UFCD

Free position locking flat cylinder

ø25/ø32/ø40/ø50/ø63

With brake/position locking

Overview

Cylinder equipped with position locking mechanism capable of stopping at any position of the stroke length for FCD Series flat cylinders.

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Free-position flat cylinder FCD Series with position locking!

Saves space and ensures the safety of workpieces or the like during power failures or accidents.

UFCD Series

With free position locking mechanism

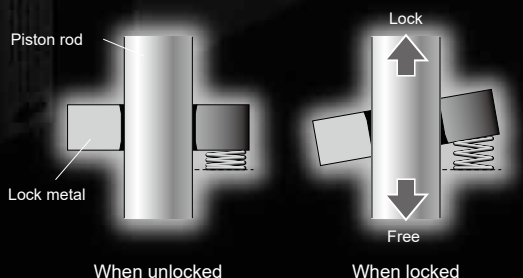
- The locking position can be at any point as long as the piston rod remains still
- The direction of the lock can either be forward or backward
- It moves freely in the reverse lock direction, and is therefore easy to remove even with workpiece clamped.

Space saving/simple design

- A flat type that can be installed in a tight space or arranged side-by-side
- Even with its position locking mechanism, it has a simple design that can work with any device.

Rotation-stop is not required

- Due to the oval piston structure, the cylinder body has a rotation-stop function. Therefore, there is no need to provide a separate rotation-stop mechanism.



Series variation

Free position locking flat cylinder UFCD Series

●: Standard ◎: Option

Variation	Model No.	Bore size (mm)	Standard stroke length (mm)								Min. stroke length	Custom stroke length	Max. stroke length	Option	Switch	Page
			5	10	15	20	25	30	40	50	(mm)	(/mm)	(mm)	Rod end male thread N		
Double acting/ single rod	UFCD-KL	ø25 equivalent/ ø32 equivalent/ ø40 equivalent/ ø50 equivalent/ ø63 equivalent	●	●	●	●	●	●	●	●	1	1	150	◎	◎	888

Free position locking flat cylinder double acting/single rod

UFCD Series

● Bore size: ø25/ø32/ø40/ø50/ø63

Specifications

Item	UFCD-KL				
Bore size mm	ø25 or equiv.	ø32 or equiv.	ø40 or equiv.	ø50 or equiv.	ø63 or equiv.
Actuation	Double acting				
Working fluid	Compressed air				
Max. working pressure MPa	0.7 (≈100 psi, 7 bar)				
Min. working pressure MPa	0.25 (≈36 psi, 2.5 bar)				
Proof pressure MPa	1.05 (≈150 psi, 10.5 bar)				
Ambient temperature °C	-10 (14°F) to 60 (140°F) (no freezing)				
Port size	M5		Rc1/8		Rc1/4
Stroke tolerance mm	$^{+1.5}_{0}$ (to 50) $^{+2.0}_{0}$ (to 150)				
Working piston speed mm/s	50 to 500				
Cushion	Rubber cushion				
Lubrication	Not required (turbine oil class 1 ISO VG32 if necessary for lubrication)				
Holding force N	345	543	904	1350	2220
Allowable absorbed energy J	0.34	0.54	0.67	1.02	1.56

Rotation-stop precision/Allowable torque

Item	ø25 or equiv.	ø32 or equiv.	ø40 or equiv.	ø50 or equiv.	ø63 or equiv.
Non-rotating accuracy *2	±1°	±0.8°	±0.5°	±0.5°	±0.5°
Allowable torque N·m	1	1.6	2.5	3.9	5.9

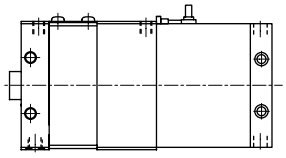
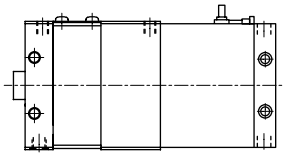
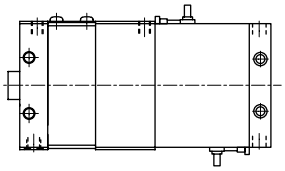
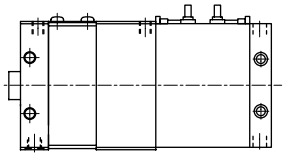
*1: Avoid applying rotation torque with impact, or with violent changes in torque load direction.
*2: "Non-rotating accuracy" is the value when a torque load equivalent to 10% of "allowable torque" is applied to the end of the piston rod.

Stroke length

Model No.	Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)
UFCD-KL	ø25, ø32 ø40, ø50 ø63 or equiv.	5/10/15/20/25 30/40/50	150	1

*1: The custom stroke length is available in 1 mm increments.
*2: The min. stroke length varies depending on switch mounting method. Refer to the following table.

Min. stroke length with switch

1		2	
Rod side installation	Head side installation	Different surface mounting	Same surface mounting
			
10 mm		15 mm	35 mm(ø25/32/40/50) 30 mm(ø63)

Switch specifications

● Proximity switch

Item	Proximity 2-wire		Proximity 3-wire		
	M2V	M2WV (2-color display)	M3V	M3PV (Made to order)	M3WV (2-color display)
Applications	Dedicated for programmable controller		Programmable controller, relay, IC circuit, small solenoid valve		
Output method	-	NPN output	NPN output	PNP output	NPN output
Power supply voltage	-		4.5 to 28 VDC		10 to 28 VDC
Load voltage	10 to 30 VDC		30 VDC or less		
Load current	5 to 30 mA		100 mA or less	100 mA or less	100 mA or less
Indicator lamp	LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	1 mA or less		10 μA or less	0.05 mA or less	10 μA or less
Weight g	1 m:22 3 m:57 5 m:93				

● Reed switch

Item	Reed 2-wire			
	MOV		M5V	
Applications	Programmable controller, relay		For programmable controller, relay, IC circuit (without indicator lamp), serial connection	
Power supply voltage	-		-	
Load voltage	12/24 VDC	110 VAC	5/12/24 VDC	110 VAC or less
Load current	5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less
Indicator lamp	LED (Lit when ON)		Without indicator lamp	
Leakage current	0 mA			
Weight g	1 m:22 3 m:57 5 m:93			

*1: Refer to Ending Page 1 for other switch specifications.
*2: Dimensions depend on switch model No. Refer to Ending Page 13 for details.

Cylinder weight

(Unit: g)

Bore size (mm)	Product weight when stroke length (S) = 0 mm	Additional weight per S = 10 mm	Switch weight	Mounting bracket weight
ø25 or equiv.	454	26	Refer to the weight in the switch specifications.	2
ø32 or equiv.	613	37		
ø40 or equiv.	1046	46		
ø50 or equiv.	1730	71		
ø63 or equiv.	3088	90		

(Example) Product weight of UFCD-KL-32-20
- ● Product weight when S = 0 mm ..... 613 g
- ● Additional weight when S = 20 mm ..... 37 g×$\frac{20}{10}$ = 74 g
- ● Product weight ..... 613 g+74 g = 687 g

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa				
		0.3	0.4	0.5	0.6	0.7
ø25	Push	1.48×10^2	1.97×10^2	2.46×10^2	2.96×10^2	3.45×10^2
	Pull	1.14×10^2	1.52×10^2	1.90×10^2	2.28×10^2	2.66×10^2
ø32	Push	2.33×10^2	3.10×10^2	3.88×10^2	4.66×10^2	5.43×10^2
	Pull	1.73×10^2	2.30×10^2	2.88×10^2	3.45×10^2	4.03×10^2
ø40	Push	3.87×10^2	5.16×10^2	6.45×10^2	7.75×10^2	9.04×10^2
	Pull	3.27×10^2	4.36×10^2	5.45×10^2	6.54×10^2	7.63×10^2
ø50	Push	5.80×10^2	7.73×10^2	9.66×10^2	1.16×10^3	1.35×10^3
	Pull	4.85×10^2	6.47×10^2	8.09×10^2	9.71×10^2	1.13×10^3
ø63	Push	9.53×10^2	1.27×10^3	1.59×10^3	1.91×10^3	2.22×10^3
	Pull	8.59×10^2	1.15×10^3	1.43×10^3	1.72×10^3	2.00×10^3

How to order

● With switch (built-in magnet for switch)

UFCD-KL - 25 - ○ - 10 - F - M2V - R - N

Ⓐ Model No. / Ⓑ Bore size / Ⓒ Port thread / Ⓓ Stroke length / Ⓔ Lock direction / Ⓕ Switch model No. * indicates the lead wire length. / Ⓖ Switch quantity / Ⓗ Option

Code	Description
Ⓐ Model No.	
UFCD-KL	Double acting/cushioned/with switch
Ⓑ Bore size (mm)	
25	ø25
32	ø32
40	ø40
50	ø50
63	ø63
Ⓒ Port thread	
Blank	Rc thread
NN	NPT thread (ø40 and over) (made-to-order product)
GN	G thread (ø40 and over) (made-to-order product)

Ⓓ Stroke length (mm)

Bore size	Stroke length *1	Custom stroke length
ø25 to ø63	**1 to 150**	In 1 mm increments

Ⓔ Lock direction	
F	Forward locking
B	Backward locking

Ⓕ Switch model No.

Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
M2V*	Proximity		●	1-color display	2-wire
M2WV*			●	2-color display	
M3V*			●	1-color display	3-wire
M3WV*			●	2-color display	
M3PV*			●	1-color display (made-to-order)	
M0V*	Reed	●	●	1-color display	2-wire
M5V*		●	●	Without indicator lamp	

*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)
Ⓖ Switch quantity	
R	1 on rod side
H	1 on head side
D	2
T	3
Ⓗ Option	
Blank	Rod end female thread
N	Rod end male thread

⚠ Precautions for model No. selection

*1: Refer to page 888 for the min. stroke length with switch.

[Example of model No.]

UFCD-KL-25-10-F-M2V-R-N

Model: Free position locking flat cylinder

Ⓐ Model No. : Double acting/cushioned/with switch
Ⓑ Bore size : ø25 mm
Ⓒ Port thread : Rc thread
Ⓓ Stroke length : 10 mm
Ⓔ Lock direction : Forward locking
Ⓕ Switch model No. : Proximity switch M2V, lead wire 1 m
Ⓖ Switch quantity : 1 on rod side
Ⓗ Option : Rod end male thread

How to order switch

● Switch body + mounting bracket set

FCS - M2V

Switch model No.
(Item Ⓕ on page 890)

● Switch body only

SW - M2V

Switch model No.
(Item Ⓕ on page 890)

● Mounting bracket set

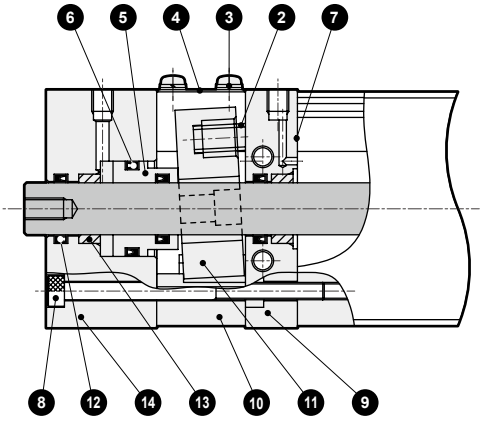
FCS - M

Mounting bracket

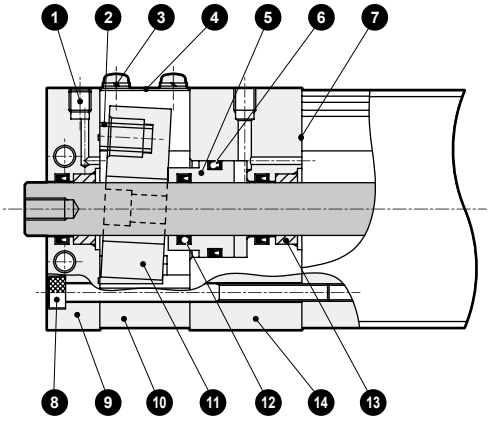
Internal structure and parts list (Refer to the internal structure of FCD-KL regarding the cylinder)

● UFCD-KL-25, 32

• Lock direction: F (forward locking)



• Lock direction: B (backward locking)



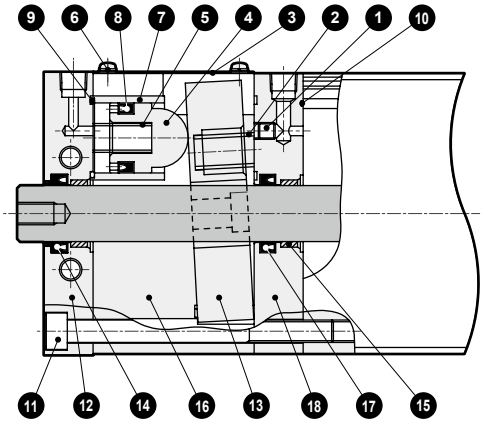
Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Hexagon socket set screw	Steel	Black finish	8	Hexagon socket head cap screw	Steel	Black finish
2	Spring	Steel	Black finish	9	Rod cover	Aluminum alloy	Black alumite
3	Cross-recessed pan head machine screw	Steel	Chromate	10	Lock tube	Aluminum alloy	Alumite
4	Dust cover	Stainless steel		11	Lock plate	Special steel	Chromate
5	Release piston	Copper alloy casting		12	Rod packing	Nitrile rubber	
6	Piston packing	Nitrile rubber		13	Metal bush	Oil-less metal	
7	Gasket	Nitrile rubber		14	Lock body	Aluminum alloy	Black alumite

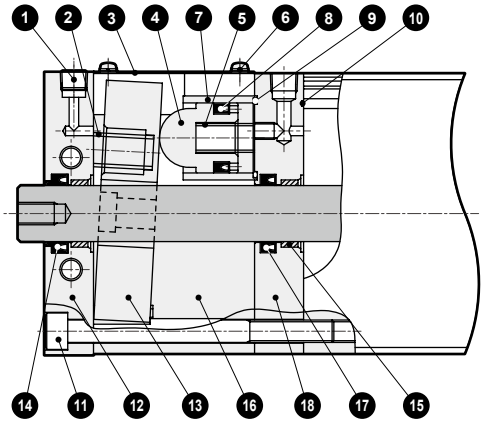
Note: Do not disassemble, as the holding force may be affected, which is dangerous.

● UFCD-KL-40 to 63

• Lock direction: F (forward locking)



• Lock direction: B (backward locking)



Cannot be disassembled

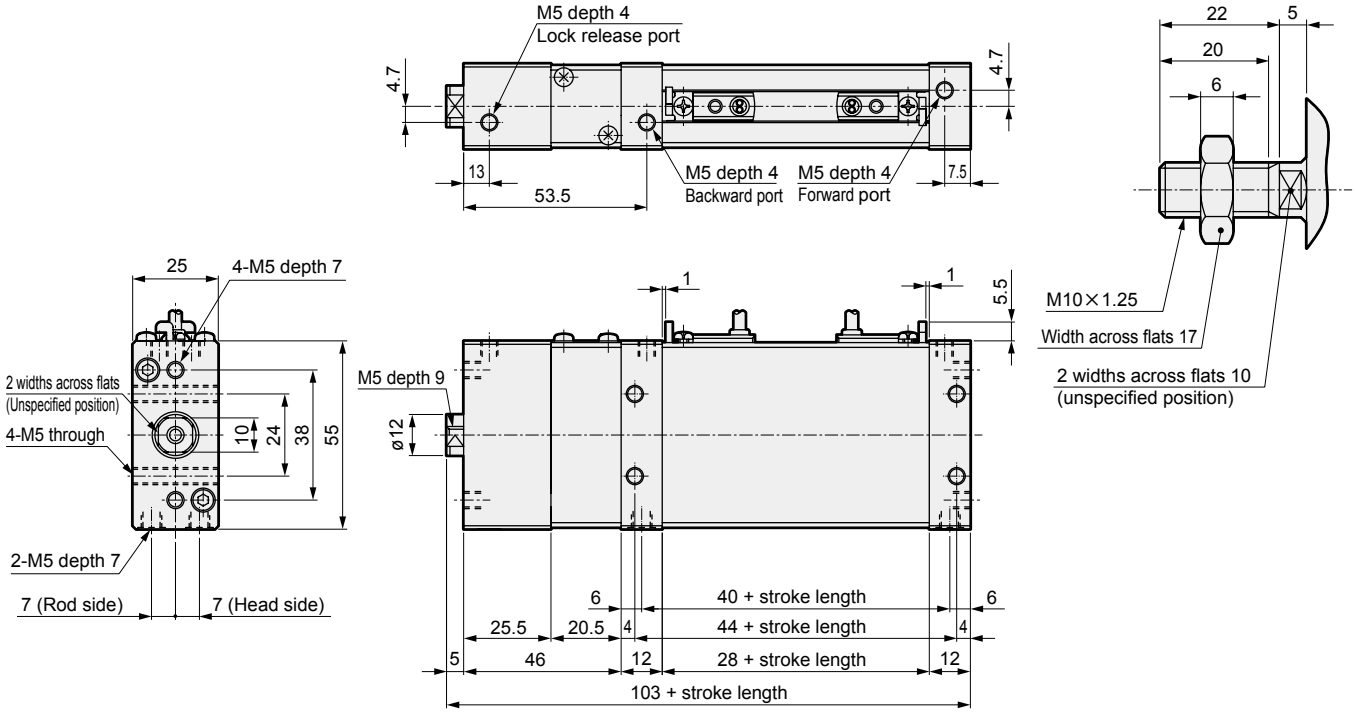
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	F type: Hexagon socket set screw	Steel		10	Gasket	Nitrile rubber	
	B type: Hex socket head cap taper thread plug	Steel		11	Hexagon socket head cap screw	Steel	Black finish
2	Brake spring	Steel	Black finish	12	Rod cover	Aluminum alloy	Black alumite
3	Dust cover	Stainless steel		13	Lock plate	Special steel	Chromate
4	Piston	Copper alloy casting		14	Rod packing	Nitrile rubber	
5	Piston spring	Steel		15	Metal bush	Oil-less metal	
6	Cross-recessed pan head machine screw	Steel	Chromate	16	Lock tube	Aluminum alloy	Alumite
7	Release piston tube	Stainless steel		17	Rod packing	Nitrile rubber	
8	Piston packing	Nitrile rubber		18	Lock body	Aluminum alloy	Black alumite
9	O-ring	Nitrile rubber					

Note: Do not disassemble, as the holding force may be affected, which is dangerous.

Dimensions (ø25)

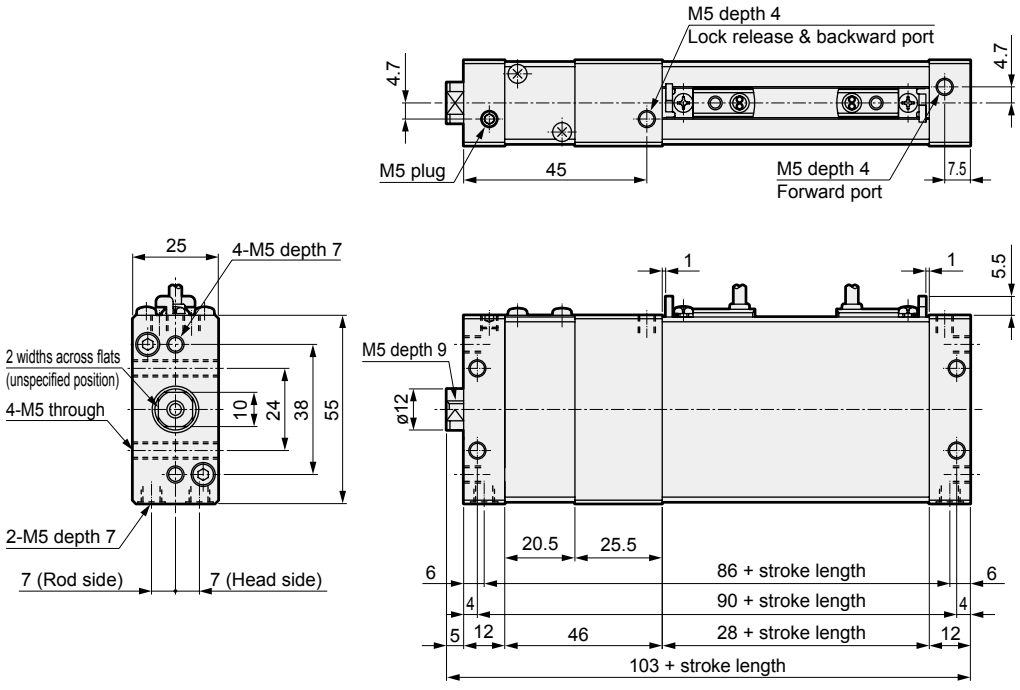
● UFCD-KL-25-F (forward locking)

● Rod end male thread
(Option code: N)



*1: For same-surface installation with 2 switches, the stroke length of 35 mm and over is required. For the stroke length of that value or less, set on both sides.

● UFCD-KL-25-B (backward locking)

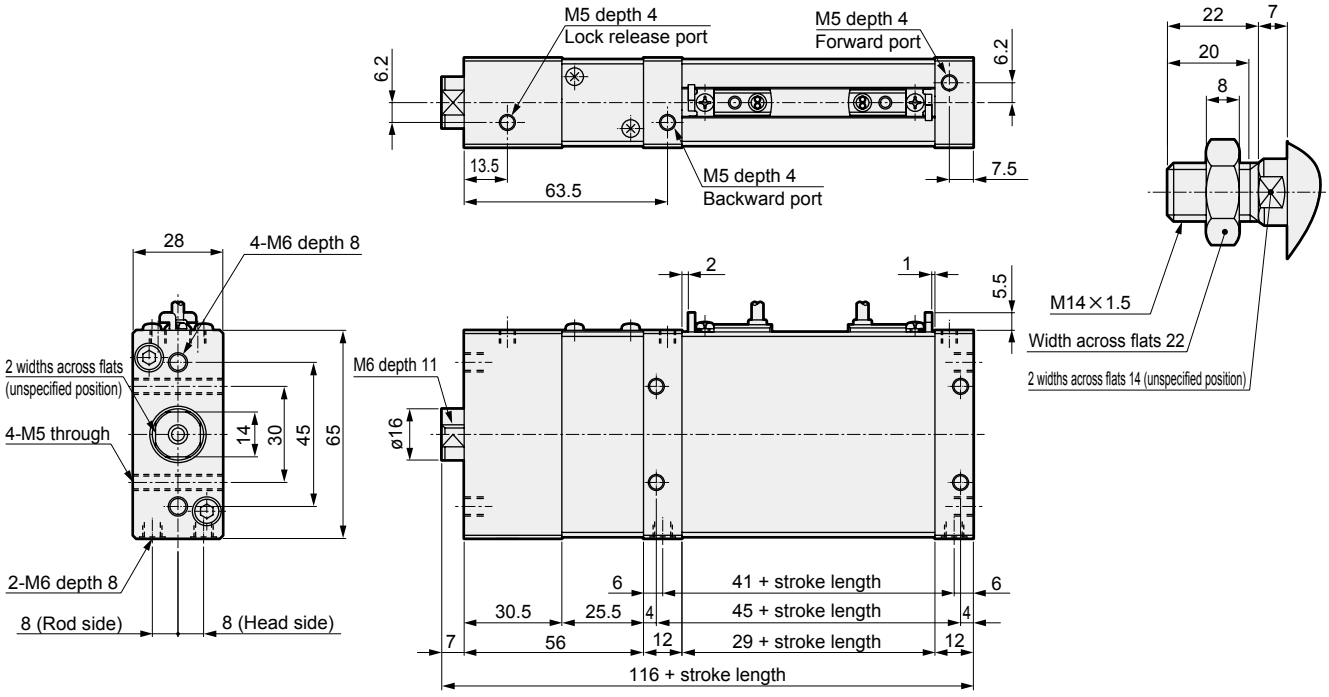


*1: For same-surface installation with 2 switches, the stroke length of 35 mm and over is required. For the stroke length of that value or less, set on both sides.

Dimensions (ø32) CAD

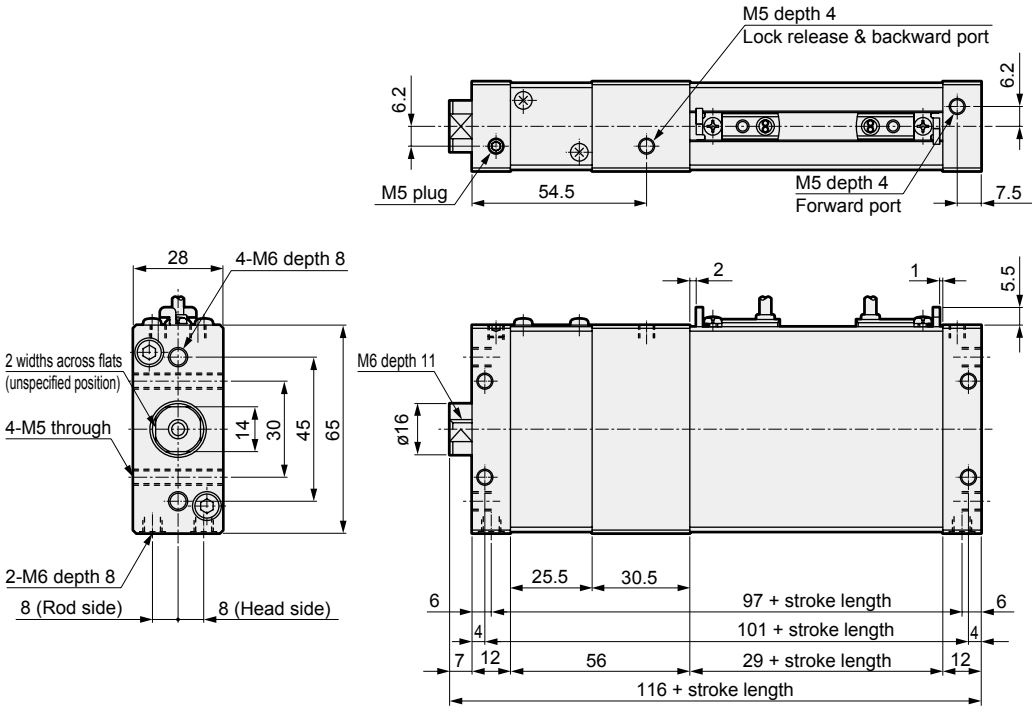
● UFCD-KL-32-F (forward locking)

● Rod end male thread (Option code: N)



*1: For same-surface installation with 2 switches, the stroke length of 35 mm and over is required. For the stroke length of that value or less, set on both sides.

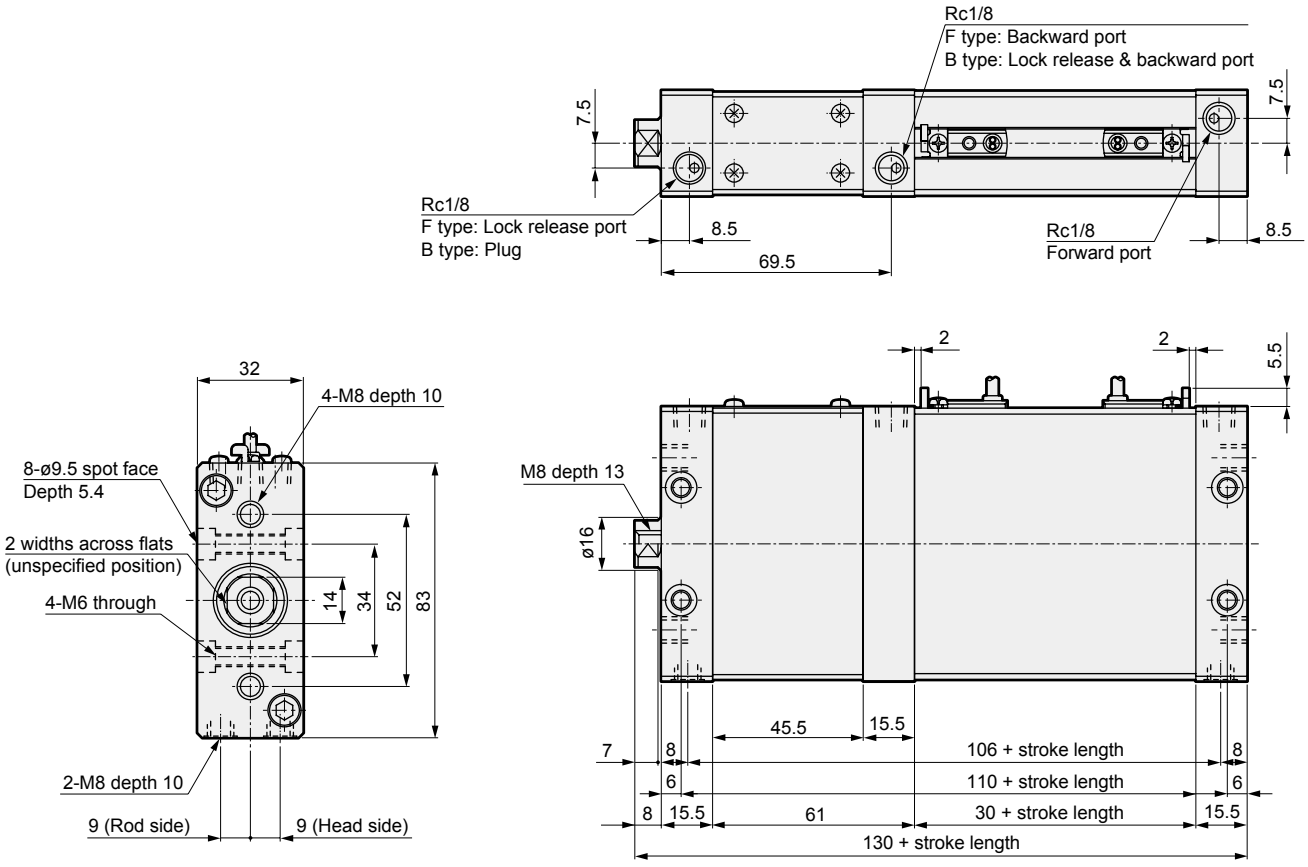
● UFCD-KL-32-B (backward locking)



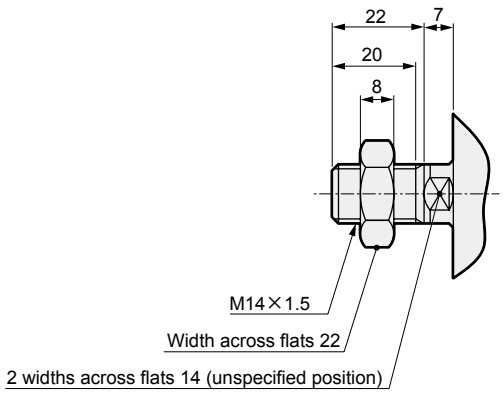
*1: For same-surface installation with 2 switches, the stroke length of 35 mm and over is required. For the stroke length of that value or less, set on both sides.

Dimensions (ø40)

● UFCD-KL-40-F/B (forward/backward locking)



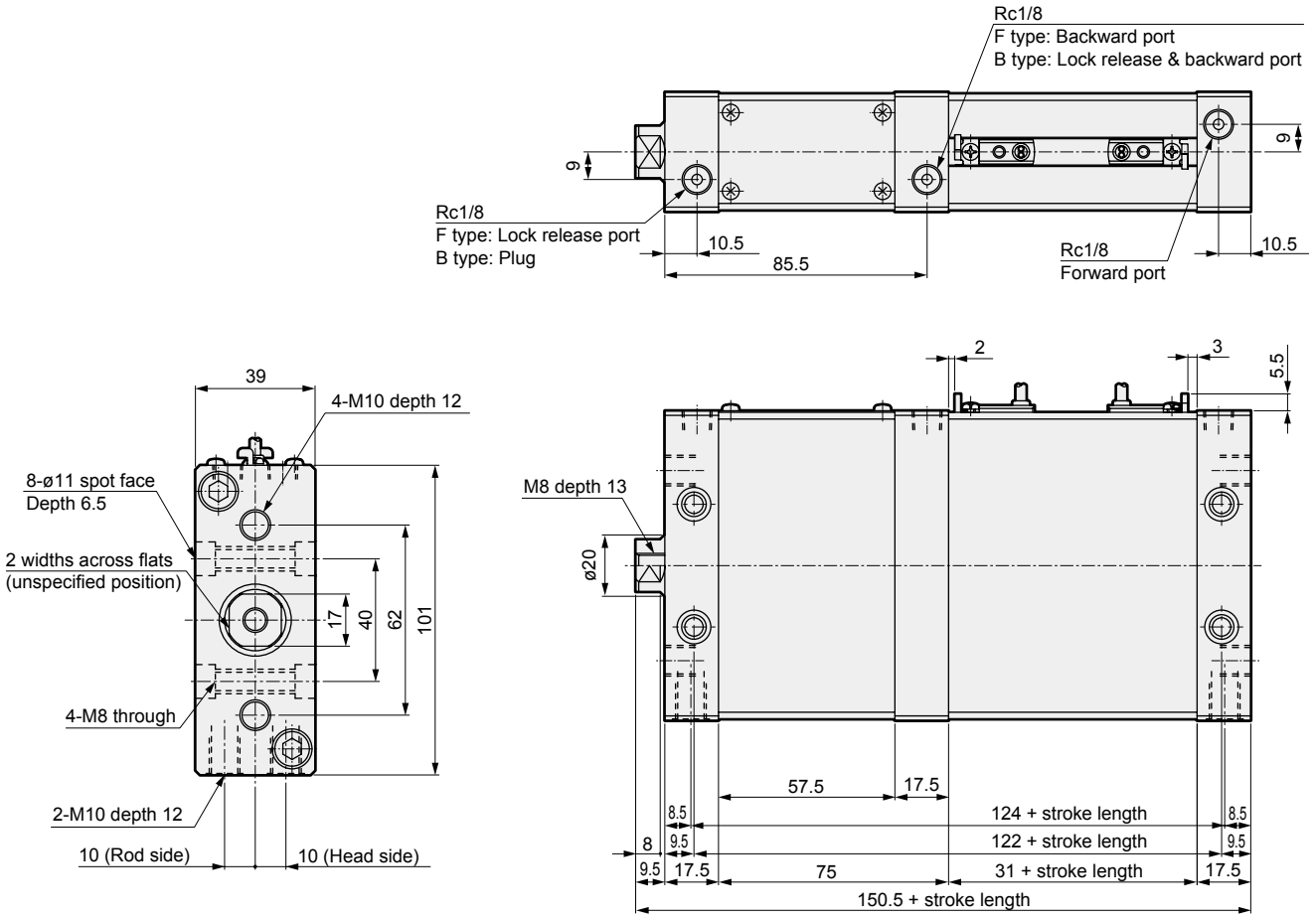
● Rod end male thread
(Option code: N)



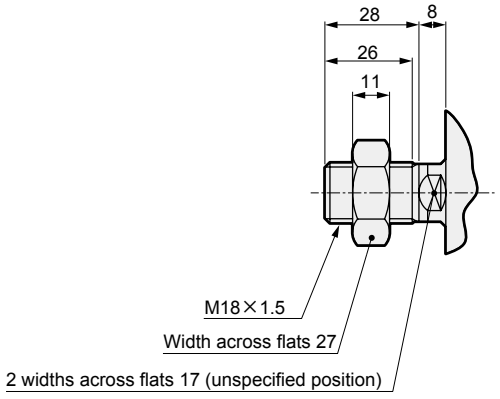
*1: For same-surface installation with 2 switches, the stroke length of 35 mm and over is required. For the stroke length of that value or less, set on both sides.

Dimensions (ø50) CAD

● UFCD-KL-50-F/B (forward/backward locking)



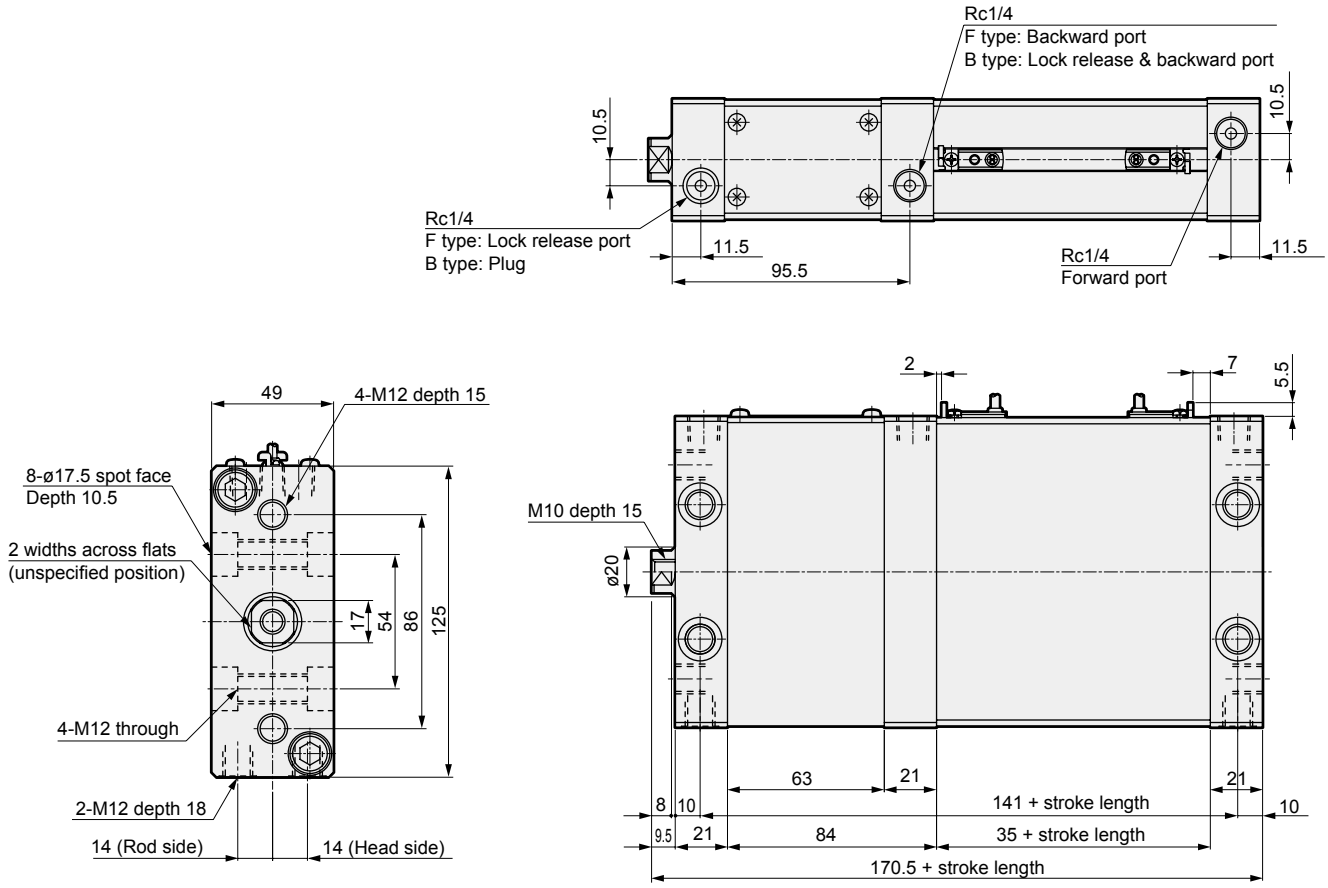
● Rod end male thread
(Option code: N)



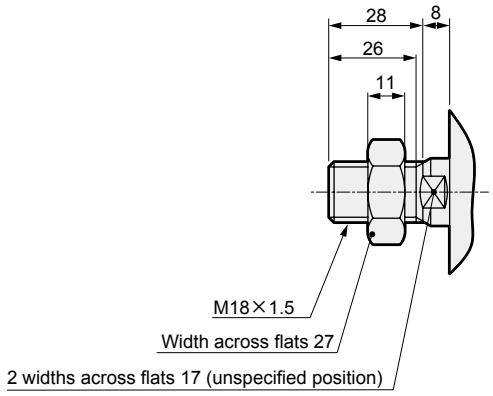
*1: For same-surface installation with 2 switches, the stroke length of 35 mm and over is required. For the stroke length of that value or less, set on both sides.

Dimensions (ø63)

● UFCD-KL-63-F/B (forward/backward locking)



● Rod end male thread
(Option code: N)



*1: For same-surface installation with 2 switches, the stroke length of 30 mm and over is required. For the stroke length of that value or less, set on both sides.

Pneumatic components

Safety Precautions

Be sure to read this section before use.
Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Free position locking flat cylinder UFCD Series

Design/selection

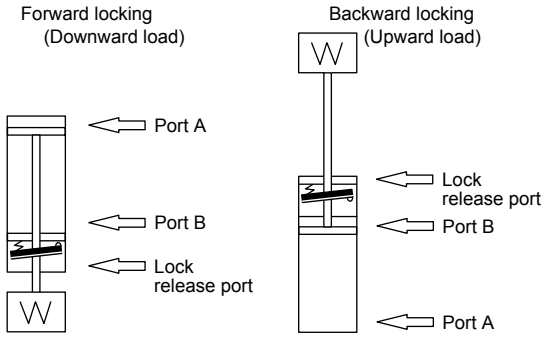
⚠ WARNING

■ Cylinder with position locking mechanism (for holding cylinder stationary).
Emergency stops (while the cylinder is in operation) can significantly decrease the service life.

■ If back pressure is applied to the locking mechanism, the lock may be released. Use a discrete valve, or use an individual exhaust manifold.

■ Do not apply torque to the rod when locked because the holding force may decrease, creating a dangerous condition. Also, use this product in mechanisms in which the rod does not rotate.

■ To release the lock, when using forward locking, supply pressure to port B, and when using backward locking, supply pressure to port A. Check that load is not applied to the locking mechanism. When both ports A and B are exhausted and the piston is locked, if pressure is supplied to port A for forward locking or to port B for backward locking, the lock may not be released or, even if released, the piston rod may pop out, creating a hazard.



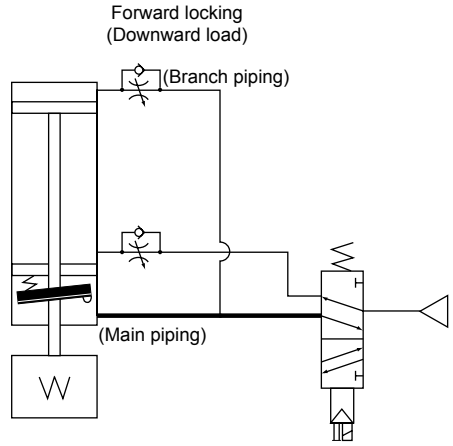
■ Do not use multiple synchronized cylinders with position locking. If the synchronization deviates, an excess moment load or load concentration is applied to the cylinder locked first, risking lock release defects, shortened service life, or damage.

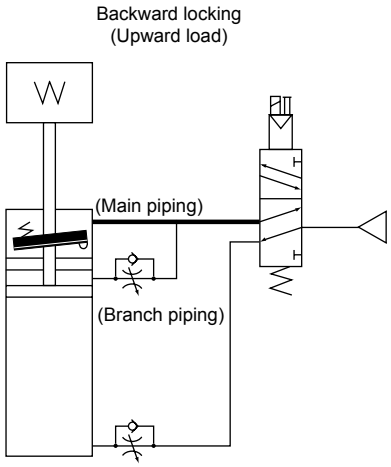
⚠ CAUTION

■ Basic circuit diagram
Arrange the air piping of this cylinder as shown in the figure below. Arranging the pipes differently from the figure below, such as piping the position locking part as a single unit, may cause problems such as delayed response.

1. Be sure to branch the piping of this cylinder after the valve into the position locking part (lock release port as main piping) and cylinder part (cylinder port as branch piping) as shown in the figure below.

2. Be sure to design the piping so that the lock is released before the cylinder starts operating. Failure to do so may prevent unlocking or cause the piston rod to jump out.





Using the emergency stop with the air piping as shown in the figure above will move the cylinder backward in a forward locking and forward in a backward locking, returning it to the original position. (When there is no residual pressure, the cylinder stops at that point.)

Mounting, installation and adjustment

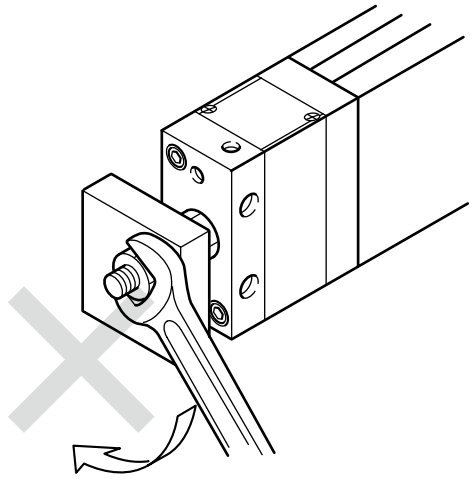
⚠ WARNING

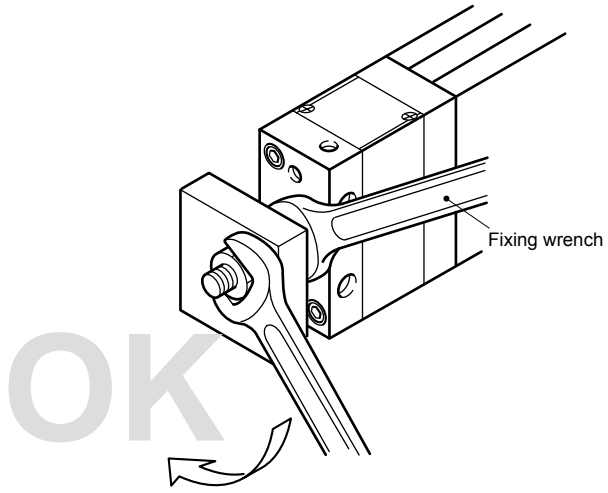
■ Do not apply grease to the piston rod because the holding force may decrease, creating a dangerous condition.

⚠ CAUTION

■ Main piping in the basic circuit diagram on the previous page should be thicker and shorter than branch piping.

■ For male threads with load mounted on ends, fix the wrench hook at the end of the rod with a wrench and tighten.





■ For female threads, fix the wrench hook at the end of the rod with a wrench using a standard tool (Allen wrench), and tighten.

■ Avoid using the product so as to apply rotation torque to the piston rod. When inevitable, use within the allowable torque range.

Item \ Model No.	ø25	ø32	ø40	ø50	ø63
Allowable torque (N·m)	1	1.6	2.5	3.9	5.9

- Do not apply rotation torque with impact, or with instantaneous changes in torque load direction.

■ Be sure to provide a guide separately when using multiple synchronized cylinders.
Using only the cylinder may impair synchronicity and cause the rod to twist, leading to malfunctions.

Use/maintenance

⚠ WARNING

■ Do not apply additional grease to the piston rod or wipe off the grease that is already applied.

■ Do not disassemble the unit, as doing so may be dangerous.

■ Always use the product with the dust cover on, except for when performing manual release, in order to prevent failure or malfunction.

■ If no air pressure is supplied in vertical mounting, etc., holding force may not be sufficient when the lock is manually released. This may cause the rod to move (drop) with the load's weight.
For safety, take the following measures before manually releasing the lock:

- Move the load to the bottom end.
- Provide a stopper to the load
- Apply air pressure to the cylinder to balance the load.

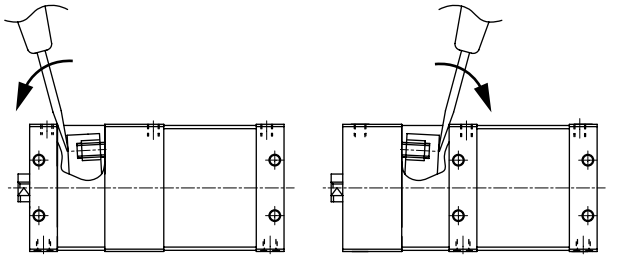
⚠ CAUTION

■ When locking the first time after leaving the lock released for a long time, a delayed response may occur in the lock.
Do not leave the lock pressurized, and operate the lock at each cylinder operation.
(Use the basic circuit diagram shown on page 898)

■ Keeping the cylinder with pressure applied to the lock mechanism may cause the lock to release.
Do not use 3-position closed center and 3-position P/A/B connection solenoid valves.

■ Due to the structure, the piston rod drops by about 1 mm when the lock is applied.

■ How to unlock manually



Forward locking (lock direction ←) Backward locking (lock direction →)

- Remove the cover, insert a flathead screwdriver or the like and lightly push it down in the direction of arrow A to lift the lock plate, unlock and free the piston rod.

■ The cylinder body may be damaged or may malfunction if a unit with excessive inertia, etc., is actuated. Use within the allowable absorbed energy range.