

Air Cylinder

ø125, ø140, ø160, ø180, ø200, ø250, ø320

RoHS

Lightweight

Weight: Max. **65%** reduction

39.1 kg → **13.4 kg**

(Compared with a ø180, 100 mm stroke CS1 (steel tube) series model)

High Rigidity

■ Allowable lateral load equal to the CS1 (steel tube) series

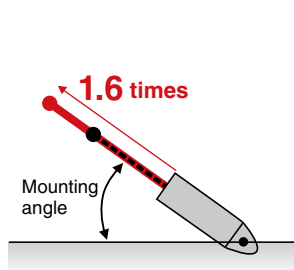
Allowable lateral load: Max. **900 N**

(ø320, 100 mm stroke, with piston rod extended)

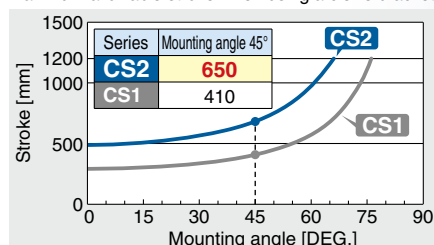
■ When using a rotating bracket:

Max. stroke increased by **1.6 times**

410 mm stroke → **650 mm stroke**



Maximum allowable stroke when using a clevis bracket



Improved Ease of Piping

Centralized piping ports in the axial direction increase piping flexibility.

(Axial centralized piping type)

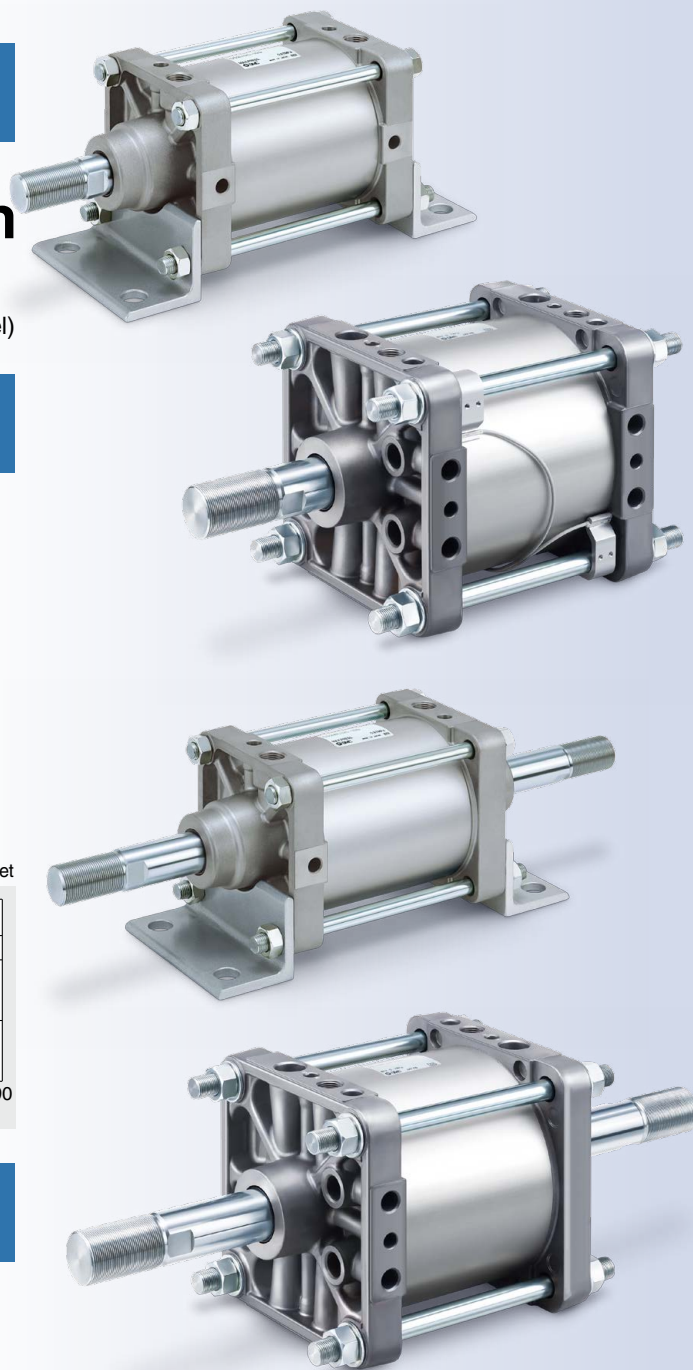


Rod side axial piping



Head side axial piping

CS2 Series



New

- Bore size ø320 has been added to the standard type (single rod and double rod).
- A long stroke type (ø180 to ø320) has been added.



SMC

CAT.ES20-196D

Lightweight

Weight reduced by a change in the cover material

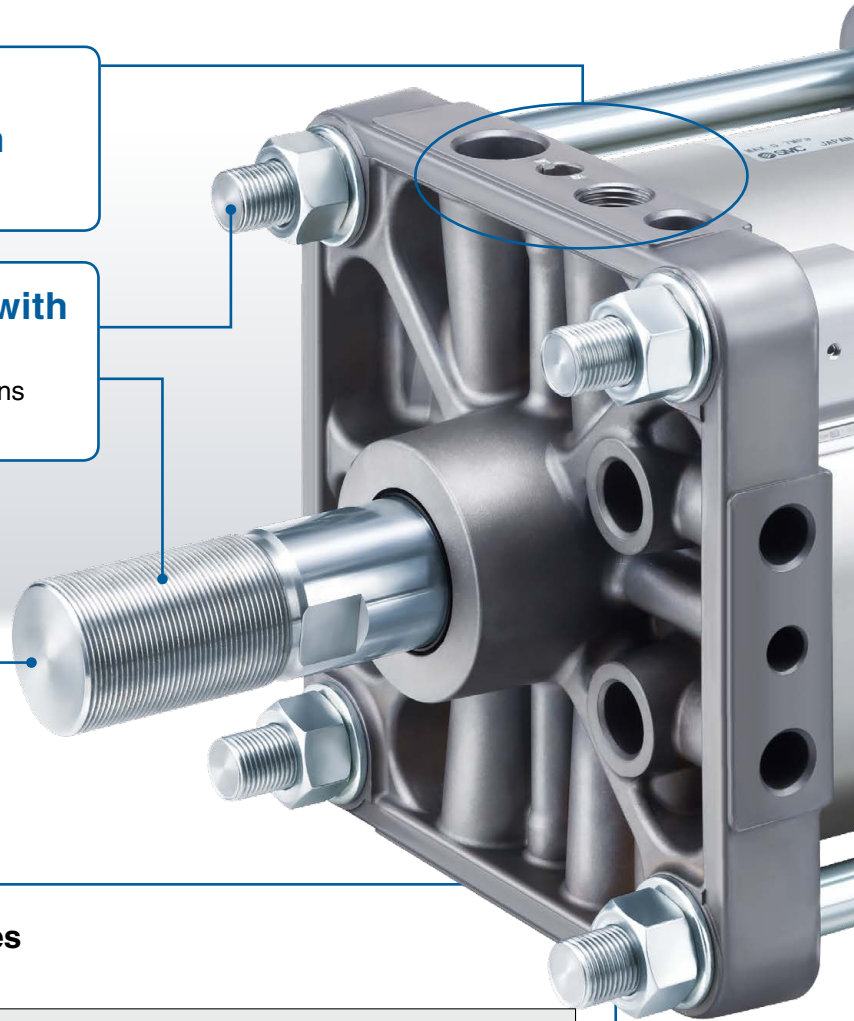
* Compared at a 100 mm stroke

Bore size [mm]	CS2 (Aluminum tube) [kg]	CS1 (Steel tube) [kg]	Reduction rate [%]
125	7.0	17.9	61
140	8.2	21.4	62
160	11.3	28.8	61
180	13.4	39.1	65
200	17.8	48.4	63
250	30.8	88.9	65
New 320	56.4	128.1 (CS1 ø300)	65

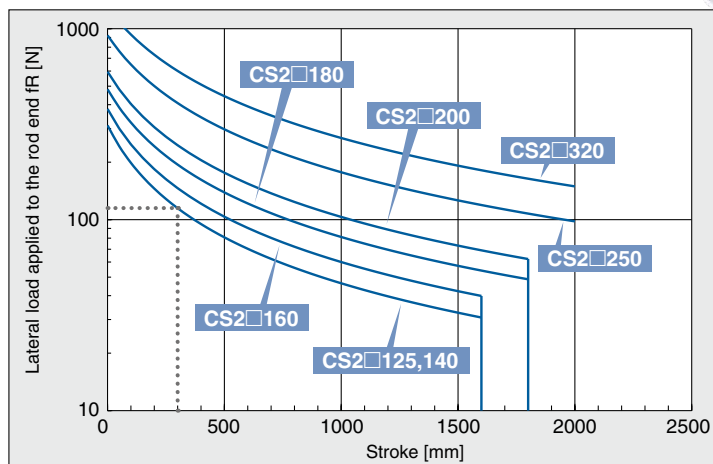
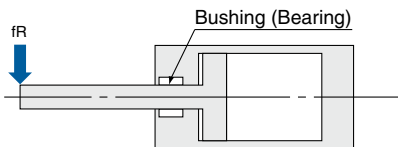
Ease of piping improved by placing the piping and cushion valve on the same side

Mounting is interchangeable with the CS1 series.

- Interchangeable cylinder mounting dimensions
- Interchangeable rod end thread sizes



Lateral load equal to the CS1 series



High Rigidity

Allowable lateral load: **Max. 900 N**

(ø320, 100 mm stroke, with piston rod extended)

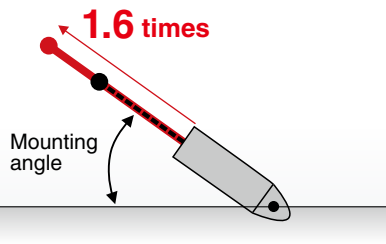
■ When using a rotating bracket:

Max. stroke increased by 1.6 times

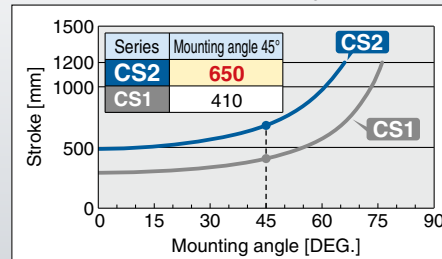
410 mm stroke → **650 mm** stroke

Lighter cylinder reduces self-weight deflection

Stroke range extended to widen use



Maximum allowable stroke when using a clevis bracket



Air cushion



Bumper cushion

Combined structure

- The bumper cushion reduces the metal noise that occurs when the piston stops at the end of the stroke. (ø180, ø200, ø250, and ø320 only)

Auto switches can be mounted on ø125 to ø320.

- Solid state auto switch: D-M9□
- Reed auto switch: D-A9□
- Magnetic field-resistant auto switch: D-P3DWA (ø125 to ø200 only)



Smooth Cylinder

CS2Y Series

(ø125 to ø160 only)

- Min. operating pressure: 0.005 MPa
- For stable operation even at low speeds of 5 mm/s

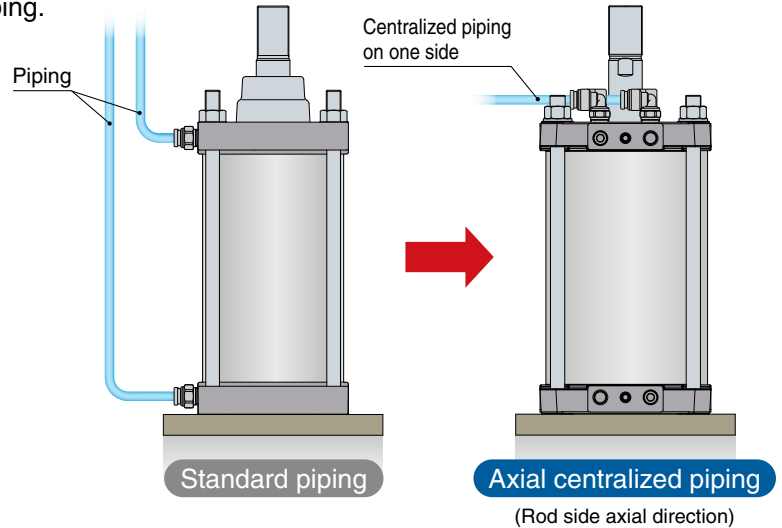
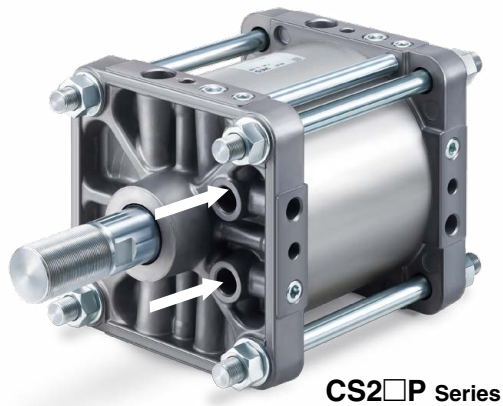


For details, refer to the **Web Catalog**.





Axial Centralized Piping (ø180, ø200, and ø250 only)

Increased piping flexibility, Reduced piping labor

- Piping ports are located in the axial direction of the head cover or the rod cover.
- For long-stroke operation, the speed can be adjusted on one side. Furthermore, the piping has been simplified, resulting in improved ease of piping.



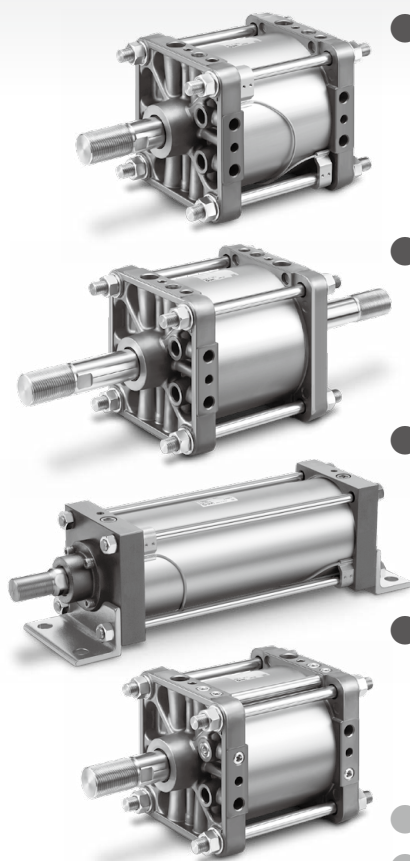
Series Variations

Series	Action	Type	Piping type	Standard variations		Bore size [mm]	Made to order	Page
				With rod boot	Copper-free			
 Standard CS2	Double acting	Single rod	Standard piping	●	●*1	125 140 160 180 200	<ul style="list-style-type: none"> • Change of rod end shape • Heat-resistant cylinder (0 to 150°C) • Special port location • With heavy duty scraper • Heat-resistant cylinder (0 to 110°C) • Adjustable stroke cylinder/ Adjustable retraction type • Dual stroke cylinder/Double rod type • Dual stroke cylinder/Single rod type • Change of trunnion bracket mounting position • Change of tie-rod length • Fluororubber seal • With split pins for double clevis pin/ double knuckle joint pin and flat washers • Double clevis and double knuckle joint pins made of stainless steel • Rod side trunnion • With coil scraper • Made of stainless steel (With hard chrome plated piston rod) • With rod end bracket 	6
		Double rod	Standard piping	●	●*1	250 320		27
 Long stroke CS2-V	Double acting	Single rod	Standard piping	●		180 200 250 320	<ul style="list-style-type: none"> • Change of rod end shape • Change of trunnion bracket mounting position • Change of tie-rod length 	40
 Axial centralized piping CS2□P	Double acting	Single rod	Centralized piping	●		180 200 250		51
 Smooth Cylinder CS2Y	Double acting	Single rod	Standard piping	●		125 140 160		Refer to the Web Catalog.

*1 Refer to the **Web Catalog** for details on copper-free products (ø125 to ø160).

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Standard	Double Acting, Single Rod	CS2
Standard	Double Acting, Double Rod	CS2W
Long Stroke	Double Acting, Single Rod	CS2-V
Axial Centralized Piping	Double Acting, Single Rod	CS2□P
Auto Switch		Auto Switch
Made to Order		Made to Order

Combination of Standard Products and Made to Order Specifications

CS2 Series

● : Standard
 ◎ : Made to order
 ○ : Special product (Please contact SMC for details.)
 — : Not available

Symbol	Specifications	Applicable bore size	Series		CS2 (Standard)		CS2-V (Long stroke)	CS2□P (Axial centralized piping)	
			Action/Type	Double acting				Double acting	Double acting
				Single rod		Double rod		Single rod	Single rod
				Non-lube				Non-lube	Non-lube
			ø125 to ø160	ø180 to ø320	ø125 to ø160	ø180 to ø320	ø180 to ø320	ø180 to ø250	
Standard	Standard	ø125 to ø320	●	●	●	●	●	●	
CDS2	Built-in magnet		●	●	●	●	●	●	
CS2□-□ ^J _K	With rod boot		●	●	●	●	●	●	
20-	Copper and Fluorine-free *1	ø125 to ø320	◎	○	◎	○	○	○	
-XA□	Change of rod end shape		◎	◎	◎	◎	◎	◎	
-XB5	Oversized rod cylinder		○	○	○	○	○	○	
-XB6	Heat-resistant cylinder (0 to 150°C)		◎	○	◎	○	○	○	
-XB7	Cold-resistant cylinder		○	—	○	—	—	—	
-XC3	Special port location		◎	○	○	○	○	○	
-XC4	With heavy duty scraper		◎	○	◎	○	○	○	
-XC5	Heat-resistant cylinder (0 to 110°C)		◎	○	◎	○	○	○	
-XC6*2	Made of stainless steel		Available as "-XC68"						
-XC7	Tie-rod, cushion valve, tie-rod nut, etc. made of stainless steel		○	○	○	○	○	○	
-XC8	Adjustable stroke cylinder/Adjustable extension type		○	○	—	—	—	—	
-XC9	Adjustable stroke cylinder/Adjustable retraction type		◎	○	—	—	—	—	
-XC10	Dual stroke cylinder/Double rod type		◎	○	—	—	—	—	
-XC11	Dual stroke cylinder/Single rod type		◎	○	—	—	—	—	
-XC12	Tandem cylinder		○	○	—	—	—	—	
-XC14	Change of trunnion bracket mounting position		◎	◎	◎	◎	◎	◎	
-XC15	Change of tie-rod length		◎	◎	◎	◎	◎	◎	
-XC22	Fluororubber seal		◎	○	◎	○	○	○	
-XC26	With split pins for double clevis pin/ double knuckle joint pin and flat washers		◎	◎	—	—	○	○	
-XC27	Double clevis and double knuckle joint pins made of stainless steel		◎	◎	—	—	○	○	
-XC30	Rod side trunnion		◎	○	◎	○	○	○	
-XC35	With coil scraper		◎	○	◎	○	○	○	
-XC39	Special trunnion bearing		○	○	○	○	○	○	
-XC40	Clevis hole with bushing		○	○	—	—	○	○	
-XC50	Knuckle fixed with nut		○	○	○	○	○	○	
-XC68	Made of stainless steel (With hard chrome plated piston rod)		◎	◎	◎	◎	○	○	
-XC86	With rod end bracket		◎	◎	○	○	○	○	

*1 For details, refer to the SMC website.

*2 The specification of "-XC6" made of stainless steel is available as "-XC68."

Air Cylinder: Standard Type Double Acting, Single Rod

CS2 Series

ø125, ø140, ø160, ø180, ø200, ø250, ø320

RoHS

How to Order

CS2 L 125 - 300

With auto switch CDS2 L 125 - 300 - M9BW

With auto switch (Built-in magnet)

Mounting

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

Bore size

125	125 mm
140	140 mm
160	160 mm
180	180 mm
200	200 mm
250	250 mm
320	320 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke [mm]

Refer to "Maximum Strokes" on page 7.

Number of auto switches

Nil	2
3	3
S	1
n	n

Auto switch

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

* For applicable auto switches, refer to the table below.

Suffix for cylinder

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat-resistant tarpaulin

* The minimum stroke with a rod boot is 30 mm. (35 mm for ø160 when the center trunnion type is selected)

Made to order

Refer to page 7 for details.

Applicable Auto Switches/Refer to the Web Catalog 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	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC						
				3-wire (PNP)				M9P	●	●	●	○	○								
		2-wire	M9B	●	●	●	○	○	—												
		Terminal conduit	3-wire (NPN)	24 V	5 V, 12 V	—	—	G39	—	—	—	—	—	IC circuit							
	2-wire	—	K39				—	—	—	—	—	—									
	Diagnostic indication (2-color indicator)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	●	●	●	○	○	IC circuit							
				3-wire (PNP)				M9PW	●	●	●	○	○	—							
	Water resistant (2-color indicator)	Grommet	No	2-wire	24 V	12 V	—	M9BW	●	●	●	○	○	—							
				3-wire (NPN)				M9NA*1	—	○	○	●	○	○		IC circuit					
	With diagnostic output (2-color indicator)	Grommet	No	3-wire (PNP)	24 V	5 V, 12 V	—	M9PA*1	—	○	○	●	○	○		IC circuit					
2-wire				M9BA*1				—	○	○	●	○	○	—							
Magnetic field resistant (2-color indicator)	Grommet	No	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	—	●	—	●	○	○	IC circuit							
			2-wire (Non-polar)				P3DWA*2	—	●	—	●	●	○	—							
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	5 V	—	A96	—	●	—	●	—	—	IC circuit	—					
				No				2-wire	12 V	100 V	A93	—	●	●	●		●	—	IC circuit	Relay, PLC	
				Yes							100 V, 120 V	A90	—	●	—		●	—			—
				No							100 V, 200 V	A54	—	●	—		●	—			
		Terminal conduit	Grommet	Yes	2-wire	24 V	12 V	200 V or less	A64	—	●	—	●	—	—	—	PLC				
									—	A33	—	—	—	—	—			—			
									—	A34	—	—	—	—	—						
									—	A44	—	—	—	—	—						
Diagnostic indication (2-color indicator)	Grommet	No	—	24 V	—	—	A59W	—	●	—	●	—	—	—	Relay, PLC						
			—				—	—	—	—	—	—									

*1 Water-resistant type auto switches can be mounted on the above models, but SMC cannot guarantee water resistance.

Please contact SMC regarding water-resistant types with the above model numbers.

*2 The D-P3DWA, A54, A64, and A59W are not applicable to bore sizes ø250 and ø320.

* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW 3 m..... L (Example) M9NWL
1 m..... M (Example) M9NWM 5 m..... Z (Example) M9NWZ

* Solid state auto switches marked with a "O" are produced upon receipt of order.

* Since there are applicable auto switches other than those listed above, refer to page 63 for details.

* D-A9□/M9□/M9□W/M9□A/P3DWA□ auto switches are shipped together with the product but do not come assembled. (Only the auto switch mounting brackets are assembled before shipment.)

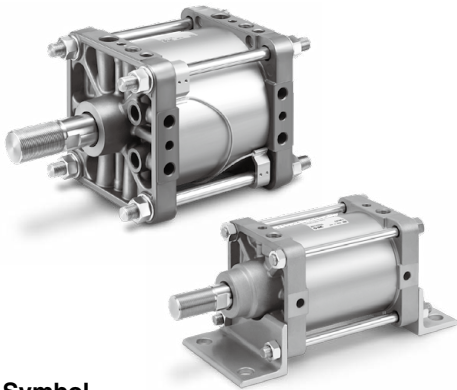
* D-G39/K39/A3□/A44 auto switches (band mounting type) can only be mounted on ø125 to ø160.

Standard Double Acting, Single Rod CS2
Double Acting, Double Rod CS2W
Long Stroke Double Acting, Single Rod CS2-V
Axial Centralized Piping Double Acting, Single Rod CS2□P

Auto Switch

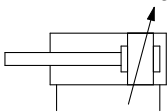
Made to Order

CS2 Series



Symbol

Double acting, Air cushion



Made to Order Specifications (For details, refer to pages 65 to 75.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat-resistant cylinder (0 to 150°C)
-XC3	Special port location
-XC4	With heavy duty scraper
-XC5	Heat-resistant cylinder (0 to 110°C)
-XC9	Adjustable stroke cylinder/Adjustable retraction type
-XC10	Dual stroke cylinder/Double rod type
-XC11	Dual stroke cylinder/Single rod type
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length
-XC22	Fluororubber seal
-XC26	With split pins for double clevis pin/double knuckle joint pin and flat washers
-XC27	Double clevis and double knuckle joint pins made of stainless steel
-XC30	Rod side trunnion
-XC35	With coil scraper
-XC68	Made of stainless steel (With hard chrome plated piston rod)
-XC86	With rod end bracket

* Refer to page 5 for details on whether or not to use a made-to-order product with the above common specifications.

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat-resistant tarpaulin	110°C*1

*1 Max. ambient temperature for rod boot itself

Refer to pages 59 to 63 for cylinders with auto switches.

- Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height
- Minimum Stroke for Auto Switch Mounting
- Operating Range
- Auto Switch Mounting Brackets/Part Nos.

Specifications

Bore size [mm]		125	140	160	180	200	250	320
Action		Double acting, Single rod						
Fluid		Air						
Proof pressure		1.57 MPa			1.2 MPa			
Max. operating pressure		0.97 MPa			0.7 MPa			
Min. operating pressure		0.05 MPa						
Piston speed		50 to 500 mm/s			50 to 300 mm/s			
Cushion		Air cushion			Air cushion + Bumper cushion			
Ambient and fluid temperatures	Without auto switch	0 to 70°C (No freezing)						
	With auto switch	0 to 60°C (No freezing)						
Lubrication		Not required (Non-lube)						
Stroke length tolerance [mm]	250 or less	+1.0 0			+2.0 0			
	251 to 1000	+1.4 0			+2.4 0			
	1001 to 1500	+1.8 0			+2.8 0			
	1501 to 1600	+2.2 0			+3.2 0			
Mounting		Basic, Foot, Rod flange, Head flange, Single clevis, Double clevis, Center trunnion						
Allowable kinetic energy (When air cushion is activated)		32.3 J	44.6 J	58.8 J	78.4 J	98 J	147 J	265 J

Maximum Strokes

* When using with auto switches, refer to the "Minimum Stroke for Auto Switch Mounting" table on page 61.

Mounting bracket	Maximum stroke [mm]	
	Basic, Head flange, Single clevis, Double clevis, Center trunnion	Foot, Rod flange
Bore size	125	1600 or less
	140	
	160	
	180	
200	998 or less	
250	813 or less	
320	495 or less	

* For bore sizes $\phi 180$ to $\phi 320$, cylinders whose strokes exceed the lengths shown in the table to the right are categorized as class 2 pressure vessels under the Class 2 Pressure Vessel Act. Only the long stroke specification (page 40) is selectable for class 2 pressure vessels to be used or installed in Japan. For laws and regulations, refer to the CS1 series ([Web Catalog](#)).

* A bore size $\phi 320$ class 2 pressure vessel is available as a special product.

* For bore size $\phi 180$, the 1201 to 1569 stroke range for mounting bracket types other than the foot bracket and rod flange is only selectable with the individual made-to-order specification -X1034. As this specification exceeds the stroke limit, be sure to check the operating conditions, such as buckling of the piston rod, before deciding to use the product.

Bore size [mm]	Cylinder stroke [mm]
180	1569
200	998
250	813
320	495

Accessories

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

* If using the rod end nut with a single knuckle joint or a double knuckle joint, use the type with a rod end bracket (-XC86) or order the accessory separately. For part numbers and dimensions of accessories, refer to page 26.

Mounting Bracket Part Nos.

Bore size [mm]	125	140	160	180	200	250	320
Foot	CS2-L12	CS2-L14	CS2-L16	CS2-L18	CS2-L20	CS2-L25	CS2-L32
Flange	CS2-F12	CS2-F14	CS2-F16	CS2-F18	CS2-F20	CS2-F25	CS2-F32
Single clevis	CS2-C12	CS2-C14	CS2-C16	CS2-C18	CS2-C20	CS2-C25	CS2-C32
Double clevis	CS2-D12	CS2-D14	CS2-D16	CS2-D18	CS2-D20	CS2-D25	CS2-D32

* When ordering foot brackets, order two pieces per cylinder.

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

* Mounting nuts are included in the brackets for bore size $\phi 320$.

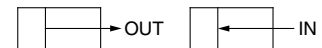
Weight (Guide)

Bore size [mm]		125	140	160	180	200	250	320	[kg]
Basic weight	Basic	5.5	6.5	9.1	10.9	14.8	25.7	49.3	
	Foot	7.5	9.5	12.5	15.6	20.3	36.6	75.1	
	Rod flange	8.6	12.1	15.8	20.5	26.6	47.5	87.3	
	Head flange	8.6	12.1	15.8	20.5	26.6	47.5	87.3	
	Single clevis	8.6	10.8	14.6	19.2	24.8	44.0	89.3	
	Double clevis	9.0	11.6	15.5	20.9	26.6	47.1	94.0	
	Trunnion	9.6	12.3	15.5	21.6	28.8	52.0	82.9	
Additional weight with magnet (With built-in magnet and auto switch)		0.1	0.1	0.1	0.1	0.2	0.2	0.3	
Additional weight per 100 mm of stroke		1.6	1.7	2.3	2.5	3.0	5.1	7.1	
Accessories	Single knuckle	1.0	1.2	1.6	3.1	2.9	5.4	10.8	
	Double knuckle (Knuckle pin, Split pin)	1.4	1.9	2.5	4.8	4.6	9.3	17.2	
	Rod end nut	0.2	0.2	0.3	0.4	0.9	1.3	1.4	

Calculation: (Example) **CS2L160-500**

- Basic weight 12.5 [kg]
 - Additional weight ... 2.3 [kg/100 mm]
 - Cylinder stroke 500 [mm]
- $12.5 + 2.3 \times 500/100 = 24.0$ [kg]

Theoretical Output



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
180	40	OUT	25400	5080	7620	10200	12700	15200	17800	—	—	—
		IN	24200	4840	7260	9680	12100	14520	16940	—	—	—
200	45	OUT	31400	6280	9420	12600	15700	18800	22000	—	—	—
		IN	29800	5960	8940	11930	14910	17890	20870	—	—	—
250	56	OUT	49100	9820	14700	19600	24600	29500	34400	—	—	—
		IN	46600	9320	13980	18640	23310	27970	32630	—	—	—
320	65	OUT	80400	16100	24100	32200	40200	48200	56300	—	—	—
		IN	77100	15400	23100	30800	38600	46300	54000	—	—	—

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2-P**
 Auto Switch
 Made to Order

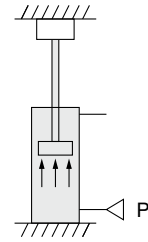
CS2 Series

Relationship between Cylinder Size and Maximum Stroke

The below table shows the applicable maximum stroke (in cm units), found by calculation assuming the case where the force generated by the cylinder itself acts as 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.

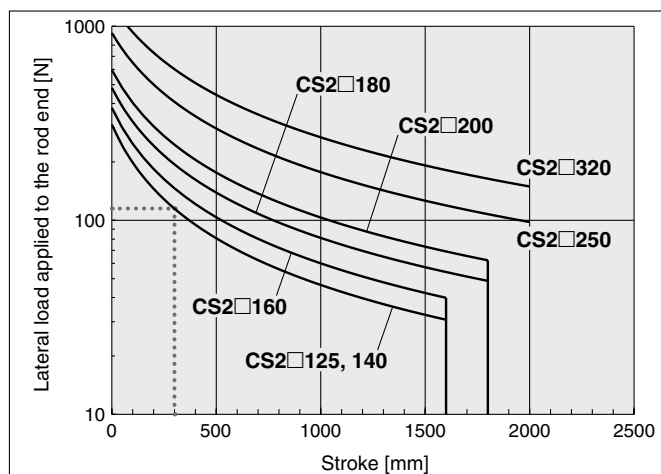
[Reference] If it is stopped with the external stopper on the cylinder extension side, even with a light load, the maximum generated force of the cylinder will act on the cylinder itself.



[cm]

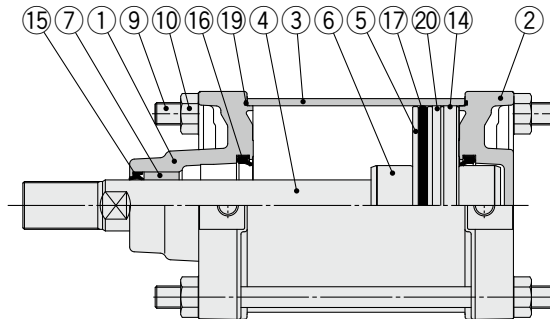
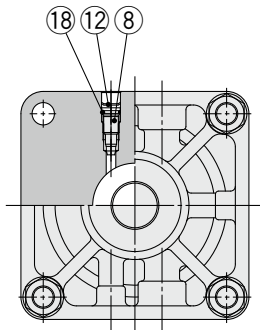
Mounting			Operating pressure [MPa]	Applicable maximum stroke according to buckling strength								
Support bracket nominal symbol and schematic diagram		Nominal symbol		125	140	160	180	200	250	320		
Foot: L	Rod flange: F	Head flange: G	0.3	103	92	113	108	124	155	162		
				L, F	0.5	79	70	86	81	94	118	122
					0.7	66	58	72	67	78	98	101
			G		0.3	45	38	47	46	54	67	69
				0.5	33	27	34	33	39	49	49	
				0.7	26	22	27	26	31	39	39	
Clevis: C, D		Center trunnion: T	0.3	96	83	106	102	118	147	152		
		C, D		0.5	71	61	76	75	88	109	113	
				0.7	59	50	62	61	72	89	92	
			T	0.3	135	119	147	146	167	208	217	
		0.5		101	89	111	110	127	158	164		
		0.7		84	74	91	91	105	131	136		
Foot: L	Rod flange: F	Head flange: G	0.3	301	267	330	324	370	460	483		
				L, F	0.5	231	207	253	248	284	354	371
					0.7	193	172	212	208	239	297	311
			G		0.3	144	126	156	154	177	220	230
				0.5	109	94	118	116	134	167	174	
				0.7	90	78	97	96	111	138	144	
Foot: L	Rod flange: F	Head flange: G	0.3	433	386	476	462	528	655	688		
				L, F	0.5	334	297	367	355	406	505	530
					0.7	281	250	309	299	342	425	446
			G		0.3	210	185	229	223	256	317	332
				0.5	160	141	175	170	195	242	253	
				0.7	134	117	129	142	163	202	211	

Allowable Lateral Load (Same as the CS1 series)

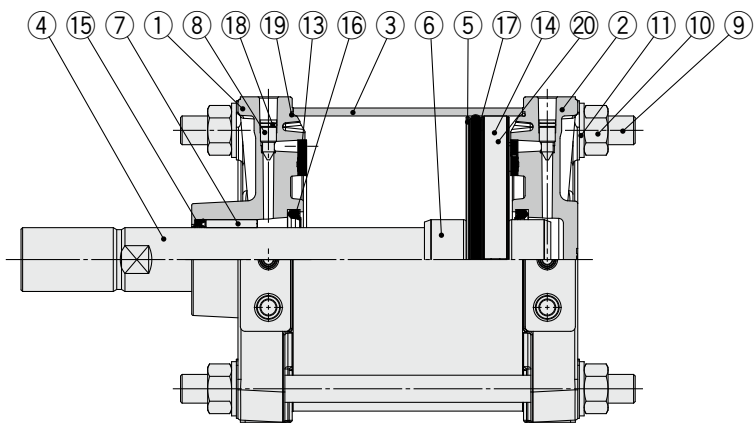
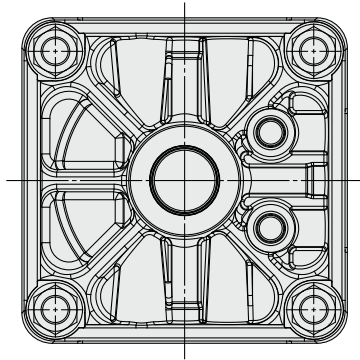


Construction

ø125 to ø160



ø180 to ø250



Component Parts

No.	Description	Material	Qty.	Note
1	Rod cover	Aluminum die-cast	1	
2	Head cover	Aluminum die-cast	1	
3	Cylinder tube	Aluminum alloy	1	
4	Piston rod	Carbon steel	1	
5	Piston	Aluminum alloy	1	
6	Cushion ring	Stainless steel	2	ø125 to ø180
		Rolled steel	2	ø200, ø250
7	Bushing	Bearing alloy	1	
8	Cushion valve	Rolled steel	2	ø125 to ø160
		Brass	2	ø180 to ø250
9	Tie-rod	Carbon steel	4	
10	Tie-rod nut	Rolled steel	8	
11	Flat washer	Rolled steel	8	ø180 to ø250
12	Retaining ring	Spring steel	2	ø125 to ø160
13	Bumper	Urethane	2	ø180 to ø250
14	Wear ring	Resin	1	
15	Rod seal	NBR	1	
16	Cushion seal	Urethane	2	ø125 to ø200
		NBR	2	ø250
17	Piston seal	NBR	1	

Component Parts

No.	Description	Material	Qty.	Note
18	Cushion valve seal	NBR	2	
19	Cylinder tube gasket	NBR	2	
20	Magnet*1	—	1	

*1 Built-in magnet type with auto switch

Replacement Parts/Seal Kit

Bore size [mm]	Kit no.	Contents
125	CS2-125A-PS	Set of nos. 15, 16, 17, 19
140	CS2-140A-PS	
160	CS2-160A-PS	
180	CS2-180A-PS	Set of nos. 16, 17, 19
200	CS2-200A-PS	
250	CS2-250A-PS	Set of nos. 17, 19

* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.

Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

* Refer to page 11 for bore size ø320 replacement parts/seal kit.

* Do not remove the rod seal of bore sizes ø180 to ø250 because it is a non-replaceable part.

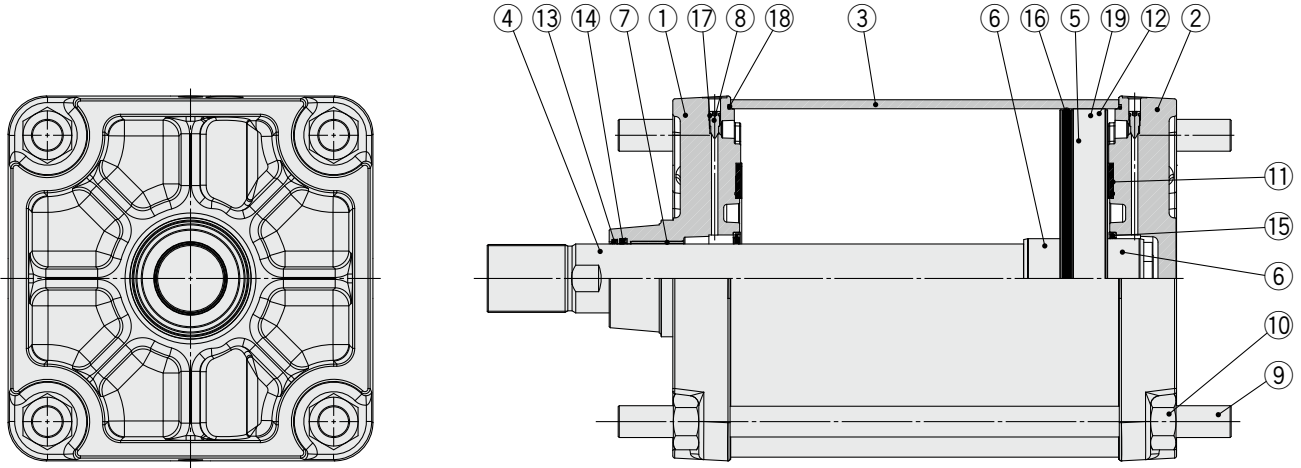
* Refer to page 76 for precautions when replacing the seal.

* Please contact SMC to order the common made-to-order specification -XA□ (Change of rod end shape), in which the rod seal of bore sizes ø180 to ø250 can be replaced.

CS2 Series

Construction

ø320



Component Parts

No.	Description	Material	Qty.
1	Rod cover	Aluminum casted	1
2	Head cover	Aluminum casted	1
3	Cylinder tube	Aluminum alloy	1
4	Piston rod	Carbon steel	1
5	Piston	Aluminum alloy	1
6	Cushion ring	Rolled steel	2
7	Bushing	Bearing alloy	1
8	Cushion valve	Brass	2
9	Tie-rod	Carbon steel	4
10	Tie-rod nut	Rolled steel	8
11	Bumper	Urethane	2
12	Wear ring	Resin	1

Component Parts

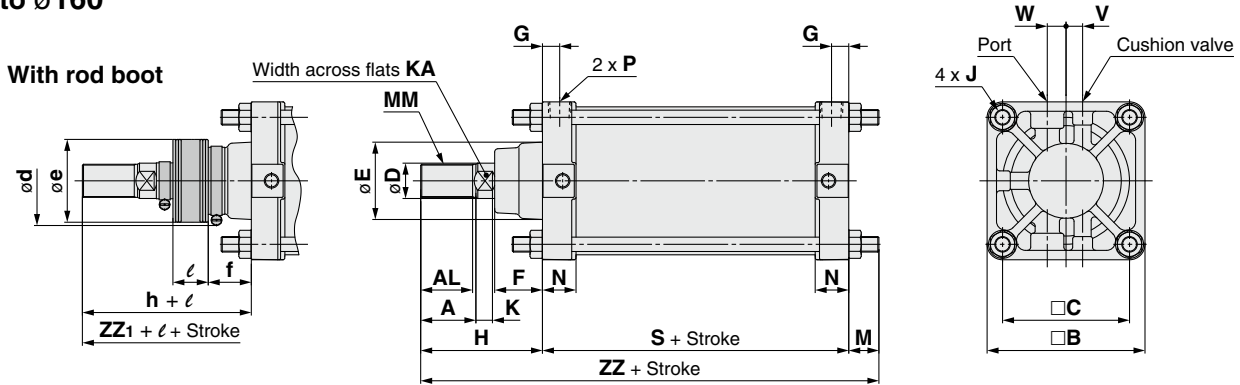
No.	Description	Material	Qty.
13	Scraper	NBR	1
14	Rod seal	NBR	1
15	Cushion seal	NBR	2
16	Piston seal	NBR	1
17	Cushion valve seal	NBR	2
18	Cylinder tube gasket	NBR	2
19	Magnet	—	(1)

Replacement Parts/Seal Kit

Bore size [mm]	Kit no.	Contents
320	CS2-320A-PS	Set of nos. 13, 14, 16, 18

Dimensions

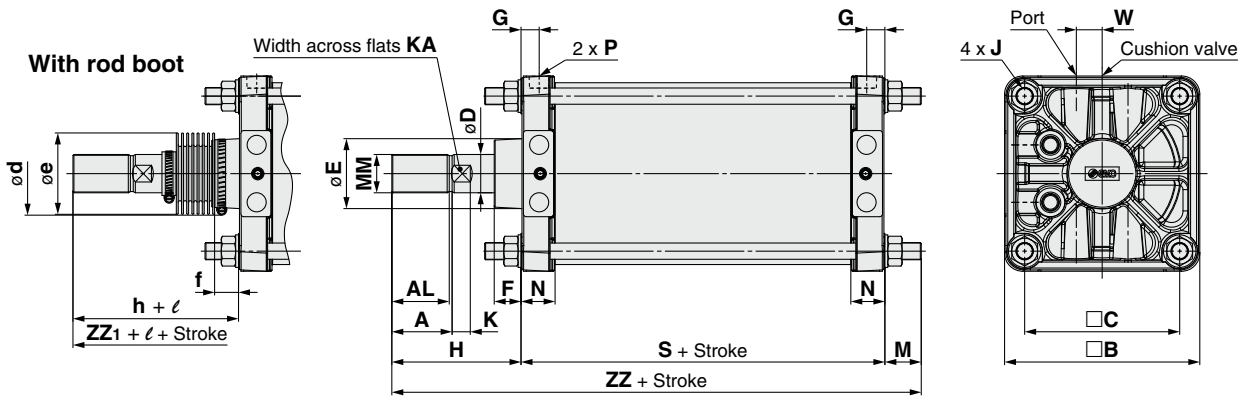
Basic: CS2B
ø125 to ø160



Bore size	Stroke range	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

Bore size	N	P	S	Without rod boot		With rod boot					
				H	ZZ	d	e	f	h	ℓ	ZZ ₁
125	30.5	1/2	98	110	235	82	75	40	133	1/5 stroke	258
140	30.5	1/2	98	110	235	82	75	40	133	1/5 stroke	258
160	34.5	3/4	106	120	256.5	82	75	40	141	1/5 stroke	277.5

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	K	KA	M	MM	N	P
180	Up to 1200	63	60	204	162	40	73	28	19	M18 x 1.5	17	36	35	M40 x 1.5	35.6	1/2
200	Up to 998	63	60	226	182	45	78.5	32	19	M20 x 1.5	20	41	35	M45 x 1.5	35.6	1/2
250	Up to 813	71	67	277	225	56	91	43	23	M24 x 1.5	22	50	41.5	M56 x 2	45.6	3/4

Bore size	S	W	Without rod boot		With rod boot					
			H	ZZ	d	e	f	h	ℓ	ZZ ₁
180	115	27	135	285	92	85	25	153	1/5 stroke	303
200	120	27	135	290	96	90	29	153	1/5 stroke	308
250	141	32	160	342.5	108	105	36	176	1/6 stroke	358.5

Standard Double Acting, Single Rod **CS2**

Long Stroke Double Acting, Double Rod **CS2W**

Long Stroke Double Acting, Single Rod **CS2-V**

Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch

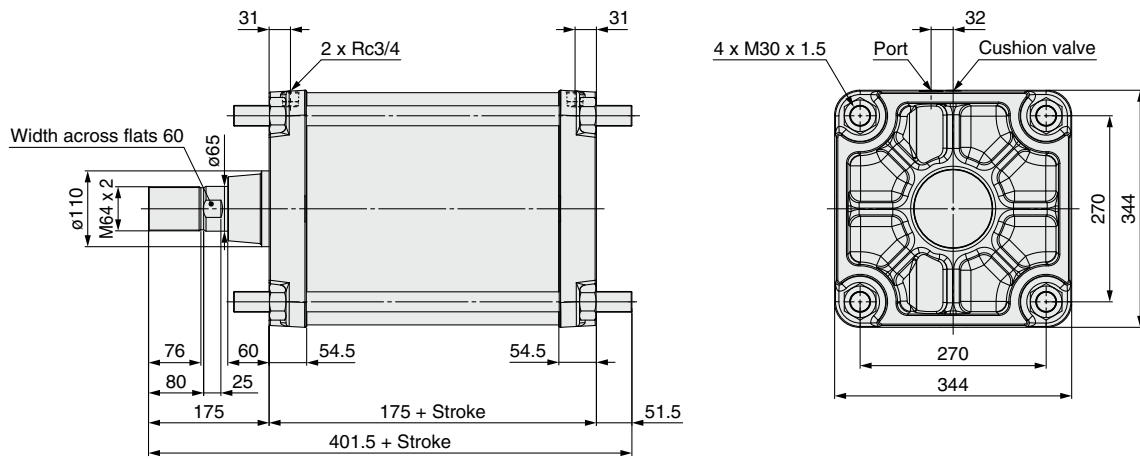
Made to Order

CS2 Series

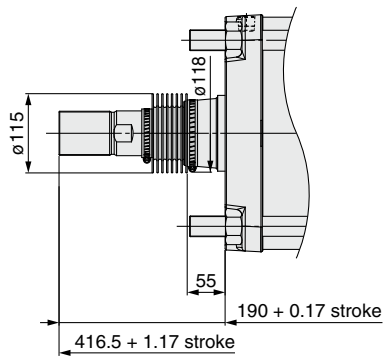
Dimensions

Basic: CS2B

Ø320



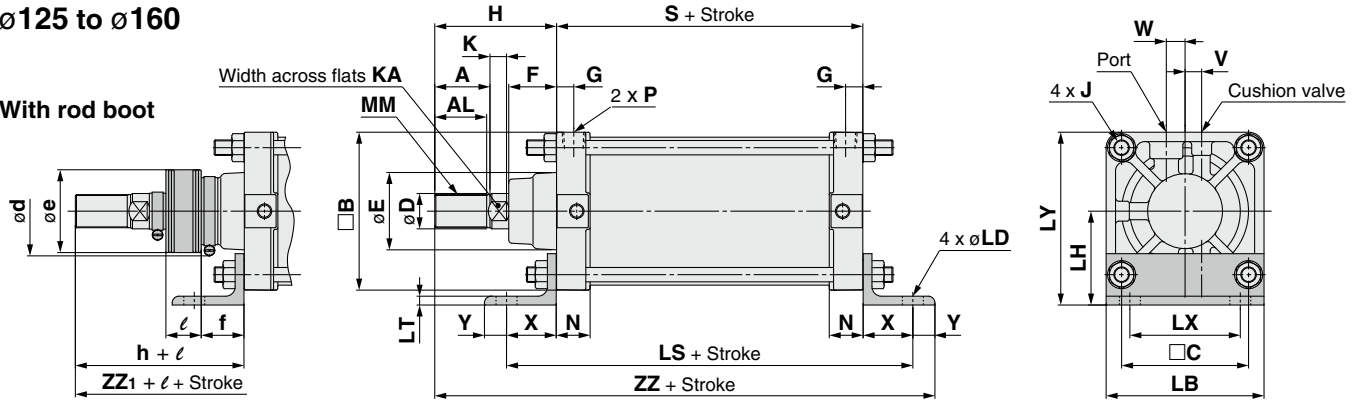
With rod boot



Dimensions

Foot: CS2L
ø125 to ø160

With rod boot

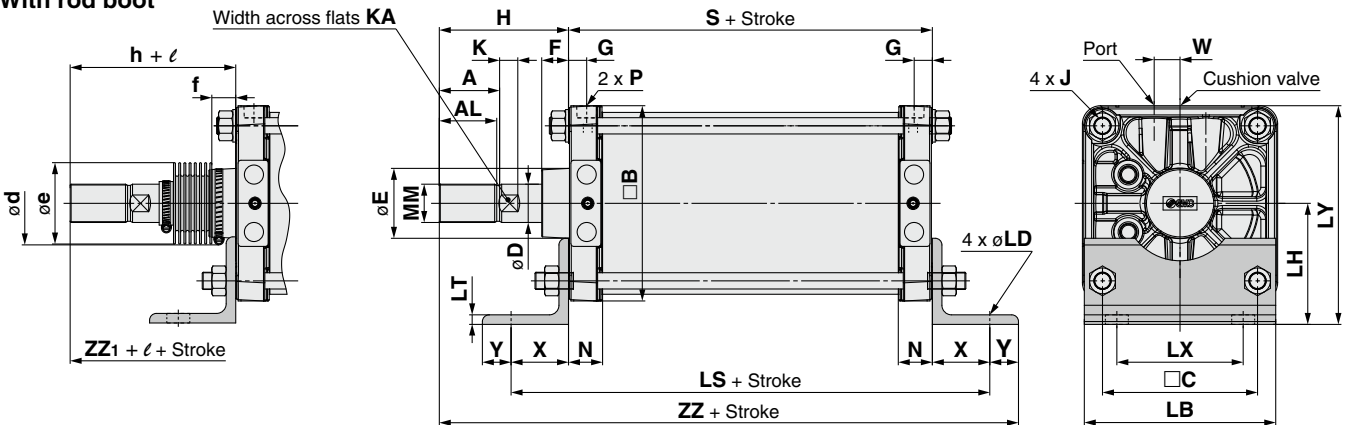


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	LB	LD	LH	LS
125	Up to 1600	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	143	19	85	188
140	Up to 1600	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	157	19	100	188
160	Up to 1600	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	177	19	106	206

Bore size	LT	LX	LY	MM	N	P	S	X	Y	Without rod boot		With rod boot					
										H	ZZ	d	e	f	h	ℓ	ZZ1
125	8	100	156.5	M30 x 1.5	30.5	1/2	98	45	20	110	273	82	75	40	133	1/5 stroke	296
140	9	112	178.5	M30 x 1.5	30.5	1/2	98	45	30	110	283	82	75	40	133	1/5 stroke	306
160	9	118	194.5	M36 x 1.5	34.5	3/4	106	50	25	120	301	82	75	40	141	1/5 stroke	322

ø180 to ø250

With rod boot



Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	K	KA	LB	LD	LH	LS	LT	LX
180	Up to 1569	63	60	204	162	40	73	28	19	M18 x 1.5	17	36	200	24	125	235	10	132
200	Up to 998	63	60	226	182	45	78.5	32	19	M20 x 1.5	20	41	225	24	132	240	10	150
250	Up to 813	71	67	277	225	56	91	43	23	M24 x 1.5	22	50	275	29	160	301	12	180

Bore size	LY	MM	N	P	S	W	X	Y	Without rod boot		With rod boot					
									H	ZZ	d	e	f	h	ℓ	ZZ1
180	227	M40 x 1.5	35.6	1/2	115	27	60	30	135	340	92	85	25	153	1/5 stroke	358
200	245	M45 x 1.5	35.6	1/2	120	27	60	30	135	345	96	90	29	153	1/5 stroke	363
250	298.5	M56 x 2	45.6	3/4	141	32	80	40	160	421	108	105	36	176	1/6 stroke	437

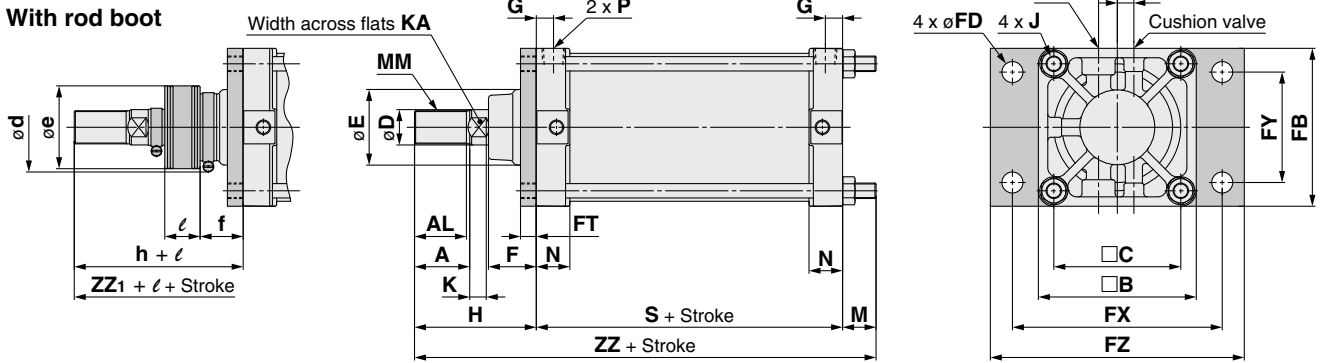
Standard Double Acting, Single Rod **CS2**
Double Acting, Double Rod **CS2W**
Long Stroke Double Acting, Single Rod **CS2-V**
Axial Centralized Piping Double Acting, Single Rod **CS2□P**
Auto Switch
Made to Order

Dimensions

Rod flange: CS2F

ø125 to ø160

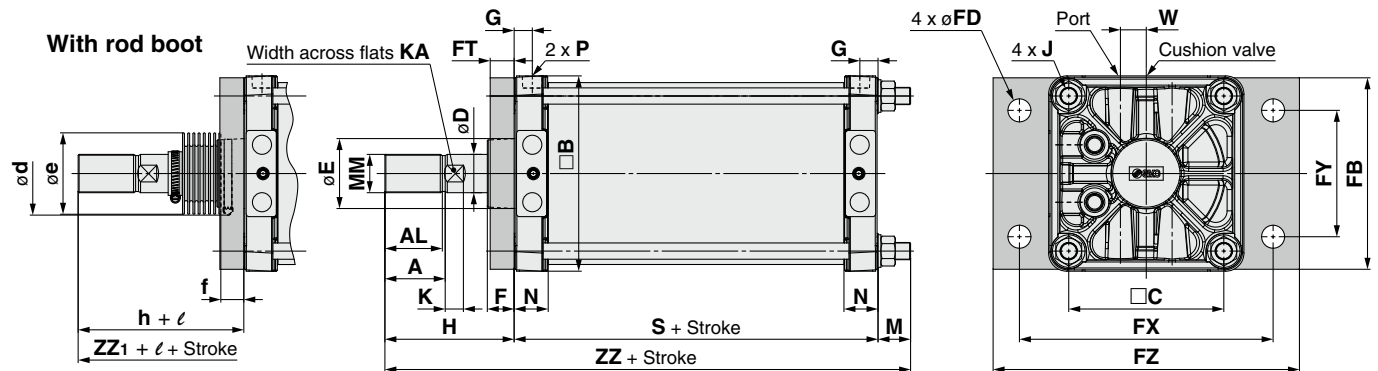
With rod boot



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

Bore size	W	K	KA	M	MM	N	P	S	Without rod boot		With rod boot					
									H	ZZ	d	e	f	h	ℓ	ZZ1
125	17	15	27	13	M30 x 1.5	30.5	1/2	98	110	221	82	75	40	133	1/5 stroke	244
140	17	15	27	13	M30 x 1.5	30.5	1/2	98	110	221	82	75	40	133	1/5 stroke	244
160	20	17	34	15	M36 x 1.5	34.5	3/4	106	120	241	82	75	40	141	1/5 stroke	262

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	J	K
180	Up to 1569	63	60	204	162	40	73	28	200	24	25	265	132	320	19	M18 x 1.5	17
200	Up to 998	63	60	226	182	45	78.5	32	225	24	25	280	150	335	19	M20 x 1.5	20
250	Up to 813	71	67	277	225	56	91	43	275	29	30	355	180	420	23	M24 x 1.5	22

Bore size	KA	M	MM	N	P	S	W	Without rod boot		With rod boot					
								H	ZZ	d	e	f	h	ℓ	ZZ1
180	36	31	M40 x 1.5	35.6	1/2	115	27	135	281	92	85	25	153	1/5 stroke	299
200	41	31	M45 x 1.5	35.6	1/2	120	27	135	286	96	90	29	153	1/5 stroke	304
250	50	35	M56 x 2	45.6	3/4	141	32	160	336	108	105	36	176	1/6 stroke	352

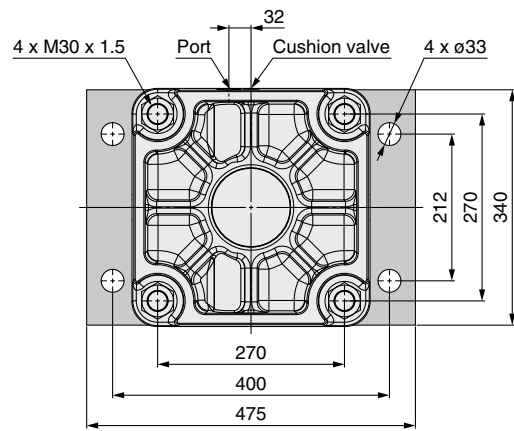
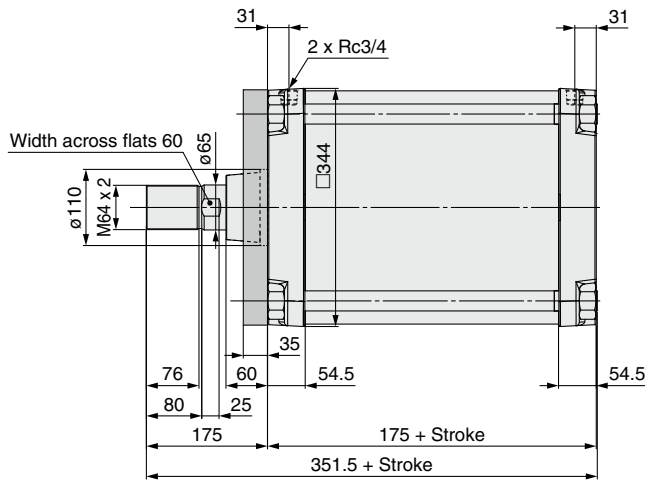
Standard Double Acting, Single Rod CS2
Double Acting, Double Rod CS2W
Long Stroke Double Acting, Single Rod CS2-V
Axial Centralized Piping Double Acting, Single Rod CS2-P
Auto Switch
Made to Order

CS2 Series

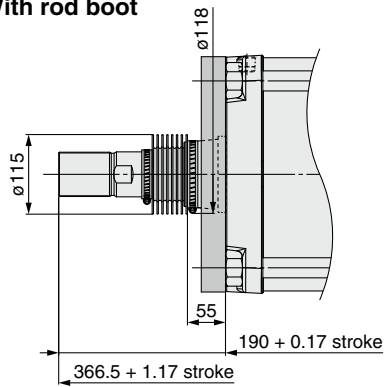
Dimensions

Rod flange: CS2F

ø320



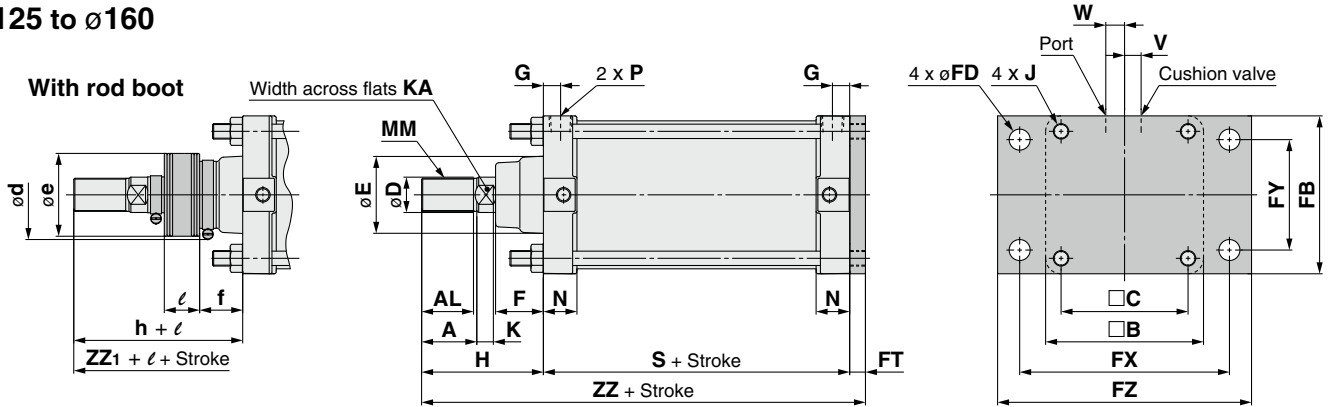
With rod boot



Dimensions

Head flange: CS2G

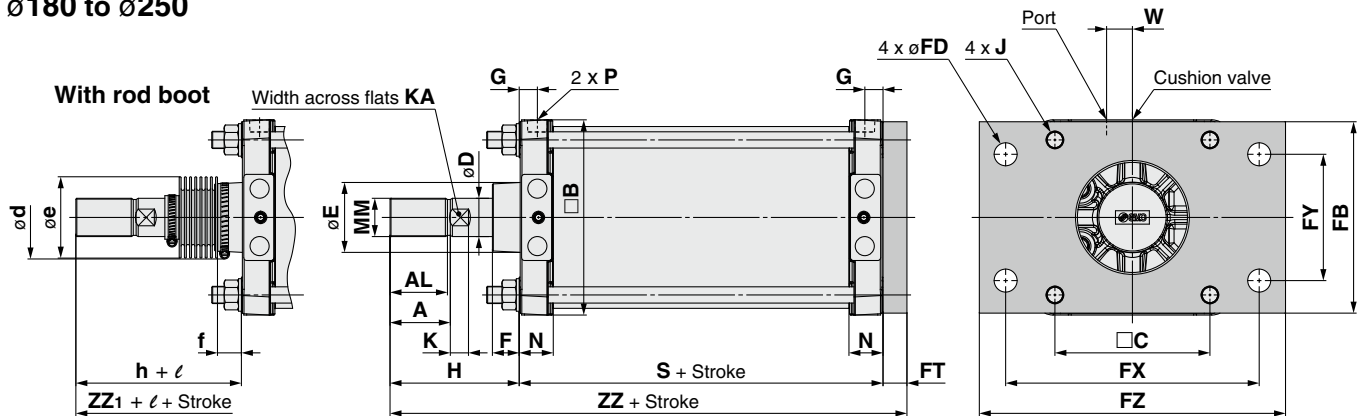
ø125 to ø160



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

Bore size	W	K	KA	MM	N	P	S	Without rod boot		With rod boot					
								H	ZZ	d	e	f	h	ℓ	ZZ1
125	17	15	27	M30 x 1.5	30.5	1/2	98	110	222	82	75	40	133	1/5 stroke	245
140	17	15	27	M30 x 1.5	30.5	1/2	98	110	228	82	75	40	133	1/5 stroke	251
160	20	17	34	M36 x 1.5	34.5	3/4	106	120	246	82	75	40	141	1/5 stroke	267

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	J	K
180	Up to 1200	63	60	204	162	40	73	28	200	24	25	265	132	320	19	M18 x 1.5	17
200	Up to 998	63	60	226	182	45	78.5	32	225	24	25	280	150	335	19	M20 x 1.5	20
250	Up to 813	71	67	277	225	56	91	43	275	29	30	355	180	420	23	M24 x 1.5	22

Bore size	KA	MM	N	P	S	W	Without rod boot		With rod boot					
							H	ZZ	d	e	f	h	ℓ	ZZ1
180	36	M40 x 1.5	35.6	1/2	115	27	135	275	92	85	25	153	1/5 stroke	293
200	41	M45 x 1.5	35.6	1/2	120	27	135	280	96	90	29	153	1/5 stroke	298
250	50	M56 x 2	45.6	3/4	141	32	160	331	108	105	36	176	1/6 stroke	347

Standard Double Acting, Single Rod **CS2**

Long Stroke Double Acting, Double Rod **CS2W**

Long Stroke Axial Centralized Piping Double Acting, Single Rod **CS2-V**

Auto Switch

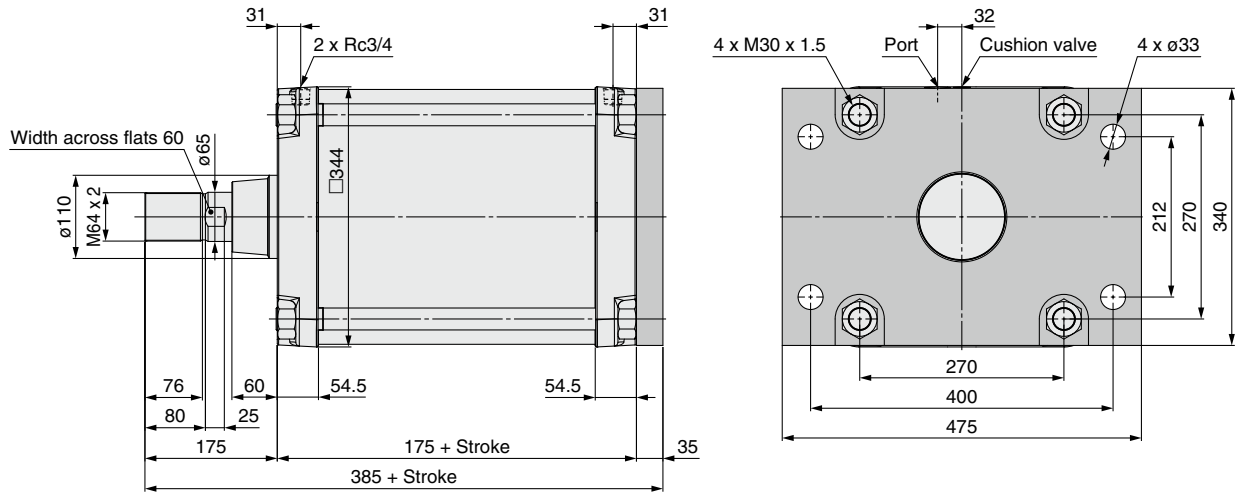
Made to Order

CS2 Series

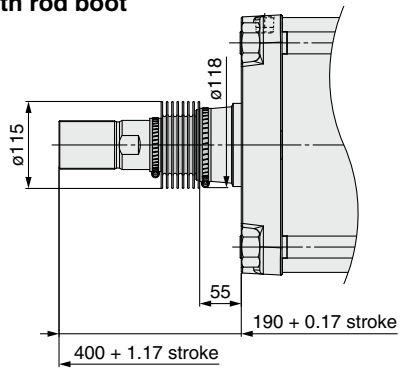
Dimensions

Head flange: CS2G

ø320



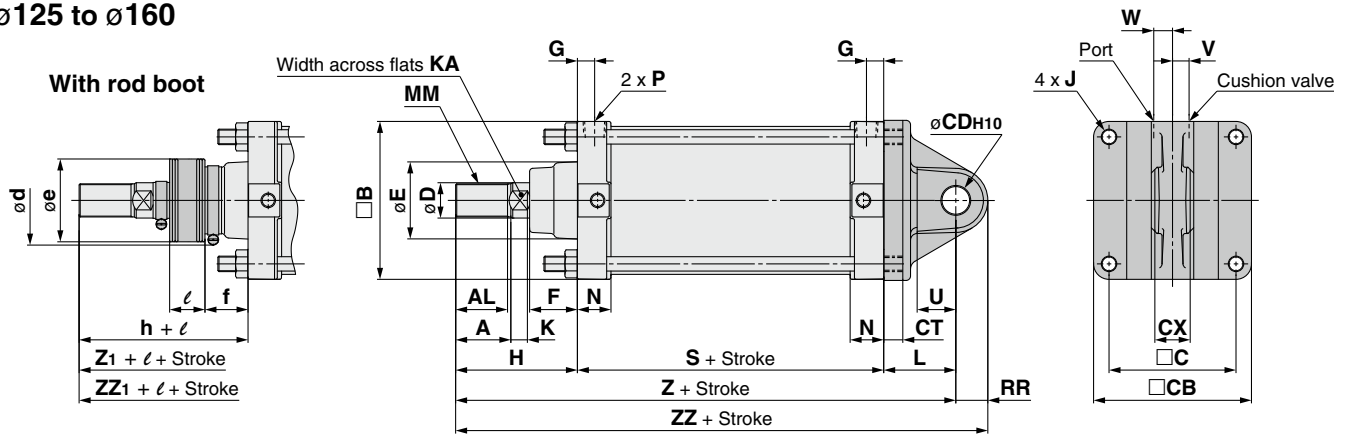
With rod boot



Dimensions

Single clevis: CS2C

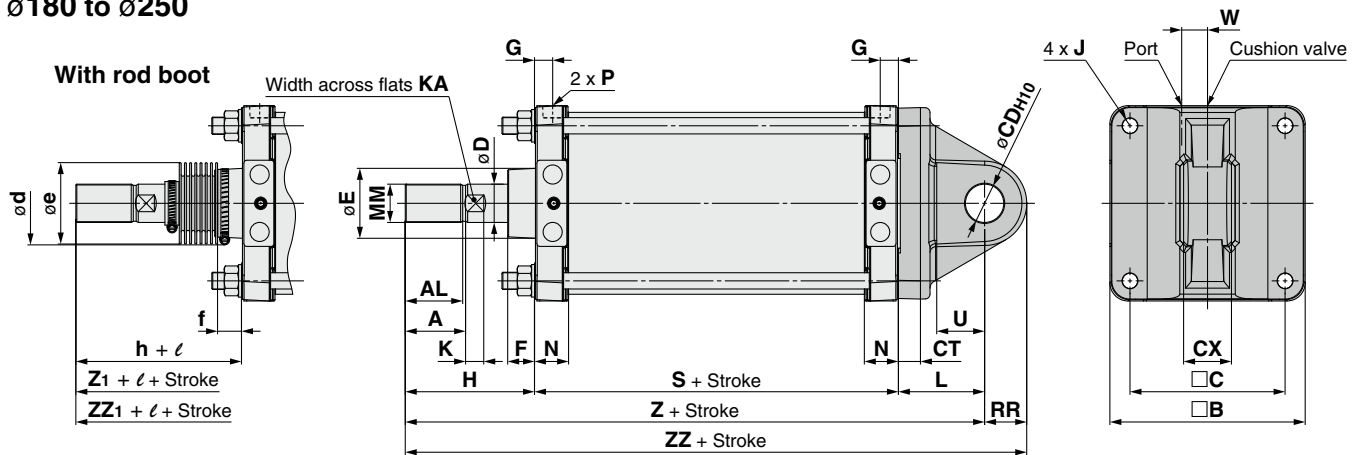
ø125 to ø160



Bore size	Stroke range	A	AL	B	C	CB	CDH10	CT	CX	D	E	F	G	J	V	W	K
125	Up to 1000	50	47	143	115	145	25 ^{+0.084} ₀	17	32 ^{-0.1} _{-0.3}	32	71	43	15	M14 x 1.5	15	17	15
140	Up to 1000	50	47	157	128	160	28 ^{+0.084} ₀	17	36 ^{-0.1} _{-0.3}	32	71	43	15	M14 x 1.5	15	17	15
160	Up to 1200	56	53	177	144	180	32 ^{+0.100} ₀	20	40 ^{-0.1} _{-0.3}	38	78.5	42	18	M16 x 1.5	15	20	17

Bore size	KA	L	MM	N	P	S	U	RR	Without rod boot			With rod boot						
									H	Z	ZZ	d	e	f	h	l	Z1	ZZ1
125	27	65	M30 x 1.5	30.5	1/2	98	35	29	110	273	302	82	75	40	133	1/5 stroke	296	325
140	27	75	M30 x 1.5	30.5	1/2	98	40	32	110	283	315	82	75	40	133	1/5 stroke	306	338
160	34	80	M36 x 1.5	34.5	3/4	106	45	36	120	306	342	82	75	40	141	1/5 stroke	327	363

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	CDH10	CT	CX	D	E	F	G	J	K	KA	L
180	Up to 1200	63	60	204	162	40 ^{+0.100} ₀	23	50 ^{-0.1} _{-0.3}	40	73	28	19	M18 x 1.5	17	36	90
200	Up to 998	63	60	226	182	40 ^{+0.100} ₀	25	50 ^{-0.1} _{-0.3}	45	78.5	32	19	M20 x 1.5	20	41	90
250	Up to 813	71	67	277	225	50 ^{+0.100} ₀	30	63 ^{-0.1} _{-0.3}	56	91	43	23	M24 x 1.5	22	50	110

Bore size	MM	N	P	RR	S	U	W	Without rod boot			With rod boot						
								H	Z	ZZ	d	e	f	h	l	Z1	ZZ1
180	M40 x 1.5	35.6	1/2	44	115	50	27	135	340	384	92	85	25	153	1/5 stroke	358	402
200	M45 x 1.5	35.6	1/2	44	120	50	27	135	345	389	96	90	29	153	1/5 stroke	363	407
250	M56 x 2	45.6	3/4	55	141	65	32	160	411	466	108	105	36	176	1/6 stroke	427	482

Standard Double Acting, Single Rod **CS2**

Long Stroke Double Acting, Double Rod **CS2W**

Long Stroke Double Acting, Single Rod **CS2-V**

Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch

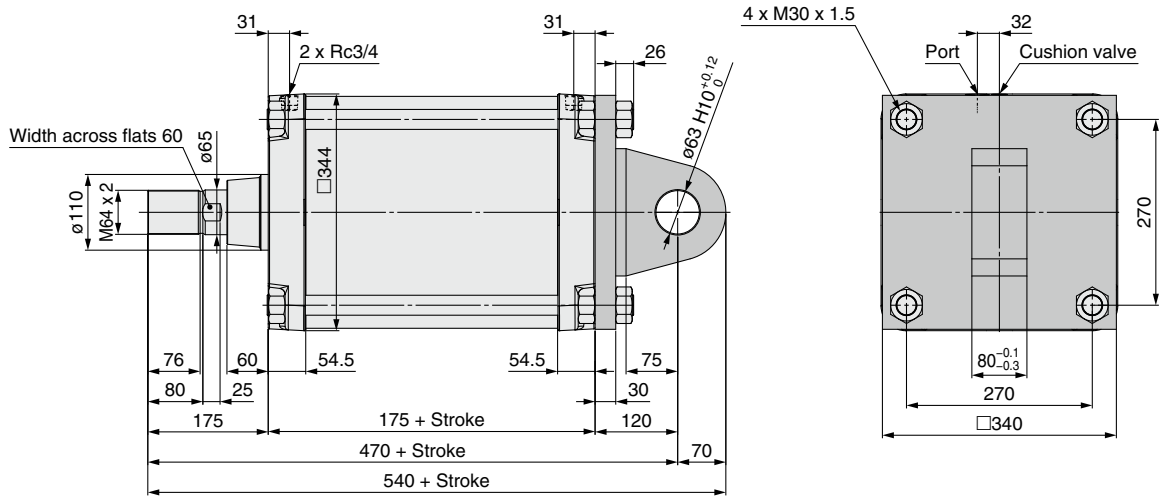
Made to Order

CS2 Series

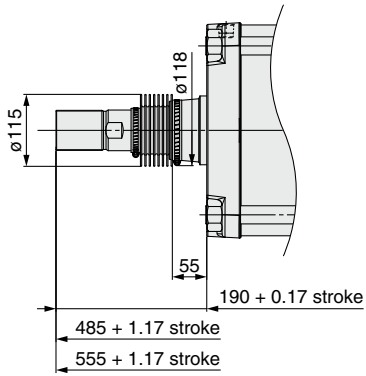
Dimensions

Single clevis: CS2C

ø320



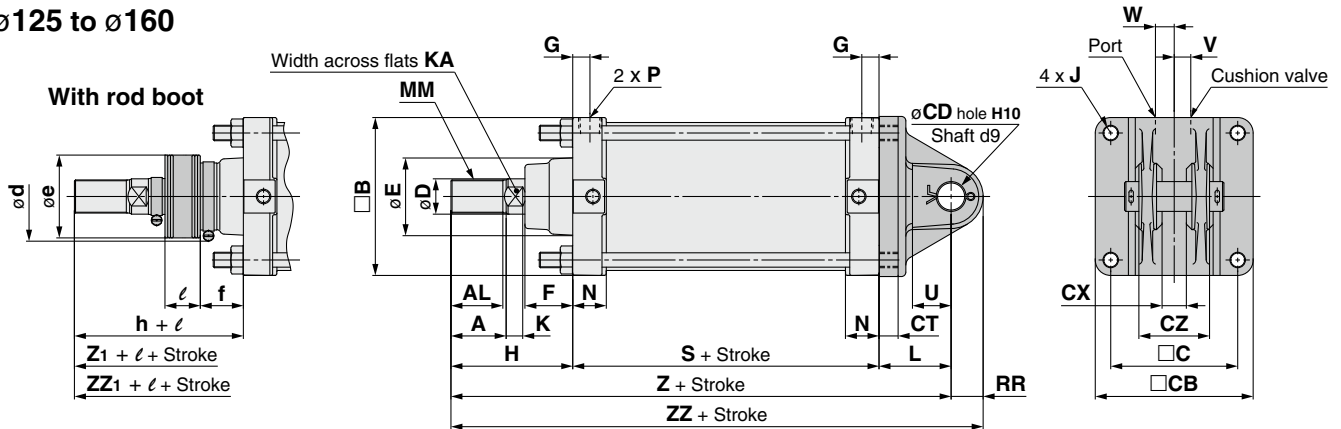
With rod boot



Dimensions

Double clevis: CS2D

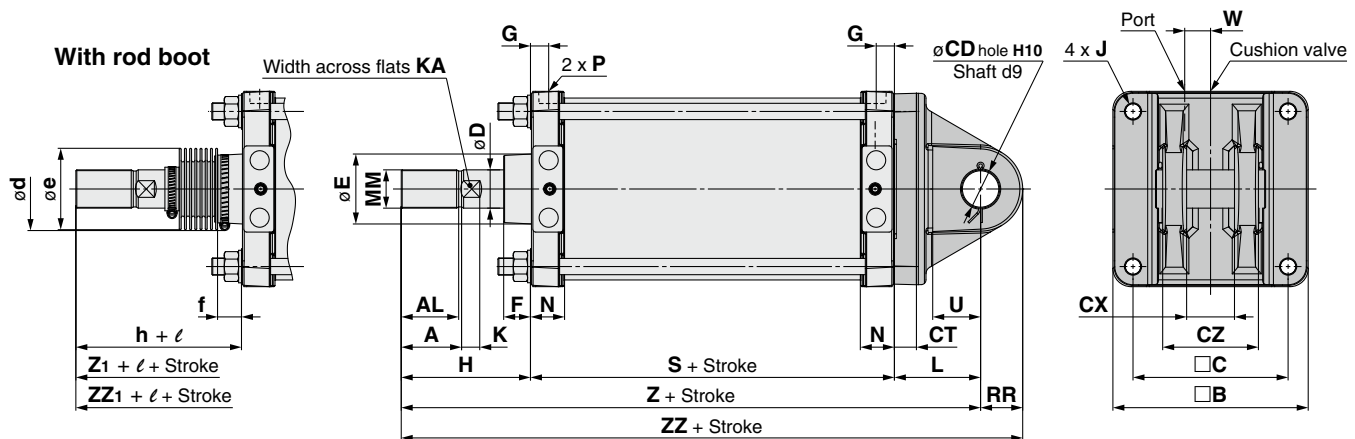
ø125 to ø160



Bore size	Stroke range	A	AL	B	C	CB	CDH10	CT	CX	CZ	D	E	F	G	J	V	W
125	Up to 1000	50	47	143	115	145	$25_{-0}^{+0.084}$	17	$32_{-0.1}^{+0.3}$	$64_{-0.2}^0$	32	71	43	15	M14 x 1.5	15	17
140	Up to 1000	50	47	157	128	160	$28_{-0}^{+0.084}$	17	$36_{-0.1}^{+0.3}$	$72_{-0.2}^0$	32	71	43	15	M14 x 1.5	15	17
160	Up to 1200	56	53	177	144	180	$32_{-0}^{+0.100}$	20	$40_{-0.1}^{+0.3}$	$80_{-0.2}^0$	38	78.5	42	18	M16 x 1.5	15	20

Bore size	K	KA	L	MM	N	P	S	U	RR	Without rod boot			With rod boot						
										H	Z	ZZ	d	e	f	h	l	Z ₁	ZZ ₁
125	15	27	65	M30 x 1.5	30.5	1/2	98	35	29	110	273	302	82	75	40	133	1/5 stroke	296	325
140	15	27	75	M30 x 1.5	30.5	1/2	98	40	32	110	283	315	82	75	40	133	1/5 stroke	306	338
160	17	34	80	M36 x 1.5	34.5	3/4	106	45	36	120	306	342	82	75	40	141	1/5 stroke	327	363

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	CDH10	CT	CX	CZ	D	E	F	G	J	K	KA	L
180	Up to 1200	63	60	204	162	$40_{-0}^{+0.100}$	23	$50_{-0.1}^{+0.3}$	$100_{-0.3}^{+0.1}$	40	73	28	19	M18 x 1.5	17	36	90
200	Up to 998	63	60	226	182	$40_{-0}^{+0.100}$	25	$50_{-0.1}^{+0.3}$	$100_{-0.3}^{+0.1}$	45	78.5	32	19	M20 x 1.5	20	41	90
250	Up to 813	71	67	277	225	$50_{-0}^{+0.100}$	30	$63_{-0.1}^{+0.3}$	$126_{-0.3}^{+0.1}$	56	91	43	23	M24 x 1.5	22	50	110

Bore size	MM	N	P	RR	S	U	W	Without rod boot			With rod boot						
								H	Z	ZZ	d	e	f	h	l	Z ₁	ZZ ₁
180	M40 x 1.5	35.6	1/2	44	115	50	27	135	340	384	92	85	25	153	1/5 stroke	358	402
200	M45 x 1.5	35.6	1/2	44	120	50	27	135	345	389	96	90	29	153	1/5 stroke	363	407
250	M56 x 2	45.6	3/4	55	141	65	32	160	411	466	108	105	36	176	1/6 stroke	427	482

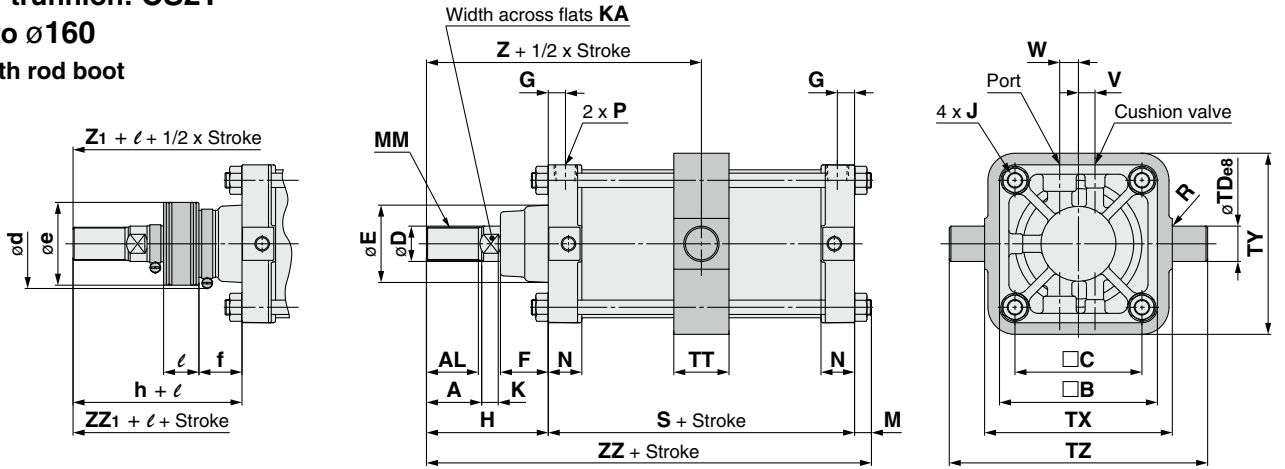
Standard Double Acting, Single Rod CS2
 Double Acting, Double Rod CS2W
 Long Stroke Double Acting, Single Rod CS2-V
 Axial Centralized Piping Double Acting, Single Rod CS2-P
 Auto Switch
 Made to Order

Dimensions

Center trunnion: CS2T

Ø125 to Ø160

With rod boot

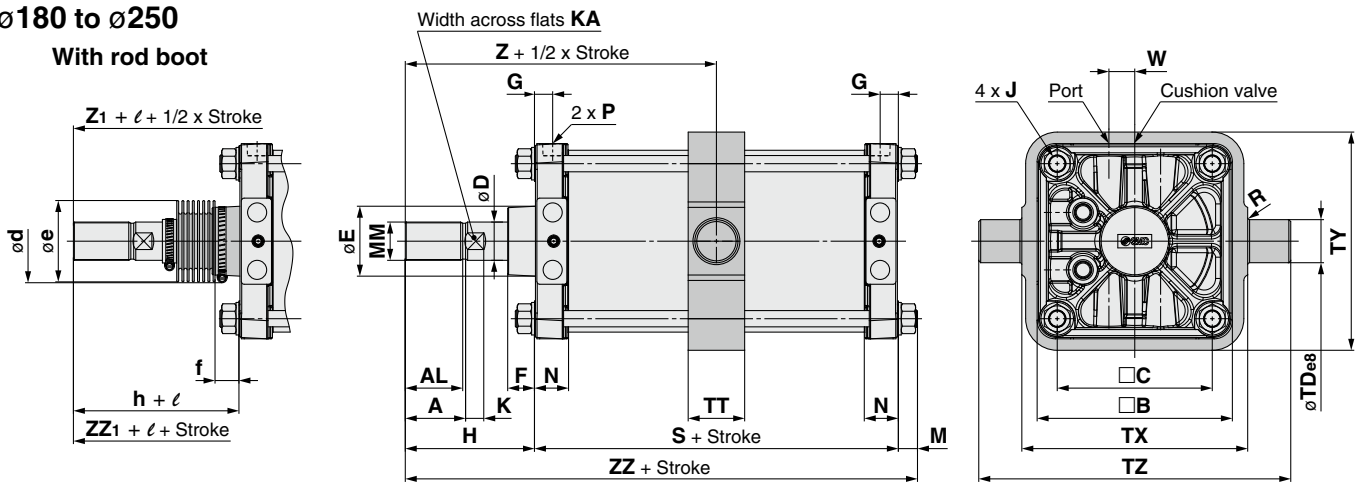


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	M	MM	N
125	25 to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5
140	30 to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5
160	35 to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	15	M36 x 1.5	34.5

Bore size	P	R	S	TD _{e8}	TT	TX	TY	TZ	Without rod boot			With rod boot						
									H	Z	ZZ	d	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	82	75	40	133	1/5 stroke	182	244
140	1/2	1.5	98	36 ^{-0.050} _{-0.089}	55	190	184	262	110	159	221	82	75	40	133	1/5 stroke	182	244
160	3/4	1.5	106	40 ^{-0.050} _{-0.089}	60	212	204	292	120	173	241	82	75	40	141	1/5 stroke	194	262

Ø180 to Ø250

With rod boot

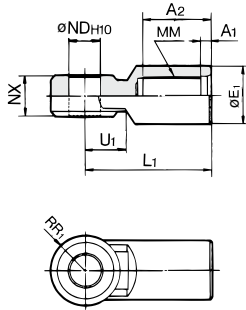


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	K	KA	M	MM	N	P	R
180	25 to 1200	63	60	204	162	40	73	28	19	M18 x 1.5	17	36	20	M40 x 1.5	35.6	1/2	2
200	25 to 998	63	60	226	182	45	78.5	32	19	M20 x 1.5	20	41	21	M45 x 1.5	35.6	1/2	2
250	25 to 813	71	67	277	225	56	91	43	23	M24 x 1.5	22	50	25	M56 x 2	45.6	3/4	3

Bore size	S	TD _{e8}	TT	TX	TY	TZ	W	Without rod boot			With rod boot						
								H	Z	ZZ	d	e	f	h	ℓ	Z ₁	ZZ ₁
180	115	45 ^{-0.050} _{-0.089}	59	236	228	326	27	135	192.5	270	92	85	25	153	1/5 stroke	210.5	288
200	120	45 ^{-0.050} _{-0.089}	59	265	257	355	27	135	195	276	96	90	29	153	1/5 stroke	213	294
250	141	56 ^{-0.060} _{-0.106}	69	335	325	447	32	160	230.5	326	108	105	36	176	1/6 stroke	246.5	342

Standard Double Acting, Single Rod CS2
 Double Acting, Double Rod CS2W
 Long Stroke Double Acting, Single Rod CS2-V
 Axial Centralized Piping Double Acting, Single Rod CS2-P
 Auto Switch
 Made to Order

I Type Single Knuckle Joint

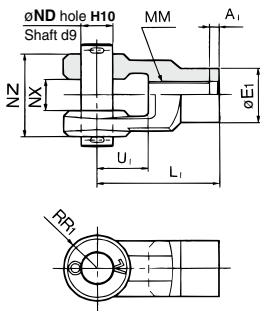


Material: Cast iron

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
I-18A	180	8	67	70	125	M40 x 1.5	40 ^{-0.1} ₀	50 ^{-0.1} _{-0.3}	42.5	44
I-20A	200	8	67	70	125	M45 x 1.5	40 ^{-0.1} ₀	50 ^{-0.1} _{-0.3}	42.5	44
I-25A	250	9	75.5	86	160	M56 x 2	50 ^{+0.1} ₀	63 ^{-0.1} _{-0.3}	53	66
I-32A	320	9	84.5	105	175	M64 x 2	63 ^{+0.12} ₀	80 ^{-0.1} _{-0.3}	66	71

- * Use a single knuckle joint individually.
(Screw it entirely over the rod end threads and tighten it.)
- * Extend the dimensions of A and H when using a single knuckle joint together with a rod end nut.
For dimensions A and H, refer to made-to-order -XC86 with rod end bracket (p. 75).
When ordering, please use simple special -XA0 (p. 66).

Y Type Double Knuckle Joint

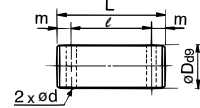


Material: Cast iron

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
Y-18A	180	8	70	125	M40 x 1.5	40 ^{-0.1} ₀	50 ^{-0.3} _{0.1}	100 ^{-0.1} _{-0.3}	42.5	54
Y-20A	200	8	70	125	M45 x 1.5	40 ^{-0.1} ₀	50 ^{-0.3} _{0.1}	100 ^{-0.1} _{-0.3}	42.5	54
Y-25A	250	9	86	160	M56 x 2	50 ^{+0.1} ₀	63 ^{-0.3} _{0.1}	126 ^{-0.1} _{-0.3}	53	81
Y-32A	320	9	105	175	M64 x 2	63 ^{+0.12} ₀	80 ^{-0.3} _{0.1}	160 ^{-0.1} _{-0.3}	66	87

- * Use a double knuckle joint individually.
(Screw it entirely over the rod end threads and tighten it.)
- * Extend the dimensions of A and H when using a double knuckle joint together with a rod end nut.
For dimensions A and H, refer to made-to-order -XC86 with rod end bracket (p. 75).
When ordering, please use simple special -XA0 (p. 66).
- * A pin and split pin are included with the double knuckled joint.

Knuckle Pin / Clevis Pin

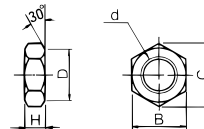


Material: Carbon steel

Part no.	Applicable bore size [mm]	Dd ₉	L	ℓ	m	d (Drill through)	Applicable split 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
IY-18	180, 200	40 ^{-0.080} _{-0.142}	115	105	5	4	ø4 x 55
IY-25	250	50 ^{-0.080} _{-0.142}	144	132	6	5	ø5 x 65
IY-30	320	63 ^{-0.100} _{-0.174}	178	166	6	5	ø5 x 80

* Split pin is included.

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
NT-18	180	M40 x 1.5	23	60	69.3	57
NT-20	200	M45 x 1.5	27	70	80.8	67
NT-25	250	M56 x 2	34	85	98.1	82
NT-30	320	M64 x 2	38	95	110.0	92

Standard Double Acting, Single Rod CS2
 Double Acting, Double Rod CS2W
 Long Stroke Double Acting, Single Rod CS2-V
 Axial Centralized Piping Double Acting, Single Rod CS2-IP
 Auto Switch
 Made to Order

Air Cylinder: Standard Type Double Acting, Double Rod

CS2W Series

RoHS

ø125, ø140, ø160, ø180, ø200, ø250, ø320

How to Order

CS2W L 125 - 100 -

With auto switch CDS2W L 125 - 100 - M9BW -

With auto switch (Built-in magnet)

Double rod type

Mounting

B	Basic
L	Foot
F	Flange
T	Center trunnion

Bore size

125	125 mm
140	140 mm
160	160 mm
180	180 mm
200	200 mm
250	250 mm
320	320 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke [mm]
Refer to "Maximum Strokes" on page 28.

Made to order
Refer to page 28 for details.

Number of auto switches

Nil	2
3	3
S	1
n	n

Auto switch

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

* For applicable auto switches, refer to the table below.

Suffix for cylinder

Single side rod boot	J	Nylon tarpaulin
	K	Heat-resistant tarpaulin
Both side rod boot	JJ	Nylon tarpaulin
	KK	Heat-resistant tarpaulin

* The minimum stroke with a rod boot is 30 mm. (35 mm for ø160 when the center trunnion type is selected)

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDS2WB125-100

Applicable Auto Switches/Refer to the Web Catalog 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	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit			
				3-wire (PNP)				M9P	●	●	●	○	○				
		2-wire		12 V	M9B	●	●	●	○	○	—						
		3-wire (NPN)			—	G39	—	—	—	—		—	IC circuit				
	Diagnostic indication (2-color indicator)	Terminal conduit	Yes	3-wire (PNP)	24 V	5 V, 12 V	—	M9NW	●	●	●	○	○	IC circuit	Relay, PLC		
				2-wire				M9PW	●	●	●	○	○				
	Water resistant (2-color indicator)	Grommet	No	3-wire (NPN)	24 V	5 V, 12 V	—	M9BW	●	●	●	○	○	—			
				3-wire (PNP)				M9NA*1	—	○	○	●	○		○	IC circuit	
	With diagnostic output (2-color indicator)	Terminal conduit	Yes	2-wire	24 V	12 V	—	M9PA*1	—	○	○	●	○	○	—		
				3-wire (PNP)				M9BA*1	—	○	○	●	○	○		—	
Magnetic field resistant (2-color indicator)	DIN terminal	Yes	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	—	●	—	●	○	○	IC circuit			
			2-wire (Non-polar)				P3DWA*2	—	●	—	●	●	○	—			
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	12 V	—	A96	—	●	—	●	—	—	IC circuit	—	
				12 V				100 V	A93	—	●	●	●	—	—		
				5 V, 12 V				100 V or less	A90	—	●	—	—	—	—		IC circuit
				100 V, 200 V				200 V or less	A54	—	●	—	●	—	—		
		Terminal conduit	No	Yes	2-wire	24 V	12 V	—	—	A33	—	—	—	—	—	—	PLC
										A34	—	—	—	—	—		
										A44	—	—	—	—	—		
										A59W	—	●	—	●	—		
Diagnostic indication (2-color indicator)	Grommet	Yes	2-wire	24 V	100 V, 200 V	—	—	A44	—	—	—	—	—	—	Relay, PLC		
								A59W	—	●	—	●	—			—	

*1 Water-resistant type auto switches can be mounted on the above models, but SMC cannot guarantee water resistance.

Please contact SMC regarding water-resistant types with the above model numbers.

*2 The D-P3DWA, A54, A64, and A59W are not applicable to bore sizes ø250 and ø320.

* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW 3 m..... L (Example) M9NWL
1 m..... M (Example) M9NWM 5 m..... Z (Example) M9NWZ

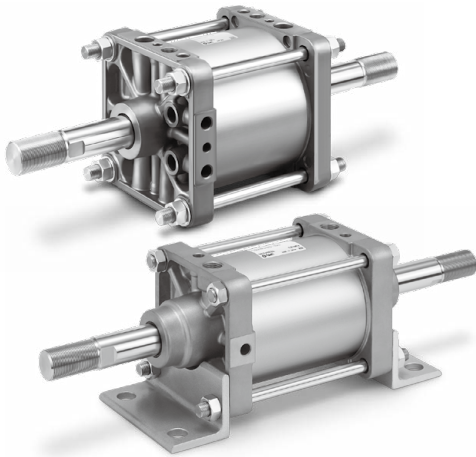
* Solid state auto switches marked with a "O" are produced upon receipt of order.

* Since there are applicable auto switches other than those listed above, refer to page 63 for details.

* D-A9□/M9□/M9□W/M9□A/P3DWA□ auto switches are shipped together with the product but do not come assembled. (Only the auto switch mounting brackets are assembled before shipment.)

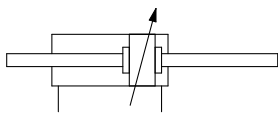
* D-G39/K39/A3□/A44 auto switches (band mounting type) can only be mounted on ø125 to ø160.

Air Cylinder: Standard Type Double Acting, Double Rod **CS2W Series**



Symbol

Double acting, Air cushion



Made to Order Common Specifications
(For details, refer to pages 65 to 75.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat-resistant cylinder (0 to 150°C)
-XC4	With heavy duty scraper
-XC5	Heat-resistant cylinder (0 to 110°C)
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length
-XC22	Fluororubber seal
-XC30	Rod side trunnion
-XC35	With coil scraper
-XC68	Made of stainless steel (With hard chrome plated piston rod)

* Refer to page 5 for details on whether or not to use a made-to-order product with the above common specifications.

Refer to pages 59 to 63 for cylinders with auto switches.

- Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height
- Minimum Stroke for Auto Switch Mounting
- Operating Range
- Auto Switch Mounting Brackets/Part Nos.

Specifications

Bore size [mm]	125	140	160	180	200	250	320
Action	Double acting, Double rod						
Fluid	Air						
Proof pressure	1.57 MPa			1.2 MPa			
Max. operating pressure	0.97 MPa			0.7 MPa			
Min. operating pressure	0.05 MPa						
Piston speed	50 to 500 mm/s			50 to 300 mm/s			
Cushion	Air cushion			Air cushion + Bumper cushion			
Ambient and fluid temperatures	Without auto switch	0 to 70°C (No freezing)					
	With auto switch	0 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)						
Stroke length tolerance [mm]	250 or less	+1.0 0					+2.0 0
	251 to 1000	+1.4 0					+2.4 0
	1001 to 1200	—		+1.8 0			
Mounting	Basic, Foot, Flange, Center trunnion						
Allowable kinetic energy (When air cushion is activated)	32.3 J	44.6 J	58.8 J	78.4 J	98 J	147 J	265 J

Maximum Strokes

* When using with auto switches, refer to the "Minimum Stroke for Auto Switch Mounting" table on page 61.

Bore size	Maximum stroke [mm]
125, 140	1000 or less
160, 180	1200 or less
200	998 or less
250	813 or less
320	495 or less

* Bore sizes $\phi 200$ to $\phi 320$ with strokes which exceed the above-mentioned strokes (up to 1200 mm) are available as a special product. **However, this excludes class 2 pressure vessels which are to be used or installed in Japan.**

Accessories

Mounting		Basic	Foot	Flange	Center trunnion
Option	Rod end nut	●	●	●	●
	Single knuckle joint	●	●	●	●
	Double knuckle joint (Knuckle pin, Split pin)	●	●	●	●
	Rod boot	●	●	●	●

* If using the rod end nut with a single knuckle joint or a double knuckle joint, please refer to page 26.

Mounting Bracket Part Nos.

Bore size [mm]	125	140	160	180	200	250	320
Foot*1	CS2-L12	CS2-L14	CS2-L16	CS2-L18	CS2-L20	CS2-L25	CS2-L32
Flange	CS2-F12	CS2-F14	CS2-F16	CS2-F18	CS2-F20	CS2-F25	CS2-F32

*1 When ordering foot brackets, order two pieces per cylinder.
* Mounting nuts are included in the brackets for bore size $\phi 320$.

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat-resistant tarpaulin	110°C*1

*1 Max. ambient temperature for rod boot itself

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2-P**
 Auto Switch
 Made to Order

CS2W Series

Weight (Guide)

Bore size [mm]		125	140	160	180	200	250	320
Basic weight	Basic	6.4	7.6	10.0	12.6	16.8	29.4	54.6
	Foot	8.4	10.6	13.4	17.4	22.3	40.4	80.4
	Flange	9.5	13.1	16.7	22.3	28.6	51.2	92.6
	Trunnion	10.5	13.3	16.4	23.3	30.8	55.7	89.1
Additional weight with magnet (With built-in magnet and auto switch)		0.1	0.1	0.1	0.1	0.2	0.2	0.3
Additional weight per 100 mm of stroke		2.2	2.3	3.2	3.5	4.3	7.1	9.7
Accessories	Single knuckle	1.0	1.2	1.6	3.1	3.0	5.4	10.8
	Double knuckle (Knuckle pin, Split pin)	1.4	1.9	2.5	4.8	4.6	9.3	17.2
	Rod end nut	0.2	0.2	0.3	0.4	0.9	1.3	1.4

Calculation: (Example) **CS2WL160-500**

- Basic weight 13.4 [kg]
 - Additional weight ... 3.2 [kg/100 mm]
 - Cylinder stroke 500 [mm]
- $$13.4 + 3.2 \times 500/100 = 29.4 \text{ [kg]}$$

Theoretical Output

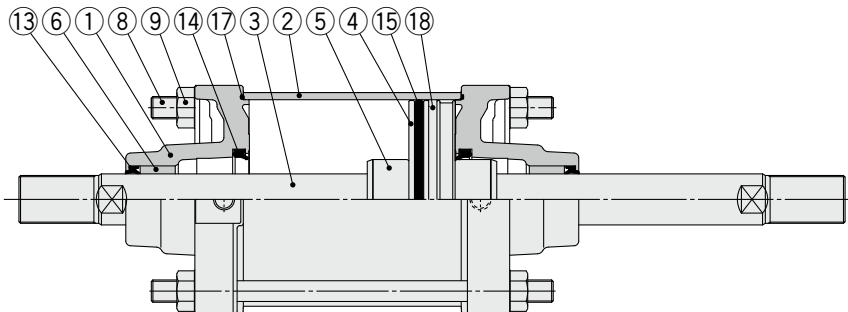
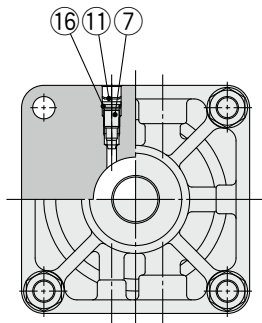


Unit: N

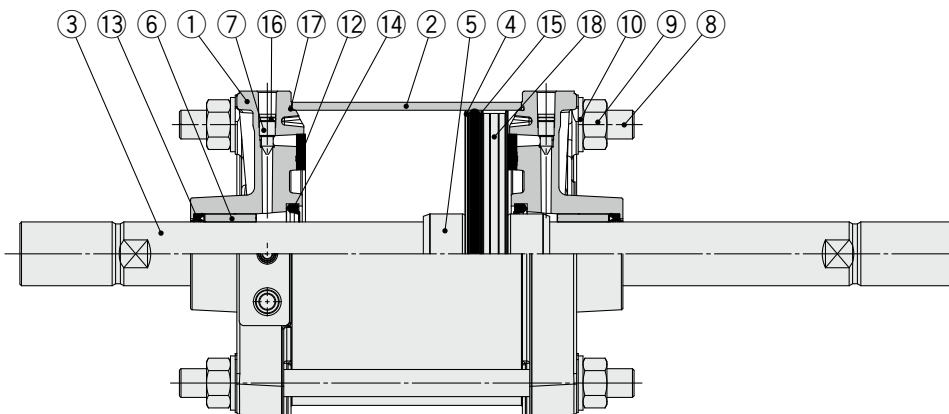
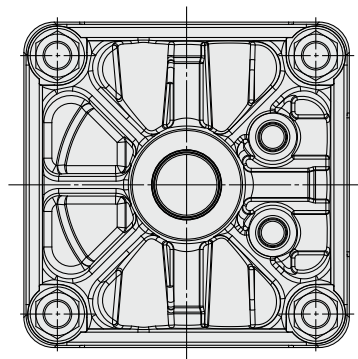
Bore size [mm]	Rod size [mm]	Piston area [mm ²]	Operating pressure [MPa]								
			0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	32	11500	2300	3450	4600	5750	6900	8050	9200	10350	11500
140		14600	2920	4380	5840	7300	8760	10220	11680	13140	14600
160	38	19000	3800	5700	7600	9500	11400	13300	15200	17100	19000
180	40	24200	4840	7260	9680	12100	14520	16940	—	—	—
200	45	29800	5960	8940	11920	14900	17880	20860	—	—	—
250	56	46600	9320	13980	18640	23300	27960	32620	—	—	—
320	65	77100	15400	23100	30800	38600	46300	54000	—	—	—

Construction

ø125 to ø160



ø180 to ø250



Component Parts

No.	Description	Material	Qty.	Note
1	Rod cover	Aluminum die-cast	2	
2	Cylinder tube	Aluminum alloy	1	
3	Piston rod	Carbon steel	1	
4	Piston	Aluminum alloy	1	
5	Cushion ring	Stainless steel	2	ø125 to ø180
		Rolled steel	2	ø200, ø250
6	Bushing	Bearing alloy	2	
7	Cushion valve	Rolled steel	2	ø125 to ø160
		Brass	2	ø180 to ø250
8	Tie-rod	Carbon steel	4	
9	Tie-rod nut	Rolled steel	8	
10	Flat washer	Rolled steel	8	ø180 to ø250
11	Retaining ring	Spring steel	2	ø125 to ø160
12	Bumper	Urethane	2	ø180 to ø250
13	Rod seal	NBR	2	
14	Cushion seal	Urethane	2	ø125 to ø200
		NBR	2	ø250

Component Parts

No.	Description	Material	Qty.	Note
15	Piston seal	NBR	1	
16	Cushion valve seal	NBR	2	
17	Cylinder tube gasket	NBR	2	
18	Magnet	—	1	

Replacement Parts/Seal Kit

Bore size [mm]	Kit no.	Contents
125	CS2W125A-PS	Set of nos. 13, 14, 15, 17
140	CS2W140A-PS	
160	CS2W160A-PS	

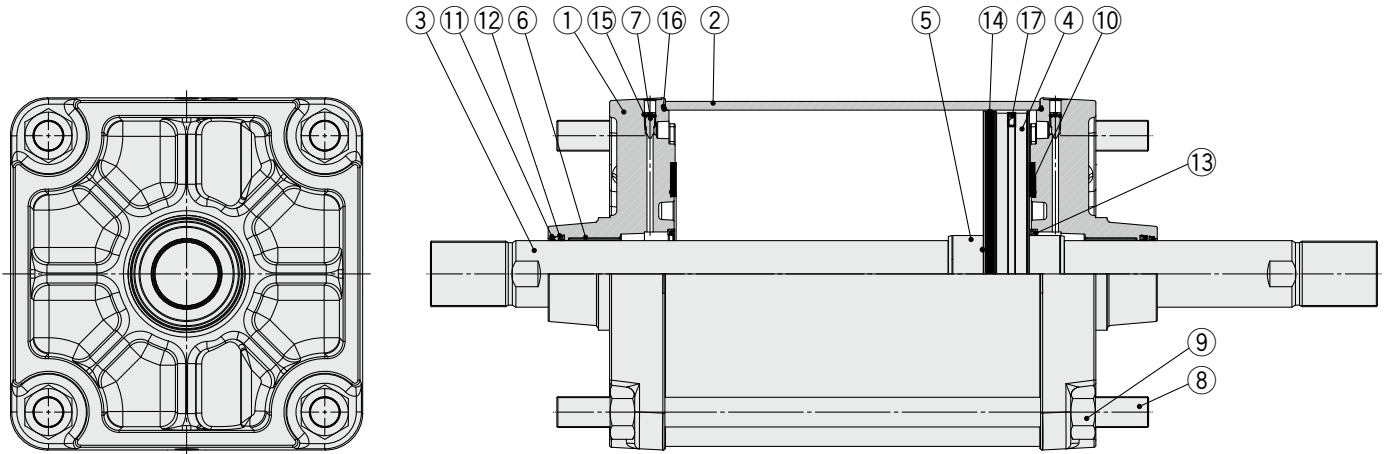
* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)
 * Refer to page 31 for bore size ø320 replacement parts/seal kit.
 * Do not remove the rod seal of bore sizes ø180 to ø250 because it is a non-replaceable part.
 * Refer to page 76 for precautions when replacing the seal.
 * Please contact SMC to order the common made-to-order specification -XA□ (Change of rod end shape), in which the seal of bore sizes ø180 to ø250 can be replaced.

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

CS2W Series

Construction

ø320



Component Parts

No.	Description	Material	Qty.
1	Rod cover	Aluminum casted	2
2	Cylinder tube	Aluminum alloy	1
3	Piston rod	Carbon steel	1
4	Piston	Aluminum alloy	1
5	Cushion ring	Rolled steel	2
6	Bushing	Bearing alloy	2
7	Cushion valve	Brass	2
8	Tie-rod	Carbon steel	4
9	Tie-rod nut	Rolled steel	8
10	Bumper	Urethane	2
11	Scraper	NBR	2
12	Rod seal	NBR	2

Component Parts

No.	Description	Material	Qty.
13	Cushion seal	NBR	2
14	Piston seal	NBR	1
15	Cushion valve seal	NBR	2
16	Cylinder tube gasket	NBR	2
17	Plastic magnet	—	(1)

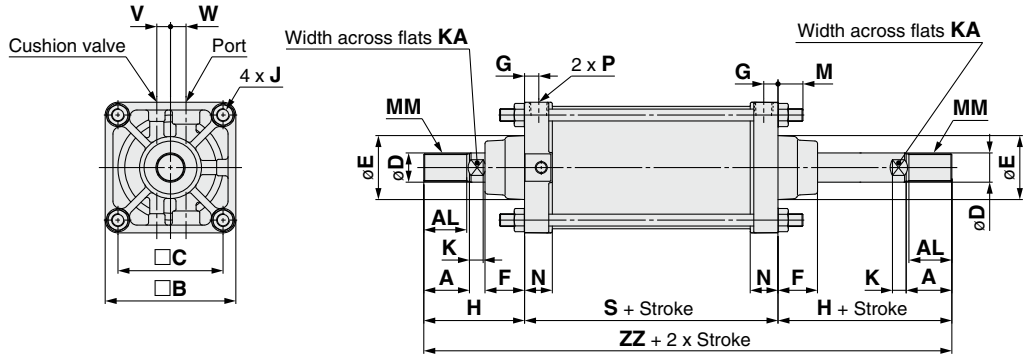
Replacement Parts/Seal Kit

Bore size [mm]	Kit no.	Contents
320	CS2W320A-PS	Set of nos. ⑪, ⑫, ⑭, ⑯

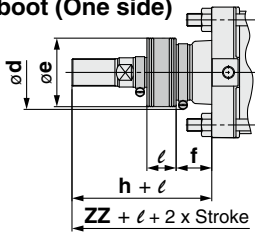
* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

Dimensions

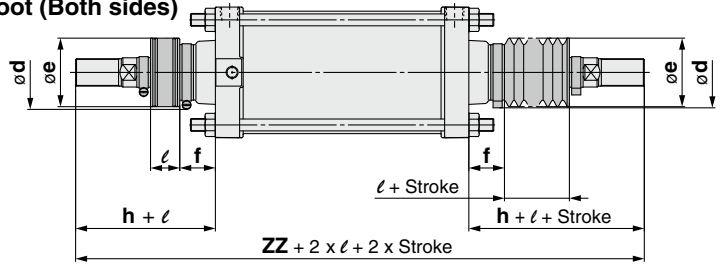
Basic: CS2WB
 ø125 to ø160



With rod boot (One side)



With rod boot (Both sides)

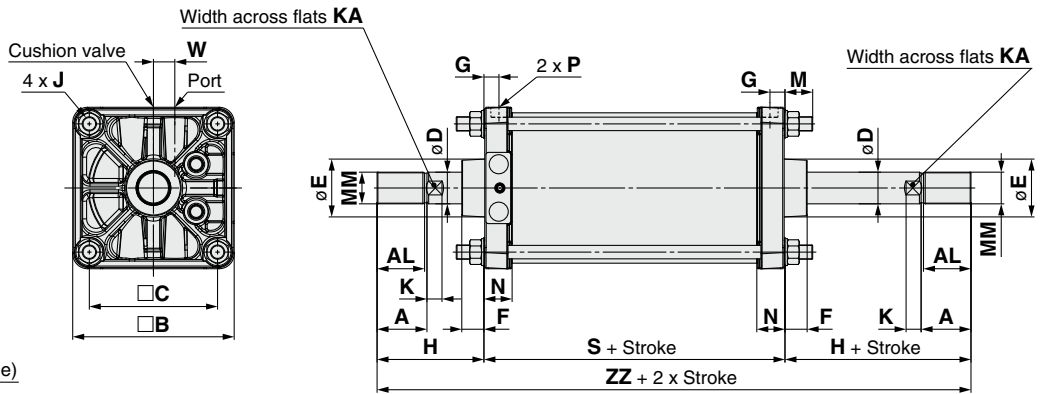
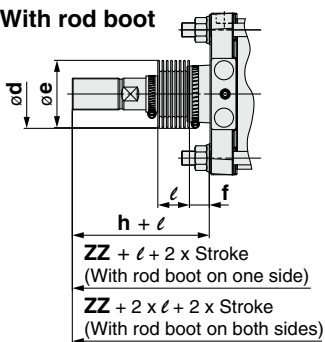


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	M	MM	N	P	S
125	Up to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	27	M30 x 1.5	30.5	1/2	98
140	Up to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	27	M30 x 1.5	30.5	1/2	98
160	Up to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	30.5	M36 x 1.5	34.5	3/4	106

Bore size	Without rod boot		With rod boot (One side)						With rod boot (Both sides)	
	H	ZZ	d	e	f	h	l	ZZ	ZZ	
125	110	318	82	75	40	133	1/5 stroke	341	364	
140	110	318	82	75	40	133	1/5 stroke	341	364	
160	120	346	82	75	40	141	1/5 stroke	367	388	

ø180 to ø250

With rod boot



Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	K	KA	M	MM	N	P	S	W
180	Up to 1200	63	60	204	162	40	73	28	19	M18 x 1.5	17	36	35	M40 x 1.5	35.6	1/2	115	27
200	Up to 998	63	60	226	182	45	78.5	32	19	M20 x 1.5	20	41	35	M45 x 1.5	35.6	1/2	120	27
250	Up to 813	71	67	277	225	56	91	43	23	M24 x 1.5	22	50	41.5	M56 x 2	45.6	3/4	141	32

Bore size	Without rod boot		With rod boot (One side)						With rod boot (Both sides)	
	H	ZZ	d	e	f	h	l	ZZ	ZZ	
180	135	385	92	85	25	153	1/5 stroke	403	421	
200	135	390	96	90	29	153	1/5 stroke	408	426	
250	160	461	108	105	36	176	1/6 stroke	477	493	

Standard Double Acting, Single Rod **CS2**

Double Acting, Double Rod **CS2W**

Long Stroke Double Acting, Single Rod **CS2-V**

Axial Centralized Piping Double Acting, Single Rod **CS2-P**

Auto Switch

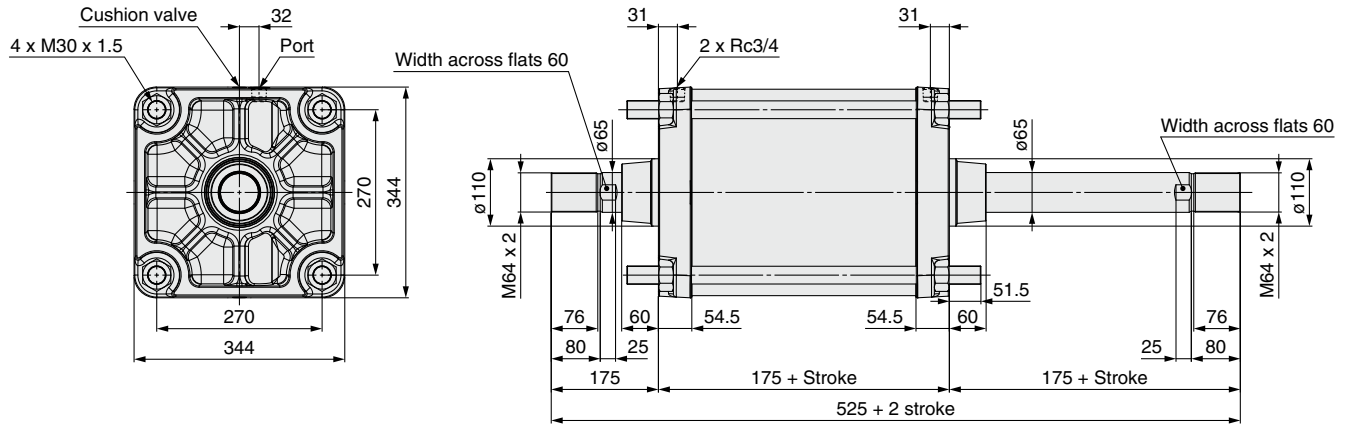
Made to Order

CS2W Series

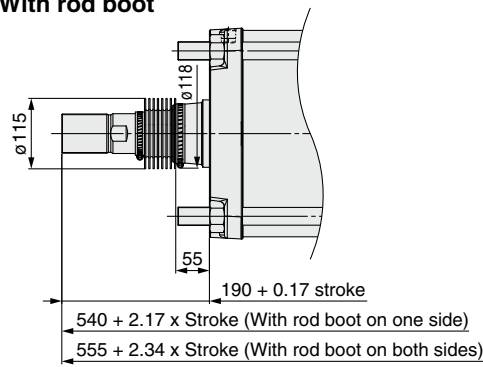
Dimensions

Basic: CS2WB

ø320



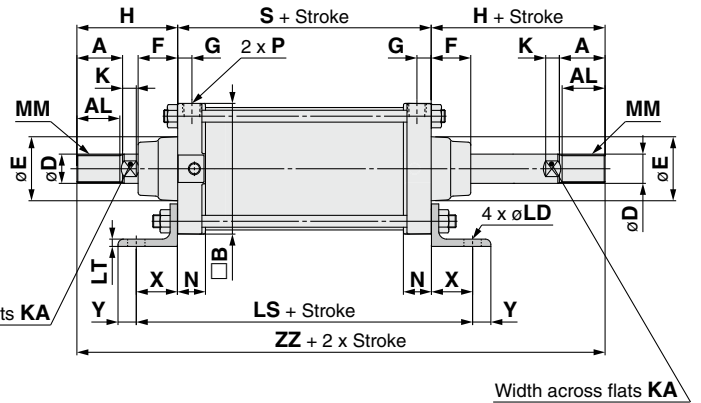
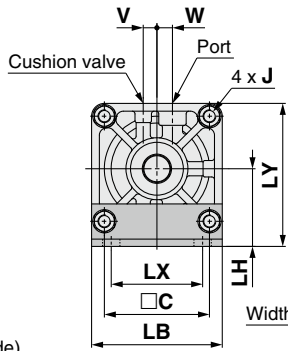
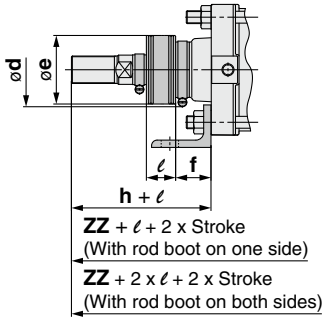
With rod boot



Dimensions

Foot: CS2WL
ø125 to ø160

With rod boot

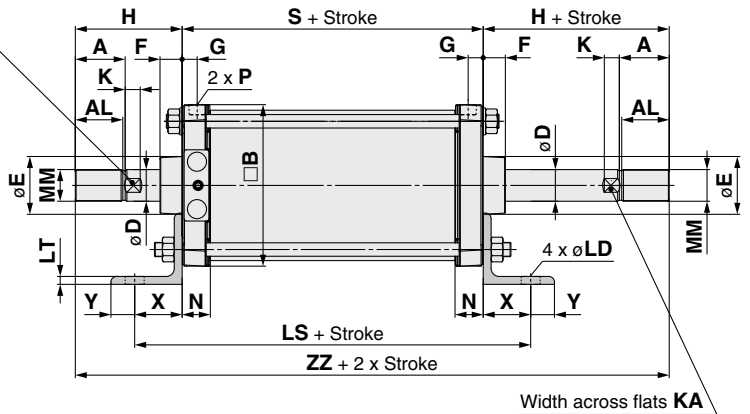
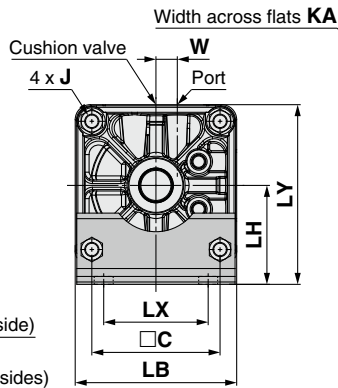
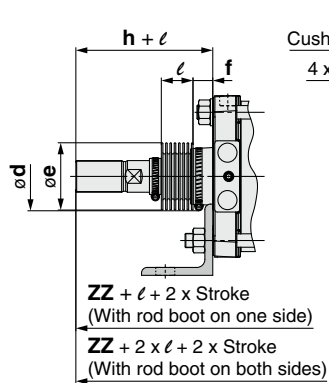


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	LB	LD	LH	LS	LT	LX	LY
125	Up to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	143	19	85	188	8	100	156.5
140	Up to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	157	19	100	188	9	112	178.5
160	Up to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	177	19	106	206	9	118	194.5

Bore size	MM	N	P	S	X	Y	Without rod boot		With rod boot (One side)				With rod boot (Both sides)	
							H	ZZ	e	f	h	l	ZZ	ZZ
125	M30 x 1.5	30.5	1/2	98	45	20	110	318	75	40	133	1/5 stroke	341	364
140	M30 x 1.5	30.5	1/2	98	45	30	110	318	75	40	133	1/5 stroke	341	364
160	M36 x 1.5	34.5	3/4	106	50	25	120	346	75	40	141	1/5 stroke	367	388

ø180 to ø250

With rod boot



Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	K	KA	LB	LD	LH	LS	LT	LX	LY
180	Up to 1200	63	60	204	162	40	73	28	19	M18 x 1.5	17	36	200	24	125	235	10	132	227
200	Up to 998	63	60	226	182	45	78.5	32	19	M20 x 1.5	20	41	225	24	132	240	10	150	245
250	Up to 813	71	67	277	225	56	91	43	23	M24 x 1.5	22	50	275	29	160	301	12	180	298.5

Bore size	MM	N	P	S	W	X	Y	Without rod boot		With rod boot (One side)				With rod boot (Both sides)		
								H	ZZ	d	e	f	h	l	ZZ	ZZ
180	M40 x 1.5	35.6	1/2	115	27	60	30	135	385	92	85	25	153	1/5 stroke	403	421
200	M45 x 1.5	35.6	1/2	120	27	60	30	135	390	96	90	29	153	1/5 stroke	408	426
250	M56 x 2	45.6	3/4	141	32	80	40	160	461	108	105	36	176	1/6 stroke	477	493

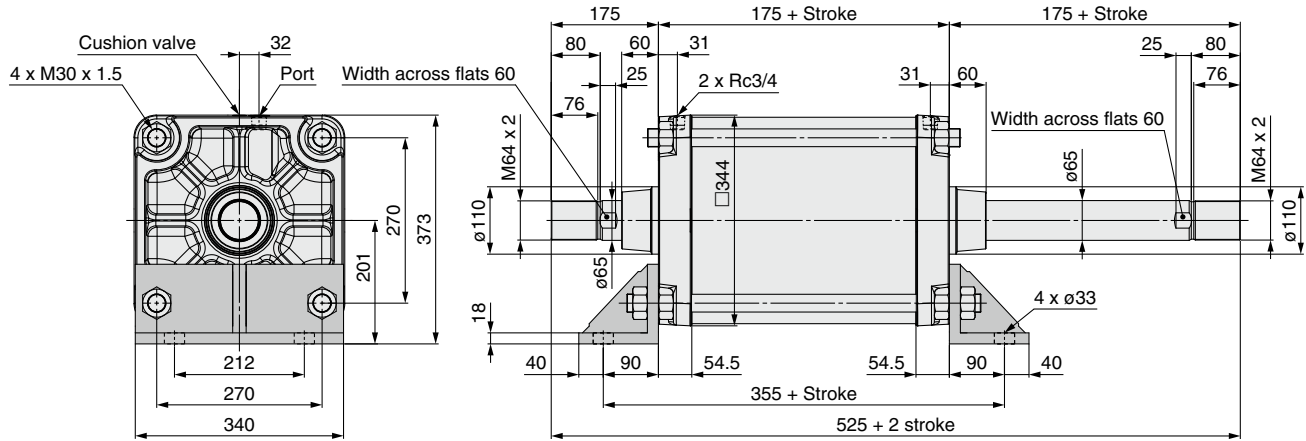
Standard Double Acting, Single Rod CS2
Double Acting, Double Rod CS2W
Long Stroke Double Acting, Single Rod CS2-V
Axial Centralized Piping Double Acting, Single Rod CS2-P
Auto Switch
Made to Order

CS2W Series

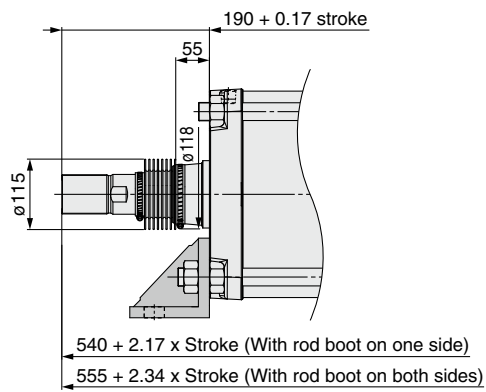
Dimensions

Foot: CS2WL

ø320



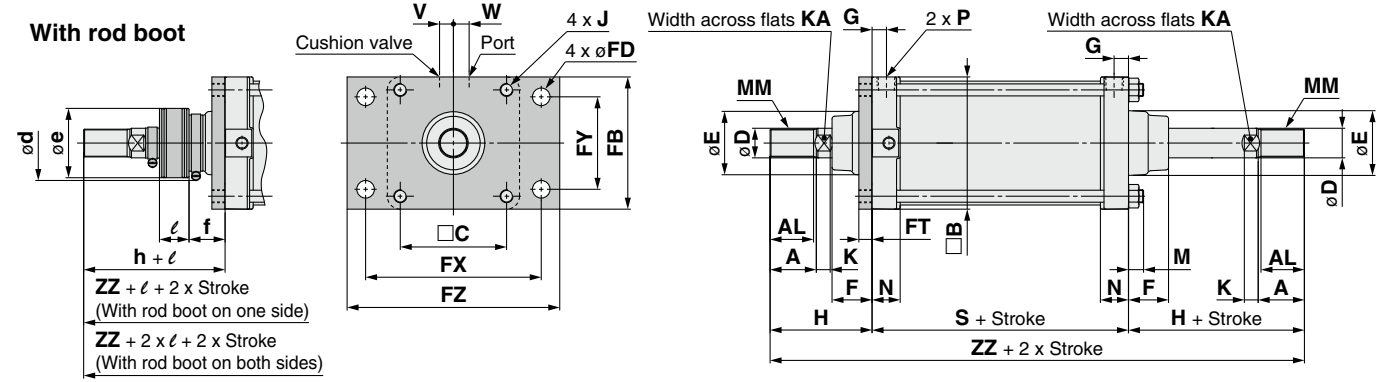
With rod boot



Dimensions

Flange: CS2WF

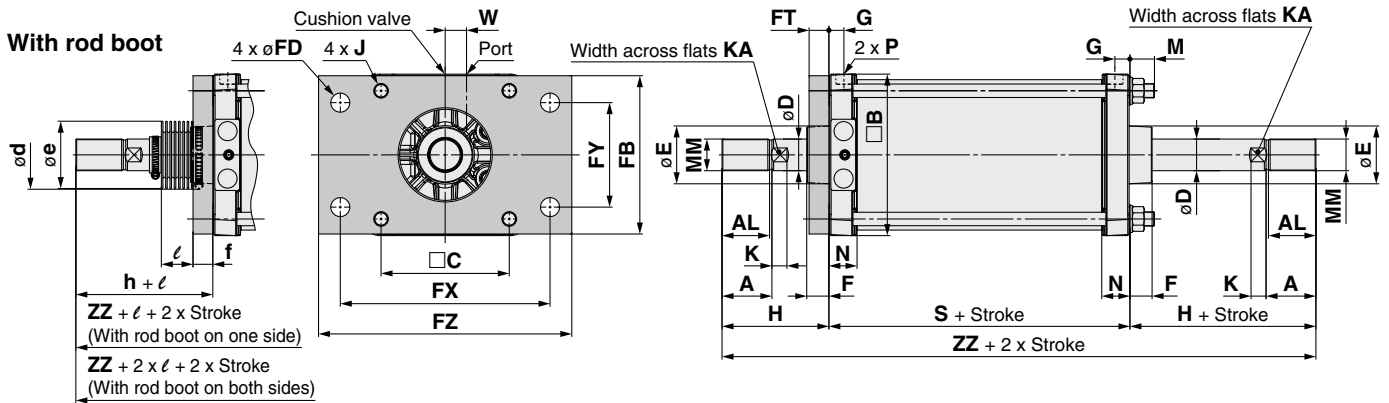
ø125 to ø160



Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	J	V	W	K	KA	M
125	Up to 1000	50	47	143	115	32	71	43	145	19	14	190	100	230	15	M14 x 1.5	15	17	15	27	13
140	Up to 1000	50	47	157	128	32	71	43	160	19	20	212	112	255	15	M14 x 1.5	15	17	15	27	13
160	Up to 1200	56	53	177	144	38	78.5	42	180	19	20	236	118	275	18	M16 x 1.5	15	20	17	34	15

Bore size	MM	N	P	S	Without rod boot										With rod boot (One side)		With rod boot (Both sides)	
					H	ZZ	d	e	f	h	l	ZZ	ZZ					
125	M30 x 1.5	30.5	1/2	98	110	318	82	75	40	133	1/5 stroke	341	364					
140	M30 x 1.5	30.5	1/2	98	110	318	82	75	40	133	1/5 stroke	341	364					
160	M36 x 1.5	34.5	3/4	106	120	346	82	75	40	141	1/5 stroke	367	388					

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	J	K	KA	M
180	Up to 1200	63	60	204	162	40	73	28	200	24	25	265	132	320	19	M18 x 1.5	17	36	31
200	Up to 998	63	60	226	182	45	78.5	32	225	24	25	280	150	335	19	M20 x 1.5	20	41	31
250	Up to 813	71	67	277	225	56	91	43	275	29	30	355	180	420	23	M24 x 1.5	22	50	35

Bore size	MM	N	P	S	W	Without rod boot										With rod boot (One side)		With rod boot (Both sides)	
						H	ZZ	d	e	f	h	l	ZZ	ZZ					
180	M40 x 1.5	35.6	1/2	115	27	135	385	92	85	25	153	1/5 stroke	403	421					
200	M45 x 1.5	35.6	1/2	120	27	135	390	96	90	29	153	1/5 stroke	408	426					
250	M56 x 2	45.6	3/4	141	32	160	461	108	105	36	176	1/6 stroke	477	493					

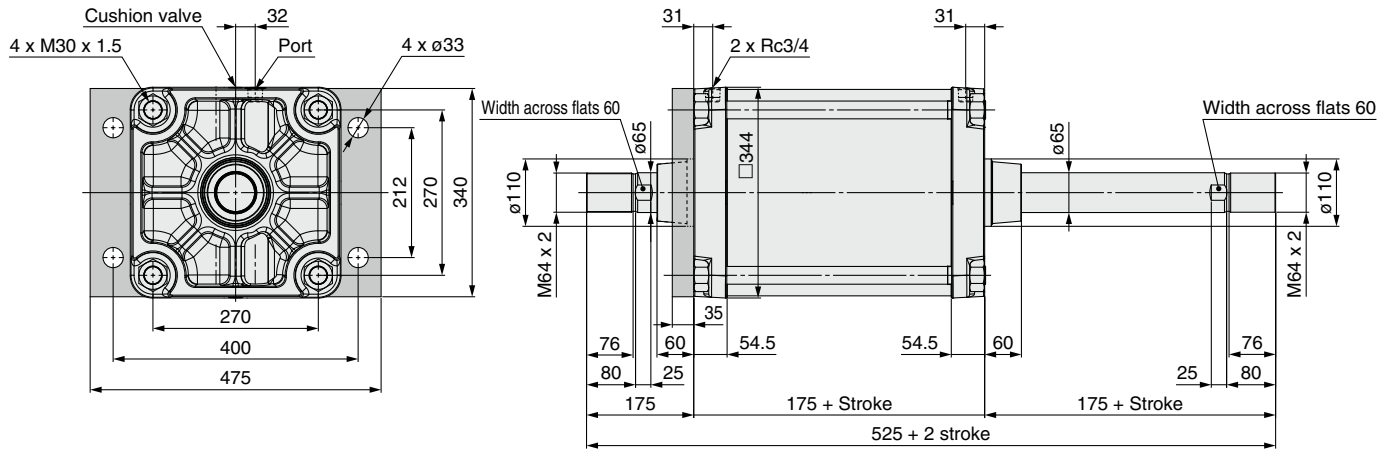
Standard Double Acting, Single Rod CS2
 Double Acting, Double Rod CS2W
 Long Stroke Double Acting, Single Rod CS2-V
 Axial Centralized Piping Double Acting, Single Rod CS2-CP
 Auto Switch
 Made to Order

CS2W Series

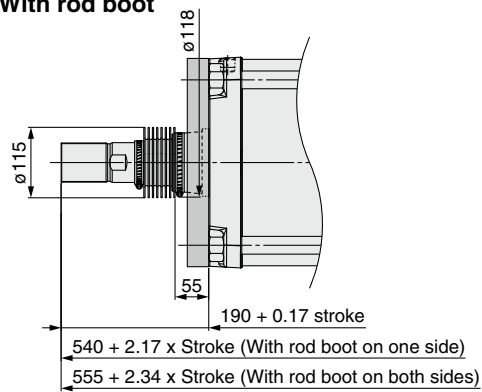
Dimensions

Flange: CS2WF

ø320



With rod boot

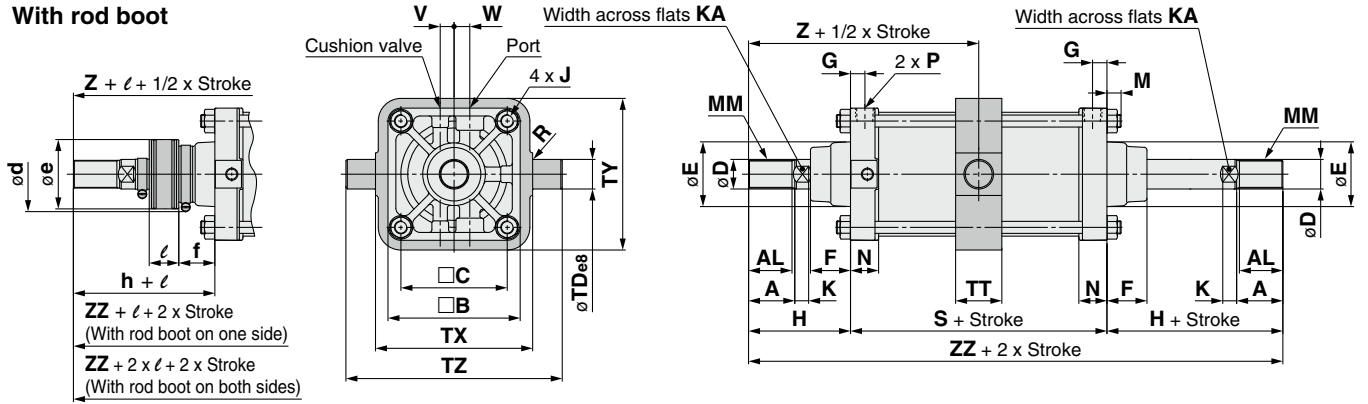


Dimensions

Center trunnion: CS2WT

ø125 to ø160

With rod boot

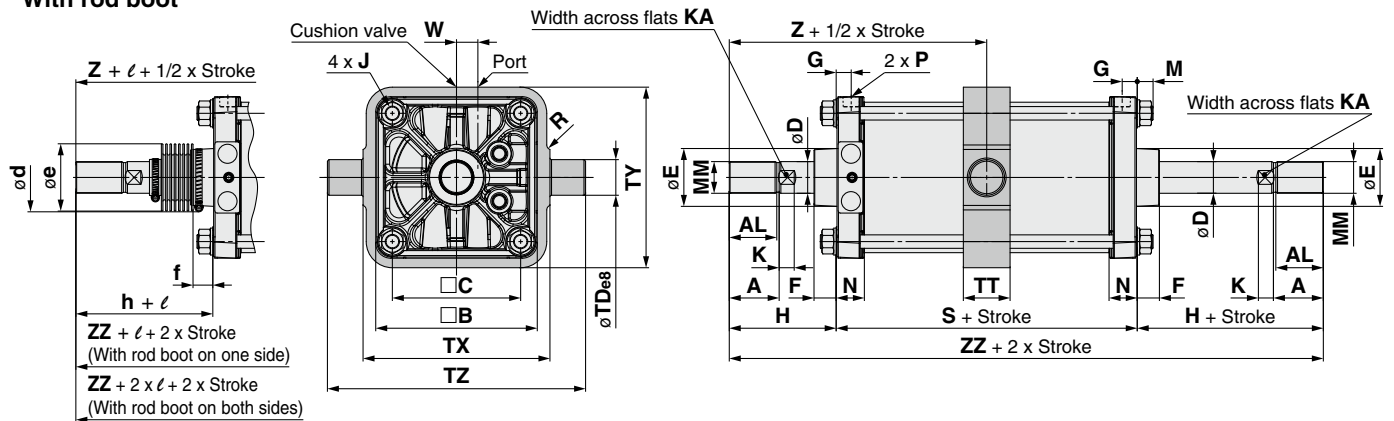


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	M	MM	N	P	R	S
125	25 to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5	1/2	1	98
140	30 to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5	1/2	1.5	98
160	35 to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	15	M36 x 1.5	34.5	3/4	1.5	106

Bore size	TDe8	TT	TX	TY	TZ	Without rod boot			With rod boot (One side)										Both sides		
						H	Z	ZZ	d	e	f	h	l	Z	ZZ	ZZ					
125	32 ^{-0.050} _{-0.089}	50	170	164	234	110	159	318	82	75	40	133	1/5 stroke	182	341	364					
140	36 ^{-0.050} _{-0.089}	55	190	184	262	110	159	318	82	75	40	133	1/5 stroke	182	341	364					
160	40 ^{-0.050} _{-0.089}	60	212	204	292	120	173	346	82	75	40	141	1/5 stroke	194	367	388					

ø180 to ø250

With rod boot



Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	K	KA	M	MM	N	P	R	S	TDe8
180	25 to 1200	63	60	204	162	40	73	28	19	M18 x 1.5	17	36	20	M40 x 1.5	35.6	1/2	2	115	45 ^{-0.050} _{-0.089}
200	25 to 998	63	60	226	182	45	78.5	32	19	M20 x 1.5	20	41	21	M45 x 1.5	35.6	1/2	2	120	45 ^{-0.050} _{-0.089}
250	25 to 813	71	67	277	225	56	91	43	23	M24 x 1.5	22	50	25	M56 x 2	45.6	3/4	3	141	56 ^{-0.060} _{-0.106}

Bore size	TT	TX	TY	TZ	W	Without rod boot			With rod boot (One side)										Both sides		
						H	Z	ZZ	d	e	f	h	l	Z	ZZ	ZZ					
180	59	236	228	326	27	135	192.5	388	92	85	25	153	1/5 stroke	210.5	406	424					
200	59	265	257	355	27	135	195	393	96	90	29	153	1/5 stroke	213	411	429					
250	69	335	325	447	32	160	230.5	465	108	105	36	176	1/6 stroke	246.5	481	497					

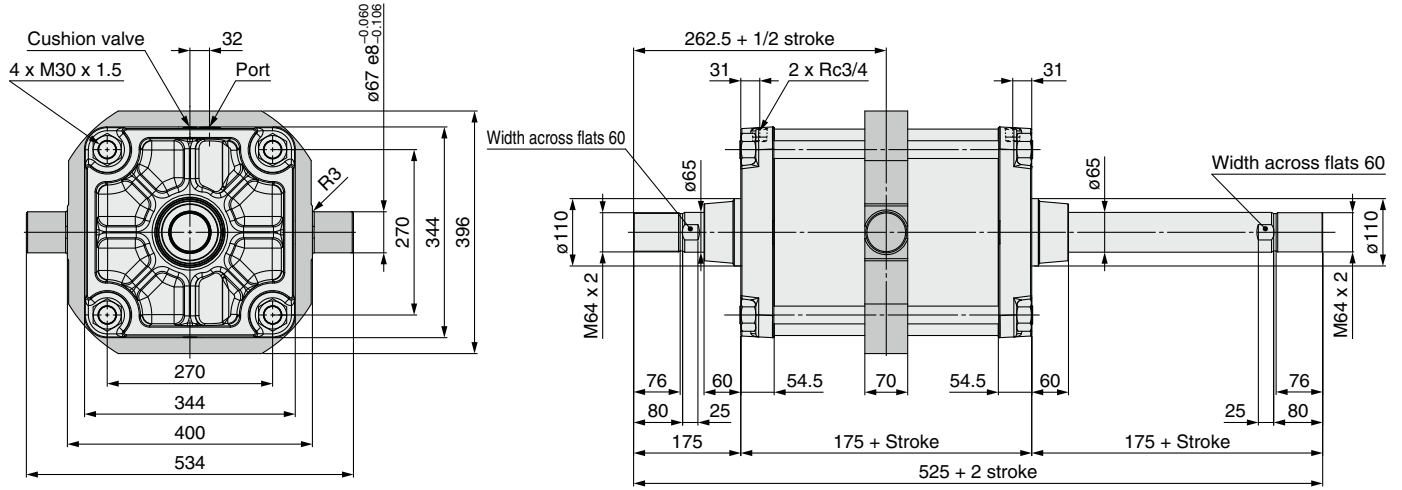
Standard Double Acting, Single Rod CS2
 Double Acting, Double Rod CS2W
 Long Stroke Double Acting, Single Rod CS2-V
 Axial Centralized Piping Double Acting, Single Rod CS2-P
 Auto Switch
 Made to Order

CS2W Series

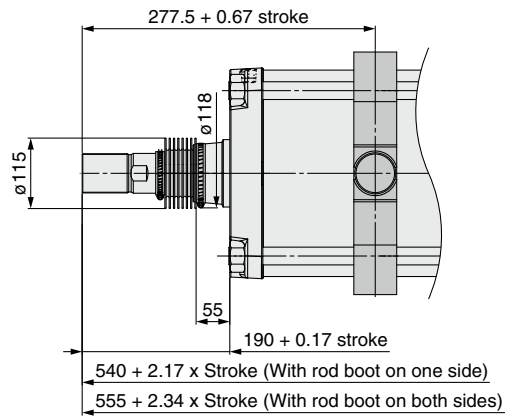
Dimensions

Center trunnion: CS2WT

ø320



With rod boot



Air Cylinder: Long Stroke Type Double Acting, Single Rod

CS2-V Series

∅180, ∅200, ∅250, ∅320



How to Order

CS2 L 200 [] - 1000 V - []

With auto switch CDS2 L 200 [] - 1000 V - M9BW [] - []

With auto switch (Built-in magnet)

Mounting

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

Bore size

180	180 mm
200	200 mm
250	250 mm
320	320 mm

Number of auto switches

Nil	2
3	3
S	1
n	n

Auto switch

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

* For applicable auto switches, refer to the table below.

Cylinder stroke [mm]
Refer to "Maximum Strokes" on page 41.

Port thread type

Nil	Rc
TN	NPT
TF	G

Made to order
Refer to page 41 for details.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDS2B200-1000V

Applicable Auto Switches/Refer to the Web Catalog 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		0.5 (Nil)	1 (M)	3 (L)	5 (Z)							
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC			
				3-wire (PNP)				M9P	●	●	●	○	○					
				2-wire				M9B	●	●	●	○	○					
	Diagnostic indication (2-color indicator)			3-wire (NPN)	24 V	5 V, 12 V	—	M9NW	●	●	●	○	○	IC circuit				
				3-wire (PNP)				M9PW	●	●	●	○	○					
				2-wire				M9BW	●	●	●	○	○					
				3-wire (NPN)				M9NA*1	○	○	●	○	○					
	Water resistant (2-color indicator)			3-wire (PNP)	24 V	5 V, 12 V	—	M9PA*1	○	○	●	○	○	IC circuit				
				2-wire				M9BA*1	○	○	●	○	○					
	With diagnostic output (2-color indicator)			Magnetic field resistant (2-color indicator)	Grommet	Yes	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	●	—	●		○	○	IC circuit
2-wire (Non-polar)		P3DWA*2	●				—				●	●	○	○				
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	5 V	—	A96	●	—	●	—	—	IC circuit	—			
				2-wire				12 V	100 V	A93	●	●	●			●	—	—
								5 V, 12 V	100 V or less	A90	●	—	●			—	—	IC circuit
								100 V, 200 V	200 V or less	A54	●	—	●			●	—	—
								12 V	—	A64	●	—	●			—	—	—
								—	—	A59W	●	—	●			—	—	—

*1 Water-resistant type auto switches can be mounted on the above models, but SMC cannot guarantee water resistance.

Please contact SMC regarding water-resistant types with the above model numbers.

*2 The D-P3DWA, A54, A64, and A59W are not applicable to bore sizes ∅250 and ∅320.

* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW 3 m..... L (Example) M9NWL
1 m..... M (Example) M9NWM 5 m..... Z (Example) M9NwZ

* Solid state auto switches marked with a "○" are produced upon receipt of order.

* Since there are applicable auto switches other than those listed above, refer to page 63 for details.

* D-A9□/M9□/M9□W/M9□A/P3DWA□ auto switches are shipped together with the product but do not come assembled. (Only the auto switch mounting brackets are assembled before shipment.)

Standard Double Acting, Single Rod CS2

Double Acting, Double Rod CS2W

Long Stroke Double Acting, Single Rod CS2-V

Axial Centralized Piping Double Acting, Single Rod CS2□P

Auto Switch

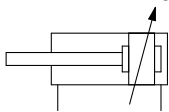
Made to Order

CS2-V Series



Symbol

Double acting, Air cushion



Made to Order Specifications
(For details, refer to pages 65 to 75.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length

* Refer to page 5 for details on whether or not to use a made-to-order product with the above common specifications.

Specifications

Bore size [mm]		180	200	250	320
Action		Double acting, Single rod			
Fluid		Air			
Proof pressure		1.05 MPa			
Max. operating pressure		0.7 MPa			
Min. operating pressure		0.05 MPa			
Piston speed		50 to 300 mm/s			
Cushion		Air cushion + Bumper cushion			
Ambient and fluid temperatures	Without auto switch	0 to 70°C (No freezing)			
	With auto switch	0 to 60°C (No freezing)			
Lubrication		Not required (Non-lube)			
Stroke length tolerance [mm]	496 to 1000	+2.4 0			
	1001 to 1500	+2.8 0			
	1501 to 2000	+3.2 0			
	2001 to 2500	+3.6 0			
Mounting		Basic, Foot, Rod flange, Head flange, Single clevis, Double clevis, Center trunnion			
Allowable kinetic energy (When air cushion is activated)		78.4 J	98 J	147 J	265 J

Maximum Strokes

* When using with auto switches, refer to the "Minimum Stroke for Auto Switch Mounting" table on page 62.

Bore size	Mounting bracket	Stroke range [mm]	
		Stroke range ①	Stroke range ②
180		—	1570 to 2500
200		999 to 1200	1201 to 2500
250		814 to 1200	1201 to 2400
320		496 to 1200	1201 to 2400

* The CS2-V series cylinders are categorized as class 2 pressure vessels under the Class 2 Pressure Vessel Act when the products are to be used or installed in Japan.

For laws and regulations, refer to the CS1 series (**Web Catalog**).

* A bore size ø320 class 2 pressure vessel is available as a special product.

* Stroke range ② is only selectable with the individual made-to-order specification -X1034. As this specification exceeds the stroke limit, be sure to check the operating conditions, such as buckling of the piston rod, before deciding to use the product.

Accessories

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

* If using the rod end nut with a single knuckle joint or a double knuckle joint, use the type with a rod end bracket (-XC86) or order the accessory separately. For part numbers and dimensions of accessories, refer to page 26.

Mounting Bracket Part Nos.

Bore size [mm]	180	200	250	320
Foot	CS2-L18	CS2-L20	CS2-L25	CS2-L32
Flange	CS2-F18	CS2-F20	CS2-F25	CS2-F32
Single clevis	CS2-C18	CS2-C20	CS2-C25	CS2-C32
Double clevis	CS2-D18	CS2-D20	CS2-D25	CS2-D32

* When ordering foot brackets, order two pieces per cylinder.

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

* Mounting nuts are included in the brackets for bore size ø320.

Refer to pages 59 to 63 for cylinders with auto switches.

- Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height
- Minimum Stroke for Auto Switch Mounting
- Operating Range
- Auto Switch Mounting Brackets/Part Nos.

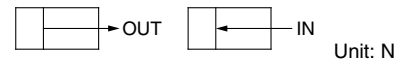
Weight (Guide)

Bore size [mm]		180	200	250	320
Basic weight	Basic	16.2	20.1	36.4	62.5
	Foot	20.9	25.6	47.3	88.3
	Rod flange	25.8	31.9	58.2	100.5
	Head flange	25.8	31.9	58.2	100.5
	Single clevis	24.5	30.1	54.7	103.0
	Double clevis	26.2	31.9	57.8	107.2
	Trunnion	26.9	34.1	62.7	96.1
Additional weight with magnet (With built-in magnet and auto switch)		0.1	0.2	0.2	0.3
Additional weight per 100 mm of stroke		2.8	3.3	5.4	7.5
Accessories	Single knuckle	3.1	2.9	5.4	10.8
	Double knuckle (Knuckle pin, Split pin)	4.8	4.6	9.3	17.2
	Rod end nut	0.4	0.9	1.3	1.4

Calculation: (Example) **CS2L200-1000V**

- Basic weight 25.6 [kg]
 - Additional weight ... 3.3 [kg/100 mm]
 - Cylinder stroke 1000 [mm]
- $25.6 + 3.3 \times 1000/100 = 58.6$ [kg]

Theoretical Output



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
180	45	OUT	25400	5080	7620	10200	12700	15200	17800
		IN	23900	4780	7170	9560	12000	14300	16700
200	50	OUT	31400	6280	9420	12600	15700	18800	22000
		IN	29500	5900	8850	11800	14800	17700	20700
250	60	OUT	49100	9820	14700	19600	24600	29500	34400
		IN	46300	9260	13900	18500	23200	27800	32400
320	70	OUT	80400	16100	24100	32200	40200	48200	56300
		IN	76600	15300	23000	30600	38300	46000	53600

Standard Double Acting, Single Rod **CS2**

Standard Double Acting, Double Rod **CS2W**

Long Stroke Double Acting, Single Rod **CS2-V**

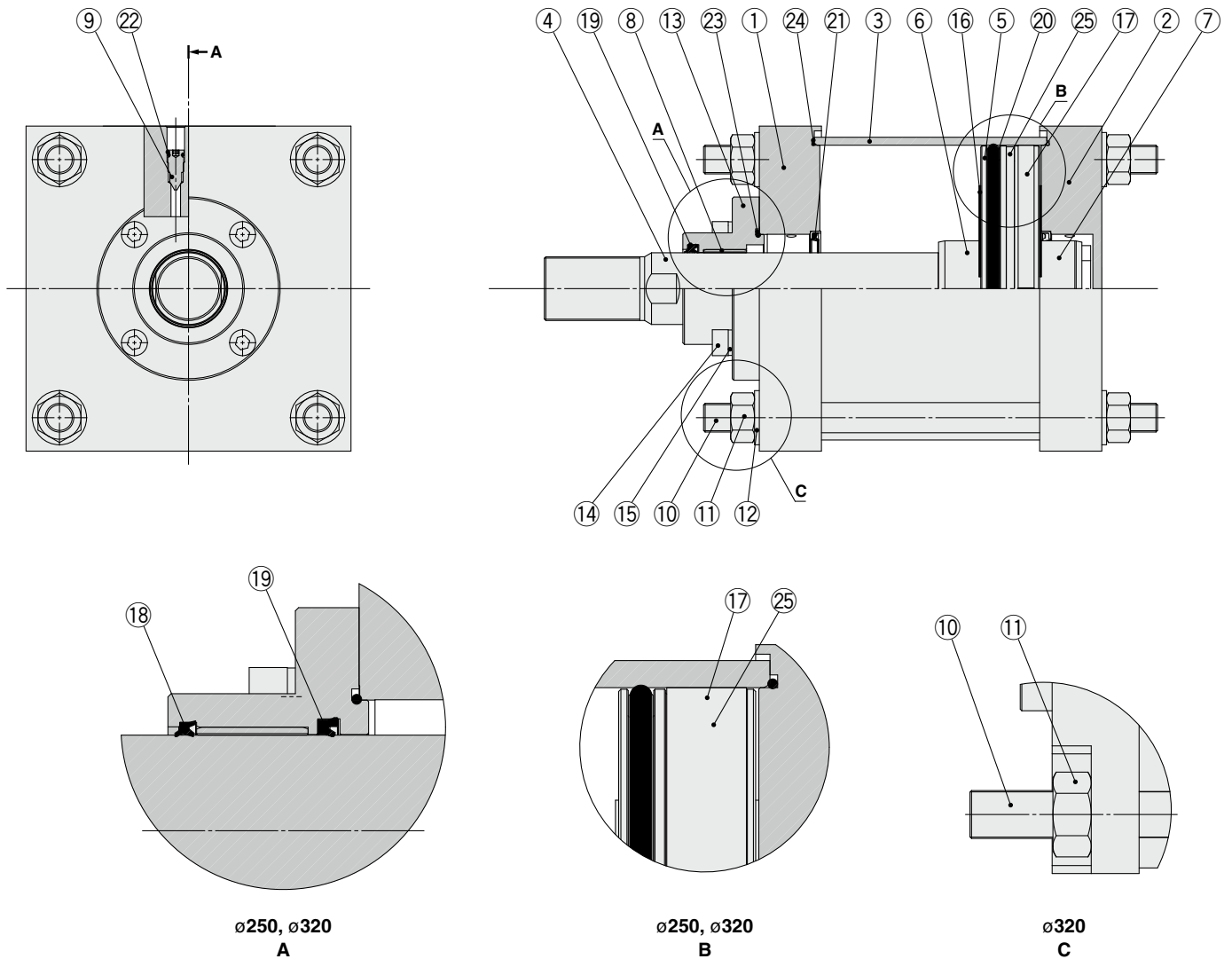
Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch

Made to Order

CS2-V Series

Construction



Component Parts

No.	Description	Material	Qty.	Note
1	Rod cover	Aluminum alloy	1	
2	Head cover	Aluminum alloy	1	
3	Cylinder tube	Aluminum alloy	1	
4	Piston rod	Carbon steel	1	
5	Piston	Aluminum alloy	1	
6	Cushion ring A	Rolled steel	1	
7	Cushion ring B	Rolled steel	1	
8	Bushing	Bearing alloy	1	
9	Cushion valve	Brass	2	
10	Tie-rod	Carbon steel	4	
11	Tie-rod nut	Rolled steel	8	
12	Flat washer	Rolled steel	8	
13	Retainer plate	Aluminum alloy	1	
14	Hexagon socket head cap screw	Chromium molybdenum steel	4	
15	Spring washer	Steel wire	4	
16	Bumper	Urethane	2	
17	Wear ring	Resin	1	
18	Wiper ring	NBR	1	ø250 and ø320 only

Component Parts

No.	Description	Material	Qty.	Note
19	Rod seal	NBR	1	
20	Piston seal	NBR	1	
21	Cushion seal	Urethane	2	
22	Cushion valve seal	NBR	2	
23	Retaining plate gasket	NBR	1	
24	Cylinder tube gasket	NBR	2	
25	Plastic magnet	—	(1)	

Replacement Parts/Seal Kit

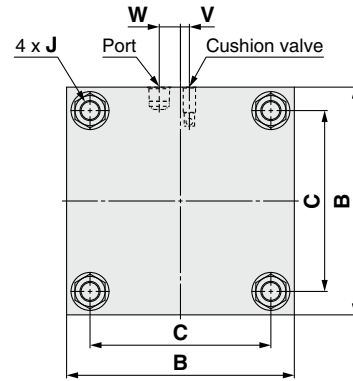
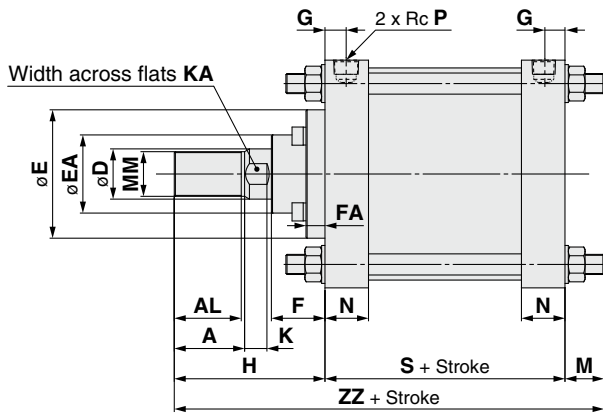
Bore size [mm]	Kit no.	Contents
180	CS2-180A-V-PS	Set of nos. 18, 19, 20, 23, 24
200	CS2-200A-V-PS	
250	CS2-250A-V-PS	
320	CS2-320A-V-PS	

* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

Dimensions

Basic: CS2B-V

ø180 to ø250



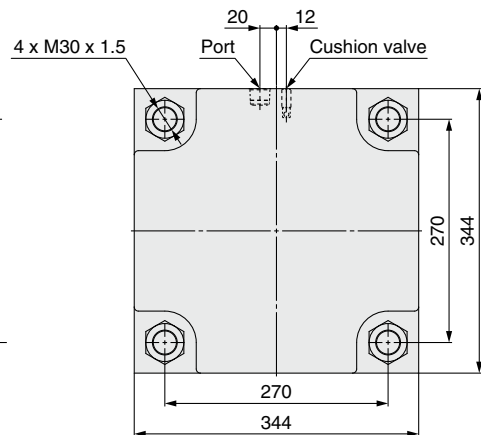
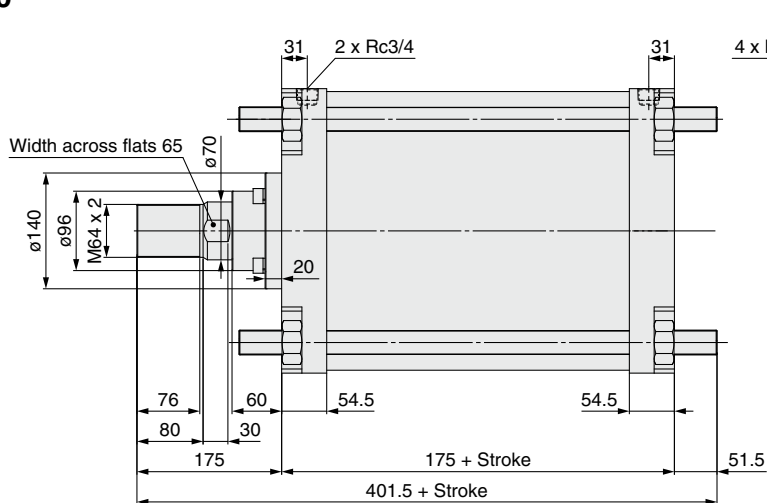
[mm]

Bore size	A	AL	B	C	D	E	EA	F	FA	G	H	J	K	KA	M	MM
ø180	63	60	204	162	45	115	70	48	17	19	135	M18 x 1.5	20	41	35	M40 x 1.5
ø200	63	60	226	182	50	115	74	48	17	19	135	M20 x 1.5	20	46	35	M45 x 1.5
ø250	71	67	277	225	60	140	86	60	20	23	160	M24 x 1.5	25	56	41.5	M56 x 2

[mm]

Bore size	N	P	S	W	V	ZZ
ø180	39	1/2	115	19	8	285
ø200	39	1/2	120	19	8	290
ø250	49	3/4	141	22	10	342.5

ø320



Standard Double Acting, Single Rod **CS2**

Double Acting, Double Rod **CS2W**

Long Stroke Double Acting, Single Rod **CS2-V**

Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch

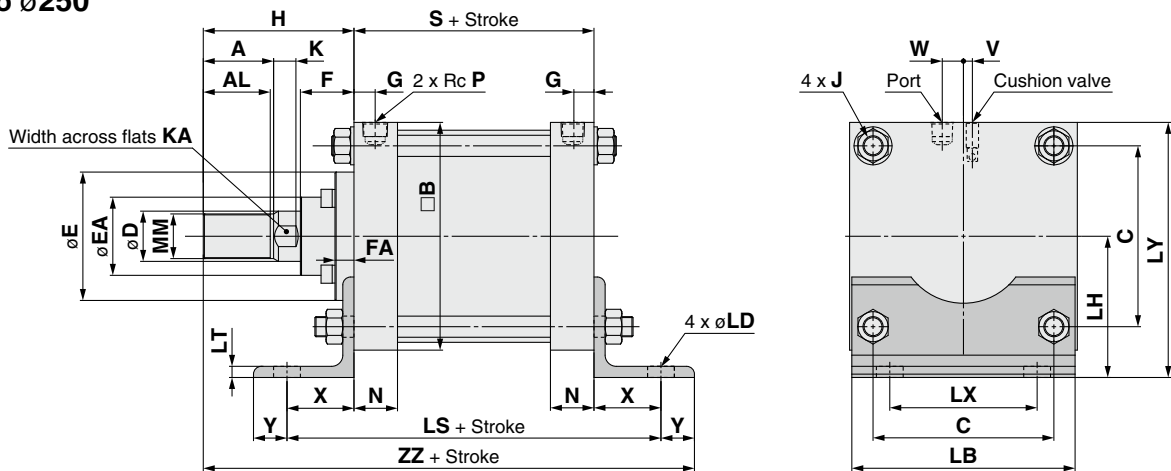
Made to Order

CS2-V Series

Dimensions

Foot: CS2L-V

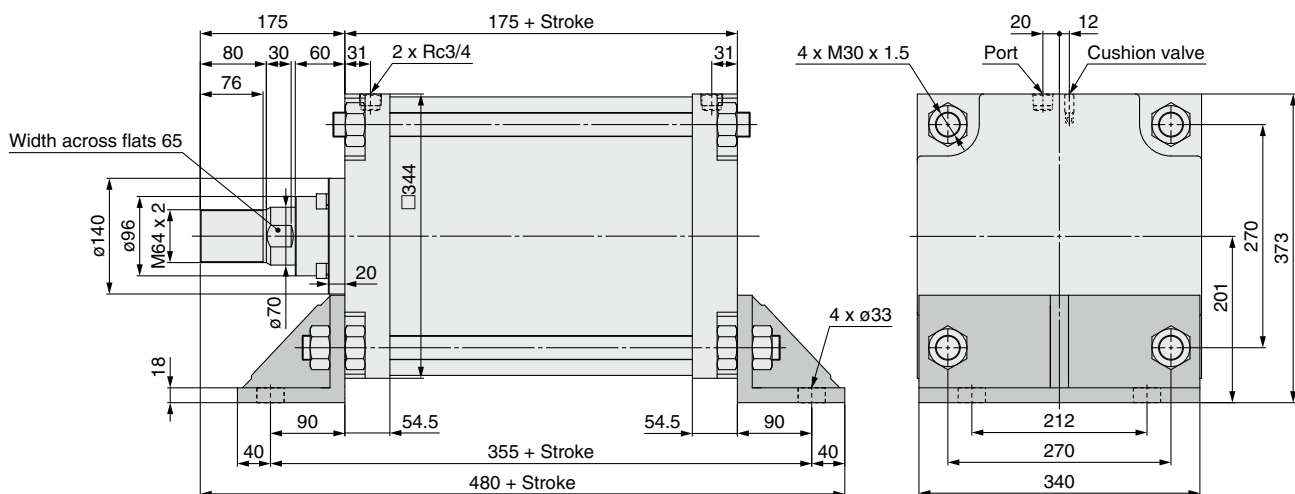
ø180 to ø250



Bore size	A	AL	B	C	D	E	EA	F	FA	G	H	J	K	KA	LB	LD	LH
ø180	63	60	204	162	45	115	70	48	17	19	135	M18 x 1.5	20	41	200	24	125
ø200	63	60	226	182	50	115	74	48	17	19	135	M20 x 1.5	20	46	225	24	132
ø250	71	67	277	225	60	140	86	60	20	23	160	M24 x 1.5	25	56	275	29	160

Bore size	LS	LT	LX	LY	MM	N	P	S	W	V	X	Y	ZZ
ø180	235	10	132	227	M40 x 1.5	39	1/2	115	19	8	60	30	340
ø200	240	10	150	245	M45 x 1.5	39	1/2	120	19	8	60	30	345
ø250	316	12	180	298.5	M56 x 2	49	3/4	141	22	10	80	40	421

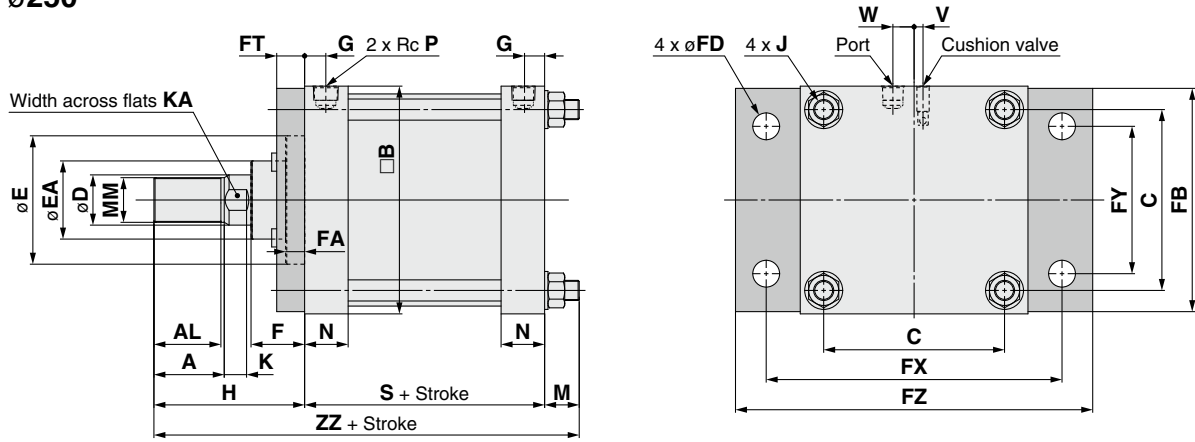
ø320



Dimensions

Rod flange: CS2F-V

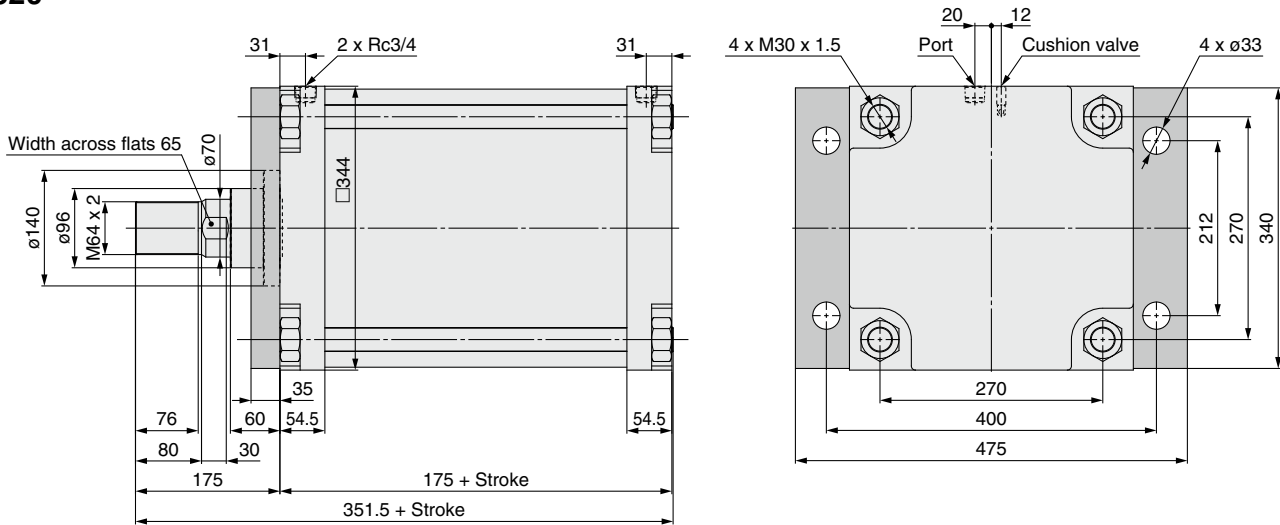
ø180 to ø250



Bore size	A	AL	B	C	D	E	EA	F	FA	FB	FD	FT	FX	FY	FZ	G	H
ø180	63	60	204	162	45	115	70	48	17	200	24	25	265	132	320	19	135
ø200	63	60	226	182	50	115	74	48	17	225	24	25	280	150	335	19	135
ø250	71	67	277	225	60	140	86	60	20	275	29	30	355	180	420	23	160

Bore size	J	K	KA	M	MM	N	P	S	W	V	ZZ
ø180	M18 x 1.5	20	41	31	M40 x 1.5	39	1/2	115	19	8	281
ø200	M20 x 1.5	20	46	31	M45 x 1.5	39	1/2	120	19	8	286
ø250	M24 x 1.5	25	56	35	M56 x 2	49	3/4	141	22	10	336

ø320



Standard Double Acting, Single Rod **CS2**

Double Acting, Double Rod **CS2W**

Long Stroke Double Acting, Single Rod **CS2-V**

Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch

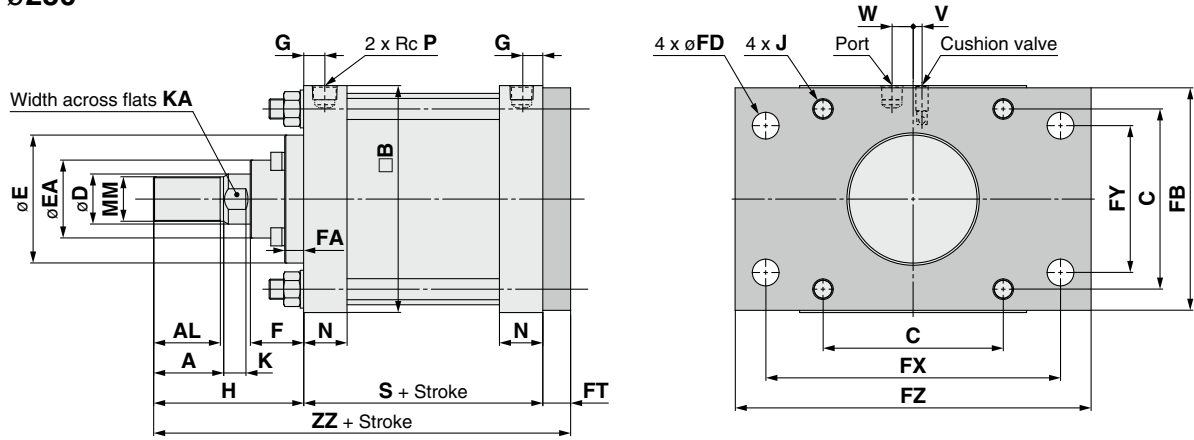
Made to Order

CS2-V Series

Dimensions

Head flange: CS2G-V

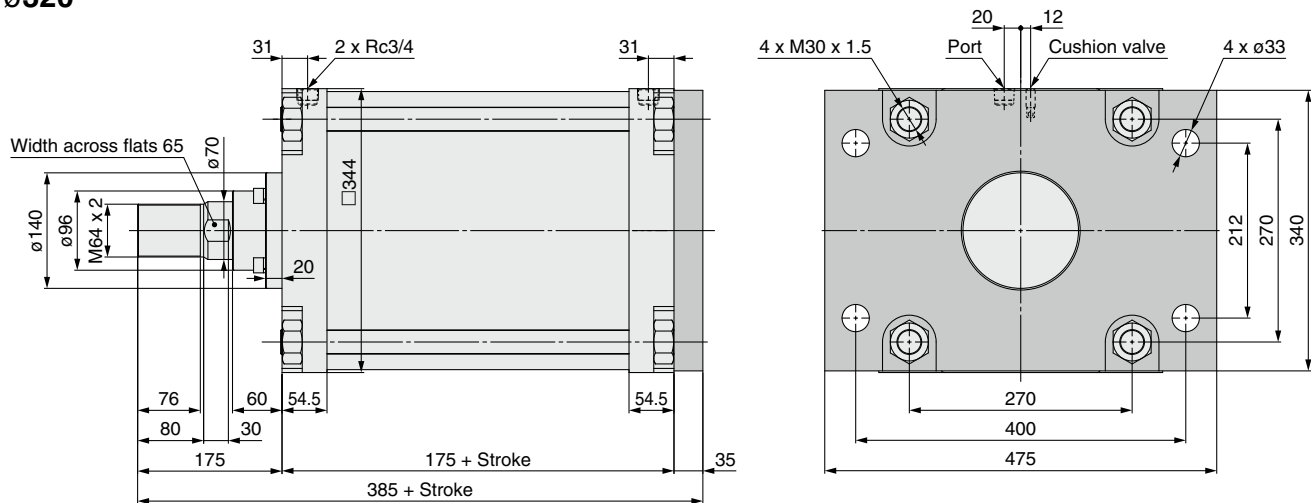
ø180 to ø250



Bore size	A	AL	B	C	D	E	EA	F	FA	FB	FD	FT	FX	FY	FZ	G	H
ø180	63	60	204	162	45	115	70	48	17	200	24	25	265	132	320	19	135
ø200	63	60	226	182	50	115	74	48	17	225	24	25	280	150	335	19	135
ø250	71	67	277	225	60	140	86	60	20	275	29	30	355	180	420	23	160

Bore size	J	K	KA	MM	N	P	S	W	V	ZZ
ø180	M18 x 1.5	20	41	M40 x 1.5	39	1/2	115	19	8	275
ø200	M20 x 1.5	20	46	M45 x 1.5	39	1/2	120	19	8	280
ø250	M24 x 1.5	25	56	M56 x 2	49	3/4	141	22	10	331

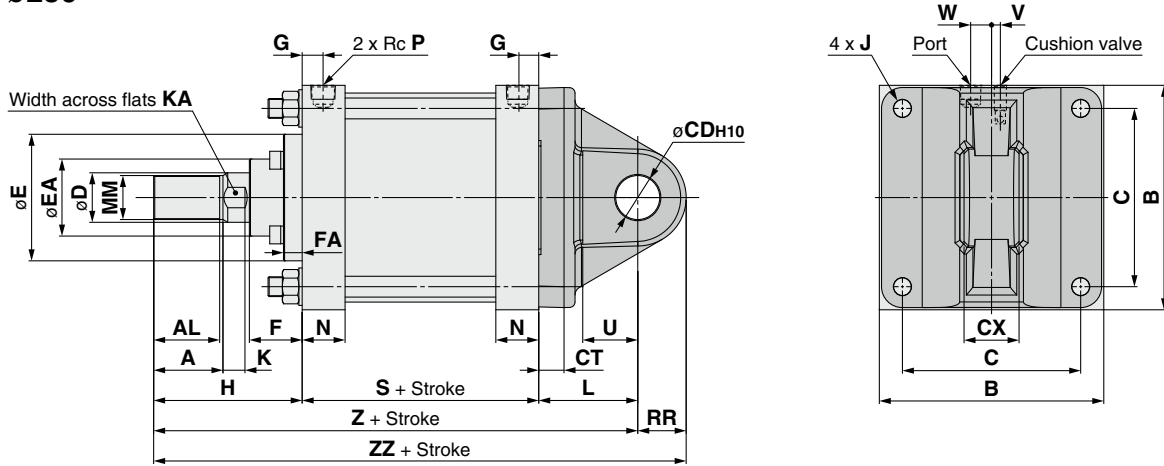
ø320



Dimensions

Single clevis: CS2C-V

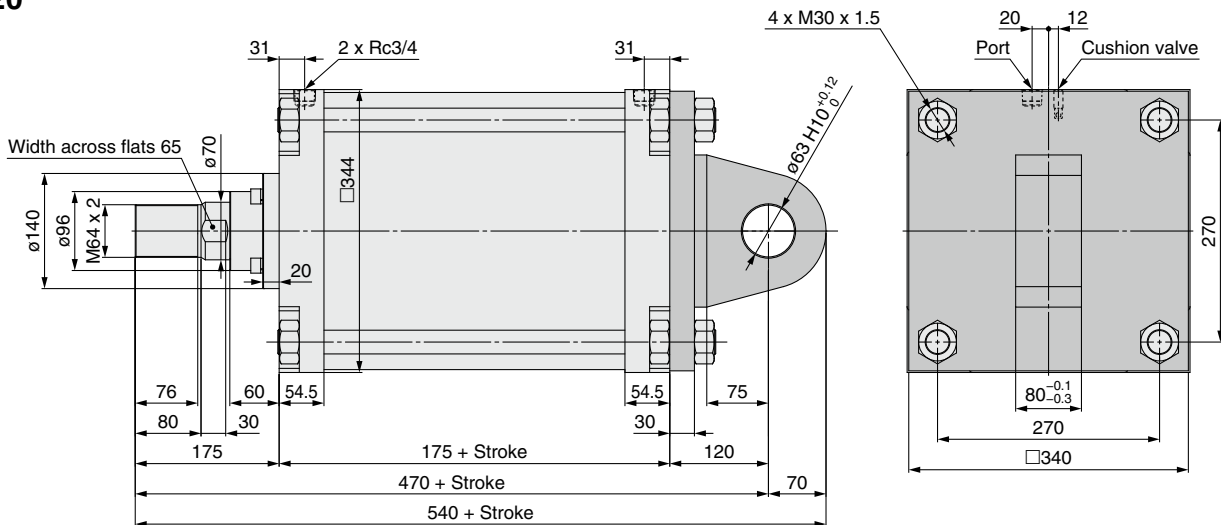
ø180 to ø250



Bore size	A	AL	B	C	CDH10	CT	CX	D	E	EA	F	FA	G	H	J	K
ø180	63	60	204	162	40 ^{+0.100} ₀	23	50 ^{-0.1} _{-0.3}	45	115	70	48	17	19	135	M18 x 1.5	20
ø200	63	60	226	182	40 ^{+0.100} ₀	25	50 ^{-0.1} _{-0.3}	50	115	74	48	17	19	135	M20 x 1.5	20
ø250	71	67	277	225	50 ^{+0.100} ₀	30	63 ^{-0.1} _{-0.3}	60	140	86	60	20	23	160	M24 x 1.5	25

Bore size	KA	L	MM	N	P	RR	S	U	W	V	Z	ZZ
ø180	41	90	M40 x 1.5	39	1/2	44	115	50	19	8	340	384
ø200	46	90	M45 x 1.5	39	1/2	44	120	50	19	8	345	389
ø250	56	110	M56 x 2	49	3/4	55	141	65	22	10	411	466

ø320



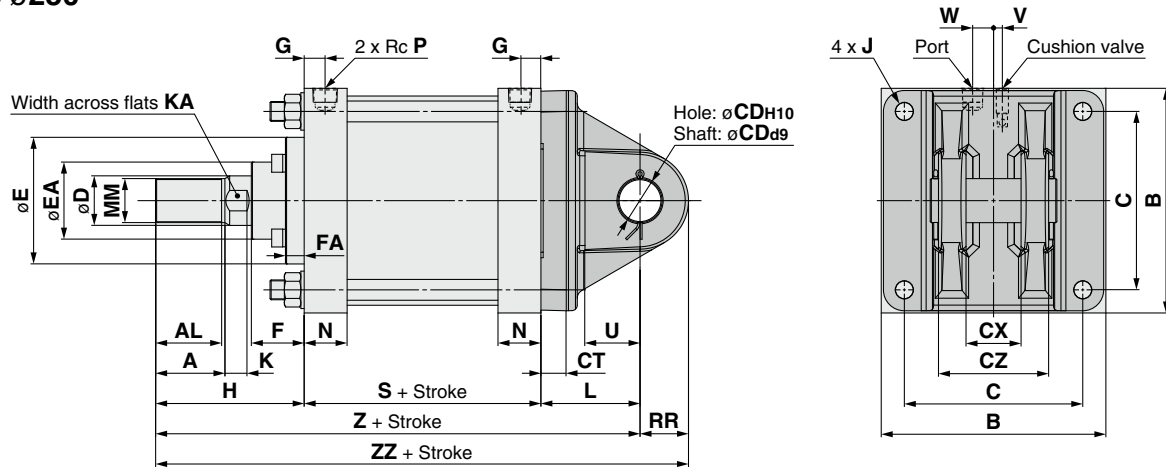
Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

CS2-V Series

Dimensions

Double clevis: CS2D-V

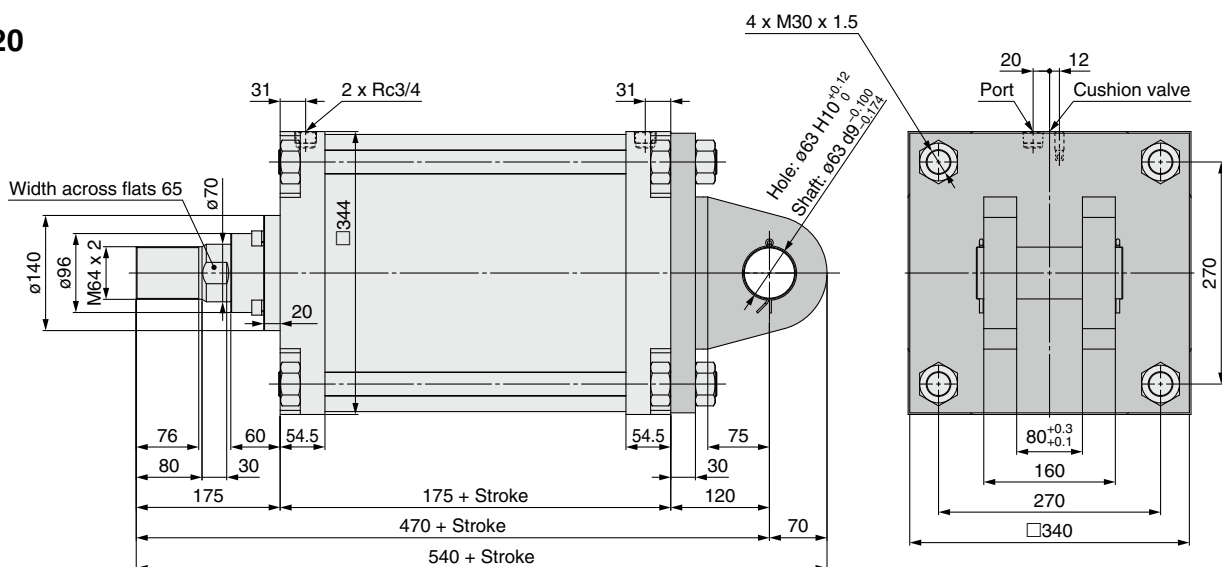
ø180 to ø250



Bore size	A	AL	B	C	CDH10	CDd9	CT	CX	CZ	D	E	EA	F	FA	G	H	J
ø180	63	60	204	162	40 ^{+0.100} ₀	40 ^{-0.080} _{-0.142}	23	50 ^{+0.3} _{+0.1}	100 ^{-0.1} _{-0.3}	45	115	70	48	17	19	135	M18 x 1.5
ø200	63	60	226	182	40 ^{+0.100} ₀	40 ^{-0.080} _{-0.142}	25	50 ^{+0.3} _{+0.1}	100 ^{-0.1} _{-0.3}	50	115	74	48	17	19	135	M20 x 1.5
ø250	71	67	277	225	50 ^{+0.100} ₀	50 ^{-0.080} _{-0.142}	30	63 ^{+0.3} _{+0.1}	126 ^{-0.1} _{-0.3}	60	140	86	60	20	23	160	M24 x 1.5

Bore size	K	KA	L	MM	N	P	RR	S	U	W	V	Z	ZZ
ø180	20	41	90	M40 x 1.5	39	1/2	44	115	50	19	8	340	384
ø200	20	46	90	M45 x 1.5	39	1/2	44	120	50	19	8	345	389
ø250	25	56	110	M56 x 2	49	3/4	55	141	65	22	10	411	466

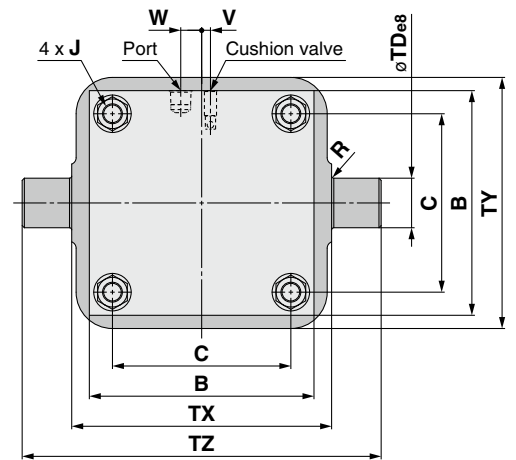
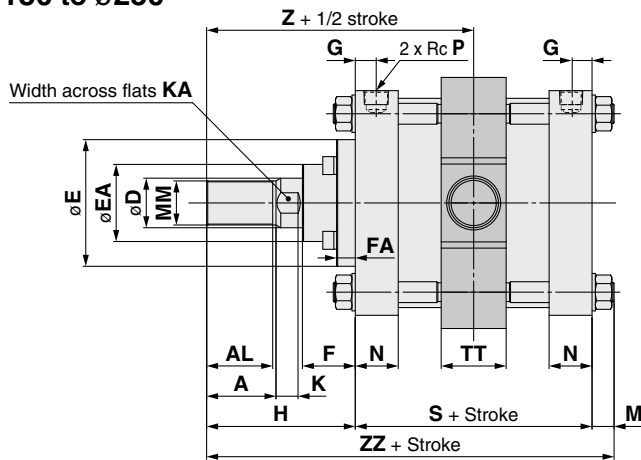
ø320



Dimensions

Center trunnion: CS2T-V

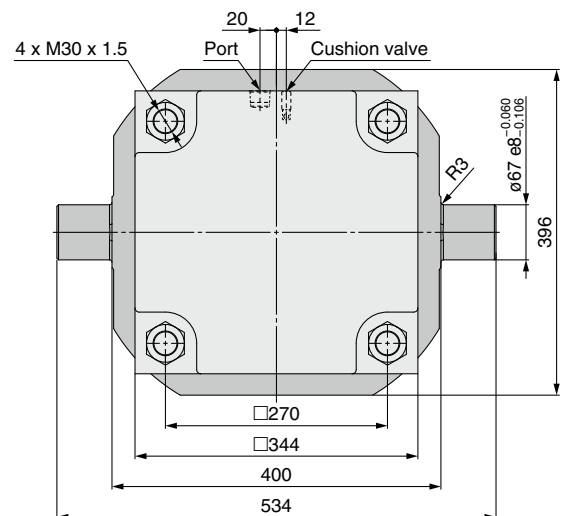
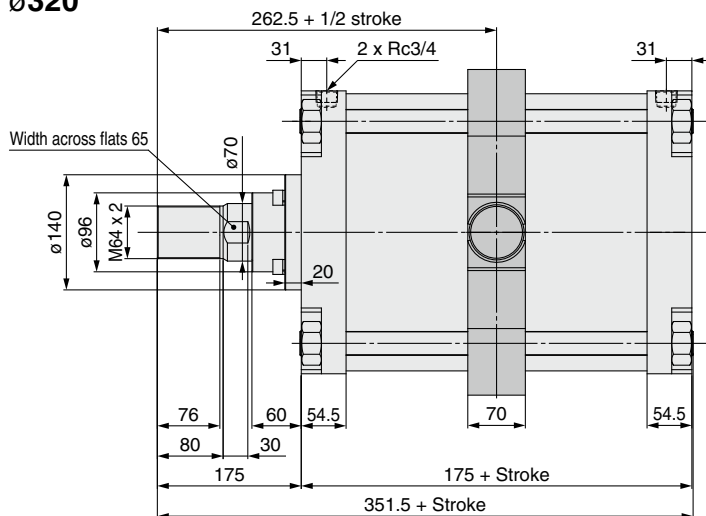
ø180 to ø250



Bore size	A	AL	B	C	D	E	EA	F	FA	G	H	J	K	KA	M	MM	N
ø180	63	60	204	162	45	115	70	48	17	19	135	M18 x 1.5	20	41	20	M40 x 1.5	39
ø200	63	60	226	182	50	115	74	48	17	19	135	M20 x 1.5	20	46	21	M45 x 1.5	39
ø250	71	67	277	225	60	140	86	60	20	23	160	M24 x 1.5	25	56	25	M56 x 2	49

Bore size	P	R	S	TD _{e8}	TT	TX	TY	TZ	W	V	Z	ZZ
ø180	1/2	2	115	45 ^{-0.050} _{-0.089}	59	236	228	326	19	8	192.5	270
ø200	1/2	2	120	45 ^{-0.050} _{-0.089}	59	265	257	355	19	8	195	276
ø250	3/4	3	141	56 ^{-0.060} _{-0.106}	69	335	325	447	22	10	230.5	326

ø320



Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

Air Cylinder: Axial Centralized Piping Type Double Acting, Single Rod

CS2 P Series

ø180, ø200, ø250



How to Order

CS2 L 180 P H - 300 -

With auto switch **CDS2 L 180 P H - 300** - **M9BW** -

With auto switch (Built-in magnet)

Mounting

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

Bore size

180	180 mm
200	200 mm
250	250 mm

Axial centralized piping type

Position of centralized piping

H	Head side axial direction
R	Rod side axial direction

Cylinder stroke [mm]
Refer to "Maximum Strokes" on page 52.

Number of auto switches

Nil	2
3	3
S	1
n	n

Auto switch

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

* For applicable auto switches, refer to the table below.

Suffix for cylinder

	Nil	None
Rod boot	J	Nylon tarpaulin
	K	Heat-resistant tarpaulin

* The minimum stroke with a rod boot is 30 mm. (35 mm for ø160 when the center trunnion type is selected)

Made to order
Refer to page 52 for details.

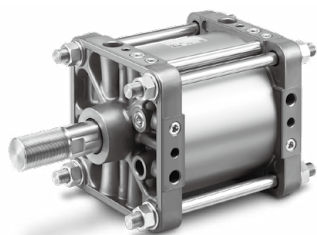
Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDS2B180PH-200

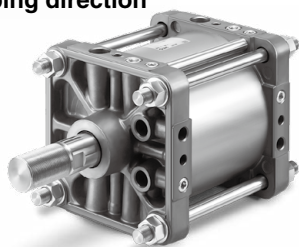
Applicable Auto Switches/Refer to the Web Catalog for further information on auto switches.

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		0.5 (Nil)	1 (M)	3 (L)	5 (Z)						
Solid state auto switch	Diagnostic indication (2-color indicator)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	M9N	●	●	●	○	○	IC circuit				
				3-wire (PNP)				●	●	●	○	○					
				2-wire	●	●		●	○	○	—						
				3-wire (NPN)	●	●		●	○	○							
	Water resistant (2-color indicator)			3-wire (PNP)	24 V	5 V, 12 V		M9NW	●	●	●	○		○	IC circuit		
				2-wire				M9PW	●	●	●	○		○			
	With diagnostic output (2-color indicator)			3-wire (NPN)	24 V	5 V, 12 V		M9BW	●	●	●	○		○	—		
				3-wire (PNP)				M9NA*1	○	○	●	○		○			
	Magnetic field resistant (2-color indicator)			2-wire	24 V	12 V		M9PA*1	○	○	●	○		○	IC circuit		
				4-wire (NPN)				M9BA*1	○	○	●	○		○			
		2-wire (Non-polar)	—	5 V, 12 V	—	5 V	F59F	●	—	●	○	○	IC circuit				
				—			P3DWA*2	●	—	●	●	○		○			
Reed auto switch	Diagnostic indication (2-color indicator)	Grommet	Yes	3-wire (NPN equivalent)	24 V	12 V	A96	●	—	●	—	—	IC circuit	—			
				No				5 V, 12 V	100 V	A93	●	●			●	●	—
										A90	●	—			●	—	—
				Yes				12 V	100 V, 200 V	A54	●	—			●	●	—
										A64	●	—			●	—	—
				No				—	—	—	A59W	●			—	●	—

*1 Water-resistant type auto switches can be mounted on the above models, but SMC cannot guarantee water resistance. Please contact SMC regarding water-resistant types with the above model numbers.
*2 The D-P3DWA, A54, A64, and A59W are not applicable to bore size ø250.
* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW 3 m..... L (Example) M9NWL
1 m..... M (Example) M9NWM 5 m..... Z (Example) M9NWX
* Solid state auto switches marked with a "○" are produced upon receipt of order.
* Since there are applicable auto switches other than those listed above, refer to page 63 for details.
* D-A9□/M9□/M9□W/M9□A/P3DWA□ auto switches are shipped together with the product but do not come assembled. (Only the auto switch mounting brackets are assembled before shipment.)



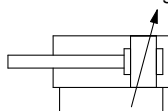
Head side piping direction



Rod side piping direction

Symbol

Double acting, Air cushion



Made to Order Common Specifications
 (For details, refer to pages 65 to 75.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length

* Refer to page 5 for details on whether or not to use a made-to-order product with the above common specifications.

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat-resistant tarpaulin	110°C*1

*1 Max. ambient temperature for rod boot itself

Refer to pages 59 to 63 for cylinders with auto switches.

- Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height
- Minimum Stroke for Auto Switch Mounting
- Operating Range
- Auto Switch Mounting Brackets/Part Nos.

Specifications

Bore size [mm]		180	200	250
Action		Double acting, Single rod		
Fluid		Air		
Proof pressure		1.2 MPa		
Max. operating pressure		0.7 MPa		
Min. operating pressure		0.05 MPa		
Piston speed		50 to 300 mm/s		
Cushion		Air cushion + Bumper cushion		
Ambient and fluid temperatures	Without auto switch	0 to 70°C (No freezing)		
	With auto switch	0 to 60°C (No freezing)		
Lubrication		Not required (Non-lube)		
Stroke length tolerance [mm]	250 or less	+2.0 0		
	251 to 1000	+2.4 0		
	1001 to 1200	+2.8 0		
Mounting		Basic, Foot, Rod flange, Head flange, Single clevis, Double clevis, Center trunnion		
Allowable kinetic energy (When air cushion is activated)		78.4 J	98 J	147 J

Maximum Strokes

* When using with auto switches, refer to the "Minimum Stroke for Auto Switch Mounting" table on page 61.

Bore size	Mounting bracket	Maximum stroke [mm]	
		Basic, Foot, Rod flange, Head flange, Single clevis, Double clevis, Center trunnion	
180		1200 or less	
200		998 or less	
250		813 or less	

* Bore sizes ø200 and ø250 with strokes which exceed the above-mentioned strokes (up to 1200 mm) are available as a special product. **However, this excludes class 2 pressure vessels which are to be used or installed in Japan.**

Accessories

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

* If using the rod end nut with a single knuckle joint or a double knuckle joint, use the type with a rod end bracket (-XC86) or order the accessory separately. For part numbers and dimensions of accessories, refer to page 26.

Mounting Bracket Part Nos.

Bore size [mm]	180	200	250
Foot*1	CS2-L18	CS2-L20	CS2-L25
Flange	CS2-F18	CS2-F20	CS2-F25
Single clevis	CS2-C18	CS2-C20	CS2-C25
Double clevis*2	CS2-D18	CS2-D20	CS2-D25

*1 When ordering foot brackets, order two pieces per cylinder.

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

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

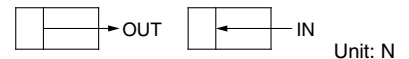
Weight (Guide)

Bore size [mm]		180	200	250
Basic weight	Basic	11.0	15.0	25.9
	Foot	15.7	20.5	36.8
	Rod flange	20.6	26.8	47.7
	Head flange	20.6	26.8	47.7
	Single clevis	19.3	25.0	44.2
	Double clevis	21.0	26.8	47.3
	Trunnion	21.7	29.0	52.2
Additional weight with magnet (With built-in magnet and auto switch)		0.1	0.2	0.2
Additional weight per 100 mm of stroke		2.5	3.0	5.2
Accessories	Single knuckle	3.1	2.9	5.4
	Double knuckle (Knuckle pin, Split pin)	4.8	4.6	9.3
	Rod end nut	0.4	0.9	1.3

Calculation: (Example) **CS2L180PH-500**

- Basic weight 15.7 [kg]
 - Additional weight ... 2.5 [kg/100 mm]
 - Cylinder stroke 500 [mm]
- $15.7 + 2.5 \times 500/100 = 28.2$ [kg]

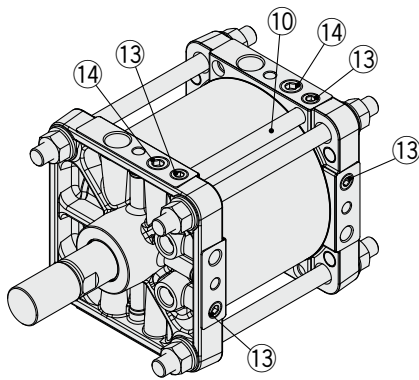
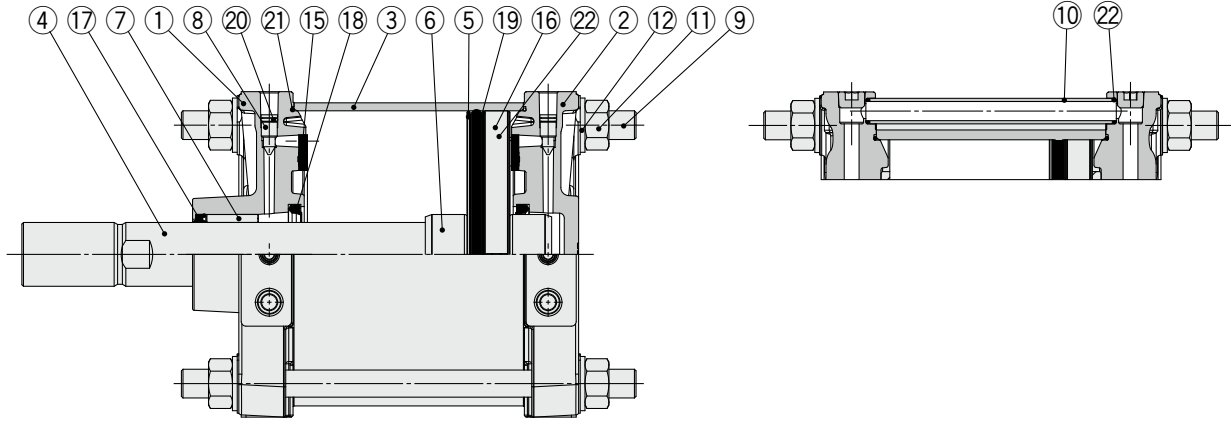
Theoretical Output



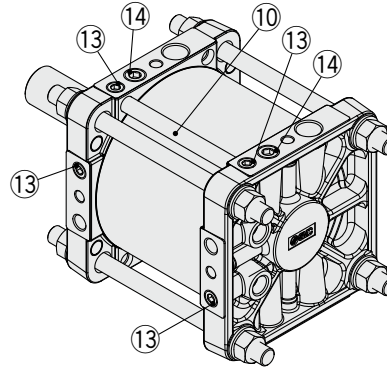
Bore size [mm]	Rod size [mm]	Operating direction	Piston area [mm ²]	Operating pressure [MPa]					
				0.2	0.3	0.4	0.5	0.6	0.7
180	40	OUT	25400	5080	7620	10200	12700	15200	17800
		IN	24200	4840	7260	9680	12100	14520	16940
200	45	OUT	31400	6280	9420	12600	15700	18800	22000
		IN	29800	5960	8940	11930	14910	17890	20870
250	56	OUT	49100	9820	14700	19600	24600	29500	34400
		IN	46600	9320	13980	18640	23310	27970	32630

Construction

ø180 to ø250



Rod side axial direction



Head side axial direction

Component Parts

No.	Description	Material	Qty.	Note
1	Rod cover	Aluminum die-cast	1	
2	Head cover	Aluminum die-cast	1	
3	Cylinder tube	Aluminum alloy	1	
4	Piston rod	Carbon steel	1	
5	Piston	Aluminum alloy	1	
6	Cushion ring	Stainless steel	2	ø180
		Rolled steel	2	ø200, ø250
7	Bushing	Bearing alloy	1	
8	Cushion valve	Brass	2	
9	Tie-rod	Carbon steel	4	
10	Pipe	Aluminum alloy	1	
11	Tie-rod nut	Rolled steel	8	
12	Flat washer	Rolled steel	8	
13	Hexagon socket head plug	Rolled steel	4	
14	Hexagon socket head plug	Rolled steel	4	
15	Bumper	Urethane	2	
16	Wear ring	Resin	1	
17	Rod seal	NBR	1	

Component Parts

No.	Description	Material	Qty.	Note
18	Cushion seal	Urethane	2	ø180, ø200
		NBR	2	ø250
19	Piston seal	NBR	1	
20	Cushion valve seal	NBR	2	
21	Cylinder tube gasket	NBR	2	
22	Pipe gasket	NBR	2	
23	Magnet	—	1	

Replacement Parts/Seal Kit

Bore size [mm]	Kit no.	Contents
180	CS2P180A-PS	Set of nos.
200	CS2P200A-PS	18, 19, 21, 22
250	CS2P250A-PS	Set of nos. 19, 21, 22

* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.

Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

* Do not remove the rod seal because it is a non-replaceable part.

* Refer to page 76 for precautions when replacing the seal.

* Please contact SMC to order the common made-to-order specification -XA□ (Change of rod end shape), in which the rod seal is replaceable.

Standard Double Acting, Single Rod **CS2**
Double Acting, Double Rod **CS2W**
Long Stroke Double Acting, Single Rod **CS2-V**
Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch

Made to Order

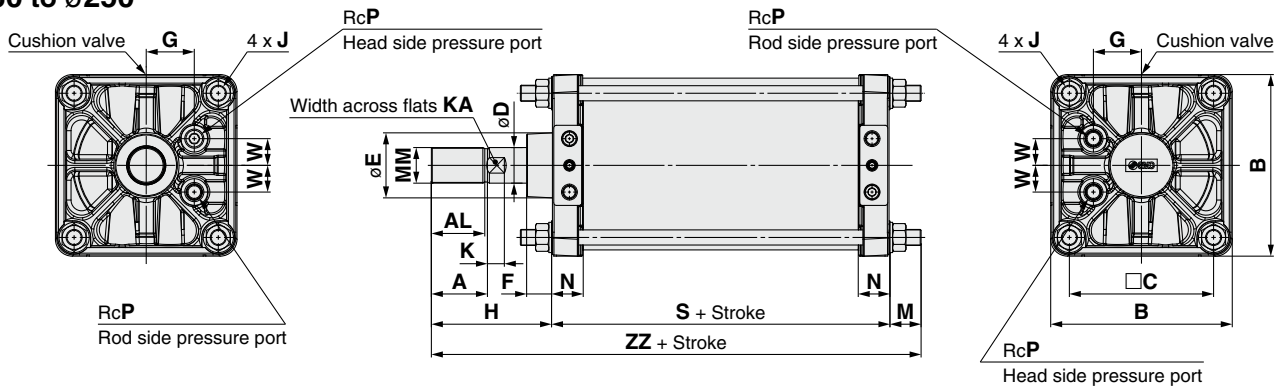
CS2□P Series

The accessory bracket and rod boot mounting dimensions are the same as those of the standard type. For details, refer to pages 12 to 26.

Dimensions

Basic: CS2B□P

∅180 to ∅250



Rod side axial direction

Head side axial direction

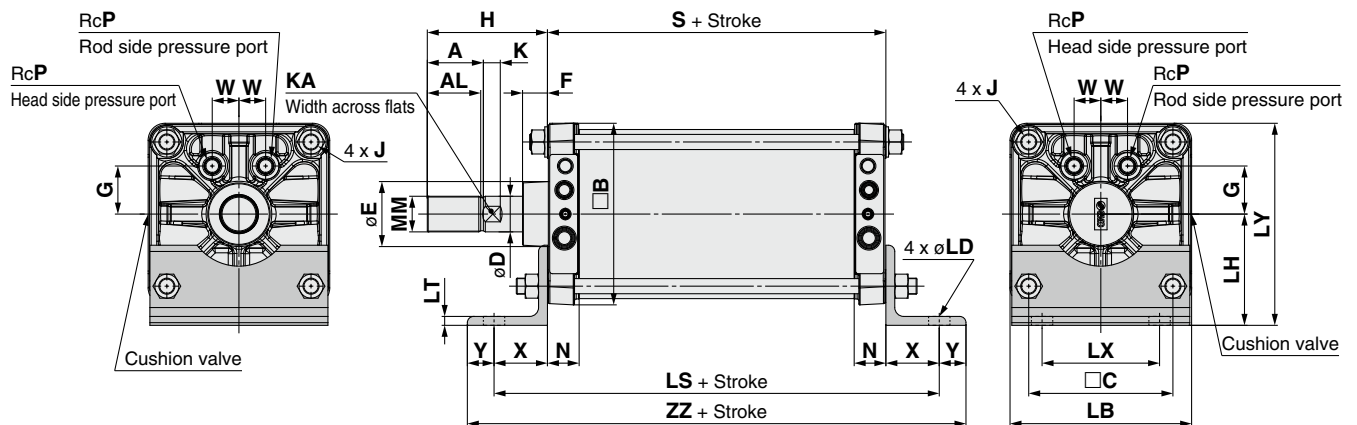
Bore size	Stroke range	A	AL	B	C	D	E	F	G	H	J	K	KA	M	MM	N
180	Up to 1200	63	60	204	162	40	73	28	54	135	M18 x 1.5	17	36	35	M40 x 1.5	35.6
200	Up to 998	63	60	226	182	45	78.5	32	60	135	M20 x 1.5	20	41	35	M45 x 1.5	35.6
250	Up to 813	71	67	277	225	56	91	41	78	160	M24 x 1.5	22	50	41.5	M56 x 2	45.6

[mm]

Bore size	P	S	W	ZZ
180	1/2	115	30	285
200	1/2	120	30	290
250	3/4	141	45	342.5

Foot: CS2L□P

∅180 to ∅250



Rod side axial direction

Head side axial direction

Bore size	Stroke range	A	AL	B	C	D	E	F	G	H	J	K	KA	LB	LD	LH	LS	LT
180	Up to 1200	63	60	204	162	40	73	28	54	135	M18 x 1.5	17	36	200	24	125	235	10
200	Up to 998	63	60	226	182	45	78.5	32	60	135	M20 x 1.5	20	41	225	24	132	240	10
250	Up to 813	71	67	277	225	56	91	43	78	160	M24 x 1.5	22	50	275	29	160	301	12

[mm]

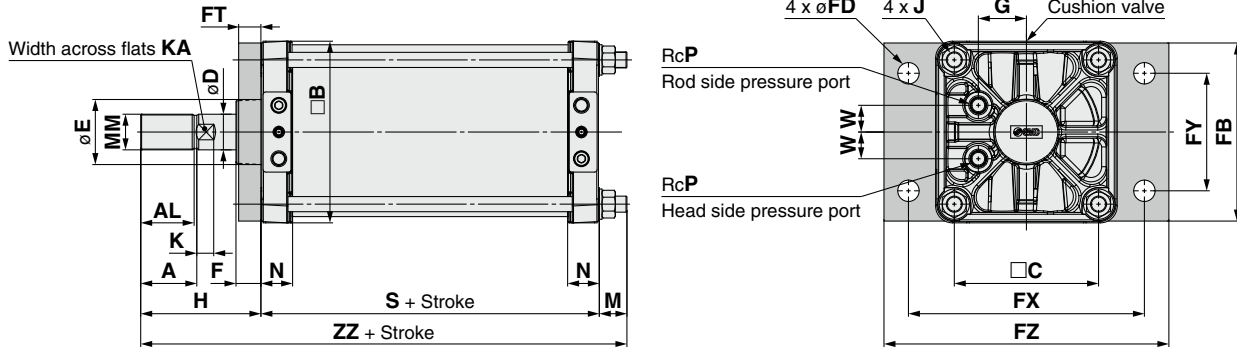
Bore size	LX	LY	MM	N	P	S	W	X	Y	ZZ
180	132	227	M40 x 1.5	35.6	1/2	115	30	60	30	340
200	150	245	M45 x 1.5	35.6	1/2	120	30	60	30	345
250	180	298.5	M56 x 2	45.6	3/4	141	45	80	40	421

Dimensions

The accessory bracket and rod boot mounting dimensions are the same as those of the standard type. For details, refer to pages 12 to 26.

Rod flange: CS2F□P

∅180 to ∅250

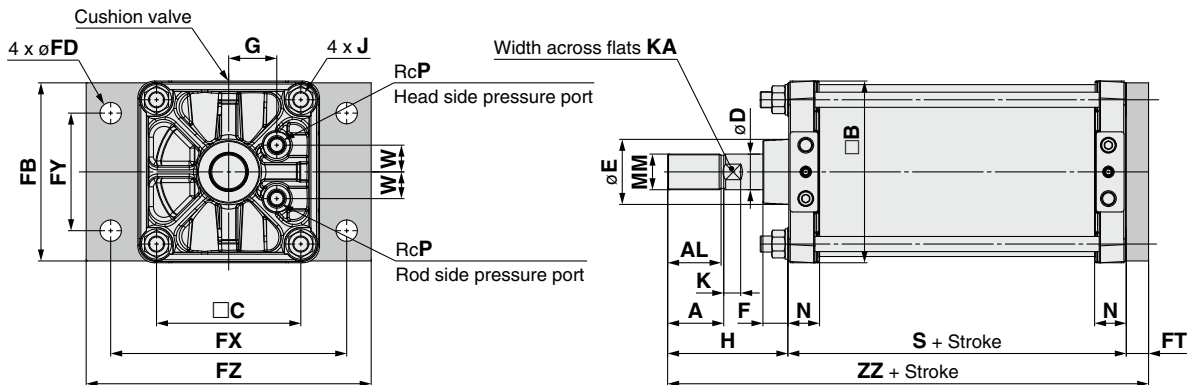


Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	H	J	K
180	Up to 1200	63	60	204	162	40	73	28	200	24	25	265	132	320	54	135	M18 x 1.5	17
200	Up to 998	63	60	226	182	45	78.5	32	225	24	25	280	150	335	60	135	M20 x 1.5	20
250	Up to 813	71	67	277	225	56	91	41	275	29	30	355	180	420	78	160	M24 x 1.5	22

Bore size	KA	M	MM	N	P	S	W	ZZ
180	36	31	M40 x 1.5	35.6	1/2	115	30	281
200	41	31	M45 x 1.5	35.6	1/2	120	30	286
250	50	35	M56 x 2	45.6	3/4	141	45	336

Head flange: CS2G□P

∅180 to ∅250



Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	H	J	K
180	Up to 1200	63	60	204	162	40	73	28	200	24	25	265	132	320	54	135	M18 x 1.5	17
200	Up to 998	63	60	226	182	45	78.5	32	225	24	25	280	150	335	60	135	M20 x 1.5	20
250	Up to 813	71	67	277	225	56	91	43	275	29	30	355	180	420	78	160	M24 x 1.5	22

Bore size	KA	MM	N	P	S	W	ZZ
180	36	M40 x 1.5	35.6	1/2	115	30	275
200	41	M45 x 1.5	35.6	1/2	120	30	280
250	50	M56 x 2	45.6	3/4	141	45	331

Standard Double Acting, Single Rod **CS2**
Double Acting, Double Rod **CS2W**
Long Stroke Double Acting, Single Rod **CS2-V**
Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch
Made to Order

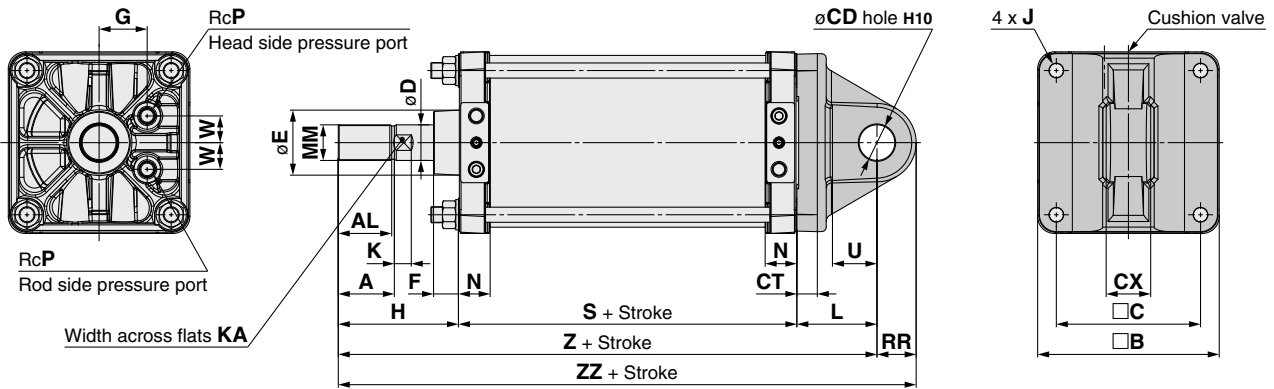
CS2□P Series

The accessory bracket and rod boot mounting dimensions are the same as those of the standard type. For details, refer to pages 12 to 26.

Dimensions

Single clevis: CS2C□P

ø180 to ø250

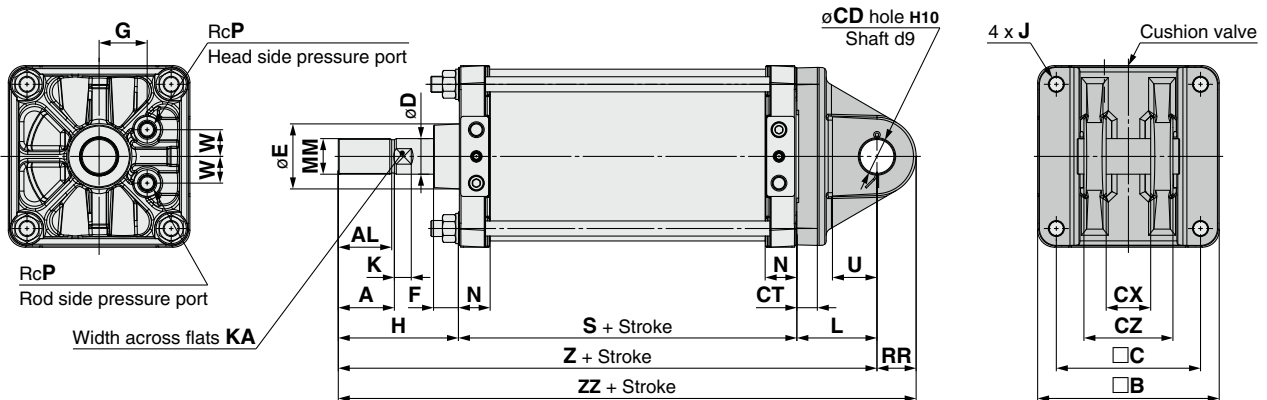


Bore size	Stroke range	A	AL	B	C	CDH10	CT	CX	D	E	F	G	H	J	K	KA	L
180	Up to 1200	63	60	204	162	40 ^{+0.100} ₀	23	50 ^{-0.1} _{-0.3}	40	73	28	54	135	M18 x 1.5	17	36	90
200	Up to 998	63	60	226	182	40 ^{+0.100} ₀	25	50 ^{-0.1} _{-0.3}	45	78.5	32	60	135	M20 x 1.5	20	41	90
250	Up to 813	71	67	277	225	50 ^{+0.100} ₀	30	63 ^{-0.1} _{-0.3}	56	91	41	78	160	M24 x 1.5	22	50	110

Bore size	MM	N	P	RR	S	U	W	Z	ZZ
180	M40 x 1.5	35.6	1/2	44	115	50	30	340	384
200	M45 x 1.5	35.6	1/2	44	120	50	30	345	389
250	M56 x 2	45.6	3/4	55	141	65	45	411	466

Double clevis: CS2D□P

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	CDH10	CT	CX	CZ	D	E	F	G	H	J	K	KA	L
180	Up to 1200	63	60	204	162	40 ^{+0.100} ₀	23	50 ^{+0.3} _{+0.1}	100 ^{-0.1} _{-0.3}	40	73	28	54	135	M18 x 1.5	17	36	90
200	Up to 998	63	60	226	182	40 ^{+0.100} ₀	25	50 ^{+0.3} _{+0.1}	100 ^{-0.1} _{-0.3}	45	78.5	32	60	135	M20 x 1.5	20	41	90
250	Up to 813	71	67	277	225	50 ^{+0.100} ₀	30	63 ^{+0.3} _{+0.1}	126 ^{-0.1} _{-0.3}	56	91	43	78	160	M24 x 1.5	22	50	110

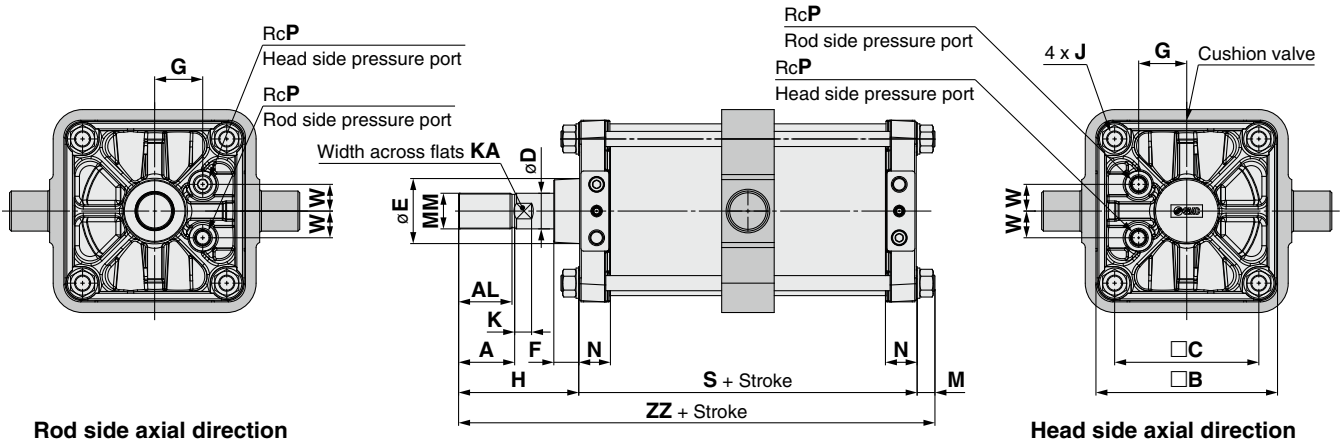
Bore size	MM	N	P	RR	S	U	W	Z	ZZ
180	M40 x 1.5	35.6	1/2	44	115	50	30	340	384
200	M45 x 1.5	35.6	1/2	44	120	50	30	345	389
250	M56 x 2	45.6	3/4	55	141	65	45	411	466

Dimensions

The accessory bracket and rod boot mounting dimensions are the same as those of the standard type. For details, refer to pages 12 to 26.

Center trunnion: CS2T□P

ø180 to ø250



Bore size	Stroke range	A	AL	B	C	D	E	F	G	H	J	K	KA	M	MM	N	P
180	25 to 1200	63	60	204	162	40	73	28	54	135	M18 x 1.5	17	36	20	M40 x 1.5	35.6	1/2
200	25 to 998	63	60	226	182	45	78.5	32	60	135	M20 x 1.5	20	41	21	M45 x 1.5	35.6	1/2
250	25 to 813	71	67	277	225	56	91	43	78	160	M24 x 1.5	22	50	25	M56 x 2	45.6	3/4

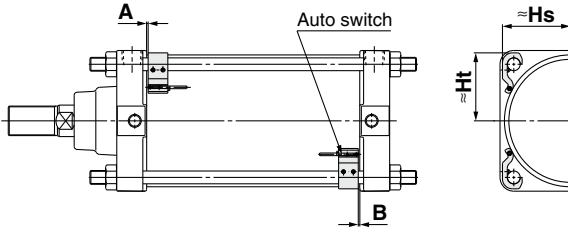
Bore size	R	S	TDe8	TT	TX	TY	TZ	W	Z	ZZ
180	2	115	45 ^{-0.050} _{-0.089}	59	236	228	326	30	192.5	270
200	2	120	45 ^{-0.050} _{-0.089}	59	265	257	355	30	195	276
250	3	141	56 ^{-0.060} _{-0.106}	69	335	325	447	45	230.5	326

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

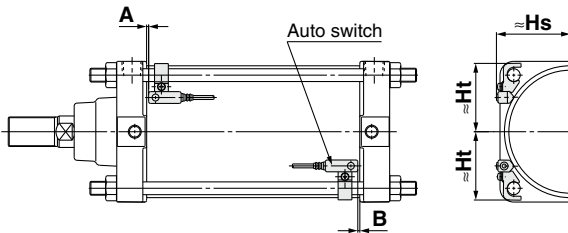
Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height

<Tie-rod mounting>

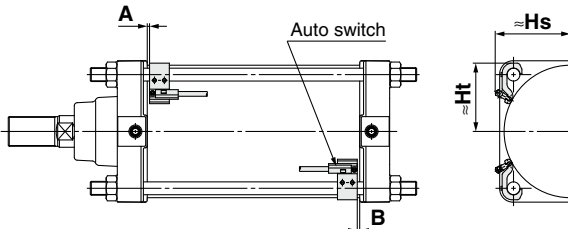
D-M9□/M9□V **D-Z7□/Z80**
D-M9□W/M9□WV **D-Y59□/Y69□/Y7P/Y7PV**
D-M9□A/M9□AV **D-Y7□W/Y7□WV**
D-A9□/A9□V **D-Y7BA**



D-F5□/J59/D-F5NT **D-F5□W/J59□W**
D-F5BAL/F59F **D-A5□/A6□**

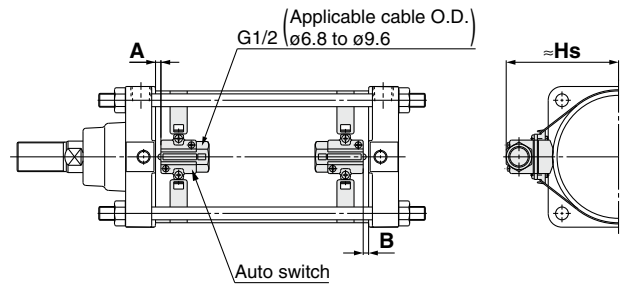


D-P3DWA

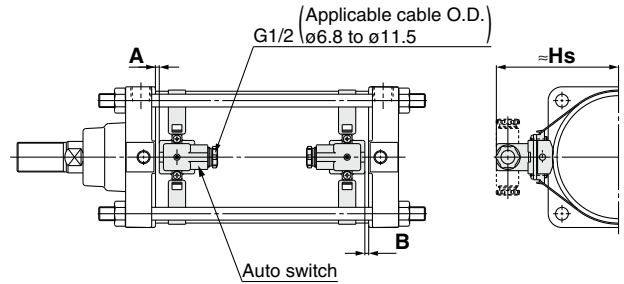


<Band mounting>

D-G3/K3
D-A3□



D-A44



* The indicator light faces the inside.

Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height

Applicable Cylinder: CDS2, CDS2W (Double rod), CDS2□P (Axial centralized piping) [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-Y5□/Y6□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BA D-Z7□/Z80		D-G39 D-K39 D-A3□ D-A44		D-A5□ D-A6□		D-A59W		D-F5□ D-F5□W D-J59 D-J59W D-F5BA D-F59F		D-F5NT		D-P3DWA	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
125	13	12	9	8	6.5	5.5	3	2	3	2	7	6	9.5	8.5	14.5	13.5	8.5	7.5
140	13	12	9	8	6.5	5.5	3	2	3	2	7	6	9.5	8.5	14.5	13.5	8.5	7.5
160	13	12	9	8	6.5	5.5	3	2	3	2	7	6	9.5	8.5	14.5	13.5	8.5	7.5
180	21	11	17	7	—	—	—	—	11	1	15	5	17.5	7.5	22.5	12.5	16.5	6.5
200	23.5	13.5	19.5	9.5	—	—	—	—	13.5	3.5	17.5	7.5	20	10	25	15	19	9
250	24	14	20	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—
320	32	22	28	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—

* Provided as guidelines for auto switch proper mounting position (detection at stroke end)
Adjust the auto switch after confirming the operating conditions in the actual setting.

Applicable Cylinder: CDS2-V (Long stroke) [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	
	A	B	A	B
180	12.5	12.5	8.5	8.5
200	15	15	11	11
250	21.5	9.5	17.5	5.5
320	42.5	11.5	38.5	7.5

* Provided as guidelines for auto switch proper mounting position (detection at stroke end)
Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

Applicable Cylinder: CDS2, CDS2W (Double rod), CDS2□P (Axial centralized piping) [mm]

Auto switch model	D-M9□ D-M9□W D-M9□A D-A9□		D-M9□V D-M9□WV D-M9□AV D-A9□V		D-Y5□/Y6□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BA D-Z7□/Z80		D-G39 D-K39 D-A3□		D-A44		D-A5□ D-A6□ D-A59W		D-F5□ D-F5□W D-J59 D-J59W D-F5BA D-F59F D-F5NT		D-P3DWA	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Hs	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
125	69	69.5	71.5	69.5	69	69.5	116	126	75.5	69.5	74.5	70	76	69.5	—	
140	76	76	77.5	76	76	76	124	134	81	76.5	80	76.5	82	76	—	
160	85	85	86	85	85	85	134.5	144.5	89	87.5	88	87.5	91	85	—	
180	95	95	95.5	95	—	—	—	—	97	97.5	96	97.5	100	95	—	
200	106	106	106	106	—	—	—	—	107	108	107	108	111	106	—	
250	130.5	131.5	130.5	131.5	—	—	—	—	—	—	—	—	—	—	—	
320	160	156.5	160	156.5	—	—	—	—	—	—	—	—	—	—	—	

Applicable Cylinder: CDS2-V (Long stroke) [mm]

Auto switch model	D-M9□ D-M9□W D-M9□A D-A9□		D-M9□V D-M9□WV D-M9□AV D-A9□V	
	Hs	Ht	Hs	Ht
180	95	95	95.5	95
200	106	106	106	106
250	130.5	131.5	130.5	131.5
320	160	156.5	160	156.5

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

Minimum Stroke for Auto Switch Mounting

Applicable Cylinder: CDS2, CDS2W (Double rod), CDS2□P (Axial centralized piping) n: Number of auto switches [mm]

Auto switch model	Number of auto switches	Brackets other than center trunnion	Center trunnion						
			125	140	160	180	200	250	320
D-M9□ D-M9□W	2 (Different surfaces, same surface), 1	15	105	110	115	115		125	135
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$125 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$135 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-M9□V D-M9□WV	2 (Different surfaces, same surface), 1	10	80	85	90	100		110	110
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$80 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$100 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$100 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$110 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-M9□A	2 (Different surfaces, same surface), 1	20	115	120		120		130	140
	n	$20 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$120 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$120 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$130 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$140 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-M9□AV	2 (Different surfaces, same surface), 1	15	90	95		105		115	115
	n	$15 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$95 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$105 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$115 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$115 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-A9□	2 (Different surfaces, same surface), 1	15	100	105	110	110		120	130
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$100 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$120 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$130 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-A9□V	2 (Different surfaces, same surface), 1	10	75	80	85	95		105	105
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$75 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$80 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$95 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$105 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$105 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-F5□/J59 D-F5□W D-J59W D-F5BA D-F59F D-A5□/A6□ D-A59W	2 (Different surfaces, same surface), 1	25	125	135		150		—	
	n (Same surface)	$25 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$125 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$135 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$150 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		—	
D-F5NT	2 (Different surfaces, same surface), 1	35	145	155		165		—	
	n (Same surface)	$35 + 55 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$145 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$155 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$165 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		—	
D-G39 D-K39 D-A3□	2	Different surfaces Same surface	35 100	110				—	
	n	Different surfaces	$35 + 30(n-2)$ (n = 2, 3, 4, 5...)	$110 + 30(n-2)$ (n = 2, 4, 6, 8...)*1				—	
		Same surface	$100 + 100(n-2)$ (n = 2, 3, 4, 5...)	$110 + 100(n-2)$ (n = 2, 4, 6, 8...)*1				—	
	1		15	110				—	
D-A44	2	Different surfaces Same surface	35 55	110				—	
	n	Different surfaces	$35 + 30(n-2)$ (n = 2, 3, 4, 5...)	$110 + 30(n-2)$ (n = 2, 4, 6, 8...)*1				—	
		Same surface	$55 + 55(n-2)$ (n = 2, 3, 4, 5...)	$110 + 50(n-2)$ (n = 2, 4, 6, 8...)*1				—	
	1		15	110				—	
D-Y59□ D-Y7P D-Y7□W D-Z7□ D-Z80	2 (Different surfaces, same surface), 1	15	105	110	115	—		—	
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$105 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	—		—	
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, same surface), 1	10	90	95	100	—		—	
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$95 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$100 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	—		—	
D-Y7BA	2 (Different surfaces, same surface), 1	20	115	120	125	—		—	
	n	$20 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$115 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$120 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$125 + 45 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	—		—	
D-P3DWA	2 (Different surfaces, same surface), 1	20	105	110	115	125		—	
	n	$20 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$105 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$110 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$115 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$125 + 50 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		—	

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

Minimum Stroke for Auto Switch Mounting

Applicable Cylinder: CDS2-V (Long stroke)

n: Number of auto switches [mm]

Auto switch model	Number of auto switches	Brackets other than center trunnion	Center trunnion			
			180	200	250	320
D-M9□ D-M9□W	2 (Different surfaces, same surface), 1	15	115		135	155
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$135 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$155 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-M9□V D-M9□WV	2 (Different surfaces, same surface), 1	10	90		110	130
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$90 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$110 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$130 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-M9□A	2 (Different surfaces, same surface), 1	20	115		140	160
	n	$20 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$115 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$140 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$160 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-M9□AV	2 (Different surfaces, same surface), 1	15	95		115	135
	n	$15 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$95 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$115 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$135 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-A9□	2 (Different surfaces, same surface), 1	15	110		130	150
	n	$15 + 40 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$110 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$130 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$150 + 40 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2
D-A9□V	2 (Different surfaces, same surface), 1	10	85		105	125
	n	$10 + 30 \frac{(n-2)}{2}$ (n = 2, 4, 6, 8...)*1	$85 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2		$105 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	$125 + 30 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2

*1 When "n" is an odd number, an even number that is one larger than the odd number is to be used for the calculation.

*2 When "n" is an odd number, a multiple of 4 that is larger than the odd number is to be used for the calculation.

Operating Range

Applicable Cylinder: CDS2, CDS2W (Double rod), CDS2□P (Axial centralized piping) [mm]

Auto switch model	Bore size						
	125	140	160	180	200	250	320
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	6	6.5	6.5	7.5	8.5	9	9
D-A9□/A9□V	12	12.5	11.5	11	16.5	15	13
D-Z7□/Z80	14	14.5	13	—	—	—	—
D-A3□/A44	10	10	10	—	—	—	—
D-A5□/A6□	10	10	10	13	16.5	—	—
D-A59W	17	17	17	17	22	—	—
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA	12	13	7	—	—	—	—
D-F5□/J59/F5□W D-J59W/F5BA D-F5NT/F59F	5	5	5.5	5.5	6	—	—
D-G39/K39	11	11	10	—	—	—	—
D-P3DWA	7	7	7	7.5	8.5	—	—

* Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.

Applicable Cylinder: CDS2-V (Long stroke) [mm]

Auto switch model	Bore size			
	180	200	250	320
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	7.5	8.5	9	9
D-A9□/A9□V	11	16.5	15	13
D-Z7□/Z80	—	—	—	—
D-A3□/A44	—	—	—	—
D-A5□/A6□	—	—	—	—
D-A59W	—	—	—	—
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA	—	—	—	—
D-F5□/J59/F5□W D-J59W/F5BA D-F5NT/F59F	—	—	—	—
D-G39/K39	—	—	—	—
D-P3DWA	—	—	—	—

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**

Auto Switch
 Made to Order

Auto Switch Mounting Brackets/Part Nos.

Auto switch model	Bore size [mm]						
	125	140	160	180	200	250	320
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	BS5-250	BS5-320
D-F5□/J59 D-F5NT D-F5□W/J59W D-F5BAL/F59F D-A5□/A6□ D-A59W	BT-12	BT-12	BT-16	BT-18A	BT-20	—	—
D-G39/K39 D-A3□/A44	BS1-125	BS1-140	BS1-160	—	—	—	—
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA D-Z7□/Z80	BS4-125	BS4-125	BS4-160	—	—	—	—
D-P3DWA	BS7-125S	BS7-125S	BS7-160S	BS7-180S	BS7-200S	—	—

[Stainless Steel Mounting Screw]

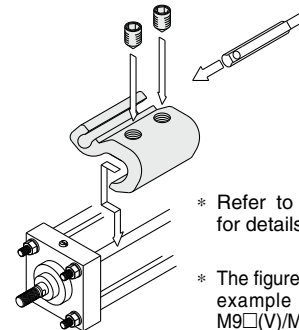
The following stainless steel mounting screw kit (including set screws) is available. Use it in accordance with the operating environment. (Since the auto switch mounting bracket is not included, order it separately.)

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

The above stainless steel screws are used when a cylinder is shipped with the D-F5BA auto switch. When only one auto switch is shipped independently, the BBA1 is attached.

* When using the D-M9□A/M9□AV or Y7BA, do not use the steel set screws which are included with the auto switch mounting brackets on the left (BS5-□□□, BS4-□□□).

Order a stainless steel screw kit (BBA1) separately, and use the M4 x 8 L stainless steel set screws included in the BBA1.



* Refer to the **Web Catalog** for details on the BBA1.

* The figure shows the mounting example for the D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V)

Other than the applicable auto switches listed in "How to Order," the following auto switches are also mountable. Refer to the **Web Catalog** for the detailed specifications.

Type	Model	Electrical entry	Features
Solid state	D-F59, F5P, J59	Grommet (In-line)	—
	D-Y59A, Y59B, Y7P		2-color indicator
	D-F59W, F5PW, J59W		Water-resistant (2-color indicator)
	D-Y7NW, Y7PW, Y7BW		With timer
	D-F5BA, Y7BA	Grommet (Perpendicular)	—
	D-F5NT		2-color indicator
	D-M9NV, M9PV, M9BV		Water-resistant (2-color indicator)
Reed	D-Y69A, Y69B, Y7PV	Grommet (Perpendicular)	Without indicator light
	D-M9NWV, M9PWV, M9BWV		—
	D-Y7NWV, Y7PWV, Y7BWV	Grommet (In-line)	Without indicator light
	D-M9NAV, M9PAV, M9BAV		Without indicator light
	D-A90V		—
	D-A93V, A96V		—
	D-Z73, Z76	Grommet (In-line)	Without indicator light
D-A53, A56	Without indicator light		
D-A67	Without indicator light		
D-Z80			

* With pre-wired connector is also available for solid state switches. For details, refer to the **Web Catalog**.

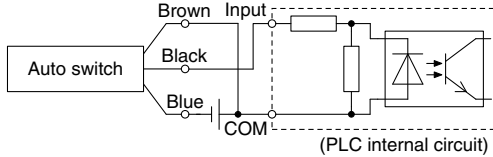
* Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)/D-Y7G/Y7H) are also available. For details, refer to the **Web Catalog**.

Prior to Use

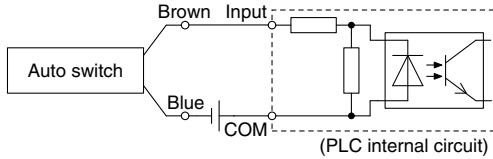
Auto Switch Connections and Examples

Sink Input Specifications

3-wire, NPN

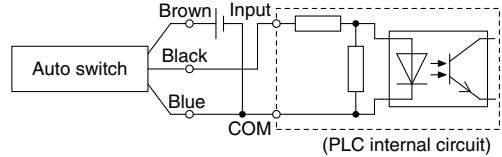


2-wire

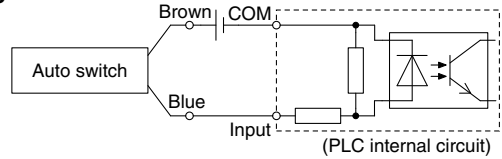


Source Input Specifications

3-wire, PNP



2-wire

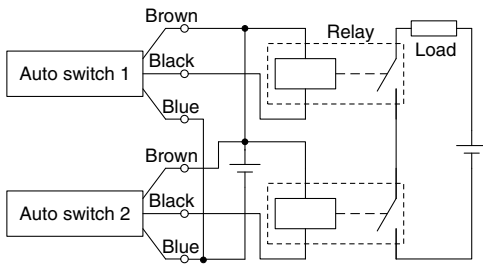


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

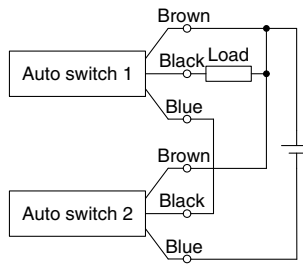
Examples of AND (Series) and OR (Parallel) Connections

* When using solid state auto switches, ensure the application is set up so the signals for the first 50 ms are invalid. Depending on the operating environment, the product may not operate properly.

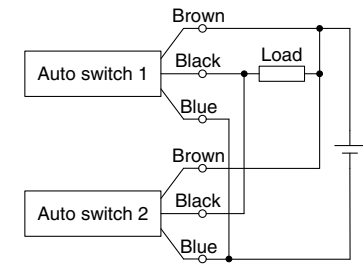
3-wire AND connection for NPN output (Using relays)



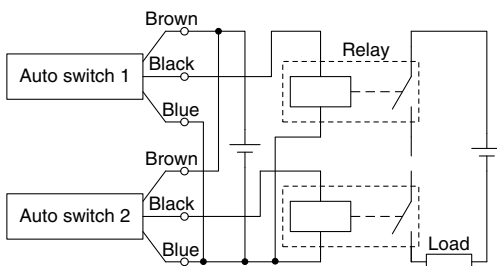
(Performed with auto switches only)



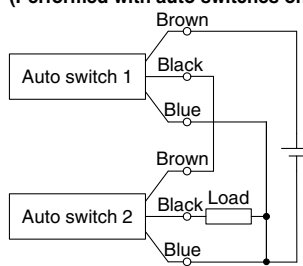
3-wire OR connection for NPN output



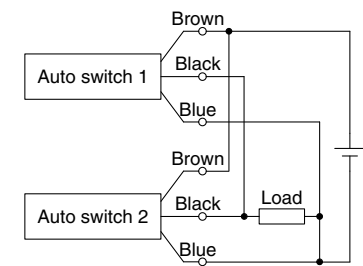
3-wire AND connection for PNP output (Using relays)



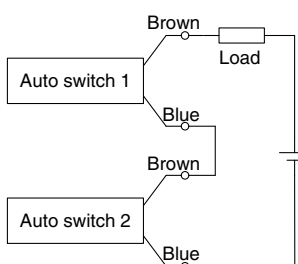
(Performed with auto switches only)



3-wire OR connection for PNP output



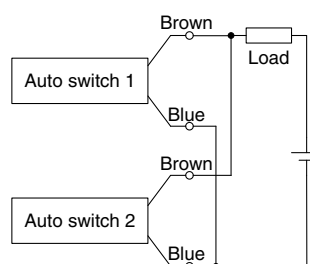
2-wire AND connection



When two auto switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up when both of the auto switches are in the ON state. Auto switches with a load voltage less than 20 V cannot be used. Please contact SMC if using AND connection for a heat-resistant solid state auto switch or a trimmer switch.

Example) Load voltage at ON
 Power supply voltage: 24 VDC
 Internal voltage drop: 4 V
 Load voltage at ON = Power supply voltage – Internal voltage drop x 2 pcs.
 = 24 V – 4 V x 2 pcs.
 = 16 V

2-wire OR connection



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

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

Example) Load voltage at OFF
 Leakage current: 1 mA
 Load impedance: 3 kΩ
 Load voltage at OFF = Leakage current x 2 pcs. x Load impedance
 = 1 mA x 2 pcs. x 3 kΩ
 = 6 V

Standard Double Acting, Single Rod CS2
 Double Acting, Double Rod CS2W
 Long Stroke Double Acting, Single Rod CS2-V
 Axial Centralized Piping Double Acting, Single Rod CS2-IP
 Auto Switch
 Made to Order

Simple Specials/Made to Order Common Specifications

Please contact SMC for detailed specifications, delivery, and prices.

Simple Specials

The following special specifications can be ordered as a simplified Made-to-Order. Please contact your local sales representative for more details.

Symbol	Specifications	CS2 (Standard type)				CS2-V (Long stroke type)	CS2□P (Axial centralized piping type)	Page	
		Double acting							
		Single rod		Double rod		Single rod			
		Non-lube							
		φ125 to φ160	φ180 to φ320	φ125 to φ160	φ180 to φ320	φ180 to φ320	φ180 to φ250		
-XA□	Change of rod end shape	●	●	●	●	●	●	66	
-XC14	Change of trunnion bracket mounting position	●	●	●	●	●	●	67	
-XC15	Change of tie-rod length	●	●	●	●	●	●	67	

Made to Order Common Specifications

Symbol	Specifications	CS2 (Standard type)				CS2-V (Long stroke type)	CS2□P (Axial centralized piping type)	Page	
		Double acting							
		Single rod		Double rod		Single rod			
		Non-lube							
		φ125 to φ160	φ180 to φ320	φ125 to φ160	φ180 to φ320	φ180 to φ320	φ180 to φ250		
-XB6	Heat-resistant cylinder (0 to 150°C)	●		●				68	
-XC3	Special port location	●						68	
-XC4	With heavy duty scraper	●		●				69	
-XC5	Heat-resistant cylinder (0 to 110°C)	●		●				69	
-XC9	Adjustable stroke cylinder/Adjustable retraction type	●						70	
-XC10	Dual stroke cylinder/Double rod type	●						71	
-XC11	Dual stroke cylinder/Single rod type	●						72	
-XC22	Fluororubber seal	●		●				73	
-XC26	With split pins for double clevis pin/double knuckle joint pin and flat washers	●	●					73	
-XC27	Double clevis and double knuckle joint pins made of stainless steel	●	●					74	
-XC30	Rod side trunnion	●		●				74	
-XC35	With coil scraper	●		●				75	
-XC68	Made of stainless steel (With hard chrome plated piston rod)	●	●	●	●			75	
-XC86	With rod end bracket	●	●					75	

Air Cylinder/CS2 Series Simple Specials

The following changes are dealt with through the Simple Specials System.

To place an order, please download the Simple Special Order Specification Form from the SMC website.



1 Change of Rod End Shape

Symbol
-XA0 to XA30

Applicable Series

Description	Model	Action	Symbol for change of rod end shape	Note
Standard type	CS2	Double acting, Single rod	XA0 to 30	
	CS2W	Double acting, Double rod	XA0 to 30	
Long stroke type	CS2-V	Double acting, Single rod	XA0 to 30	ø180 to ø320
Axial centralized piping type	CS2□P	Double acting, Single rod	XA0 to 30	ø180 to ø250

Precautions

- SMC will make appropriate arrangements if no dimension, tolerance, or finish instructions are given in the diagram.
- Standard dimensions marked with "*" will be as follows to the rod diameter (D). Enter any special dimension you require.
 $D \leq 6 \rightarrow D - 1 \text{ mm}$, $6 < D \leq 25 \rightarrow D - 2 \text{ mm}$, $D > 25 \rightarrow D - 4 \text{ mm}$
- In the case of the double rod type and single acting retraction type, enter the dimensions when the rod is retracted.
- Only one side of a double rod can be manufactured.
- "A0" is the same shape as the standard type. (The specifications of A0 are that only dimensions A and H are changed from the standard type.)

Symbol: A0 	Symbol: A1 	Symbol: A2 	Symbol: A3 	Symbol: A4
Symbol: A5 	Symbol: A6 	Symbol: A7 	Symbol: A8 	Symbol: A9
Symbol: A10 	Symbol: A11 	Symbol: A12 	Symbol: A13 	Symbol: A14
Symbol: A15 	Symbol: A16 	Symbol: A17 	Symbol: A18 	Symbol: A19
Symbol: A20 	Symbol: A21 	Symbol: A22 	Symbol: A23 	Symbol: A24
Symbol: A25 	Symbol: A26 	Symbol: A27 	Symbol: A28 	Symbol: A29
Symbol: A30 				

Standard
Double Acting, Single Rod
CS2

Double Acting, Double Rod
CS2W

Long Stroke
Double Acting, Single Rod
CS2-V

Axial Centralized Piping
Double Acting, Single Rod
CS2□P

Auto Switch

Made to Order

2 Change of Trunnion Bracket Mounting Position

Symbol
-XC14

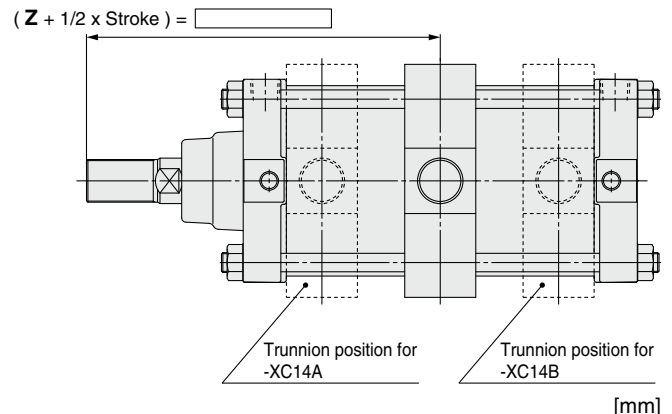
The position for mounting the trunnion pivot bracket on the cylinder can be moved from the standard mounting position to any desired position.

Applicable Series

Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	
	CS2W	Double acting, Double rod	
Long stroke type	CS2-V	Double acting, Single rod	ø180 to ø320
Axial centralized piping type	CS2□P	Double acting, Single rod	ø180 to ø250

Precautions

- Specify "Z + 1/2 x Stroke" in the case the trunnion bracket position is not -XC14A, -XC14B or trunnion is not a center trunnion.
- SMC will make appropriate arrangements if no dimension, tolerance, or finish instructions are given in the diagram.
- The possible range of trunnion bracket mounting position is indicated in the table below.
- Some trunnion mounting positions do not allow auto switch mounting. Please consult with SMC for more information.
- The CS2 series has a greater range of trunnion bracket mounting positions than CS1 series, so the value of "Z + 1/2 x Stroke" at -XC14A and -XC14B is different.



Bore size	Symbol	Z + 1/2 x Stroke					
		For -XC14A	For -XC14B	For -XC14		Reference Standard (Center trunnion)	Minimum stroke
				Minimum	Maximum		
125		165.5	152.5 + Stroke	166	152 + Stroke	159 + 1/2 x Stroke	25
140		168	150 + Stroke	168.5	149.5 + Stroke	159 + 1/2 x Stroke	30
160		186	160 + Stroke	186.5	159.5 + Stroke	173 + 1/2 x Stroke	35
180		200	185 + Stroke	200.5	184.5 + Stroke	192.5 + 1/2 x Stroke	25
200		200	190 + Stroke	200.5	189.5 + Stroke	195 + 1/2 x Stroke	25
250		240	221 + Stroke	240.5	220.5 + Stroke	230.5 + 1/2 x Stroke	25
320		264.5	260.5 + Stroke	265	260 + Stroke	262.5 + 1/2 x Stroke	35

3 Change of Tie-rod Length

Symbol
-XC15

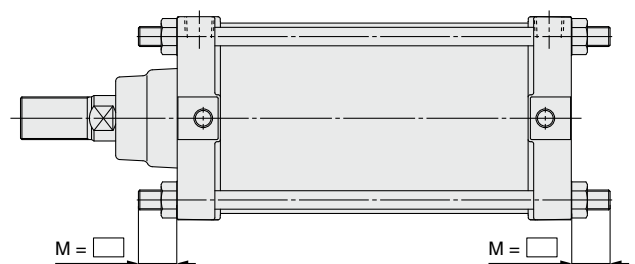
Cylinder with M dimension for tie-rod length changed from the standard length

Applicable Series

Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	
	CS2W	Double acting, Double rod	
Long stroke type	CS2-V	Double acting, Single rod	ø180 to ø320
Axial centralized piping type	CS2□P	Double acting, Single rod	ø180 to ø250

Precautions

- To order, specify the M dimension as well as the part number.
- SMC will make appropriate arrangements if no dimension, tolerance, or finish instructions are given in the diagram.
- Tie-rod length changeable range is described in the below.
- The M dimension of the bracket mounting side of flange (F, G), clevis (C, D) types cannot be specified.



Tie-rod Length Changeable Range

Bore size	125		140		160		180		200		250		320	
	L	B, F, G, C, D, T	L	B, F, G, C, D, T	L	B, F, G, C, D, T	L	B, F, G, C, D, T	L	B, F, G, C, D, T	L	B, F, G, C, D, T	L	B, F, G, C, D, T
M Min.	20	12	21	12	23	14	27	17	28	18	33	21	38	0
M Max.	110													

Made to Order Common Specifications

Please contact SMC for detailed dimensions, specifications, and delivery times.

1 Heat-resistant Cylinder (0 to 150°C)

Symbol
-XB6

The seal material and grease used in this air cylinder have been changed so that it can be used at temperatures up to 150°C.

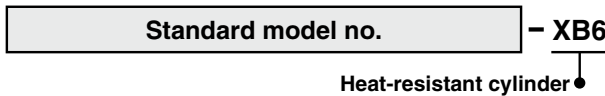
Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only Excludes the cylinder with auto switch
	CS2W	Double acting, Double rod	ø125 to ø160 only Excludes the cylinder with auto switch

Specifications

Ambient temperature range	0°C to 150°C
Seal material	Fluororubber
Grease	Heat-resistant grease
Specifications other than the above and external dimensions	Same as the standard type

How to Order



Warning Precautions

Be aware that smoking cigarettes, etc., after your hands have come into contact with the grease used in this cylinder can create a gas that is hazardous to humans.

- * Operate without lubrication from a pneumatic system lubricator.
- * Please contact SMC for details on the maintenance intervals for this cylinder as they differ from those of the standard cylinder.
- * In principle, it is impossible to make a heat-resistant cylinder with a built-in magnet or with an auto switch.
- * Piston speed ranges from 50 to 500 mm/s

2 Special Port Location

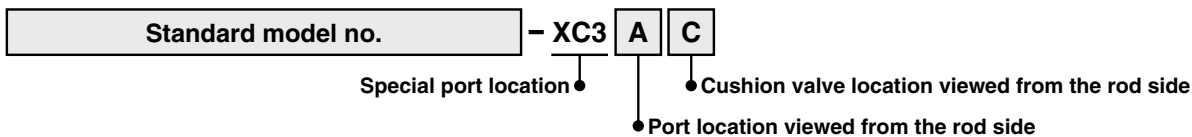
Symbol
-XC3

The locations of the connection port of the rod/head cover and the cushion valve for this cylinder are different than those of the standard type.

Applicable Series

Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	ø125 to ø160 only

How to Order



* For port locations, refer to the following diagrams and select either A, B, C, or D.

Specifications: Same as the standard type

Relationship between Port Location and Cushion Valve Location

Corresponding symbol of mounting bracket (Positional relationships)

1. The position symbols for the port and cushion valve have to be looked at from the rod side, as in the figures above. (In the case of standard cylinders, the port must be positioned on the upper side.) Define the upper side to be A, with B, C, and then D following in clockwise order.

2. -XC3AA is not available in terms of the position between the port and cushion valve, since it is available in the standard products.

Standard Double Acting, Single Rod CS2
Double Acting, Double Rod CS2W
Long Stroke Double Acting, Single Rod CS2-V
Axial Centralized Piping Double Acting, Single Rod CS2□P
Auto Switch
Made to Order

3 With Heavy Duty Scraper

Symbol
-XC4

With the heavy duty scraper on the wiper ring, this cylinder is suitable for use in environments where die-cast equipment, construction machinery or industrial vehicles are exposed to dirt or sand, or in environments with significant amounts of dust.

Applicable Series

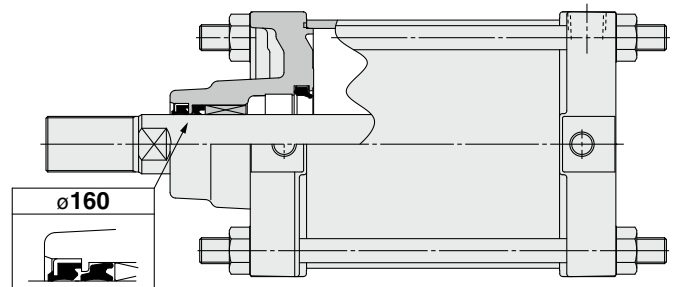
Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only
	CS2W	Double acting, Double rod	ø125 to ø160 only

How to Order

Standard model no. **-XC4**
With heavy duty scraper

Specifications: Same as the standard type

Construction (Dimensions are the same as the standard type.)



Caution

Do not replace heavy duty scrapers.

- Since heavy duty scrapers are press-fit, do not replace the cover only, but rather the entire rod cover assembly.

4 Heat-resistant Cylinder (0 to 110°C)

Symbol
-XC5

The seal material used in this air cylinder has been updated for heat resistance (up to 110°C) for use under severe ambient temperatures which exceed the standard specifications of 0 to 70°C.

Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only
	CS2W	Double acting, Double rod	ø125 to ø160 only

How to Order

Standard model no. **-XC5**
Heat-resistant cylinder

Specifications

Ambient temperature range	0°C to 110°C
Seal material	Fluororubber
With auto switch	Unavailable*1
Specifications other than the above and external dimensions	Same as the standard type

*1 Manufacturing built-in magnet type and the one with auto switch is impossible.

* Please contact SMC for details on the maintenance intervals for this cylinder as they differ from those of the standard cylinder.

* Material of rod boot is heat-resistant tarpaulin.

5 Adjustable Stroke Cylinder/Adjustable Retraction Type

Symbol
-XC9

The retract stroke of the cylinder can be adjusted by the adjustment bolt.

Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only (Excludes the head flange and clevis types)

How to Order

CS2 **Mounting type** **Bore size** **Port suffix** - **Stroke** **Suffix** **Stroke adjustment symbol** - **XC9**

* Excludes the head flange and clevis types

Adjustable stroke cylinder/
Adjustable retraction type

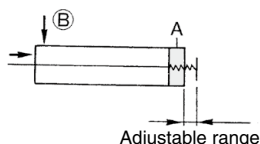
(After adjusting the stroke, the both-side cushion type becomes a single-side cushion type.)

Specifications

Series	Stroke adjustment symbol	Stroke adjustment range [mm]
CS2	A	0 to 25
	B	0 to 50

* Specifications other than the above are the same as the standard type.

Symbol

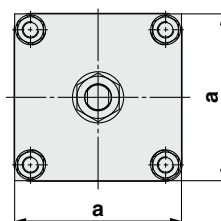
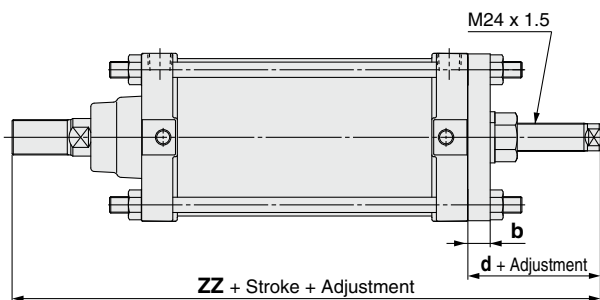


Precautions

⚠ Caution

- When air is supplied to the cylinder, if the stroke adjustment bolt is loosened in excess of the allowable stroke adjustment amount, be aware that the stroke adjustment bolt could fly off or air could be discharged, which could injure personnel or damage the peripheral equipment.
- Adjust the stroke when the cylinder is not pressurized. If it is adjusted while in a pressurized state, the seal of the adjustment section could become deformed, leading to air leakage.

Dimensions (Dimensions other than those below are the same as the standard type.)



Bore size	a	b	d	ZZ
125	142	19	63	271
140	155	19	63	271
160	174	19	59	285

[mm]

Standard
Double Acting, Single Rod
CS2

Double Acting, Double Rod
CS2W

Long Stroke
Double Acting, Single Rod
CS2-V

Axial Centralized Piping
Double Acting, Single Rod
CS2□P

Auto Switch

Made to Order

6 Dual Stroke Cylinder/Double Rod Type

-XC10

Two cylinders are integrated into one in a back-to-back configuration allowing for the cylinder stroke to be controlled in three steps.

Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only (* Excludes the clevis and trunnion types)

How to Order

CS2 **Mounting type** **Bore size** **Port suffix** - **Stroke A** **Suffix** + **Stroke B** **Suffix** - **XC10**
 * Excludes the clevis and trunnion types Dual stroke cylinder ●

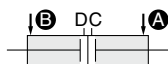
Specifications

Series	Bore size [mm]	Max. manufacturable stroke [mm]
CS2	125, 140	1000
	160	1200

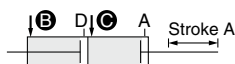
* Specifications other than the above are the same as the standard type.

Symbol

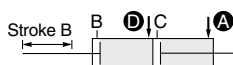
Function



When air pressure is supplied to ports **A** and **B**, both strokes A and B retract.



When air pressure is supplied to ports **B** and **C**, stroke A is operated.



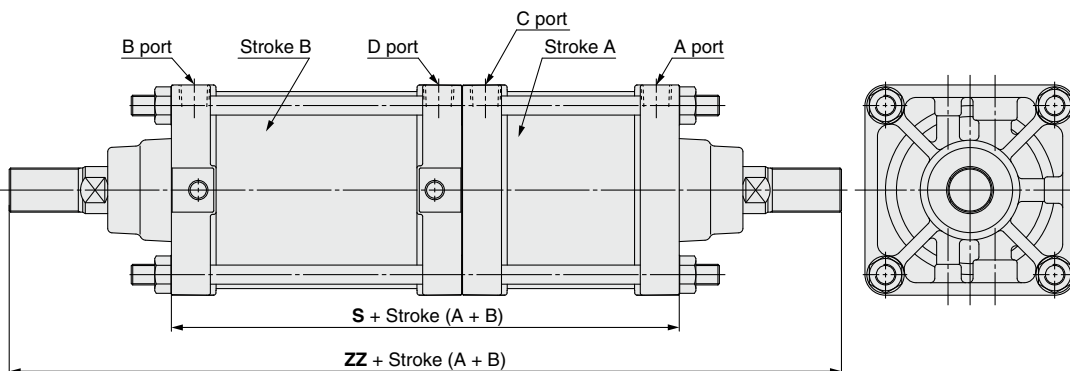
When air pressure is supplied to ports **A** and **D**, stroke B is operated.



When air pressure is supplied to ports **C** and **D**, both strokes A and B are operated.

Dimensions (Dimensions other than those below are the same as the standard type.)

Bore size	[mm]	
	S	ZZ
125	196	416
140	196	416
160	212	452



* For the rod flange type (F), the flange bracket will be attached on the stroke A side.

7 Dual Stroke Cylinder/Single Rod Type

Symbol
-XC11

Two cylinders can be integrated by connecting them in line, and the cylinder stroke can be controlled in two stages in both directions.

Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only * Excludes the trunnion type

Specifications: Same as the standard type

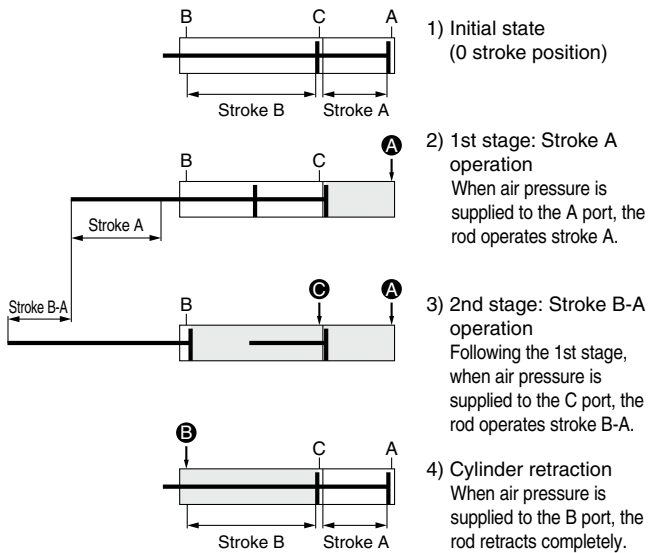
(Please contact SMC for each manufacturable stroke length.)

How to Order

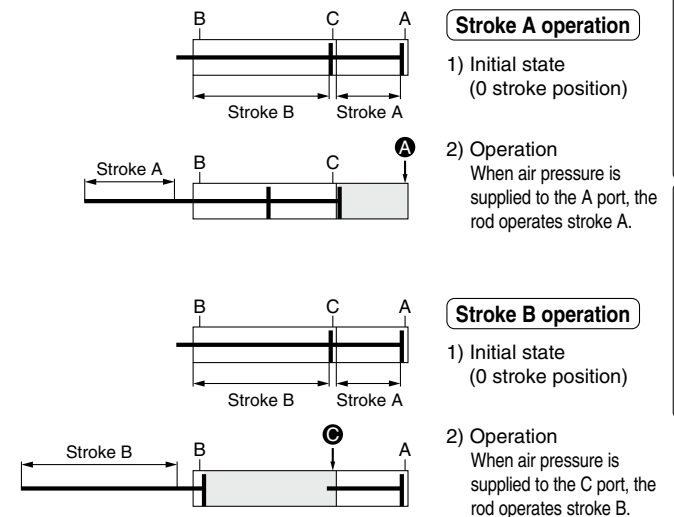
CS2 **Mounting type** **Bore size** **Port suffix** - **Stroke A** **Suffix** + **Stroke B-A** **Suffix** - **XC11**
 * Excludes the trunnion type

Dual stroke cylinder/Single rod type

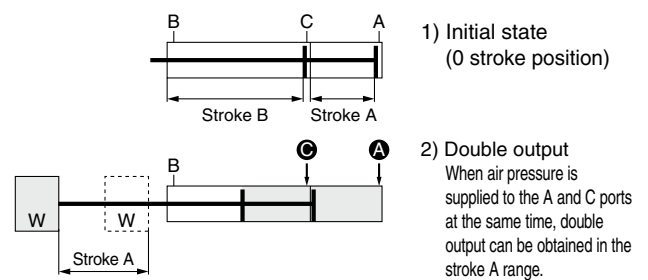
Functional description of dual stroke cylinder



Stroke A and stroke B can be operated individually.



Double output is possible.

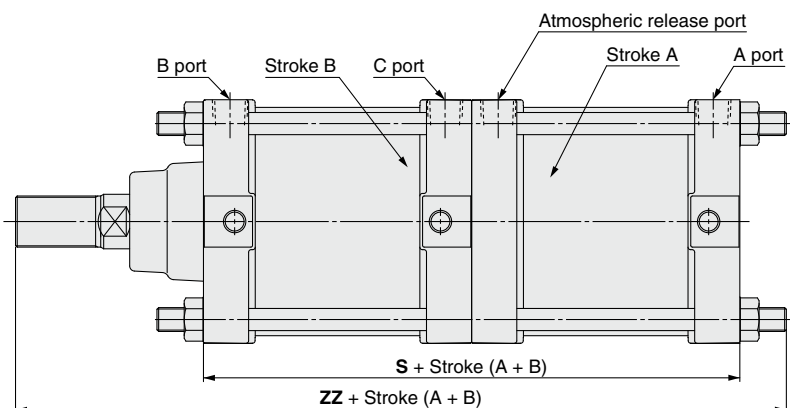


Precautions

⚠ Caution

1. Do not supply air until the cylinder is fixed with the attached bolt.
2. If air is supplied before securing the cylinder, the cylinder could lurch, posing a risk of bodily injury or damage to the peripheral equipment.

Dimensions (Dimensions other than those below are the same as the standard type.)



Bore size	[mm]	
	S	ZZ
125	197	334
140	197	334
160	213	363.5

Standard Double Acting, Double Rod **CS2W**
 Standard Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2□P**
 Auto Switch
 Made to Order

8 Fluororubber Seal

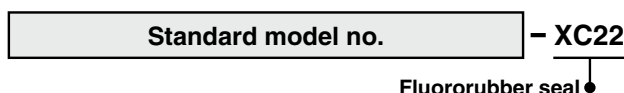
Symbol

-XC22

Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only
	CS2W	Double acting, Double rod	ø125 to ø160 only

How to Order



Specifications

Seal material	Fluororubber
Ambient temperature range	With auto switch : 0°C to 60°C Without auto switch: 0°C to 70°C (No freezing)*1
Specifications other than the above and external dimensions	Same as the standard type

*1 Please contact SMC, since the type of chemical and the operating temperature may not allow the use of this product.

* Cylinders with auto switches can also be produced; however, auto switch related parts (auto switch units, mounting brackets, built-in magnets) are the same as standard products. Before using these, please contact SMC regarding their suitability for the operating environment.

9 With Split Pins for Double Clevis Pin/Double Knuckle Joint Pin and Flat Washers

Symbol

-XC26

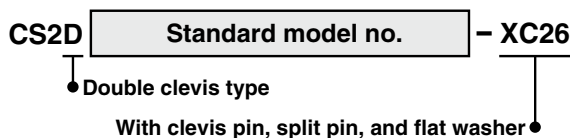
A flat washer has been added for the double clevis (one of the mounting types) or double knuckle joint (one of the accessories).

Applicable Series

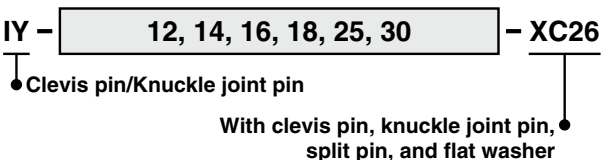
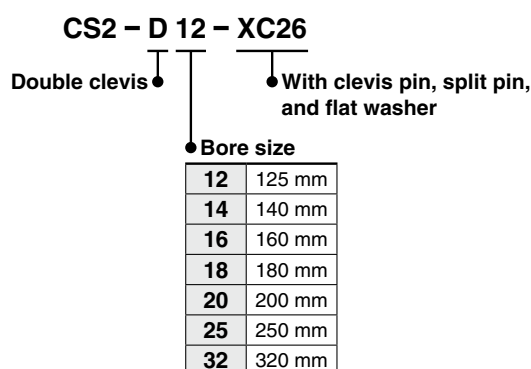
Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	

How to Order

• Product



• Parts assembly

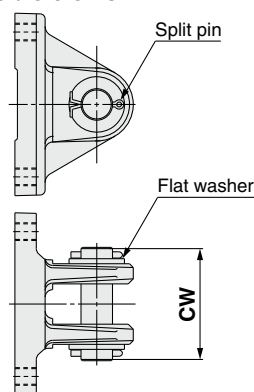


Specifications

Mounting type	Double clevis type (D), double knuckle joint only
Changed parts	Clevis pin, knuckle joint pin, flat washer
Specifications other than the above	Same as the standard type

Dimensions (Dimensions other than those below are the same as the standard type.)

Double clevis

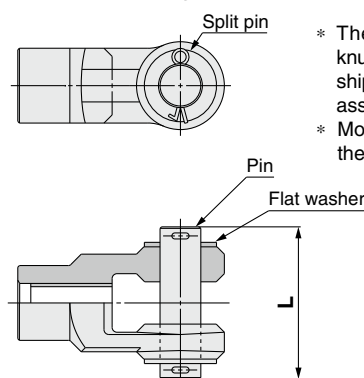


* The mounting bracket, split pin, clevis pin, and flat washer are shipped together but do not come assembled.

* Mounting method is the same as the standard type.

[mm]	
Bore size	CW
125	90
140	104
160	113
180	136
200	136
250	169
320	207

Double knuckle joint



* The mounting bracket, split pin, knuckle joint pin and flat washer are shipped together but do not come assembled.

* Mounting method is the same as the standard type.

[mm]	
Bore size	L
125	90
140	104
160	113
180	136
200	136
250	169
320	207

10 Double Clevis and Double Knuckle Joint Pins Made of Stainless Steel

Symbol
-XC27

To prevent the oscillating portion of the double clevis or the double knuckle joint from rusting, the material of the pin and the retaining ring (split pin) has been changed to stainless steel.

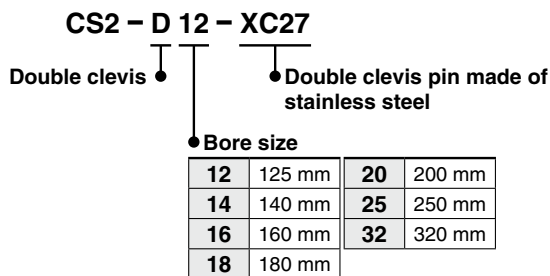
Applicable Series

Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	

How to Order

CS2D Standard model no. - **XC27**
 • Double clevis type Double clevis pin made of stainless steel •

• Parts assembly



Y - 12A, 14A, 16A, 18A, 20A, 25A, 32A - **XC27**
 • Double knuckle joint Double knuckle joint pin made of stainless steel •

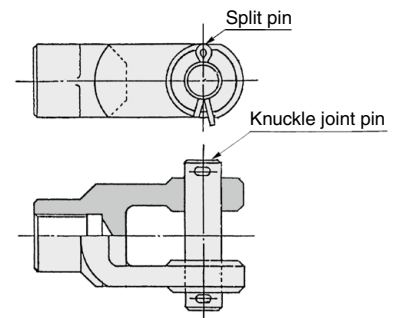
IY - 12, 14, 16, 18, 25, 30 - **XC27**
 • Clevis pin/Knuckle pin made of stainless steel •

Specifications

Mounting type	Double clevis type (D), double knuckle joint only
Changed parts	Clevis pin, knuckle joint pin, split pin
Specifications other than the above	Same as the standard type

Dimensions: Same as the standard type

* The mounting bracket, split pin, clevis pin, and knuckle joint pin are shipped together but do not come assembled.



* Mounting method is the same as the standard type.

11 Rod Side Trunnion

Symbol
-XC30

This cylinder shortens the distance between the fulcrum and the rod end by installing a trunnion bracket in front of the rod side cover.

Applicable Series

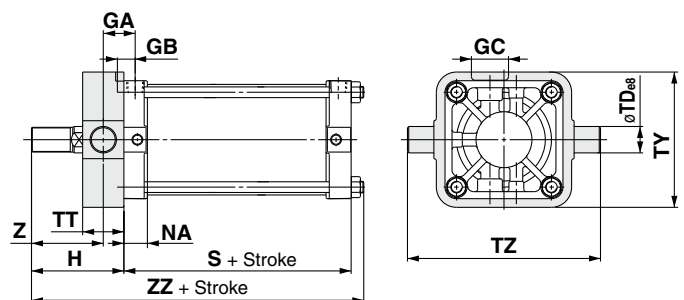
Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	ø125 to ø160 only
	CS2W	Double acting, Double rod	ø125 to ø160 only

How to Order

CS2T Standard model no. - **XC30**
 • Trunnion bracket Rod side trunnion •

Specifications: Same as the standard type

Dimensions (Dimensions other than those below are the same as the standard type.)



Bore size	GA	GB	GC	NA	S	TDe8	TT	TY	TZ	H	Z	ZZ
125	38	23	45	28.5	96	32 ^{+0.050} _{-0.089}	50	164	234	112	87	221
140	40.5	23	45	28.5	96	36 ^{+0.050} _{-0.089}	55	184	262	112	84.5	221
160	46	26	50	32.5	104	40 ^{+0.050} _{-0.089}	60	204	292	122	92	241

Standard Double Acting, Single Rod **CS2**
 Double Acting, Double Rod **CS2W**
 Long Stroke Double Acting, Single Rod **CS2-V**
 Axial Centralized Piping Double Acting, Single Rod **CS2-P**
 Auto Switch
 Made to Order

CS2 Series

12 With Coil Scraper

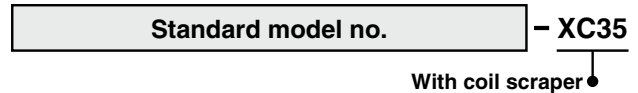
Symbol
-XC35

Removes frost, ice, weld spatter, cutting chips, etc. adhered to the piston rod, protecting the seals.

Applicable Series

Description	Model	Action	Note
Air cylinder	CS2	Double acting, Single rod	ø125 to ø160 only
	CS2W	Double acting, Double rod	ø125 to ø160 only

How to Order



Specifications: Same as the standard type Dimensions: Same as the standard type

13 Made of Stainless Steel (With Hard Chrome Plated Piston Rod)

Symbol
-XC68

Suitable for cases where immersion in water leads to corrosion or the generation of rust.

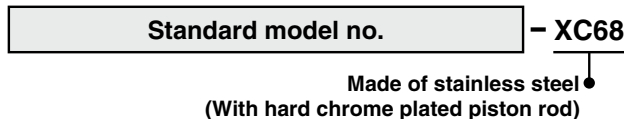
Applicable Series

Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	
	CS2W	Double acting, Double rod	

Specifications

Parts changed to stainless steel	Piston rod
Specifications other than the above and external dimensions	Same as the standard type

How to Order



Maximum Strokes

		[mm]
Double acting, Single rod	Double acting single rod with rod boot	
1600	1400	

14 With Rod End Bracket

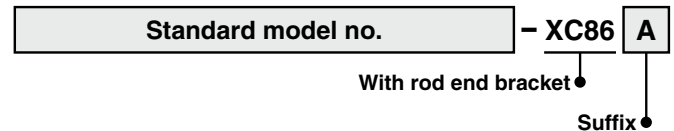
Symbol
-XC86

A model with the rod end bracket to simplify the order process

Applicable Series

Description	Model	Action	Note
Standard type	CS2	Double acting, Single rod	

How to Order

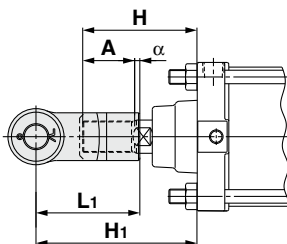


- * Rod end brackets are shipped together with the product but do not come assembled.
- * A pin and two split pins are attached for double knuckle joint.
- * XC86A to C: Standard type, XC86D to F: Standard type except for rod end thread length (A and H dimensions)

A	With rod end nut
B	With double knuckle joint
C	With single knuckle joint
D	With double knuckle joint and rod end nut
E	With single knuckle joint and rod end nut
F	With rod end nut (For knuckle joint)

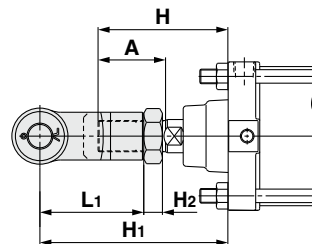
Dimensions (Dimensions other than those below are the same as the standard type.)

XC86B, XC86C



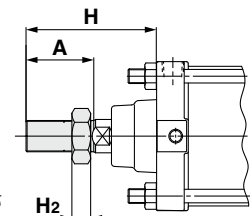
Symbol Bore size [mm]	H	A	α	L ₁	H ₁	Applicable knuckle joint part no.	
						I type single knuckle	Y type double knuckle
125	110	50	3.5	100	156.5	I-12A	Y-12A
140	110	50	3.5	105	161.5	I-14A	Y-14A
160	120	56	3.5	110	170.5	I-16A	Y-16A
180	135	63	3.5	125	193.5	I-18A	Y-18A
200	135	63	3.5	125	193.5	I-20A	Y-20A
250	160	71	3.5	160	245.5	I-25A	Y-25A
320	175	80	3.5	175	266.5	I-32A	Y-32A

XC86D, XC86E



Symbol Bore size [mm]	H	A	L ₁	H ₁	H ₂	Applicable knuckle joint part no.		Applicable rod end nut
						I type single knuckle	Y type double knuckle	
125	125	65	100	181	18	I-12A	Y-12A	NT-12
140	125	65	105	186	18	I-14A	Y-14A	NT-12
160	140	76	110	198	21	I-16A	Y-16A	NT-16
180	155	83	125	223	23	I-18A	Y-18A	NT-18
200	160	88	125	227	27	I-20A	Y-20A	NT-20
250	195	106	160	287	34	I-25A	Y-25A	NT-25
320	210	115	175	312	38	I-32A	Y-32A	NT-30

XC86F





CS2 Series

Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For actuator and auto switch precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

Handling

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 too far. Be sure to stay within the allowable number of rotations when opening.

Although a retaining ring is installed or caulked as a retaining mechanism for the cushion valve, do not open the cushion valve too far. Be sure to stay within the allowable number of rotations when opening.

If air is supplied and operation started without confirming the above condition, the cushion valve may be ejected from the cover.

The allowable number of rotations refers to the number of rotations until the restrictor of the cushion valve is completely opened from a completely closed state.

To adjust the cushion valve, use a JIS B 4648 hexagon wrench key 4 (width across flats of cushion valve: 4).

Allowable Number of Rotations

Bore size [mm]	Allowable number of rotations
125, 140, 160	5
180, 200, 250, 320	6

3. Be certain to activate the air cushion at the stroke end.

Mounting

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.

2. Regarding the screw-in of fittings when piping

When ports and fittings are screwed in, tighten them with the proper tightening torque below.

Bore size [mm]	Connecting thread nominal size	Proper tightening torque [N·m]
125, 140	1/2	28 to 30
160	3/4	
180, 200	1/2	
250, 320	3/4	

3. Do not place tape or other objects onto the painted surface of the mounting bracket.

The paint of the mounting bracket is dried naturally, so it may peel off if tape or another object is placed onto it.

Disassembly / Assembly

Caution

1. Do not damage the cushion rings during removal or assembly.

If a cushion ring bumps against something during removal or assembly, the air cushion may not function properly due to cushion ring deformation.

2. Seal replacement

For cylinders for which the rod seal cannot be replaced, note that reassembly will not be possible if the rod cover is pulled out of the piston rod when the cylinder is disassembled for seal replacement.

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

Caution: **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning: **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

Danger: **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

- The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
- When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
- Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

- Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
- Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
- An application which could have negative effects on people, property, or animals requiring special safety analysis.
- Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

- The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
- For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
- Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

- The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
- The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

SMC products are not intended for use as instruments for legal metrology.


Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Revision History

Edition B * The double rod type and smooth cylinder have been added to the CS2 series.
* 9 types of made-to-order specifications have been added. NZ

Edition C * Bore sizes $\phi 180$, $\phi 200$, and $\phi 250$ have been added to the single rod and double rod types.
* The axial centralized piping type ($\phi 180$, $\phi 200$, and $\phi 250$) has been added.
* The number of pages has been increased from 32 to 52. ZZ

Edition D * Bore size $\phi 320$ has been added to the standard type (single rod and double rod).
* A long stroke type ($\phi 180$ to $\phi 320$) has been added.
* The number of pages has been increased from 52 to 80. AU

 **Safety Instructions** Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.

SMC Corporation

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D-G