

● Flow rate

Av factor (For the 0.5 MPa specification)

SGC2 : 155

SGC3 : 284

SGC4 : 440

● Service life: **5** million cycles or more
(based on SMC's test conditions)

● With auto switches for verifying whether the valve is open/closed

● Reduction of environmentally harmful chemical substances, Compliant with **RoHS** Directive

● Power consumption: **0.35 W**
(For 24 VDC)

CE

For 0.5 MPa/1.0 MPa/1.6 MPa

Coolant Valve



Series **SGC**


CAT.EUS70-32A-UK

(For the air operated valve type)

Dry bearings

Prevents the shaft, which is a sliding part, from vibrating and this helps to extend the service life of the rubber components and improves the seal performance of the main valve.

Squeeze seal

Completely shuts off the leakage of liquid coolant and increases the scraper effect. These two safety features result in a dual advantage.

Scraper

Prevents foreign materials from entering, while the main valve is activated.

- Choice of seal materials
NBR, FKM

Auto switch

Able to confirm whether the valve is open/closed.
Mountable on the 2 sides.

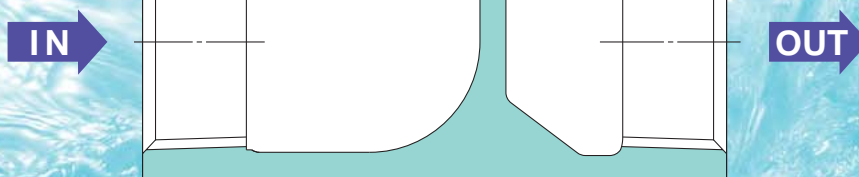


* When a bracket is fitted, auto switches are mounted on the opposite surface.

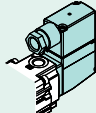
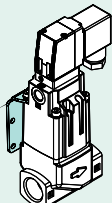
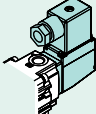
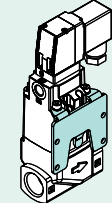
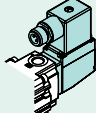

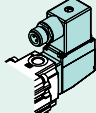

- Magnet

Grease channel

Prevents the loss of grease and helps to extend the service life.

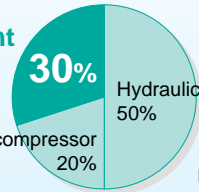


Variation (Common specifications for solenoid valve and air operated valve)

Series	Port size	Thread type	Type of actuation	Operating pressure range MPa	Av factor x 10 ⁻⁶ m ²	Electrical entry (For the solenoid valve type)	Bracket				
SGC2	3/8 (10A)	Rc G (ISO1179) NPT NPTF	N.C. / N.O.	0.5	110	<ul style="list-style-type: none"> • Conduit terminal 	<ul style="list-style-type: none"> • Bracket on the left side 				
				1	85						
				1.6	30						
SGC3	1/2 (15A)			Rc G (ISO1179) NPT NPTF	N.C. / N.O.	0.5	155	<ul style="list-style-type: none"> • DIN terminal 	<ul style="list-style-type: none"> • Bracket on the right side 		
						1	116				
						1.6	64				
SGC4	3/4 (20A)					Rc G (ISO1179) NPT NPTF	N.C. / N.O.	0.5	284	<ul style="list-style-type: none"> • M12 connector 	<ul style="list-style-type: none"> • Bracket on the right side 
								1	170		
								1.6	109		
SGC4	1 (25A)	Rc G (ISO1179) NPT NPTF	N.C. / N.O.					0.5	440	<ul style="list-style-type: none"> • M12 connector 	<ul style="list-style-type: none"> • Bracket on the right side 
								1	265		
								1.6	174		

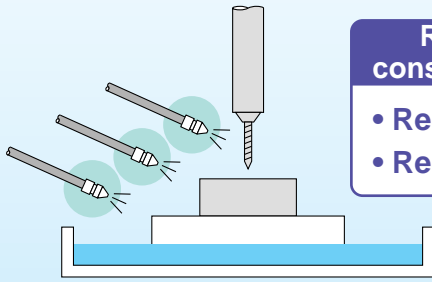
Coolant Flow Energy Saving

Coolant pump



Electric power consumption by purpose (SMC research)

The research has revealed that coolant pumps account for 30% of the electric power consumption in a production facility. By reducing the energy consumed by coolant pumps it will substantially contribute to the reduction of electricity in the whole factory.



Reduction of electric power consumption by the coolant pump

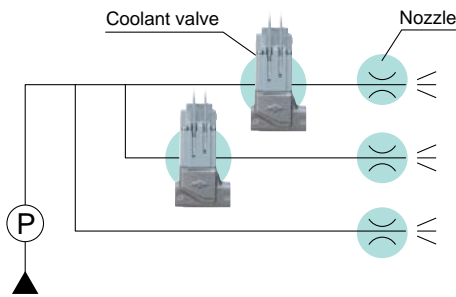
- Reducing the number of pumps
- Reducing the size of pumps

Improvement Example case 1

Improvement of Pressure Loss

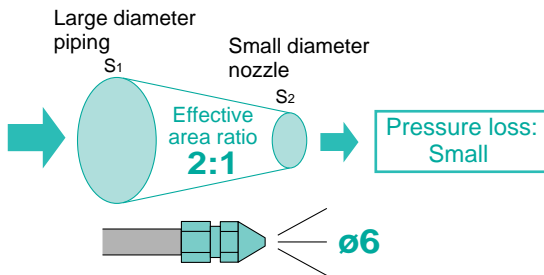
Before improvement

After improvement

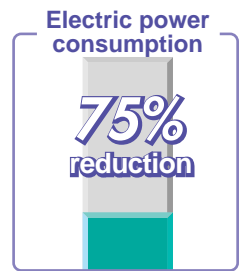
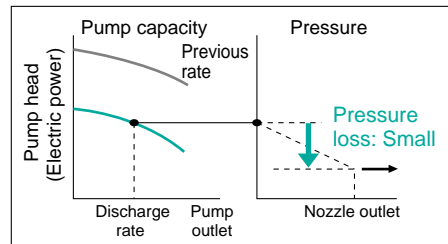


Pressure loss is improved by making the effective area ratio 2 : 1 between the upstream side and the nozzle.

- By making the effective area on the upstream side larger. (Changing to equipment with a larger effective area)
- Attaching a nozzle.

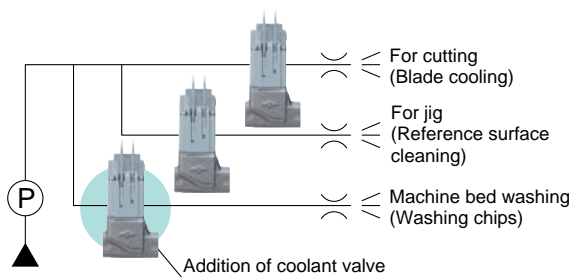


Effect of Energy Saving Improvement



Improvement Example case 2

Intermittent Flow

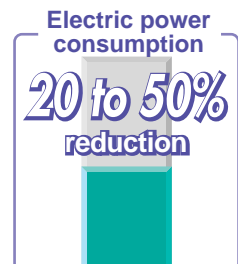
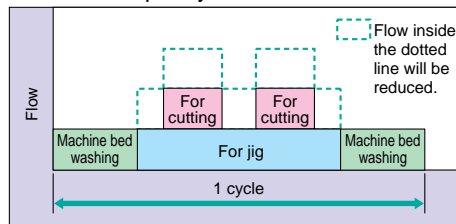
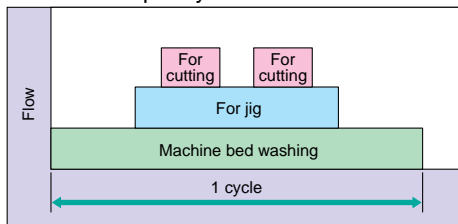


Stop machine bed-washing all the time. Machine bed washing can be stopped when coolant is flowing for cutting or jig by means of an additional valve.

Effect of Energy Saving Improvement

Coolant flow per cycle

Coolant flow per cycle



Coolant Flow System / Related Equipment



Pressure Switches P.15
Coolant line pressure control

- High precision digital pressure switch for general fluids
ISE50
- 2-colour display digital pressure switch
ISE75/75H
- General purpose pressure switch
ISG

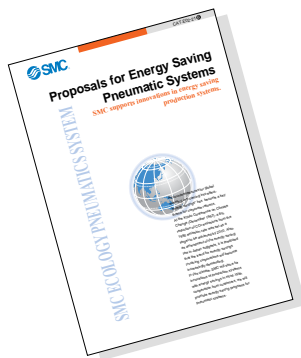
Industrial Filters P.13
Coolant liquid filtration

- Industrial filter
FG
- Bag filter
FGF
- Low maintenance filter
FN

Nozzles for Flow P.12

- Nozzle for blow
KN

Energy Saving Related Material



Proposals for Energy Saving Pneumatic Systems (CAT. E02-21B)

Introducing our energy saving themes including case studies as well as our energy saving related equipment.

Splash Proof Air Cylinders



Splash Proof Air Cylinders (CAT. E244C)

Coolant Valve Series SGC

How to Order

External pilot solenoid

SGC 2 2 1 A 05 10 Y 1 T Z

Air operated

SGCA 2 2 1 A 05 10

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

-	Rc
G	G (ISO1179)
N	NPT
T	NPTF

⑥ Port size

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

⑦ Pilot valve

Y	V116
---	------

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 back page 5 for use when energising for long periods of time.

⑨ Electrical entry

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

⑩ Light / surge voltage suppressor

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

⑪ Manual override

-: Non-locking push type 	D: Push-turn locking lever type
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⑫ Bracket mounting position

-: Without bracket 	B1: Bracket on the left side 	B2: Bracket on the right side
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Note) Bracket cannot be attached later.

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

-	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

-	0.5 m
L	3 m
Z	5 m

* 0.5 m is not available with D-F9BA.

⑮ Number of auto switches

-	2 pcs.
S	1 pc.

Option

(For detail, refer to page 6.)

Cable for M12 connector

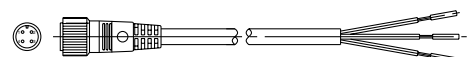
V100-200-1-4

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

Symbol	Part no.	Electrical entry	Indicator light	Special function	Wiring (Output)	Load voltage		Applicable load	
						DC	DC	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					Water resistance (2-colour display)			

* 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 0.25 to 0.7 MPa SGC□□□2 0.5 MPa specification: 0.25 MPa to 0.7 MPa 1.0, 1.6 MPa specification: 0.3 MPa to 0.7 MPa
	Lubrication	Not required (Use turbine oil Class 1 (ISO VG32), if lubricated.)
	Temperature	-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	12 V, 24 V	
	AC (50/60 Hz)	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)
		200 V	0.94 (With indicator light: 1.07)
		220 V [230 V]	1.15 (With indicator light: 1.30)
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

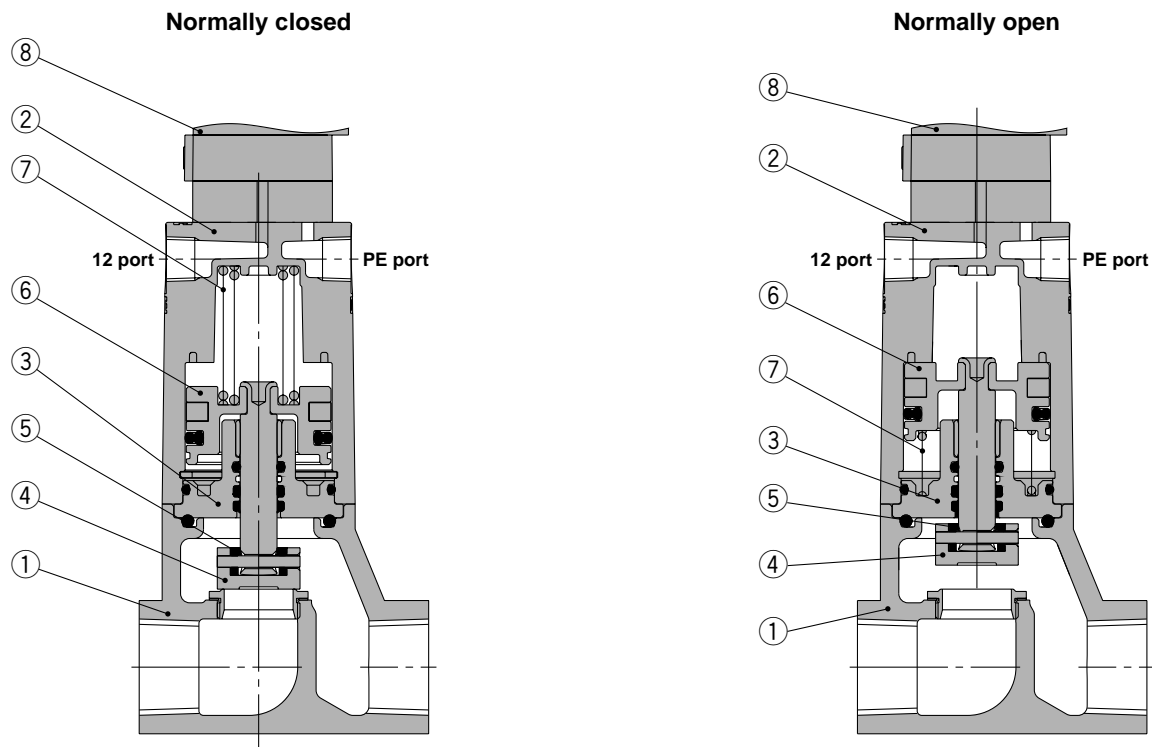
② Electrical entry

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

③ Light / surge voltage suppressor

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

Construction



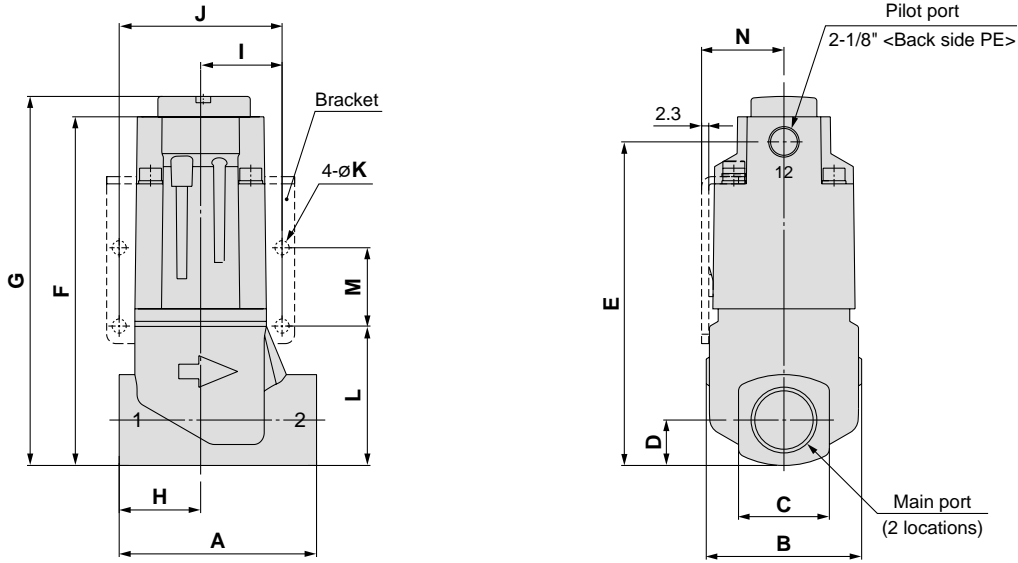
Component Parts

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

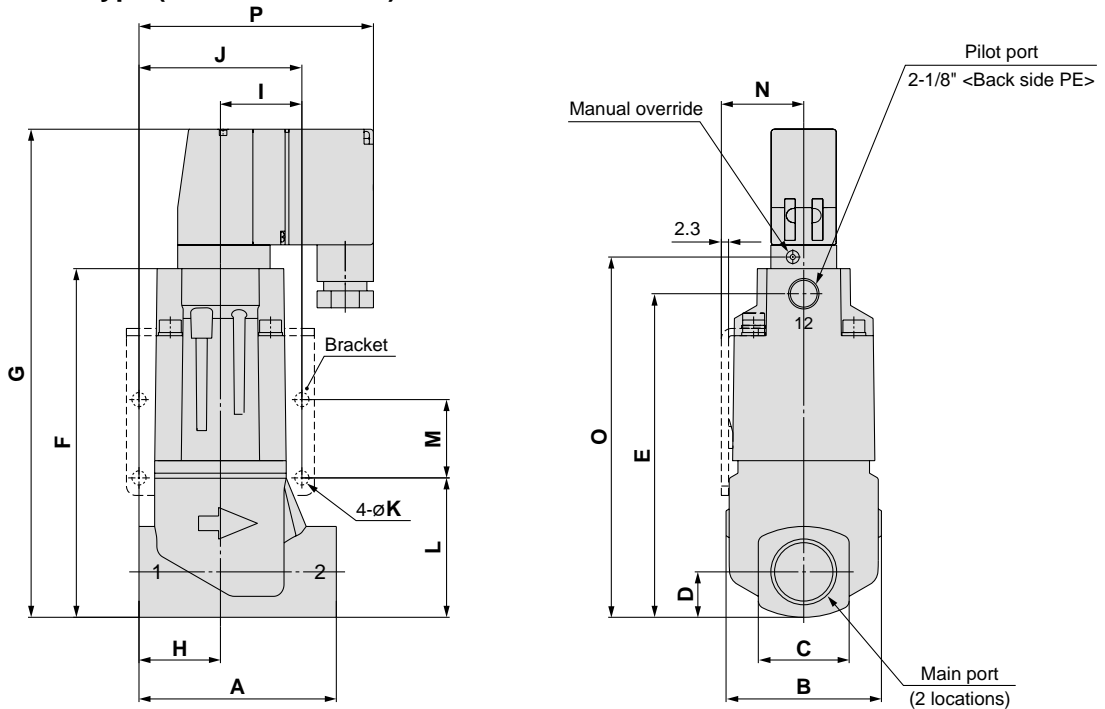
Dimensions

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

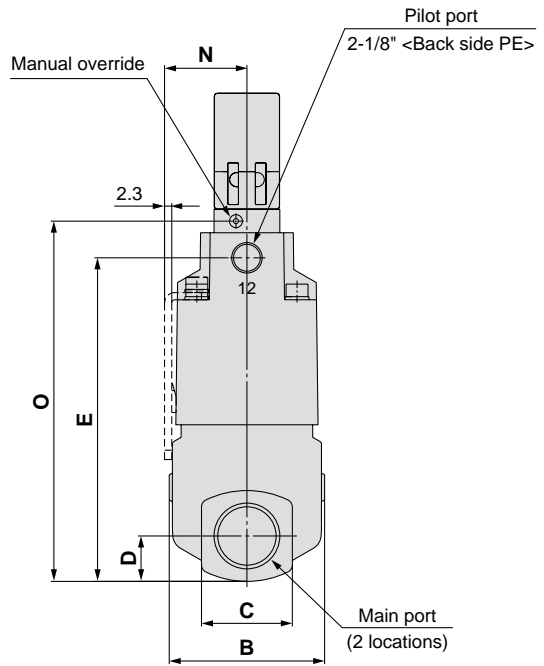
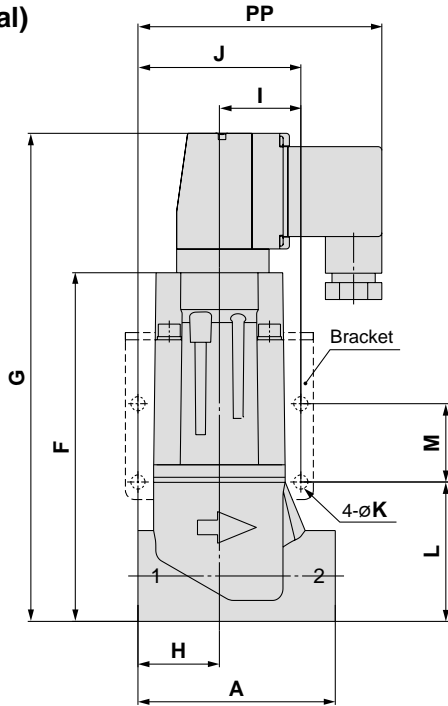
External pilot solenoid type (Conduit terminal)



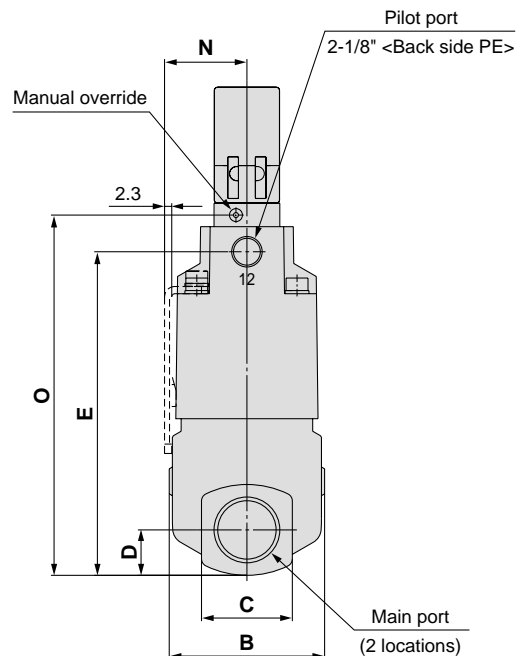
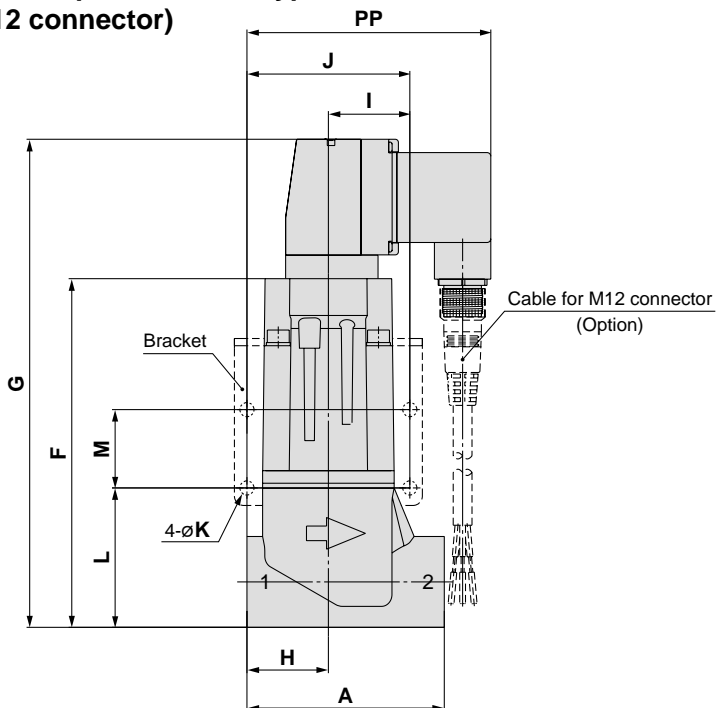
Model	Main port	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
SGC2□□□-□□10	3/8	63	49.6	29	14.5	103.3	111.3	155.8	26	26	52	4.5	44.5	25	26.3	115	74.9
SGC2□□□-□□15	1/2	63	49.6	29	14.5	103.3	111.3	155.8	26	26	52	4.5	44.5	25	26.3	115	74.9
SGC3□□□-□□20	3/4	80	59	35	17.5	112	120.5	165	35	31	62	5.5	48	30	31	124.2	86.8
SGC4□□□-□□25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

Dimensions

**External pilot solenoid type
(DIN terminal)**



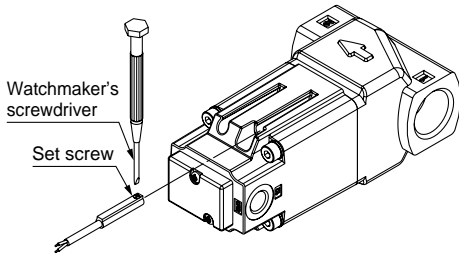
**External pilot solenoid type
(M12 connector)**



Model	Main port	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	PP
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	77.9
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	77.9
SGC3□□□-□□20	3/4	80	59	35	17.5	112	120.5	165	35	31	62	5.5	48	30	31	124.2	83.8
SGC4□□□-□□25	1	90	74	44	22	135.9	144.5	189	40	36	72	6.5	60	35	39.5	148.2	94.8

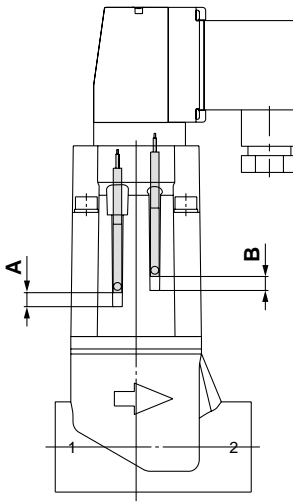
Series SGC

How to Fix an Auto Switch



When tightening the 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 for the proper mounting position of an auto switch are for reference only. Please be sure that the auto switch works appropriately.

Option

Cable for M12 connector (Female connector with cable)

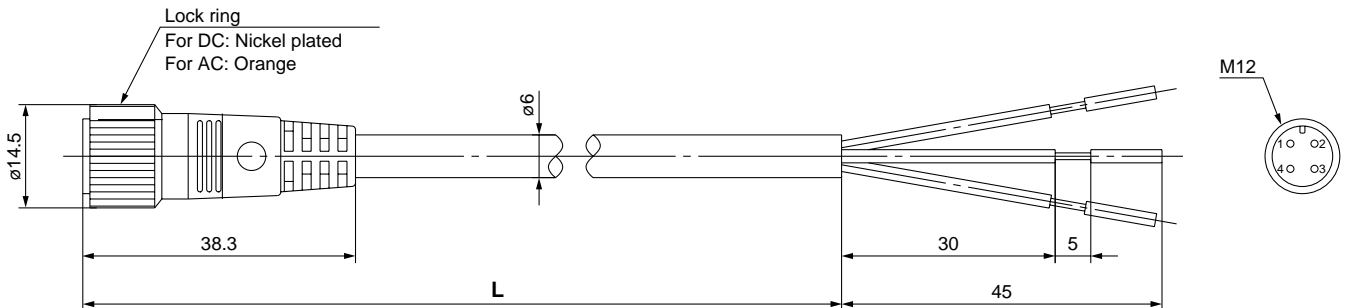
V100-200-1-4

Specification

1	For DC
2	For AC

Cable length (L)

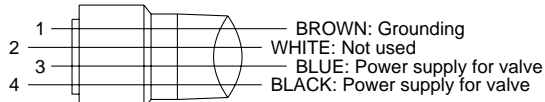
4	1000 [mm]
8	3000 [mm]
9	5000 [mm]



Socket pin connector
pin assignment

Terminal no.

Cable colours
Cable cover colours for core wire



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

-	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.

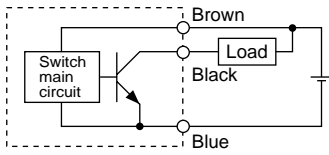
(Example) D-M9PVL- **61**

•Flexible specification

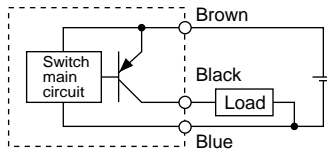
Series SGC Auto Switch Connections and Examples

Basic Wiring

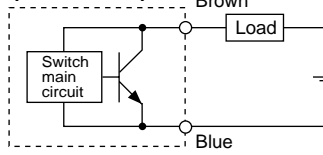
Solid state 3-wire, NPN



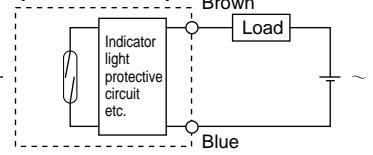
Solid state 3-wire, PNP



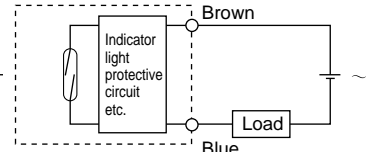
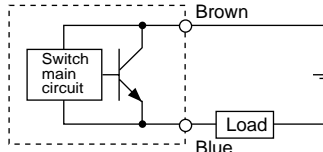
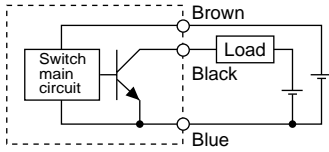
2-wire (Solid state)



2-wire (Reed switch)

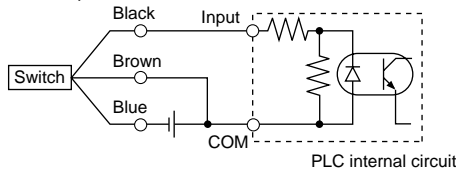


(Power supplies for switch and load are separate.)

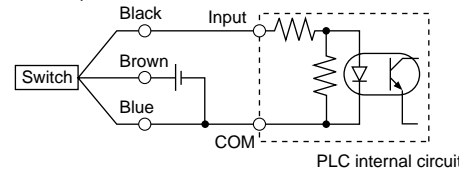


Example of Connection to PLC (Programmable Logic Controller)

• Sink input specifications 3-wire, NPN

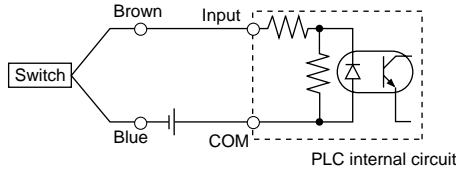


• Source input specifications 3-wire, PNP

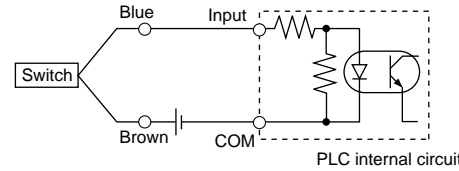


Connect according to the applicable PLC input specifications, since the connection method will vary depending on the PLC input specifications.

2-wire



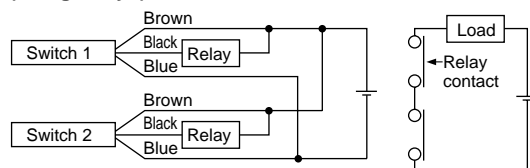
2-wire



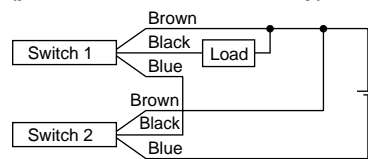
Example of AND (Serial) and OR (Parallel) Connection

• 3-wire

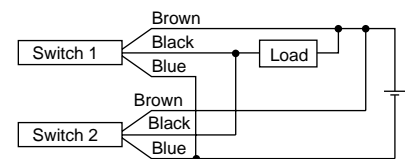
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

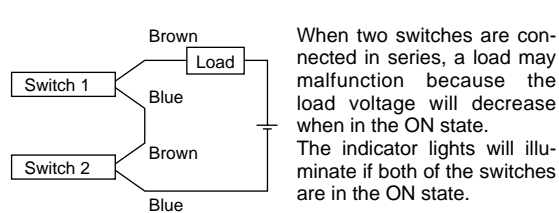


OR connection for NPN output



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

2-wire with 2-switch AND connection

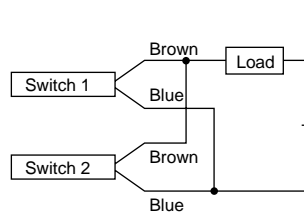


When two switches are connected in series, a load may malfunction because the load voltage will decrease when in the ON state. The indicator lights will illuminate if both of the switches are in the ON state.

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

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.