Discontinue

SM-6498-A

INSTRUCTION MANUAL

FOR

ROBOT CYLINDER (MFC)

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.

CKD Corporation

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

CONTENTS

1. SPECIFICATIONS 1
2. BASIC CIRCUIT DIAGRAM 4
3. SELECTION OF RELATED EQUIPMENT 7
4. ELECTRICAL CONTROL CIRCUIT 8
5. INSTALLATION 11
6. OPERATIONS 13
7. PERIODICAL INSPECTION 14
8. TROUBLESHOOTING 15
9. MAINTENANCE 18
10. MODEL NO. INDICATION 26

Discontinue

We thank you for your purchasing CKD product.
Please read this manual thoroughly to use the product effectively.
(For the cylinder with a switch, refer to the instruction manual SM-)

1. SPECIFICATIONS

1-1 MFC (ø30 to ø80) standard type, MFC-K (ø30 to ø80) high-load type

Specifications

Model No. / Items		MFC, MFC-K
Tube bore	(mm)	ø30, ø40, ø50, ø63, ø80
Standard stroke	(mm)	50, 75, 100, 150, 200, 300
Media		Compressed air
Operating pressure range	(kgf/cm^2)	1.5 to 9.9 (at no load)
Proof pressure	(kgf/cm^2)	16.0
Lubrication		Unnecessary *1
Ambient temperature range	(^oC)	-10 to 60 (shall not show any freezing)
Piston operating speed	(mm/sec)	50 to 300 (at no load)
Cushion		Air cushion

*1 Use turbine oil class 1 ISOVG32.
*2 Consult us in the case of low hydraulic specification.

Discontinue

1-2 MFC-B (ø30 to ø80) with brake and MFC-BK (ø30 to ø80) with brake, high-load type.

Specifications

Model No. / Items		MFC-B, MFC-BK
Tube bore	(mm)	ø30, ø40, ø50, ø63, ø80
Standard stroke	(mm)	50, 75, 100, 150, 200, 300
Media		Compressed air
Operating pressure range	(kgf/cm^2)	3.5 to 9.9
Proof pressure	(kgf/cm^2)	16.0
Lubrication		Unnecessary *1
Ambient temperature range	(^oC)	-5 to 50 (shall not show any freezing)
Piston operating speed	(mm/sec)	50 to 300 (at no load)
Stopping accuracy	(mm)	±1.0 (300 mm/sec at no load)
Holding power		ø30: 44, ø40: 78, ø50: 160, ø63: 250, ø80: 400
Cushion		Air cushion

*1 Use turbine oil class 1 ISOVG32.
*2 Consult us in the case of low hydraulic specification.

Discontinue

1-3 MFC-BS (ø30 to ø80) with brake sensor and MFC-BSK (ø30 to ø80) with brake sensor, high-load type

Specifications

Model No. / Items		MFC-BS, MFC-BSK
Tube bore	(mm)	ø30, ø40, ø50, ø63, ø80
Standard stroke	(mm)	50, 75, 100, 150, 200, 300
Media		Compressed air
Operating pressure range	(kgf/cm^2)	3.5 to 9.9
Proof pressure	(kgf/cm^2)	16.0
Lubrication		Unnecessary *1
Ambient temperature range	(^oC)	0 to 50
Piston operating speed	(mm/sec)	50 to 300 (at no load)
Stopping accuracy	(mm)	±1.0 (300 mm/sec at no load)
Holding power	(kgf)	ø30: 44, ø40: 78, ø50: 160, ø63: 250, ø80: 400
Minimum detectable dimension	(mm)	0.1
Cushion		Air cushion

*1 Use turbine oil class 1 ISOVG32.
*2 Consult us in the case of low hydraulic specification.

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2. BASIC CIRCUIT DIAGRAM (MFC-B, MFC-BS, MFC-BK, MFC-BSK)

In order to attain accurate operation, observe the following basic items and make the circuit diagram as shown below:

① Pressure shall be applied to both sides while in stop. (In order to prevent the piston rod from coming out at start-up.)

② Connect a regulator with check valve to the side having larger thrust to keep the thrust balance (including a load.)
(In order to prevent sticking at start-up.)

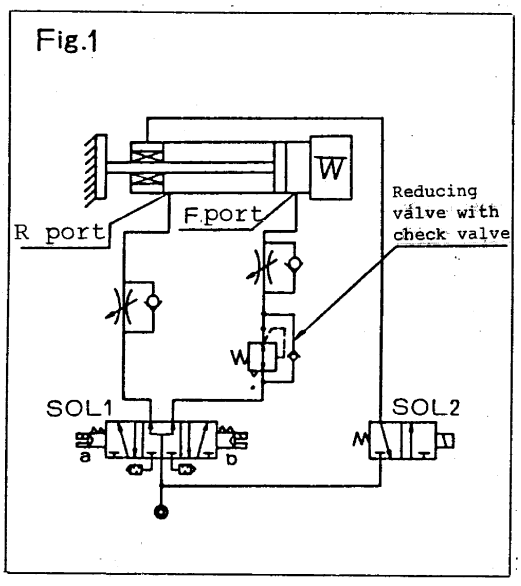
③ Locate the solenoid valve for releasing a brake closer to the brake port as much as possible.

Basic Circuit Diagrams for MFC-B, MFC-BS, MFC-BK, and MFC-BSK

o For horizontal load

In the case of piping as shown in Fig. 1, equivalent pressure is applied to both sides of the piston during stoppage, which prevents the sleeve from coming out while releasing the brake. A regulator with check valve is installed at the head side to keep the thrust balance.

Fig.1

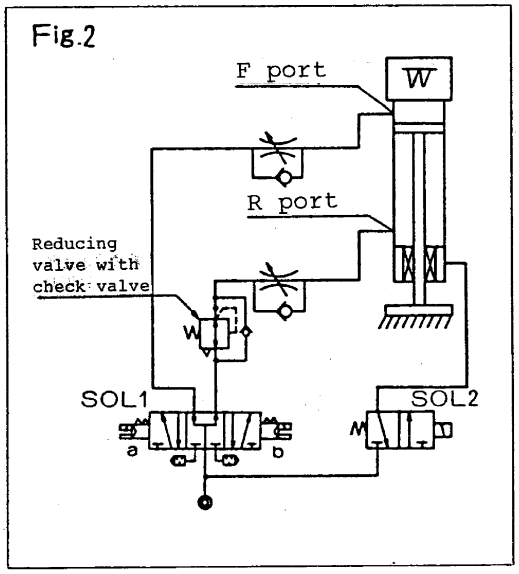


ⓐ SOL-1	ⓑ	SOL-2	Operating state
OFF	OFF	OFF	Stop
ON	OFF	ON	Backward
OFF	ON	ON	Forward

o For upward vertical load

In the case of upward vertical load as shown in Fig. 2, since the sleeve malfunctions in the direction of the load while releasing the brake, a reducing valve with check valve shall be installed at the rod side to reduce the thrust in the direction of the load, allowing to keep the thrust balance.

Fig.2

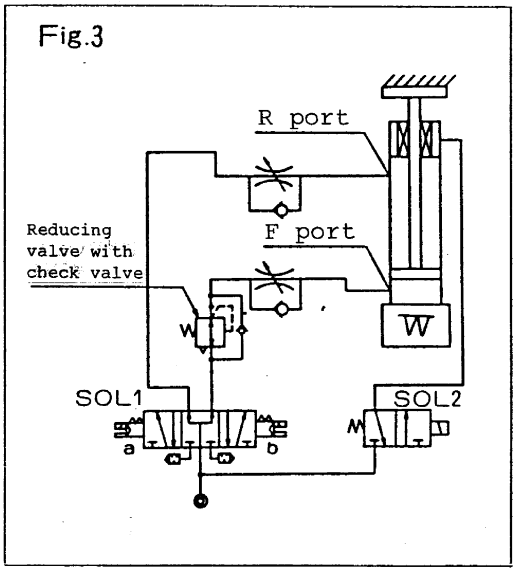


ⓐ SOL-1	ⓑ	SOL-2	Operating state
OFF	OFF	OFF	Stop
ON	OFF	ON	Upward
OFF	ON	ON	Downward

o For downward vertical load

In the case of downward vertical load as shown in Fig. 3, since the sleeve malfunctions in the direction of the load while releasing the brake, a reducing valve with check valve shall be installed at the head side to reduce the thrust in the direction of the load, allowing to keep the thrust balance.

Fig.3



ⓐ SOL-1	ⓑ	SOL-2	Operating state
OFF	OFF	OFF	Stop
ON	OFF	ON	Upward
OFF	ON	ON	Downward

3. SELECTION OF RELATED EQUIPMENT

Overrun and stopping accuracy differ depending on the response and effective sectional area of the brake release valve (SOL 2 in the basic circuit diagram).
Use the following related equipment.

Selection guide of related equipment

Name of related equipment Tube bore (mm)	SOL 1 directional control valve	SOL 2 brake release valve	Reducing valve with check valve	Speed controller	Silencer	Piping
ø30	4K250	4KB110 4A210	2419-1C	SC1-6	SLW 6A	ø6 x ø8 Nylon tube
ø40	4K250	4KB110 4KA210	2419-2C	SC1-8	SLW 8A	ø8 x ø6 Nylon tube
ø50	4K350 4L350 PV5-6-FIG-D	4F110 4KA210	2400 3C	SC1-10 SC3G-10 SC2G-10	SLW 10A	ø10 x ø8 Nylon tube
ø63	4K350 4L350 PV5-6-FIG-D	4F110 4KB210	2400 3C	SC1-10 SC3G-10 SC2G-10	SLW 10A	ø10 x ø8 Nylon tube
ø80	4K350 4L350 PV5-6-FIG-D	4F210 4KB210	2400 3C	SC1-10 SC3G-10 SC2G-10	SLW 10A	ø10 x ø8 Nylon tube

4. ELECTRICAL CONTROL CIRCUIT

Since a control equipment and a circuit used have an effect on stopping accuracy and so on, take the following items into account:

(1) Use an equipment whose control circuit has shorter response time and better accuracy.

(2) Issue a brake release signal and a cylinder control signal simultaneously or issue a brake release signal prior to the cylinder control signal in order to prevent the cylinder from coming out while releasing the brake.

(3) Use a self-retaining circuit for a detecting switch electrical circuit of the stop signal.

(4) Select the detecting switch of the stop signal out of the cylinder switch, roller plunger type limit switch, proximity switch, photocell, and so on.

(5) Precautions when using a sequencer

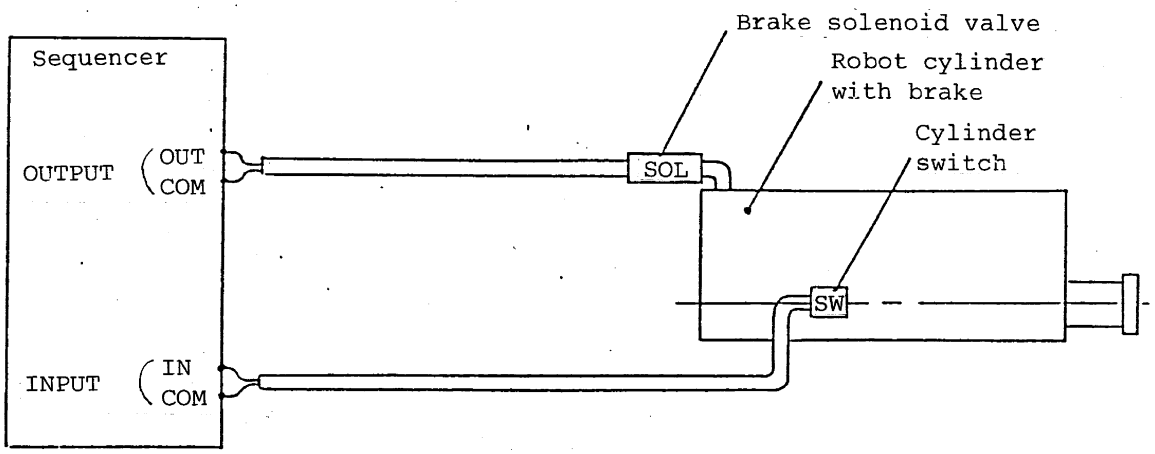
o When a brake circuit is used by way of a sequencer, the brake release timing varies due to the variation of the scan time (±20 ms to 30 ms), causing the accuracy of stoppage to have an error of as great as ±3 mm to ±5 mm.

Scan time .... The time required to carry out one routine of a program.

Variation .... Error to be ±1.5 mm at 30 ms scan time and cylinder speed at 100 mm/s.

a) Circuit via a sequencer

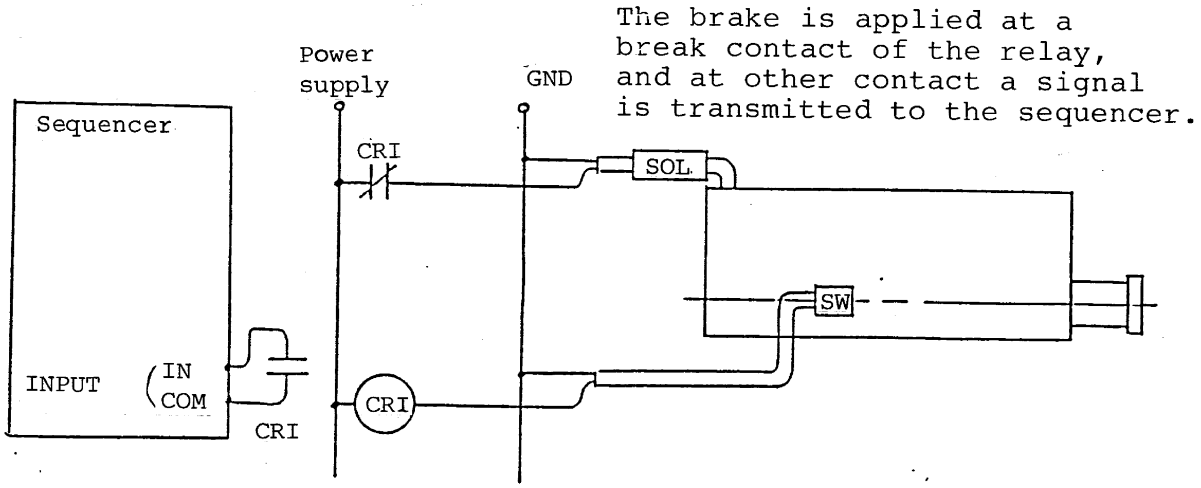
Bad example of circuit via a sequencer
(because of an adverse effect due to variation of the scan time)



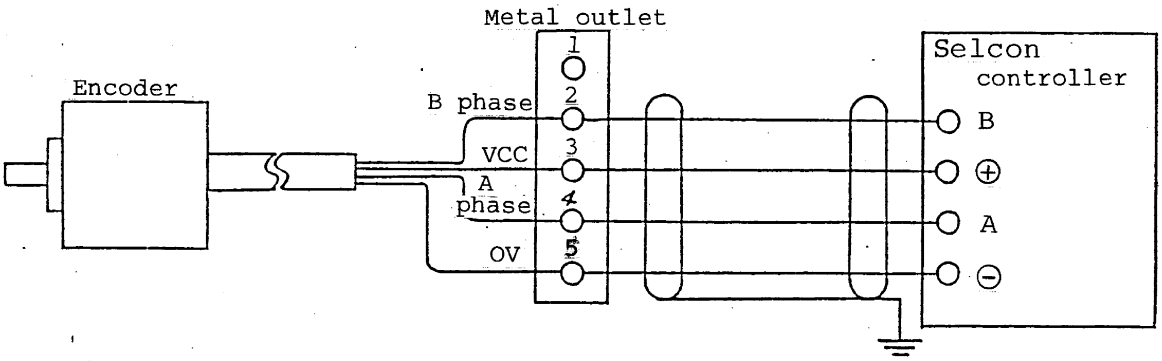
Corrective action

Apply brake directly using a relay without passing through the sequencer in the brake circuit.

The brake is applied at a break contact of the relay, and at other contact a signal is transmitted to the sequencer.



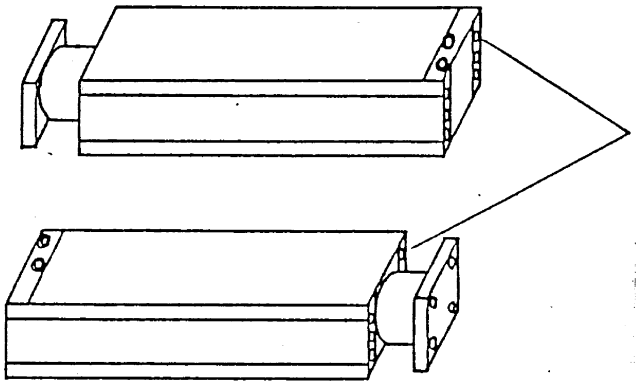
b) MFC-BS and MFC-BSK with a robot cylinder brake sensor



Since the Selcon controller is a controller exclusively for positioning, only the metal outlet and the **Selcon** controller are directly connected.

5. INSTALLATION

5-1 MFC-00 (Basic type)



Install the MFC-00 directly in the mounting holes on the cross guide by taking the flatness and the surface roughness of the mounting surface account.

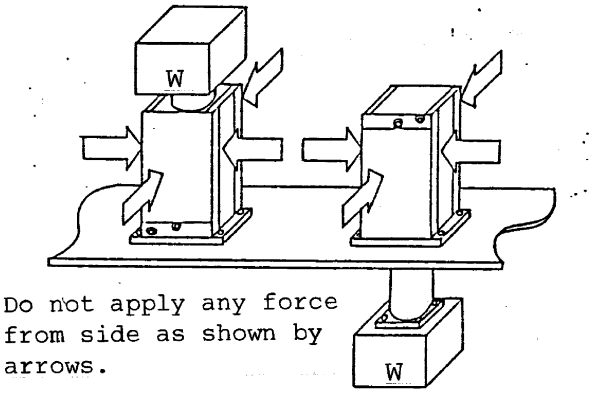
Flatness: 0.1 mm or less

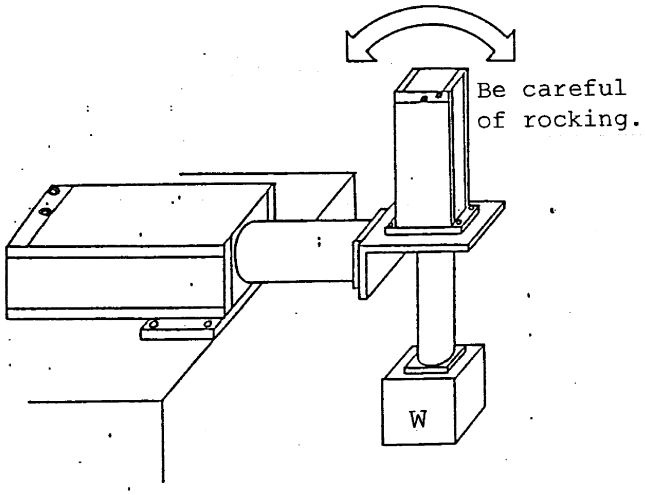
Surface roughness: 12.5 s or less

5-2 MFC-FA, -FB (Front flange mounting, rear flange mounting)

Since the MFC-FA and -FB are designed to be installed at the front or the rear of the cylinder, for a longer stroke, be careful for a surrounding force applied to it and a rocking when moving the cylinder body.

For the flatness and the surface roughness of the mounting surface, the same is also true as the MFC-00.

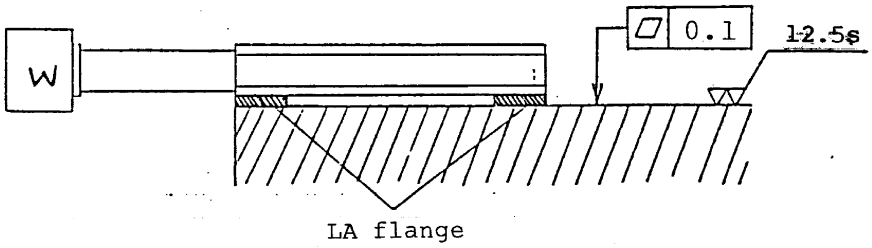




5-3 MFC-LA (Foot mounting type)

Two LA flanges are installed at the front and rear sides for the following strokes of the MFC-LA (Foot mounting type).

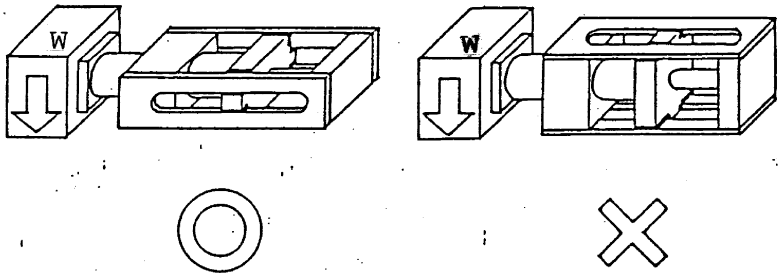
MFC-LA-30	m ———	300	strokes or more
" 40	———	300	"
" 50	———	400	"
" 63	———	500	"
" 80	———	500	"



*For a type with foot mounting at both sides, be careful especially for the flatness.

5-4 Other precautions

The loads should be installed as shown below.



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6. OPERATIONS

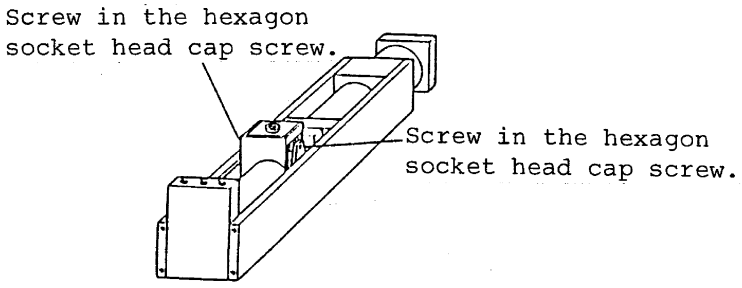
6-1 Use the equipment within the following, operating pressure range.

Model No.	Brake pressure range	Cylinder pressure range
MFC MFC-K(ø30-ø80)	————	1.5 - 9.9
MFC-B MFC-BK (ø30-ø80)	3.5 - 9.9	1.5 - 9.9
MFC-BS MFC-BSK (ø30-ø80)	3.5 - 9.9	1.5 - 9.9

6-2 Manual releasing method of the brake

Screw in the hexagon socket head cap screws to the female threads at right and left sides of the brake to release the brake. (Be sure to remove the hexagon socket head cap screws during normal operation.)

Refer to the figure below.



Code Tube bore (mm)	Screw size
ø30	M5
ø40	M5
ø50	M6
ø63	M6
ø80	M8

7. PERIODICAL INSPECTION

(1) Perform the periodical inspections once or twice a year in order to use the cylinder in the most optimum condition.

(2) Inspection items

(a) Looseness of the bolts for brake mounting
(b) Confirmation of brake motion
(c) Looseness of the bolts and nuts for mounting legs
(d) Operating state
(e) Variation of piston speed and cycle time
(f) Internal and external leakages
(g) Flaw and deformation of the piston rod
(h) Abnormality of stroke
(i) Corrosion inside the port

Check the items above and if there are any problems, take corrective actions such as retightening or disassembling.

8. TROUBLESHOOTING

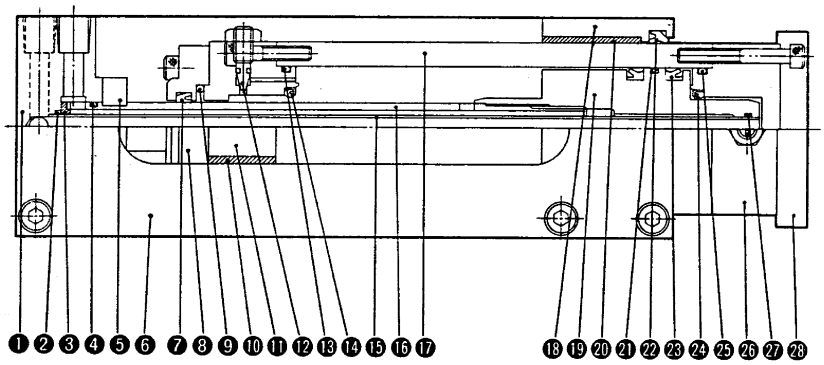
Symptoms	Causes	Corrective actions
Stop function does not release.	No pressure at the brake. Insufficient pressure	Apply pressure.
	A signal is not sent to the brake solenoid valve. (For NO type, a signal is sent.)	Confirm the wiring and send a signal. (Confirm the wiring and turn off the signal.)
	The brake solenoid valve does not activate.	Confirm the wiring and repair. Repair or replace the control valve.
A rod (cylinder tube) does not stop.	A signal is being sent to the solenoid valve for the brake. (For NO type, a signal is not sent.)	Confirm the wiring and turn off the signal. (Confirm the wiring and turn on the signal.)
	The brake solenoid valve does not activate.	Confirm the wiring and repair. Repair or replace the control valve.
	The brake is in the "Open" state by the manual device.	Make repairs on the "Open" state of the manual device.
	A rod jumps over the dog for the brake: a The cylinder speed is too fast. b The self-holding circuit not used for the relay.	a Decelerate the cylinder speed or extend the detecting width of the dog. b Use the self-holding circuit for the relay.
	The cylinder switch does not activate.	Refer to the troubleshooting of the switch.
Stopping accuracy is poor.	Effective sectional area of the solenoid valve for the brake is small.	Replace it with larger one.
	The piping between the solenoid valve for the brake and the brake port is narrow and long.	Use thicker one. Shorten the piping or directly connect to the solenoid valve.
	The response of the solenoid valve for the brake is bad.	Replace it with a solenoid valve with better response.

Symptoms	Causes	Corrective actions
Stopping accuracy is poor.	The response of the signal detecting switch for the brake solenoid valve is bad.	Replace it with a detecting switch with better response.
	The relays are activated sequentially by the brake control signal circuit.	Change the signal circuit. (When using a sequencer, be careful for an operational speed (response).)
	There is a play such as locseness on the dog for brake signal.	Correct the looseness.
	Do the dog for brake signal have proper contour? a When using a roller plunger type LS, set an angle of inclination to 30° or less. b If an interlock is provided by the dog, it is necessary to use a length more than that for an overrun.	a When an angle of inclination is large, it causes the load to vary, thus lowers the accuracy. (For a roller lever, 60° is acceptable.) b For a self-holding circuit of the relay, it is necessary to set a length corresponding to an activating time of the relay.
	The cylinder speed varies; a Is an inertia load large in respect to the cylinder thrust? (Use care especially when a stopping pitch is small.) b Is it stopped in the cushion compartment or at its edge?	a Enlarge an inner diameter of the cylinder or change to a hydraulic specification. b When using it at the edge of cushion compartment, install a check valve to the cushion.
	A rod (cylinder tube) moves as it tends to jump over: a Is the pressure of the regulator for pressure balance correct? b Does a timing for releasing at stopping delay?	a Adjust of the regulator pressure. b Set the timing for releasing at stopping faster. (Also check if supply air port is squeezed.)

Symptoms	Causes	Corrective actions
Stopping accuracy is poor.	Does the load vary? a The load varies while contouring a curved surface and so on. (continuous variation) b The load varies due to a vertical load and so on. (stepwise variation)	a Change to a hydraulic specification. b When load variation is small or it changes stepwise, change the circuit to that uses plural number of regulator for pressure balance are used.
A rod (cylinder tube) dose not activate.	A signal is not sent to the directional control valve.	Correct the control circuit.
	A rod is installed with out of alignment.	Correct the installing state. Change the mounting style.
	The piston packing is damaged.	Replace it with a new one.
A rod (cylinder tube) does not activate smoothly.	A rod is installed with out of alignment.	Correct the installing state. Change the mounting style.
	A lateral load is applied.	Reduce a transverse load moment or turning moment. Correct the installing state. Change the mounting style.
	Speed below the low-speed limit.	Reduce the load variation. Consider use of low hydraulic pressure cylinder.
	Large load	Increase pressure. Enlarge an inner diameter of the tube.
	A meter-in circuit is used for the speed control valve.	Change the installing direction of the speed control valve.
Breakage and deformation	Impact force due to high-speed operation.	Apply cushion more effectively. Slow down the speed. Lighten the load. Provide with more secure cushion mechanism. (External cushion mechanism)
	A lateral load is applied.	Reduce a transverse load moment or turning moment. Correct the installing state. Change the mounting style.

9. MAINTENANCE

9-1 Internal construction drawing and expendable parts list for MFC & MFC-K



Parts No.	Parts name	Material	Remarks	Parts No.	Parts name	Material	Remarks
1	Fixed guide	FC25	Parkerizing	15	Pipe	SUS304	———
2	Packing 1	NBR	O-ring	16	Piston rod	S45C	*
3	Pipe guide	Aluminum	———	17	Cylinder tube	S45C	*
4	Packing 2	NBR	O-ring	18	Bearing housing	FC25	Parkerizing
5	Rod collar	SS41	Chromate	19	Piston	Aluminum	———
6	Lateral guide	S45C	*	20	Bearing metal	Dry Bearing	DU bushing
7	Rod packing	NBR	PNY	21	Wear ring	POM	———
8	Metal	FC25	Parkerizing	22	Scraper	NBR	SFR
9	Gasket	NBR	O-ring	23	Piston packing	NER	PGY
10	Retaining plate	Dry bearing	DU bushing	24	Cushion packing	U,SPCC	———
11	Rod cover	FC25	Parkerizing	25	Cylinder gasket	NBR	O-ring
12	Cushion needle	C3604BDF	———	26	Head cover	Gray iron casting	Parkerizing
13	Cylinder gasket	NBR	O-ring	27	Packing 1	NBR	O-ring
14	Cushion packing	U,SPCC	———	28	Top flange	SS41	Parkerizing

* Industrial hardened chrome plating

Discontinue

Expendable parts list (standard)

Parts No. / Tube bore (mm)	Kit No.	7	14 24	21	22	23
		Rod packing	Cushion packing	Wear ring	Scraper	Piston packing
ø30	MFC-30K	PDU-12	PCS-14	F4-125617	SFR-45	PSD-30
ø40	MFC-40K	PNY-16	PCS-20	F4-125614	SFR-55	PSD-40
ø50	MFC-50K	PNY-20	PCS-24	F4-650240	SFR-70	PGY-50
ø63	MFC-63K	PNY-20	PCS-24	F4-650241	SDR-85	PGY-63
ø80	MFC-80K	PNY-25	PCS-35	F4-650242	SDR-110	PGY-80

Note: When ordering, specify kit No.

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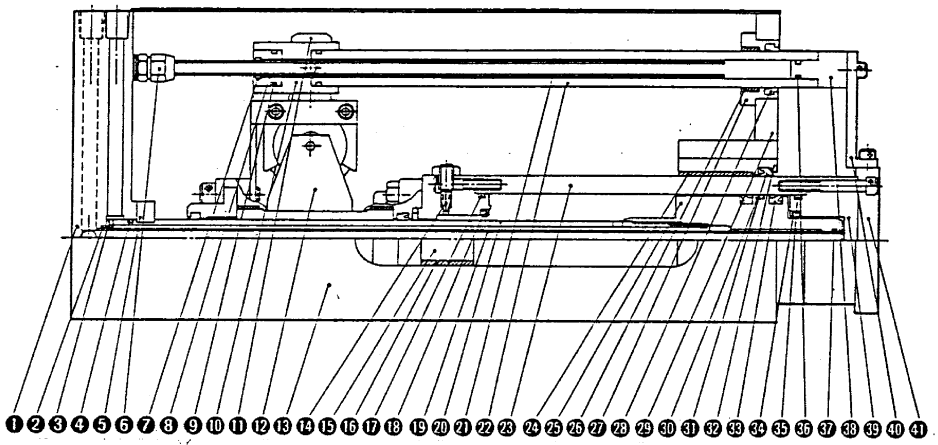
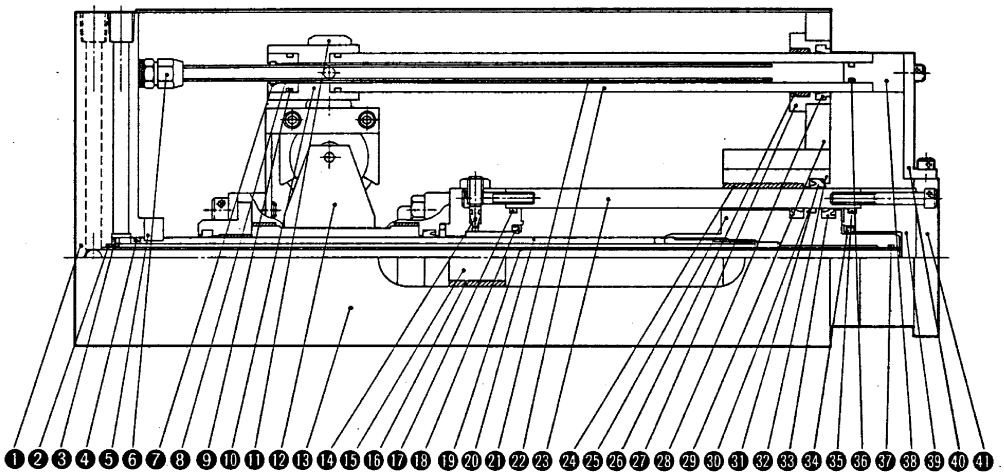
9-2 Internal construction drawing and expendable parts list for MFC-B & MFC-BK



Parts No.	Parts name	Material	Remarks	Parts No.	Parts name	Material	Remarks
1	Fixed guide	FC25	Parkerizing	13	Lateral guide	S45C	*
2	Packing 1	NBR	O-ring	14	Cushion needle	C3604BDF	————
3	Pipe guide	Aluminum	————	15	Rod cover	FC25	Parkerizing
4	Packing 2	NBR	O-ring	16	Retaining plate	Dry metal	DU bushing
5	Rod collar	SS41	Chromate	17	Cylinder gasket	NBR	O-ring
6	Joint	C3604BD	————	18	Cushion packing	U,SPCC	————
7	Piping packing	NBR	Mini Y-shape packing	19	Pipe	SUS304	————
8	Piping metal 1	Dry metal	DU bushing	20	Piston rod	S45C	MFIcr-10
9	Packing 3	NBR	O-ring	21	Piping pipe	SUS304	————
10	Piping plate	Aluminum	————	22	Piping rod	S45C	MFIcr-10
11	Piping nipple	BsBM2	————	23	Cylinder tube	S45C	MFIcr-10
12	Brake	————	————	24	Bearing metal	FC25	Parkerizing

* Industrial hardened chrome plating

Discontinue



Parts No.	Parts name	Material	Remarks	Parts No.	Parts name	Material	Remarks
25	Piston	Aluminum	————	34	Cushion packing	U,SPCC	————
26	Piping metal 2	Dry metal	DU bushing	35	Cylinder gasket	NBR	O-ring
27	Piping receiver	SS41	Chromate	36	Packing 4	NBR	O-ring
28	Piping scraper	NBR	SFR	37	Packing 1	NBR	O-ring
29	Piping stand	SS41	Chromate	38	Piping end guide	SS41	Chromate
30	Wear ring	POM	————	39	Head cover	Gray iron casting	Parkerizing
31	Scraper	NBR	SFR	40	Piping holder	SS41	Chromate
32	Bearing housing	FC25	Parkerizing	41	Top flange	SS41	Parkerizing
33	Piston packing	NBR	PGY				

Discontinue

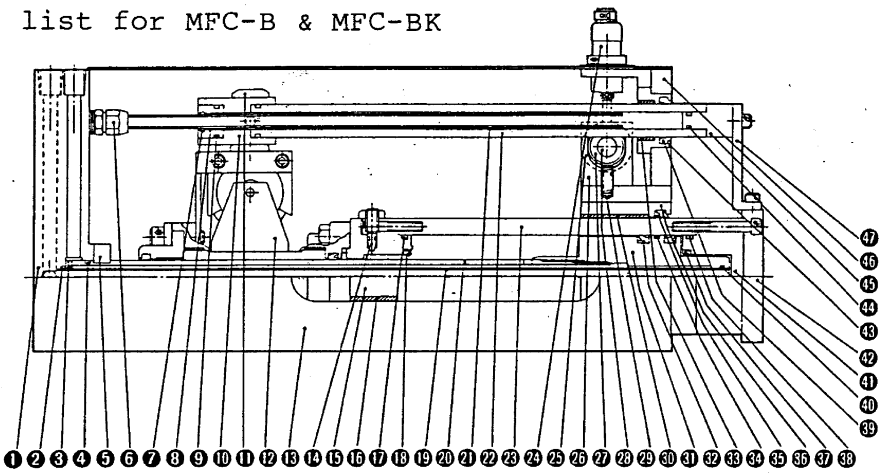
Expendable parts list (standard)

Parts No.	Kit No.	18 34	30	31	33
Tube bore (mm)		Cushion packing	Wear ring	Scraper	Piston packing
ø30	MFC-B-30K	PCS-14	F4-125617	SFR-45	PSD-30
ø40	MFC-B-40K	PCS-20	F4-125614	SFR-55	PSD-40
ø50	MFC-B-50K	PCS-24	F4-650240	SFR-70	PGY-50
ø63	MFC-B-63K	PCS-24	F4-650241	SDR-85	PGY-63
ø80	MFC-B-80K	PCS-35	F4-650242	SDR-110	PGY-80

Note: When ordering, specify kit No.

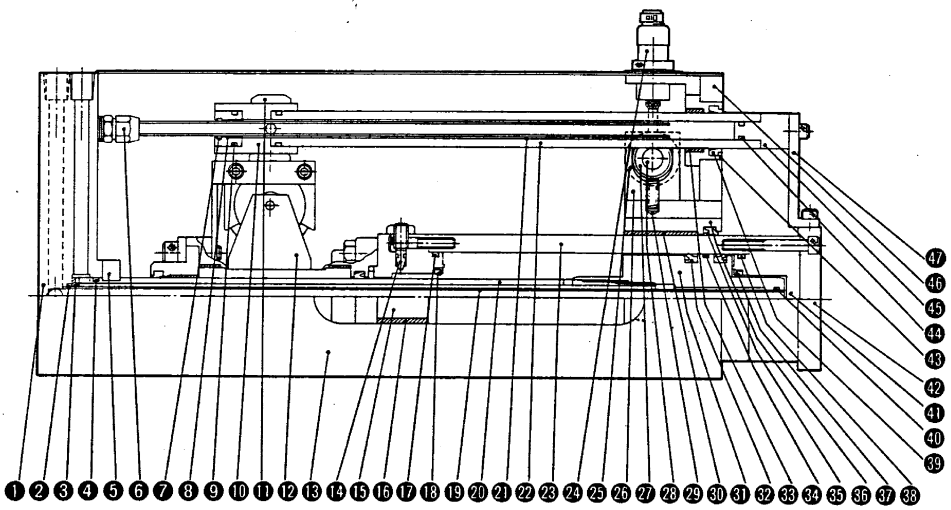
Discontinue

9-3 Internal construction drawing and expendable parts list for MFC-B & MFC-BK



Parts No.	Parts name	Material	Remarks	Parts No.	Parts name	Material	Remarks
1	Fixed guide	FC25	Parkerizing	13	Lateral guide	S45C	
2	Packing 1	NBR	O-ring	14	Cushion needle	C3604BDF	
3	Pipe guide	Aluminum	———	15	Rod cover	FC25	Parkerizing
4	Packing 2	NBR	O-ring	16	Retaining plate	Dry metal	DU bushing
5	Rod collar	SS41	Chromate	17	Cylinder gasket	NBR	O-ring
6	Joint	C3604BD	———	18	Cushion packing	U,SPCC	———
7	Piping packing	NBR	Mini Y-shape packing	19	Pipe	SUS304	———
8	Piping metal 1	Dry metal	DU bushing	20	Piston rod	S45C	MFIcr-10
9	Packing 3	NBR	O-ring	21	Piping pipe	SUS304	
10	Piping plate	Aluminum	———	22	Piping rod	S45C	MFIcr-10
11	Piping nipple	BsBM2	———	23	Cylinder tube	S45C	MFIcr-10
12	Brake	———	———	24	Metal outlet	———	Hirose 5P

Discontinue



Parts No.	Parts name	Material	Remarks	Parts No.	Parts name	Material	Remarks
25	Encoder	———	OSS-04-2	37	Cushion packing	U.SPCC	———
26	Rotator receiver	Gray iron casting	Parkerizing	38	Cylinder gasket	NBR	O-ring
27	Bearing	———	———	39	Piping scraper	NBR	SFR
28	Rotator	BsBM2	———	40	Packing 1	NBR	O-ring
29	Spring	SWP	———	41	Head cover	Gray iron casting	Parkerizing
30	Bearing metal	FC25	Parkerizing	42	Top flange	SS41	Parkerizing
31	Piston	Aluminum	———	43	Piping receiver	SS41	Chromate
32	Piston packing	NBR	PGY	44	Packing 4	NBR	O-ring
33	Piping metal 2	Dry metal	DU bushing	45	Piping end guide	SS41	Chromate
34	Wear ring	POM	———	46	Piping stand	SS41	Chromate
35	Scraper	NBR	SFR	47	Piping holder	SS41	Chromate
36	Bearing housing	FC25	Parkerizing				

Discontinue

Expendable parts list (standard)

Parts No. / Tube bore (mm)	Kit No.	18 37	32	34	35
		Cushion packing	Piston packing	Wear ring	Scraper
ø30	MFC-B-30K	PCS-14	PSD-30	F4-125617	SFR-45
ø40	MFC-B-40K	PCS-20	PSD-40	F4-125614	SFR-55
ø50	MFC-B-50K	PCS-24	PGY-50	F4-650240	SFR-70
ø63	MFC-B-63K	PCS-24	PGY-63	F4-650241	SDR-85
ø80	MFC-B-80K	PCS-35	PGY-80	F4-650242	SDR-110

Note: When ordering, specify kit No.

Discontinue

10. MODEL NO. INDICATION (ø30 to ø80)

Model —— ⓐ —— ⓑ —— ⓒ —— ⓓ

Model	Type
MFC	Dual action standard type
MFC-B	Dual action with brake
MFC-BS	Dual action with brake sensor
MFC-K	Dual action high load type
MFC-BK	Dual action high load type with brake
MFC-BSK	Dual action High load type with brake sensor

ⓐ Mounting form	
OO	Standard
LA	Front foot type
FA	Front flange mounting type
FB	Rear flange mounting type

ⓑ Tube bore (mm)	
30	ø30
40	ø40
50	ø50
63	ø63
80	ø80

ⓒ Cushion	
B	Both end cushion
R	Front end cushion
H	Rear end cushion
N	No cushion

ⓓ Stroke (mm)
50
75
100
150
200
300

Example of model No. indication
"MFC-LA-50B-100" indicates robot cylinder, front foot type, tube bore ø50 mm, with both end cushion and stroke 100 mm .

"MFC-BS-FA-63B-200-RO-D" indicates robot cylinder, with brake, with brake sensor, front flange mounting type, tube bore ø63 mm, with both end cushion, stroke 200 mm and with 2 RO switch.