Doc. no.MWB*-OM0078Q

Operation Manual

PRODUCT NAME

Lock unit

MODEL / Series / Product Number

MWB*32&100-UT-*
MWB*32&100TN-UT-*
MWB*32&100TF-UT-*

SMC Corporation

Contents

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: 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.**

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.
Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

1. Product Specifications

1-1. Lock unit specification

Lock unit model	MWB∗32-UT	MWB∗40-UT	MWB∗50-UT	MWB∗63-UT	MWB∗80-UT	MWB∗100-UT
Applicable rod size mm *2	Ø12 f8	Ø16 f8	Ø20 f8	Ø20 f8	Ø25 f8	Ø30 f8
Locking operation type	Exhaust locking					
Fluid	Air					
Proof pressure	1.5MPa					
Max. operating pressure	1.0MPa					
Min. operating pressure	0.3MPa					
Ambient and fluid temperature Operating fluid temperature	-10℃～70℃ (No freezing)					
Lubrication	Not required (non-lube)					
Rod speed mm/s	～1000					
Locking direction	Both directions					
Holding force (Maximum static load)(N) *1	630	980	1570	2450	3920	6080
Port size (Rc, NPT, G)	1/8			1/4		
Mounting type	Basic type, axial foot type, flange type					

*1 The holding force (max. static load) shows the maximum capability and does not show the normal holding capability. Choose the cylinder based on the Selection graph (Page 6 and 7).
*2 Applicable rod size affects holding force. Ensure the rod used is the appropriate size as shown in the table above. For the shape of the inserted rod, refer to Fig.2 Rod end style.

1-2. Stop accuracy

Lock unit model	MWB*32	MWB*40	MWB*50	MWB*63	MWB*80	MWB*100
Stop accuracy	±1.0mm					
Conditions (Used with air cylinder)	・Mounting orientation ･･･ Horizontal ・Supply pressure ･･･ 0.5MPa ・Piston speed ･･･ 300mm/s ・Load condition ･･･ Upper limit of allowable value Solenoid valve for lock Mounted to the lock release port Value shown is based on testing and the largest value is quoted. (Test repeated 100 times)					

⚠ Warning

・Confirm the specifications.

This product is designed only for use in compressed air systems including vacuum. Do not operate at pressures or temperatures outside of the specification, as this could cause damage or malfunction (Refer to the specifications.)

Please contact SMC if using fluids other than compressed air (including vacuum) generated by air compressor.

SMC does not guarantee against any damage if the product is used outside of the specification range.

1-3. Precautions on model selection

⚠ Caution

① Choose the optimum lock unit size based on the operating condition in the application , such as load , travel distance (stroke) , stroke time , mounting orientation , operating pressure, etc.

② Attention should be taken so that the operating speed does not exceed the maximum speed for the cylinder.

③ Stroke time means the time taken for the load to move from the start of the stroke to the end without an intermediate stop.

④ When the cylinder stroke and travel distance of the load are different such as in double speed mechanism shown as anexample in Fig. 1 , select the model based on the travel distance of the load.

⑤ The example and method of selection below are based on the use of an intermediate stop including emergency stops during operation. The maximum load weight for the lock should only be used, when kinetic energy is not generated during locking, i.e. for preventing a static object from falling. Choose the actuator model based on the operating pressure referring to the Graphs 5 to 7 so that the load mass does not exceed the load for the maximum speed V = 100mm/s.

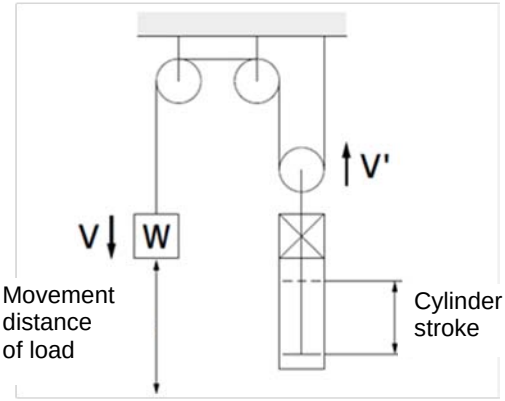


Fig. 1 Double speed mechanism

Example

【Used with air cylinder】
- Load weight: m=50kg
- Travel distance: st=500mm
- Positioning time: t=2s
- Load: Vertically downwards
- Operating pressure: P=0.4MPa

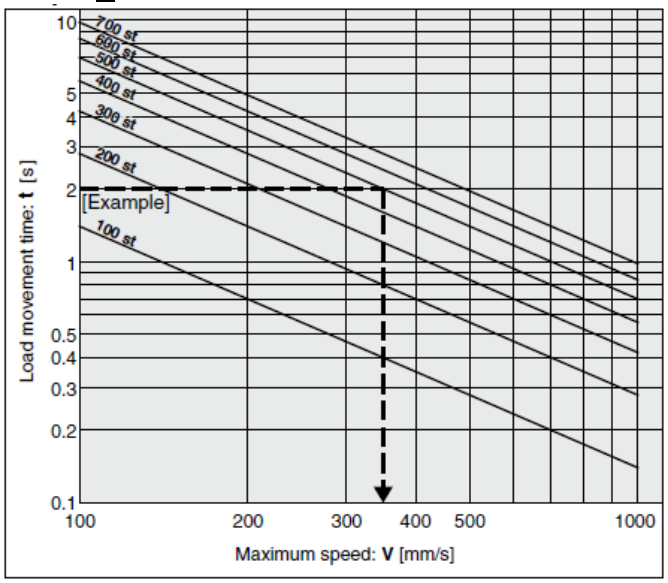
Step 1: Based on Graph 1
Calculate the maximum speed of the load.
∴Max speed V≒350mm/s

Step 2: Select Graph 6 based on the load conditions and operating pressure. According to the max. speed, V≒350mm/s calculated above and load weight m=50kG,
∴ø63, which means the bore size of MWB shall be larger than ø63.

Step 1	Calculate the maximum speed of the load: V

Calculate the maximum speed of the load, V (mm) from travel time of the load, t (s) and stroke, st (mm).

Graph 1

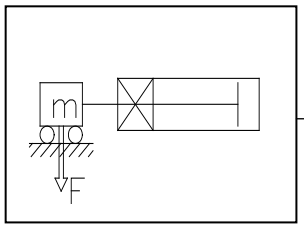


Step 2	Find the lock unit size

Select the appropriate Graph based on the load conditions and operating pressure. Find the intersection of the load weight and max. speed from Step 1 . A suitable lock unit size is indicated by the diagonal line above the intersection.

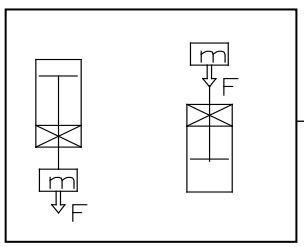
Load	Operating pressure

Load applied perpendicularly to the rod
(Received by guide)



0.3MPa~ → Graph 2
0.4MPa~ → Graph 3
0.5MPa~ → Graph 4

Load applied in extending direction of the rod
Load applied in retracting direction of the rod

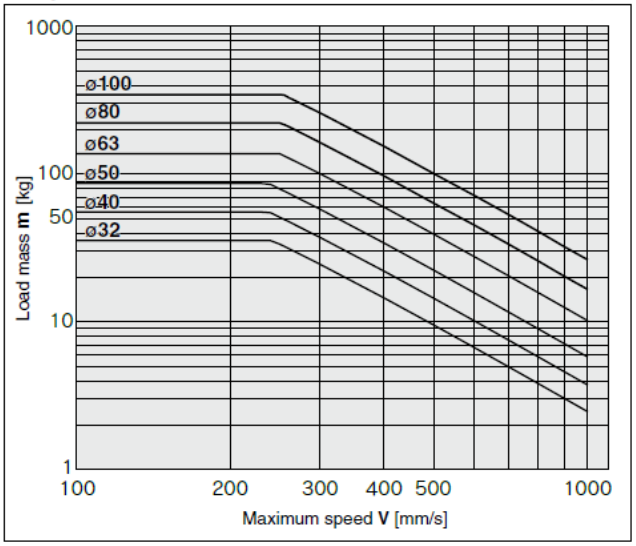


0.3MPa~ → Graph 5
0.4MPa~ → Graph 6
0.5MPa~ → Graph 7

Selection graph

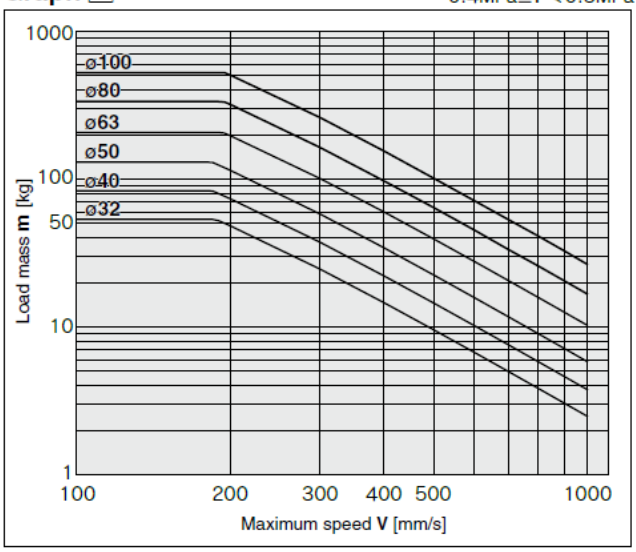
Graph 2

0.3MPa≦P<0.4MPa



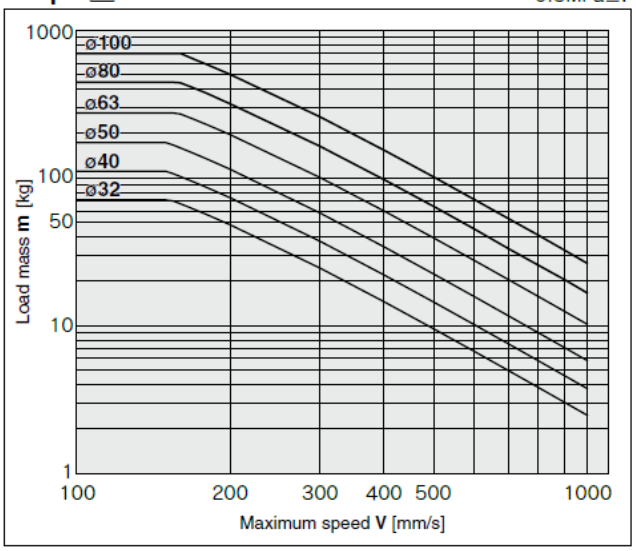
Graph 3

0.4MPa≦P<0.5MPa



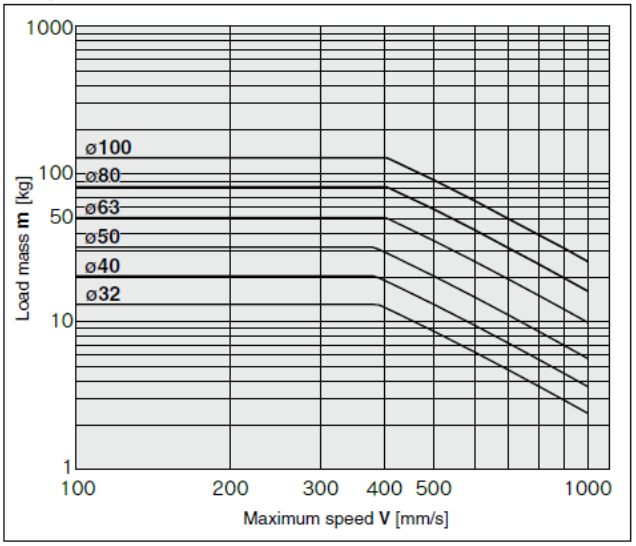
Graph 4

0.5MPa≦P



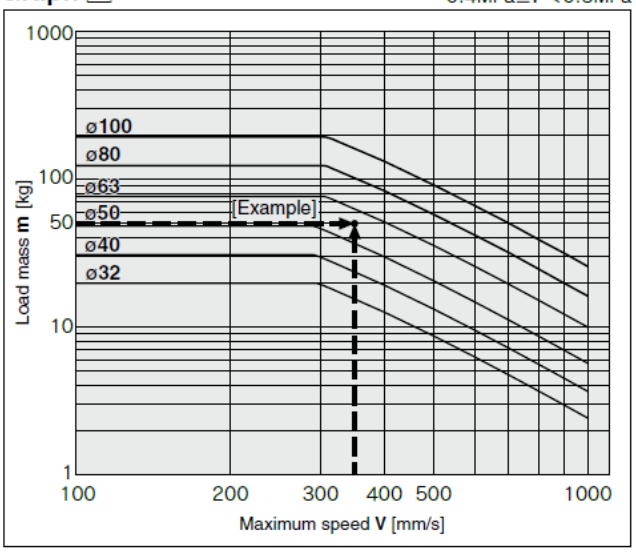
Graph 5

0.3MPa≦P<0.4MPa



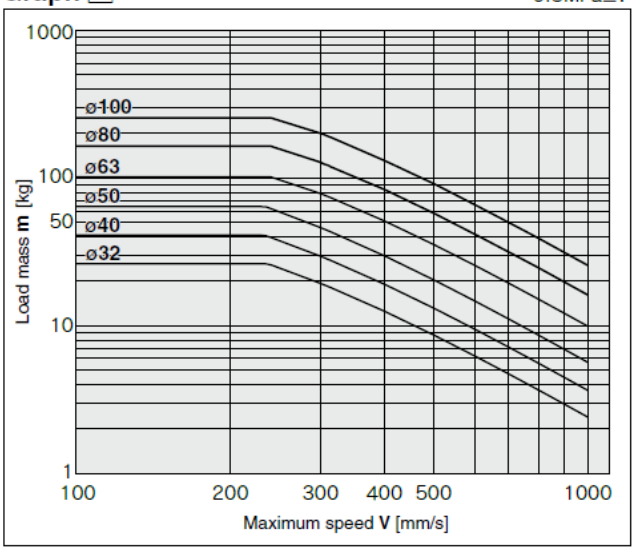
Graph 6

0.4MPa≦P<0.5MPa



Graph 7

0.5MPa≦P



2. Installation and Handling

2-1. Air supply

① The air supplied to the lock unit should be filtered by SMC AF series air filter and regulated to the specified set pressure by SMC AR series regulator.

⚠ Warning

- **Type of fluids**
  Please contact SMC when using the product in applications other than with compressed air.
- **When there is a large amount of condensate**
  Compressed air containing a large amount of condensate can cause the malfunction of pneumatic equipment. An air dryer or water droplet separator should be installed upstream from the filters.
- **Drain flushing**
  If condensate in the drain bowl is not emptied on a regular basis, the bowl will overflow and this may cause the malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.
- **Use clean air.**
  Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or a malfunction.

⚠ Caution

- When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.
- **Install an air filter.**
  Install an air filter upstream near the valve. Select an air filter with a filtration size of 5μm or smaller.
- **Therefore, take appropriate measures to ensure air quality, by providing an after cooler, or water separator, if needed.**
  Compressed air that contains excessive foreign material may cause malfunction of valves and other pneumatic equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an after cooler, air dryer, or water separator.
- **Ensure that the fluid temperature and ambient temperature are within the specified range.**
  When operating at temperatures below 5°C, moisture in the circuit may freeze and cause breakage of seals or a malfunction. Corrective measures should be taken to prevent freezing.

② Lubrication of lock unit
The product has been lubricated during manufacturing, so it does not require lubrication in service.
Regular or continuous application of oil to the lock unit may reduce locking force.

For detailed information regarding the quality of the compressed air described above, refer to SMC's "Air Cleaning Systems".

2-2. Design

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

⚠ Warning

- Refer to section 1-3 Precautions on model selection.

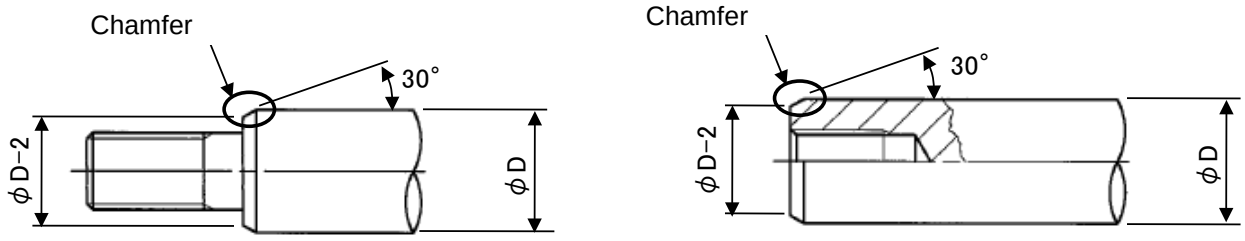
- Refer to the table below for the recommended rod dimensions.

Lock unit model	MWB∗32	MWB∗40	MWB∗50	MWB∗63	MWB∗80	MWB∗100
Applicable rod size *	Ø12 f8	Ø16 f8	Ø20 f8		Ø25 f8	Ø30 f8
Material	Carbon steel / Stainless					
Surface treatment	Hard chrome alloy 10μm					
Surface roughness	Max. roughness Rz1.6 or less					

∗If a larger diameter rod is used; it may lead to the breakage of the inner parts of the lock unit, mounting failure of lock unit, operation failure or a decrease in lock holding force.

⚠ Caution

- The shape of the rod end to be inserted into the lock unit should be like those shown below so that the lock unit seal and inner surfaces are not damaged.



(1) For male thread (2) For female thread

Fig. 2 Rod end style

- Do not apply excessive lateral load or external force to the lock unit. They may break the lock unit.

- Do not use the product in applications where the rod rotates.

- Do not apply loads with impact, strong vibration or rotational forces while the lock mechanism is activated.

External impact loads, strong vibrations or rotating forces may break or reduce the life of the lock unit.

- If the piping between the lock release port and the solenoid valve for locking is long or the piping diameter is small, the stopping accuracy of the lock unit will be decreased.

- The rod will move suddenly if the lock unit is unlocked whilst the rod is under load or if the piston is pressurised incorrectly. If the sudden movements frequently occur in the application, make adjustment to the air circuit or control system to prevent short life or breakage of the lock unit.

- Do not operate the product outside of the specified rod speed.

- The base oil component of grease may seep out.

The base oil of grease in the lock unit may seep out from the holding plate or cap depending on the operating conditions (ambient temperature of 40°C or more, pressurized condition, low frequency operation etc.). If the lock unit is required for use in a clean room consult with SMC.

[Use with air cylinder]

⚠ W a r n i n g

- **There is a possibility of dangerous sudden action by cylinders if force is changed due to twisting of sliding parts of machinery.**
  In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be designed to operate smoothly and avoid such dangers.
- **A protective cover is recommended to minimize the risk of personal injury.**
  If the driven object or moving parts of the product will pose a hazard to humans, a construction that prevents direct contact with the exposed area must be provided.
- **Securely tighten all stationary parts and connected parts, so that they will not become loose.**
  Be certain to adopt a reliable connecting method if the cylinder is used frequently, or if it is used in a location that is exposed to a large amount of vibration.
- **Design the system so that an external force exceeding the maximum output does not apply to the product.**
  The product can break, causing a risk of personal injury or damage to equipment.
- **The product generates a large force. Install on a sufficiently rigid mounting base, taking this force into consideration.**
  There is a risk of personal injury or damage to equipment.
- **Power failure may cause the circuit pressure to decrease.**
- **Consider a possible loss of power source.**
  Measures should be taken to prevent personal injury and damage to equipment in the event that there is a power malfunction to equipment controlled by air pressure, electricity or hydraulics, etc.
- **Consider the behavior of an emergency stop.**
  Devise a safety system so that if a person engages the emergency stop, or if a safety device is tripped during a system malfunction such as a power outage, the movement of the cylinder will not cause a hazard to humans or damage the equipment.
- **Consider the action when operation is restarted after an emergency stop or abnormal stop.**
  Design the machinery so that personal injury or damage to equipment will not occur upon restart of operation. When the cylinder has to be reset at the starting position, install safety manual control equipment.

For other cautions, refer to the catalogue and operation manual of the actuator.

- Align the cylinder and rod correctly when the lock unit and actuating cylinder are placed in parallel as shown below.

If alignment is not adequate, operation failure or breakage of the actuating cylinder or lock unit can result.

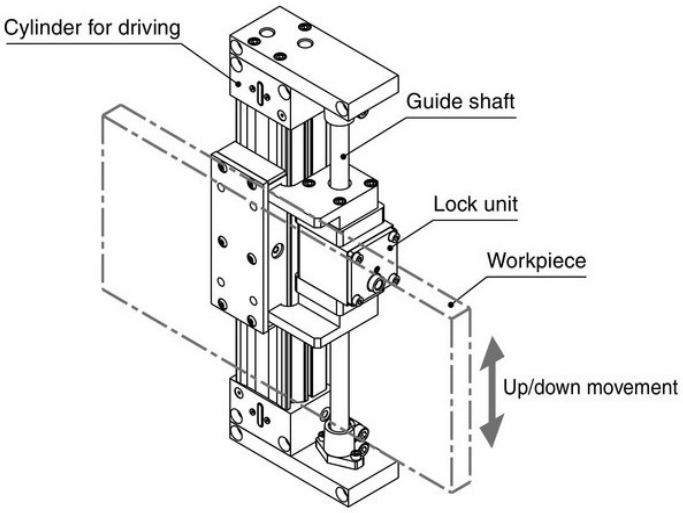


Fig. 3.Example when operated with the rodless cylinder

2-3. Mounting

The foot mounting cylinder has a hole in the foot to drive a pin into for accurate positioning and fixing.

⚠ Caution

- Be careful not to scratch or damage the sliding surface of the rod while mounting it to the product or during maintenance.

Scratches, gouges or dents on the rod surface can be the cause of abnormal level of frictions of the inner surface of the brake shoe and can cause a reduction of the holding force.

- Mounting and maintenance should be performed with lock released.

a. If mounting or maintenance is performed with the lock in a locked state, there is a risk that the rotating force exceeding the holding force will be applied to the piston rod, breaking the lock mechanism.

b. For mounting to the device or during maintenance, connect piping to the lock release port to supply air pressure of at least 0.3MPa, or release the lock by using the lock release bolt (Page 16).

・Do not apply loads with impact, strong vibration or rotational force while the lock mechanism is activated.

External impact load, strong vibration or rotating force may break or reduce the life of lock part.

・Do not use the product until you have verified that the equipment can operate properly.

After installation or repair, apply compressed air and power supplies to the equipment and perform appropriate functional and leakage inspections to make sure the equipment is mounted properly.

・When the support brackets are replaced, use a hexagon wrench as specified below.

Lock unit model		Bolt	Hexagon wrench size	Tightening torque (N・m)
MWB∗32 MWB∗40		MB-32-48-C1247	4	5.1
MWB∗50 MWB∗63		MB-32-48-C1249	5	11
MWB*80 MWB*100	Foot	MB-80-48AC1251	6	25
	Other	MB-80-48BC1251		

・There is a vent hole on the element. If the ventilation is not adequate, there will be locking/ unlocking delay or operation failure. Install the cylinder so that the element is not covered. Keep 10mm or more away from the wall.

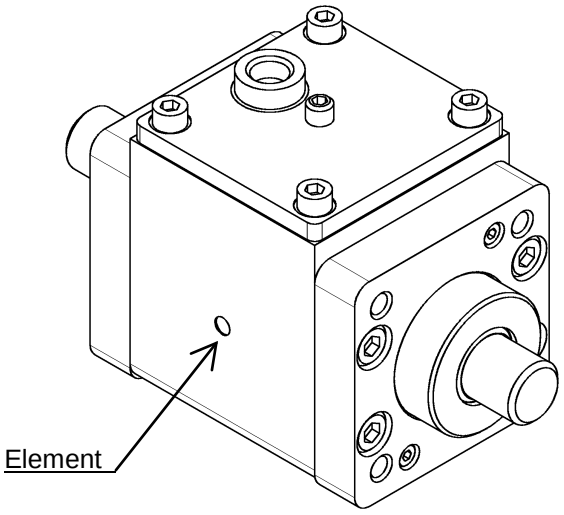


Fig. 4 Lock unit element

2-4. Operating environment

⚠ Warning

- **Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.**
- **Provide a protective cover if the product is used in direct sunlight.**
- **Do not operate in environments subject to heavy vibration and/or impact.**
- **Do not mount the product in locations where it is exposed to radiant heat.**
- **Install a cover over the rod if it is used in an area that is dusty, or in an environment in which water or oil splashes on the cylinder.**
- **When using auto switches, do not operate in an environment with strong magnetic fields.**
- **Grease oil can decrease depending on the properties of the compressed air used with the pneumatic equipment, external environment and operating conditions. This may reduce the lubrication performance and shorten the life of the product.**
- **Avoid storing the product in humid conditions.**

  Store the product with the piston rod retracted and avoid humidity, in order to prevent generation of rust.

- **Preparation before piping**

  Before piping, perform air blow (flushing) or cleaning to remove any cutting chips, cutting oil, dust, etc. from the piping and fittings.

- **Winding of sealant tape**

  When screwing together pipes and fittings , etc., be certain that chips from the pipe threads and sealant do not get inside the pipe.

  Also, when the sealant tape is used , leave approx. 1 thread ridge exposed at the end of the threads.

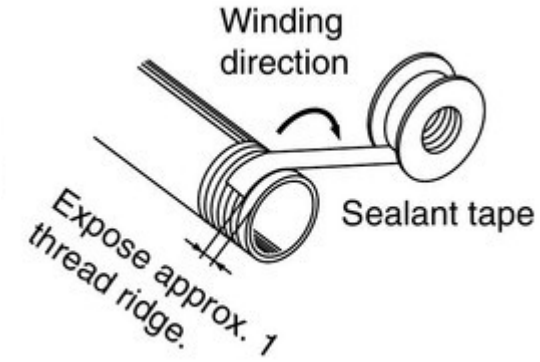


Fig. 5 Sealant tape

2-5. Pneumatic circuit

⚠ Warning

① **Install the lock release solenoid valve as close as possible from the lock unit and keep the piping length short.**

When the piping between the lock unit and solenoid valve is long, delayedlocking or deterioration of stopping accuracy can result due to the longer overrun.

② **Be aware that repeated supply and exhaust of the solenoid valve for lock may cause condensation.**

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.

[Use with air cylinder]

③ Use the pneumatic circuit which applies balance pressure to the both sides of the piston when locking.

To prevent sudden extension when operation restarts or lock is released, control the cylinder to make balancing pressure applied to both sides of the piston so that the force generated in the operating direction of the piston due to load can be counteracted.

④ Effective area of the lock release solenoid valve shall be more than 50% of that of the cylinder actuating solenoid valve. The lock release solenoid valve should be installed closer to the cylinder than the solenoid valve actuating the cylinder.

If the effective area of the lock release solenoid valve is small, or the solenoid valve is far from the cylinder, it takes longer to exhaust lock release air and may cause locking delay. Due to the delay, the increase of overrun for intermediate stop or emergency stop in the middle of operation can result. In applications of holding as drop prevention, due to the locking delay, the work piece may fall temporarily depending on the timing of the load.

⑤ Back flow of the exhaust pressure from the common exhaust type valve manifold is not allowed.

If exhaust pressure for lock release flows backwards, locking may not be performed correctly. Use an individual exhaust type manifold or single unit valve.

⑥ Time between locking and lock release shall be 0.5 seconds or longer.

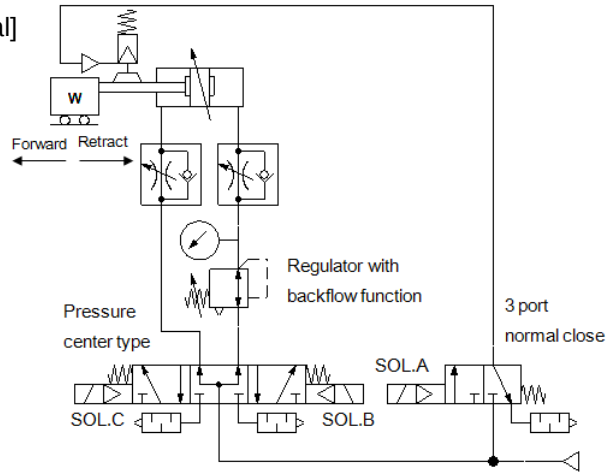
If locking time is short, the piston rod and the workload will shoot out faster than the speed controlled by speed controller.

⑦ Control the switching operation of the lock release solenoid valve during restart of the cylinder so that the lock release solenoid valve is switched before the cylinder actuating solenoid valve or both switched at the same time.

If locking time is short, the piston rod and the workload will shoot out faster than the speed controlled by the speed controller.

⑧ Basic Circuit

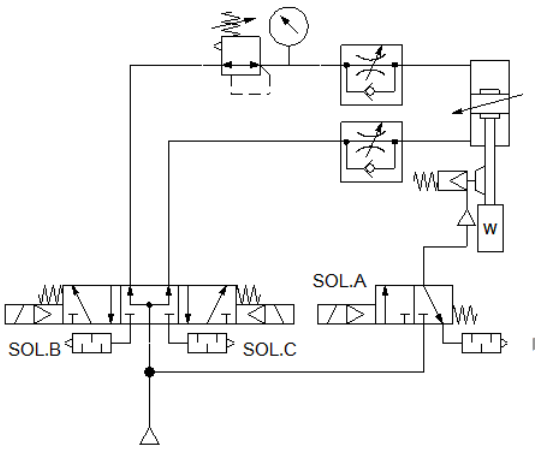
1. [Horizontal]



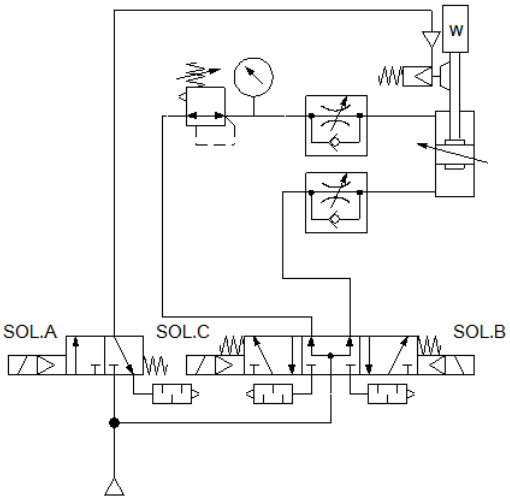
SOL.A	SOL.B	SOL.C	Operation	
ON	ON	OFF	Forward	
OFF	OFF	OFF	Lock	0.5S or longer
ON	OFF	OFF	Unlock	0~0.5S
ON	ON	OFF	Forward	
ON	OFF	ON	Retract	
OFF	OFF	OFF	Lock	0.5S or longer
ON	OFF	OFF	Unlock	0~0.5S
ON	OFF	ON	Retract	

2. [Vertical]

[Load applied in extending direction of the rod]



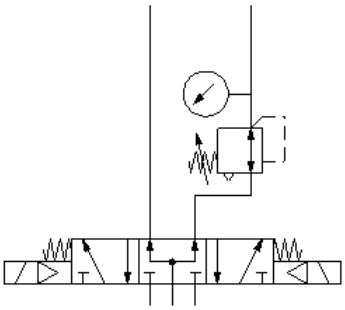
[Load applied in retracting direction of the rod]



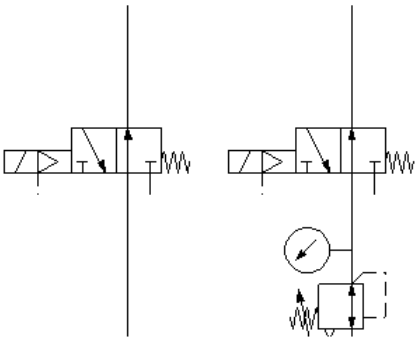
Caution

① One 3-position pressure center solenoid valve and a regulator with check valve can be replaced by 2 3-port normally open valves and a regulator with a relief valve.

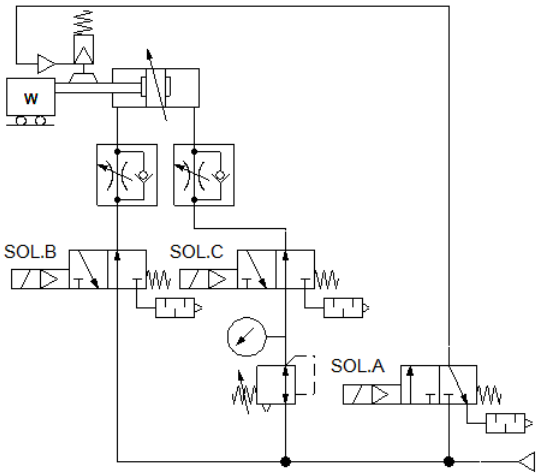
Cylinder side



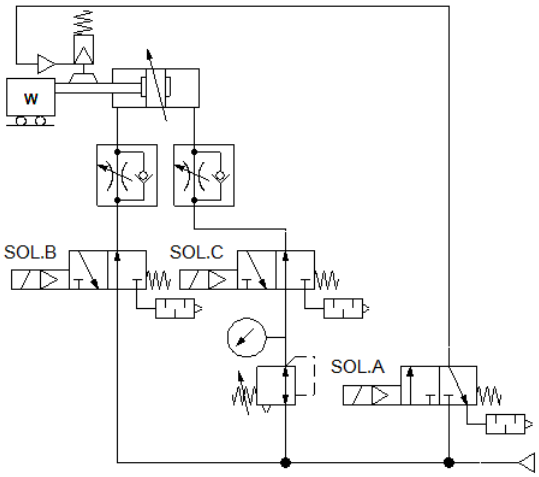
Cylinder side

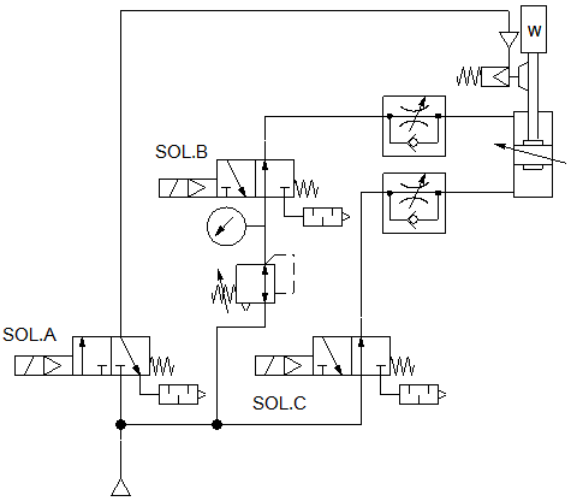


1. [Horizontal]



2. [Vertical]





2-6. Adjustment and Operation [Use with air cylinder]

Caution

① Adjust the air balance of the cylinder. Adjust the air pressure of the cylinder rod side and head side with the cylinder (with load) unlocked. With balanced air, the cylinder will not shoot out when unlocked.

② Adjust the position for detection part of auto switch, etc. For intermediate stop, adjust the auto switch detection position, taking the overrun into consideration.

3. How to Use
3-1. Usage

① For intermediate stop, take stopping accuracy and overrun into consideration.

As this is a mechanical lock, there will be a slight time difference for the stop signal and delay of the cylinder. The cylinder stroke during the delay is called overrun. The range between maximum and minimum overrun is referred to as overrun. The relation is shown below.

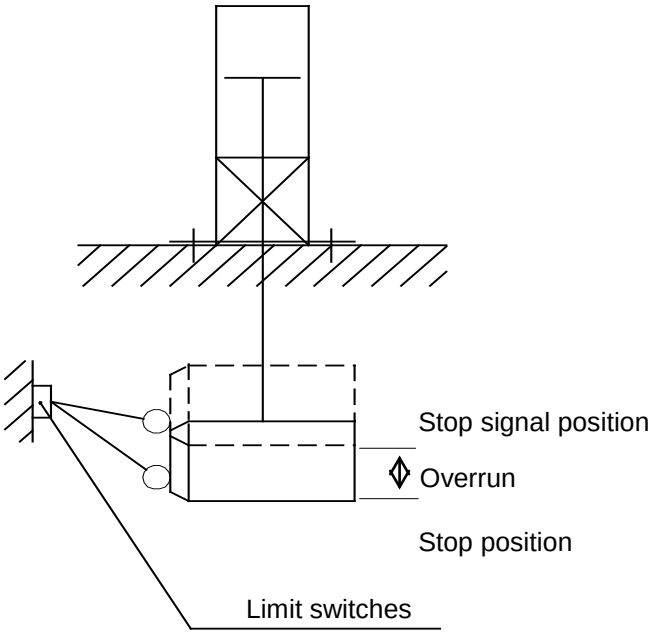


Fig. 5 Overrun of intermediate stop

a. It is necessary to place the limit switch taking account the amount of overrun to achieve the desired stop position.
b. The length of the limit switch needs to be overrun + α for detection (switch detector length).
c. The operating range of standard SMC auto switches is between 8 and 14mm (varies depending on switch type and cylinder bore size.) For an overrun exceeding this value, install proximity switches or limit switches which posses self-holding function of the output signal to the outside of the cylinder in order to adjust the overrun .

② In order to reduce overrun and improve the stop accuracy, reduce the time between the generation of the stop signal and stopping by locking as short as possible.

a. Use an electric circuit for control and solenoid valve with high response.
b. Keep the lock release solenoid valve and lock release port as close as possible.
c. If b is difficult, install a rapid exhaust valve between the lock release solenoid valve and lock release port.

③Piston speed is the most significant factor in stopping accuracy.

Examples when used in combination with an air cylinder.

a. Piston speed has to be stable before the stop position. If the piston speed varies due to the change of load or interference the stop position will vary.
b. During cushioning or acceleration of the operation start, the variation of stop position is high (as the change in speed is high).

3-2. Lock release mechanism

Operation principle for unlocking mechanism.

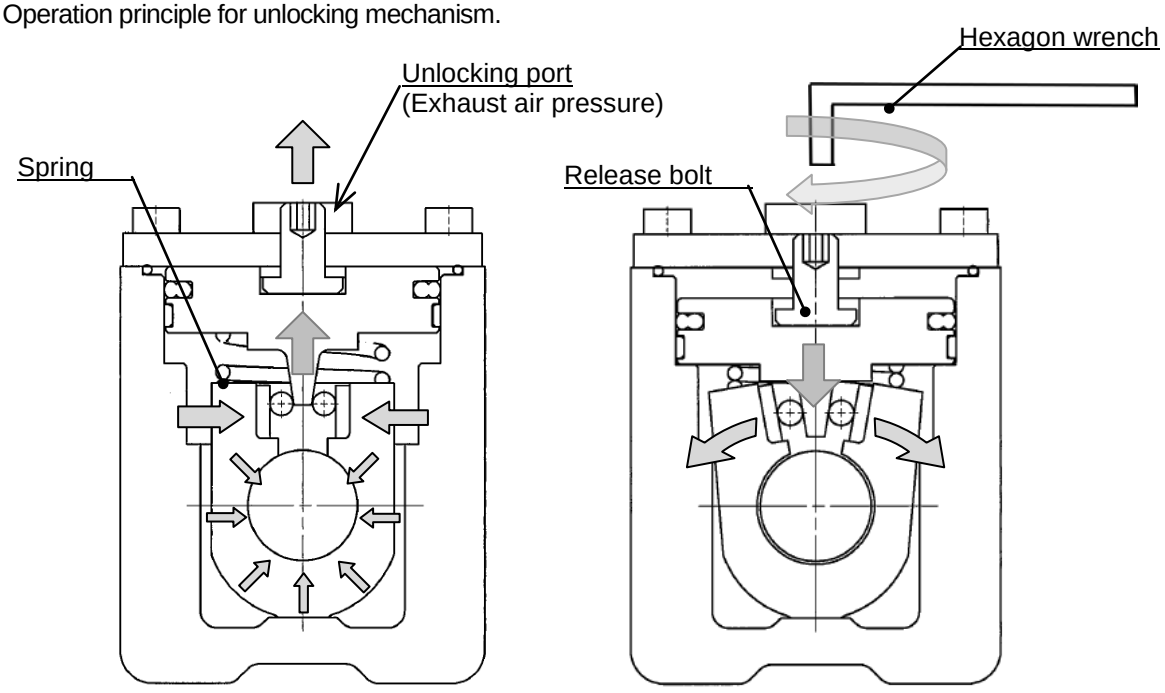


Fig. 7 Operation principle of locking mechanism

(Fig. 7 is for reference for the operation principle. (Different from the actual structure))

⚠ C a u t i o n

The manual lock is released as default. The lock will not operate in this condition. Before starting operation engage the lock according to the instructions shown in Fig. 8.

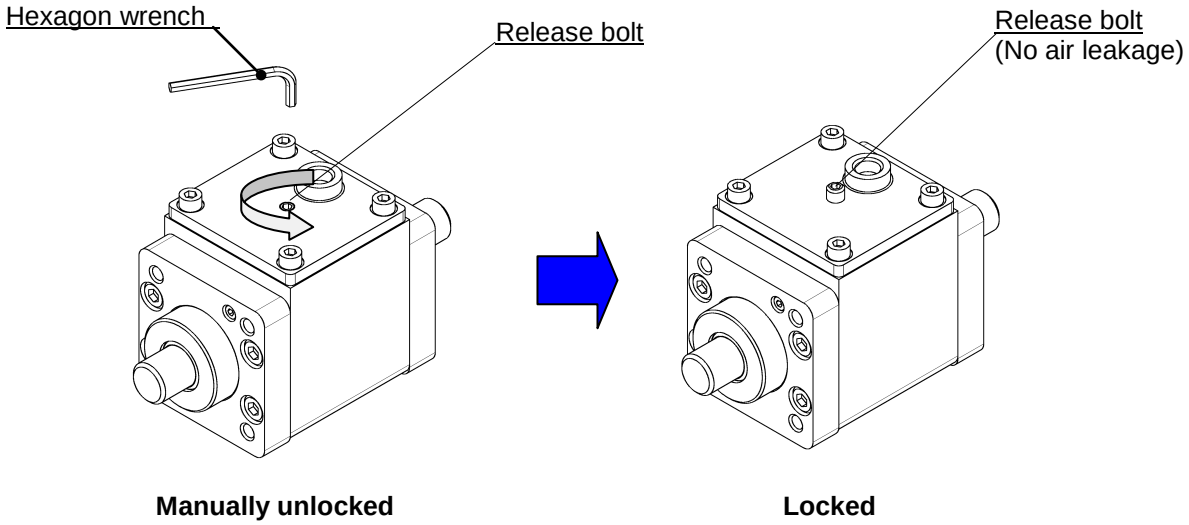


Fig.8 How to return to lock

Rotate the release bolt anti-clockwise by hand with a hexagon wrench until resistance is felt. Once that position is reached, rotate it an additional 1/6th of a turn to securely tighten the release bolt.

∗) Please do not use an electric driver or pneumatic driver.

Pressurize the lock release port with 0.3MPa or more of air pressure and check that there is no air leakage from the release bolt and lock correctly functions.
Unlocked condition can be held in reversed order of Fig. 8.

Tube I. D.	Hexagon wrench size of the release bolt
32･40	3
50･63	4
80･100	5

⚠ Warning

(1) Do not operate the release bolt until safety is confirmed. Do not twist

a) Examples when used in combination with an air cylinder.

b) Carefully confirm that personnel are not within the moving range of the load and there is no danger, even if the load moves suddenly.

(2) Exhaust all residual pressure in the system and turn off the power supply before screwing in the lock release bolt. Do not supply air pressure to the lock release port when the lock is manually unlocked.

(3) Take action to prevent the load from falling when unlocked.

a) Place the load at the end of the downward stroke.

b) Place guides, etc. to stop the load from falling.

c) When the lock unit is used together with an air cylinder , confirm that forces at both ends of the piston are balanced.

⚠ Caution

When releasing the locked state with the release bolt for the purpose of mounting or adjustment, be sure to return the release bolt to the locked state.

If the release bolt is not returned to the locked state, the lock might not function correctly or lock release might not be completed due to air leakage from the release bolt.

4. Maintenance

Do not disassemble the lock unit or perform maintenance. Replace the complete lock unit instead.

4-1. Checks

4-1-1. Inspection points

① Check the tightness of the mounting bolts (hexagon socket head cap screw) holding the lock unit.
② Operation of the lock unit. Overrun and the stopping accuracy.
③ Check the tightness of bracket mounting bolts and nuts.
④ Ensure smooth operation of the actuator and device.
(Smooth operation of the actuator and device while lock released)
⑤ Check to see if there have been any changes to the actuator and device operating speed or cycle time.
⑥ Are there any gouges, dents or deformation on the rod which the lock unit is fitted to?

When any abnormality is found as a result of the inspections shown above, eliminate the causes and take the necessary countermeasures such as retightening screws or replacement of the lock unit.
Contact SMC Sales if the lock unit needs to be repaired.

4-1-2. Inspection interval

To ensure the MWB series with lock unit is kept in the best possible condition, inspections need to be performed once or twice a year

⚠ W a r n i n g

- **Maintenance should be performed according to the items above. Perform additional inspections as necessary.**
  Improper handling can cause damage or malfunction of equipment and machinery.
- **Removal of equipment and supply/exhaust of compressed air**
  When equipment is removed, first confirm that measures are in place to prevent work piece from dropping and/or equipment running away, etc. Cut the supply pressure and electric power and exhaust all compressed air from the system. Before restarting the equipment, confirm that measures are taken to prevent sudden action.

⚠ C a u t i o n

To avoid the reduction of the holding force, do not apply too much grease of oil to the piston surface.

5. Troubleshooting

Reported failure	Major causes			Countermeasures
Lock unit does not release. The actuator or device does not operate.	Check the lock unit and peripheral equipment.	①	Air piping is not connected to the lock unit. Or air supplied to the lock unit is not adequate for operation.	Connect piping to the lock unit and supply 0.3MPa or more air.
		②	Solenoid valve connected to the lock unit does not operate.	・Check the power supply to the solenoid valve ・Check that the wiring of the solenoid valve is correct. ・Check that the piping of the solenoid valve is correct. ・Check if air is supplied to the solenoid valve ・Make sure that the solenoid valve is not in manual lock state. No problems are confirmed with above. If the solenoid valve failure is confirmed, repair it or replace it.
		③	Solenoid valve for locking is energized and operated, but air is not supplied from the solenoid valve.	Check the solenoid valve type. If the solenoid valve is normal open type which shuts off air while the solenoid valve is energised, change it to normal close type which supplies air while the valve is energised.
		④	Air leakage from the manual lock release bolt.	Return the manual lock release bolt to the locking status. (Air leakage may occur if the manual lock release bolt is not returned to the correct lock position and status)
		⑤	No problems are confirmed in ① to ④ above, but lock is not released even when air is supplied to the lock unit.	It is possible that the inside of the lock unit is broken. Release the lock manually and replace the lock unit. If manual cannot be released manually, replace the product by actuator. (Do not disassemble or repair. Contact SMC Sales office.)
Lock unit does not release and the actuator or device does not operate smoothly.	Check the actuator and peripheral equipment	①	Driving actuator malfunctions.	・Check the installation and use of the actuator referring to the operation manual. Take corrective actions if any problems are found. ・Repair or replace the actuator if it malfunctions.
		②	Mounting alignment is inadequate or affected by lateral load.	・Align the product and make adjustment. ・ Install a guide to prevent excessive load from being applied to the cylinder. ・ Modify mounting conditions, change the support brackets.
		③	The rod inserted into the lock unit is distorted or warped.	・Eliminate the distortion or warp of the rod during installation or mounting of the rod.

Locking Malfunction	Check the lock unit and peripheral equipment.	①	Manual lock is released. (Check the condition of the lock release bolt)	Check the operating conditions to replace with the optimum type and size of the guide.
		②	Air of the lock unit is not exhausted. (If the lock unit and solenoid valve for locking are installed too far, it is possible that air in the piping tube is not exhausted completely.	・nstall the solenoid valve for locking close to the lock unit and shorten the piping tube or, directly connect them. ・Install a quick exhaust valve close to the lock unit piping port.
		③	Solenoid valve connected to the lock unit does not operate.	・Check the power supply to the solenoid valve ・Check that the wiring of the solenoid valve is correct. ・Check that the piping of the solenoid valve is correct. ・Check if air is supplied to the solenoid valve ・Make sure that the solenoid valve is not in manual lock status. No problems are confirmed with above. If the solenoid valve failure is confirmed, repair it or replace it.
		④	Solenoid valve for locking is de-energized, but air is supplied from the solenoid valve.	Check the solenoid valve type if it is normal open type. Change it to normal close type which supplies air while the valve is energized.
		⑤	No problems are confirmed in ① to ④ above, but locking is not possible even when air is supplied to the lock unit.	It is possible that the inside of the lock unit is broken. Replace the unit. (Do not disassemble or repair. Contact SMC Sales office.)
	Check the actuator and peripheral equipment	①	Speed is too fast.	Decrease the speed.
		②	Load weight is too large. (Load factor is too high)	Replace the lock unit with the appropriate size.
		③	Excessive external force is applied to the lock unit from the actuator, etc.	Correct the circuit and system so that the output force of the actuator, etc. is not applied to the lock unit when in the locked condition.
		④	Failure of the auto switch for signals for locking.	Check the auto switch wiring and operation. Replace the auto switch if it is broken.
		⑤	[Proximity switch for locking is installed outside of the actuator] Operation range of the proximity switch is exceeded.	・Check the operation range of the proximity switch. (Change the switch to the auto switch with timer) ・Change to proximity with with self-holding circuit. ・Revise the installation of the proximity switch and switch detector for redesign.

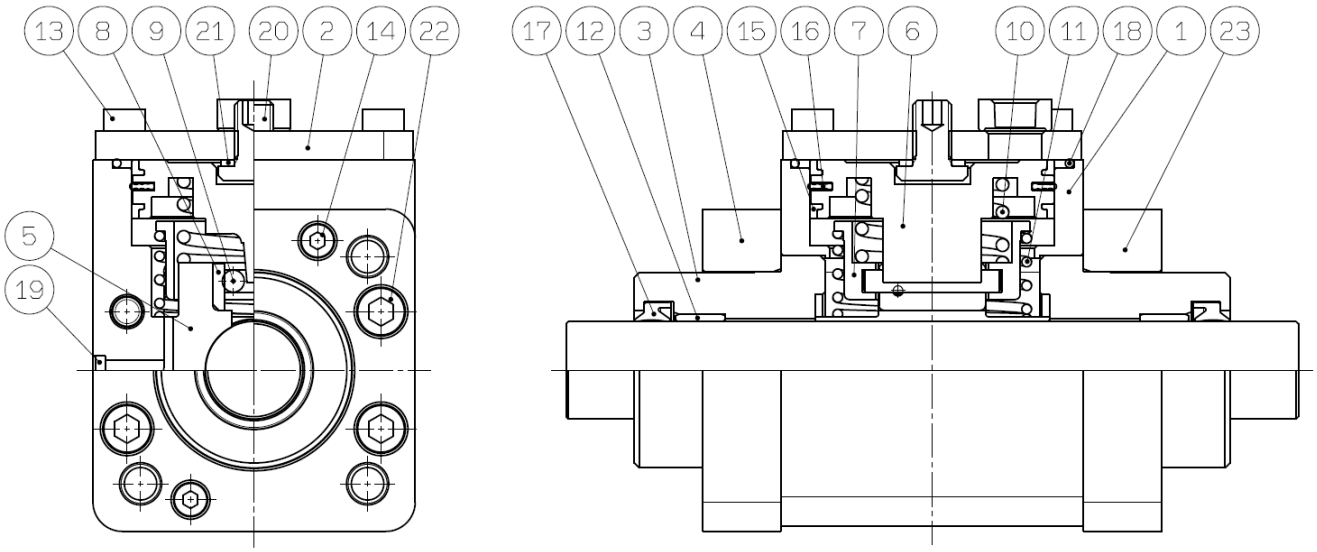
Reported failure	Major causes			Countermeasures
Large overrun. (Stopping accuracy is low)	Check the peripheral equipment of the lock unit.	①	Effective area of the solenoid valve for locking is too small.	Replace the solenoid valve to the one with larger effective area.
		②	Piping between the lock release port and the solenoid valve for locking is long or the piping diameter is small.	・Install the solenoid valve for locking close to the lock unit and shorten the piping tube or, directly connect them. ・Install a rapid exhaust valve close to the lock unit piping port.
		③	Poor response of the solenoid valve for locking.	Replace the solenoid valve to the one with better response.
		④	Poor response of the solenoid valve for locking to the auto switch for signal detection.	Replace the switch with the auto switch with better response.
		⑤	[Proximity switch for locking is installed outside of the actuator] There is a play with the switch detector of the proximity switch. The shape of switch detector is not suitable.	・Adjust the switch detector to eliminate the play. ・Redesign the switch detector.
		⑥	AC is used for the electric circuit.	Change the circuit to DC type.

[Used with air cylinder]

Reported failure	Major causes			Countermeasures
Lock is released and cylinder does not operate smoothly.	Check the cylinder and peripheral equipment	①	Air piping is not connected to the cylinder or air supplied to the lock unit is not adequate for cylinder operation. (Load factor is too high)	・Check the air piping of the cylinder ・Increase the operating pressure of the cylinder. ・Use a larger cylinder.
		②	Speed controller mounted to the cylinder is fully closed.	Gradually open the speed controller from the fully closed position so that the cylinder travels full stroke smoothly at the optimum speed.
		③	Speed controller is meter-in control.	・Change it to meter-out control.
		④	Operation speed of the cylinder is below the limit of minimum speed.	・Adjust the piston speed using a speed controller to keep the minimum operation speed or higher. ・Remove the factor of load fluctuation.
		⑤	Solenoid valve connected to the cylinder does not operate.	・Check the power supply to the solenoid valve ・Check that the wiring of the solenoid valve is correct. ・Check that the piping of the solenoid valve is correct. ・Check if air is supplied to the solenoid valve ・Make sure that the solenoid valve is not in manual lock status. No problems are confirmed with above. If the solenoid valve failure is confirmed, repair it or replace it.
		⑥	External guide of the cylinder is distorted or warped.	Check the operating conditions to replace with the optimum type and size of the guide.
Locking Malfunction	Check the cylinder and peripheral equipment	①	Cylinder is too fast.	Decrease the speed by setting the speed controller.
		②	Air circuit is not a recommended balanced circuit. (Excessive cylinder output is applied to the lock unit)	Connect air by recommended balanced circuit. (Refer to Page 13 to 14)

Large overrun. (Stopping accuracy is low)	Sudden extension of the rod when the lock is released.	a. The circuit is not balanced. b. Regulator for balancing pressure is not adjusted. c. Line pressure fluctuates. d. After stopping by locking, it is too fast to unlock.	Change to recommended balanced circuit. (Refer to Page 13 to 14) b. Adjust the regulator valve. Check if the locked status is balanced. c. Install an air tank so that pressure fluctuation does not occur when supplying air to the lock unit and cylinder. d. After stopping by locking, release the lock after waiting for 0.5sec or longer.
	Cylinder speed changed	a. Misalignment of the piston rod and guide. b. High load rate of the cylinder. c. Stopping interval (pitch) is short. d. Stopping in the middle of cushioning process or immediately after the cushioning process. (When air cushion type is used) e. Line pressure fluctuates.	a. Adjust the alignment of the piston rod and guide or use the floating joint. b. Use a larger cylinder. c. Set the stop interval to 40mm or wider. d. Change the cylinder to rubber cushion type. c. Install an air tank so that pressure fluctuation does not occur when supplying air to the lock unit and cylinder.
	Changes in the load.	a. Load varies continuously due to rotating movement. b. Load varies due to vertical load. (Step change)	a. Cylinder with lock is not suitable. Use the cylinder which use incompressible fluid such as air-hydro cylinder. b. When there is a step like change of the load, use a multi-stage pressure regulating valve for balancing pressure.

6. Construction



No.	Description	Material	Qty	Note
1	BRAKE BODY	Aluminum alloy	1	Hard anodized
2	BODY CAP	Rolled steel	1	Zinc chromated
3	COLLAR	Aluminum alloy	2	Chromated
4	HOLDER	Aluminum alloy	1	Anodized
5	BRAKE METAL	Cast iron	1	
6	PISTON A	Aluminum alloy	1	
7	ROLLER HOLDER	Carbon steel	1	
8	ROLLER PLATE	Stainless steel	2	Heat treatment
9	NEEDLE ROLLER	Carbon steel	2	Heat treatment
10	PISTON SPRING	Spring steel	1	Zinc chromated
11	ROLLER SPRING	Spring steel	1	Zinc chromated
12	BUSHING	Bearing alloy	2	
13	HEXAGON SOCKET CAP BOLT	Alloy steel	4	
14	HEXAGON SOCKET CAP BOLT	Alloy steel	2	
15	WEAR RING	Resin	2	
16	PISTON SEAL	NBR	1	
17	ROD SEAL	NBR	2	
18	GASKET	NBR	1	
19	ELEMENT	Bronze	1	
20	RELEASE BOLT	Alloy steel	1	
21	SEAL WASHER	NBR+Stainless steel	1	
22	HEXAGON SOCKET CAP BOLT	Bronze	4	
23	UNIT COVER	Aluminum alloy	1	

Do not disassemble the lock unit or perform maintenance.

Revision history

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