

Air Cylinder: Double Rod Type

CS1W Series

Lube/Non-lube: $\varnothing 125, \varnothing 140, \varnothing 160, \varnothing 180, \varnothing 200, \varnothing 250, \varnothing 300$

Air-hydro: $\varnothing 125, \varnothing 140, \varnothing 160$

For the aluminum tubing of bore sizes 125, 140 and 160, a new "CS2 series" (P.655) model is now available with reduced weight and self weight deflection. Please consider using the CS2 series.

How to Order

CS1W L **125** **100** **V**

With auto switch CDS1W L **125** **100** **M9BW**

Built in magnet (σ125 to σ200) (Built-in magnet) **Double rod type**

Mounting

B	Basic type
L	Foot type
F	Rod side flange type
T	Center trunnion type

Port thread type

Nil	Rc
TN	NPT
TF	G

Bore size

Lube, Non-lube		Air-hydro	
125	125 mm	125	125 mm
140	140 mm	140	140 mm
160	160 mm	160	160 mm
180	180 mm		
200	200 mm		
250	250 mm		
300	300 mm		

* It is not available with auto switch.

Type

Nil	Lube
N	Non-lube
H	Air-hydro

Number of auto switches

Nil	2 pcs.
3	3 pcs.
S	1 pc.
n	n pcs.

Made to Order (Refer to page 639 for details.)

Auto switch

Nil	Without auto switch
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* Refer to the table below for the applicable auto switch model.

Suffix for cylinder

Rod boot in one side	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Rod boot in both sides	JJ	Nylon tarpaulin
	KK	Heat resistant tarpaulin
	N	Without cushion
	R	With cushion in rod side
	H	With cushion in head side
Cushion	Nil	With cushion in both sides (Air-hydro type has no cushion.)

Class 2 Pressure Vessel (Subject to or not subject to)

Nil	Applicable
V	Not applicable

Tubing material

Symbol	Bore size (mm)	Tubing material	Stroke range (mm)	
			Without switch	With switch
Nil	125, 140	Aluminum tube	1000 or less	1000 or less
	160		1200 or less	1200 or less
	180		1200 or less	1200 or less
	200	Steel tube	1200 or less ^{Note}	998 or less
F	250, 300		1200 or less	—
	125, 140	Steel tube	1000 or less	1000 or less
F	160		1200 or less	1200 or less

* Refer to page 639 for the maximum strokes.
Note) For items corresponding to the Class 2 Pressure Vessel Act, the material is aluminum alloy.

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) CDS1WB125-100

Cylinder stroke (mm) (Refer to "Maximum Stroke" on page 639.)

* If specifying more than one symbol, indicate them in alphabetical order.
** Air-hydro type has no cushion. No symbol indicates no cushion.

Applicable Auto Switches

Refer to pages 1271 to 1365 for further information on auto switches.

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 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state auto switch	—	Grommet	—	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	○	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)				M9P	●	●	○	○				
		2-wire		M9B	●	●	○	○								
		3-wire (NPN)		—	G39	—	—	—	—	—	—	—	—			IC circuit
	2-wire	K39	—			—	—	—	—	—	—					
	Diagnostic indication (2-color indicator)	Yes	Grommet	—	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	●	●	○	○	○		IC circuit
					3-wire (PNP)				M9PW	●	●	○	○	○		
	Water resistant (2-color indicator)	—	Grommet	—	2-wire	24 V	5 V, 12 V	—	M9BW	●	●	○	○	○		IC circuit
					3-wire (NPN)				M9NA *1	○	○	●	○	○		
					3-wire (PNP)				M9PA *1	○	○	●	○	○		
2-wire					M9BA *1				○	○	○	○	○	○		
With diagnostic output (2-color indicator)	—	—	—	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	●	●	○	○	○	IC circuit		
				2-wire (Non-polar)				P3DWA	●	●	○	○	○			
Magnetic field resistant (2-color indicator)	—	—	—	3-wire (PN equivalent)	24 V	5 V	—	A96	●	●	○	○	○	IC circuit		
				—				A93	●	●	○	○	○			
Reed auto switch	—	Grommet	—	2-wire	24 V	5 V, 12 V	100 V	A90	●	●	○	○	○	IC circuit	Relay, PLC	
								100 V or less	A93	●	●	○	○			○
								100 V, 200 V	A54	●	●	○	○			○
		200 V or less						A64	●	●	○	○	○	—		
		100 V, 200 V						A33	—	—	—	—	—			
		—						A34	—	—	—	—	—			
Diagnostic indication (2-color indicator)	—	Grommet	—	—	—	—	—	A44	●	●	○	○	○	—		
								A59W	●	●	○	○	○			

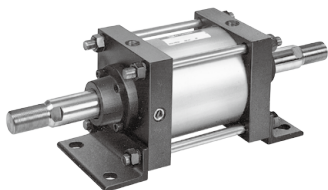
*1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

* Lead wire length symbols: 0.5 m Nil (Example) M9NW 3 m L (Example) M9NWL
1 m M (Example) M9NWM 5 m Z (Example) M9NZ

* Solid state auto switches marked with "O" are produced upon receipt of order.
* Since there are other applicable auto switches than listed above, refer to page 653 for details.

* For details about auto switches with pre-wired connector, refer to pages 1340 and 1341.

* D-A9□/M9□/M9□/M9□/□/□/□ auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)



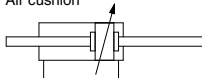
Specifications

Type	Lube, Non-lube	Air-hydro
Fluid	Air	Turbine oil
Proof pressure	1.57 MPa ^{Note)}	
Max. operating pressure	0.97 MPa	0.97 MPa
Min. operating pressure	0.05 MPa	0.06 MPa
Piston speed	50 to 500 mm/s	0.5 to 200 mm/s
Cushion	Interchangeable	
Ambient and fluid temperature	Without switch	0 to 70°C (No freezing)
	With switch	0 to 60°C (No freezing)
Stroke length tolerance	250 st or less: $^{+1.0}_{0}$ 251 to 1,000 st : $^{+1.4}_{0}$ 1,001 to 1,200 st : $^{+1.8}_{0}$	
Mounting	Basic type, Foot type, Rod side flange type, Center trunnion type	

Note) Item corresponding to Class 2 Pressure Vessel Act is 1.46 MPa.

Symbol

Air cushion



Made to Order Specifications
[Click here for details](#)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat-resistant cylinder (-10 to 150°C)
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length
-XC30	Rod side trunnion
-XC35	With coil scraper

Refer to pages 651 to 653 for auto switch specifications.

- Proper auto switch mounting position (detection at stroke end) and mounting height
- Minimum auto switch mounting stroke
- Operating range
- Switch mounting bracket: Part no.

Maximum Stroke

(mm)

Tubing material	Aluminum tube		Steel tube
	Without switch	With switch	Without switch
Bore size (mm) / Mounting bracket	Basic type, Foot type, Rod side flange type, Center trunnion type		
	125, 140	1000 or less	1000 or less
160	1200 or less	1200 or less	1200 or less
180	—	1200 or less	1200 or less
200	—	998 or less ^{Note 1)}	1200 or less ^{Note 2)}
250, 300	—	—	1200 or less

Note 1) For models with a bore size of 200 with auto switches, strokes of 999 to 1200 are available as special orders.

Note 2) The tubing material of items with a bore size of 180 and 200 corresponding to the Class 2 Pressure Vessel Act is aluminum tubing.

Note 3) Using a stroke of a length which is smaller than the effective cushion length may result in reduced air cushion performance. Refer to "Technical Data 1" on page 1573 for details on the effective cushion length.

Accessory

Mounting		Basic type	Foot type	Rod side flange type	Center trunnion type
Option	Rod end nut	●	●	●	●
	Single knuckle joint	●	●	●	●
	Double knuckle joint (Cleviss pin, Cotter pin)	●	●	●	●
	Rod boot	●	●	●	●

* For details about part numbers and dimensions, refer to page 637.
 (For rod boots, refer to page 643.)

Mounting Bracket Part No.

Bore size (mm)	125	140	160	180	200	250	300
Foot type*	CS1W-L12	CS1W-L14	CS1W-L16	CS1W-L18	CS1W-L20	CS1W-L25	CS1W-L30
Flange type	CS1-F12	CS1-F12	CS1-F16	CS1-F18	CS1-F20	CS1-F25	CS1-F30

* Order two foot brackets per cylinder.

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

CS1W Series

Principal Parts Material and Surface Treatment

Description		Material	Note
Cover		Rolled steel plate	Black painted
Tube *	ø125, ø140, ø160	Aluminum alloy	Hard anodized
		Carbon steel tube	Hard chrome plated
	ø180, ø200, ø250, ø300	Carbon steel tube ^{Note)}	Hard chrome plated ^{Note)}
Sliding seal	Lube	NBR	JIS B 2401 O-ring *
	Non-lube	NBR	
	Air-hydro	NBR	
Piston rod		Carbon steel	Hard chrome plated
Piston	Lube	Cast iron (With auto switch: Aluminum alloy casted)	Chromated (In the case of aluminum alloy casted)
	Non-lube	Aluminum alloy casted (Iron tube: Cast iron)	Chromated (In the case of aluminum alloy casted)
	Air-hydro	Aluminum alloy casted (Iron tube: Cast iron)	Chromated (In the case of aluminum alloy casted)

* In the case of an auto switch with bore sizes ø180 and ø200, tubing material is aluminum alloy (hard anodized). Piston seal is NLP.

Note) For items with a bore size of ø180 and ø200 corresponding to the Class 2 Pressure Vessel Act, the material is "Aluminum alloy" and the note should state "Hard anodized".

Weight/Aluminum Tube: Lube Type (Non-lube, Air-hydro) (kg)

Bore size (mm)		ø125	ø140	ø160
Basic weight	Basic type	16.51 (15.28)	19.62 (18.12)	26.65 (24.79)
	Foot type	18.14 (16.91)	22.14 (20.64)	29.45 (27.59)
	Rod side flange type	19.19 (17.96)	24.62 (23.12)	33.04 (31.18)
	Trunnion type	20.64 (19.41)	25.35 (23.85)	34.05 (32.19)
Add'l weight per each 100 mm stroke		2.57	2.76	3.38
Accessory bracket	Single knuckle	0.91	1.16	1.56
	Double knuckle (Knuckle pin, Cotter pin)	1.37	1.81	2.48
	Rod end nut	0.16	0.16	0.23

* (): Denotes the non-lube and air-hydro type.

Calculation: (Example) **CS1WL125-500**

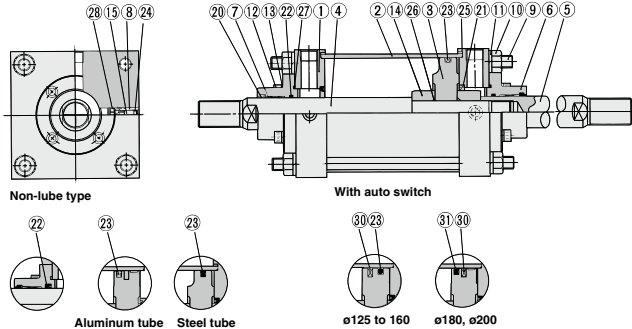
- Basic weight18.14 (Foot type, ø125)
 - Additional weight.....2.57/100 stroke
 - Cylinder stroke500 stroke
- 18.14 + 2.57 x 500/100 = 30.99 kg

Weight/Steel Tube (kg)

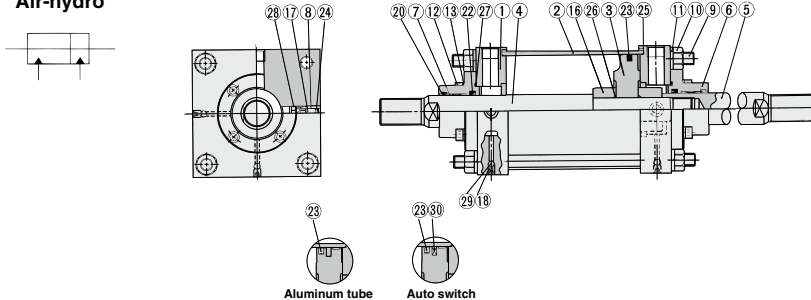
Bore size (mm)		ø125	ø140	ø160	ø180	ø200	ø250	ø300
Basic weight	Basic type	16.85	20.03	27.12	36.90	45.79	85.36	122.39
	Foot type	18.48	22.55	29.92	41.10	50.67	94.86	139.67
	Rod side flange type	19.53	25.03	33.51	46.73	57.70	107.20	152.59
	Trunnion type	20.98	25.76	34.52	47.52	59.78	113.20	162.82
Add'l weight per each 100 mm stroke		3.46	3.81	4.57	6.20	7.29	11.30	15.17
Accessory bracket	Single knuckle	0.91	1.16	1.56	3.07	2.90	5.38	10.82
	Double knuckle (Knuckle pin, Cotter pin)	1.37	1.81	2.48	4.74	4.59	9.22	17.17
	Rod end nut	0.16	0.16	0.23	0.32	0.85	1.26	1.43

Construction

Lube, Non-lube With auto switch



Air-hydro



Component Parts

No.	Description	Material	Note
1	Rod cover	Rolled steel	Black painted
2	Cylinder tube	ø125 to ø160 Aluminum alloy	Hard anodized
		ø125 to ø300* Carbon steel tube	Inside: Hard chrome plated
3	Piston	Cast iron*	
4	Piston rod A	Carbon steel	Hard chrome plated
5	Piston rod B	Carbon steel	Hard chrome plated
6	Retaining plate	Cast iron	Black painted
7	Bushing	Bearing alloy	
8	Valve guide	Brass	
9	Tie-rod	Carbon steel	Chromated
10	Tie-rod nut	Rolled steel	Black zinc chromated
11	Spring washer	Steel wire	Black zinc chromated
12	Retaining plate bolt	Chromium molybdenum steel	Black zinc chromated
13	Spring washer	Steel wire	Black zinc chromated
14	Cushion ring A	Rolled steel	Zinc chromated
15	Cushion valve	Rolled steel	Electroless nickel plated
16	Spacer A	Rolled steel	
17	Air releasing B	Rolled steel	Zinc chromated
18	Air releasing A	Chromium molybdenum steel	
29	Check ball	Chrome bearing steel	
30	Magnet	—	

* In the case of the aluminum tube of non-lube and air-hydro type, piston material is an aluminum alloy casted. In the case of auto switch bore size ø180 and ø200, piston material is aluminum alloy casted and tubing material is aluminum alloy (hard anodized). For items with a bore size of ø180 and ø200 corresponding to the Class 2 Pressure Vessel Act, the material is "Aluminum alloy" and the note should state "Hard anodized".
 • Trunnion type should not be disassembled. (Refer to page 654.)

Seal List

No.	Description	Material	Note
Lube			
20	Wiper ring	NBR	
21	Cushion seal		
22	Rod seal		
23	Piston seal		
24	Valve seal		
25	Tube gasket		
26*	Piston gasket		
27	Retaining plate gasket		
28*	Guide gasket		

Non-lube

Seals except 22 and 23 are the same as lube type.

22	Rod seal	NBR	
23	Piston seal	NBR	

Air-hydro

Seals except 22 and 23 are the same as lube type.

No.	Description	Material	Note
22	Rod seal	NBR	
23	Piston seal		

Lube (With switch)

Seals except 31 are the same as lube type.

No.	Description	Material	Note
31	Piston seal	NBR	

Replacement Parts (Seal kit)

- For replacement parts no. (seal kits) of double rod type cylinder for the CS1W series, refer to page 642.
- Seal kits do not include cushion seal, piston gasket and guide gasket because those are not replaceable parts.

CS1W Series

Double Acting, Double Rod/Replacement Parts /Seal kit

When ordering the replacement parts (seal kits) for the CS1W series double rod type cylinder, indicate the order number listed in the table at right.

Each set of replacement parts contains the following: wiper ring, rod seal, piston seal, valve seal, tube gasket, and push plate gasket (for 1 cylinder).

Lube

Bore size (mm)	Kit no.	Description
125	CS1W-125A-PS	Component part numbers: ⑳, ㉒, ㉓, ㉔, ㉕, ㉖
140	CS1W-140A-PS	
160	CS1W-160A-PS	
180	CS1W-180A-PS	
200	CS1W-200A-PS	
300	CS1W-300A-PS	

* Seal kit includes a grease pack (ø125 to 160: 40 g, ø180 and 200: 50 g, ø250 and 300: 60 g). Order with the following part number when only the grease pack is needed.

Grease pack part no.: GR-S-010 (10 g), GR-S-020 (20 g)

Non-lube with Auto Switch

Bore size (mm)	Kit no.	Description
125	CS1WN125A-PS	Component part numbers: ⑳, ㉒, ㉓, ㉔, ㉕, ㉖
140	CS1WN140A-PS	
160	CS1WN160A-PS	
180	CS1WN180A-PS	
200	CS1WN200A-PS	
250*	CS1WN250A-PS	
300*	CS1WN300A-PS	

* It is not available with auto switch.

* Seal kit includes a grease pack (ø125 to 160: 40 g, ø180 and 200: 50 g, ø250 and 300: 60 g). Order with the following part number when only the grease pack is needed.

Grease pack part no.: GR-S-010 (10 g), GR-S-020 (20 g)

Lube with Auto Switch

Bore size (mm)	Kit no.	Description
125	CS1W-125A-PS	Component part numbers: ⑳, ㉒, ㉓, ㉕, ㉖, ㉗
140	CS1W-140A-PS	
160	CS1W-160A-PS	
180	CDS1W180A-PS	
200	CDS1W200A-PS	

* Seal kit includes a grease pack (ø125 to 160: 40 g, ø180 and 200: 50 g). Order with the following part number when only the grease pack is needed.

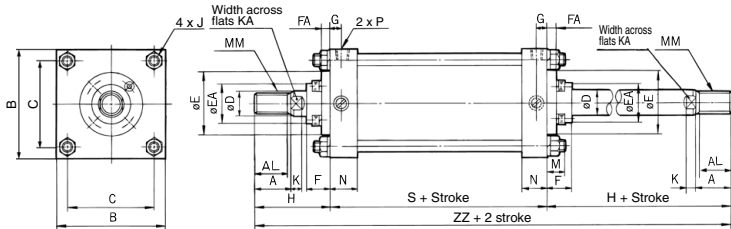
Grease pack part no.: GR-S-010 (10 g), GR-S-020 (20 g)

Air-hydro

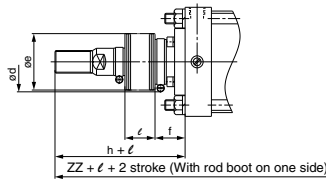
Bore size (mm)	Kit no.	Description
125	CS1WH125A-PS	Component part numbers: ⑳, ㉒, ㉓, ㉔, ㉕, ㉖
140	CS1WH140A-PS	
160	CS1WH160A-PS	

Basic Type: CS1WB

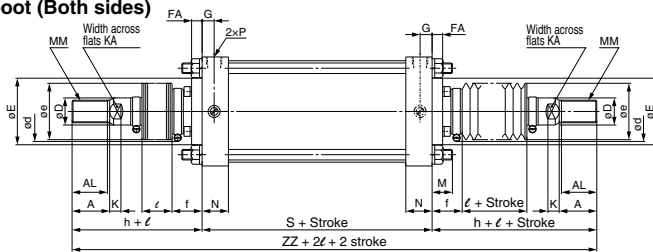
Lube type (CS1WB), Non-lube type (CS1WBN), Air-hydro type (CS1WBH)



With rod boot (One side)



With rod boot (Both sides)



Type	Bore size (mm)	Stroke range (mm)		A	AL	B	C	D	E	EA	F	FA	G	J	K	KA	M	MM	N	P	S
		Without rod boot	With rod boot																		
Lube Non-lube Air-hydro	125	Up to 1000	30 to 1000	50	47	145	115	36	90	59	43	14	16	M14 x 1.5	15	31	27	M30 x 1.5	35	1/2	98
	140	Up to 1000	30 to 1000	50	47	161	128	36	90	59	43	14	16	M14 x 1.5	15	31	27	M30 x 1.5	35	1/2	98
	160	Up to 1200	30 to 1200	56	53	182	144	40	90	59	43	14	18.5	M16 x 1.5	17	36	30.5	M36 x 1.5	39	3/4	106
Lube Non-lube	180	Up to 1200	30 to 1200	63	60	204	162	45	115	74	48	17	18.5	M18 x 1.5	20	41	35	M40 x 1.5	39	3/4	111
	200	Up to 1200	30 to 1200	63	60	226	182	50	115	74	48	17	18.5	M20 x 1.5	20	46	35	M45 x 1.5	39	3/4	111
	250	Up to 1200	30 to 1200	71	67	277	225	60	140	86	60	20	23	M24 x 1.5	25	56	41.5	M56 x 2	49	1	141
	300	Up to 1200	30 to 1200	80	76	330	270	70	140	96	60	20	23	M30 x 1.5	30	65	51.5	M64 x 2	49	1	146

Type	Bore size (mm)	Stroke range (mm)									
		Both sides									
Type	Bore size (mm)	Without rod boot		With rod boot (Single side)						Both sides	
		H	ZZ	d	e	f	h	l	ZZ	ZZ	
Lube Non-lube Air-hydro	125	110	318	82	75	40	133	0.2 stroke	341	364	
	140	110	318	82	75	40	133	0.2 stroke	341	364	
	160	120	346	82	75	40	141	0.2 stroke	367	388	
Lube Non-lube	180	135	381	92	85	45	153	0.2 stroke	399	417	
	200	135	381	96	90	45	153	0.2 stroke	399	417	
	250	160	461	108	105	55	176	0.17 stroke	477	493	
	300	175	496	118	115	55	190	0.17 stroke	511	526	

With Auto Switch: ø125 to ø200 Only

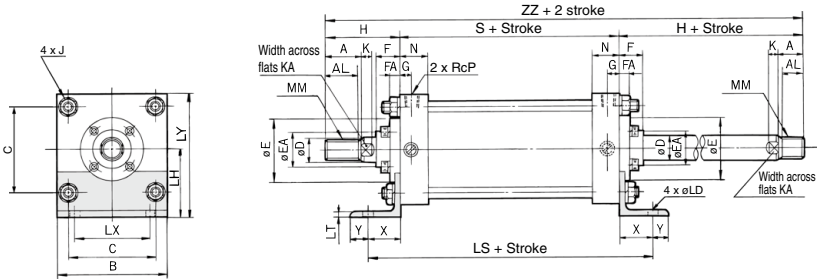
Type	Bore size (mm)	Stroke range (mm)		S	Without rod boot		
		Without rod boot	With rod boot		Without rod boot	With rod boot (Single side)	With rod boot (Both sides)
Type	Bore size (mm)	Without rod boot	With rod boot	S	ZZ	ZZ	ZZ
Lube Non-lube Air-hydro	125	Up to 1000	30 to 1000	98	318	341	364
	140	Up to 1000	30 to 1000	98	318	341	364
	160	Up to 1200	30 to 1200	106	346	367	388
Lube Non-lube	180	Up to 1200	30 to 1200	115	385	403	421
	200	Up to 998	30 to 998	120	390	408	426

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 652.

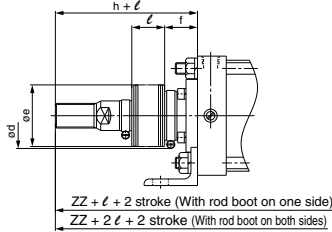
CS1W Series

Foot Type: CS1WL

Lube type (CS1WL), Non-lube type (CS1WLN), Air-hydro type (CS1WLH)



With rod boot



Type	Bore size (mm)	Stroke range (mm)		(mm)																
		Without rod boot	With rod boot	A	AL	B	C	D	E	EA	F	FA	G	J	K	KA	LD	LH	LS	LT
		Lube	125	Up to 1000	30 to 1000	50	47	145	115	36	90	59	43	14	16	M14 x 1.5	15	31	19	85
Non-lube	140	Up to 1000	30 to 1000	50	47	161	128	36	90	59	43	14	16	M14 x 1.5	15	31	19	100	188	9
Air-hydro	160	Up to 1200	30 to 1200	56	53	182	144	40	90	59	43	14	18.5	M16 x 1.5	17	36	19	106	206	9
Lube	180	Up to 1200	30 to 1200	63	60	204	162	45	115	70	48	17	18.5	M18 x 1.5	20	41	24	125	231	10
	200	Up to 1200	30 to 1200	63	60	226	182	50	115	74	48	17	18.5	M20 x 1.5	20	46	24	132	231	10
	250	Up to 1200	30 to 1200	71	67	277	225	60	140	86	60	20	23	M24 x 1.5	25	56	29	160	301	12
	300	Up to 1200	30 to 1200	80	76	330	270	70	140	96	60	20	23	M30 x 1.5	30	65	33	200	326	15

Type	Bore size (mm)	LX	LY	MM	N	P	S	X	Y	(mm)											
										Without rod boot					With rod boot (Single side)					Both sides	
										H	ZZ	d	e	f	h	l	ZZ	ZZ			
Lube	125	100	157.5	M30 x 1.5	35	1/2	98	45	20	110	318	82	75	40	133	0.2 stroke	341	364			
Non-lube	140	112	180.5	M30 x 1.5	35	1/2	98	45	30	110	318	82	75	40	133	0.2 stroke	341	364			
Air-hydro	160	118	197	M36 x 1.5	39	3/4	106	50	25	120	346	82	75	40	141	0.2 stroke	367	388			
Lube	180	132	227	M40 x 1.5	39	3/4	111	60	30	135	381	92	85	45	153	0.2 stroke	399	417			
	200	150	245	M45 x 1.5	39	3/4	111	60	30	135	381	96	90	45	153	0.2 stroke	399	417			
	250	180	298.5	M56 x 2	49	1	141	80	40	160	461	108	105	55	176	0.17 stroke	477	493			
	300	212	365	M64 x 2	49	1	146	90	40	175	496	118	115	55	190	0.17 stroke	511	526			

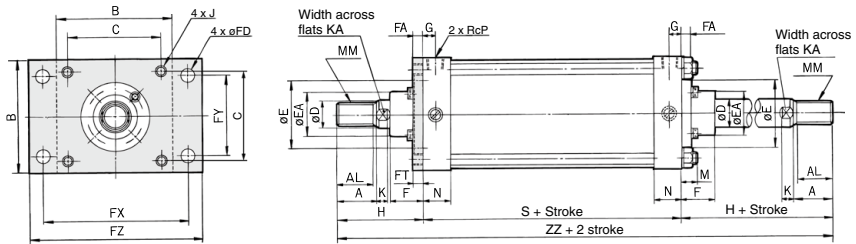
With Auto Switch: ø125 to ø200 Only

Type	Bore size (mm)	Stroke range (mm)		(mm)						
		Without rod boot	With rod boot	S	LS	Without rod boot		With rod boot (Both sides)		
		ZZ	ZZ	ZZ	ZZ	ZZ	ZZ			
Lube	125	Up to 1000	30 to 1000	98	188			318	341	364
Non-lube	140	Up to 1000	30 to 1000	98	188			318	341	364
Air-hydro	160	Up to 1200	30 to 1200	106	206			346	367	388
Lube	180	Up to 1200	30 to 1200	115	235			385	403	421
	200	Up to 998	30 to 998	120	240			390	408	426

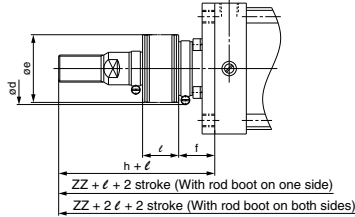
*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 652.

Rod Side Flange Type: CS1WF

Lube type (CS1WF), Non-lube type (CS1WFN), Air-hydro type (CS1WFH)



With rod boot



Type	Bore size (mm)	Stroke range (mm)		A	AL	B	B	C	D	E	EA	F	FA	FD	FT	FT	FX	FY	FZ	G	J
		Without rod boot	With rod boot																		
Lube	125	Up to 1000	30 to 1000	50	47	145	145	115	36	90	59	43	14	19	14	190	100	230	16	M14 x 1.5	
	140	Up to 1000	30 to 1000	50	47	160	161	128	36	90	59	43	14	19	20	212	112	255	16	M14 x 1.5	
	Air-hydro	160	Up to 1200	30 to 1200	56	53	180	182	144	40	90	59	43	14	19	20	236	118	275	18.5	M16 x 1.5
Lube	180	Up to 1200	30 to 1200	63	60	200	204	162	45	115	70	48	17	24	25	265	132	320	18.5	M18 x 1.5	
	200	Up to 1200	30 to 1200	63	60	225	226	182	50	115	74	48	17	24	25	280	150	335	18.5	M20 x 1.5	
	250	Up to 1200	30 to 1200	71	67	275	277	225	60	140	86	60	20	29	30	355	180	420	23	M24 x 1.5	
	300	Up to 1200	30 to 1200	80	76	330	330	270	70	140	96	60	20	33	30	400	212	475	23	M30 x 1.5	

Type	Bore size (mm)	K	KA	M	MM	N	P	S	Without rod boot		With rod boot (Single side)							Both sides	
									H	ZZ	d	e	f	h	ℓ	ZZ	ZZ		
Lube	125	15	31	30	M30 x 1.5	35	1/2	98	110	318	82	75	40	133	0.2 stroke	341	364		
	140	15	31	24	M30 x 1.5	35	1/2	98	110	318	82	75	40	133	0.2 stroke	341	364		
	Air-hydro	160	17	36	26	M36 x 1.5	39	3/4	106	120	346	82	75	40	141	0.2 stroke	367	388	
Lube	180	20	41	31	M40 x 1.5	39	3/4	111	135	381	92	85	45	153	0.2 stroke	399	417		
	200	20	46	31	M45 x 1.5	39	3/4	111	135	381	96	90	45	153	0.2 stroke	399	417		
	250	25	56	35	M56 x 2	49	1	141	160	461	108	105	55	176	0.17 stroke	477	493		
	300	30	65	48	M64 x 2	49	1	146	175	496	118	115	55	190	0.17 stroke	511	526		

With Auto Switch: ø125 to ø200 Only

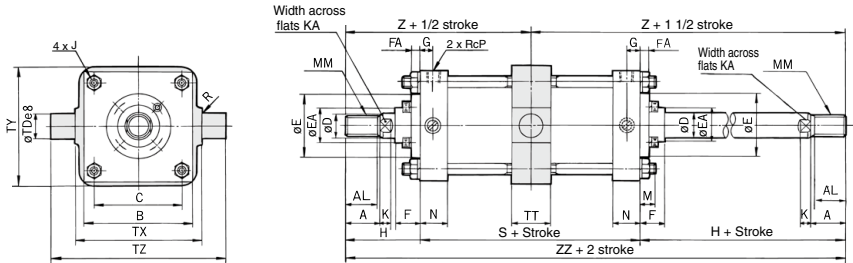
Type	Bore size (mm)	Stroke range (mm)		S	Without rod boot		
		Without rod boot	With rod boot		ZZ	ZZ	ZZ
Lube	125	Up to 1000	30 to 1000	98	318	341	364
	140	Up to 1000	30 to 1000	98	318	341	364
Lube	160	Up to 1200	30 to 1200	106	346	367	388
	180	Up to 1200	30 to 1200	115	385	403	421
Non-lube	200	Up to 998	30 to 998	120	390	408	426

*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 652.

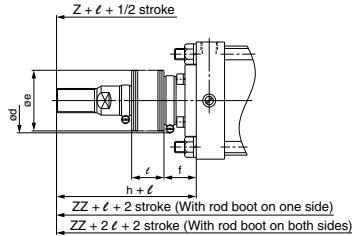
CS1W Series

Center Trunnion Type: CS1WT

Lube type (CS1WT), Non-lube type (CS1WTN), Air-hydro type (CS1WTH)



With rod boot



Type	Bore size (mm)	Stroke range (mm)																				
		Without rod boot	With rod boot	A	AL	B	C	D	E	EA	F	FA	G	J	K	KA	M	MM	N	P	R	S
		Lube	125	25 to 1000	30 to 1000	50	47	145	115	36	90	59	43	14	16	M14 x 1.5	15	31	19	M30 x 1.5	35	1/2
Non-lube	140	30 to 1000	30 to 1000	50	47	161	128	36	90	59	43	14	16	M14 x 1.5	15	31	19	M30 x 1.5	35	1/2	1.5	98
Air-hydro	160	35 to 1200	35 to 1200	56	53	182	144	40	90	59	43	14	18.5	M16 x 1.5	17	36	22	M36 x 1.5	39	3/4	1.5	106
	180	30 to 1200	30 to 1200	63	60	204	162	45	115	70	48	17	18.5	M18 x 1.5	20	41	26	M40 x 1.5	39	3/4	2	111
Lube	200	30 to 1200	30 to 1200	63	60	226	182	50	115	74	48	17	18.5	M20 x 1.5	20	46	26	M45 x 1.5	39	3/4	2	111
Non-lube	250	30 to 1200	30 to 1200	71	67	277	225	60	140	86	60	20	23	M24 x 1.5	25	56	30	M56 x 2	49	1	3	141
	300	35 to 1200	35 to 1200	80	76	330	270	70	140	96	60	20	23	M30 x 1.5	30	65	36	M64 x 2	49	1	4	146

Type	Bore size (mm)	TDes	TT	TX	TY	TZ	H	Without rod boot												With rod boot (Single side)				(Both sides)			
								Without rod boot		With rod boot		Without rod boot		With rod boot		Without rod boot		With rod boot		Without rod boot		With rod boot					
								Z	ZZ	d	e	f	h	l	Z	ZZ	Z	ZZ	Z	ZZ	Z	ZZ					
Lube	125	32 ^{+0.050} _{-0.089}	50	170	164	234	110	159	318	82	75	40	133	0.2 stroke	182	341	182	364									
Non-lube	140	36 ^{+0.050} _{-0.089}	55	190	184	262	110	159	318	82	75	40	133	0.2 stroke	182	341	182	364									
Air-hydro	160	40 ^{+0.050} _{-0.089}	60	212	204	292	120	173	346	82	75	40	141	0.2 stroke	194	367	194	388									
	180	45 ^{+0.050} _{-0.089}	59	236	228	326	135	190.5	381	92	85	45	153	0.2 stroke	208.5	399	208.5	417									
Lube	200	45 ^{+0.050} _{-0.089}	59	265	257	355	135	190.5	381	96	90	45	153	0.2 stroke	208.5	399	208.5	417									
Non-lube	250	56 ^{+0.060} _{-0.106}	69	335	325	447	160	230.5	461	108	105	55	176	0.17 stroke	246.5	477	246.5	493									
	300	67 ^{+0.060} _{-0.106}	79	400	390	534	175	248	496	118	115	55	190	0.17 stroke	263	511	263	526									

With Auto Switch: ø125 to ø200 Only

Type	Bore size (mm)	Stroke range (mm)		S	Without rod boot				With rod boot (Single side)				With rod boot (Both sides)			
		Without rod boot	With rod boot		Without rod boot		With rod boot		Without rod boot		With rod boot					
		Z	ZZ		Z	ZZ	Z	ZZ	Z	ZZ	Z	ZZ				
Lube	125	25 to 1000	30 to 1000	98	159	318	182	341	364							
Non-lube	140	30 to 1000	30 to 1000	98	159	318	182	341	364							
Air-hydro	160	35 to 1200	35 to 1200	106	173	346	194	367	388							
Lube	180	30 to 1200	30 to 1200	115	192.5	385	210.5	403	421							
Non-lube	200	30 to 998	30 to 998	120	195	390	213	408	426							

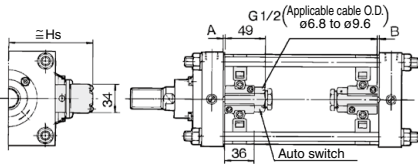
*** Refer to "Minimum Stroke for Auto Switch Mounting" on page 652.

Auto Switch Mounting 1

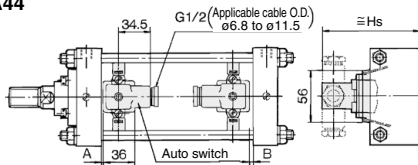
Proper Auto Switch Mounting Position (Detection at stroke end) and Mounting Height

Band mounting type

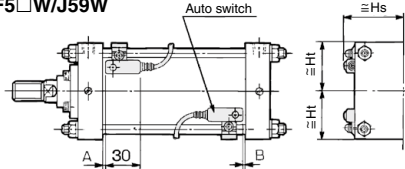
D-A3□
D-G3/K3



D-A44

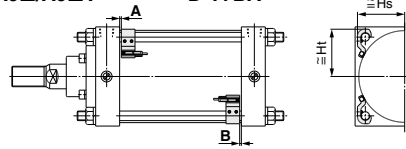


D-F5□/J59/D-F5NT
D-F5BA/F59F
D-F5□W/J59W

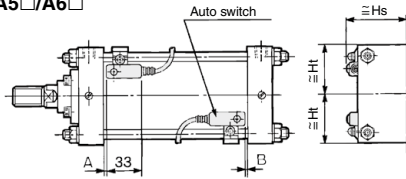


Tie-rod mounting type

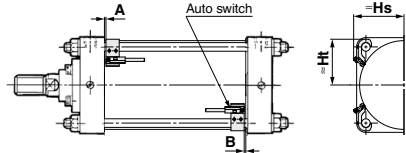
D-M9□/M9□V D-Z7□/Z80
D-M9□W/M9□WV D-Y59□/Y69□/Y7P/Y7PV
D-M9□A/M9□AV D-Y7□W/Y7□WV
D-A9□/A9□V D-Y7BA



D-A5□/A6□



D-P3DWA



Proper Auto Switch Mounting Position

(mm)

Auto switch model	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-Z7□/Z80 D-Y5□/Y6□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-A5□ D-A6□ D-A3□ D-A44 D-G39 D-K39		D-A59W		D-F5□W D-J59W D-F5BA D-F5□ D-J59 D-F59F		D-F5NT		D-P3DWA	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bore size 125	8	8	4	4	1.5	1.5	0	0	2	2	4.5	4.5	9.5	9.5	3.5	3.5
140	8	8	4	4	1.5	1.5	0	0	2	2	4.5	4.5	9.5	9.5	3.5	3.5
160	8	8	4	4	1.5	1.5	0	0	2	2	4.5	4.5	9.5	9.5	3.5	3.5
180	13.5	12.5	9.5	7.5	7	5	3.5	1.5	7.5	5.5	10	8	15	13	9	7
200	16	14	12	10	9.5	7.5	6	4	10	8	12.5	10.5	17.5	15.5	11.5	9.5

* The mounting position should be referred for reference only for the auto switch mounting position at the stroke end detection.

* Adjust the auto switch after confirming the operation to set actually.

* Low friction type (CDS1□Q): ø125, ø140, ø160

Auto Switch Mounting Height

(mm)

Auto switch model	D-M9□ D-M9□W D-M9□A D-A9□ D-A9□V		D-M9□WV D-M9□AV D-M9□V		D-Z7□/Z80 D-Y5□/Y6□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-A3□ D-G39 D-K39		D-A44		D-A5□ D-A6□ D-A59W		D-F5□ D-J59 D-F5□W D-J59W D-F5BA D-F59F D-F5NT		D-P3DWA	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
Bore size 125	69	69.5	71.5	69.5	69	69.5	116	116	126	75.5	69.5	74.5	70	76	69.5	69.5
140	76	76	77.5	76	76	76	124	124	134	81	76.5	80	76.5	82	76	76
160	85	85	86	85	85	85	134.5	134.5	144.5	89	87.5	88	87.5	91	85	85
180	95	95	95.5	95	95	95	144	144	154	97	97.5	96	97.5	100	95	95
200	106	106	106	106	106	106	154	154	164	107	108	107.5	108	111	106	106

* Low friction type (CDS1□Q): ø125, ø140, ø160

CS1 Series Auto Switch Mounting 2

Minimum Stroke for Auto Switch Mounting

n: No. of auto switch (mm)

Auto switch model No.	No. of auto switch mounted	Bracket other than center trunnion	Center trunnion type			
			ø125	ø140	ø160	ø180
D-M9□ D-M9□W	2 (Different surfaces, Same surface)	15	105	110		115
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-M9□V D-M9□WV	2 (Different surfaces, Same surface)	10	80	85		90
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$80 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-M9□A	2 (Different surfaces, Same surface)	20	115		120	
	n	$20 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$115 + 40 \frac{(n-2)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$120 + 40 \frac{(n-2)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	
D-M9□AV	2 (Different surfaces, Same surface)	15	90		95	
	n	$15 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$90 + 30 \frac{(n-2)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$95 + 30 \frac{(n-2)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	
D-A9□	2 (Different surfaces, Same surface)	15	100	105		110
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$100 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-A9□V	2 (Different surfaces, Same surface)	10	75	80		85
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$75 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$80 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-A5□/A6□ D-A59W D-F5□/J59 D-F5□W D-F59W D-F5BA D-F59F	2 (Different surfaces, Same surface)	25	125	135		150
	n (Same surface)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$125 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$135 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$150 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-F5NT	2 (Different surfaces, Same surface)	35	145	155		170
	n (Same surface)	$35 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$145 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$155 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$170 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-A3□ D-G39 D-K39	2	Different surfaces	35		110	150
		Same surface	100			
	n	Different surfaces	$35 + 30(n-2)$ (n = 2, 3, 4, 5...)		$110 + 30(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}	$150 + 100(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}
		Same surface	$100 + 100(n-2)$ (n = 2, 3, 4, 5...)		$110 + 100(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}	$150 + 30(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}
D-A44	2	Different surfaces	35		110	150
		Same surface	55			
	n	Different surfaces	$35 + 30(n-2)$ (n = 2, 3, 4, 5...)		$110 + 30(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}	$150 + 30(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}
		Same surface	$55 + 55(n-2)$ (n = 2, 3, 4, 5...)		$110 + 50(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}	$150 + 50(n-2)$ (n = 2, 4, 6, 8...) ^{Note 1}
1	15		110	150		
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	2 (Different surfaces, Same surface)	15	105	110		115
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, Same surface)	10	90	95		100
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$95 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$100 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-Y7BA	2 (Different surfaces, Same surface)	20	115	120	125	130
	n	$20 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$115 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$120 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$125 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$130 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}
D-P3DWA	2 (Different surfaces, Same surface)	20	110	115		120
	n	$20 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...) ^{Note 1}	$110 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}	$115 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}		$120 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) ^{Note 2}

* Low friction type (CDS□□): ø125, ø140, ø160

Note 1) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.
Note 2) When "n" is an odd number, a multiple of 4 that is larger than this odd number is used for the calculation.

Operating range

Auto switch model	Bore size (mm)				
	125	140	160	180	200
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	6	6.5	6.5	6.5	7
D-A9□/A9□V	12	12.5	11.5	12	12.5
D-Z7□/Z80	14	14.5	13	14	14.5
D-A3□/A44 D-A5□/A6□	10	10	10	10	10
D-A59W	17	17	17	17	17
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA	12	13	7	7.5	8
D-F5□/J59/F5□W D-J59W/F5BA D-F5NT/F59F	5	5	5.5	6	6
D-G39/K39	11	11	10	10	10
D-P3DWA	6	6.5	6.5	6.5	7

- * 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.
- * Low friction type (CDS1□Q): ø125, ø140, ø160

Auto Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)				
	ø125	ø140	ø160	ø180	ø200
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV D-A9□/A9□V	BS5-125	BS5-125	BS5-160	BS5-180	BS5-200
D-A5□/A6□ D-A59W D-F5□/J59 D-F5NT D-F5□W/J59W D-F5BA/F59F	BT-12	BT-12	BT-16	BT-18A	BT-20
D-A3□/A44 D-G39/K39	BS1-125	BS1-140	BS1-160	BS1-180	BS1-200
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA	BS4-125	BS4-125	BS4-160	BS4-180	BS4-200
D-P3DWA	BS7-125S	BS7-125S	BS7-160S	BS7-180S	BS7-200S

[Stainless Steel Mounting Screw Kit]

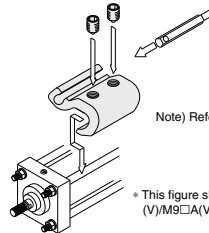
The following set of stainless steel mounting screws is available. Use them in accordance with the operating environment. (Since auto switch brackets are not included, order them separately.)

BBA1: For D-A5/A6/F5/J5 types

The above stainless steel screws are used when a cylinder is shipped with D-F5BA-type auto switches.

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

Note) When D-M9□A/M9□AV/Y7BA auto switches are used, do not use steel set screws included in the auto switch mounting brackets above (BS5-□□□ and BS4-□□□). Order the stainless steel screw set BBA1 separately, and use M4 x 8L stainless steel set screws included in BBA1 instead.



Note) Refer to page 1377 for the details of BBA1 screws.

* This figure shows how to mount D-A9□(V)/M9□(V)/M9□V(V)/M9□A(V).

Besides the models listed in How to Order, the following auto switches are applicable. Refer to pages 1271 to 1365 for the detailed specifications.

Auto switch type	Part no.	Electrical entry (Fetching direction)	Features
Reed	D-A90V	Grommet (perpendicular)	Without indicator light
	D-A93V, A96V		
	D-Z73, Z76		—
	D-A53, A56	Grommet (in-line)	Without indicator light
	D-A67		
	D-Z80		
Solid state	D-F59, F5P, J59	Grommet (in-line)	—
	D-Y59A, Y59B, Y7P		
	D-F59W, F5PW, J59W		2-color display
	D-Y7NW, Y7PW, Y7BW		Water resistant (2 colors)
	D-F5BA, Y7BA		With timer
	D-F5NT		—
	D-M9NV, M9PV, M9BV	Grommet (perpendicular)	—
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWW		2-color display
	D-Y7NWV, Y7PWV, Y7BWW		
	D-M9NAV, M9PAV, M9BAV		Water resistant (2 colors)

* For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1340 and 1341 for details.

* Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)/Y7G/Y7H) are also available. Refer to pages 1290 and 1292 for details.