*Cannot be mounted on bore size ø25 or less.)
ø32 to ø63



ø80 to ø100



Less than 25 to 75 strokes
* For bore sizes ø32 through 63 with two auto switches, one switch is mounted on each side.

Auto switch proper mounting position

(mm)

Auto switch model	D-M9□		D-A9□(V)		D-Z7□/Z80 D-Y59□/Y7P D-Y69□/Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-P3DWA		D-P3DW		D-P4DW	
	A	B	A	B	A	B	A	B	A	B	A	B
ø20	9.5	12.5	5.5	8.5	4.5	7.5	-	-	-	-	-	-
ø25	9.5	13	5.5	9	4.5	8	6	8.5	1.5	5	-	-
ø32	10.5	12	6.5	8	5.5	7	6	7.5	2.5	4	5	6.5
ø40	14.5	14.5	10.5	10.5	9.5	9.5	10	10	6.5	6.5	9	9
ø50	12.5	16.5	8.5	12.5	7.5	11.5	8	12	4.5	8.5	7	11
ø63	15	19	11	15	10	14	10.5	14.5	7	11	9.5	13.5
ø80	18	23.5	14	19.5	13	18.5	13.5	19	10	15.5	12.5	18
ø100	22.5	28.5	18.5	24.5	17.5	23.5	18	24	14.5	20.5	17	23

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

Auto switch mounting height

(mm)

Auto switch model	D-A9□/M9□ D-M9□W D-M9□A D-Z7□/Z80 D-Y59□/Y7P D-Y7□W D-Y7BA	D-A9□V		D-M9□V D-M9□WV D-M9□AV		D-Y69□ D-Y7PV D-Y7□WV		D-P3DWA		D-P3DW		D-P4DW	
		Hs	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs
ø20	18.5	22	-	24.5	-	20	-	-	-	-	-	-	-
ø25	20.5	24	-	26	-	21.5	-	32	-	30	-	-	-
ø32	23	26.5	-	29	-	24.5	-	35	-	33	-	41.5	-
ø40	27	30.5	-	33	-	28.5	-	39	-	37	-	44.5	-
ø50	32.5	36	-	38.5	-	34	-	44.5	-	42.5	-	50	-
ø63	39.5	43	-	45.5	-	41	-	51.5	-	49.5	-	57	-
ø80	40	43	71.5	45	74	41	70	49.5	84	48	78.5	61	84.5
ø100	50	53	83	55	85.5	51	81.5	60	95	58	90	71	96.5

11-4. Auto switch operating range

(mm)

Auto switch model	Bore size (mm)							
	ø20	ø25	ø32	ø40	ø50	ø63	ø80	ø100
D-A9□(V)	9	9	9	9.5	9.5	11	10.5	10.5
D-M9□(V) D-M9□W(V) D-M9□A(V)	5.5	5	6	5.5	6	6.5	6	7
D-Z7□/Z80	10	10	10.5	10.5	10.5	11.5	11.5	12
D-Y5□/Y6□ D-Y7P(V) D-Y7□W(V) D-Y7BA	7.5	7	6.5	6	7	8	9.5	10
D-P3DWA	-	5.5	6	6.5	6	6.5	6	6
D-P3DW	-	6	5.5	5.5	5.5	6.5	7.5	7.5
D-P4DW	-	-	5	4	4	5	4	4

* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately +/-30% dispersion) There may be the case it will vary substantially depending on an ambient environment.

11-5 Auto switch mounting bracket: Part no.

Auto switch model	Bore size (mm)		
	ø20	ø25	ø32~ø100
D-A9□(V) D-M9□(V) D-M9□W(V) D-M9□A(V)	BMG2-012		
D-P3DWA	-	BMG2-012	
D-P3DW	-	BMG6-025S	
D-P4DW	-		BMG1-040

Revision history

Initial release	2000. 5. 31
Revised 1	2000. 8. 8
Revised 2	2015. 5. 26

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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