

Miniature Guide Rod Cylinder

Series MGJ

ø6, ø10

How to Order

Miniature Guide Rod Cylinder

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MGJ 6-10-F8N

Bore size

6	6 mm
10	10 mm

Cylinder stroke (mm)

Refer to the following table a and b.

Number of auto switches

Nil	2 pcs.
S	1 pc.

Auto switch type

Nil	Without auto switch (built-in magnet cylinder)
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* Select the applicable auto switch from the table below.

* Auto switch is shipped together (not assembled).

Table a Standard strokes

Bore size (mm)	Standard stroke (mm)
6	5, 10, 15
10	5, 10, 15, 20

Table b Intermediate stroke (by the 1 mm stroke)

Bore size (mm)	Applicable stroke (mm)
6	1 to 15 (Spacer type)
10	1 to 20 (Spacer type)
Example	Model no.: MGJ6-9 Installing a 1 mm width spacer for MGJ6-10 External size: same as MGJ6-10

* Minimum stroke for auto switch mounting is 4 mm.

Table c Applicable auto switches/Refer to page 6 for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch part no.			Applicable load		
					DC	Direct mounting	Lead wire length (m)					
							0.5 (Nil)	3 (L)	5 (Z)			
Solid state switch	-	Grommet (Perpendicular)	Yes	3-wire (NPN)	24 V	5 V 12 V	F8N	∩	∩	∩	IC circuit	Relay PLC
				3-wire (PNP)			F8P	∩	∩	∩		
				2-wire	12 V	F8B	∩	∩	∩	-		

* Lead wire length symbols: 0.5 m Nil (Example) F8N
 3 m L (Example) F8NL
 5 m Z (Example) F8NZ

* Auto switches marked with ∩ are produced upon receipt of order.

* When using non-applicable auto switches, please consult with SMC.



⚠ Caution

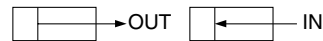
This product should not be used as a stopper.

Specifications

Bore size (mm)	6	10
Action	Double acting	
Fluid	Air	
Proof pressure	1.05 MPa	
Maximum operating pressure	0.7 MPa	
Minimum operating pressure	0.15 MPa	
Ambient and fluid temperature	-10 to 60°C (with no freezing)	
Cushion	Rubber bumper at both ends	
Lubrication	Non-lube	
Piston speed	50 to 500 mm/s ^{Note)}	
Thread tolerance	JIS class 2	
Stroke length tolerance	+1.0 mm 0	
Port size	M3 x 0.5	
Guide size	ø5	ø6

Note) Within allowable kinetic energy use only

Theoretical Output



Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)			
				0.15	0.3	0.5	0.7
6	3	OUT	28.3	4.24	8.48	14.15	19.81
		IN	21.2	3.18	6.36	10.60	14.84
10	5	OUT	78.5	11.77	23.55	39.25	54.95
		IN	58.9	8.83	17.67	29.45	41.23

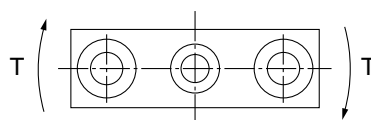
Weight

Unit: g

Bore size (mm)	Standard stroke (mm)			
	5	10	15	20
6	27.3	33.0	38.4	—
10	40.6	48.0	55.6	63.2

Allowable Rotational Torque of Plate

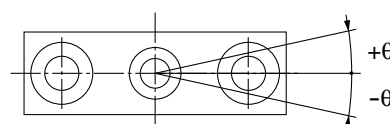
For the rotational torque (T) added to the plate (rod end), use a value no more than the values in the table. Operation outside of this range may cause excessive impact, which may result in the damage to the devices.



Unit: cN·m

Bore size (mm)	Stroke (mm)			
	5	10	15	20
6	0.92	0.73	0.61	—
10	4.75	3.96	3.36	2.87

Plate Non-rotating Accuracy



Bore size (mm)	Non-rotating accuracy θ
6	±0.1°
10	

* When extending the cylinder (initial value), non-rotating accuracy θ, without loads and deflection of guide rods, it should be a value no more than the value in the table as a guide.

Series MGJ

Allowable Kinetic Energy

When driving the cylinder with inertial load, keep kinetic energy no more than the allowable value. The area between bold lines in the below graphic shows the relation between load weight and maximum speed.

Bore size (mm)	6	10
Operating piston speed (m/s)	0.05 to 0.5	
Allowable kinetic energy (J)	0.012	0.035

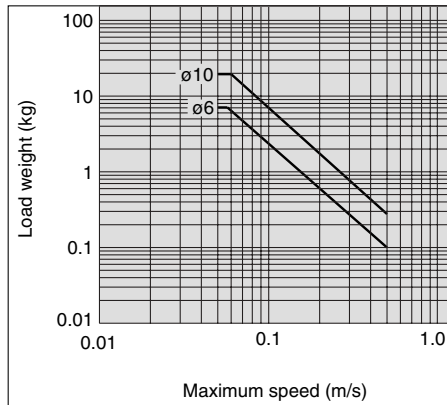
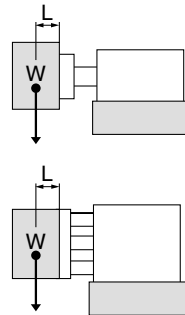
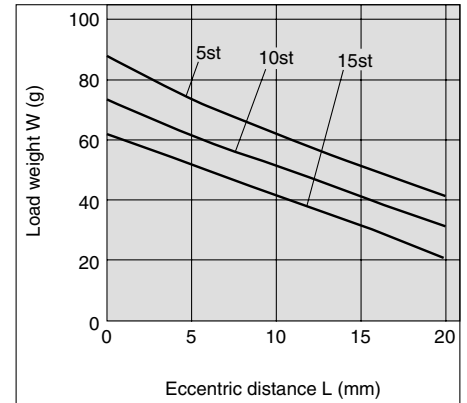


Plate Allowable Lateral Load

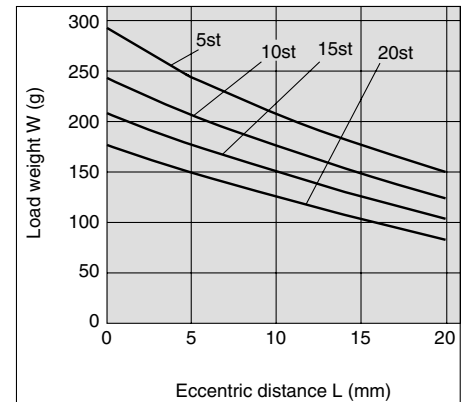
When the eccentric distance (L) generates from the plate (rod end), be sure to keep the load weight (W) no more than a value in the below graphic. Operation outside of this range may cause excessive impact, which may result in the damage to the devices.



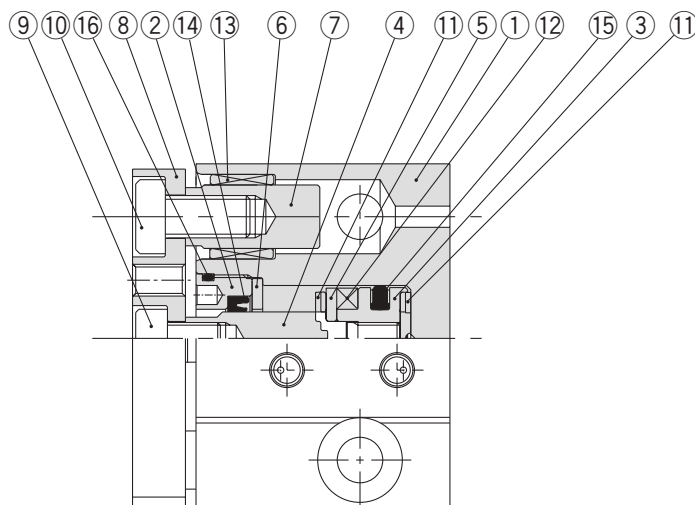
ø6



ø10



Construction

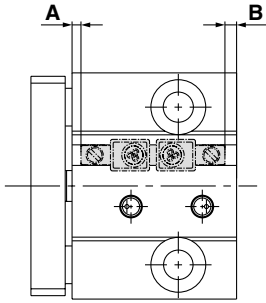


Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Rod cover	Aluminum alloy	Chromated
3	Piston	Aluminum alloy	Chromated
4	Piston rod	Stainless steel	
5	Magnet retainer	Aluminum alloy Stainless steel	Chromated, in case of ø6 In case of ø10
6	Seal retainer	Aluminum alloy Stainless steel	Chromated, in case of ø6 In case of ø10
7	Guide rod	Constructional steel	Hard chromium electroplated
8	Plate	Aluminum alloy	Hard anodized
9	Torque socket head bolt	Constructional steel	Nickel plated, in case of ø6
	Hexagon socket head cap screw	Constructional steel	Nickel plated, in case of ø10
10	Brazier head hexagon socket bolt	Constructional steel	Nickel plated
11	Bumper	Resin	
12	Magnet	Magnet	
13	Bushing	Sintered oil-impregnated bearing	
14	Rod seal	NBR	
15	Piston seal	NBR	
16	O-ring	NBR	

Series MGJ

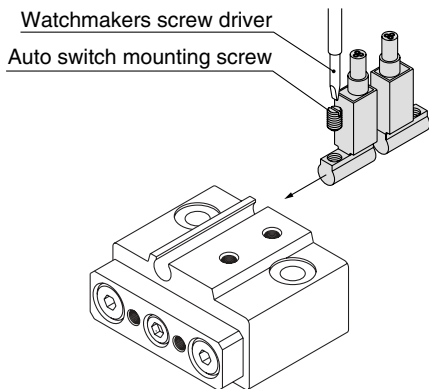
Auto Switches/Proper Mounting Position for Stroke End Detection



Bore size	A	B	Operating range
ø6	1.6	0.9	3
ø10	1.3	1.7	4

(mm)

Auto Switch Mounting



- Use a watchmakers screw driver with a handle about 5 to 6 mm in diameter when tightening the auto switch mounting screw.
- Tightening torque of auto switch mounting screw should be set 0.10 to 0.20 N·m.

Auto Switch Common Specifications

Auto Switch Common Specifications

Type	Solid state switch
Operating time	1 ms or less
Impact resistance	1000 m/s ²
Insulation resistance	50 MΩ or more at 500 VDC M (between lead wire and case)
Withstand voltage	1000 VAC for 1 minute (between lead wire and case)
Ambient temperature	-10 to 60°C
Enclosure	IEC529 standard IP67, JISC0920 waterproof construction

Lead Wire Length

Lead wire length indication

(Example)

D-F8P L

● Lead wire length

Nil	0.5 m
L	3 m
Z	5 m

Note 1) Lead wire length Z: 5 m applicable auto switch

Solid state switch: All types are produced upon receipt of order.

Note 2) For solid state with flexible wire specification, add -61 after the lead wire length.

(Example) D-F8PL-61

● Flexible specification

Lead Wire Color Change

Lead wire colors of SMC switches have been changed for production beginning September 1996 and thereafter. Please refer to the tables provided.

Special care should be taken regarding wire polarity during the time that the old colors still coexist with the new colors.

2-wire

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

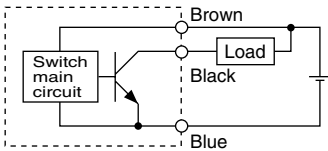
3-wire

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

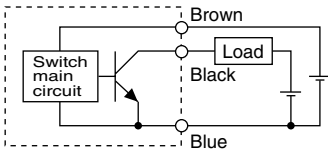
Series MGJ Auto Switch Connections and Examples

Basic Wiring

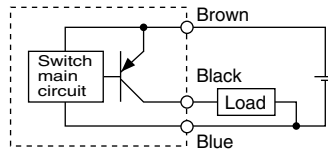
Solid state 3-wire, NPN



(Power supplies for switch and load are separate.)

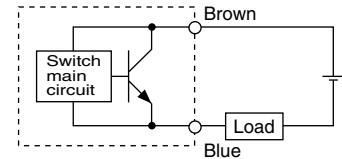
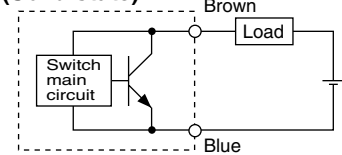


Solid state 3-wire, PNP



2-wire

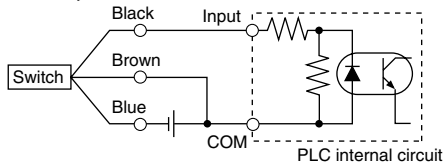
(Solid state)



Examples of Connection to PLC (Programable Logic Controller)

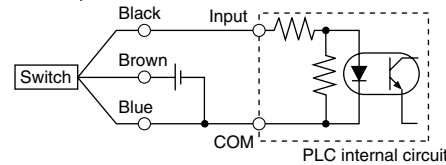
• Sink input specifications

3-wire, NPN



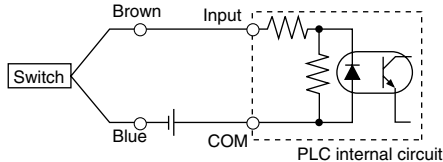
• Source input specifications

3-wire, PNP

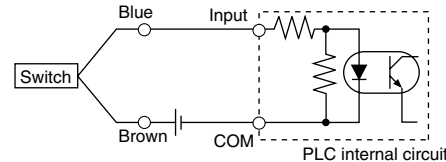


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

2-wire



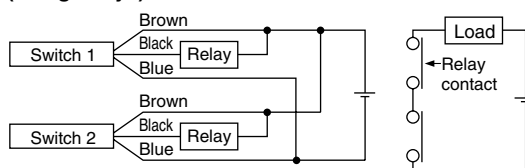
2-wire



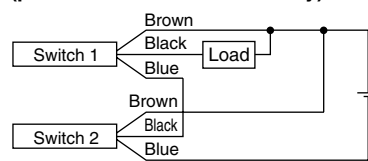
Connection Examples for AND (Series) and OR (Parallel)

v 3-wire

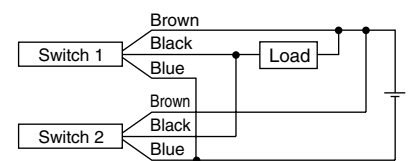
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

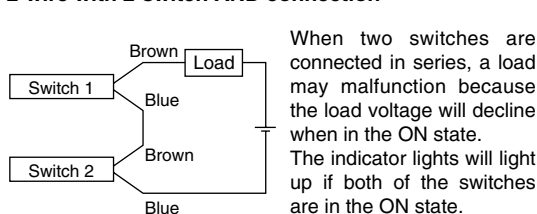


OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

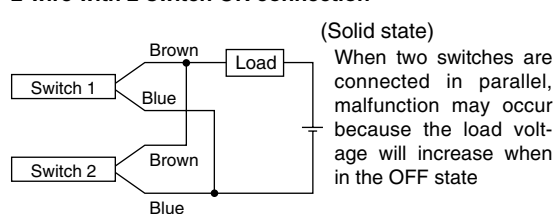
2-wire with 2-switch AND connection



$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Internal voltage drop} \times 2 \text{ pcs.} \\ &= 24 \text{ V} - 4 \text{ V} \times 2 \text{ pcs.} \\ &= 16 \text{ V} \end{aligned}$$

Example: Power supply is 24 VDC.
Internal voltage drop in switch is 4 V.

2-wire with 2-switch OR connection



$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \times \text{Load impedance} \\ &= 1 \text{ mA} \times 2 \text{ pcs.} \times 3 \text{ k}\Omega \\ &= 6 \text{ V} \end{aligned}$$

Example: Load impedance is 3 kΩ.
Leakage current from switch is 1 mA.

Solid State Switches: Direct Mounting Type D-F8N/D-F8P/D-F8B



Refer to www.smcworld.com for details of products compatible with overseas standards.

Auto Switch Specifications

PLC: Programmable Logic Controller

Auto switch part No.	D-F8N	D-F8P	D-F8B
Electrical entry direction	Perpendicular	Perpendicular	Perpendicular
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, 24 VDC relay, PLC		24 VDC relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 VDC)		—
Current consumption	10 mA or less		—
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less	80 mA or less	2.5 to 40 mA
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)	0.8 V or less	4 V or less
Leakage current	100 μ A or less at 24 VDC		0.8 mA or less at 24 VDC
Indicator light	Red LED lights when ON		

Grommet



Caution

Operating precautions

Fix the switch with appropriate screw installed on the switch body. If using other screws, switch may be damaged.

Lead wires

Oilproof vinyl heavy insulation cable, $\phi 2.7$

D-F8N, D-F8P 0.15 mm² x 3-cores (Brown, Black, Blue [Red, White, Black]), 0.5 m

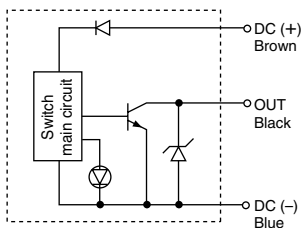
D-F8B 0.18mm² x 2-cores (Brown, Blue [Red, Black]), 0.5 m

Note 1) Refer to page 6 for auto switch common specifications.

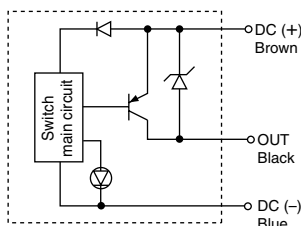
Note 2) Refer to page 6 for lead wire lengths.

Auto switch internal circuit

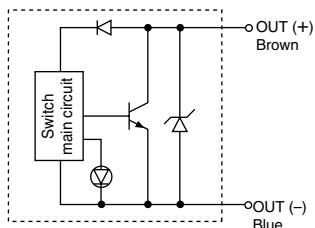
D-F8N



D-F8P



D-F8B



Weight

Unit: (g)

Auto switch part No.	D-F8N	D-F8P	D-F8B
Lead wire length (m)	0.5	7	7
	3	32	32
	5	52	52

Dimensions

D-F8N, D-F8P, D-F8B

