Discontinue

CKD Corporation

SM-6499-A

INSTRUCTION MANUAL

ROBOT CYLINDERS

MFC - (L), MFC - K (L), MFC - B (L)

MFC - BK (L), MFC - BS, MFC - BSK

Please read this operation manual carefully before using this product, particularly the section describing safety.

Retain this operation manual with the product for further consultation whenever necessary.

[EC8-0FC01]

For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, read this operation manual carefully for proper operation.

Observe the cautions on handling described in this manual, as well as the following instructions :

⚠ Precautions

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

Discontinue

INDEX

MFC - (L), MFC - K (L), MFC - B (L)
MFC - BK (L), MFC - BS, MFC - BSK
Robot Cylinders
SM 6499-A

1. PRODUCTS

1-1. Cylinder Specifications

1) MFC & MFC-L (ϕ30~ϕ80) Standard type and MFC-K & MFC-KL (ϕ30~ϕ80), high load type

Specifications

Model / Item	MFC・MFC-L	MFC-K・MFC-KL
Type of actuation and Classification	Double Acting	
Media	Compressed air	
Max. Working pressure MPa {kgf/cm²}	1 {10} (with no load)	
Min. Working pressure MPa {kgf/cm²}	0.15 {1.5} (with no load)	
Withstanding pressure MPa {kgf/cm²}	1.6 {16}	
Ambient temperature (°C)	−10~60 (Not to be frozen)	
Tube bore (mm)	ϕ30、ϕ40、ϕ50、ϕ63、ϕ80	
Diam. of Connecting port (Rc)	1/8 (ϕ30・ϕ40)、1/4 (ϕ50・ϕ63)、3/8 (ϕ80)	
Piston speed (mm/s)	50~300 (with no load)	
Cushion	Air cushion	
Lubrication	Not required. (Use Turbine oil Class 1, ISO VG32 if required.)	

※ Consult us as for Low pressure hydraulic type.

2) MFC-B, MFC-BL (ϕ30~ϕ80) with Brake and MFC-BK, MFC-BKL (ϕ30~ϕ80) with brake, high load type

Specifications

Model / Item	MFC-B・MFC-BL	MFC-BK・MFC-BKL
Type of actuation and Classification	Double Acting	
Media	Compressed air	
Max. Working pressure MPa {kgf/cm²}	Brake portion 1 {10} Cylinder portion 1 {10}	
Min. Working pressure MPa {kgf/cm²}	Brake portion 0.35 {3.5} Cylinder portion 0.15 {1.5}	
Withstanding pressure MPa {kgf/cm²}	1.6 {16}	
Ambient temperature (°C)	−10~50 (Not to be frozen)	
Tube bore (mm)	ϕ30、ϕ40、ϕ50、ϕ63、ϕ80	
Diam. of Connecting port (Rc)	1/8 (ϕ30・ϕ40)、1/4 (ϕ50・ϕ63)、3/8 (ϕ80)	
Piston speed (mm/s)	50~300 (with no load)	
Cushion	Air cushion	
Lubrication	Not required. (Use Turbine oil Class 1, ISO VG32 if required.)	

※ Consult us as for Low pressure hydraulic type.

3) MFC-BS (ϕ30~ϕ80) with Brake sensor and MFC-BSK (ϕ30~ϕ80) with Brake sensor, High Load type

Specifications

Model / Item	MFC-BS	MFC - BSK
Type of actuation and Classification	Double Acting	
Media	Compressed air	
Max. Working pressure MPa {kgf/cm²}	Brake portion 1 {10} Cylinder portion 1 {10}	
Min. Working pressure MPa {kgf/cm²}	Brake portion 0.35 {3.5} Cylinder portion 0.15 {1.5}	
Withstanding pressure MPa {kgf/cm²}	1.6 {16}	
Ambient temperature (℃)	0~50	
Tube bore (mm)	ϕ30、ϕ40、ϕ50、ϕ63、ϕ80	
Diam. of Connecting port (Rc)	1/8 (ϕ30・ϕ40)、1/4 (ϕ50・ϕ63)、3/8 (ϕ80)	
Piston speed (mm/s)	50~300 (with no load)	
Cushion	Air cushion	
Lubrication	Not required. (Use Turbine oil Class 1, ISO VG32 if required.)	
Stop position accuracy (mm)	±1.0 (at speed of 300mm/s, No load)	
Holding power N {×0.1kgf}	440 (ϕ30)、780 (ϕ40)、1600 (ϕ50)、2500 (ϕ63)、4000 (ϕ80)	
Minimum sendorable dimmension (mm)	0.1	

※ Consult us as for Low pressure hydraulic type.

1-2. Switch Specifications

Type & Model / Item	Non contacy Switch		
	R1	R2	R3
Application	For programmable controller, relay, compact solenoid valve	For programmable controller, exclusively	For programmable controller, relay, IC circuit, solenoid valve
Voltage of source of power	——	——	DC4.5V~28V
Load Voltage Current	AC85V~265V 5~100mA	DC10V~30V 5~30mA	Below DC30V Less than 200mA
Current consumption	——	——	Less than 10mA (Lit while Power is ON) at DC24V
Internal Voltage drop	Below 7V	Below 4V	Less than 0.5 at 150mA
Lamp	LED (Lit when LED is on)		
Leak Current	Less than 1mA at AC100V Less than 2mA at AC200V	Less than 1mA	Less than 10μA
Length of lead cord	1m (Oil-proof, Vinyl cabtyre cord, 2-core, 0.3mm²)		1m (Oil-proof, Vinyl Cabtyre cord, 3-core, 0.15mm²)
Max. Impact	100G		
Insulation resistance	20 MΩ or more measuring with DC500V megger tester		
Dielectric strength	AC1500V for 1minute	AC1000V for 1minute	
Ambient Temperature range	−10°C~+60°C		
Protective structure	For Grommet-IEC Standard 1P64, JIS C0920 (Splash proof), Oil Resistance		
Option	with Terminal box, Model R※B (Non-Water-Proof)		

Type & Model / Item	Contact type			
	R0	R4	R5	R6
Application	For Relay, Programmable controller	For Large Capacity Relay, Solenoid valve	For programmable controller, relay, IC circuit (wo/Lamp), series connection	For programmable controller, exclusively (with DC self holding function)
Voltage of source of power	——	——	——	——
Load Voltage Current	DCV24V、5~50mA AC100V、7~20mA AC200V、7~10mA	AC100V、20~200mA AC200V、10~100mA	Less than 50mA at DC24V Les than 20mA at AC100V Less than 10mA at AC200V	DC24V、5~50mA
Current consumption	——	——	——	——
Internal Voltage drop	Below 2.4V	Below 2V	0V	Below 5V
Lamp	LED (Lit when power is ON)	Neon Lamp (Lit when power is OFF)	without	LED (Lit when power is ON)
Leak Current	0	Less than 1mA	0	Less than 0.1mA
Length of lead cord	1m (Oil-proof, Vinyl cabtyre cord, 2-core, 0.3mm²)			
Max. Impact	30G			
Insulation resistance	20 MΩ or more measuring with DC500V megger tester			
Dielectric strength	Should stand normal for 1 minute with AC1500V applined.			
Ambient Temperature range	−10°C + 60°C			
Protective structure	For Grommet-IEC Standard 1P64, JIS C0920 (Splash proof), Oil Resistance			
Option	with Terminal box, Model R※B (Non-Water-Proof)			

Note : Terminal box model R※A is available on Order production.

Discontinue

1 PRODUCT

1-3. Selection of Peripheral Equipment

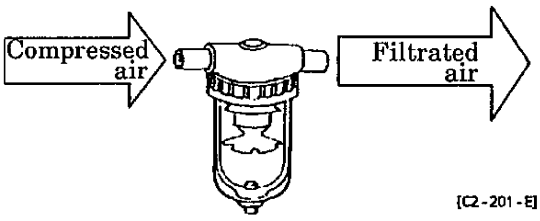
The accuracy of overrun stopping depends upon the response as well as effective sectional area of the Brake releasing valve (Sol 2 in the Fundamental circuit diagrams). Select appropriate peripheral equipment according to the following guide table.

Peripheral / Equip.Tube bore	SOL1 Directional Control Valve	SOL2 Brake Valve	Pressure reducing valve w/check valve	Speed Controller	Silencer	Pipings
ϕ30	4K250	4KB110	2419-1C	SC1-6 SC3G-6 SC2G-6	SLW-6A	ϕ6×ϕ4 Nylon Tube
ϕ40	4K250	4KB110	2419-1C	SC1-6 SC3G-6 SC2G-6	SLW-6A	ϕ6×ϕ4 Nylon Tube
ϕ50	4K350 4L350 PV5-6-FIG-D	4F110	2400-2C	SC1-8 SC3G-8 SC2G-8	SLW-8A	ϕ8×ϕ6 Nylon Tube
ϕ63	4K350 4K350 PV5-6-FIG-D	4F110	2400-2C	SC1-8 SC3G-8 SC2G-8	SLW-8A	ϕ8×ϕ6 Nylon Tube
ϕ80	4K350 4L350 PV5-6-FIG-D	4F110	2400-3C	SC1-10 SC3G-10 SC2G-10	SLW-10A	ϕ10×ϕ8 Nylon Tube

2. CAUTION

2-1. Fluid

1) Use the compressed air, filtrated and dehumidified. Carefully select a filter of an adequate filtration rate (5μm or lower preferred), flow rate and its mounting location (as closest to directional control valve as possible).

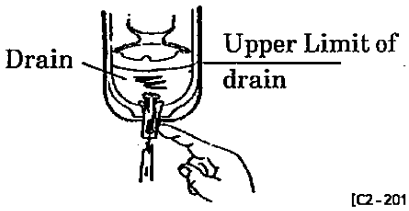


[C2-201-E]

2) Be sure to drain out the accumulation in filter periodically.

3) Note that the intrusion of carbide of compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of solenoid valve and cylinder. Be sure to carry out thorough inspection and maintenance of compressor.

4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as lubricant if lubrication is preferred.



[C2-201-F]

3. OPERATION

3-1. Service Pressure Range

Apply the following service pressure to each model, respectively.

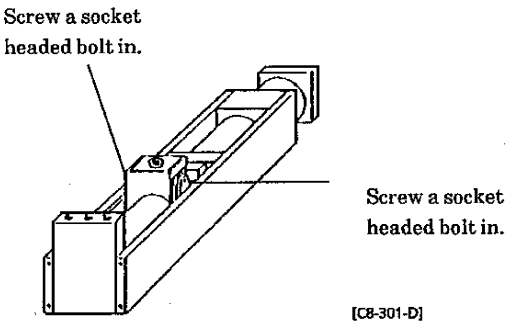
Unit : MPa {×10kgf / cm²}

Model	Pressure Range for Brake	Pressure range for Cylinder
MFC - (L) MFC - K (L) (ϕ30~ϕ80)	———	0.15~1
MFC - B (L) MFC - BK (L) (ϕ30~ϕ80)	0.35~1	0.15~1
MFC - BS (L) MFC - BSK (L) (ϕ30~ϕ80)	0.35~1	0.15~1

3-2. Manual Release of Brake

Brake will be released when socket headed bolts (Refer the table at right as for its size) are screwed into female threaded holes on both sides of brake component. (Keep bolts away from the brake for normal operation.)

Tube bore (mm)	Nominal thread of socket headed bolt
ϕ30	M5
ϕ40	M5
ϕ50	M6
ϕ63	M6
ϕ80	M8



3-3. Regarding Switches

1) Installation position of switches on cylinder

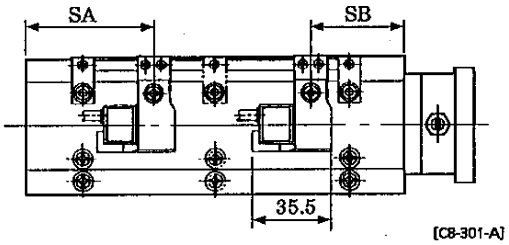
(1) Installation at stroke end

Install the switches at the positions of SA and SB dimensions so as to have switch function at the most sensitive position.

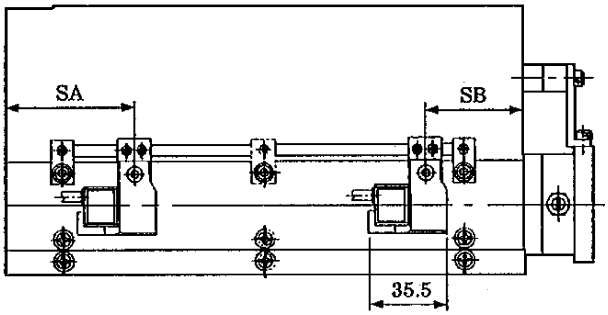
Install switches so as to have lead cord of both switch come out to left side (Refer to the following illustlations.)

(2) Installation of switch at an intermediate position of stroke

Tentatively fix the piston where it is anticipated to make it stop within its stroke. Slide switch over cylinder from left to right as well as vise versa to locate switch functioning range. Middle point of the range is the most sensitive point for switch and it is the position to install the switch.



[C8-301-A]



[C8-301-B]

MFC-L、MFC-KL Unit: mm

Symbol / Tube bore (mm)	SA	SB
ϕ30	54	66
ϕ40	58.5	73.5
ϕ50	75	93
ϕ63	72	116
ϕ80	96	129

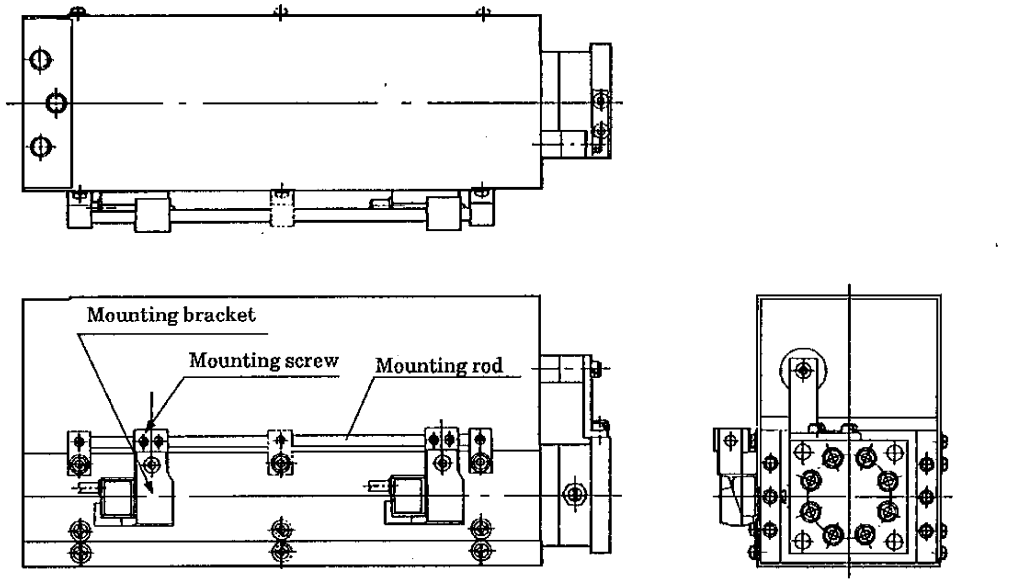
MFC-BL、MFC-BKL Unit: mm

Symbol / Tube bore (mm)	SA	SB
ϕ30	54	66
ϕ40	58.5	73.5
ϕ50	186	93
ϕ63	196	116
ϕ80	241	129

2) Relocation of switch

So long as the two mounting bolts are loosened by turning it for about 1/2 to 3/4 turn, the switches are able to be slid either direction required for re-setting, without being detached from cylinder.

Tighten mounting screw upon completion of relocating switch while lightly pressing the switch toward cylinder. Tightening torque for the screws are 150N · cm {×0.1kgf · cm} ~190N · m {×0.1kgf · cm}.



[C8-301-C]

4. INSTALLATION

4-1. Fundamental Circuit diagrams

1) Comply with the following fundamental items and select one of the following appropriate circuits for accurate performance of cylinders.

① Make sure of designing the circuit system to supply pressure to both sides of piston while it is held stalled. (It is for the purpose of preventing piston rod from jerk starting when resumes its operation.)

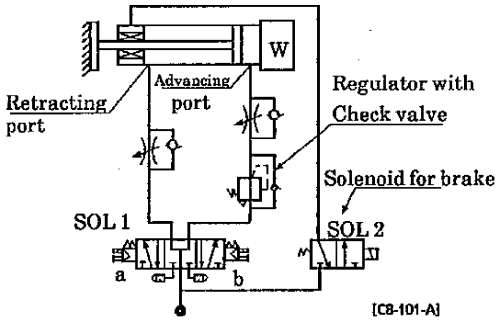
② Adjust propulsion balance by installing a regulator with check valve to the side of larger propulsion to keep propulsion balance (including load). Confirm it to be cylinder with brake.

③ Install Brake releasing solenoid valve as close to a Brake port as possible.

Fundamental Circuit diagrams for Models MFC-B, MFC-BS

☆ In case of Horizontal load

Fig. 1



(a) SOL - 1 (b)		SOL - 2	Actuation
OFF	OFF	OFF	Halting
ON	OFF	ON	Retracting
OFF	ON	ON	Advancing

★ Pressure within the regulator with check valve $\fallingdotseq \frac{(D^2-d^2)}{D^2} P$

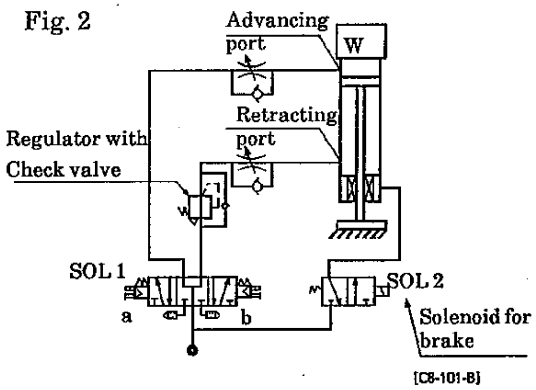
D: Cylinder bore (mm)
d: Diameter of rod (mm)
P: Working pressure MPa {kgf/cm²}

The lay-out per Fig. 1 prevents the sleeve from jerk start at the movement when the brake system is released because the pressure is delivered on both sides of piston. Keep propulsion balance by installing a regulator with a check valve to the circuit of cylinder head side.

☆ In case of Upward Perpendicular load

When the load is upward as shown in Fig. 2, install a Pressure Reducing valve with check valve to the circuit of piston rod side for the purpose of preventing an erroneous motion of cylinder tube to the line of load gravity by reducing reversed thrust of the rod and keeping a balance.

Fig. 2



(a) SOL - 1 (b)		SOL - 2	Actuation
OFF	OFF	OFF	Halting
ON	OFF	ON	Ascending
OFF	ON	ON	Descending

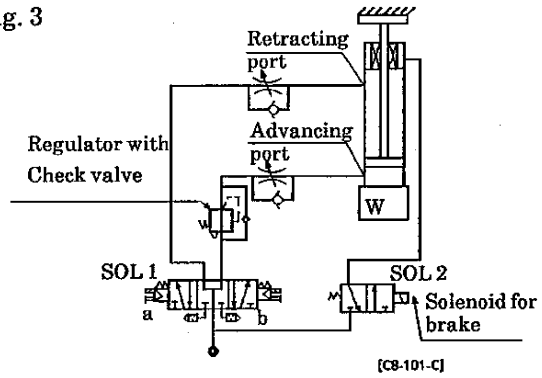
★ Pressure within the regulator with check valve $\fallingdotseq \frac{\pi D^2 P - 4W}{\pi (D^2 - d^2)}$

D: Cylinder bore (mm)
d: Diameter of rod (mm)
P: Working pressure MPa {kgf/cm²}
W: Load (kgf)

☆ In case of Downward load

When the load is downward as shown in Fig. 3, install a Pressure Regulator valve with check valve to the circuit of cylinder head side for the purpose of preventing an erroneous motion of cylinder tube to the line of load gravity by reducing reversed thrust of the rod and keeping a balance.

Fig. 3



(a) SOL - 1 (b)		SOL - 2	Actuation
OFF	OFF	OFF	Halting
ON	OFF	ON	Ascending
OFF	ON	ON	Descending

★ Pressure within the regulator with check valve $\fallingdotseq \frac{\pi (D^2 - d^2) - 4W}{\pi D^2}$

D: Cylinder bore (mm)
d: Diameter of rod (mm)
P: Working pressure MPa {kgf/cm²}
W: Load N {kgf}

2) Keeping a balance of propulsion

Keep a balance of propulsion by regulator with check valve as per fundamental circuit diagram posted above. Adjust pressure in the duration if raising it instead of reducing it. Guide line value is calculated out if formulae posted above (★ marked).

4-2. Electric Control Circuit

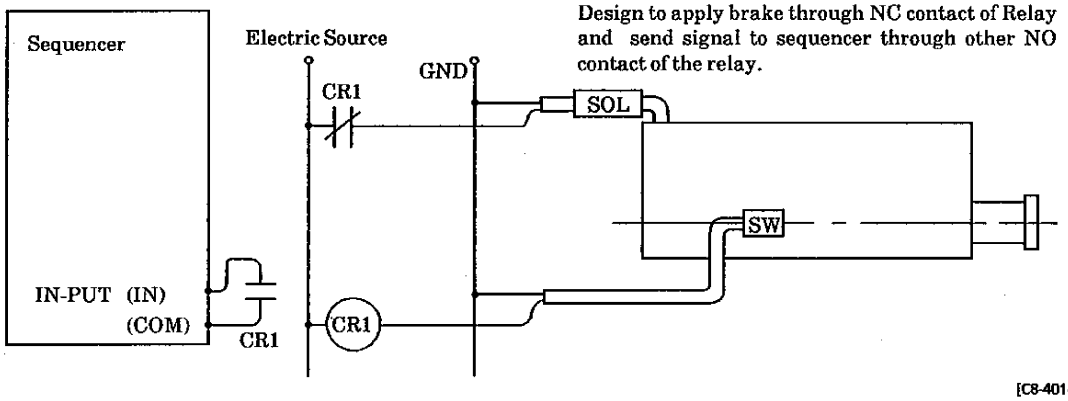
Comply with the following items because the type of selected equipment and its circuit may influence for overrunning or to repeating accuracy of piston stopping.

1) Select equipment with the shortest response time and high accuracy.
2) Arrange to coincide both brake release signal and cylinder start signal or set brake release signal a moment sooner than signal to cylinder for the sake of avoiding jerk start of cylinder.
3) Make it self holding circuit for Stop signal censor switch circuit.
4) Select cencor switch for stop signal out of such types as Cylinder switch, Roller plunger type limit switch, Proximity switch or photocell tube.
5) Cautions while using sequencer:
   In case when brake control circuit is taken out through sequencer, the stopping accuracy disperses with wrong range due to the dispersion (±20ms~30ms) of scan timing of sequencer.

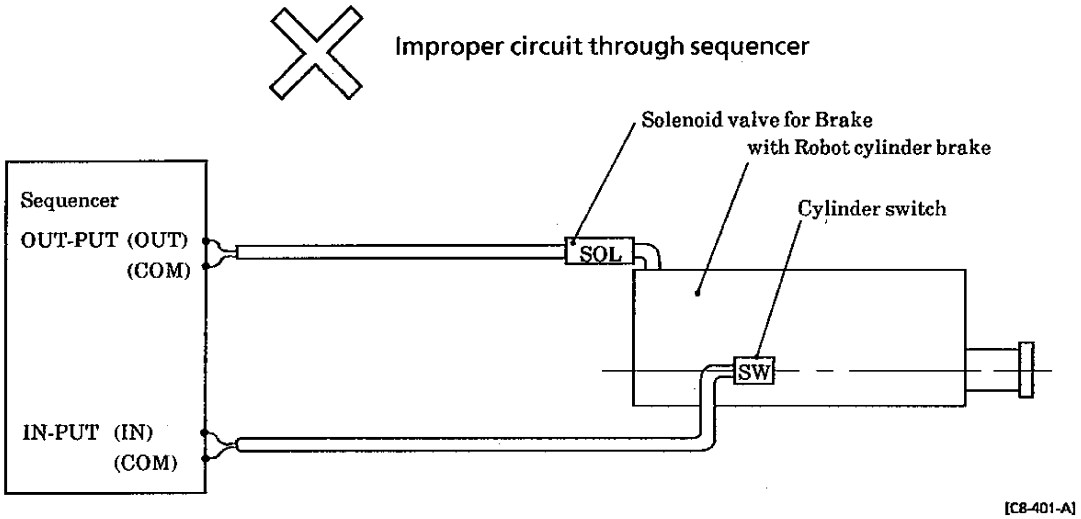
Design the brake control circuit to apply brake through a relay directly instead of through sequencer circuit.

※ Scanning time ..... Required time for program routine to make one cycle.
※ Dispersion ..... Tolerance of ±1.5mm when Cylinder speed is 100mm/s and scanning time is 30m s.

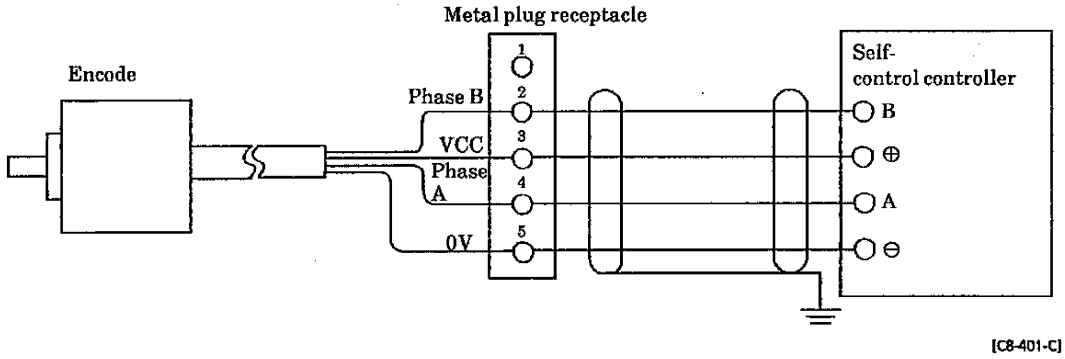
○ Appropriate circuit without coming through sequencer



[C8-401-B]



6) Circuit of brake with sensor (MFC-BS and MFC-BSK)



In case Self-control type controller is selected, it is sufficient just to connect the controller with metal plug receptacle directly because the controller is exclusively for positioning.

4. INSTALLATION

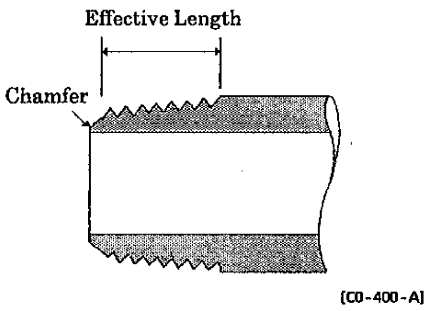
4-1. Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc. (It is also recommended to use galvanized pipes for the portion preceding to Filter.)

2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to drive at specified speed. (Refer to Selection Guide Table for Related Equipment.)

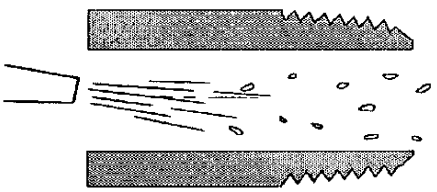
3) Install filter preferably adjacent upper-stream to solenoid valve for eliminating rust, foreign substance and drain in the pipe.

4) Strictly observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

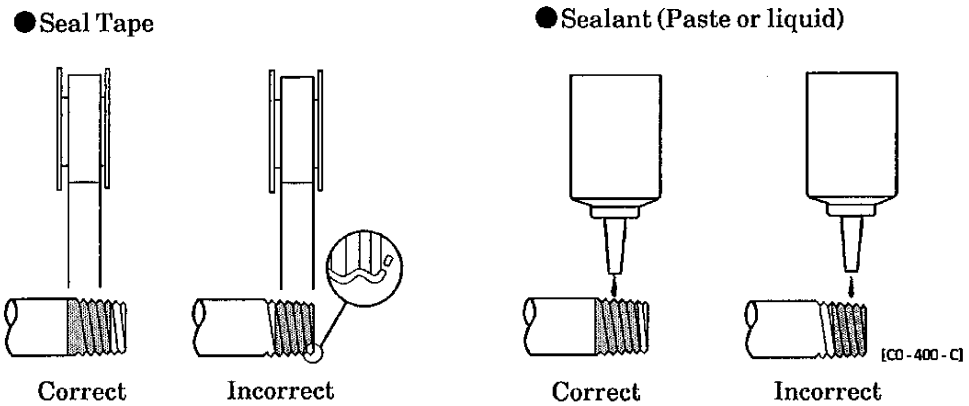


[C0-400-A]

5) Flush air into the pipe to blow out foreign substances and chips before piping.


[C0-400-B]

6) Refrain applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

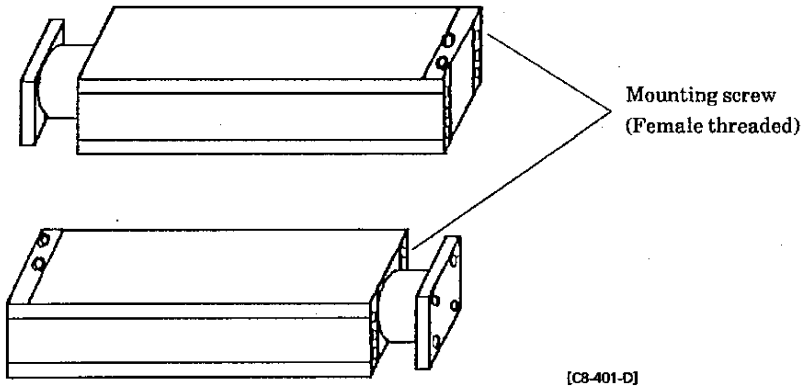


[C0-400-C]

7) Inspect against any external leakage at each threaded joint, upon completion of piping, by applying soapy water over it. Wipe solusion well after inspection is completed.

4-4. Installation

1) MFC-00 (Basic Model)



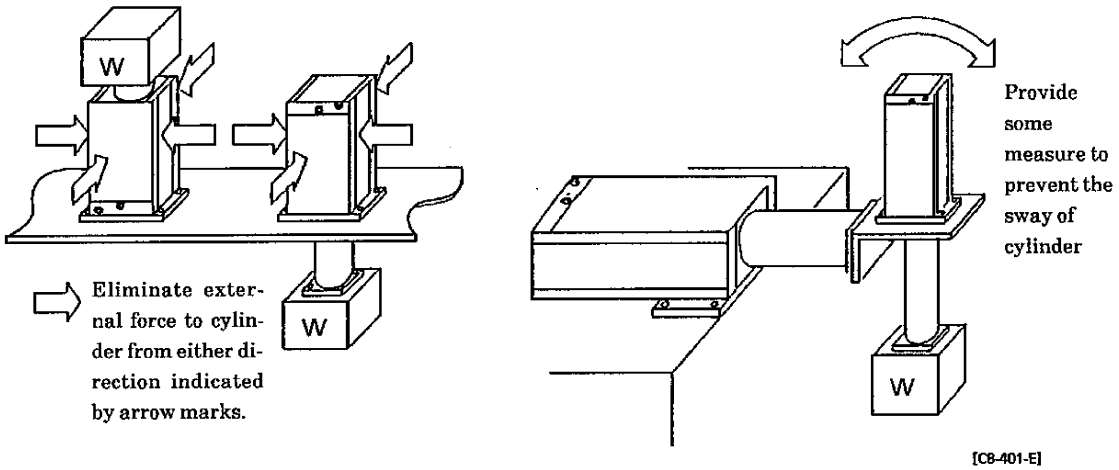
There are mounting holes (female threaded) on the side guides of MFC - 00 Model. Keep the flatness and surface roughness of mounting faces within the following tolerances :

Flatness	Finer than 0.1mm
Surface roughness	Finer than 12.5s

2) MFC-FA & FB (Head end Flange type and Rod end Flange type)

It is anticipated to mount each model of Flange type cylinder, making use of either head end flange or rod side flange. Particular care has to be given to prevent the sway of cylinder itself due to peripheral circumstances in case of either long stroke or reciprocating conveyance of cylinder.

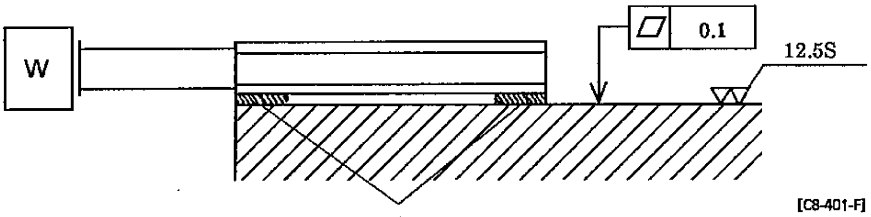
Flatness and Surface roughness are specified as same as that for model MFC-00.



3) MFC - LA (Foot mounting type)

Make use both foot flanges to mount cylinder of longer stroke than specified below when installing Foot types.

Models	Specified stroke length
MFC - LA - 30	More than 300
MFC - LA - 40	More than 300
MFC - LA - 50	More than 400
MFC - LA - 63	More than 500
MFC - LA - 80	More than 500



[C8-401-F]

Observe the flatness of mounting surface carefully in case of mounting it on two foot flanges.

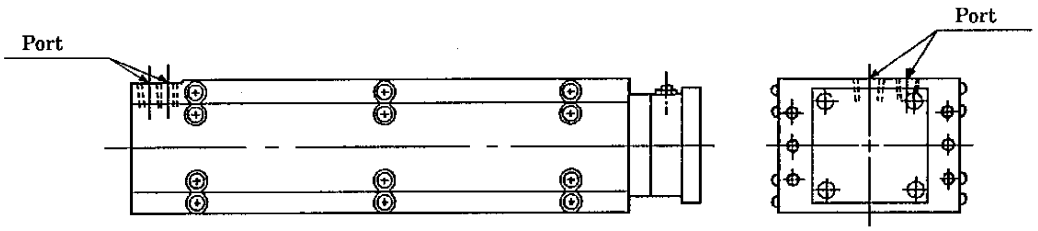
4) Regarding Switches

(1) Magnetic environment

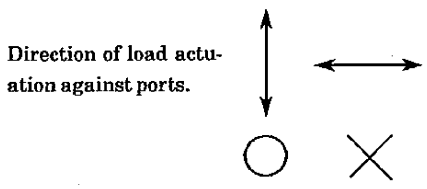
Avoid usage of these switches within the area where strong magnetic field or large current exists. (such as a large magnet or spot welding equipment). Position censoring errors will be resulted when installing many cylinders with switch in parallel or magnetized piece comes across the cylinders due to intervention among each other.

5) Cautions while fixing load on the tip of rod.

Comply with the following illustrations to fix a load at tip of rod.



[C8-401-G]



5. MAINTENANCE

5-1. Periodic Inspection

1) Carry out periodic inspection once or twice a year in order to upkeep the cylinder in optimum condition.

2) Inspection Items

ⓐ Check for the loosen bolts of mounting brake mechanism.
ⓑ Confirm the close and open motion of brake mechanism.
ⓒ Check for the loosen bolts and nuts of fixing supporting flanges.
ⓓ Check for the smooth operation of cylinder.
ⓔ Check for the noticeable change of piston speed or cycle time.
ⓕ Check for an external or internal leakage.
ⓖ Check for flaw (scratch) and deformation of piston rod.
ⓗ Check for the stroke abnormality.
ⓘ Check for any corrosion inside of each port.

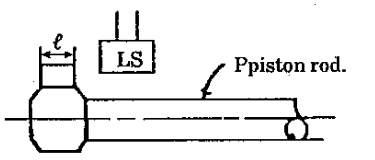
Carry out additional tightening, should there be any abnormal loosening

3) Carry out inspection of components for the following items.

ⓐ Scratch marks on the bore surface of the tube
ⓑ Scratch marks, break away of chrome plate and dust on piston rod
ⓒ Scratch marks and wear inside of the bushing
ⓓ Scratch marks, wear and crack on surface of piston
ⓔ Loosen connection of piston and rod
ⓕ Crack of both end covers
ⓖ Scratch marks and wear of packing in sliding parts. (such as dust wiper, rod packing, cushion packing and piston packings.

Repair it when any abnormality is disclosed or replace the parts when it is defective.

5-2. Trouble Shooting

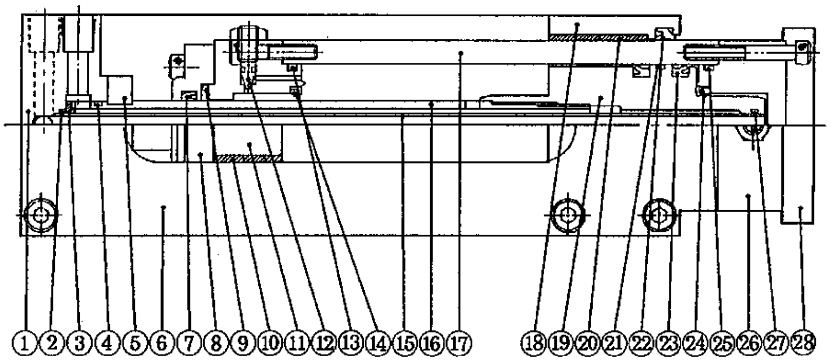
Trouble	Cause	Correction
Brake is not released.	Insufficient pressure to the brake mechanism	Secure ample pressure.
	No signal to brake solenoid valve (In case NO type - Electric signal is there.)	Reaffirm the circuit to receive a signal. (Reaffirm the circuit to shut off a signal.)
	Solenoid valve for brake does not function	Check the circuit and repair the matter as is required. Repair or replace solenoid valve as is required.
Cylinder Tube does not stop.	Electric signal is there. (In case NO type - No signal to brake solenoid)	Reaffirm the circuit to shut off a signal. (Reaffirm the circuit to receive a signal.)
	Solenoid valve for brake does not function	Check the circuit and repair the matter as is required. Repair or replace solenoid valve as is required.
	Left manual release of brake	Release the manually open status.
	Skips off the dog for brake signal a. Excessive cylinder speed b. Circuit is not self-holding circuit  [C7-502-A] a. Excessive speed	a. Either slow down the speed or increase the dog length (ℓ). b. Revise the circuit to that of self holding.
	Cylinder switch does not actuate	Refer to the article of trouble shooting of switch.
Inaccurate positioning	Effective sectional area of solenoid valve for brake is not large enough.	Replace the solenoid valve with the one of larger effective sectional area.
	Either too fine or too long tubing of connecting solenoid valve for brake and brake port	Either replace tubing with the one of larger diameter or shorten it if possible. As an alternative, connect the solenoid valve directly
	Too low response of solenoid valve for brake	Replace the solenoid valve with the one of high response.
	Too low response of signal censor switch to solenoid valve for brake	Replace the sensor switch with the one of high response.
	Relays within signal circuit of brake control are actuated sequentially.	Revise the signal circuit. (Carefully review the response time, particularly when using sequencer.)
	Mounting of the dog for brake signal became loose.	Correct and remove the play.
	Is the shape of dog for brake signal appropriate? a. Slant angle is to be maintained less than 30° when using roller plunger type limit switch. b. More length of dog than over run length is required when making an interlocking by means of dog.	a The larger angle cause load variation and results inaccurate positioning. (The slant angle can be up to 60° when using roller lever.) b. When relay is used for self holding circuit, dog length is required to provide an appropriate time length of relay actuating.

Discontinue

Trouble	Cause	Correction
Inaccurate positioning	Fluctuation of cylinder speed a. The momentum inertia of load is excessive in comparison with thrust to cylinder. (Particularly when the positioning pitch is too small.) b. See if the stopping position is within the cushion chamber or just after piston comes out of cushion chamber.	a. Either use larger bore cylinder or revise to hydraulic oil cylinder of low pressure ramnge. b. Install a check valve to cushion in the event that stopping piston just when getting out of cushion chamber.
	Cylinder tube is apt to pop out. a. Incorrect setting of pressure balancing regulator b. Delayed timing of stop release	a. Reset the pressure regulator. b. Shorten the timing of stop release. (See if supply line is chalked, also.)
	Fluctuation of load a. Feeding load change along curvature variation of copying profile (Steady change) b. Remarkable change of load due to perpendicular load (Step change)	a. Revise the specification to adopt hydraulic cylinder of low pressure range. b. Revise the circuit by building plural number of regulators for pressure balancing in the event that the range of load variation is relatively small or load changes stepping trend.
Cylinder does not move.	No signal to direction control solenoid valve	Correct the control circuit
	Misalignment of center lines at mounting cylinder	Correct the installation state and/or change the supporting system.
	Damage to piston packing	Replace piston packing.
Unsteady motion of Cylinder	Misalignment of center lines at mounting	Correct the installation state and/or change the supporting system.
	Exertion of transverse (lateral) load	Install guide, correct the installation state and/or change the supporting system.
	Speed is less than the low speed limit	Relieve the load change. Consider of using low pressure hydraulic oil cylinder.
	Excessive load	Raise the pressure. Use the cylinder of larger bore.
	Speed control valve is built in the way of "Meter in" circuit.	Revise the installation direction of speed control valve.
Damage or distortion	Shock due to high speed operation	Raise the cushion effect. Lower the speed. Reduce the load. Improve cushion mechanism (such as adopting external cushion mechanism.)
	Exertion of transverse load	Install guide. Correct the installation state and/or change the supporting system.

5-3. Structures

1) Internal structures of models MFC, MFC-K and Expendable parts list



[C8-501-A]

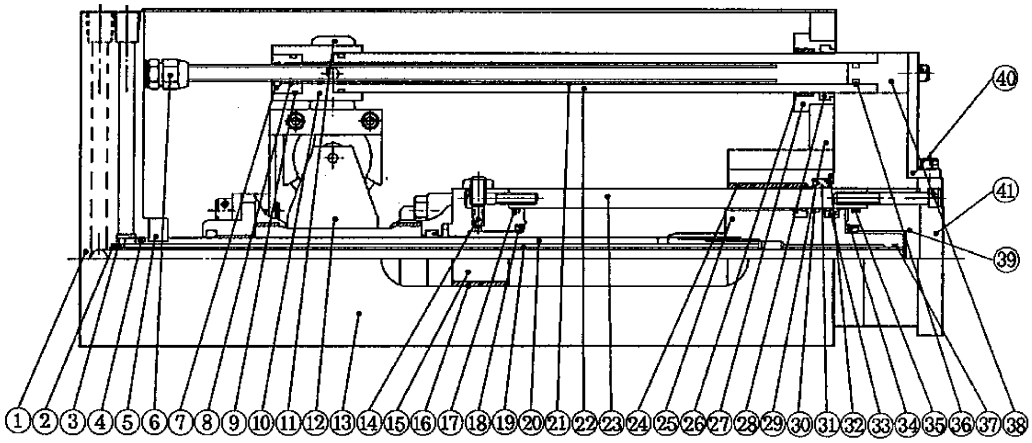
No.	Parts	Materia	Remarks	No.	Parts	Materia	Remarks
①	Fixing Guide	Cast Iron	Parkalized	⑰	Cylinder Gasket	Nitril Rubber	O ring
②	Packing 1	Nitril Rubber	O ring	⑱	Cushion Packing	Urethane, Steel	—
③	Pipe Guide	Alu-minum	—				
④	Packing 2	Nitril Rubber	O ring	⑲	Pipe	Stainless Steel	—
⑤	Rod Collar	Steel	Chromate				
⑥	Joint	Copper Alloy	—	⑳	Piston Rod	Steel	MF1cr-10
⑦	Piping Packing	Nitril Rubber	Mini-Y Packing	㉑	Piping Pipe	Stainless Steel	—
⑧	Piping Metal 1	Dry Metal	DU Bushing				
⑨	Packing 3	Nitril Rubber	O ring	㉒	Piping Rod	Steel	Ind. Chrome Plate
⑩	Piping Plaste	Alu-minum	—				
⑪	Piping Nipple	Copper Alloy	—	㉓	Cylinder Tube	Alu-minum	Ind. Chrome Plate
⑫	Brake Unit	—	—				
⑬	Side Guide	Steel	Ind. Chrome Plate	㉔	Bearing Metal	Dry Metal	DBB Metal
				㉕	Piston	Alu-minum	—
⑭	Cushion Needle	Copper Alloy	—	㉖	Piping Metal 2	Dry Metal	DU Bushing
⑮	Rod Cover	Cast Iron	Parkalized	㉗	Piping Support	Steel	Chromate
⑯	Whirl Stopper Plate	Dry Metal	DBB Metal	㉘	Piping Scraper	Nitril Rubber	SFR

Expendable Parts List (Standard)

Parts No. · name of Parts		⑦	⑭㉔	㉑	㉒	㉓
Tube bore (mm)	Kit No.	Rod Packing	Cushion Packing	Wear Ring	Scraper	Piston Packing
ϕ30	MFC-30K	PDU-12	PCS-14	F4-125617	SFR-45	PSD-30
ϕ40	MFC-40K	PNY-16	PCS-20	F4-125614	SFR-55	PSD-40
ϕ50	MFC-50K	PNY-20	PCS-24	F4-650240	SFR-70	PGY-50
ϕ63	MFC-63K	PNY-20	PCS-24	F4-650241	SDR-85	PGY-63
ϕ80	MFC-80K	PNY-25	PCS-35	F4-650242	SDR-110	PGY-80

Note : Specify the Kit No. when ordering Expendable parts.

2) Internal Structure Diagram, MFC-B, MFC-BK and Expendable parts list



[C8-501-B]

No.	Parts	Materia	Remarks
①	Fixing Guide	Cast Iron	Parkalized
②	Packing 1	Nitril Rubber	O ring
③	Pipe Guide	Alu-minum	—
④	Packing 2	Nitril Rubber	O ring
⑤	Rod Collar	Steel	Chromate
⑥	Joint	Copper Alloy	—
⑦	Piping Packing	Nitril Rubber	Mini-Y Packing
⑧	Piping Metal 1	Dry Metal	DU Bushing
⑨	Packing 3	Nitril Rubber	O ring
⑩	Piping Plaste	Alu-minum	—
⑪	Piping Nipple	Copper Alloy	—
⑫	Brake Unit	—	—
⑬	Side Guide	Steel	Ind. Chrome Plate
⑭	Cushion Needle	Copper Alloy	—
⑮	Rod Cover	Cast Iron	Parkalized
⑯	Whirl Stopper Plate	Dry Metal	DBB Metal
⑰	Cylinder Gasket	Nitril Rubber	O ring
⑱	Cushion Packing	Urethane, Steel	—
⑲	Pipe	Stainless Steel	—
⑳	Piston Rod	Steel	MF1cr-10

No.	Parts	Materia	Remarks
㉑	Piping Pipe	Stainless Steel	—
㉒	Piping Rod	Steel	Ind. Chrome Plate
㉓	Cylinder Tube	Alu-minum	Ind. Chrome Plate
㉔	Bearing Metal	Dry Metal	DBB Metal
㉕	Piston	Alu-minum	—
㉖	Piping Metal 2	Dry Metal	DU Bushing
㉗	Piping Support	Steel	Chromate
㉘	Piping Scraper	Nitril Rubber	SFR
㉙	Piping Block	Steel	Chromate
㉚	Wear Ring	Polyacetal	—
㉛	Scraper	Nitril Rubber	SFR
㉜	Bearing Housing	Cast Iron	Parkalized
㉝	Piston Packing	Nitril Rubber	PGY
㉞	Cushion Packing	Urethane, Steel	—
㉟	Cylinder Gasket	Nitril Rubber	O ring
㊱	Packing 4	Nitril Rubber	O ring
㊲	Packing 1	Nitril Rubber	O ring
㊳	Pipin End Guide	Steel	Chromate
㊴	Head Cover	Cast Iron	Parkalized
㊵	Piping holder	Steel	Chromate
㊶	Rod Tip Flange	Steel	Parkalized

Expendable Parts List (Standard)

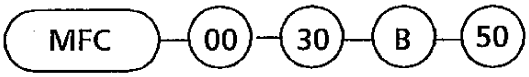
Parts No. · name of Parts		⑱㉞	㉚	㉛	㉝
Tube bore (mm)	Kit No.	Cushion Packing	Wear Ring	Scraper	Piston Packing
ϕ30	MFC-B-30K	PCS-14	F4-125617	SFR-45	PSD-30
ϕ40	MFC-B-40K	PCS-20	F4-125614	SFR-55	PSD-40
ϕ50	MFC-B-50K	PCS-24	F4-650240	SFR-70	PGY-50
ϕ63	MFC-B-63K	PCS-24	F4-650241	SDR-85	PGY-63
ϕ80	MFC-B-80K	PCS-35	F4-650242	SDR-110	PGY-80

Note : Specify the Kit No. when ordering Expendable parts.

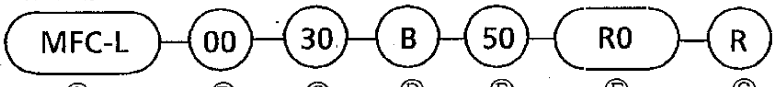
6. MODEL CODE (ϕ30~ϕ80)

6-1. Model Code of Cylinders

● Without Switch



● With Switch



Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

Model symbol

Ⓐ Model symbol			Ⓑ Mounting type		Ⓒ Tube bore (mm)	
without Switch	with Switch		00	Basic type	30	ϕ30
MFC	MFC-L	Basic type	LA	Foot mounting, Rod end	40	ϕ40
MFC-K	MFC-KL	High Load type	FA	Flange mounting, Rod end	50	ϕ50
MFC-B	MFC-BL	with Brake	FB	Flange mounting, Head end	63	ϕ63
MFC-BK	MFC-BKL	with Brake High Load type			80	ϕ80
MFC-BS	——	with Brake, High Load type				
MFC-BSK	——	with Brake and Censor, High load type				

Ⓓ Cushion		Ⓔ Stroke (mm)	Ⓕ Switch Model Code				Ⓖ Qty of Switches	
B	with Cushion, both ends	50	Grommet type	Terminal box type			R	Rod end, 1 ea.
R	with Cushion, Rod end	75					H	Head end, 1 ea.
H	with Cushion, Head end	100	R1※	R1B	Prox-imity	2-core	D	2 ea.
N	without Cushion	150	R2※	R2B		3-core	T	3 ea.
		200	R3※	R3B	Reed	2-core		
		300	R0※	R0B				
			R4※	R4B				
			R5※	R5B				

※ Designote the length of Lead cord

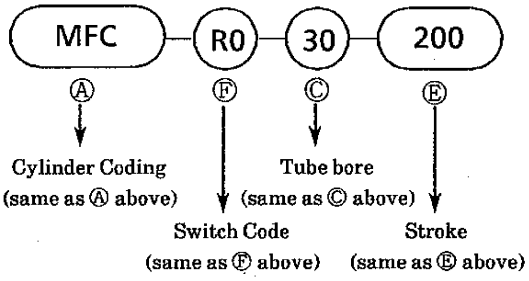
Note : Splash-proof Terminal Box (R□A) is also available.

※ Length of Lead Cord	
No marking	1m (Standard)
3	3m (Optional)
5	5m (Optional)

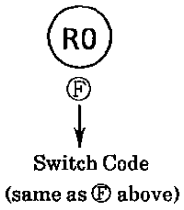
6-2. Model Code of Component parts

1) Switch Component

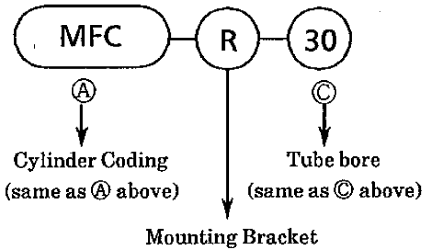
- Switch + A set of Mounting brackets
  (Switch rail + Rail mounting brackets
  + Switch mounting brackets)



- Switch only



- A set of Mounting brackets



2) Expendable Parts

Specify the following Kit No. when ordering parts

Kit No.	Applicable tube bore (mm)	Applicable model code
MFC - 30K MFC - 40K MFC - 50K MFC - 63K MFC - 80K	ϕ30 ϕ40 ϕ50 ϕ63 ϕ80	MFC - (L) MFC - K (L)
MFC - B - 30K MFC - B - 40K MFC - B - 50K MFC - B - 63K MFC - B - 80K	ϕ30 ϕ40 ϕ50 ϕ63 ϕ80	MFC - B (L) MFC - BK (L) MFC - BS MFC - BSK