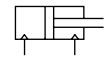
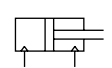


●: Standard, ◎: Option, ■: Not available

Variation	Model no. JIS symbol	Bore size (mm)	Standard stroke length (mm)							Min. stroke length (mm)	Max. stroke length (mm)	Custom stroke length (per mm)	Mounting style				Cushion				Switch	Page	
			50	75	100	150	200	300	Basic type				Rod end foot type	Rod end flange type	Head end flange type	No cushion	Both sides cushion	Rod end cushion	Head end cushion				
			●	●	●	●	●	●	00				LA	FA	FB	N	B	R	H				
Double acting single rod type with switch	MFC MFC-L 	φ 30, φ 40	●	●	●	●	●	●	●	5	500	5	●	●	●	●	●	●	●	●	◎	2302	
		φ 50, φ 63, φ 80	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●		●
Double acting high load type with switch	MFC-K MFC-KL 	φ 30, φ 40	●	●	●	●	●	●	●	5	500	5	●	●	●	●	●	●	●	●	●	◎	2302
		φ 50, φ 63, φ 80	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●	●	
Double acting with brake with switch	MFC-B MFC-BL	φ 30, φ 40	●	●	●	●	●	●	●	5	500	5	●	●	●	●	●	●	●	●	●	◎	2310
		φ 50, φ 63, φ 80	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●	●	
Double acting with brake High load type with switch	MFC-BK MFC-BKL	φ 30, φ 40	●	●	●	●	●	●	●	5	500	5	●	●	●	●	●	●	●	●	●	◎	2310
		φ 50, φ 63, φ 80	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●	●	
Double acting with brake sensor	MFC-BS	φ 30, φ 40	●	●	●	●	●	●	●	5	500	5	●	●	●	●	●	●	●	●	●	■	2318
		φ 50, φ 63, φ 80	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●	●	
Double acting with brake sensor high load type	MFC-BSK	φ 30, φ 40	●	●	●	●	●	●	●	5	500	5	●	●	●	●	●	●	●	●	●	●	2318
		φ 50, φ 63, φ 80	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●	●	

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
**MFC**  
SHC  
GLC  
Ending

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
**MFC**  
SHC  
GLC  
Ending

Robot cylinder  
Special type

## Product introduction

- SCP\*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC
- SMD2
- MSD\*
- FC\*
- STK
- ULK\*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC**
- SHC
- GLC
- Ending

● Easy piping

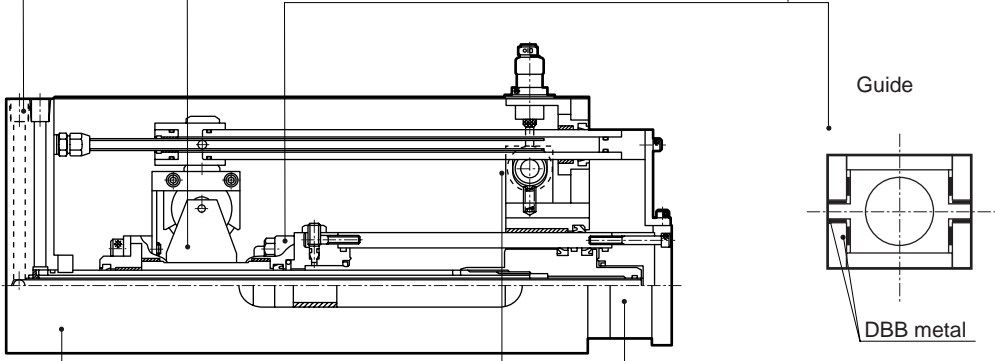
Since cylinder port (for advance, backward) and brake port are integrated at this position, piping is easy.

● Excellent braking function

CKD original brake mechanism enables  
 · Stoppage accuracy  $\pm 1.0\text{mm}$  (300mm/s)  
 · Holding force is outstanding 2 time of cylinder thrust (0.4MPa).

● Non-rotating structure

DBB metal is installed on rod cover. The non-rotating structure like following figure is provided.



● Compact design

No non-rotating mechanism and no guide for lateral load are required.

● Detection moving distance of cylinder tube (BS, BSK types)

Travel distance is generated as pulse from rotary encoder directly connected to rotator. Connection to an external controller enables detection and stop at any position.

● Resistant to lateral load

Even when heavy load is applied, stationary cylinder tube eliminates the necessity of guide installation. (Lateral load 10 times larger than a standard cylinder can be applied.)



## Pneumatic components

# Safety precautions

Always read this section before starting use.

Refer to Intro 71 for general precautions of the cylinder, and to Intro 78 for general precautions of the cylinder switch.

### Robot cylinder MFC Series

## Design & Selection

### ⚠ WARNING

■ Structure so that nothing directly touches the driven object or movable sections of the cylinder with brakes. Provide a protective cover so that no human-body directly touches the unit. If parts contact is possible, provide safety measures by placing a sensor to stop the cylinder or sound a warning to report danger.

■ Use a balance circuit considering piston rod protrusion.

When activating brakes at the specified position in the stroke, as with braking, or if pneumatic pressure is applied to only 1 side of the cylinder, the piston protrudes at high speed when brakes are released. This involves risk to personnel and equipment. Use a balance circuit, such as the recommended pneumatic pressure circuit, to prevent protrusion.

■ Holding force (maximum static load) refers to performance to hold a static load without vibration or impact when brakes are activated in a no-load state. Take care when constantly using near the upper limit of the holding force.

■ If using the kinetic energy during braking or during locking, there may be limits to the allowable kinetic energy. Refer to the allowable kinetic energy for each series and select the cylinder.

■ Do not apply loads with impact, strong vibration, or torque while brakes are activated. If a load with impact, strong vibration, or torque is applied externally, holding force drops.

■ Consider stopping accuracy and overrun distance when braking.

A mechanical lock is applied, so the cylinder does not stop instantly when the stop signal is issued, but stops with a time-wise delay. The stroke at which the cylinder slides due to this delay is the overrun distance. The maximum and minimum width of overrun distance is stopping accuracy.

- To achieve the required stop position, move the limit switch forward by the overrun distance.
- The limit switch must have a detection length (dog length).
- When using the CKD cylinder switch, the working range is 7 to 16 mm, depending on the switch. If overrun distance exceeds this, provide self-holding of the contact at the switch load.

■ To improve stopping accuracy, minimize the time from stop signal output to brake stoppage.

Use a high-response DC control electricity circuit or solenoid valve, and set the solenoid valve as close to the cylinder as possible.

■ Stopping accuracy is affected by changes in piston speed.

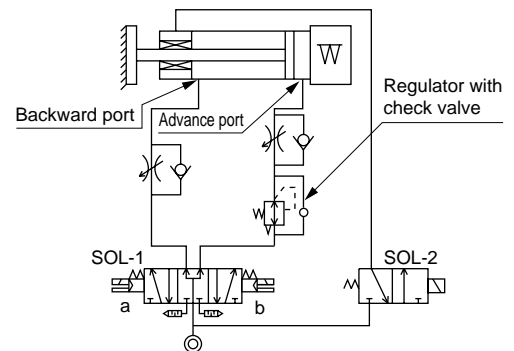
If piston speed changes due to load fluctuation or disturbance during cylinder reciprocation, stop position dispersion increases. Take measures to keep piston speed constant just before the stop position. Speed changes are large during the acceleration range, compared to during the cushion stroke and when starting operation, so dispersion in the stop position increases.

■ Basic circuit

● For horizontal load

If piping is as shown in Fig.6, equalizing pressure is applied to both ends of the piston when stopped to prevent the rod from protruding when brakes are released. Place a regulator with a check valve on the head to balance thrust.

Fig. 6



① SOL-1 ②		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Return
OFF	ON	ON	Advance

● For upward vertical load

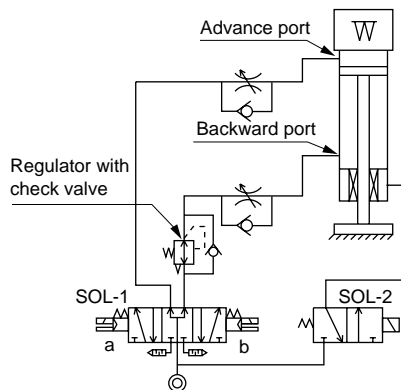
If the load is facing upward as shown in Fig.7, the cylinder tube moves incorrectly in the load direction when brakes are released. Install a regulator with a check valve on the rod to reduce thrust in the load direction and balance the load.

SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC
Ending

Robot cylinder  
Special type

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
**MFC**  
SHC  
GLC  
Ending

Fig. 7

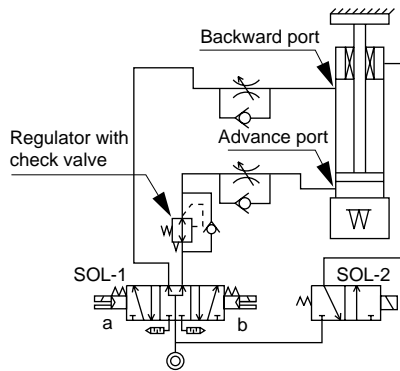


@SOL-1Ⓟ		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Up
OFF	ON	ON	Down

● For downward vertical load

If the load is facing downward as shown in Fig. 8, the cylinder tube moves incorrectly in the load direction when brakes are released. Install a regulator with a check valve on the rod to reduce thrust in the load direction and balance the load.

Fig.8



@SOL-1Ⓟ		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Up
OFF	ON	ON	Down

- Release brakes faster than cylinder operation. If the cylinder operates first, brakes may not be released.
- If back pressure is applied to the locking mechanism, the lock may be released. Use a discrete valve, or use a check valve on the side with an individual exhaust type manifold.
- Use a 3-position P/A/B connection (both sides pressurization) solenoid valve for the cylinder drive to prevent the piston from protruding when starting.

- Use a regulator with a check valve on the side with large thrust to balance thrust, including load.

⚠ CAUTION

■ Stoppage accuracy

- Stop pitch and load factor

Stopping accuracy differs with stop pitch and load ratio.

The load ratio below is recommended for achieving specified stopping accuracy.

Stop pitch	load factor
50mm or less	20% of thrust
50mm to 100mm	40% of thrust
100mm and over	60% of thrust

- Selection of solenoid valve for brake

Stopping accuracy and overrun distance change with the response time of the solenoid valve for brake. Use a solenoid valve in the Device Selection Guide. Couple the solenoid valve to the brake port to improve stopping accuracy.

- When using a PLC

If a PLC is used as the electric control unit for the solenoid valve for brake, stopping accuracy drops due to scan time (computing time). When using a PLC, do not assemble the solenoid valve for brake into the PC circuit.

- Do not make major changes in load weight when stopped with brakes, or the stopping position may change.

## Installation & Adjustment

### ⚠ WARNING

■ When mounting a jig, etc., on the piston rod's end flange, first pull in the piston rod to the stroke end. When tightening, make sure that a lateral load or torque exceeding the allowable load or allowable moment is not applied on the cylinder or piston rod.

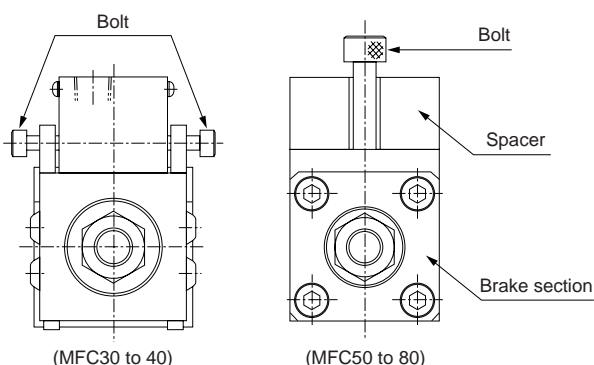
■ Release brakes before coupling the load to the end of the rod.

If coupled while brakes are applied, torque or load exceeding holding force may be applied to the piston rod and damage the brake mechanism.

■ If brakes are released when air is pressurized on only 1 side of the cylinder, the piston may protrude at high speed, causing a hazard. Observe the points below when releasing brakes for adjustment, etc.

- Check that no one is in the movable range of the load and that no problem arises if the load moves when brakes are released.
- Take the following measures to prevent the load from dropping when brakes are released:
  - Set the load at the lowering end
  - Pressurize both sides
  - Set a support column
- Confirm that air is not pressured on only one side of the cylinder when releasing brakes.

■ Manually releasing brakes



● The brakes are released when a bolt is screwed into the female threads on the side or top of the brakes.

Always remove the release bolt during normal use.

● The suitable bolt size and screw-in amounts are shown below.

Bore size (mm)	Bolt size		Screw-in volume
	Nominal	Length	
φ 30	M5	15 and over	11 to 12 rotations
φ 40		14 to 15 rotations	
φ 50	M10	42 and over	4 rotations or less
φ 63	M12	57 and over	
φ 80	M14	65 and over	

■ When manually releasing the brakes, the brakes can be released by screwing a bolt into the brake release female threads. However, if the screw is tightened too far, the brakes could be damaged, so always use the suitable screw-in amounts.

■ Brakes are released manually or by pressurizing the brake release port. If brakes are left released in this state while a load is installed, the load may drop. Return to the initial state after manually releasing brakes or stop the air supply to the brake release port, and confirm that brakes work before installing a load.

■ Do not apply torque to the rod in locked state because holding force drops and create a hazard. Use a mechanism that does not rotate the rod.

■ Do not apply brake holding force to the cylinder exceeding that indicated in the catalog.

■ If there is any play, such as looseness, in the brake signal dog, stopping accuracy is affected. Securely fix to eliminate play, etc.

■ If cylinder speed is fast, the detection dog must be long enough to match relay response time. If the dog is short, the stop signal is not output and operation does not stop.

### ⚠ CAUTION

■ Adjust the cylinder air balance.

With brakes released, place a load on the cylinder and balance the load by adjusting air pressure applied to the cylinder rod and head. Faults such as cylinder protrusion during brake release or improper brake release are prevented by accurately balancing the load.

■ Check the installation position of detectors such as the cylinder switch.

When using braking, consider overrun distance for the required stopping position, and adjust the position of detectors such as the cylinder switch.

■ Load fluctuation during the cylinder reciprocation stroke leads to changes in the piston speed, which in turn increases dispersion in the stop position. Place and adjust so the load does not change just before stopping in the cylinder reciprocation stroke.

- SCP\*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC
- SMD2
- MSD\*
- FC\*
- STK
- ULK\*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC**
- SHC
- GLC
- Ending

Robot cylinder  
Special type

SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC
Ending

## Installation & Adjustment

- Speed changes are large during the acceleration range compared to during the cushion stroke and when starting operation, so dispersion in the stop position increases. Accuracy in specifications may therefore not be attained in step operation with a short stroke from the starting position to the next position.

- Load to piston rod**

Compared to using a general-purpose air cylinder, check that load applied totally to the piston rod is applied in the axial direction. Limit load movement using guides so play or torsion does not occur.

- Maintenance of rod sliding section**

Handle carefully to prevent scratching or denting the piston rod sliding section. Rough handling could damage packing seal and result in air leaks.

## During Use & Maintenance

### WARNING

- The brake section can be removed from the cylinder body. Do not disassemble or inspect brakes or hazards may result when brakes are used again.

- The required grease is applied to brakes. Avoid applying extra grease and do not wipe grease off.

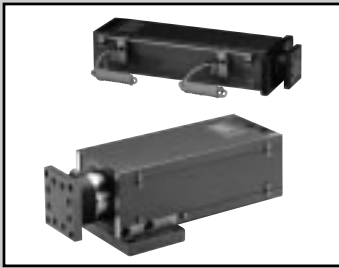
- The required grease is applied when brakes are replaced, so there is no need to apply grease to rods.

- To prevent faults, use a dust cover during operation except when manually releasing brakes.

### CAUTION

- If the air supply pipe is thin or long, stopping accuracy drops.

- Frictional resistance increases and causes the piston speed to change when the cylinder has been stopped for a long time, such as when using first thing in the morning or afternoon. This may impair stoppage accuracy. Conduct break-in operation to obtain stable stopping accuracy.



Robot cylinder Double acting single rod type  
Double acting high load type

# MFC/MFC-K Series

● Bore size:  $\phi 30$ ,  $\phi 40$ ,  $\phi 50$ ,  $\phi 63$ ,  $\phi 80$

JIS symbol



## Specifications

Descriptions	MFC/MFC-L/MFC-K/MFC-KL					
Bore size mm	$\phi 30$	$\phi 40$	$\phi 50$	$\phi 63$	$\phi 80$	
Actuation	Double acting					
Working fluid	Compressed air					
Max. working pressure MPa	1.0					
Min. working pressure MPa	0.15					
Withstanding pressure MPa	1.6					
Ambient temperature $^{\circ}\text{C}$	-10 to 60 (no freezing)					
Port size	Rc1/8		Rc1/4		Rc3/8	
Stroke tolerance mm	$^{+0.5}_0$ (to 350 or less) $^{+1.0}_0$ (to 350 and over)					
Working piston speed mm/s	50 to 300 (loadless)					
Cushion	Air cushion					
Effective cushion length mm	15	13	22	22	26	
Lubrication	Not required (when lubricating, use turbine oil Class 1 ISOVG 32.)					
Allowable energy absorption J	Cushioned	0.9	4.3	8.4	15.8	27.9
	No cushion	Can not absorb a large energy generated by an external load. So an external shock absorber should be used.				

\* Please consult CKD about low hydraulic specification.

## Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)	Min. stroke length (mm) * For types with switch
$\phi 30$	50, 75, 100, 150	500	5	30
$\phi 40$				
$\phi 50$	200, 300	1000	Note 2	30
$\phi 63$				
$\phi 80$				

Note 1: Custom stroke length is available per 5mm increment.

Note 2: The cushion effect may not be attained if the cylinder stroke is shorter than the effective cushion length.

## Switch specifications

Descriptions	Proximity 2 wire			Proximity 3 wire
	R1	R2	R2Y (2 color indicator type)	R3 R3Y (2 color indicator type)
Applications	Programmable controller, relay, small solenoid valve	Programmable controller		Programmable controller, relay, IC circuit, solenoid valve
Output method	-			NPN output
Power voltage/current	-			4.5 to 28 VDC
Load voltage/current	85 to 265 VAC 5 to 100mA	10 to 30 VDC 5 to 30mA		30 VDC or less 200mA or less (R3) 150mA or less (R3Y)
Light	LED ON lighting (R1/R2/R3)/red/green LED (ON lighting) (R2Y/R3Y)			
Leakage current	1mA or less with 100 VAC 2mA or less with 200 VAC	1mA or less	1.2mA or less	10 $\mu\text{A}$ or less
Max. shock resistance	980m/s <sup>2</sup>			
Descriptions	Reed 2 wire			
	R0	R4	R5	R6
Applications	Relay, programmable controller	High capacity relay, solenoid valve	Programmable controller, relay, IC circuit, serial connection	Programmable controller I (with DC self hold)
Load voltage/current	12/24 VDC, 5 to 50mA 110 VAC, 7 to 20mA 220 VAC, 7 to 10mA	110 VAC, 20 to 200mA 220 VAC, 10 to 200mA	5/12/24 VDC, 50mA or less 110 VAC, 20mA or less 220 VAC, 10mA or less	24 VDC, 5 to 50mA
Light	LED ON lighting	Neon light OFF lighting	None	LED ON lighting
Leakage current	0mA	1mA or less	0mA	0.1mA or less
Max. shock resistance	294m/s <sup>2</sup>			

Note 1: Refer to Ending 1 for other switch specifications.

### Cylinder weight (basic type)

(Unit: kg)

Bore size (mm)	Product weight when stroke length (S) = 0mm				Switch weight		Additional weight per S = 100mm
	Basic type (00)	Foot type (LA)	Flange type (FA)	Flange type (FB)	Grommet	Terminal box	
φ 30	3.3	3.8	3.7	3.8	0.08	0.07	1.1
φ 40	4.2	5.1	4.8	5.1			1.3
φ 50	9.3	11.1	10.5	11.1			2.5
φ 63	15.1	18.1	17.2	18.1	0.09	0.08	2.8
φ 80	29.1	34.6	33.0	34.6			4.2

(E.g.) Product weight of MFC-L-FA-30B-200-R0-R

- Product weight when S = 0mm ..... 3.7kg
- Additional weight when S = 200mm .....  $1.1 \times \frac{200}{100} = 2.2\text{kg}$
- Weight per switch ..... 0.08kg
- Product weight .....  $3.7 + 2.2 + 0.08 = 5.98\text{kg}$

SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC
Ending

Robot cylinder  
Special type



# MFC/MFC-K Series

## How to order

Without switch

**MFC** — **00** - **30** **B** - **50**

With switch

**MFC-L** - **00** - **30** **B** - **50** - **R0** - **R**

**A** Model

**B** Mounting style

**C** Bore size

**D** Cushion

**E** Stroke length

**F** Switch model no.

**G** Switch quantity

Symbol	Descriptions				
<b>A Model</b>					
<b>MFC</b>	Basic type				
<b>MFC-L</b>	Basic type with switch				
<b>MFC-K</b>	High load type				
<b>MFC-KL</b>	High load type with switch				
<b>B Mounting style</b>					
<b>00</b>	Basic type				
<b>LA</b>	Rod end foot type				
<b>FA</b>	Rod end flange type				
<b>FB</b>	Head end flange type				
<b>C Bore size (mm)</b>					
<b>30</b>	φ 30				
<b>40</b>	φ 40				
<b>50</b>	φ 50				
<b>63</b>	φ 63				
<b>80</b>	φ 80				
<b>D Cushion</b>					
<b>B</b>	Both sides cushioned				
<b>R</b>	Rod end cushioned				
<b>H</b>	Head end cushioned				
<b>N</b>	No cushion				
<b>E Stroke length (mm)</b>					
Bore size	Stroke length Note 1	Custom stroke length			
φ 30	5 to 500	Per 5mm			
φ 40	5 to 500				
φ 50	5 to 1000				
φ 63	5 to 1000				
φ 80	5 to 1000				
<b>F Switch model no.</b>					
Grommet type	Terminal box type		Contact	Indication	Lead wire
	Standard type	Splash-proof			
<b>R1*</b>	<b>R1B*</b>	<b>R1A*</b>	Proximity	1 color indicator type	2-wire
<b>R2*</b>	<b>R2B*</b>	<b>R2A*</b>			
<b>R3*</b>	<b>R3B*</b>	<b>R3A*</b>			
<b>R0*</b>	<b>R0B*</b>	<b>R0A*</b>	Reed	1 color indicator type	2-wire
<b>R4*</b>	<b>R4B*</b>	<b>R4A*</b>			
<b>R5*</b>	<b>R5B*</b>	<b>R5A*</b>		Without indicator light	
<b>R6*</b>	<b>R6B*</b>	<b>R6A*</b>			
<b>*Lead wire length</b>					
<b>Blank</b>	1m (standard)				
<b>3</b>	3m (option)				
<b>5</b>	5m (option)				
<b>G Switch quantity</b>					
<b>R</b>	1 on rod end				
<b>H</b>	1 on head end				
<b>D</b>	2				
<b>T</b>	3				

### Note on model no. selection

Note 1: Refer to page 2302 for minimum stroke length with switch.

<Example of model number>

**MFC-L-00-30B-50-R0-R**

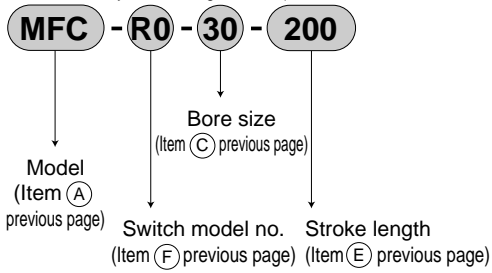
Model: Robot cylinder

- A** Model : Basic type with switch
- B** Mounting style : Basic type
- C** Bore size : φ 30mm
- D** Cushion : Both sides cushioned
- E** Stroke length : 50mm
- F** Switch model no. : Reed switch R0, lead wire length 1m
- G** Switch quantity : 1 on rod end

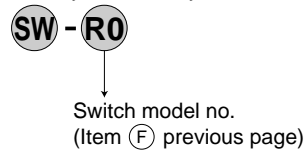
SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
MFC  
SHC  
GLC  
Ending

### How to order switch

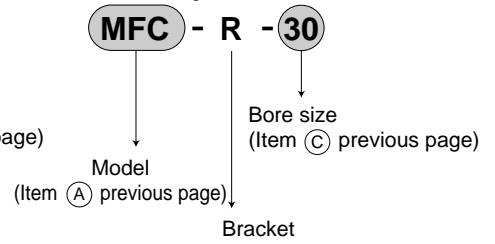
- Switch body + mounting bracket (switch rail + rail bracket + switch bracket)



- Only switch body

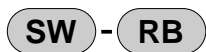


- Mounting bracket

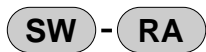


- Only terminal box

· R \* B



· R \* A



### How to order mounting bracket

Bore size (mm)	φ 30	φ 40	φ 50	φ 63	φ 80
Foot (LA)	MFC-30LA	MFC-40LA	MFC-50LA	MFC-63LA	MFC-80LA
Flange (FA/FB)	MFC-30FA	MFC-40FA	MFC-50FA	MFC-63FA	MFC-80FA

Note: The foot type mounting bracket is supplied as a one-piece set.

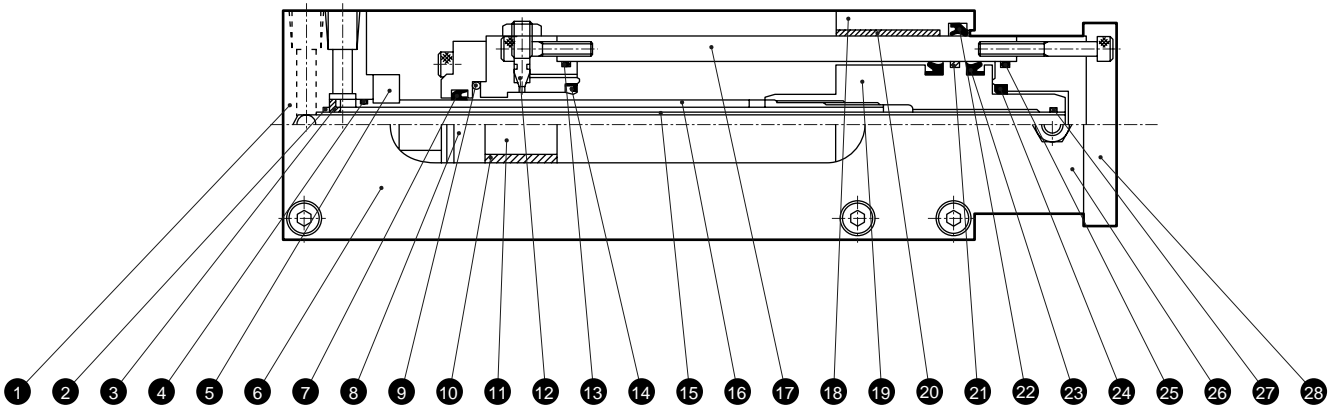
SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC
Ending

Robot cylinder  
Special type

# MFC/MFC-K Series

## Internal structure and parts list (standard type)

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
MFC  
SHC  
GLC  
Ending



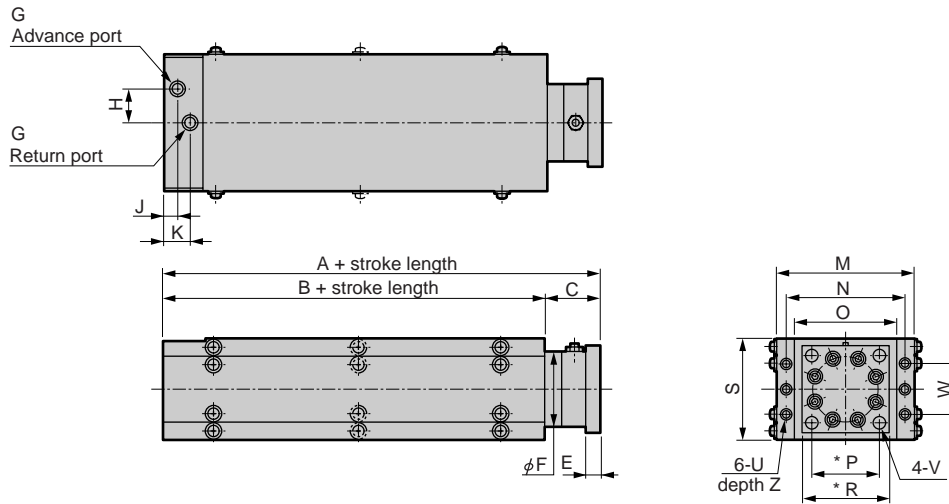
No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Fixing guide	Cast iron		15	Pipe	Stainless steel	
2	Packing seal 1	Nitrile rubber	O ring	16	Piston rod	Steel	
3	Pipe guide	Aluminum alloy		17	Cylinder tube	Aluminum alloy	
4	Packing seal 2	Nitrile rubber	O ring	18	Bearing housing	Cast iron	
5	Rod collar	Steel		19	Piston	Aluminum alloy	
6	Width guide	Steel		20	Bearing metal	Dry bearing	DBB metal
7	Rod packing seal	Nitrile rubber		21	Wear ring	Polyacetal	
8	Metal	Cast iron		22	Scraper	Nitrile rubber	
9	Gasket	Nitrile rubber	O ring	23	Piston packing seal	Nitrile rubber	
10	Non-rotating plate	Dry bearing	DBB metal	24	Cushion packing seal	Urethane and steel	
11	Rod cover	Cast iron		25	Cylinder gasket	Nitrile rubber	O ring
12	Cushion needle	Yellow steel		26	Head cover	Cast iron	
13	Cylinder gasket	Nitrile rubber	O ring	27	Packing seal 1	Nitrile rubber	O ring
14	Cushion packing seal	Urethane and steel		28	The end of flange	Steel	

## Repair parts list (standard type)

Bore size (mm)	Kit No.	Repair parts number
φ 30	MFC-30K	7 14 24
φ 40	MFC-40K	7 14 24
φ 50	MFC-50K	7 14 24
φ 63	MFC-63K	21 22 23
φ 80	MFC-80K	21 22 23

### Dimensions

● MFC- (K) basic type (00)

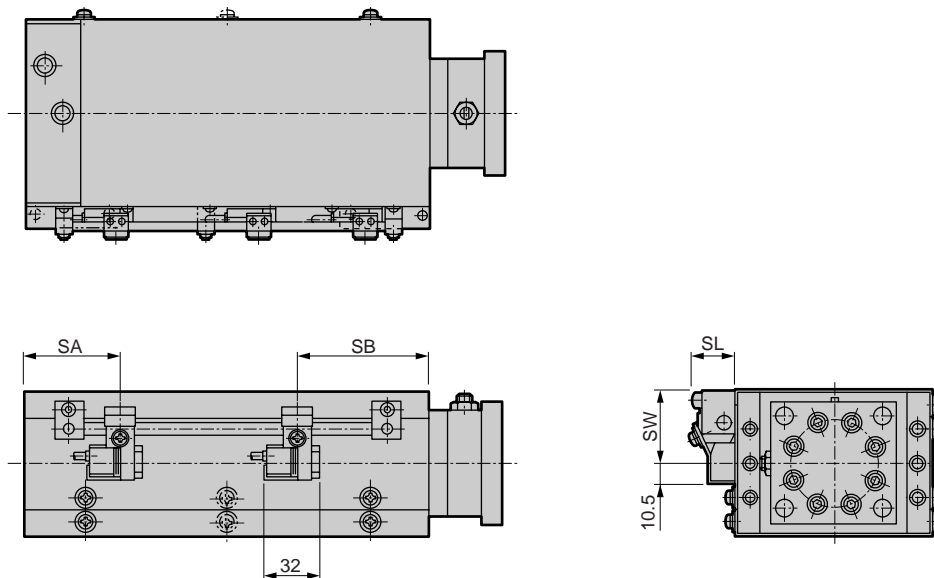


Symbol	Basic type (00) basic dimensions																		
Bore size (mm)	A	(A)	B	(B)	C	E	F	G	H	J	K	M	(M)	N	(N)	O	P	R	S
φ 30	151	249	120	218	31	8	45	Rc1/8	20	8	15	80	86	69	72	60	40	52	62
φ 40	171	286	132	246	40	10	55	Rc1/8	20	8	16	90	96	79	82	70	50	63	72
φ 50	222	376	168	322	54	12	70	Rc1/4	25	9	18	116	124	102	106	90	64	80	92
φ 63	251	449	188	386	63	16	85	Rc1/4	25	9	18	136	144	122	126	110	80	100	112
φ 80	298	522	225	449	73	19	110	Rc3/8	35	14	28	174	180	156	156	140	100	125	142

Symbol	Basic type (00) basic dimensions					
Bore size (mm)	U	(U)	V	W	Z	(Z)
φ 30	M 6	M 8	7	30	10	12
φ 40	M 6	M 8	7	35	10	12
φ 50	M 8	M10	9	40	12	15
φ 63	M10	M12	11	58	15	18
φ 80	M12	M14	14	80	18	20

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

● MFC- (K) L (robot cylinder with switch) basic type



Unit: mm

Symbol	SW	SL	SA	SB	(SB)
Bore size (mm)					
φ 30	31	20	50.5	69.5	167.5
φ 40	35	20	55	77	191
φ 50	42	21	71.5	96	247.5
φ 63	52	21	68.5	119.5	314.5
φ 80	59	21	92.5	132.5	353.5

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

SCP\*2  
 CMK2  
 CMA2  
 SCM  
 SCG  
 SCA2  
 SCS  
 CKV2  
 CA/OV2  
 SSD  
 CAT  
 MDC2  
 MVC  
 SMD2  
 MSD\*  
 FC\*  
 STK  
 ULK\*  
 JSK/M2  
 JSG  
 JSC3  
 USSD  
 USC  
 JSB3  
 LMB  
 STG  
 STS/L

LCS  
 LCG  
 LCM  
 LCT  
 LCY  
 STR2  
 UCA2  
 HCM  
 HCA  
 SRL2  
 SRG  
 SRM  
 SRT  
 MRL2  
 MRG2  
 SM-25  
 CAC3  
 UCAC  
 RCC2  
**MFC**  
 SHC  
 GLC

Ending

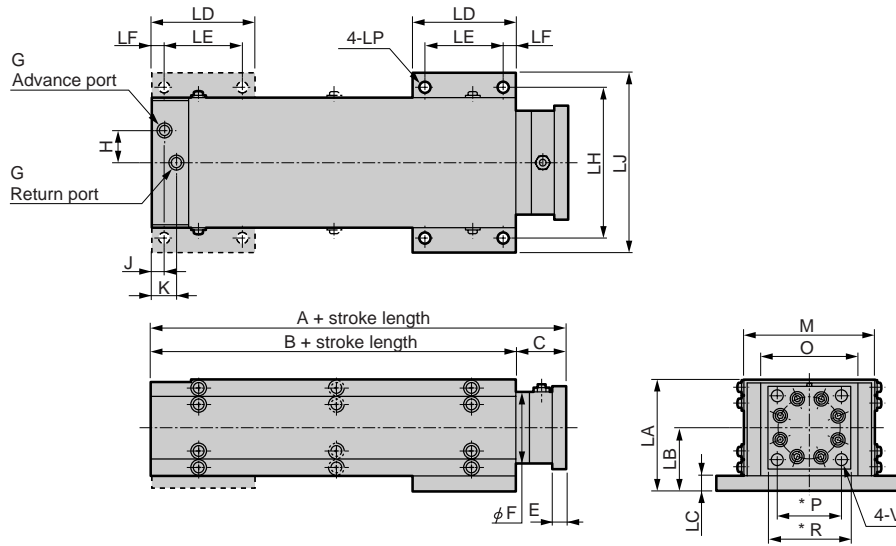
Robot cylinder  
 Special type

# MFC/MFC-K Series

## Dimensions



### ● Rod end foot type (LA)



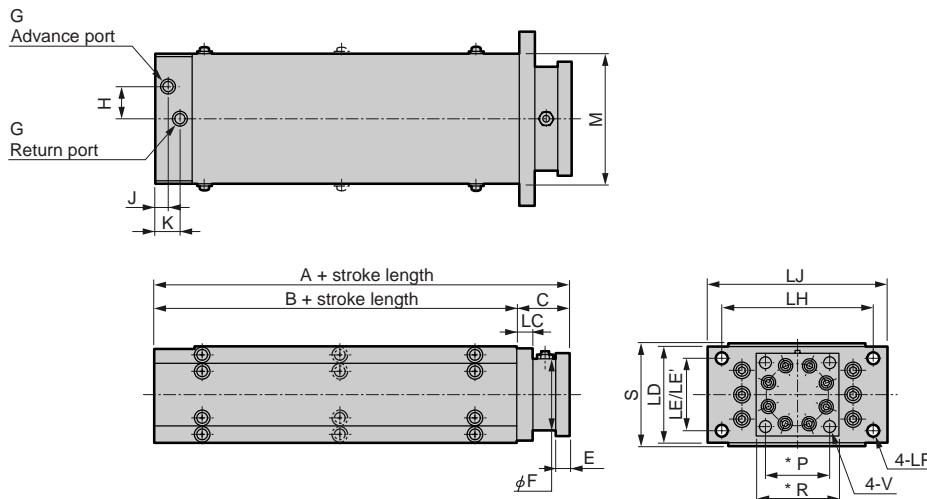
Note: Refer to page 2307 for the switch section dimension of the type with a switch.

Symbol	Rod end foot type (LA) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	C	E	F	G	H	J	K	M	(M)	O	P	R	V	LA	(LA)	LB
φ30	151	249	120	218	31	8	45	Rc1/8	20	8	15	80	86	60	40	52	7	71	73	40
φ40	172	286	132	246	40	10	55	Rc1/8	20	8	16	90	96	70	50	63	7	83	87	47
φ50	222	376	168	322	54	12	70	Rc1/4	25	9	18	116	124	90	64	80	9	107	110	61
φ63	251	449	188	386	63	16	85	Rc1/4	25	9	18	136	144	110	80	100	11	130	133	74
φ80	298	522	225	449	73	19	110	Rc3/8	35	14	28	174	180	140	100	125	14	163	166	92

Symbol	Rod end foot type (LA) basic dimensions																			
Bore size (mm)	(LB)	LC	(LC)	LD	(LD)	LE	(LE)	LF	(LF)	LH	(LH)	LJ	(LJ)	LP	(LP)					
φ30	42	10	12	60	70	46	50	7	10	90	104	106	124	7	9					
φ40	51	12	16	70	80	54	10	13	114	120	134	146	9	11						
φ50	64	16	19	90	100	70	10	15	136	152	160	182	11	14						
φ63	77	19	22	110	120	86	12	18	162	178	190	214	14	16						
φ80	95	22	25	140	150	114	110	13	20	200	218	236	16	18						

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

### ● Rod end flange type (FA)



Note: Refer to page 2307 for the switch section dimension of the type with a switch.

Symbol	Rod end flange type (FA) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	C	E	F	G	H	J	K	M	(M)	P	R	S	V	LC	(LC)	LE
φ30	151	249	120	218	31	8	45	Rc1/8	20	8	15	80	86	40	52	62	7	10	12	46
φ40	172	286	132	246	40	10	55	Rc1/8	20	8	16	90	96	50	63	72	7	12	16	50
φ50	222	376	168	322	54	12	70	Rc1/4	25	9	18	116	124	64	80	92	9	16	19	70
φ63	251	449	188	386	63	16	85	Rc1/4	25	9	18	136	144	80	100	112	11	19	22	86
φ80	298	522	225	449	73	19	110	Rc3/8	35	14	28	174	180	100	142	142	14	22	25	114

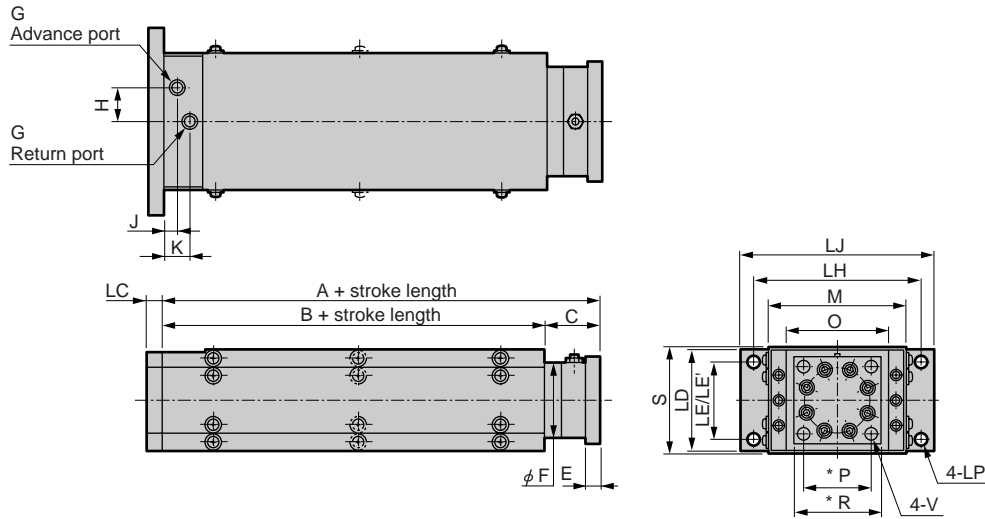
Symbol	Rod end flange type (FA) basic dimensions							
Bore size (mm)	(LE)	LH	(LH)	LJ	(LJ)	LP	(LP)	LD
φ30	40	90	104	106	124	7	9	60
φ40	44	114	120	134	146	9	11	70
φ50	60	136	152	160	182	11	14	90
φ63	74	162	178	190	214	14	16	110
φ80	100	200	218	236	258	16	18	140

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

### Dimensions



#### ● Head end flange type (FB)



Note: Refer to page 2307 for the switch section dimension of the type with a switch.

Symbol	Head end flange type (FB) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	C	E	F	G	H	J	K	M	(M)	O	P	R	S	V	LC	(LC)
φ 30	151	249	120	218	31	8	45	Rc1/8	20	8	15	80	86	60	40	52	62	7	10	12
φ 40	172	286	132	246	40	10	55	Rc1/8	20	8	16	90	96	70	50	63	72	7	12	16
φ 50	222	376	168	322	54	12	70	Rc1/4	25	9	18	116	124	90	64	80	92	9	16	19
φ 63	251	449	188	386	63	16	85	Rc1/4	25	9	18	136	144	110	80	100	112	11	19	22
φ 80	298	522	225	449	73	19	110	Rc3/8	35	14	28	174	180	140	100	125	142	14	22	25

Symbol	Head end flange type (FB) basic dimensions								
Bore size (mm)	LE	(LE)	LH	(LH)	LJ	(LJ)	LP	(LP)	LD
φ 30	46	40	90	104	106	124	7	9	60
φ 40	50	44	114	120	134	146	9	11	70
φ 50	70	60	136	152	160	182	11	14	90
φ 63	86	74	162	178	190	214	14	16	110
φ 80	114	100	200	218	236	258	16	18	140

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC

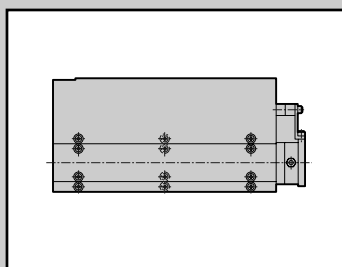
Ending

Robot cylinder  
Special type

Robot cylinder Double acting with brake  
Double acting with brake high load type

# MFC-B/MFC-BK Series

● Bore size:  $\phi 30$ ,  $\phi 40$ ,  $\phi 50$ ,  $\phi 63$ ,  $\phi 80$



## Specifications

Descriptions		MFC-B/MFC-BL/MFC-BK/MFC-BKL				
Bore size	mm	$\phi 30$	$\phi 40$	$\phi 50$	$\phi 63$	$\phi 80$
Actuation		Double acting with brake				
Working fluid		Compressed air				
Max. working pressure	Cylinder section MPa	1.0				
	Brake section MPa	1.0				
Min. working pressure	Cylinder section MPa	0.15				
	Brake section MPa	0.35				
Withstanding pressure	MPa	1.6				
Ambient temperature	°C	-10 to 50 (no freezing)				
Port size		Rc1/8		Rc1/4		Rc3/8
Stroke tolerance	mm	$^{+0.5}_0$ (to 350 or less) $^{+1.0}_0$ (to 350 and over)				
Working piston speed	mm/s	50 to 300 (loadless)				
Cushion		Air cushion				
Effective cushion length	mm	15	13	22	22	26
Lubrication		Not required (when lubricating, use turbine oil Class 1 ISOVG 32.)				
Allowable energy absorption	Cushioned	0.9	4.3	8.4	15.8	27.9
	No cushion	Can not absorb a large energy generated by an external load. So an external shock absorber should be used.				

## Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)	Min. stroke length (mm) * For types with switch
$\phi 30$	50, 75, 100, 150 200, 300	500	5	30
$\phi 40$				
$\phi 50$				
$\phi 63$	1000	1000	5	30
$\phi 80$				

Note 1: Custom stroke length is available per 5mm increment.

Note 2: The cushion effect may not be attained if the cylinder stroke is shorter than the effective cushion length.

## Switch specifications

Descriptions	Proximity 2 wire			Proximity 3 wire
	R1	R2	R2Y (2 color indicator type)	R3 R3Y (2 color indicator type)
Applications	Programmable controller, relay, small solenoid valve	Programmable controller		Programmable controller, relay, small solenoid valve
Output method	-			NPN output
Power voltage/current	-			4.5 to 28 VDC
Load voltage/current	85 to 265 VAC 5 to 100mA	10 to 30 VDC 5 to 30mA		30 VDC or less 200mA or less (R3) 150mA or less (R3Y)
Light	LED ON lighting (R1/R2/R3) / red/green LED (ON lighting) (R2Y/R3Y)			
Leakage current	1mA or less with 100 VAC 2mA or less with 200 VAC	1mA or less	1.2mA or less	10 $\mu$ A or less
Max. shock resistance	980m/s <sup>2</sup>			
Descriptions	Reed 2 wire			
	R0	R4	R5	R6
Applications	Relay, programmable controller	High capacity relay, solenoid valve	Programmable controller, relay, IC circuit, serial connection	Programmable controller I (with DC self hold)
Load voltage/current	12/24 VDC, 5 to 50mA 110 VAC, 7 to 20mA 220 VAC, 7 to 10mA	110 VAC, 20 to 200mA 220 VAC, 10 to 200mA	5/12/24 VDC, 50mA or less 110 VAC, 20mA or less 220 VAC, 10mA or less	24 VDC, 5 to 50mA
Light	LED ON lighting	Neon light OFF lighting	None	LED ON lighting
Leakage current	0mA	1mA or less	0mA	0.1mA or less
Max. shock resistance	294m/s <sup>2</sup>			

Note 1: Refer to Ending 1 for other switch specifications.

### Cylinder weight

(Unit: kg)

Bore size (mm)	Product weight when stroke length (S) = 0mm				Additional weight per S = 100mm
	Basic type (00)	Foot type (LA)	Flange type (FA)	Flange type (FB)	
φ 30	5.7	6.2	6.1	6.2	1.2
φ 40	9.1	10.0	9.7	10.0	1.5
φ 50	18.1	19.9	19.3	19.9	2.7
φ 63	28.1	31.1	30.2	31.1	3.0
φ 80	45.2	50.7	49.1	50.7	4.4

- SCP\*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC
- SMD2
- MSD\*
- FC\*
- STK
- ULK\*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC**
- SHC
- GLC
- Ending

Robot cylinder  
Special type



# MFC-B/MFC-BK Series

## How to order

Without switch

**MFC-B** - **00** - **30** **B** - **50**

With switch

**MFC-BL** - **00** - **30** **B** - **50** - **R0** - **R**

**A** Model

**B** Mounting style

**C** Bore size

**D** Cushion

**E** Stroke length

**F** Switch model no.

**G** Switch quantity

Symbol	Descriptions
<b>A Model</b>	
<b>MFC-B</b>	With brake
<b>MFC-BL</b>	With brake, with switch
<b>MFC-BK</b>	With brake high load type
<b>MFC-BKL</b>	With brake high load type with switch

<b>B Mounting style</b>	
<b>00</b>	Basic type
<b>LA</b>	Rod end foot type
<b>FA</b>	Rod end flange type
<b>FB</b>	Head end flange type

<b>C Bore size (mm)</b>	
<b>30</b>	φ 30
<b>40</b>	φ 40
<b>50</b>	φ 50
<b>63</b>	φ 63
<b>80</b>	φ 80

<b>D Cushion</b>	
<b>B</b>	Both sides cushioned
<b>R</b>	Rod end cushion
<b>H</b>	Head end cushion
<b>N</b>	No cushion

<b>E Stroke length (mm)</b>		
Bore size	Stroke length Note 1	Custom stroke length
φ 30	5 to 500	Per 5mm
φ 40	5 to 500	
φ 50	5 to 1000	
φ 63	5 to 1000	
φ 80	5 to 1000	

<b>F Switch model no.</b>					
Grommet type	Terminal box type		Contact	Indication	Lead wire
	Standard type	Splash-proof			
<b>R1*</b>	<b>R1B*</b>	<b>R1A*</b>	Proximity	1 color indicator type	2-wire
<b>R2*</b>	<b>R2B*</b>	<b>R2A*</b>			3-wire
<b>R3*</b>	<b>R3B*</b>	<b>R3A*</b>			
<b>R0*</b>	<b>R0B*</b>	<b>R0A*</b>	Reed	1 color indicator type	2-wire
<b>R4*</b>	<b>R4B*</b>	<b>R4A*</b>			
<b>R5*</b>	<b>R5B*</b>	<b>R5A*</b>			
<b>R6*</b>	<b>R6B*</b>	<b>R6A*</b>			

<b>*Lead wire length</b>	
<b>Blank</b>	1m (standard)
<b>3</b>	3m (option)
<b>5</b>	5m (option)

<b>G Switch quantity</b>	
<b>R</b>	1 on rod end
<b>H</b>	1 on head end
<b>D</b>	2
<b>T</b>	3

### Note on model no. selection

Note 1: Refer to page 2310 for minimum stroke length with switch.

<Example of model number>

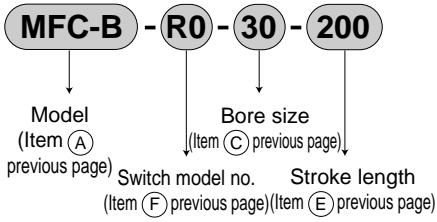
**MFC-BL-00-30B-50-R0-R**

Model: Robot cylinder

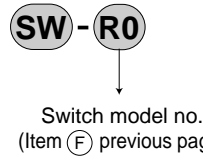
- A** Model : With brake, with switch
- B** Mounting style : Basic type
- C** Bore size : φ 30mm
- D** Cushion : Both sides cushioned
- E** Stroke length : 50mm
- F** Switch model no. : Reed switch R0, lead wire length 1m
- G** Switch quantity : 1 on rod end

### How to order switch

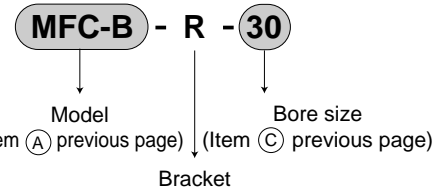
● Switch body + mounting bracket (switch rail + rail bracket + switch bracket)



● Only switch body

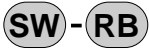


● Mounting bracket

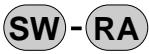


● Only terminal box

· R \* B



· R \* A



### How to order mounting bracket

Bore size (mm)	φ 30	φ 40	φ 50	φ 63	φ 80
Mounting style no.					
Foot (LA)	MFC-30LA	MFC-40LA	MFC-50LA	MFC-63LA	MFC-80LA
Flange (FA/FB)	MFC-30FA	MFC-40FA	MFC-50FA	MFC-63FA	MFC-80FA

Note: The foot type mounting bracket is supplied as a two-piece set.

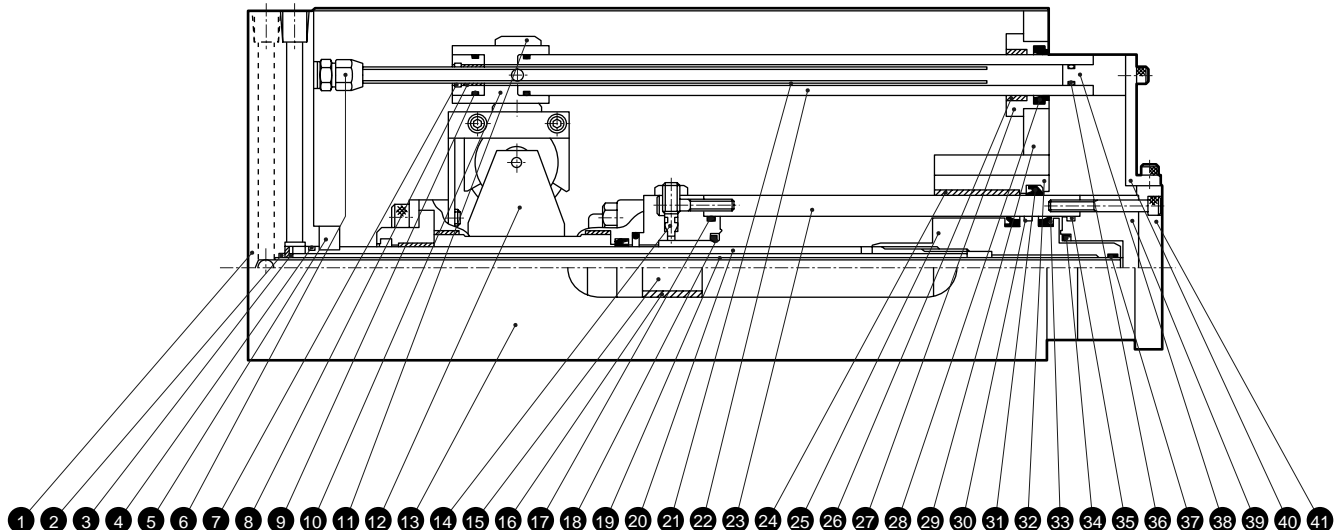
SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC
Ending

Robot cylinder  
Special type

# MFC-B/MFC-BK Series

## Internal structure and parts list (standard type)

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
MFC  
SHC  
GLC  
Ending



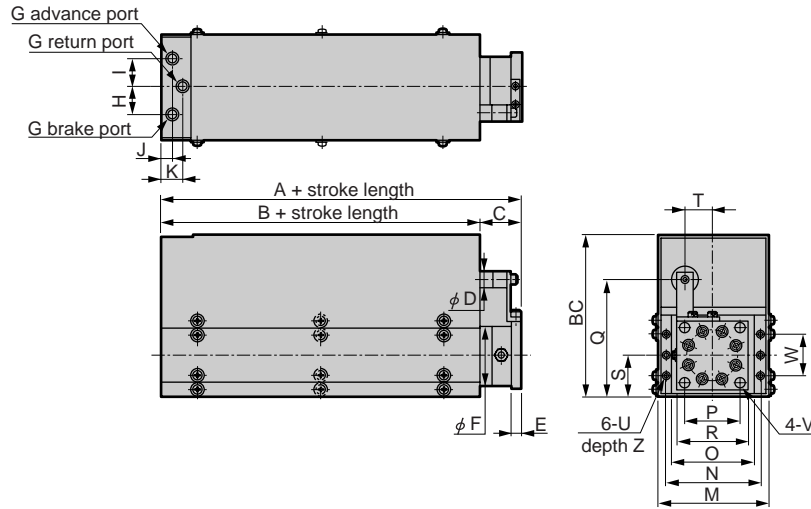
No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Fixing guide	Cast iron		22	Piping rod		
2	Packing seal 1	Nitrile rubber	O ring	23	Cylinder tube	Aluminum alloy	
3	Pipe guide	Aluminum alloy		24	Bearing metal	Dry metal	DBB metal
4	Packing seal 2	Nitrile rubber	O ring	25	Piston	Aluminum alloy	
5	Rod collar	Steel		26	Piping metal 2	Dry metal	DU bush
6	Joint	Copper alloy		27	Piping receiving	Steel	
7	Piping packing seal	Nitrile rubber	Mini-Y packing seal	28	Piping scraper	Nitrile rubber	SFR
8	Piping metal 1	Dry metal	DU bush	29	Pipe stand	Steel	
9	Packing seal 3	Nitrile rubber	O ring	30	Wear ring	Polyacetal	
10	Piping plate	Aluminum alloy		31	Scraper	Nitrile rubber	
11	Piping nipple	Copper alloy		32	Bearing housing	Cast iron	
12	Brake section	--		33	Piston packing seal	Nitrile rubber	
13	Width guide	Steel		34	Cushion packing seal	Urethane and steel	
14	Cushion needle	Copper alloy		35	Cylinder gasket	Nitrile rubber	O ring
15	Rod cover	Cast iron		36	Packing seal 4	Nitrile rubber	O ring
16	Non-rotating plate	Dry metal	DBB metal	37	Packing seal 1	Nitrile rubber	O ring
17	Cylinder gasket	Nitrile rubber	O ring	38	Piping end guide	Steel	
18	Cushion packing seal	Urethane and steel		39	Head cover	Cast iron	
19	Pipe	Stainless steel		40	Piping holder	Steel	
20	Piston rod	Steel		41	The end of flange	Steel	
21	Piping pipe	Stainless steel					

## Repair parts list (standard type)

Bore size (mm)	Kit No.	Repair parts number
φ 30	MFC-B-30K	
φ 40	MFC-B-40K	18 34 30
φ 50	MFC-B-50K	
φ 63	MFC-B-63K	31 33
φ 80	MFC-B-80K	

### Dimensions

● MFC-B (K) basic dimensions (00)



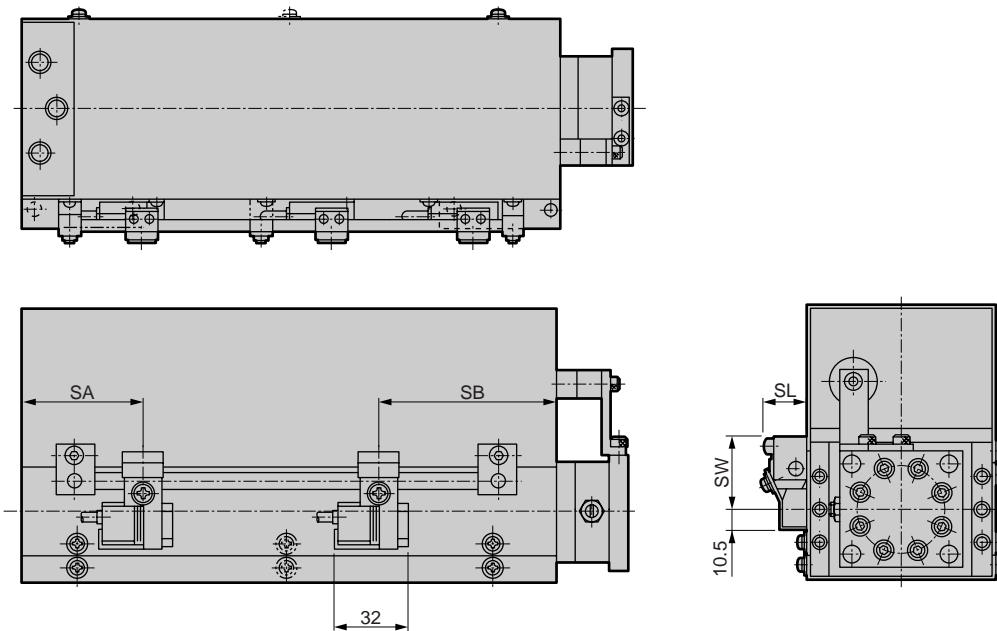
Symbol	Basic type (00) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BC	C	D	E	F	G	H	I	J	K	M	(M)	N	(N)	C	P
φ 30	212	310	181	279	122	31	12	8	45	Rc1/8	20	20	8	15	80	86	69	72	60	40
φ 40	238	352	198	312	162	40	16	10	55	Rc1/8	25	20	8	16	90	96	79	82	70	50
φ 50	333	487	279	433	172	54	20	12	70	Rc1/4	32	25	9	18	116	124	102	106	90	64
φ 63	375	573	312	510	188	63	20	16	85	Rc1/4	32	25	9	18	136	144	122	126	110	80
φ 80	443	667	370	594	225	73	25	19	110	Rc3/8	36	35	14	28	174	180	156	159	140	100

Symbol	Basic type (00) basic dimensions									
Bore size (mm)	Q	R	S	T	U	(U)	V	W	Z	(Z)
φ 30	88	52	31	20	M 6	M 8	7	30	10	12
φ 40	105	63	36	25	M 6	M 8	7	35	12	12
φ 50	140	80	46	32	M 8	M10	9	40	15	15
φ 63	161	100	56	32	M10	M12	11	58	15	18
φ 80	202	125	71	36	M12	M14	14	80	18	20

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

● MFC-B (K) L (robot cylinder with brake with switch)



Unit: mm

Symbol	SW	SL	SA	SB	(SB)
Bore size (mm)					
φ 30	31	20	111.5	69.5	167.5
φ 40	35	20	121	77	191
φ 50	42	21	182.5	96	247.5
φ 63	52	21	192.5	119.5	314.5
φ 80	59	21	237.5	132.5	353.5

Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.

For φ 30: 300mm and over  
 For φ 40: 300mm and over  
 For φ 50: 400mm and over  
 For φ 63: 500mm and over  
 For φ 80: 500mm and over

Note 3: When 30 to 50mm stroke, switch can be installed onto not only single direction, but both directions.

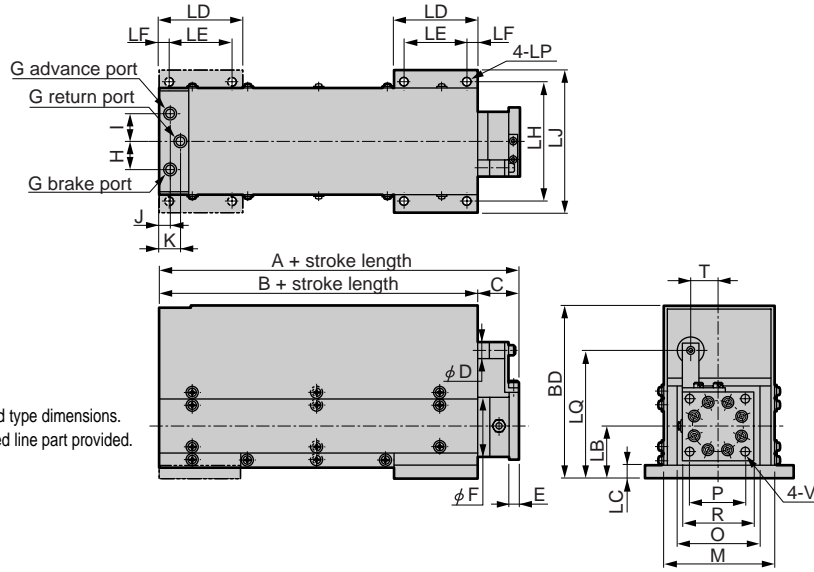
SCP\*2  
 CMK2  
 CMA2  
 SCM  
 SCG  
 SCA2  
 SCS  
 CKV2  
 CA/OV2  
 SSD  
 CAT  
 MDC2  
 MVC  
 SMD2  
 MSD\*  
 FC\*  
 STK  
 ULK\*  
 JSK/M2  
 JSG  
 JSC3  
 USSD  
 USC  
 JSB3  
 LMB  
 STG  
 STS/L  
 LCS  
 LCG  
 LCM  
 LCT  
 LCY  
 STR2  
 UCA2  
 HCM  
 HCA  
 SRL2  
 SRG  
 SRM  
 SRT  
 MRL2  
 MRG2  
 SM-25  
 CAC3  
 UCAC  
 RCC2  
**MFC**  
 SHC  
 GLC  
 Ending

Robot cylinder  
 Special type

# MFC-B/MFC-BK Series

## Dimensions

### ● Rod end foot type (LA)



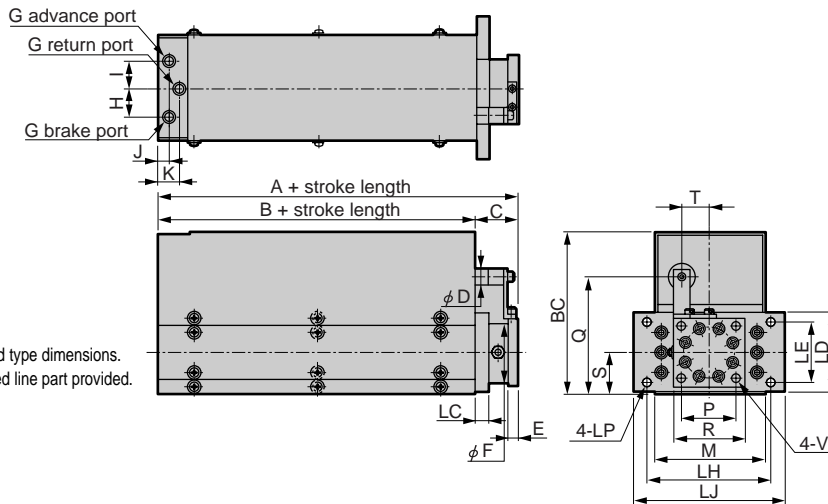
Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For  $\phi 30$ : 300mm and over  
 For  $\phi 40$ : 300mm and over  
 For  $\phi 50$ : 400mm and over  
 For  $\phi 63$ : 500mm and over  
 For  $\phi 80$ : 500mm and over

Note: Refer to page 2315 for the switch section dimension of the type with a switch.

Symbol	Rod end foot type (LA) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BD	(BD)	C	D	E	F	G	H	I	J	K	LB	(LB)	LC	(LC)	LD
$\phi 30$	212	310	181	279	131	133	31	12	8	45	Rc1/8	20	20	8	15	40	42	10	12	60
$\phi 40$	238	352	198	312	173	177	40	16	10	55	Rc1/8	25	20	8	16	47	51	12	16	70
$\phi 50$	333	487	279	433	187	190	54	20	12	70	Rc1/4	32	25	9	18	61	64	16	19	90
$\phi 63$	375	573	312	510	206	209	63	20	16	85	Rc1/4	32	25	9	18	74	77	19	22	110
$\phi 80$	443	667	370	594	246	249	73	25	19	110	Rc3/8	36	35	14	28	92	95	22	25	140

Symbol	Rod end foot type (LA) basic dimensions																			
Bore size (mm)	(LD)	LE	(LE)	LF	(LF)	LH	(LH)	LJ	(LJ)	LP	(LP)	LQ	(LQ)	M	(M)	O	P	R	T	V
$\phi 30$	70	46	50	7	10	90	104	106	124	7	9	97	99	80	86	60	40	52	20	7
$\phi 40$	80	50	54	10	13	114	120	134	146	9	11	116	120	90	96	70	50	63	25	7
$\phi 50$	100	70	70	10	15	136	152	160	182	11	14	155	158	116	124	90	64	80	32	9
$\phi 63$	120	84	84	12	18	162	178	190	214	14	16	179	182	136	144	110	80	100	32	11
$\phi 80$	150	114	110	13	20	200	218	236	258	16	18	223	226	174	180	140	100	125	36	14

### ● Rod end flange type (FA)



Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For  $\phi 30$ : 300mm and over  
 For  $\phi 40$ : 300mm and over  
 For  $\phi 50$ : 400mm and over  
 For  $\phi 63$ : 500mm and over  
 For  $\phi 80$ : 500mm and over

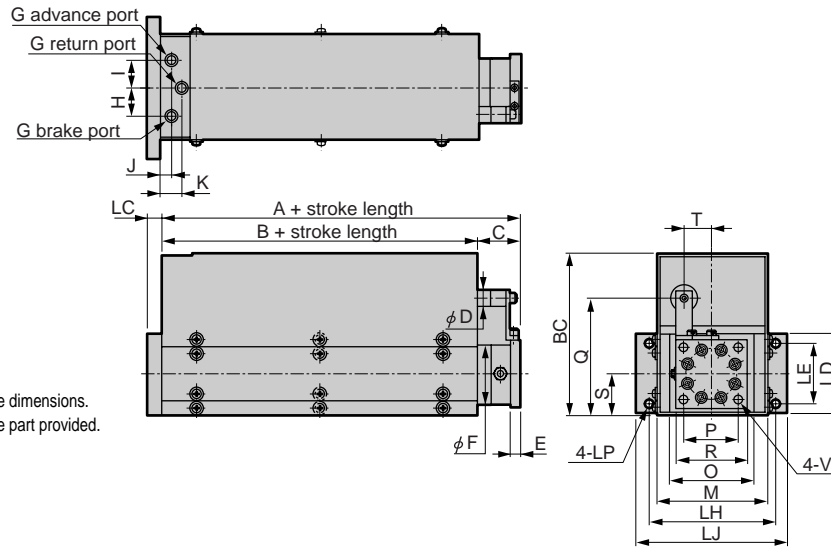
Note: Refer to page 2315 for the switch section dimension of the type with a switch.

Symbol	Rod end flange type (FA) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BC	C	D	E	F	G	H	I	J	K	LC	(LC)	LD	LE	(LE)	LH
$\phi 30$	212	310	181	279	122	31	12	8	45	Rc1/8	20	20	8	15	10	12	60	46	40	90
$\phi 40$	238	352	198	312	162	40	16	10	55	Rc1/8	25	20	8	16	12	16	70	50	44	114
$\phi 50$	333	487	279	433	172	54	20	12	70	Rc1/4	32	25	9	18	16	19	90	70	60	136
$\phi 63$	375	573	312	510	188	63	20	16	85	Rc1/4	32	25	9	18	19	22	110	86	74	162
$\phi 80$	443	667	370	594	225	73	25	19	110	Rc3/8	36	35	14	28	22	25	140	114	100	200

Symbol	Rod end flange type (FA) basic dimensions												
Bore size (mm)	(LH)	LJ	(LJ)	LP	(LP)	M	(M)	P	Q	R	S	T	V
$\phi 30$	104	106	124	7	9	80	86	40	88	52	31	20	7
$\phi 40$	120	134	146	9	11	90	96	50	105	63	36	25	7
$\phi 50$	152	160	182	11	14	116	124	64	140	80	46	32	9
$\phi 63$	178	190	214	14	16	136	144	80	161	100	56	32	11
$\phi 80$	218	236	258	16	18	174	180	100	202	125	71	36	14

### Dimensions

● Head end flange type (FB)



Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.

For  $\phi$  30: 300mm and over  
 For  $\phi$  40: 300mm and over  
 For  $\phi$  50: 400mm and over  
 For  $\phi$  63: 500mm and over  
 For  $\phi$  80: 500mm and over

Note: Refer to page 2315 for the switch section dimension of the type with a switch.

Symbol	Head end flange type (FB) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BC	C	D	E	F	G	H	I	J	K	LC	(LC)	LD	LE	(LE)	LH
$\phi$ 30	212	310	181	279	122	31	12	8	45	Rc1/8	20	20	8	15	10	12	60	46	40	90
$\phi$ 40	238	352	198	312	162	40	16	10	55	Rc1/8	25	20	8	16	12	16	70	50	44	114
$\phi$ 50	333	487	279	433	172	54	20	12	70	Rc1/4	32	25	9	18	16	19	90	70	60	136
$\phi$ 63	375	573	312	510	188	63	20	16	85	Rc1/4	32	25	9	18	19	22	110	86	74	162
$\phi$ 80	443	667	370	594	225	73	25	19	110	Rc3/8	36	35	14	28	22	25	140	114	100	200

Symbol	Head end flange type (FB) basic dimensions													
Bore size (mm)	(LH)	LJ	(LJ)	LP	(LP)	M	(M)	O	P	Q	R	S	T	V
$\phi$ 30	104	106	124	7	9	80	86	60	40	88	52	31	20	7
$\phi$ 40	120	134	146	9	11	90	96	70	50	105	63	36	25	7
$\phi$ 50	152	160	182	11	14	116	124	90	64	140	80	46	32	9
$\phi$ 63	178	190	214	14	16	136	144	110	80	161	100	56	32	11
$\phi$ 80	218	236	258	16	18	174	180	140	100	202	125	71	36	14

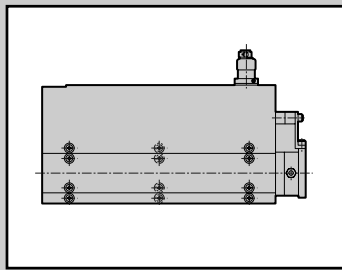
- SCP\*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC
- SMD2
- MSD\*
- FC\*
- STK
- ULK\*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC**
- SHC
- GLC
- Ending

Robot cylinder  
 Special type

Robot cylinder Double acting with brake sensor  
 Double acting with brake sensor high load type

# MFC-BS/MFC-BSK Series

● Bore size:  $\phi 30$ ,  $\phi 40$ ,  $\phi 50$ ,  $\phi 63$ ,  $\phi 80$



## Specifications

Descriptions		MFC-BS/MFC-BSK				
Bore size	mm	$\phi 30$	$\phi 40$	$\phi 50$	$\phi 63$	$\phi 80$
Actuation		Double acting with brake sensor				
Working fluid		Compressed air				
Max. working pressure	Cylinder section MPa	1.0				
	Brake section MPa	1.0				
Min. working pressure	Cylinder section MPa	0.15				
	Brake section MPa	0.35				
Withstanding pressure		MPa 1.6				
Ambient temperature		°C 0 to 50				
Port size		Rc1/8		Rc1/4		Rc3/8
Stroke length allowable		mm $^{+0.5}_0$ (to 350 or less)		mm $^{+1.0}_0$ (to 350 and over)		
Working piston speed		mm/s 50 to 300 (loadless)				
Cushion		Air cushion				
Effective cushion length	mm	15	13	22	22	26
Stoppage accuracy		mm $\pm 1.0$ (300mm/s loadless)				
Holding force		N 431 765 1569 2451 3922				
Min. detection dimension		mm 0.1				
Lubrication		Not required (when lubricating, use turbine oil Class 1 ISOVG 32.)				
Allowable energy absorption	Cushioned	0.9	4.3	8.4	15.8	27.9
	No cushion	Can not absorb a large energy generated by an external load. So an external shock absorber should be used.				

\* Please consult CKD about low hydraulic specification.

## Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)
$\phi 30$	50, 75, 100, 150, 200, 300	500	5
$\phi 40$			
$\phi 50$			
$\phi 63$	1000	Note 2	
$\phi 80$			

Note 1: Custom stroke length is available per 5mm increment.

Note 2: The cushion effect may not be attained if the cylinder stroke is shorter than the effective cushion length.

## Detector (encoder) specifications

Descriptions		Specifications
Rated voltage (V)		5 to 12 ( $\pm 5\%$ ) DC
Current consumption (mA)		50
Input unit (mm/pulse)		0.1
Response frequency (KHz)		25
Output impedance (K $\Omega$ )		2.2
Output signal (V)	1 (High)	11 (Min.)
	0 (Low)	0 (Max.)

## Cylinder weight

(Unit: kg)

Bore size (mm)	Product weight when stroke length (S) = 0mm				Additional weight per S = 100mm
	Basic type (00)	Foot type (LA)	Flange type (FA)	Flange type (FB)	
$\phi 30$	6.0	6.5	6.4	6.5	1.2
$\phi 40$	9.4	10.3	10.0	10.3	1.5
$\phi 50$	18.6	20.4	19.8	20.4	2.7
$\phi 63$	28.6	31.6	30.7	31.6	3.0
$\phi 80$	45.7	51.2	49.6	51.2	4.4

(E.g.) Product weight of MFC-BS-FA-30B-200 ————

- Product weight when S = 0mm: 6.4kg
- Additional weight when S = 200mm:  $1.2 \times \frac{200}{100} = 2.4\text{kg}$
- Product weight:  $6.4 + 2.4 = 8.8\text{kg}$

### How to order

**MFC-BS - 00 - 30 B - 50**

**A** Model

**B** Mounting style

**C** Bore size

**D** Cushion

**E** Stroke length

<Example of model number>

**MFC-BS-00-30B-50**

Model: Robot cylinder

- A** Model : With brake sensor
- B** Mounting style : Basic type
- C** Bore size :  $\phi$  30mm
- D** Cushion : Both sides cushioned
- E** Stroke length : 50mm

Symbol	Descriptions	
<b>A Model</b>		
<b>MFC-BS</b>	With brake sensor	
<b>MFC-BSK</b>	High load type with brake sensor	
<b>B Mounting style</b>		
<b>00</b>	Basic type	
<b>LA</b>	Rod end foot type	
<b>FA</b>	Rod end flange type	
<b>FB</b>	Head end flange type	
<b>C Bore size (mm)</b>		
<b>30</b>	$\phi$ 30	
<b>40</b>	$\phi$ 40	
<b>50</b>	$\phi$ 50	
<b>63</b>	$\phi$ 63	
<b>80</b>	$\phi$ 80	
<b>D Cushion</b>		
<b>B</b>	Both sides cushioned	
<b>R</b>	Rod end cushioned	
<b>H</b>	Head end cushioned	
<b>N</b>	No cushion	
<b>E Stroke length (mm)</b>		
Bore size	Stroke length	Custom stroke length
$\phi$ 30	<b>5 to 500</b>	<b>Per 5mm</b>
$\phi$ 40	<b>5 to 500</b>	
$\phi$ 50	<b>5 to 1000</b>	
$\phi$ 63	<b>5 to 1000</b>	
$\phi$ 80	<b>5 to 1000</b>	

### How to order mounting bracket

Bore size (mm)	$\phi$ 30	$\phi$ 40	$\phi$ 50	$\phi$ 63	$\phi$ 80
Mounting style no.					
Foot (LA)	MFC-30LA	MFC-40LA	MFC-50LA	MFC-63LA	MFC-80LA
Flange (FA/FB)	MFC-30FA	MFC-40FA	MFC-50FA	MFC-63FA	MFC-80FA

Note 1: The foot type mounting bracket is supplied as a two-piece set.

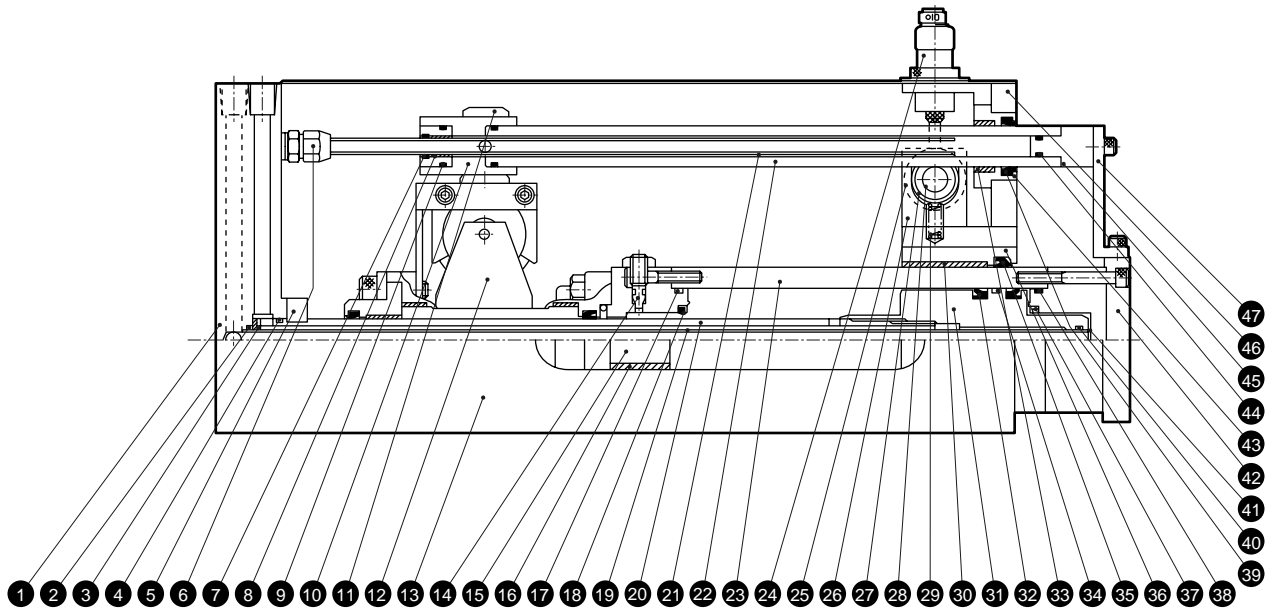
SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
**MFC**  
SHC  
GLC  
Ending

Robot cylinder  
Special type



## Internal structure and parts list (standard type)

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
MFC  
SHC  
GLC  
Ending



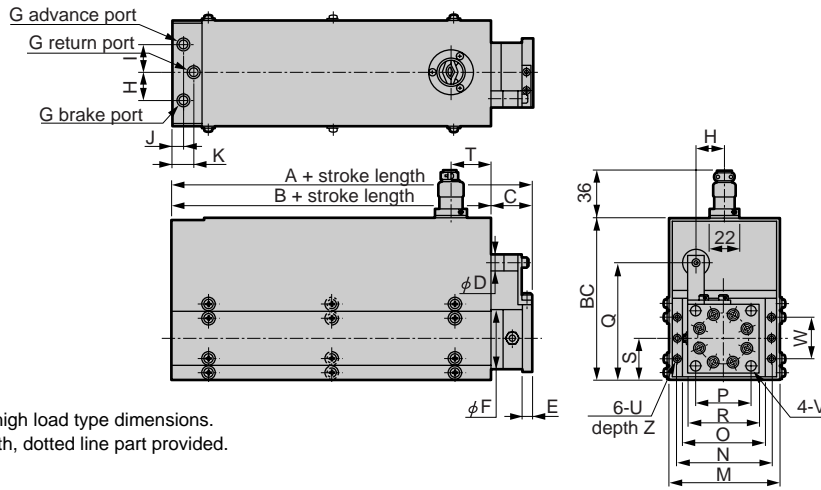
No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Fixing guide	Cast iron		25	Encoder	--	RE30E
2	Packing seal 1	Nitrile rubber	O ring	26	Rotator receiving	Cast iron	
3	Pipe guide	Aluminum alloy		27	Bearing	--	
4	Packing seal 2	Nitrile rubber	O ring	28	Rotator	Brass	
5	Rod collar	Steel		29	Spring	Piano wire	
6	Joint	Brass		30	Bearing metal	Dry metal	DDB metal
7	Piping packing seal	Nitrile rubber	Mini-Y packing seal	31	Piston	Aluminum alloy	
8	Piping metal 1	Dry metal	DU bush	32	Piston packing seal	Nitrile rubber	
9	Packing seal 3	Nitrile rubber	O ring	33	Piping metal 2	Dry metal	DU bush
10	Piping plate	Aluminum alloy		34	Wear ring	Polyacetal	
11	Piping nipple	Brass		35	Scraper	Nitrile rubber	
12	Brake section	--		36	Bearing housing	Cast iron	
13	Width guide	Carbon steel		37	Cushion packing seal	Urethane and steel	
14	Cushion needle	Brass		38	Cylinder gasket	Nitrile rubber	O ring
15	Rod cover	Cast iron		39	Piping scraper	Nitrile rubber	SFR
16	Non-rotating plate	Dry metal	DBB metal	40	Packing seal 1	Nitrile rubber	O ring
17	Cylinder gasket	Nitrile rubber	O ring	41	Head cover	Cast iron	
18	Cushion packing seal	Urethane and steel		42	The end of flange	Steel	
19	Pipe	Stainless steel		43	Piping receiving	Steel	
20	Piston rod	Carbon steel		44	Packing seal 4	Nitrile rubber	O ring
21	Piping pipe	Stainless steel		45	Piping end guide	Steel	
22	Piping rod	Carbon steel		46	Pipe stand	Steel	
23	Cylinder tube	Carbon steel		47	Piping holder	Steel	
24	Metal plug	--	HIROSE 5P				

## Repair parts list (standard type)

Bore size (mm)	Kit No.	Repair parts number
φ 30	MFC-B-30K	
φ 40	MFC-B-40K	18 32 34
φ 50	MFC-B-50K	
φ 63	MFC-B-63K	35 37
φ 80	MFC-B-80K	

### Dimensions

#### ● MFC-BS (K) basic dimensions (00)

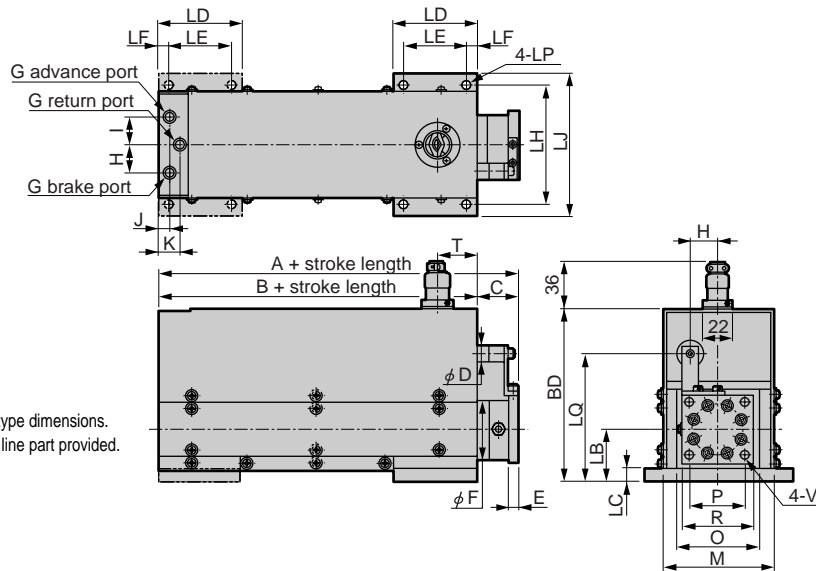


Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For  $\phi$  30: 300mm and over  
 For  $\phi$  40: 300mm and over  
 For  $\phi$  50: 400mm and over  
 For  $\phi$  63: 500mm and over  
 For  $\phi$  80: 500mm and over

Symbol	Basic type (00) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BC	C	D	E	F	G	H	I	J	K	M	(M)	N	(N)	O	P
$\phi$ 30	212	310	181	279	122	31	12	8	45	Rc1/8	20	20	8	15	80	86	69	72	60	40
$\phi$ 40	238	352	198	312	162	40	16	10	55	Rc1/8	25	20	8	16	90	96	79	82	70	50
$\phi$ 50	333	487	279	433	172	54	20	12	70	Rc1/4	32	25	9	18	116	124	102	106	90	64
$\phi$ 63	375	573	312	510	188	63	20	16	85	Rc1/4	32	25	9	18	136	144	122	126	110	80
$\phi$ 80	443	667	370	594	225	73	25	19	110	Rc3/8	36	35	14	28	174	180	156	159	140	100

Symbol	Basic type (00) basic dimensions									
Bore size (mm)	Q	R	S	T	U	(U)	V	W	Z	(Z)
$\phi$ 30	88	52	31	50	M 6	M 8	7	30	10	12
$\phi$ 40	105	63	36	35	M 6	M 8	7	35	12	12
$\phi$ 50	140	80	46	37	M 8	M10	9	40	12	15
$\phi$ 63	161	100	56	37	M10	M12	11	58	15	18
$\phi$ 80	202	125	71	37	M12	M14	14	80	18	20

#### Rod end foot type (LA)



Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.  
 For  $\phi$  30: 300mm and over  
 For  $\phi$  40: 300mm and over  
 For  $\phi$  50: 400mm and over  
 For  $\phi$  63: 500mm and over  
 For  $\phi$  80: 500mm and over

Symbol	Rod end foot type (LA) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BD	(BD)	C	D	E	F	G	H	I	J	K	LB	(LB)	LC	(LC)	LD
$\phi$ 30	212	310	181	279	131	133	31	12	8	45	Rc1/8	20	20	8	15	40	42	10	12	60
$\phi$ 40	238	352	198	312	173	177	40	16	10	55	Rc1/8	25	20	8	16	47	51	12	16	70
$\phi$ 50	333	487	279	433	187	190	54	20	12	70	Rc1/4	32	25	9	18	61	64	16	19	90
$\phi$ 63	375	573	312	510	206	209	63	20	16	85	Rc1/4	32	25	9	18	74	77	19	22	110
$\phi$ 80	443	667	370	594	246	249	73	25	19	110	Rc3/8	36	35	14	28	92	95	22	25	140

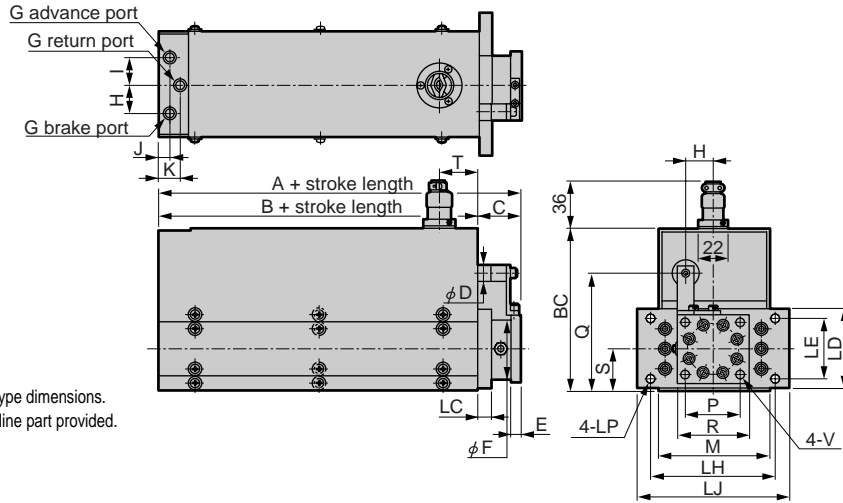
Symbol	Rod end foot type (LA) basic dimensions																			
Bore size (mm)	(LD)	LE	(LE)	LF	(LF)	LH	(LH)	LJ	(LJ)	LP	(LP)	LQ	(LQ)	M	(M)	O	P	R	T	V
$\phi$ 30	70	46	50	7	13	90	104	106	124	7	9	97	99	80	86	60	40	52	50	7
$\phi$ 40	80	50	54	10	15	114	120	134	146	9	11	116	120	90	96	70	50	63	35	7
$\phi$ 50	100	70	70	10	18	136	152	160	182	11	14	155	158	116	124	90	64	80	37	9
$\phi$ 63	120	86	84	12	28	162	178	190	214	14	16	179	182	136	144	110	80	100	37	11
$\phi$ 80	150	114	110	13	20	200	218	236	258	16	18	223	226	174	180	140	100	125	37	14

SCP\*2  
 CMK2  
 CMA2  
 SCM  
 SCG  
 SCA2  
 SCS  
 CKV2  
 CA/OV2  
 SSD  
 CAT  
 MDC2  
 MVC  
 SMD2  
 MSD\*  
 FC\*  
 STK  
 ULK\*  
 JSK/M2  
 JSG  
 JSC3  
 USSD  
 USC  
 JSB3  
 LMB  
 STG  
 STS/L  
 LCS  
 LCG  
 LCM  
 LCT  
 LCY  
 STR2  
 UCA2  
 HCM  
 HCA  
 SRL2  
 SRG  
 SRM  
 SRT  
 MRL2  
 MRG2  
 SM-25  
 CAC3  
 UCAC  
 RCC2  
**MFC**  
 SHC  
 GLC  
 Ending

Robot cylinder  
 Special type

## Dimensions

### ● Rod end flange type (FA)



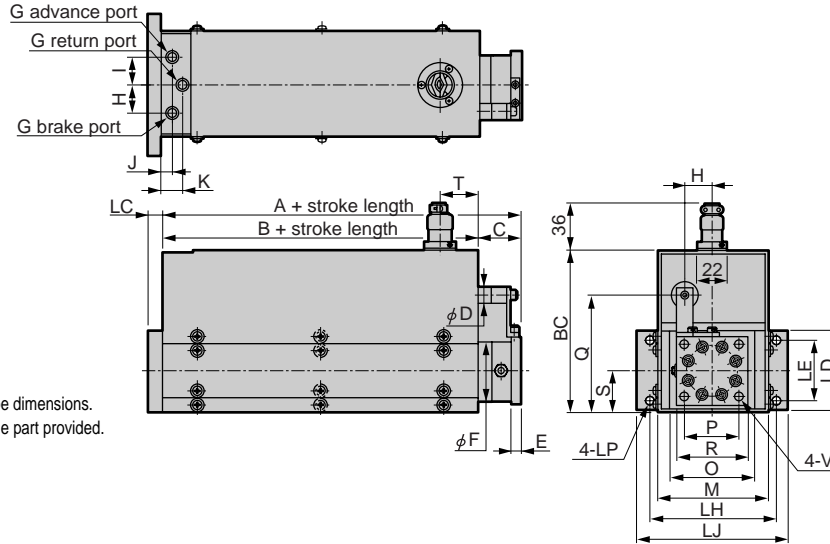
Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.

For  $\phi$  30: 300mm and over  
 For  $\phi$  40: 300mm and over  
 For  $\phi$  50: 400mm and over  
 For  $\phi$  63: 500mm and over  
 For  $\phi$  80: 500mm and over

Symbol	Rod end flange type (FA) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BC	C	D	E	F	G	H	I	J	K	LC	(LC)	LD	LE	(LE)	LH
$\phi$ 30	212	310	181	279	122	31	12	8	45	Rc1/8	20	20	8	15	10	12	60	46	40	90
$\phi$ 40	238	352	198	312	162	40	16	10	55	Rc1/8	25	20	8	16	12	16	70	50	44	114
$\phi$ 50	333	487	279	433	172	54	20	12	70	Rc1/4	32	25	9	18	16	19	90	70	60	136
$\phi$ 63	375	573	312	510	188	63	20	16	85	Rc1/4	32	25	9	18	19	22	110	86	74	162
$\phi$ 80	443	667	370	594	225	73	25	19	110	Rc3/8	36	35	14	28	22	25	140	114	100	200

Symbol	Rod end flange type (FA) basic dimensions												
Bore size (mm)	(LH)	LJ	(L)	LP	(LP)	M	(M)	P	Q	R	S	T	V
$\phi$ 30	104	106	124	7	9	80	86	40	88	52	31	50	7
$\phi$ 40	120	134	146	9	11	90	96	50	105	63	36	35	7
$\phi$ 50	152	160	182	11	14	116	124	64	140	80	46	37	9
$\phi$ 63	178	190	214	14	16	136	144	80	161	100	56	37	11
$\phi$ 80	218	236	258	16	18	174	180	100	202	125	71	37	14

### ● Head end flange type (FB)



Note 1: The circled symbol shows high load type dimensions.  
 Note 2: When following stroke length, dotted line part provided.

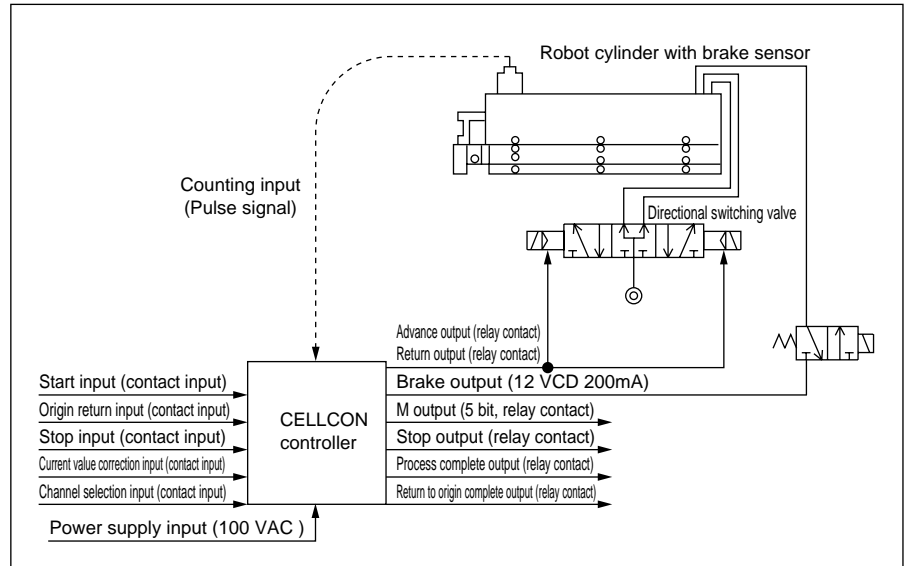
For  $\phi$  30: 300mm and over  
 For  $\phi$  40: 300mm and over  
 For  $\phi$  50: 400mm and over  
 For  $\phi$  63: 500mm and over  
 For  $\phi$  80: 500mm and over

Symbol	Head end flange type (FB) basic dimensions																			
Bore size (mm)	A	(A)	B	(B)	BC	C	D	E	F	G	H	I	J	K	LC	(LC)	LD	LE	(LE)	LH
$\phi$ 30	212	310	181	279	122	31	12	8	45	Rc1/8	20	20	8	15	10	12	60	46	40	90
$\phi$ 40	238	352	198	312	162	40	16	10	55	Rc1/8	25	20	8	16	12	16	70	50	44	114
$\phi$ 50	333	487	279	433	172	54	20	12	70	Rc1/4	32	25	9	18	16	19	90	70	60	136
$\phi$ 63	375	573	312	510	188	63	20	16	85	Rc1/4	32	25	9	18	19	22	110	86	74	162
$\phi$ 80	443	667	370	594	225	73	25	19	110	Rc3/8	36	35	14	28	22	25	140	114	100	200

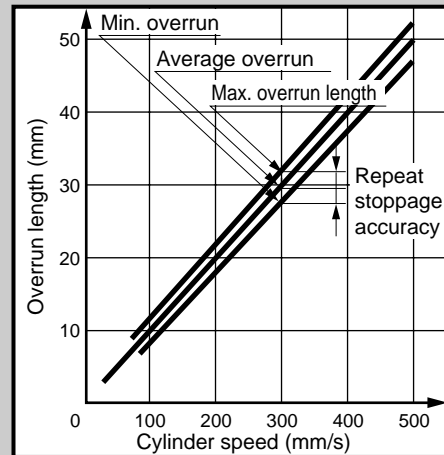
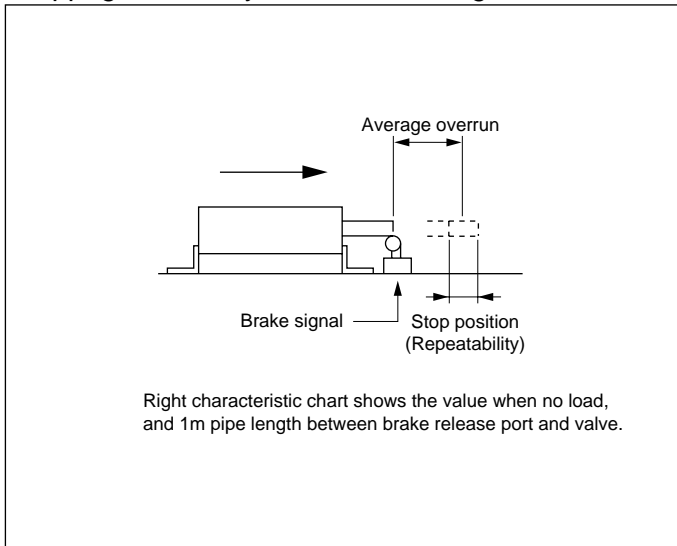
Symbol	Head end flange type (FB) basic dimensions													
Bore size (mm)	(LH)	LJ	(L)	LP	(LP)	M	(M)	O	P	Q	R	S	T	V
$\phi$ 30	104	106	124	7	9	80	86	60	40	88	52	31	50	7
$\phi$ 40	120	134	146	9	11	90	96	70	50	105	63	36	35	7
$\phi$ 50	152	160	182	11	14	116	124	90	64	140	80	46	37	9
$\phi$ 63	178	190	214	14	16	136	144	110	80	161	100	56	37	11
$\phi$ 80	218	236	258	16	18	174	180	140	100	202	125	71	37	14

### Robot cylinder with brake sensor flow chart

- (1) Number of pulse signal is generated according to sleeve moving distance from robot cylinder.
- (2) Matching with the preset value, CELLCON controller outputs OFF signal to the solenoid valve for brake release and the direction switching valve.
- (3) Piston rod is immediately stopped.
- (4) Outputting signals from CELLCON controller results in sleeve advance, or return, then stops at the following set position.



### Stoppage accuracy and overrun length



SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
JSK/M2
JSG
JSC3
USSD
USC
JSB3
LMB
STG
STS/L
LCS
LCG
LCM
LCT
LCY
STR2
UCA2
HCM
HCA
SRL2
SRG
SRM
SRT
MRL2
MRG2
SM-25
CAC3
UCAC
RCC2
<b>MFC</b>
SHC
GLC

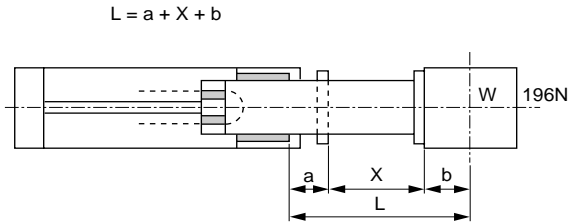
Ending

Robot cylinder  
Special type

## Selection guide

Conditions: Stroke length 300 (mm), load on the end (196N), eccentric length 200 (mm), distance from the end of flange to center of gravity of load 100 (mm)

(1) At first, calculate lateral load moment L/W.



a: Dimensions of projecting section (m)  
 b: Distance from flange end to center of gravity of load (m)  
 X: Stroke length(m)

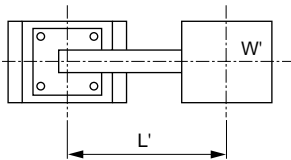
\* At first, substitute 0.067 (m) of intermediate bore size for 50mm for a dimension.

$$L = 0.067 + 0.3 + 0.1 \quad L/W = 0.467 \times 196 = 91.5(\text{N}\cdot\text{m})$$

$$= 0.467(\text{m})$$

$$W = 196\text{N}$$

(2) Calculate torque L'/W'



$$W' = 196 (\text{N})$$

$$L' = 0.2 (\text{m})$$

$$L' \cdot W' = 0.2 \times 196 = 39.2 (\text{N}\cdot\text{m})$$

(3) Find whole moment M.

$$M = (\text{lateral load moment } L \cdot W) + (\text{angular moment } L' \cdot W')$$

$$= 91.5 + 39.2 = 130.7(\text{N}\cdot\text{m})$$

(4) Find the bore size that meets conditions with 300 mm stroke according to maximum allowable moment table.

In this case, 50mm bore is obtained. (when close to allowable value, increase the bore size.)

\* When bore size selected here is any size other than 50mm, substitute a dimension of the bore size selected at (4) for (1) again, and select the model for the rest according to step (3) → (4).

(5) Read the minimum working pressure at  $M = 130.7(\text{N}\cdot\text{m})$  from the graph.

Graph shows 0.35MPa.

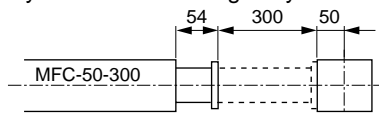
## Selection method

Conditions: Stroke 300mm, load on the end 196N

(1) Determine the bore size according to stroke length: maximum allowable load table on the following page.

When above conditions, the value that meets 300mm stroke and 196N is 50mm bore.

(2) Find the distance from shoulder of robot cylinder to center of gravity of load on the end.



(Distance from end of flange to center of gravity should be 50 mm.)

$$L = 54 + 300 + 50 = 404(\text{mm})$$

$$= 0.404(\text{m})$$

(3) Calculate self-weight moment caused by tube etc.

$$M = 0.3^2/2 \times 15 \times 9.8 + 0.404 \times 3.6 \times 9.8$$

$$= 6.615 + 14.253 = 20.868 \approx 20.9 (\text{N}\cdot\text{m})$$

$$W/L + M = 196 \times 0.404 + 20.9 = 100.08 \approx 100.1 (\text{N}\cdot\text{m})$$

(4) The graph of MFC-50 at 100.1 (N·m) shows that the minimum working pressure is 0.27(Mpa) when load on the end 196(N) and center of gravity 50(mm) for MFC-50-300.

## Stroke length: max. allowable load table

(Unit: N)

Specifications	Standard					High load				
	φ 30	φ 40	φ 50	φ 63	φ 80	φ 30	φ 40	φ 50	φ 63	φ 80
Bore size (mm)										
Stroke length (mm)										
50	428	688	1552	1971	3206	653	1050	2365	3018	4925
75	335	549	1271	1632	2687	514	843	1945	2512	4150
100	274	456	1073	1390	2307	423	703	1650	2150	3582
150	199	336	813	1063	1785	312	526	1263	1665	2807
200	153	263	650	854	1443	246	419	1021	1355	2301
300	101	178	453	598	1017	170	295	733	980	1679
400	70	128	337	445	760	128	224	567	760	1309
500	50	95	260	342	579	101	179	458	615	1060
600	-	-	203	266	454	-	-	380	512	885
700	-	-	160	208	355	-	-	322	434	752
800	-	-	129	161	273	-	-	276	372	646
900	-	-	95	121	204	-	-	240	323	560
1000	-	-	70	87	145	-	-	209	281	482

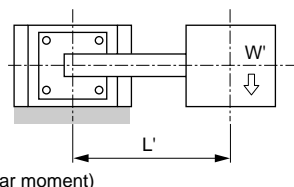
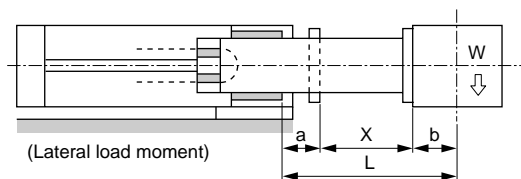
Note: Lateral load differs depending on bore size and stroke length.  
Refer to the value above to select the model.

## Stroke length: max. allowable moment table

(Unit: N·m)

Specifications	Standard					High load				
	φ 30	φ 40	φ 50	φ 63	φ 80	φ 30	φ 40	φ 50	φ 63	φ 80
Bore size (mm)										
Stroke length (mm)										
50	40.3	70.9	181.6	248.4	436.1	61.4	108.2	276.7	380.3	669.9
75	39.9	70.4	180.5	246.6	432.7	61.2	108	276.2	379.4	668.2
100	39.5	69.8	179	245	429	61.1	108	276	379	667
150	38.6	68.4	177.3	240.4	421.4	60.6	106.9	274.2	376.3	662.5
200	37.5	66.8	174	236	413	60	106	273	374	658
300	34.8	62.9	167	225	393	58.7	104	269	369	649
400	31.5	58.1	158	212	370	57	102	265	362	637
500	27.4	52.5	148	197	340	55	99	260	355	622
600	-	-	136	181	312	-	-	254	347	608
700	-	-	123	162	279	-	-	248	337	592
800	-	-	108	141	242	-	-	240	327	573
900	-	-	92.4	118	202	-	-	232	316	553
1000	-	-	74.8	93.8	158	-	-	223	303	531

Whole moment  $M = (\text{lateral load moment } L \cdot W) + (\text{angular moment } L' \cdot W')$



W: Load (N)

$L = a + x + b$  (m)

x: Stroke (m)

b: Distance from flange end to center of gravity of load (m)

a: Dimensions of projecting section (m)

Bore size (mm)	Unit (m)				
	φ 30	φ 40	φ 50	φ 63	φ 80
Symbol					
a	0.04	0.053	0.067	0.076	0.086

## ⚠ CAUTION: Load direction

Upward or downward load direction : OK.



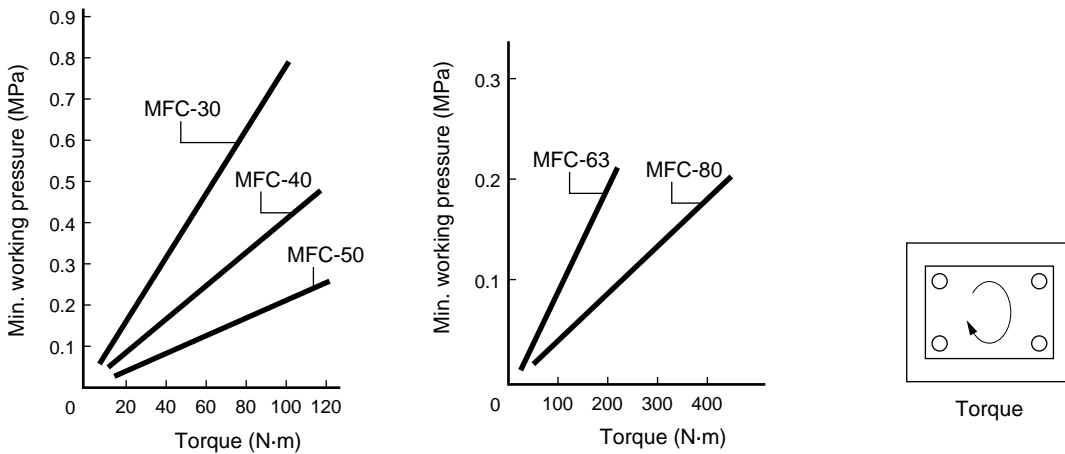
Both left and right load direction : NG. →

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
STG  
STS/L  
LCS  
LCG  
LCM  
LCT  
LCY  
STR2  
UCA2  
HCM  
HCA  
SRL2  
SRG  
SRM  
SRT  
MRL2  
MRG2  
SM-25  
CAC3  
UCAC  
RCC2  
MFC  
SHC  
GLC

Robot cylinder  
Special type

- SCP\*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC
- SMD2
- MSD\*
- FC\*
- STK
- ULK\*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC**
- SHC
- GLC
- Ending

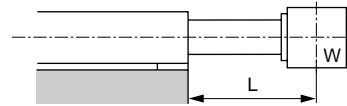
### Relation between torque and minimum working pressure



### Relation between load and minimum working pressure every stroke cycle

M: Self-weight moment by tube etc. (N-m)

$$M = \frac{X^2}{2} \times ag + L/Fg \left\{ = \frac{X^2}{2} \times a + L/F \right\}$$



Bore size (mm)	a	F
φ 30	7	1.0
φ 40	9	1.7
φ 50	15	3.6
φ 63	20	6.1
φ 80	35	11.5

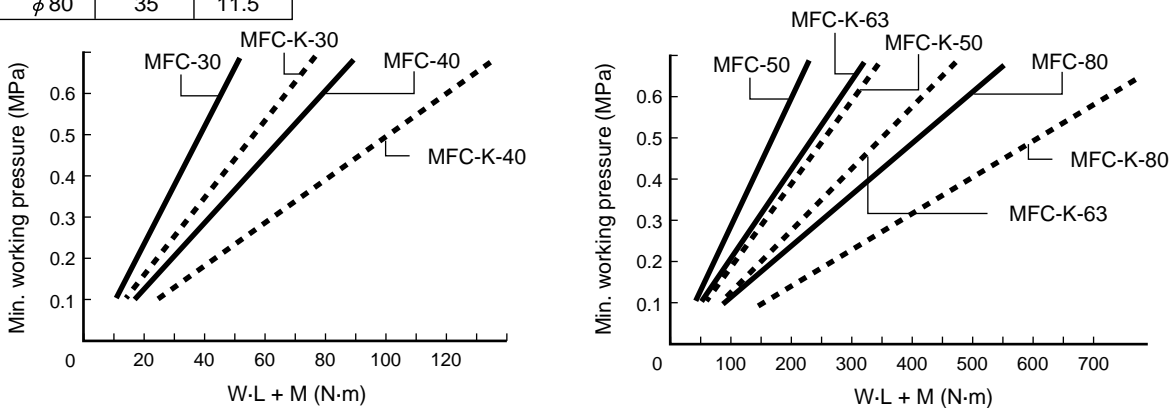
X : Stroke length(m)

a : Tube weight (kg) per 1m

F : The end of flange-head cover weight (kg)

W : Load on the end (N)

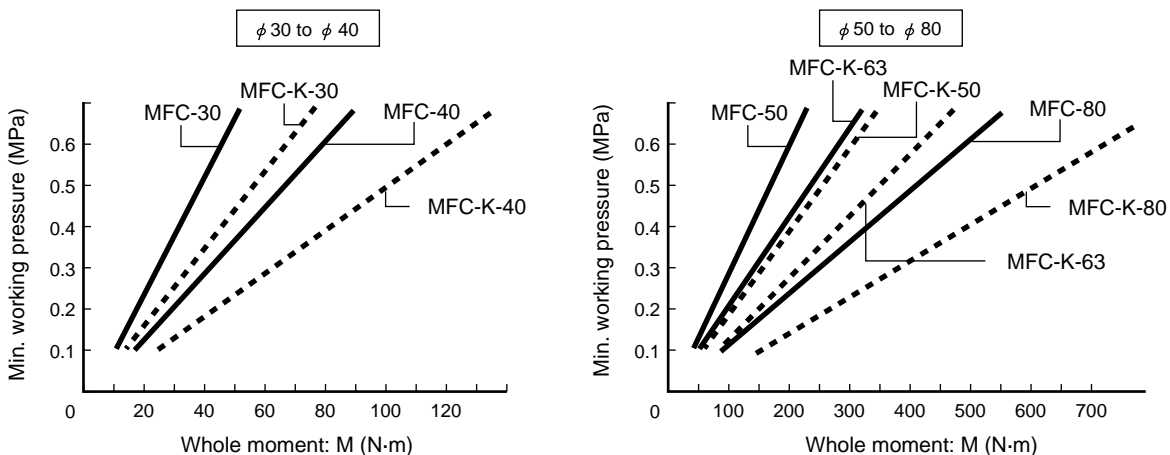
L : Distance (m) from center of gravity of load on the end W to shoulder of rod cylinder



Note: Select within the max. allowable load. (70% or less of maximum allowable load is ideal.)

When load and torque function every stroke cycle at the same time, the minimum working pressure is the sum of both them.

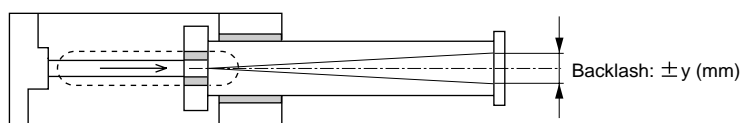
### Graph of minimum working pressure - whole moment



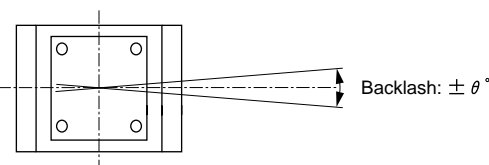
### Lateral clattering, backlash in rotational direction

Calculate the clattering value according to the following formulas.

#### 1) Backlash of axial



#### 2) Backlash of rotational direction



#### Standard

Bore size (mm)	Backlash: $\pm y$ (mm)	Stroke length (mm)		
		100	500	1000
$\phi 30$	$y = (78 + \text{stroke length}) \times 6 \times 10^{-3}$	1.07	3.47	-
$\phi 40$	$y = (92 + \text{stroke length}) \times 5.3 \times 10^{-3}$	1.02	3.14	-
$\phi 50$	$y = (119 + \text{stroke length}) \times 3.9 \times 10^{-3}$	0.85	2.41	4.36
$\phi 63$	$y = (143 + \text{stroke length}) \times 3 \times 10^{-3}$	0.73	1.93	3.43
$\phi 80$	$y = (162 + \text{stroke length}) \times 2.7 \times 10^{-3}$	0.71	1.79	3.14

Bore size (mm)	Backlash: $\pm \theta$
$\phi 30$	0.15°
$\phi 40$	0.14°
$\phi 50$	0.11°
$\phi 63$	0.087°
$\phi 80$	0.068°

#### High load type

Bore size (mm)	Backlash: $\pm y$ (mm)	Stroke length (mm)		
		100	500	1000
$\phi 30$	$y = (143 + \text{stroke length}) \times 2 \times 10^{-3}$	0.49	1.29	-
$\phi 40$	$y = (168 + \text{stroke length}) \times 1.8 \times 10^{-3}$	0.48	1.20	-
$\phi 50$	$y = (222 + \text{stroke length}) \times 1.3 \times 10^{-3}$	0.42	0.94	1.59
$\phi 63$	$y = (275 + \text{stroke length}) \times 1.0 \times 10^{-3}$	0.38	0.78	1.28
$\phi 80$	$y = (311 + \text{stroke length}) \times 9 \times 10^{-4}$	0.37	0.73	1.18

### Applications of robot cylinder with various functions

#### Applications

<p><b>1 Movement to conveyer</b></p> <p>Directly installing a conveying pallet on the top of robot cylinder, lifts up a product one by one, and moves them the conveyer by an air cylinder.</p>	<p><b>3 Nut installation to slant plate</b></p> <p>Install a robot cylinder which moves to slant direction on the top of robot cylinder which moves to horizontal direction, then install a nut runner on the top of it. This enables systematic operation of both robot cylinders and nut fixing onto the slant plate.</p>
<p><b>2 Nut installation</b></p> <p>Installing a nut runner on the top of robot cylinder, perform nut fixing. Since nut height differs depending on a manufacturing lot, adjust the height with changing the stop position of robot cylinder.</p>	<p><b>4 Loader and unloader</b></p> <p>Using simple robot with robot cylinder, load and unload work pieces to machine A and B. Robot cylinder with brake and sensor is used for X-axis, Y-axis, respectively.</p>

SCP\*2  
CMK2  
CMA2  
SCM  
SCG  
SCA2  
SCS  
CKV2  
CA/OV2  
SSD  
CAT  
MDC2  
MVC  
SMD2  
MSD\*  
FC\*  
STK  
ULK\*  
JSK/M2  
JSG  
JSC3  
USSD  
USC  
JSB3  
LMB  
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Ending

Robot cylinder  
Special type