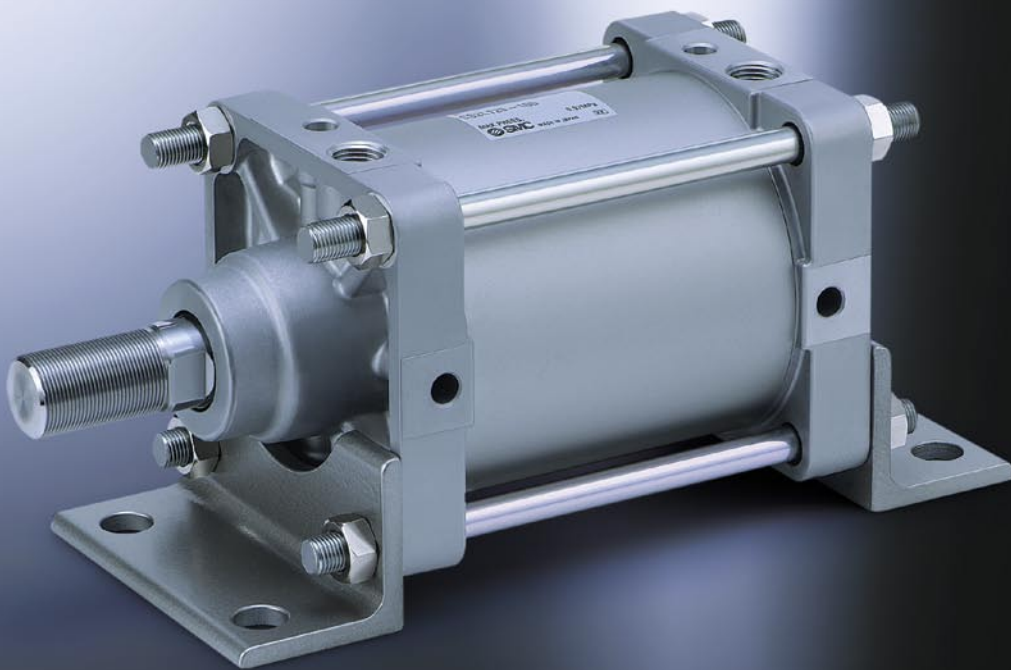


Air Cylinder

Weight: Max. **50%** reduction (Basic: ø125-100st)
Uses aluminum die-castings for
both rod and head covers.



Variation

Series	Actuation	Model	Standard variations		Bore size (mm)	Stroke (mm)
CS2	Double acting	Single rod, Non-lube	With rod boot	Air cushion	125, 140, 160	Max. 1600

Series CS2

Air Cylinder

Series CS2

ø125, ø140, ø160

How to Order

Without auto switch

CS2

With auto switch

CDS2

Mounting

B	Basic
L	Foot
F	Rod flange
G	Head flange
C	Single clevis
D	Double clevis
T	Centre trunnion

Bore size

125	125 mm
140	140 mm
160	160 mm

Cylinder stroke (mm)
(Maximum stroke → Refer to page 2.)

Port thread

-	Rc
TN	NPT
TF	G

Number of auto switches

-	2 pcs.
3	3 pcs.
S	1 pc.
n	"n" pcs.

Auto switch

-	Without auto switch
---	---------------------

* For applicable auto switch models, refer to the below table.

Suffix for cylinder

Rod boot	-	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

* With air cushions on both sides only.

Example order: CS2L125-300-M9BW

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for auto switch. (Example) CDS2B125-200

Applicable Auto Switches / For detailed auto switch specifications, refer to page 14 through to 25.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load			
					DC		AC	Tie-rod mounting	Band mounting	0.5 (-)	1 (M)	3 (L)	5 (Z)					
Reed switch	—	—	Yes	3-wire (NPN equivalent)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—		
			None	2-wire	24 V	12 V	100 V	A93	—	●	—	●	—	—	—		—	
						5 V, 12 V	100 V or less	A90	—	●	—	●	—	—	IC circuit	Relay, PLC		
		12 V				100 V, 200 V	A54	—	●	—	●	●	—	—	PLC			
						—	—	A33	—	—	—	—	—			Relay, PLC		
	100 V, 200 V	—	A34			—	—	—	—	—	—							
Diagnostic indication (2-colour indication)	DIN terminal	—	—	—	—	—	A44	—	—	—	—	—	—	—	—			
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	—	●	○	○	IC circuit	Relay, PLC		
				3-wire (PNP)				M9P	—	●	—	●	○	—				
				2-wire	24 V	12V	M9B	—	●	—	●	○	○	—				
				3-wire (NPN)		5 V, 12 V	—	G39	—	—	—	—	—	IC circuit				
		2-wire		12 V		—	K39	—	—	—	—	—	—					
	Diagnostic indication (2-colour indication)	Terminal conduit		3-wire (NPN)		24 V	5 V, 12 V	—	M9NW	—	●	●	●	○	○		IC circuit	
				3-wire (PNP)					M9PW	—	●	●	●	○	○			
				2-wire	12 V				M9BW	—	●	●	●	○	○		—	
					3-wire (NPN)				5 V, 12 V	M9BA	—	○	○	●	○			○
	3-wire (PNP)	M9NA			—				○	○	●	○	○	IC circuit				
	Water resistant 2-colour indication)	Grommet		4-wire (NPN)	5 V, 12 V				M9PA	—	○	○	○	●	○		○	IC circuit
	Diagnostic indication (2-colour indication)			—	5 V, 12 V				F59F	—	●	—	●	○	○		IC circuit	

* Lead wire length symbols: 0.5 m -
1 m M
3 m L
5 m Z

(Example) M9NW
(Example) M9NWM
(Example) M9NWL
(Example) M9NWZ

* Solid state switches marked with "○" are produced upon receipt of order.
* 1 m (M): D-M9□W, M9□A only.

* Since there are applicable auto switches other than listed, refer to page 13 for details.

* For details about auto switches with pre-wired connector, refer to SMC's "Best Pneumatics" catalogue.

* D-A9□, M9□, M9□W, M9□A are shipped together (but not assembled). (Only switch mounting bracket is assembled at the time of shipment.)

Specifications

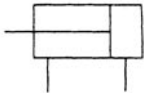


Model	CS2	
Type	Pneumatic (Non-lube)	
Fluid	Air	
Proof pressure	1.57 MPa	
Maximum operating pressure	0.97 MPa	
Minimum operating pressure	0.05 MPa	
Piston speed	50 to 500 mm/s	
Cushion	Air cushion	
Ambient and fluid temperature	0 to 70°C (No freezing) (Built-in magnet / With auto switch: 0 to 60°C)	
Thread tolerance	JIS Class 2	
Stroke length tolerance (mm)	Stroke	Tolerance
	250 or less	+1.0 0
	251 to 1000	+1.2 0
	1001 to 1200	+1.4 0
	1201 to 1400	+1.6 0
	1401 to 1600	+1.8 0
Mounting	Basic, Foot, Rod flange, Head flange, Single clevis, Double clevis, Centre trunnion	

Accessory

JIS Symbol

Double acting



Mounting		Basic	Foot	Rod flange	Head flange	Single clevis	Double clevis	Centre trunnion
Standard equipment	Clevis pin	—	—	—	—	—	●	—
	Rod end nut	●	●	●	●	●	●	●
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (Knuckle pin, Cotter pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Rod Boot Material

Symbol	Material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Maximum Stroke

		(mm)	
Mounting bracket	Bore size	Maximum stroke	
		Basic, Head flange, Single clevis, Double clevis, Centre trunnion	Foot, Rod flange
	125	1000 or less	1600 or less
	140		
	160	1200 or less	

Mounting Bracket Part No.

Bore size (mm)	125	140	160
Foot*	CS2-L12	CS2-L14	CS2-L16
Flange	CS2-F12	CS2-F14	CS2-F16
Single clevis	CS2-C12	CS2-C14	CS2-C16
Double clevis**	CS2-D12	CS2-D14	CS2-D16

* Order two foot brackets per cylinder.

** When ordering the double clevis style, the clevis pin and 2 cotter pins are included as accessories.

Weight

Bore size (mm)		125	140	160
Basic weight	Basic	5.46	6.50	9.07
	Foot	7.49	9.50	12.45
	Rod flange	8.51	12.03	15.80
	Head flange	8.51	12.03	15.80
	Single clevis	8.53	10.79	14.56
	Double clevis	8.99	11.54	15.41
	Trunnion	9.59	12.23	15.47
Additional weight with magnet (With built-in magnet and auto switch)		0.07	0.07	0.08
Additional weight per each 100 mm of stroke		1.55	1.67	2.23
Accessory bracket	Single knuckle	0.91	1.16	1.56
	Double knuckle (With Knuckle pin, Cotter pin)	1.37	1.81	2.48
	Rod end nut	0.16	0.16	0.23

Calculation: (Example)

CS2L160-500

- Basic weight 12.45 (kg)
 - Additional weight 2.23 (kg/100 mm)
 - Cylinder stroke 500 (mm)
- [Calculation] $12.45 + 2.23 \times 500/100 = 23.60$ (kg)

⚠ Precautions

Be sure to read this before handling. For Safety Instructions, refer to the back of page 1. For Common Precautions, refer to “Precautions for Handling Pneumatic Devices” (M-03-E3A)

⚠ Warning

1. Do not use the cylinder as a shock absorber.

Using the cylinder as a shock absorber may cause damage.

2. Do not open the cushion valve beyond the stopper. As a retaining mechanism for the cushion valve, retaining ring is installed, and the cushion valve should not be opened beyond that point.

If not operated in accordance with the above precautions, the cushion valve may be ejected from the cover when air pressure is supplied.

3. Use the air cushion at the end of cylinder stroke.

⚠ Caution

1. Regarding the installation of a knuckle joint

Please contact SMC if a knuckle joint must be installed on the piston rod by using the rod end nut.

Theoretical Output / Double Acting



Unit: N

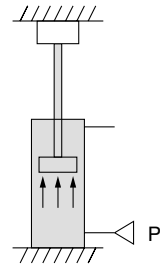
Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	32	OUT	12300	2460	3690	4920	6150	7380	8610	9840	11100	12300
		IN	11500	2300	3450	4600	5750	6900	8050	9200	10400	11500
140	32	OUT	15400	3080	4620	6160	7700	9240	10800	12300	13900	15400
		IN	14600	2920	4380	5840	7300	8760	10200	11700	13100	14600
160	38	OUT	20100	4020	6030	8040	10100	12100	14100	16100	18100	20100
		IN	19000	3800	5700	7600	9500	11400	13300	15200	17100	19000

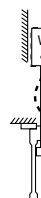
Relationship between Cylinder Size and Maximum Stroke

The table below shows the applicable maximum stroke (in cm units) found by calculation, assuming that the force generated by the cylinder itself acts as a buckling force on the piston rod, or piston rod and cylinder tube.

Therefore, it is possible to find the applicable maximum stroke for each cylinder size using the relationship between the size of the operating pressure and the cylinder support type, regardless of the load ratio.

 [Reference] If it is stopped with the external stopper on the cylinder extension side, even with a light load, the maximum generated force of the cylinder will act on the cylinder itself.

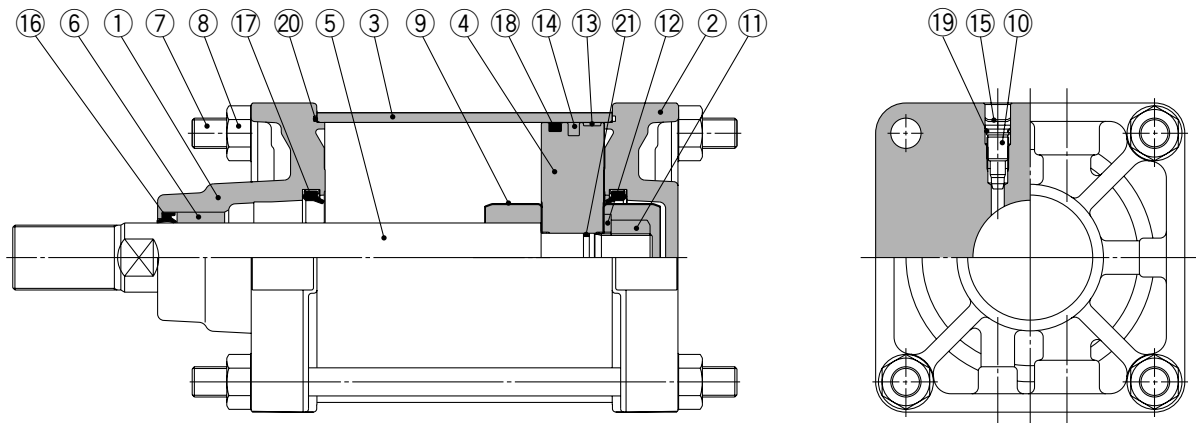


Mounting			Operating pressure (MPa)	Applicable max. stroke according to buckling strength				
Support bracket nominal symbol and schematic diagram		Mounting symbol		125	140	160		
Foot: L	Rod flange: F	Head flange: G	L, F	0.3	103	92	113	
				0.5	79	70	86	
				0.7	66	58	72	
				G	0.3	45	38	47
					0.5	33	27	34
					0.7	26	22	27
Head side trunnion: U	Centre trunnion: U		C, D	0.3	96	83	106	
	CA1, CS1 type only			0.5	71	61	76	
				0.7	59	50	62	
				T	0.3	135	119	147
					0.5	101	89	111
					0.7	84	74	91
Foot: L	Rod flange: F	Head flange: G	L, F	0.3	301	267	330	
				0.5	231	207	253	
				0.7	193	172	212	
				G	0.3	144	126	156
					0.5	109	94	118
					0.7	90	78	97
Foot: L	Rod flange: F	Head flange: G	L, F	0.3	433	386	476	
				0.5	334	297	367	
				0.7	281	250	309	
				G	0.3	210	185	229
					0.5	160	141	175
					0.7	134	117	129

Series CS2

Construction

JIS Symbol



Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-cast	
2	Head cover	Aluminum die-cast	
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston	Aluminum alloy	Chromated
5	Piston rod	Carbon steel	Hard chrome plated
6	Bushing	Oil-impregnated sintered alloy	
7	Tie-rod	Carbon steel	Zinc chromated
8	Tie-rod nut	Rolled steel	Nickel plated
9	Cushion ring	Stainless steel	
10	Cushion valve	Rolled steel	Electroless nickel plated
11	Piston nut	Carbon steel	Nickel plated
12	Flain washer	Carbon steel	Nickel plated
13	Wear ring	Resin	
14	Magnet*	Magnet material	
15	Retaining ring	Spring steel	Phosphate coated

* Built-in magnet type with auto switch

Seal Lists

No.	Description	Material	Note
16	Rod seal	NBR	
17	Cushion seal	Urethane	
18	Piston seal	NBR	
19	Valve seal	NBR	
20	Tube gasket	NBR	
21	Piston gasket	NBR	

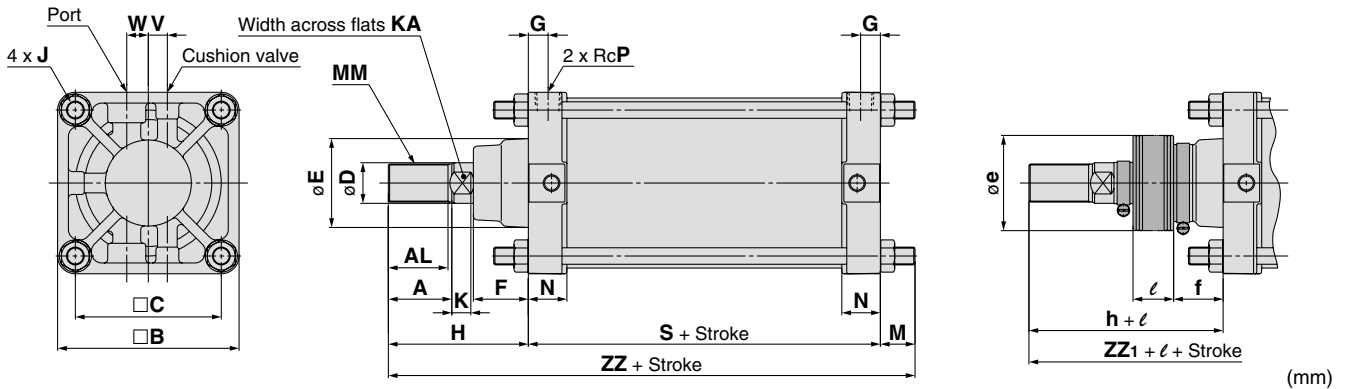
Replacement Parts (Seal Kit)

Bore size (mm)	Kit no.
125	CS2-125A-PS
140	CS2-140A-PS
160	CS2-160A-PS

Dimensions

Basic: CS2B

With rod boot



Bore size (mm)	Stroke range (mm)	A	AL	□B	□C	D	E	F	G	J	V	W	K	KA	M	MM
125	Up to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	27	M30 x 1.5
140	Up to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	27	M30 x 1.5
160	Up to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	30.5	M36 x 1.5

(mm)

Bore size (mm)	N	P	S	Without rod boot		With rod boot				
				H	ZZ	e	f	h	ℓ	ZZ1
125	30.5	1/2	98	110	235	75	40	133	0.2 stroke	258
140	30.5	1/2	98	110	235	75	40	133	0.2 stroke	258
160	34.5	3/4	106	120	256.5	75	40	141	0.2 stroke	277.5

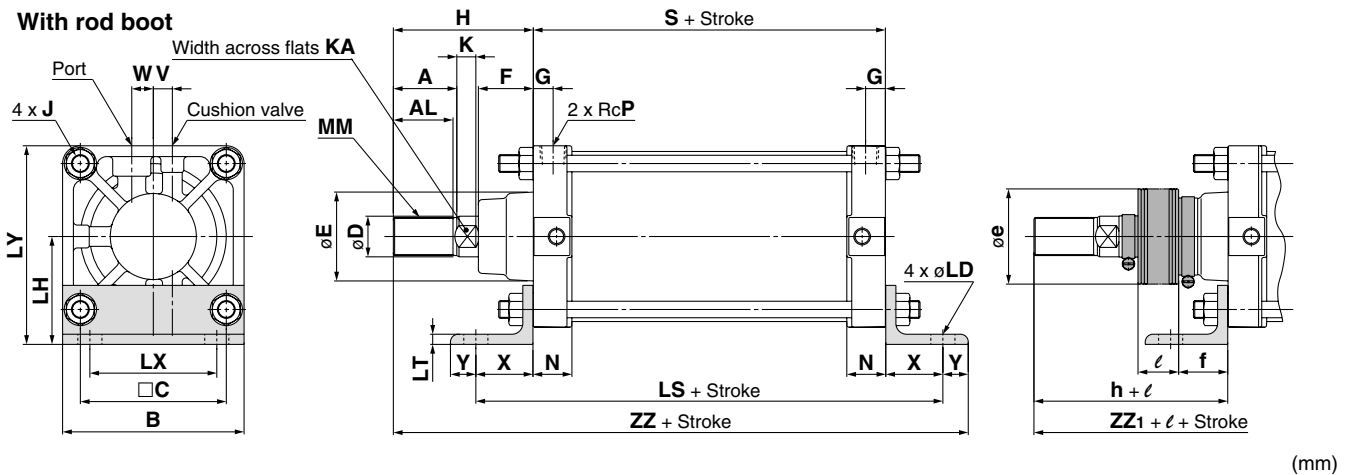
* The minimum stroke with rod boot is 30 mm or more.

** For auto switch mounting position and its mounting height, refer to page 11.

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 12.

Foot: CS2L

With rod boot



Bore size (mm)	Stroke range (mm)	A	AL	B	□C	D	E	F	G	J	V	W	K	KA	LD	LH	LS
125	Up to 1600	50	47	145	115	32	71	43	15	M14 x 1.5	15	17	15	27	19	85	188
140	Up to 1600	50	47	161	128	32	71	43	15	M14 x 1.5	15	17	15	27	19	100	188
160	Up to 1600	56	53	182	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	19	106	206

(mm)

Bore size (mm)	LT	LX	LY	MM	N	P	S	X	Y	Without rod boot		With rod boot				
										H	ZZ	e	f	h	ℓ	ZZ1
125	8	100	156.5	M30 x 1.5	30.5	1/2	98	45	20	110	273	75	40	133	0.2 stroke	296
140	9	112	178.5	M30 x 1.5	30.5	1/2	98	45	30	110	283	75	40	133	0.2 stroke	306
160	9	118	194.5	M36 x 1.5	34.5	3/4	106	50	25	120	301	75	40	141	0.2 stroke	322

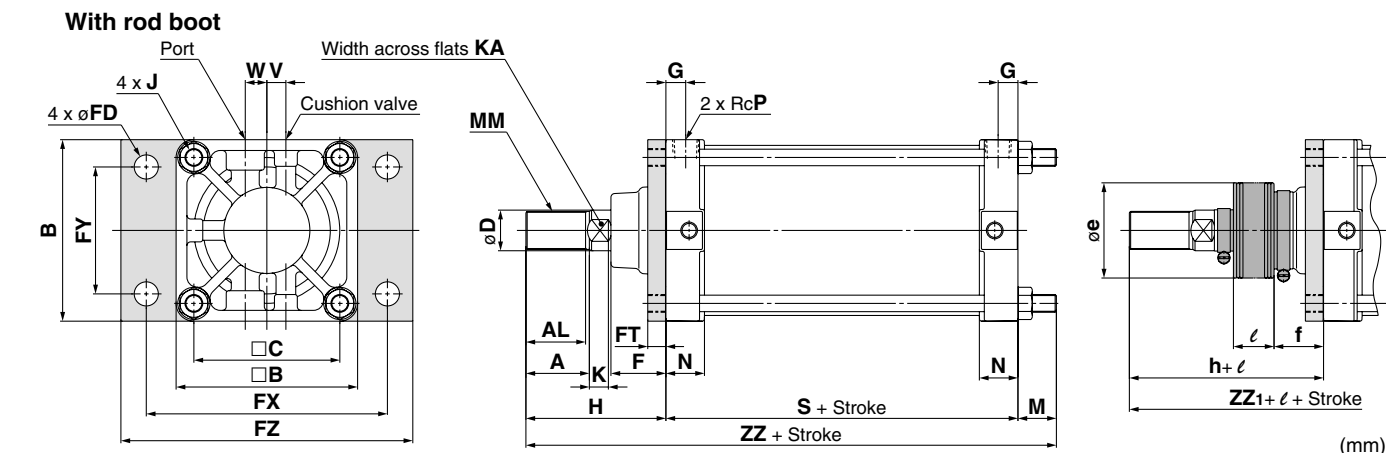
* The minimum stroke with rod boot is 30 mm or more.

** For auto switch mounting position and its mounting height, refer to page 11.

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 12.

Dimensions

Rod flange: CS2F



Bore size (mm)	Stroke range (mm)	A	AL	□B	B	□C	D	E	F	FD	FT	FX	FY	FZ	G	J	V
125	Up to 1600	50	47	143	145	115	32	71	43	19	14	190	100	230	15	M14 x 1.5	15
140	Up to 1600	50	47	157	160	128	32	71	43	19	20	212	112	255	15	M14 x 1.5	15
160	Up to 1600	56	53	177	180	144	38	78.5	42	19	20	236	118	275	18	M16 x 1.5	15

(mm)

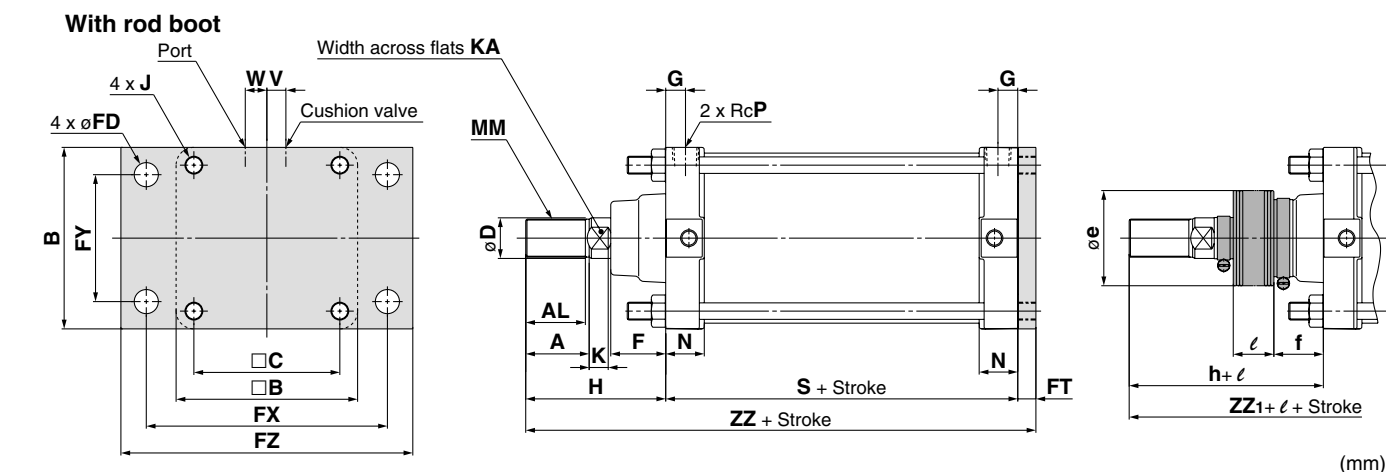
Bore size (mm)	W	K	KA	M	MM	N	P	S	Without rod boot		With rod boot				
									H	ZZ	e	f	h	ℓ	ZZ1
125	17	15	27	13	M30 x 1.5	30.5	1/2	98	110	221	75	40	133	0.2 stroke	244
140	17	15	27	13	M30 x 1.5	30.5	1/2	98	110	221	75	40	133	0.2 stroke	244
160	20	17	34	15	M36 x 1.5	34.5	3/4	106	120	241	75	40	141	0.2 stroke	262

* The minimum stroke with rod boot is 30 mm or more.

** For auto switch mounting position and its mounting height, refer to page 11.

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 12.

Head flange: CS2G



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	□B	B	□C	D	E	F	FD	FT	FX	FY	FZ	G	J	V
125	Up to 1000	50	47	143	145	115	32	71	43	19	14	190	100	230	15	M14 x 1.5	15
140	Up to 1000	50	47	157	160	128	32	71	43	19	20	212	112	255	15	M14 x 1.5	15
160	Up to 1200	56	53	177	180	144	38	78.5	42	19	20	236	118	275	18	M16 x 1.5	15

(mm)

Bore size (mm)	W	K	KA	MM	N	P	S	Without rod boot		With rod boot				
								H	ZZ	e	f	h	ℓ	ZZ1
125	17	15	27	M30 x 1.5	30.5	1/2	98	110	222	75	40	133	0.2 stroke	245
140	17	15	27	M30 x 1.5	30.5	1/2	98	110	228	75	40	133	0.2 stroke	251
160	20	17	34	M36 x 1.5	34.5	3/4	106	120	246	75	40	141	0.2 stroke	267

* The minimum stroke with rod boot is 30 mm or more.

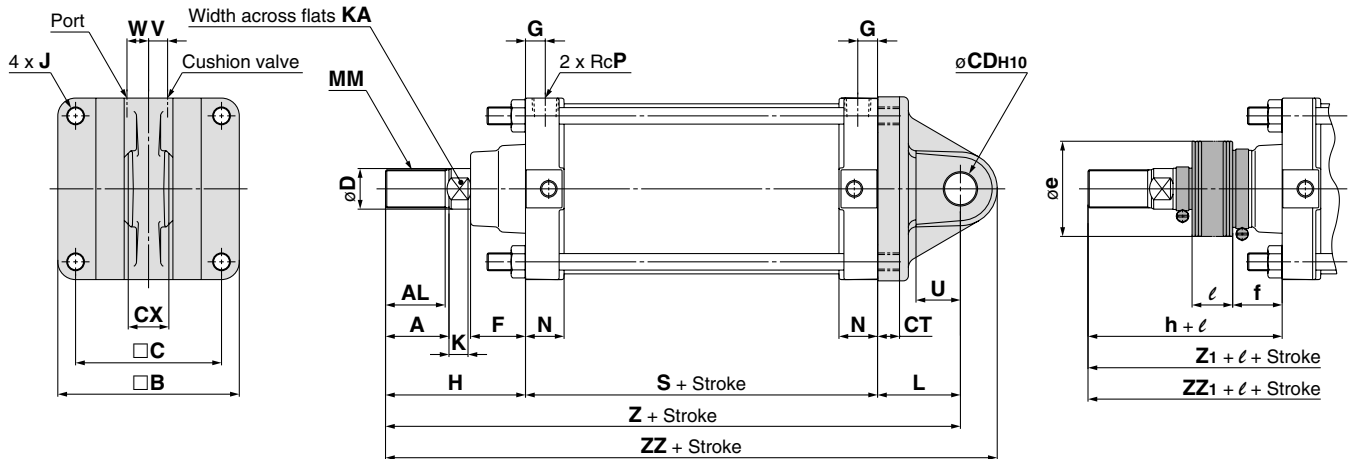
** For auto switch mounting position and its mounting height, refer to page 11.

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 12.

Dimensions

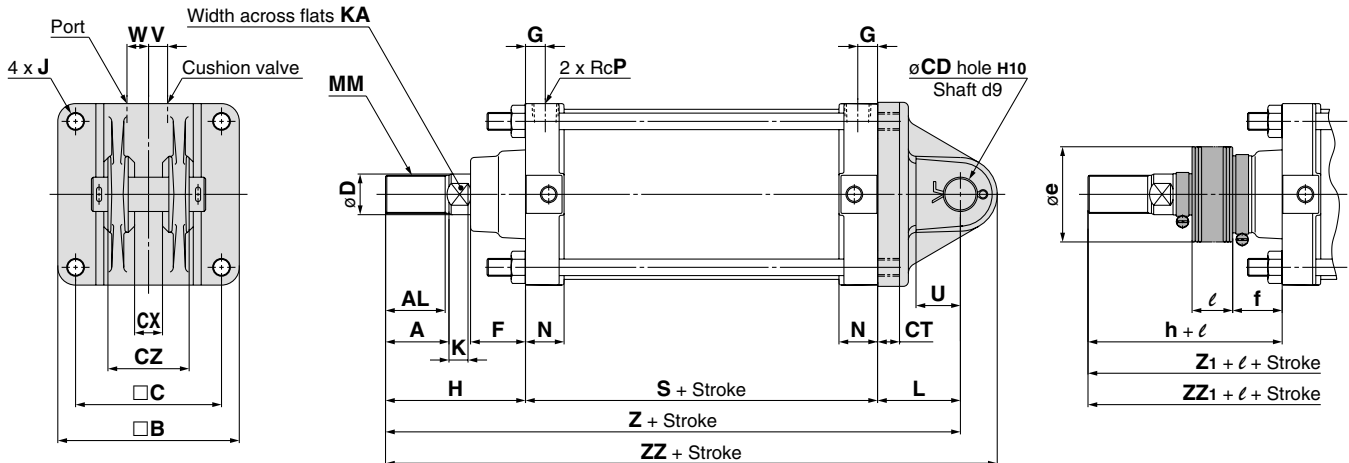
Single clevis: CS2C

With rod boot



Double clevis: CS2D

With rod boot



Bore size (mm)	Stroke range (mm)	A	AL	□B	□C	CDH10	CT	Single clevis			D	E	F	G	J	V	W
								CX	CX	CZ							
125	Up to 1000	50	47	143	115	25 ^{+0.084} ₀	17	32 ^{-0.1} _{-0.3}	32 ^{+0.3} _{-0.1}	64 ⁰ _{-0.2}	32	71	43	15	M14 x 1.5	15	17
140	Up to 1000	50	47	157	128	28 ^{+0.084} ₀	17	36 ^{-0.1} _{-0.3}	36 ^{+0.3} _{-0.1}	72 ⁰ _{-0.2}	32	71	43	15	M14 x 1.5	15	17
160	Up to 1200	56	53	177	144	32 ^{+0.100} ₀	20	40 ^{-0.1} _{-0.3}	40 ^{+0.3} _{-0.1}	80 ⁰ _{-0.2}	38	78.5	42	18	M16 x 1.5	15	20

Bore size (mm)	K	KA	L	MM	N	P	S	U	RR	Without rod boot			With rod boot					
										H	Z	ZZ	e	f	h	ℓ	Z1	ZZ1
125	15	27	65	M30 x 1.5	30.5	1/2	98	35	29	110	273	302	75	40	133	0.2 stroke	296	325
140	15	27	75	M30 x 1.5	30.5	1/2	98	40	32	110	283	315	75	40	133	0.2 stroke	306	338
160	17	34	80	M36 x 1.5	34.5	3/4	106	45	36	120	306	342	75	40	141	0.2 stroke	327	363

* The minimum stroke with rod boot is 30 mm or more.

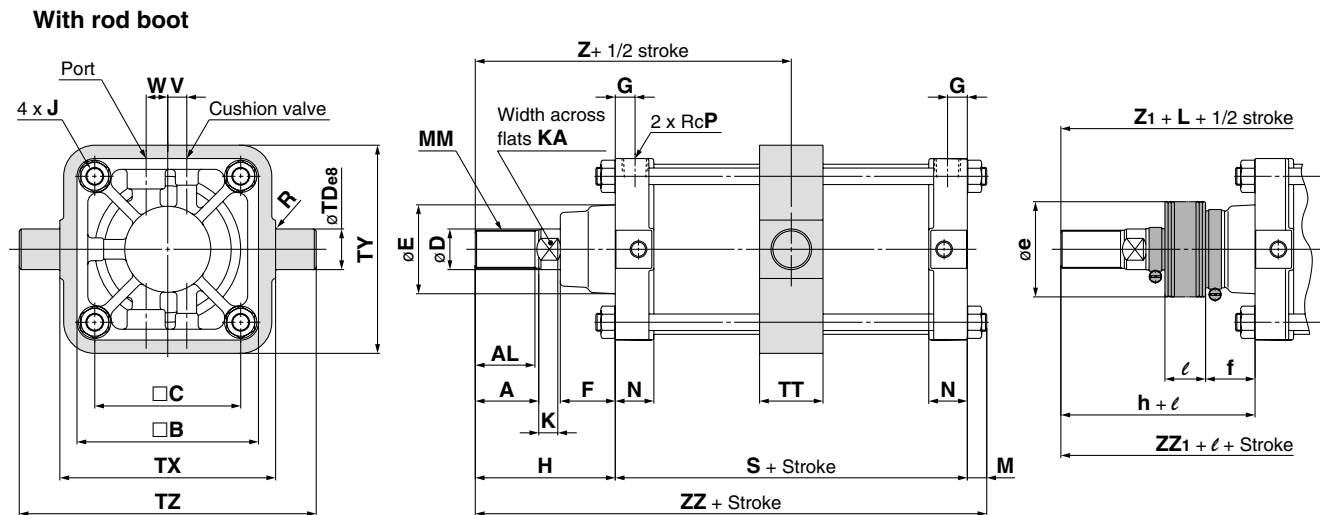
** For auto switch mounting position and its mounting height, refer to page 11.

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 12.

Series CS2

Dimensions

Centre trunnion: CS2T



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	□B	□C	D	E	F	G	J	V	W	K	KA	M	MM	N
125	25 to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5
140	30 to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5
160	35 to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	15	M36 x 1.5	34.5

(mm)

Bore size (mm)	P	R	S	TDø8	TT	TX	TY	TZ	Without rod boot			With rod boot					
									H	Z	ZZ	e	f	h	ℓ	Z ₁	ZZ ₁
125	1/2	1	98	32 ^{-0.050 -0.089}	50	170	164	234	110	159	221	75	40	133	0.2 stroke	182	244
140	1/2	1.5	98	36 ^{-0.050 -0.089}	55	190	184	262	110	159	221	75	40	133	0.2 stroke	182	244
160	3/4	1.5	106	40 ^{-0.050 -0.089}	60	212	204	292	120	173	241	75	40	141	0.2 stroke	194	262

* The minimum stroke with rod boot is 30 mm or more for ø125, ø140, and 35 mm or more for ø160.

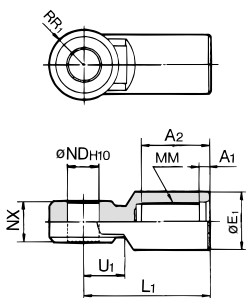
** For auto switch mounting position and its mounting height, refer to page 11.

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 12.

Air Cylinder / Series CS2

Accessory Bracket

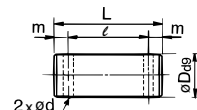
I Type Single Knuckle Joint*



Material: Cast iron

Part no.	Applicable bore size (mm)	A ₁	A ₂	E ₁	L ₁	MM	ND _{H10}	NX	RR ₁	U ₁
I-12A	125	8	54	46	100	M30 x 1.5	25 ^{+0.084} ₀	32 ^{-0.1} _{-0.3}	27	33
I-14A	140	8	54	48	105	M30 x 1.5	28 ^{+0.084} ₀	36 ^{-0.1} _{-0.3}	30	39
I-16A	160	8	60	55	110	M36 x 1.5	32 ^{+0.1} ₀	40 ^{-0.1} _{-0.3}	34	39

Knuckle Pin / Clevis Pin

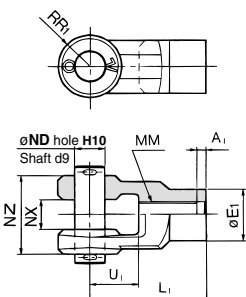


Material: Carbon steel

Part no.	Applicable bore size (mm)	Dd9	L	ℓ	m	d (Drill through)	Applicable cotter pin
IY-12	125	25 ^{-0.065} _{-0.117}	79.5	69.5	5	4	ø4 x 40
IY-14	140	28 ^{-0.065} _{-0.117}	86.5	76.5	5	4	ø4 x 40
IY-16	160	32 ^{-0.080} _{-0.142}	94.5	84.5	5	4	ø4 x 40

* Cotter pin is included.

Y Type Double Knuckle Joint*

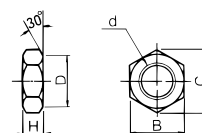


Material: Cast iron

Part no.	Applicable bore size (mm)	A ₁	E ₁	L ₁	MM	ND _{H10}	NX	NZ	RR ₁	U ₁
Y-12A	125	8	46	100	M30 x 1.5	25 ^{-0.084} ₀	32 ^{+0.3} _{+0.1}	64 ^{-0.1} _{-0.3}	27	42
Y-14A	140	8	48	105	M30 x 1.5	28 ^{-0.084} ₀	36 ^{+0.3} _{+0.1}	72 ^{-0.1} _{-0.3}	30	47
Y-16A	160	8	55	110	M36 x 1.5	32 ^{-0.1} ₀	40 ^{+0.3} _{+0.1}	80 ^{-0.1} _{-0.3}	34	46

- * Use a single knuckle joint or a double knuckle joint individually.
(Screw it entirely over the rod end threads and tighten it.)
- * Extend the dimensions A, H, when using a single/double knuckle joint together with a rod end nut.
(To extend dimensions A, H, refer to the table below, and specify the product as made-to-order -XAO.)
- * A pin and cotter pin are included with the double knuckle joint.

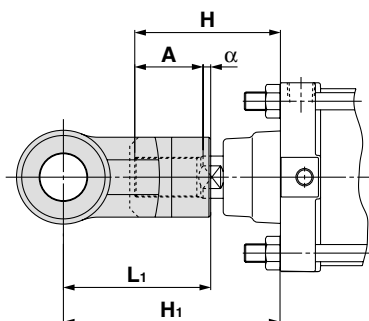
Rod End Nut



Material: Rolled steel

Part no.	Applicable bore size (mm)	d	H	B	C	D
NT-12	125/140	M30 x 1.5	18	46	53.1	44
NT-16	160	M36 x 1.5	21	55	63.5	53

Single/Double Knuckle Joint



Symbol	H	A	α	L ₁	H ₁	Applicable knuckle joint part number	
Bore size (mm)						I type single knuckle	Y type double knuckle
125	110	50	3.5	100	156.5	I-12A	Y-12A
140	110	50	3.5	105	161.5	I-14A	Y-14A
160	120	56	3.5	110	170.5	I-16A	Y-16A

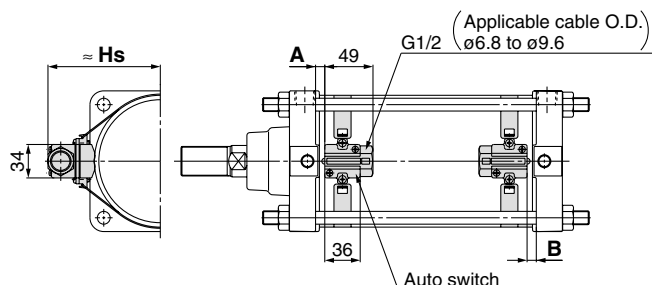
A, H Dimensions when Mounting a Single/Double Knuckle Joint together with a Rod End Nut

Bore size (mm)	A	H
125	65	125
140	65	125
160	76	140

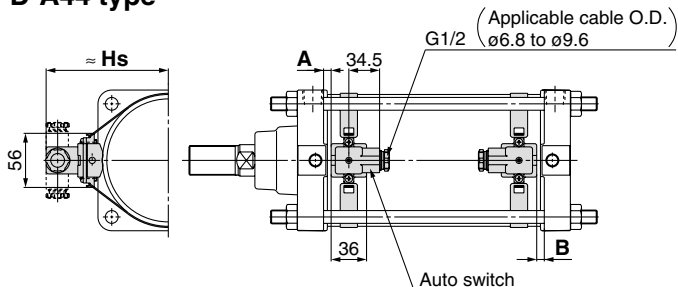
Auto Switch Proper Mounting Position (Detection at stroke end) and Its Mounting Height

<Band mounting>

D-A3□ type
D-G3/K3 type



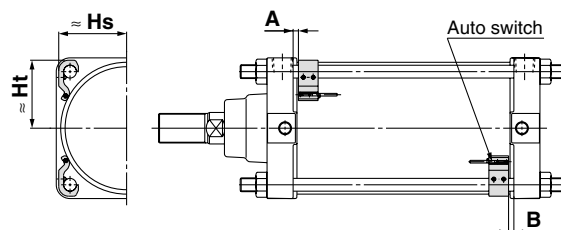
D-A44 type



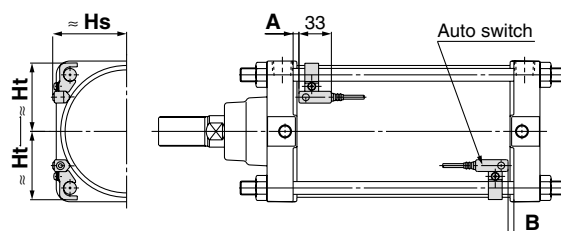
* The indicator light faces the inside.

<Tie-rod mounting>

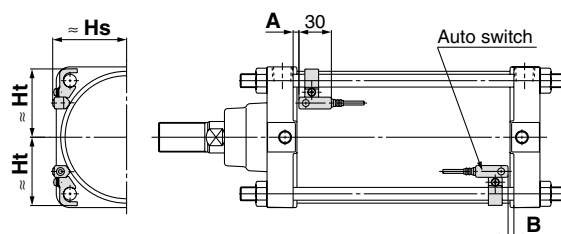
D-A9□/A9□V type D-Z7□/Z80 type
D-M9□/M9□V type D-Y59□/Y69□/Y7P/Y7PV type
D-M9□W/M9□WV type D-Y7□W/Y7□WV type
D-M9□A/M9□AV type D-Y7BAL type



D-A5□/A6□ type



D-F5□/J5□/D-F5NTL type
D-F5BAL/F59F type
D-F5□W/J59W type



Auto Switch Proper Mounting Position

(mm)

Auto switch model	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV		D-M9□A D-M9□V D-M9□AV		D-Z7□/Z80 D-Y5□/Y6□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BAL		D-A3□ D-A5□ D-A6□ D-A44 D-G39 D-K39		D-A59W		D-F5□W D-J59W D-F5BAL D-F5□ D-J5□ D-F59F		D-F5NTL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bore size 125	9	8	13	12	13	12	6.5	5.5	3	2	7	6	9.5	8.5	14.5	13.5
140	9	8	13	12	13	12	6.5	5.5	3	2	7	6	9.5	8.5	14.5	13.5
160	9	8	13	12	13	12	6.5	5.5	3	2	7	6	9.5	8.5	14.5	13.5

* Provided as guidelines for auto switch proper mounting position (detection at stroke end). When setting an auto switch, confirm the operation and adjust its mounting position.

Auto Switch Mounting Height

(mm)

Auto switch model Bore size	D-A9□(V) D-M9□ D-M9□W D-M9□A		D-M9□V D-M9□WV D-M9□AV		D-Z7□/Z80 D-Y5□/Y6□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BAL		D-A3□ D-G39 D-K39		D-A44		D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F5□W D-J59W D-F5BAL D-F59F D-F5NTL	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Hs	Hs	Hs	Ht	Hs	Ht	
125	69	69.5	71.5	69.5	69	69.5	116	126	75.5	69.5	74.5	70		
140	76	76	77.5	76	76	76	124	134	81	76.5	80	76.5		
160	85	85	86	85	85	85	134.5	144.5	89	87.5	88	87.5		

Minimum Stroke for Auto Switch Mounting

n: Number of auto switches (mm)

Auto switch model	Number of auto switches mounted	Mounting brackets other than centre trunnion	Centre trunnion		
			ø125	ø140	ø160
D-A9□	With 2 pcs. (Different side, Same side), With 1 pc.	15	100	105	110
	With n pcs.	$15 + 35 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$100 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$105 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-A9□V	With 2 pcs. (Different side, Same side), With 1 pc.	10	75	80	85
	With n pcs.	$10 + 25 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$75 + 25 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$80 + 25 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 25 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□ D-M9□W	With 2 pcs. (Different side, Same side), With 1 pc.	15	105	110	115
	With n pcs.	$15 + 35 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$105 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$115 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□V D-M9□WV	With 2 pcs. (Different side, Same side), With 1 pc.	10	80	85	90
	With n pcs.	$10 + 20 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$80 + 20 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$85 + 20 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$90 + 20 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□A	With 2 pcs. (Different side, Same side), With 1 pc.	20	115	120	120
	With n pcs.	$20 + 35 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$115 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$120 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$120 + 35 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-M9□AV	With 2 pcs. (Different side, Same side), With 1 pc.	15	90	95	95
	With n pcs.	$15 + 25 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$90 + 25 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 25 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 25 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-A5□/A6□ D-A59W D-F5□/J5□ D-F5□W/J59W D-F5BAL/F59F	With 2 pcs. (Different side, Same side), With 1 pc.	25	125	135	
	With n pcs. (Same side)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$125 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$135 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	
D-F5NTL	With 2 pcs. (Different side, Same side), With 1 pc.	35	145	155	
	With n pcs. (Same side)	$35 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$145 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$155 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	
D-A3□ D-G39 D-K39	With 2 pcs.	Different sides	35	110	
		Same side	100		
	With n pcs.	Different sides	$35 + 30 (n-2)$	$110 + 30 (n-2)$ (n = 2, 4, 6, 8...)	
		Same side	$100 + 100 (n-2)$	$110 + 100 (n-2)$ (n = 2, 4, 6, 8...)	
D-A44	With 2 pcs.	With 1 pc.	15	110	
		Different sides	35		
		Same side	55	110	
	With n pcs.	Different sides	$35 + 30 (n-2)$	$110 + 30 (n-2)$ (n = 2, 4, 6, 8...)	
		Same side	$55 + 55(n-2)$	$110 + 50 (n-2)$ (n = 2, 4, 6, 8...)	
	With 1 pc.		15	110	
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	With 2 pcs. (Different side, Same side), With 1 pc.	15	105	110	115
	With n pcs.	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-Y69□ D-Y7PV D-Y7□WV	With 2 pcs. (Different side, Same side), With 1 pc.	10	90	95	100
	With n pcs.	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$95 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$100 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)
D-Y7BAL	With 2 pcs. (Different side, Same side), With 1 pc.	20	115	120	125
	With n pcs.	$20 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)	$115 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$120 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)	$125 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)

Operating Range

Auto switch model	Bore size (mm)		
	125	140	160
D-A9□/A9□V	12	12.5	11.5
D-M9□/M9□V	4	4.5	4.5
D-M9□W/M9□WV	6	6.5	6.5
D-M9□A/M9□AV	6	6.5	6.5
D-Z7□/Z80	14	14.5	13
D-A3□/A44	16	16	16
D-A5□/A6□	13.5	13.5	13.5
D-A59W	17	17	17
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BAL	12	13	7
D-F5□/J5□/F5□W D-J59W/F5BAL D-F5NTL/F59F	5	5	5.5
D-G39/K39	11	11	10

* Since this is a guideline including hysteresis, not meant to be guaranteed.
(Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)		
	ø125	ø140	ø160
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	BS5-125	BS5-125	BS5-160
D-A5□/A6□ D-A59W D-F5□/J5□ D-F5NTL D-F5□W/J59W D-F5BAL/F59F	BT-12	BT-12	BT-16
D-A3□/A44 D-G39/K39	BS1-125	BS1-140	BS1-160
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BAL	BS4-125	BS4-125	BS4-160

[Mounting screws set made of stainless steel]

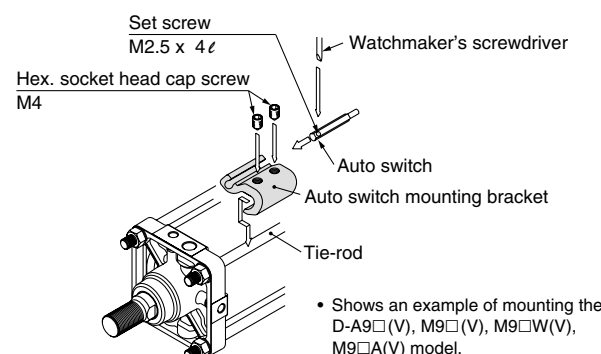
The following set of mounting screws made of stainless steel (including set screws) is also available. Use it in accordance with the operating environment. (Please order the switch mounting bracket separately, since it is not included.)

BBA1: For D-A5, A6, F5, J5 type

"D-F5BAL" switch is set on the cylinder with the stainless steel screws above when shipped.

When only a switch is shipped independently, "BBA1" screws are attached.

Note) When using the D-M9□A or Y7BAL model, do not use the steel set screw which is included with the switch mounting bracket in the above table (BS5-□□□, BS4-□□□). Please separately prepare the stainless steel screw set (BBA1), and select and use the M4 x 8L stainless steel set screw included in BBA1.



Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted. For detailed specifications, refer to SMC's "Best Pneumatics" catalogue, etc.

Type	Model	Electrical entry (Direction)	Features
Reed switch	D-A90V	Grommet (Perpendicular)	Without indicator light
	D-A93V, A96V		
	D-Z73, Z76	Grommet (in-line)	—
	D-A53, A56		
	D-A64, A67		Without indicator light
	D-Z80		
Solid state switch	D-F59, F5P, J59	Grommet (in-line)	—
	D-Y59A, Y59B, Y7P		
	D-F59W, F5PW, J59W		2-colour indication
	D-Y7NW, Y7PW, Y7BW		2-colour indication, Water resistant
	D-F5BAL, Y7BAL		With timer
	D-F5NTL		
	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	—
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		2-colour indication
	D-Y7NWV, Y7PWV, Y7BWV		
	D-M9NAV, M9PAV, M9BAV		2-colour indication, Water resistant

* With pre-wired connector is available for solid state auto switches. For details, refer to SMC's "Best Pneumatics" catalogue.

* Normally closed (NC = b contact), solid state switches (D-F9G, F9H, Y7G, Y7H type) are also available. For details, refer to SMC's "Best Pneumatics" catalogue, etc.

Auto Switch Specifications

Auto Switch Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100 μ A or less 2-wire: 0.8 mA or less
Operating time	1.2 ms	1 ms or less ^{Note 2)}
Impact resistance	300 m/s ²	1000 m/s ²
Insulation resistance	50 M Ω or more at 500 VDC Mega (between lead wire and case)	
Withstand voltage	1500 VAC for 1 minute (between lead wire and case)	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 ^{Note 1)}	
Standard	Conforming to CE Standards	

Lead Wire Length

Lead wire length indication

(Example) **D-M9BW** **L**

• Lead wire length

-	0.5 m
M	1 m
L	3 m
Z	5 m

Note 1) The terminal conduit models (D-A3, K39) and DIN terminal model (D-A44) conform to IEC529 standard IP63, and have JISC0920 waterproof construction.

Note 2) Does not include the solid state auto switch with timer (D-F5NTL model).

Note 3) Applicable auto switch with 5 m lead wire "Z"
Reed switch: D-A54 type

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

Note 4) To designate solid state switches with flexible specifications, add "-61" after the lead wire length. Flexible cable is used for D-M9□, D-M9□W, D-M9□A as standard. There is no need to place the suffix -61 to the end of part number.

(Example) **D-F59F-** **61**

• Flexible specification

Note 5) 1 m (M): D-M9□W, D-M9□A only.

Note 6) Lead wire tolerance

Lead wire length	Tolerance
0.5m	±15 mm
1 m	±30 mm
3 m	±90 mm
5 m	±150 mm

Contact Protection Boxes: CD-P11, CD-P12

<Applicable switch model>

D-A9□ (V)/Z7□/Z80/A33/A53/A67 type

The auto switches above do not have a built-in contact protection circuit. Therefore, please use a contact protection box with the switch for any of the following cases:

- ① Where the operation load is an inductive load.
- ② Where the wiring length to load is greater than 5 m.
- ③ Where the load voltage is 100 VAC.

The contact life may be shortened (due to permanent energising conditions). Since the solid state auto switch is a semiconductor switch which has no contacts, no contact protection box is needed.

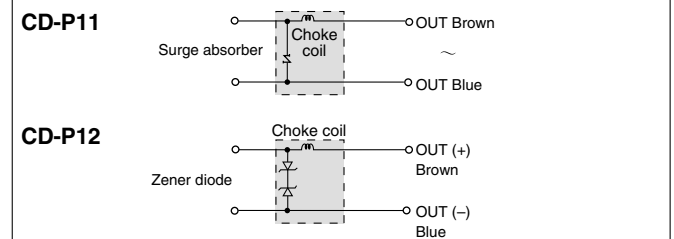
Specifications

Part no.	CD-P11		CD-P12
Load voltage	100 VAC	200 VAC	24 VDC
Max. load current	25 mA	12.5 mA	50 mA

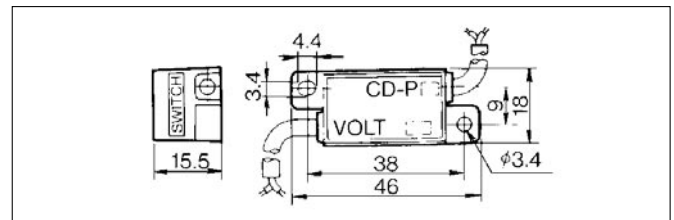
* Lead wire length — Switch connection side 0.5 m
Load connection side 0.5 m



Internal Circuit



Dimensions



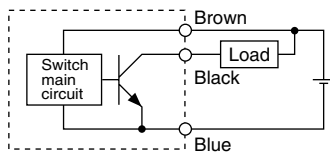
Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 metre.

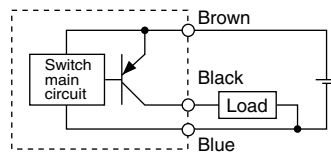
Auto Switch Connections and Examples

Basic Wiring

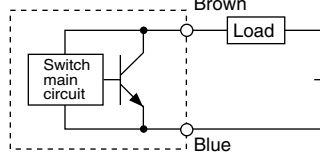
Solid state 3-wire, NPN



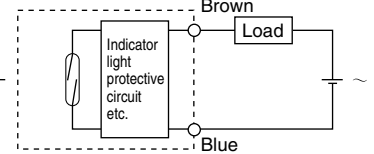
Solid state 3-wire, PNP



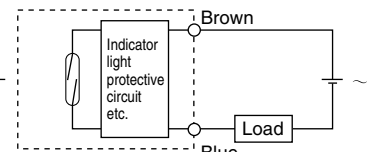
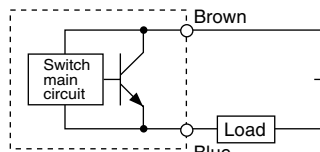
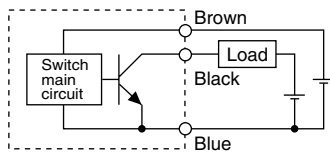
2-wire (Solid state)



2-wire (Reed)

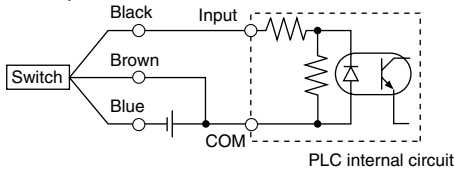


(Power supplies for switch and load are separate.)

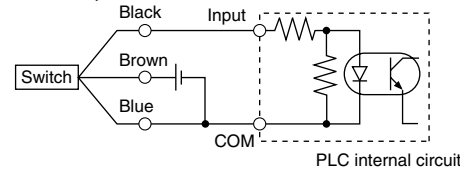


Example of Connection to PLC (Programmable Logic Controller)

• Sink input specification 3-wire, NPN

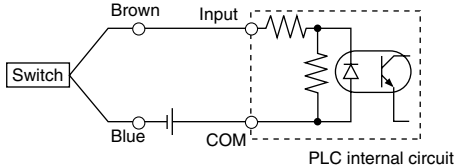


• Source input specification 3-wire, PNP

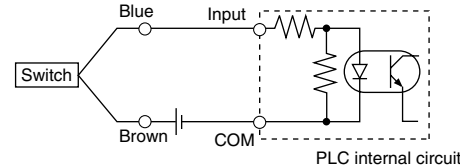


Connect according to the applicable PLC input specifications, since the connection method will vary depending on the PLC input specifications.

2-wire



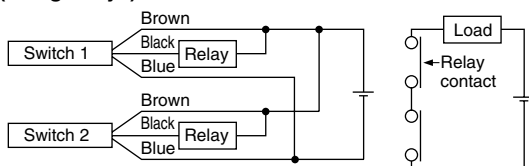
2-wire



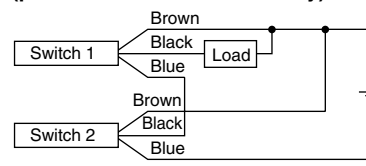
Example of AND (Serial) and OR (Parallel) Connection

• 3-wire

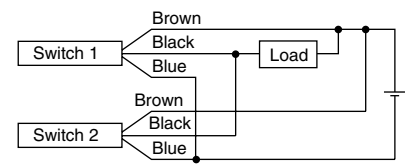
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

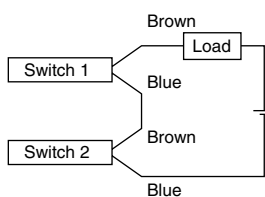


OR connection for NPN output



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

2-wire with 2-switch AND connection

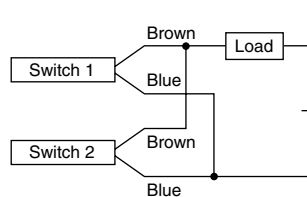


When two switches are connected in series, a load may malfunction because the load voltage will decrease when in the ON state. The indicator lights will illuminate if both of the switches are in the ON state.

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

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)

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.

Reed Switch: Direct Mounting Style D-A90/D-A93/D-A96



Grommet



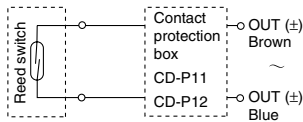
Caution

Operating Precautions

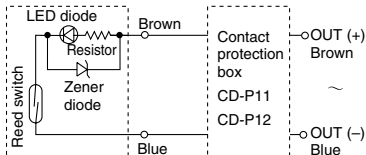
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied is used.

Auto Switch Internal Circuit

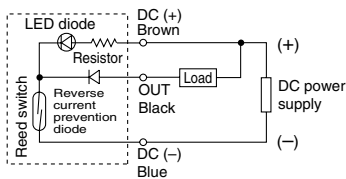
D-A90



D-A93



D-A96



- Note) ① In a case where the operation load is an inductive load.
② In a case where the wiring load is greater than 5 m.
③ In a case where the load voltage is 100 VAC.

Use the auto switch with a contact protection box in any of the above mentioned cases. (For details about the contact protection box, refer to page 14.)

Auto Switch Specifications

PLC: Programmable Logic Controller

D-A90 (Without indicator light)			
Auto switch part no.	D-A90		
Electrical entry direction	In-line		
Applicable load	IC circuit, Relay, PLC		
Load voltage	24 VAC/DC or less	48 VAC/DC or less	100 VAC/DC or less
Maximum load current	50 mA	40 mA	20 mA
Contact protection circuit	None		
Internal resistance	1 Ω or less (including lead wire length of 3 m)		
Standard	Conforming to CE Standards		
D-A93/D-A96 (With indicator light)			
Auto switch part no.	D-A93		D-A96
Electrical entry direction	In-line		
Applicable load	Relay, PLC		IC circuit
Load voltage	24 VDC	100 VAC	4 to 8 VDC
Load current range and max. load current	5 to 40 mA	5 to 20 mA	20 mA
Contact protection circuit	None		
Internal voltage drop	D-A93 — 2.4 V or less (to 20 mA)/3 V or less (to 40 mA) D-A93V — 2.7 V or less		0.8 V or less
Indicator light	Red LED illuminates when turned ON.		
Standard	Conforming to CE Standards		

Lead wires

D-A90/D-A93 — Oilproof heavy-duty vinyl cable: $\phi 2.7$, 0.18 mm² x 2 cores (Brown, Blue), 0.5 m

D-A96 — Oilproof heavy-duty vinyl cable: $\phi 2.7$, 0.15 mm² x 3 cores (Brown, Black, Blue), 0.5 m

Note 1) Refer to page 14 for reed switch common specifications.

Note 2) Refer to page 14 for lead wire lengths.

Weight

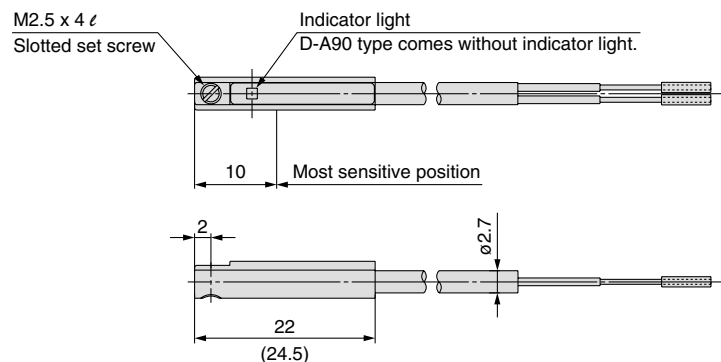
Unit: g

Auto switch part no.	D-A90	D-A93	D-A96
Lead wire length (m)	0.5	6	8
	3	30	41

Dimensions

Unit: mm

D-A90/D-A93/D-A96



() : dimensions for D-A93

Reed Switch: Tie-rod Mounting Style D-A54

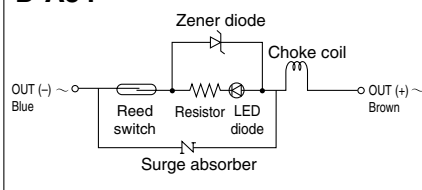


Grommet



Auto Switch Internal Circuit

D-A54



Auto Switch Specifications

PLC: Programmable Logic Controller

D-A54 (Without indicator light)			
Auto switch part no.	D-A54		
Applicable load	Relay, PLC		
Load voltage	24 VDC	100 VAC	200 VAC
Maximum load current ^{Note 3)} and Load current range	5 to 50 mA	5 to 25 mA	5 to 12.5 mA
Contact protection circuit	Built-in		
Internal resistance	2.4 V or less (to 20 mA)/3.5 V or less (to 50 mA)		
Indicator light	Red LED illuminates when turned ON.		
Standard	Conforming to CE Standards		

● Lead wires — Oilproof heavy-duty vinyl cable: $\phi 4$, 0.3 mm² x 2 cores (Brown, Blue), 0.5 m

Note 1) Refer to page 14 for reed switch common specifications.

Note 2) Refer to page 14 for lead wire lengths.

Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

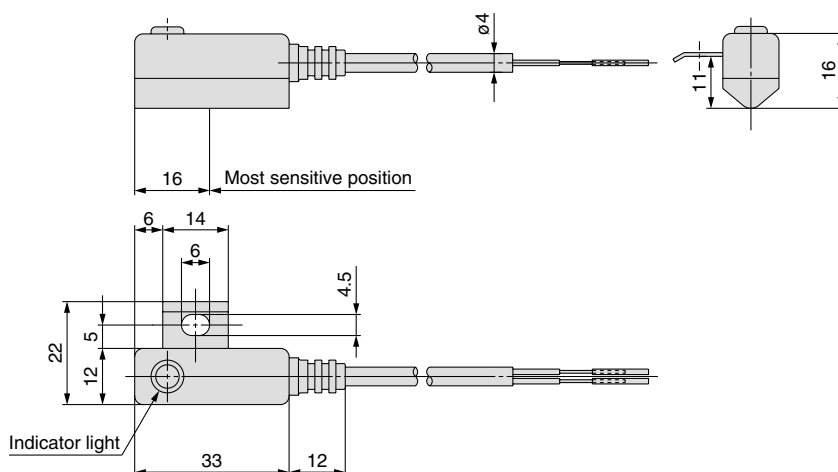
Unit: g

Auto switch part no.	D-A54	
Lead wire length (m)	0.5	24
	3	48
	5	96

Dimensions

Unit: mm

D-A54



Reed Switch: Band Mounting Style D-A33/D-A34/D-A44



Terminal conduit / D-A3 type DIN terminal / D-A4 type



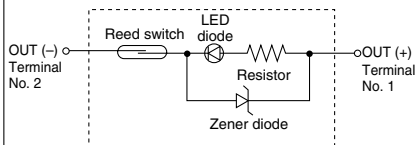
⚠ Caution

Operating Precautions

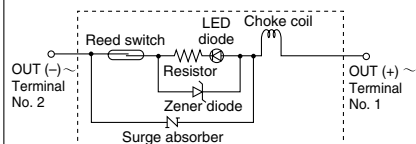
1. Use cable whose O.D. is within the size in the figure to maintain water resistant performance.
2. After wiring, confirm that tightening gland and all screws are tightened.

Auto Switch Internal Circuit

D-A33



D-A34/D-A44



Auto Switch Specifications

PLC: Programmable Logic Controller

D-A3 (With indicator light) Terminal conduit				
Auto switch part no.	D-A33	D-A34		
Applicable load	PLC	Relay, PLC		
Load voltage	24 VDC	24 VDC	100 VAC	200 VAC
Load current range ^{Note 2)}	5 to 50 mA	5 to 50 mA	5 to 25 mA	5 to 12.5 mA
Contact protection circuit	None	Built-in		
Internal voltage drop	2.4 V or less	2.4 V or less (to 20 mA)/3.5 V or less (to 50 mA)		
Indicator light	Red LED illuminates when turned ON.			
Standard	Conforming to CE Standards			
D-A44 (With indicator light) DIN terminal				
Auto switch part no.	D-A44			
Applicable load	Relay, PLC			
Load voltage	24 VDC	100 VAC	200 VAC	
Load current range	5 to 50 mA	5 to 25 mA	5 to 12.5 mA	
Contact protection circuit	Built-in			
Internal voltage drop	2.4 V or less (to 20 mA)/3.5 V or less (to 50 mA)			
Indicator light	Red LED illuminates when turned ON.			
Standard	Conforming to CE Standards			

Note 1) Refer to page 14 for reed switch common specifications.

Note 2) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

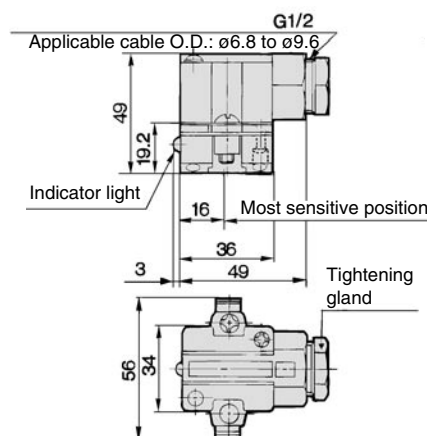
Unit: g

Auto switch part no.	D-A33	D-A34	D-A44
Lead wire	None	116	114

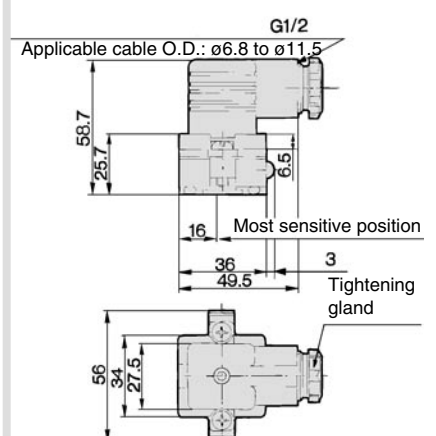
Dimensions

Unit: mm

D-A3



D-A44



2-Colour Indication Solid State Switch: Tie-rod Mounting Style D-A59W



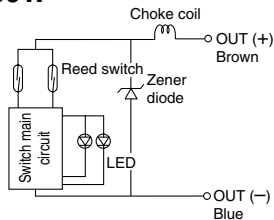
Grommet

- The optimum operating position can be determined by the colour of the light. (Red → Green ← Red)

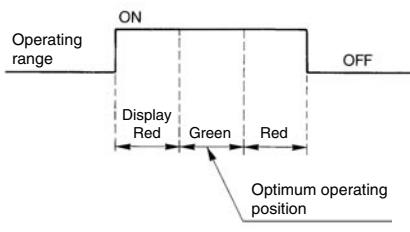


Auto Switch Internal Circuit

D-A59W



Indicator light / Display method



Auto Switch Specifications

PLC: Programmable Logic Controller

D-A59W (With indicator light)	
Auto switch part no.	D-A59W
Applicable load	Relay, PLC
Load voltage	24 VDC
Load current range ^{Note 3)}	5 to 40 mA
Contact protection circuit	None
Internal voltage drop	4 V or less
Indicator light	Operating position Red LED illuminates. Optimum operating position Green LED illuminates.
Standard	Conforming to CE Standards

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 4$, 0.3 mm² x 2 cores (Brown, Blue), 0.5 m

Note 1) Refer to page 14 for reed switch common specifications.

Note 2) Refer to page 14 for lead wire lengths.

Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

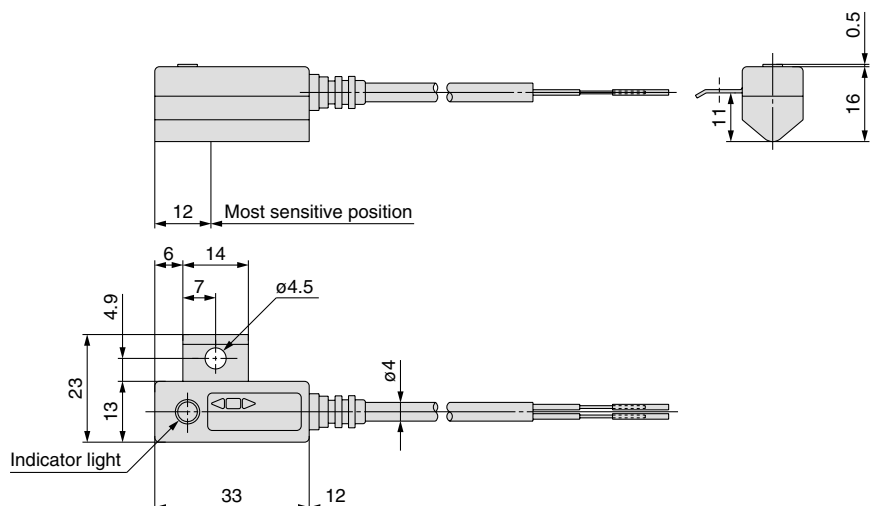
Unit: g

Auto switch part no.	D-A59W	
Lead wire length (m)	0.5	25
	3	80
	5	—

Dimensions

Unit: mm

D-A59W



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



Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- UL certified (style 2844) lead cable is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.
- Brightness of indicator light is 2 times greater than the conventional model (SMC comparison).



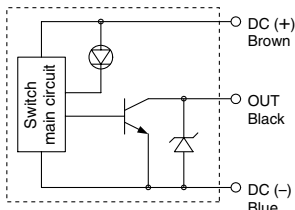
Caution

Operating Precautions

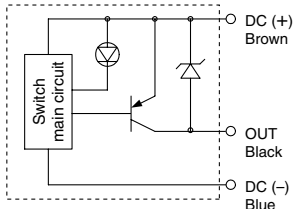
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied, is used.

Auto Switch Internal Circuit

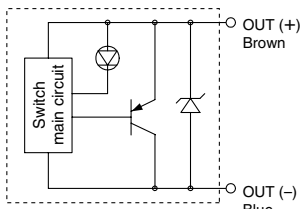
D-M9N



D-M9P



D-M9B



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		4 V or less
Leakage current	100 μ A or less at 24 VDC		0.8 mA or less
Indicator light	Red LED illuminates when turned ON.		
Standard	Conforming to CE Standards		

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 2.7 \times 3.2$ ellipse
D-M9B 0.15 mm² x 2 cores
D-M9N, D-M9P 0.15 mm² x 3 cores

Note 1) Refer to page 14 for solid state switch common specifications.

Note 2) Refer to page 14 for lead wire lengths.

Weight

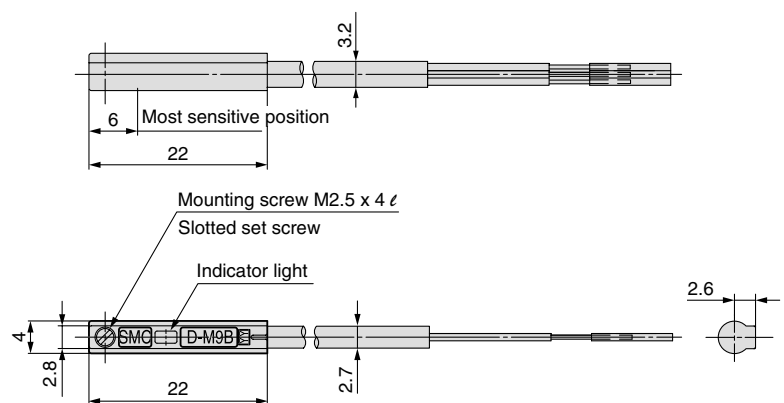
Unit: g

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

Dimensions

Unit: mm

D-M9□



Solid State Switch: Band Mounting Style D-G39/D-K39



Terminal conduit

● Free selection of lead wire



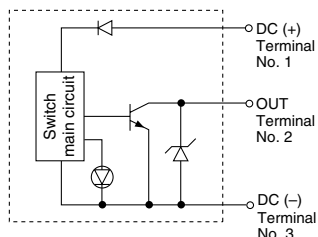
⚠ Caution

Operating Precautions

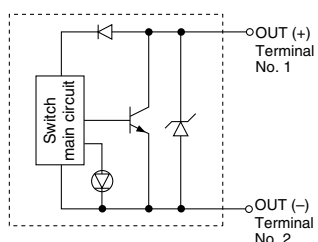
1. Use cable whose O.D. is within the size in the figure to maintain water resistant performance.
2. After wiring, confirm that tightening gland and all screws are tightened.

Auto Switch Internal Circuit

D-G39



D-K39



Auto Switch Specifications

PLC: Programmable Logic Controller

D-G39/D-K39 (With indicator light)		
Auto switch part no.	D-G39	D-K39
Wiring type	3-wire	2-wire
Output type	NPN	—
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 VAC)
Load current	40 mA or less	5 to 40 mA
Internal voltage drop	1.5 V or less (0.8 V or less with load current of 10 mA)	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 illuminates when turned ON.	
Standard	Conforming to CE Standards	

Note) Refer to page 14 for solid state switch common specifications.

Weight

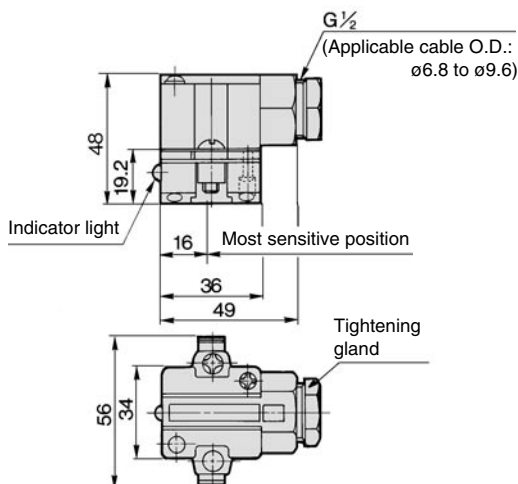
Unit: g

Auto switch part no.	D-G39	D-K39
Lead wire	None	116

Dimensions

Unit: mm

D-G39/D-K39



2-Colour Indication Solid State Switch: Direct Mounting Style

D-M9NW/D-M9PW/D-M9BW

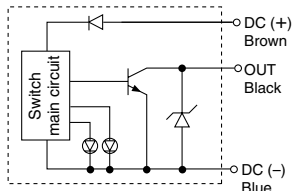
Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- UL certified (style 2844) lead cable is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.
- The optimum operating position can be determined by the colour of the light. (Red ↔ Green ↔ Red)
- Brightness of indicator light is 2 times greater than the conventional model (SMC comparison).

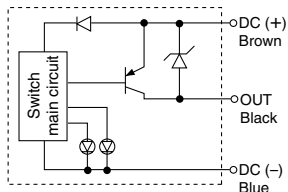


Auto Switch Internal Circuit

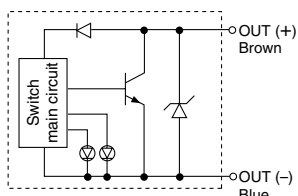
D-M9NW



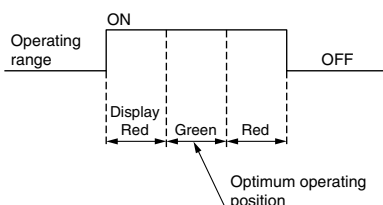
D-M9PW



D-M9BW



Indicator light / Display method



Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□W (With indicator light)			
Auto switch part no.	D-M9NW	D-M9PW	D-M9BW
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 at 10 mA (2 V or less at 40 mA)		4 V or less
Leakage current	100 μA or less at 24 VDC		0.8 mA or less
Indicator light	Operating position Red LED illuminates. Optimum operating position Green LED illuminates.		
Standard	Conforming to CE Standards		

- Lead wires — Oilproof heavy-duty vinyl cable: ø2.7 x 3.2 ellipse

D-M9BW 0.15 mm² x 2 cores

D-M9NW, D-M9PW 0.15 mm² x 3 cores

Note 1) Refer to page 14 for solid state switch common specifications.

Note 2) Refer to page 14 for lead wire lengths.

Weight

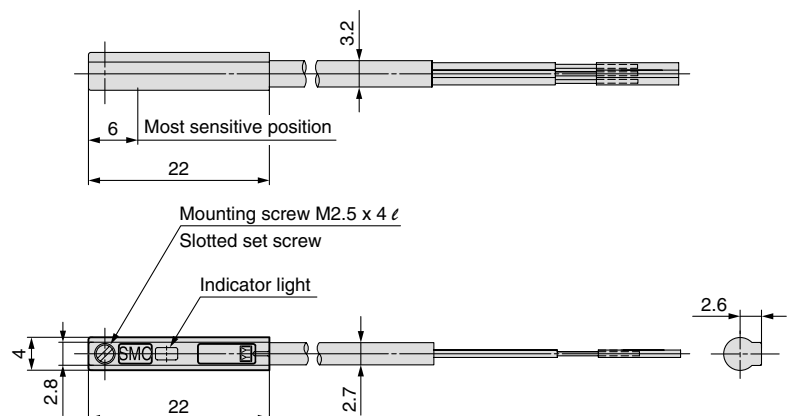
Unit: g

Auto switch part no.	D-M9NW	D-M9PW	D-M9BW
Lead wire length (m)	0.5	8	7
	1	14	13
	3	41	38
	5	68	63

Dimensions

Unit: mm

D-M9□W



Water Resistant 2-Colour Indication Solid State Switch: Direct Mounting Style

Series *D-M9NA/D-M9PA/D-M9BA*



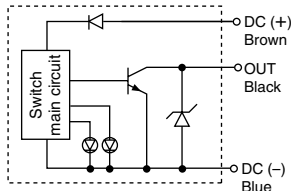
Grommet

- Water (coolant) resistant type
- 2-wire load current is reduced (2.5 to 40 mA).
- RoHS compliant
- UL certified (style 2844) lead cable is used.

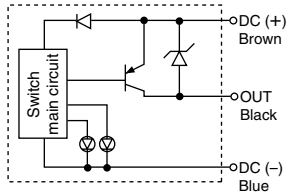


Auto Switch Internal Circuit

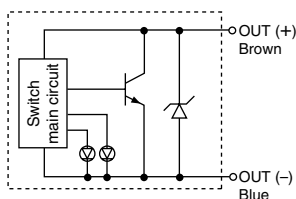
D-M9NA



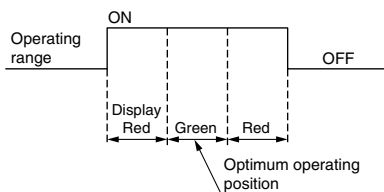
D-M9PA



D-M9BA



Indicator light / Display method



Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□A (With indicator light)			
Auto switch part no.	D-M9NA	D-M9PA	D-M9BA
Electrical entry direction	In-line	In-line	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 at 10 mA (2 V or less at 40 mA)		4 V or less
Leakage current	100 μ A or less at 24 VDC		0.8 mA or less
Indicator light	Operating position Red LED illuminates. Optimum operating position Green LED illuminates.		

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 2.7 \times 3.2$ ellipse
 - D-M9BA 0.15 mm² x 2 cores
 - D-M9NA, D-M9PA 0.15 mm² x 3 cores

Weight

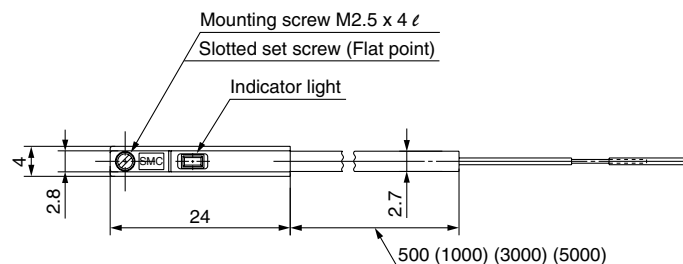
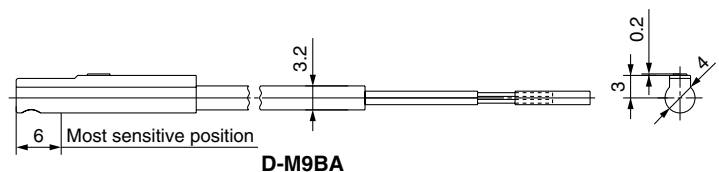
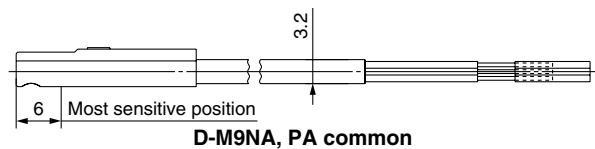
Unit: g

Auto switch part no.	D-M9NA(V)	D-M9PA(V)	D-M9BA(V)
Lead wire length (m)	0.5	8	8
	1	14	14
	3	41	41
	5	68	68

Dimensions

Unit: mm

D-M9□A



2-Colour Indication with Diagnostic Output Solid State Switch: Tie-rod Mounting Style D-F59F



Grommet

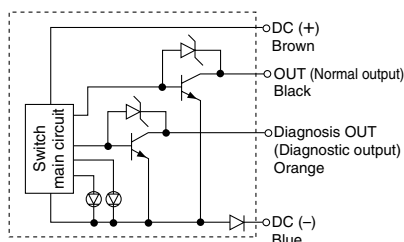
Since the output signal can be detected in an unsteady detecting area, the difference of detecting position can be confirmed by the side of PLC (Programmable Logic Controller).

- The optimum operating position can be determined by the colour of the light. (Red → Green ← Red)



Auto Switch Internal Circuit

D-F59F



Auto Switch Specifications

PLC: Programmable Logic Controller

D-F59F (With indicator light)	
Auto switch part no.	D-F59F
Wiring type	4-wire
Output type	NPN
Diagnostic output type	Normal operation
Applicable load	IC circuit, 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
Load current	50 mA or less at the total amount of normal output and diagnostic output
Internal voltage drop	1.5 V or less (0.8 V or less at 5 mA)
Leakage current	100 μ A or less at 28 VDC
Indicator light	Operating position Red LED illuminates. Optimum operating position Green LED illuminates.
Standard	Conforming to CE Standards

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 4$, 0.2 mm² x 4 cores (Brown, Black, Orange, Blue), 0.5 m
- Note 1) Refer to page 14 for solid state switch common specifications.
- Note 2) Refer to page 14 for lead wire lengths.

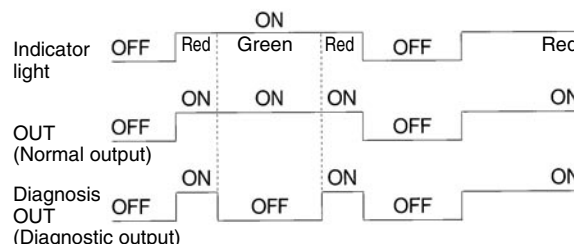
Weight

Unit: g

Auto switch part no.	D-F59F	
Lead wire length (m)	0.5	22
	3	77
	5	121

Diagnostic Output Operation

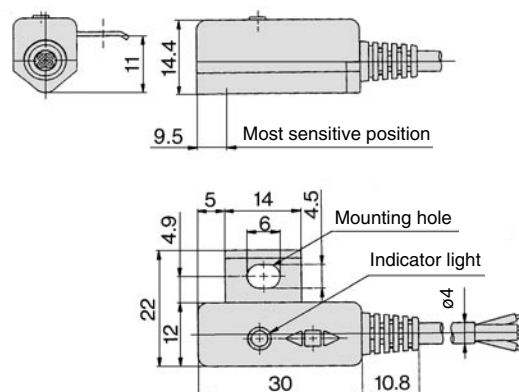
The diagnostic signal is output within unsteady detecting area (where indicator light is Red), and the diagnostic output becomes OFF when the detecting position remains within the optimum operating position (where indicator is Green). When the detecting position is not adjusted, the diagnostic output becomes



Dimensions

Unit: mm

D-F59F





Series CS2

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 ^{Note 1)}, JIS B 8370 ^{Note 2)} and other safety practices.

■ Explanation of the Labels

Labels	Explanation of the labels
 Danger	In extreme conditions, there is a possible result of serious injury or loss of life.
 Warning	Operator error could result in serious injury or loss of life.
 Caution	Operator error could result in injury ^{Note 3)} or equipment damage. ^{Note 4)}

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Note 3) Injury indicates light wounds, burns and electrical shocks that do not require hospitalisation or hospital visits for long-term medical treatment.

Note 4) Equipment damage refers to extensive damage to the equipment and surrounding devices.

■ Selection/Handling/Applications

1. The compatibility of the pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or post analysis and/or tests to meet the specific requirements. The expected performance and safety assurance are the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators. (Understanding JIS B 8370 General Rules for Pneumatic Equipment, and other safety rules are included.)

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven objects have been confirmed.
2. When equipment is removed, confirm that safety process as mentioned above. Turn off the supply pressure for this equipment and exhaust all residual compressed air in the system, and release all the energy (liquid pressure, spring, condenser, gravity).
3. Before machinery/equipment is restarted, take measures to prevent quick extension of a cylinder piston rod, etc.

4. If the equipment will be used in the following conditions or environment, please contact SMC first and be sure to take all necessary safety precautions.

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, requiring special safety analysis.
4. If the products are used in an interlock circuit, prepare a double interlock style circuit with a mechanical protection function for the prevention of a breakdown. And, examine the devices periodically if they function normally or not.

■ Exemption from Liability

1. SMC, its officers and employees shall be exempted from liability for any loss or damage arising out of earthquakes or fire, action by a third person, accidents, customer error with or without intention, product misuse, and any other damages caused by abnormal operating conditions.
2. SMC, its officers and employees shall be exempted from liability for any direct or indirect loss or damage, including consequential loss or damage, loss of profits, or loss of chance, claims, demands, proceedings, costs, expenses, awards, judgments and any other liability whatsoever including legal costs and expenses, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.
3. SMC is exempted from liability for any damages caused by operations not contained in the catalogues and/or instruction manuals, and operations outside of the specification range.
4. SMC is exempted from liability for any loss or damage whatsoever caused by malfunctions of its products when combined with other devices or software.



Series CS2 Auto Switches Precautions 1

Be sure to read this before handling.

Design and Selection

Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications of current load, voltage, temperature or impact. We do not guarantee any damage in any case the product is used outside of the specification range.

2. Pay attention to the length of time that a switch is on at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate. However if the speed is too great, the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V \text{ (mm/s)} = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

In cases of high piston speed, the use of an auto switch (D-F5NTL) with a built-in OFF delay timer (≈ 200 ms) makes it possible to extend the load operating time.

3. Keep wiring as short as possible.

<Reed switch>

1) In the case of an auto switch with no contact protection circuit: As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

Use a contact protection box when the wire length is 5 m or longer.

2) Even if an auto switch has a built-in contact protection circuit, when the wiring is more than 30 m long, it is not able to adequately absorb the rush current and its life may be reduced. It is again necessary to connect a contact protection box in order to extend its life. Please contact SMC in this case.

<Solid state switch>

Although wire length should not affect switch function, use a wire 100 m or shorter.

If the wiring is longer it will likely increase noise although the length is less than 100 m.

When the wire length is long, we recommend attaching the ferrite core to the both ends of the cable to prevent excess noise.

Since the solid state auto switch is a semiconductor switch which has no contacts, no contact protection box is needed.

4. Do not use a load that generates surge voltage. If a surge voltage is generated, the discharge occurs at the contact, possibly resulting in the shortening of product life.

<Reed switch>

If driving a load such as a relay that generates a surge voltage, use a contact protection box.

<Solid state switch>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

5. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch. Also perform periodic maintenance and confirm proper operation.

6. Do not make any modifications to the product.

Do not take the product apart. It may cause human injuries and accidents.

Caution

1. Take precautions when multiple actuators are used close together.

When two or more actuators are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40 mm.

(When the allowable interval is specified for each cylinder series, use the indicated value.) The auto switches may malfunction due to the interference from the magnetic fields.

2. Take note of the internal voltage drop of the switch.

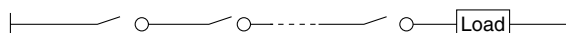
<Reed switch>

1) Switches with an indicator light (Except D-A96(V), Z76, A56)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



- In the same way, when operating under a specified voltage, although an auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Model D-A90).

<Solid state switch>

3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1). For details, refer to "Example of AND (serial) and OR (parallel) connection" on page 15.

Also, note that a 12 VDC relay is not applicable.



Series CS2 Auto Switches Precautions 2

Be sure to read this before handling.

Design and Selection

Caution

3. Pay attention to leakage current.

<Solid state switch>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

$$\text{Operating current of load (OFF condition)} > \text{Leakage current}$$

If the criteria given in the above formula are not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification will not be satisfied.

Moreover, leakage current flow to the load will be “n” times larger when “n” auto switches are connected in parallel. Refer to SMC’s “Best Pneumatics” catalogue.

4. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

5. Minimum stroke for auto switch mounting

The minimum stroke value for mounting one or two auto switches is obtained when the switch can detect at the cylinder stroke ends.

However, even if the switch is mounted at the proper position within the minimum stroke range, it may not be able to detect when the piston stops in the middle of the stroke due to a stopper, etc. It may also turn on in the middle of a stroke.

6. When multiple auto switches are required

“n” indicates the number of switch which can be physically mounted. Detection intervals depends on the switch mounting structure and set position therefore some required interval and set positions may not be available.

7. Limitations of detectable positioning

When using certain mounting brackets, the surface and position where an auto switch can be mounted maybe restricted due to physical interference (bottom side of foot bracket etc.). Please select the set position of the auto switch so that it does not interfere with the mounting bracket of the cylinder (trunnion or support ring etc.).

8. Use the cylinder and switch in proper combination.

The auto switch is pre-adjusted to activate properly for an auto-switch-capable SMC cylinder.

If the auto switch is mounted improperly, used for another brand of cylinder or used after the alternation of the machine installation, the switch may not activate properly.

Mounting and Adjustment

Warning

1. Instruction manual

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

2. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300 m/s² or more for reed switches and 1000 m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

3. Mount switches using the proper fastening torque.

When a switch is tightened beyond the range of fastening torque, the mounting screws, mounting bracket or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position. (For mounting and moving auto switches, tightening torque, etc., refer to each series.)

4. Mount a switch at the centre of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the centre of the operating range (the range in which a switch is ON). (The mounting position shown in a catalogue indicates the optimum position at stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), operation will be unstable or the service life will be shortened.

<D-M9□>

When the D-M9□ auto switch is used to replace old series auto switch, it may not activate depending on operating condition because of its shorter operating range.

Such as

- Application where the stop position of actuator may vary and exceed the operating range of the auto switch, for example, pushing, pressing, clamping operation, etc.
- Application where the auto switch is used for detecting an intermediate stop position of the actuator. (In this case the detecting time will be reduced.)

In these applications, set the auto switch to the centre of the required detecting range.

Caution

1. Do not carry an actuator by the auto switch lead wires.

Never carry a cylinder (actuator) by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

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



Series CS2 Auto Switches Precautions 3

Be sure to read this before handling.

Wiring

⚠ Warning

1. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

2. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits, including auto switches, may malfunction due to noise from these other lines.

⚠ Caution

1. Avoid repeatedly bending or stretching lead wires.

Repeated bending or tensile force applied to the lead wire may cause the sheath to fall off or disconnection of the wire. If bending or tensile force are not avoidable, fix the lead wire close to the switch and allow a bend radius of R40 to 80 mm or larger. Please consult SMC for details. Stress and tensile force applied to the connection between the cable and switch increases the possibility of disconnection. Fix the cable in the middle so that it is not movable in the area where it connects with the switch.

2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

It is the same as when the 2-wire brown cord (+, output) is directly connected to the (+) power supply terminal.

3. Do not allow short circuit of loads.

<Reed switch>

If the power is turned ON with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switch>

Model D-M9□ and all models of PNP output type switches do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged, as in the case of reed switches.

Take special care to avoid reverse wiring with the power supply line (brown) and the output line (black) on 3-wire type switches.

The 2-wire type brown lead wire is for output, and the 3-wire type lead wire with the same brown colour is the + power supply line. If the 2-wire type brown lead wire is connected to the location where the 3-wire type brown lead wire has been wired, a load short (no load) will result, causing overcurrent and damage to the switch.

⚠ Caution

4. Avoid incorrect wiring.

<Reed switch>

A 24 VDC switch with indicator light has polarity. The brown lead wire is (+) and the blue lead wire is (–).

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also note that a current greater than that specified will damage a light emitting diode and it will no longer operate.

Applicable models:

D-A93, A54

2) When using D-A59W, the switch will constantly remain ON if the connections are reversed.

<Solid state switch>

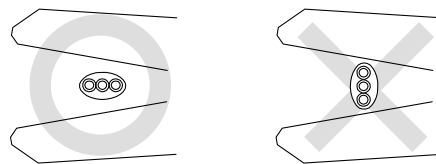
1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

2) If connections are reversed (power supply line + and power supply line –) on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue wire and the power supply line (–) is connected to the black wire, the switch will be damaged.

<D-M9□>

D-M9□ does not have built-in short circuit protection circuit. Be aware that if the power supply connection is reversed (e.g. (+) power supply wire and (–) power supply wire connection is reversed), the switch will be damaged.

5. When the cable sheath is stripped, confirm the stripping direction. The insulator may be split or damaged depending on the direction. (D-M9□ only)



Recommended Tool

Model name	Model no.
Wire stripper	D-M9N-SWY

* Stripper for a round cable (φ2.0) can be used for the 2-wire type cable.



Series CS2 Auto Switches Precautions 4

Be sure to read this before handling.

Operating Environment

Warning

1. Never use in an atmosphere of explosive gases.

The construction of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside actuators will become demagnetised.

3. Do not use in an environment where the auto switch will be in water or continually exposed to water.

Although switches satisfy IEC standard IP67 construction (JIS C 0920: waterproof construction), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in an environment with oil or chemicals.

Please consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Please consult SMC if switches are used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

6. Do not use in an environment where there is excessive impact shock.

<Reed switch>

When excessive impact (300 m/s² or more) is applied to a reed switch during operation, the contact point will malfunction and generate or cut off a signal momentarily (1 ms or less). Please consult SMC regarding the need to use a solid state switch depending upon the environment.

7. Do not use in an area where surges are generated.

<Solid state switch>

When there are units (solenoid type lifter, high frequency induction furnace, motor, radio equipment etc.) which generate large surges or electromagnetic waves in the area around actuators with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.

Caution

1. Avoid accumulation of iron debris or close contact with magnetic substances.

When a large amount of ferrous debris such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch actuator, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the actuator.

2. Please consult SMC concerning water resistance, elasticity of lead wires, usage at welding sites, etc.

3. Do not use in direct sunlight.

4. Do not mount the product in locations where it is exposed to radiant heat.

Maintenance

Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

1) Securely tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

3) Confirm the lighting of the green light on the 2-colour indicator type switch.

Confirm that the green LED is turned on when stopped at the established position. If the red LED is turned on, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

2. Maintenance procedures are outlined in the operation manual.

Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.

3. Removal of equipment, and supply/exhaust of compressed air

Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the fall or erratic movement of driven objects and equipment, then cut off the electric power and reduce the pressure in the system to zero. Only then should you proceed with the removal of any machinery and equipment.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent actuators from sudden movement.



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