

Coolant Valve Series SGC

How to Order

External pilot solenoid

SGC 2 2 1 A - 05 [] 10 Y - 1 T Z [] [] - A [] []

Air operated

SGCA 2 2 1 A - 05 [] 10 [] [] [] - A [] []

① Series

2	SGC200
3	SGC300
4	SGC400

② Valve type

1	Normally closed
2	Normally open

③ Seal material

A	NBR
B	FKM

④ Pressure range

05	Pressure range 0 to 0.5 MPa
10	Pressure range 0 to 1 MPa
16	Pressure range 0 to 1.6 MPa

⑤ Thread type

Nil	Rc
G	G (ISO1179)
N	NPT
T	NPTF

⑥ Port size

10	3/8	SGC200
15	1/2	SGC200
20	3/4	SGC300
25	1	SGC400

⑦ Pilot valve

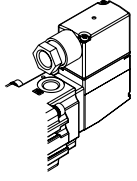
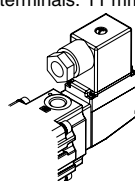
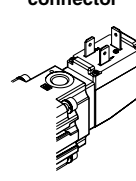
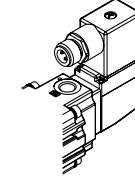
Y	V116
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⑧ Rated voltage

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3	110 VAC [115 VAC] 50/60 Hz
4	220 VAC [230 VAC] 50/60 Hz
5	24 VDC
6	12 VDC

Note) Refer to the back of page 5 when using with energization for long periods of time.

⑨ Electrical entry

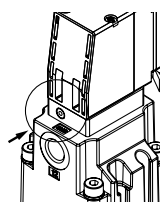
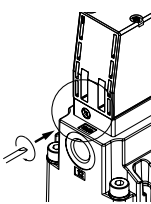
<p>T: Conduit terminal</p> 	<p>D: DIN terminal (Pitch between the terminals: 11 mm)</p> 	<p>DO: DIN terminal without connector</p> 	<p>W: M12 connector (Note)</p> 
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Note) Cable not attached. Arrange them separately, referring to the options as shown below.

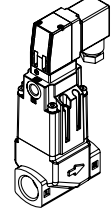
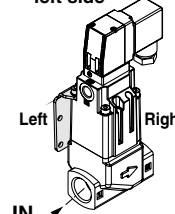
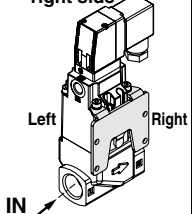
⑩ Light / surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light / surge voltage suppressor

⑪ Manual override

<p>Nil: Non-locking push type</p> 	<p>D: Push-turn locking lever type</p> 
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⑫ Bracket mounting position

<p>Nil: Without bracket</p> 	<p>B1: Bracket on the left side</p> 	<p>B2: Bracket on the right side</p> 
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Note) Bracket cannot be attached later.

⑬ Auto switches (for verifying whether the valve is open/closed)

Nil	Without auto switch (without magnet)
M	Without auto switch (with built-in magnet)
A	With auto switch Select a model, referring to the table "Applicable Auto Switches" below.
B	
C	
D	

* The auto switches are included when shipped (unmounted).

⑭ Lead wire length

Nil	0.5 m
L	3 m
Z	5 m

* 0.5 m is not available with D-F9BA.

⑮ Number of auto switches

Nil	2 pcs.
S	1 pc.

Option

(For detail, refer to page 6.)

Cable for M12 connector

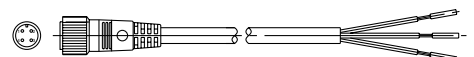
V100-200-1-4

Specification

1	For DC
2	For AC

Cable length (L)

4	1000 [mm]
8	3000 [mm]
9	5000 [mm]

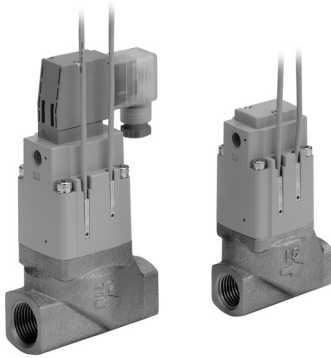


Applicable auto switches / Refer to page 7 to 10 for detailed auto switch specifications.

Solid state switch

Smbol	Part no.	Electrical entry	Indicator light	Special function	Wiring (Output)	Load voltage DC		Applicable load	
						24 V	12 V	IC circuit	Relay, PLC
A	D-M9N	Grommet	Yes	—	3-wire (NPN)	24 V	12 V	—	Relay, PLC
B	D-M9P				3-wire (PNP)				
C	D-M9B				2-wire				
D	D-F9BA								

* Only in-line electrical entry is available.



Characteristics

Pressure specification	Model	Port size	Orifice size ø [mm]	Flow characteristics Av x 10 ⁻⁶ [m ²]	Cv factor converted	Weight [kg]	
						Air operated type	External pilot solenoid type
0.5 MPa	SGC(A)22□□-05□10	3/8	ø15	110	4.6	0.69 (0.74)	0.73 (0.78)
	SGC(A)22□□-05□15	1/2	ø15	155	6.5	0.69 (0.74)	0.73 (0.78)
	SGC(A)32□□-05□20	3/4	ø20	284	11.8	1.04 (1.11)	1.08 (1.15)
	SGC(A)42□□-05□25	1	ø25	440	18.3	1.70 (1.77)	1.74 (1.81)
1.0 MPa	SGC(A)22□□-10□10	3/8	ø12	85	3.5	0.69 (0.74)	0.73 (0.78)
	SGC(A)22□□-10□15	1/2	ø12	116	4.8	0.69 (0.74)	0.73 (0.78)
	SGC(A)32□□-10□20	3/4	ø14	170	7.1	1.04 (1.11)	1.08 (1.15)
	SGC(A)42□□-10□25	1	ø17	265	11.0	1.70 (1.77)	1.74 (1.81)
1.6 MPa	SGC(A)22□□-16□10	3/8	ø 9	30	1.25	0.69 (0.74)	0.73 (0.78)
	SGC(A)22□□-16□15	1/2	ø 9	64	2.7	0.69 (0.74)	0.73 (0.78)
	SGC(A)32□□-16□20	3/4	ø12	109	4.5	1.04 (1.11)	1.08 (1.15)
	SGC(A)42□□-16□25	1	ø15	174	7.3	1.70 (1.77)	1.74 (1.81)

* (): Weight including the bracket

* Add the weight of an auto switch and a bracket additionally.

JIS Symbol

Type of actuation	Normally closed	Normally open
Air operated type	SGCA□21□ 	SGCA□22□
	SGC□21□ 	SGC□22□

Valve Specification

Operating fluid	Coolant	
Fluid temperature	SGC□□□□A, B	-5 to 60°C*
Ambient temperature	-5 to 50°C*	
Proof pressure	2.4 MPa	
Leakage from the valve seat	20 cm ³ /min or less (water pressure)	
Operating pressure range	SGC□□□□-05	0 to 0.5 MPa
	SGC□□□□-10	0 to 1 MPa
	SGC□□□□-16	0 to 1.6 MPa
External air operated	Pres- sure	SGC□□□1 SGC□□□2
	Lubrication	0.25 to 0.7 MPa 0.5 MPa specification: 0.25 MPa to 0.7 MPa 1.0, 1.6 MPa specification: 0.3 MPa to 0.7 MPa
	Temperature	Not required (Use turbine oil Class 1 (ISO VG32), if lubricated). -5 to 50°C*

* No freezing

Pilot Solenoid Valve Specification

Pilot solenoid valve specification	V116-□□□-1	
Electrical entry	Conduit terminal, DIN terminal, M12 connector	
Coil rated voltage V	DC AC (50/60 Hz)	
	12 V, 24 V 100 V, 110 V, 200 V, 220 V	
Allowable voltage fluctuation	±10% of rated voltage*	
Power consumption W	DC 0.35 W (With indicator light: 0.58 W)	
Apparent voltage VA	AC	
	100 V	0.78 (With indicator light: 0.87)
	110 V [115 V]	0.86 (With indicator light: 0.97) 0.94 (With indicator light: 1.07)
	200 V	1.15 (With indicator light: 1.30)
	220 V [230 V]	1.27 (With indicator light: 1.46) 1.39 (With indicator light: 1.60)
Surge voltage suppressor	ZNR (Varistor)	
Indicator light	LED (Neon bulb when AC with DIN terminal and M12 connector)	

* In common between 110 VAC and 115 VAC, and between 220 VAC and 230 VAC.

* For 115 VAC and 230 VAC, the allowable voltage is -15% to +5% of rated voltage.

How to Order Pilot Valve

V116-**5****T****Z**-1

① ② ③

① Rated voltage

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3	110 VAC [115 VAC] 50/60 Hz
4	220 VAC [230 VAC] 50/60 Hz
5	24 VDC
6	12 VDC

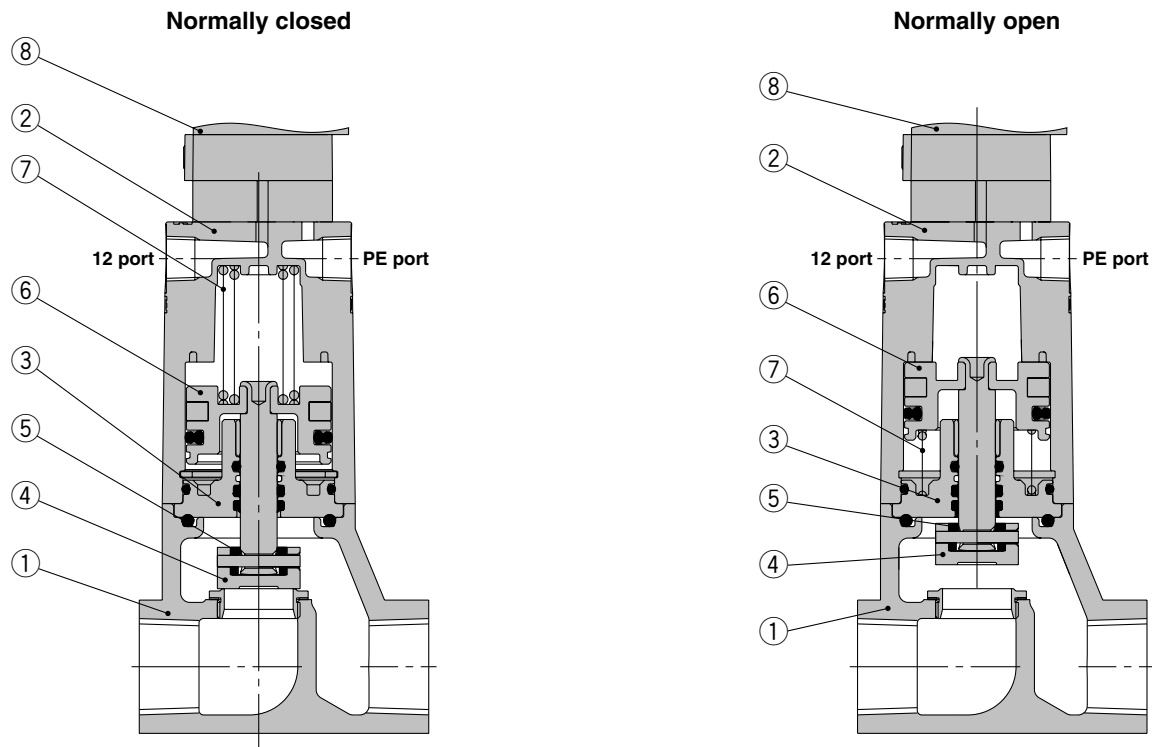
② Electrical entry

T	Conduit terminal
D	DIN terminal (with connector)
DO	DIN terminal (without connector)
W	M12 connector

③ Light / surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light / surge voltage suppressor

Construction



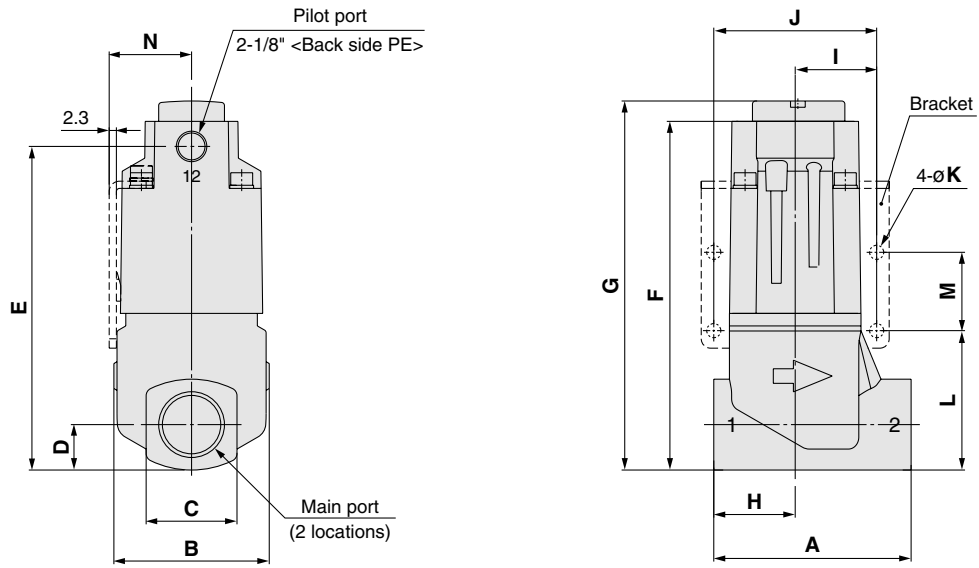
Component Parts

No.	Description	Material	Note
1	Body assembly	Cast iron	Plated
2	Cover assembly	Aluminum die-casted	White
3	Plate assembly	Iron	Valve component, NBR, FKM
4	Valve body	Stainless steel	
5	Valve cover	NBR, FKM	
6	Piston assembly	Stainless steel, Aluminum	
7	Return spring	Stainless steel, Piano wire	
8	Pilot solenoid valve	—	

Series SGC

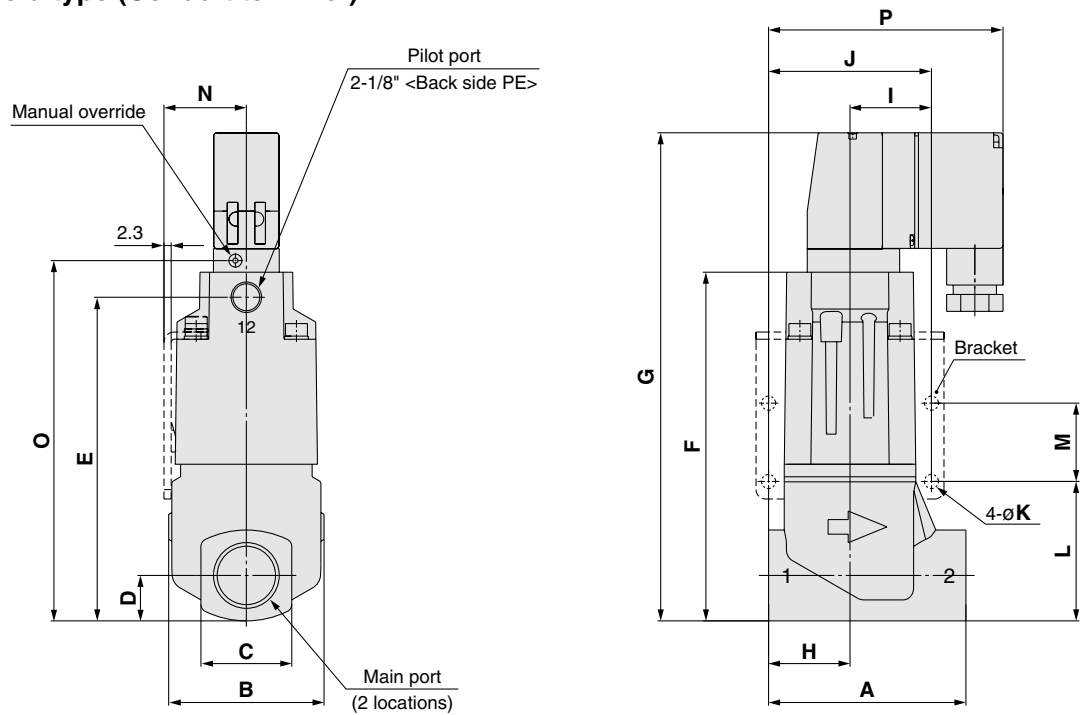
Dimensions

Air operated type



Model	Main port	A	B	C	D	E	F	G	H	I	J	K	L	M	N
SGCA2□□□-□□10	3/8	63	49.6	29	14.5	103.3	111.3	117.8	26	26	52	4.5	44.5	25	26.3
SGCA2□□□-□□15	1/2	63	49.6	29	14.5	103.3	111.3	117.8	26	26	52	4.5	44.5	25	26.3
SGCA3□□□-□□20	3/4	80	59	35	17.5	112	120.5	127	35	31	62	5.5	48	30	31
SGCA4□□□-□□25	1	90	74	44	22	135.9	144.5	151	40	36	72	6.5	60	35	39.5

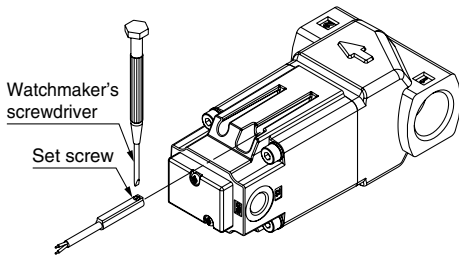
External pilot solenoid type (Conduit terminal)



Model	Main port	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
SGC2□□□-□□10	3/8	63	49.6	29	14.5	103.3	111.3	155.8	26	26	52	4.5	44.5	25	26.3	115	74.9
SGC2□□□-□□15	1/2	63	49.6	29	14.5	103.3	111.3	155.8	26	26	52	4.5	44.5	25	26.3	115	74.9
SGC3□□□-□□20	3/4	80	59	35	17.5	112	120.5	165	35	31	62	5.5	48	30	31	124.2	86.8
SGC4□□□-□□25	1	90	74	44	22	135.9	144.5	189	40	36	72	6.5	60	35	39.5	148.2	97.8

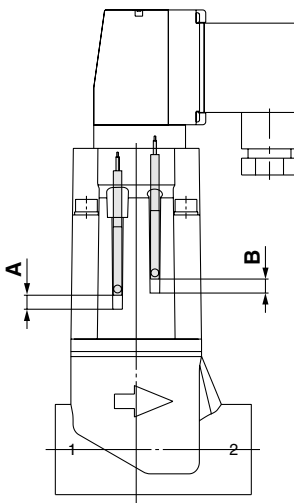
Series SGC

How to Fix an Auto Switch



When tightening an auto switch mounting screw, use a watchmaker's screwdriver with a handle of approximately 5 to 6 mm in diameter. Furthermore, use a tightening torque of approximately 0.10 to 0.20 N•m.

Auto Switch Proper Mounting Position



(mm)

Model		D-M9□	D-F9BAL
SGC(A)2□□□-05□10, 15	A	5	4
	B	5	4
SGC(A)2□□□-10□10, 15	A	6	5
	B	5	4
SGC(A)2□□□-16□10, 15	A	7	6
	B	5	4
SGC(A)3□□□-05□20	A	4	3
	B	4	3
SGC(A)3□□□-10□20	A	6	5
	B	4	3
SGC(A)3□□□-16□20	A	7	6
	B	4	3
SGC(A)4□□□-05□25	A	3	2
	B	3	2
SGC(A)4□□□-10□25	A	6	5
	B	3	2
SGC(A)4□□□-16□25	A	7	6
	B	3	2

* The above dimensions including a mounted auto switch are for reference only. Please be sure that the auto switch works appropriately.

Option

Cable for M12 connector (Female connector with cable)

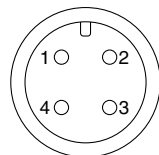
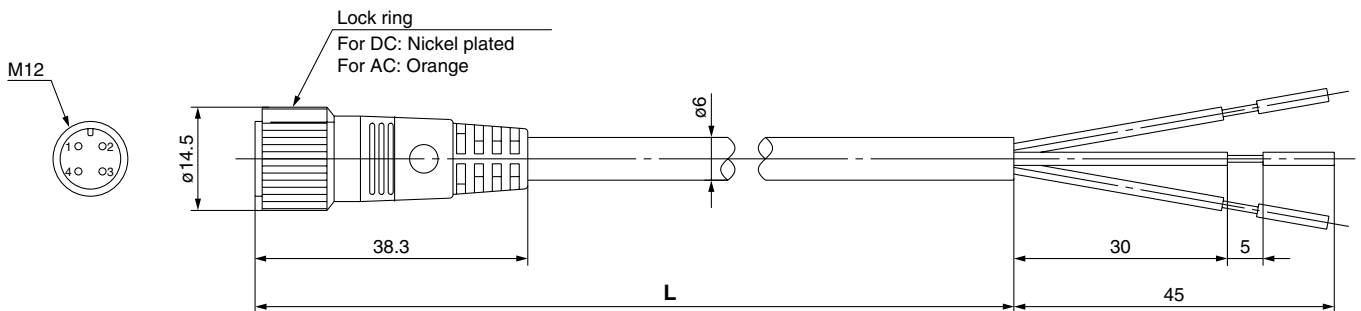
V100—200—**1**—**4**

● Specification

1	For DC
2	For AC

● Cable length (L)

4	1000 [mm]
8	3000 [mm]
9	5000 [mm]



Socket pin connector pin assignment

Terminal no.

Cable colors
Cable cover colors for core wire

1	BROWN: Grounding
2	WHITE: Not used
3	BLUE: Power supply for valve
4	BLACK: Power supply for valve

Connections

Series SGC

Auto Switch Specifications

Auto Switch Common Specifications

Type	Solid state switch
Leakage current	3-wire: 100 μ A or less 2-wire: 0.8 mA or less
Operating time	1 ms or less
Impact resistance	1000 m/s ²
Insulation resistance	50 M Ω or more at 500 VDC Mega (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, JIS C 0920 waterproof construction

Lead Wire Length

Lead wire length indication

(Example) D-M9P **L**

•Lead wire length

Nil	0.5 m
L	3 m
Z	5 m

Note 1) Applicable auto switch with 5 m lead wire "Z"

Solid state switch: Manufactured upon receipt of order as standard.

Note 2) To designate solid state switches with flexible specifications, add "-61" after the lead wire length.

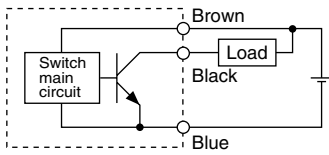
(Example) D-M9PVL- **61**

•Flexible specification

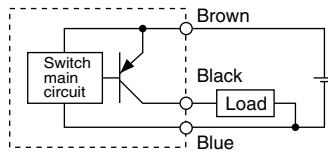
Series SGC Auto Switch Connections and Examples

Basic Wiring

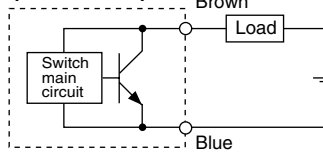
Solid state 3-wire, NPN



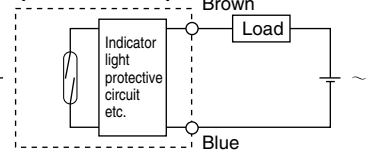
Solid state 3-wire, PNP



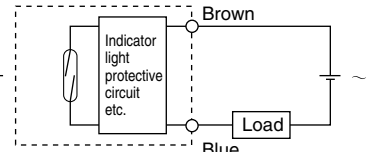
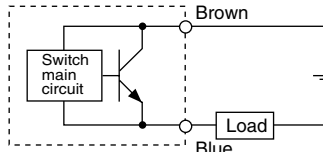
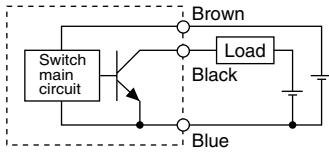
2-wire (Solid state)



2-wire (Reed switch)

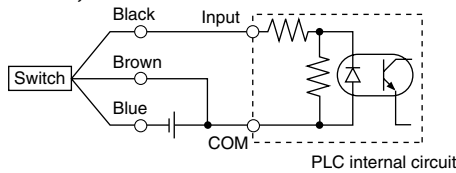


(Power supplies for switch and load are separate.)

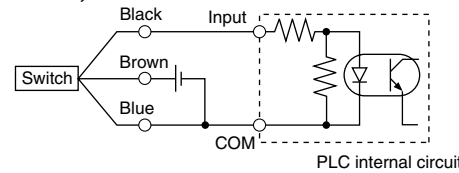


Example of Connection to PLC (Programmable Logic Controller)

• Sink input specifications 3-wire, NPN

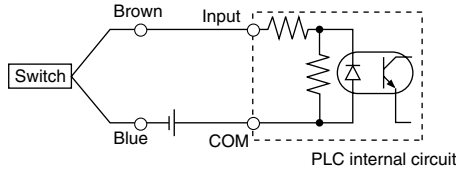


• Source input specifications 3-wire, PNP

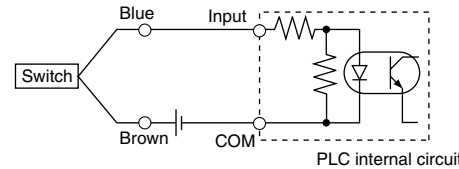


Connect according to the applicable PLC input specifications, since the connection method will vary depending on the PLC input specifications.

2-wire



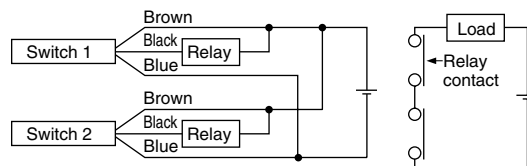
2-wire



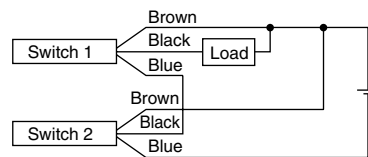
Example of AND (Serial) and OR (Parallel) Connection

• 3-wire

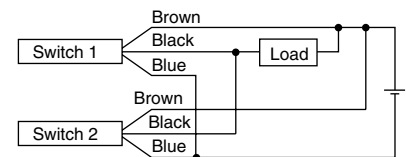
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

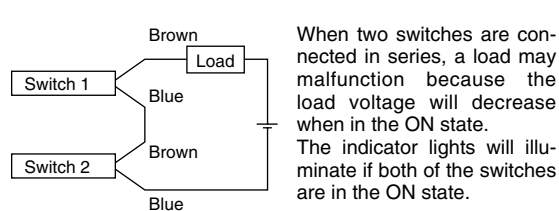


OR connection for NPN output



The indicator lights will illuminate when both switches are turned ON.

2-wire with 2-switch AND connection

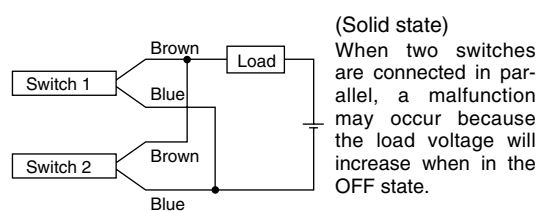


When two switches are connected in series, a load may malfunction because the load voltage will decrease when in the ON state. The indicator lights will illuminate if both of the switches are in the ON state.

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

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

2-wire with 2-switch OR connection



(Solid state)

When two switches are connected in parallel, a malfunction may occur because the load voltage will increase when in the OFF state.

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

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

(Reed switch)

Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light because of the dispersion and reduction of the current flowing to the switches.

Solid State Switch: Direct Mounting Style D-M9N/D-M9P/D-M9B



For details about certified products conforming to international standards, visit us at www.smcworld.com.

Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□ (With indicator light)			
Auto switch part no.	D-M9N	D-M9P	D-M9B
Electrical entry direction	In-line		
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, Relay, PLC		24 VDC relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)		
Current consumption	10 mA or less		
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less		2.5 to 40 mA
Internal voltage drop	0.8 V or less		
Leakage current	100 μA or less at 24 VDC		0.8 mA or less
Indicator light	Red LED illuminates when turned ON.		

Grommet

- 2-wire load current is reduced (2.5 to 40 mA)
- Lead free
- UL certified (style 2844) lead cable is used.



Caution

Operating Precautions

Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied, is used.

Lead wires

Oilproof heavy-duty vinyl cable: 2.7 x 3.2 ellipse

D-M9B 0.15 mm² x 2 cores

D-M9N, D-M9P 0.15 mm² x 3 cores

Note 1) Refer to page 7 for solid state switch common specifications.

Note 2) Refer to page 7 for lead wire lengths.

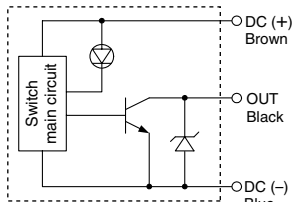
Weight

(g)

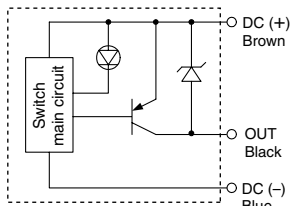
Auto switch part no.		D-M9N	D-M9P	D-M9B
Lead wire length (m)	0.5	8	8	7
	3	41	41	38
	5	68	68	63

Auto Switch Internal Circuit

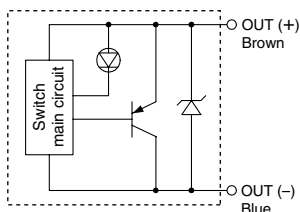
D-M9N



D-M9P



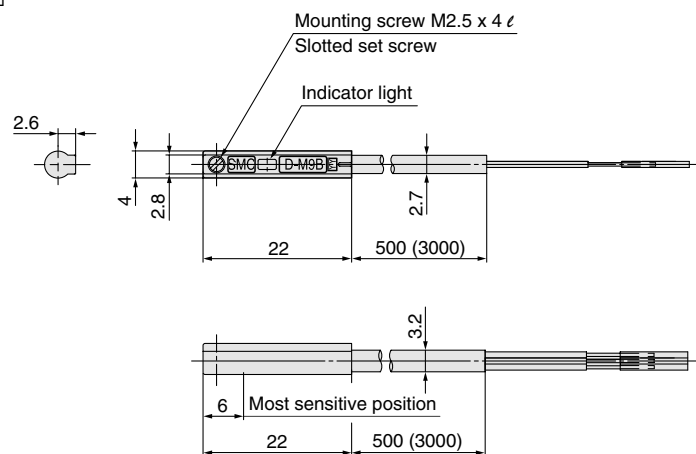
D-M9B



Dimensions

(mm)

D-M9□



Water Resistant 2-color Indication Solid State Switch: Direct Mounting Style D-F9BAL



For details about certified products conforming to international standards, visit us at www.smcworld.com.

Auto Switch Specifications

PLC: Programmable Logic Controller

D-F9BAL (With indicator light)	
Auto switch part no.	D-F9BAL
Wiring type	2-wire
Output type	—
Applicable load	24 VDC relay, PLC
Power supply voltage	—
Current consumption	—
Load voltage	24 VDC (10 to 28 VDC)
Load current	5 to 30 mA
Internal voltage drop	5 V or less
Leakage current	1 mA or less at 24 VDC
Indicator light	Operating position Red LED illuminates. Optimum operating position Green LED illuminates.

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 2.7$, 2 cores (Brown, Blue), 0.18 mm², 3 m
- Note 1) Refer to page 7 for solid state switch common specifications.
- Note 2) Refer to page 7 for lead wire lengths.

Grommet

Water (coolant) resistant type



Caution

Operating Precautions

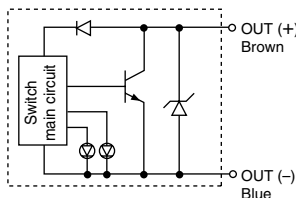
Please consult with SMC if using coolant liquid other than water based solutions.

Weight

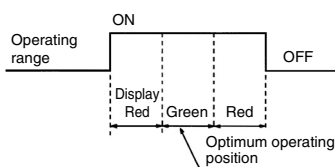
(g)

Auto switch part no.		D-F9BA
Lead wire length (m)	0.5	—
	3	37
	5	57

Auto Switch Internal Circuit



Indicator light/Display method



Dimensions

(mm)

