

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

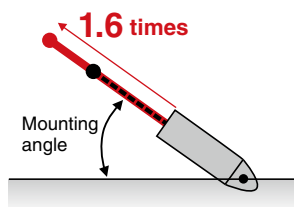
Allowable lateral load: Max. **900 N**

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

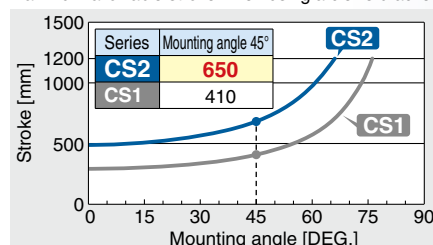
■ When using a rotating bracket:

Max. stroke increased by **1.6 times**

410 mm stroke → **650 mm** stroke



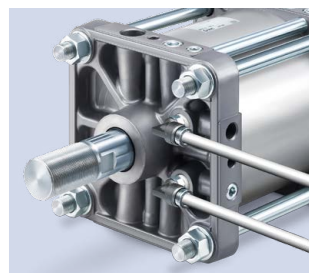
Maximum allowable stroke when using a clevis bracket



Improved Ease of Piping

Centralized piping ports in the axial direction increase piping flexibility.

(Axial centralized piping type)

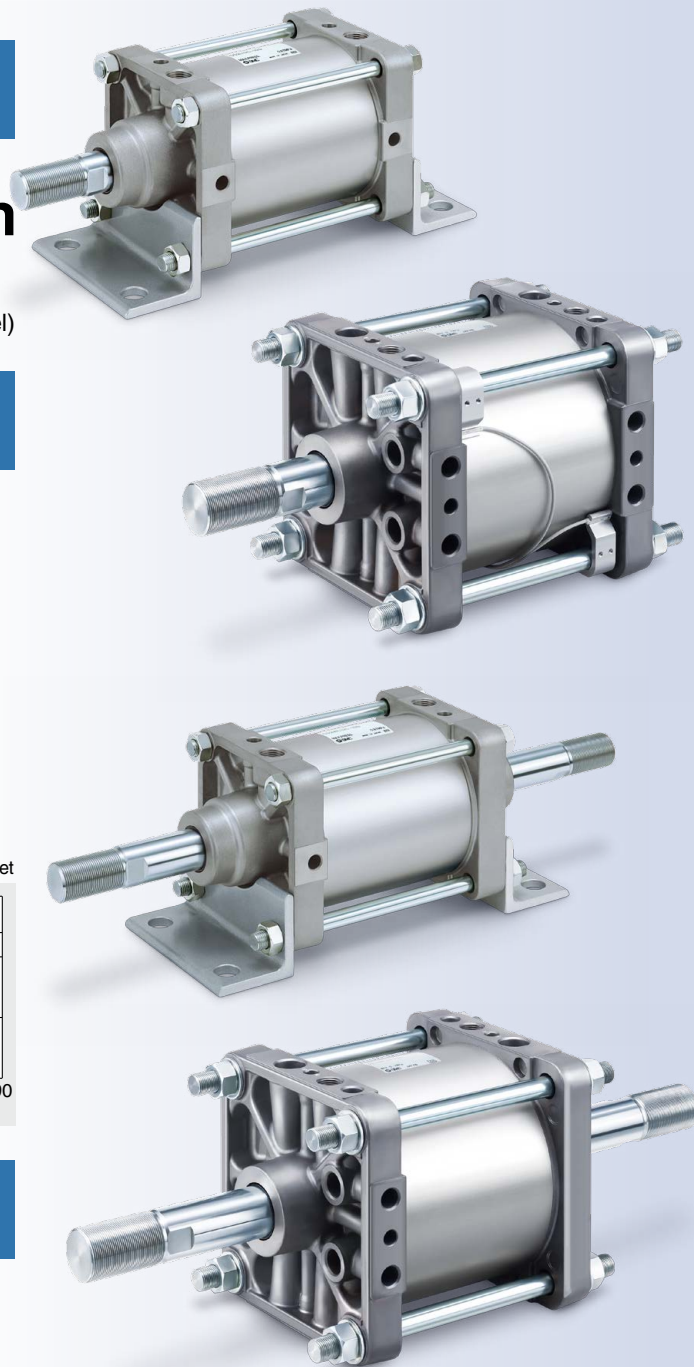


Rod side axial piping



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

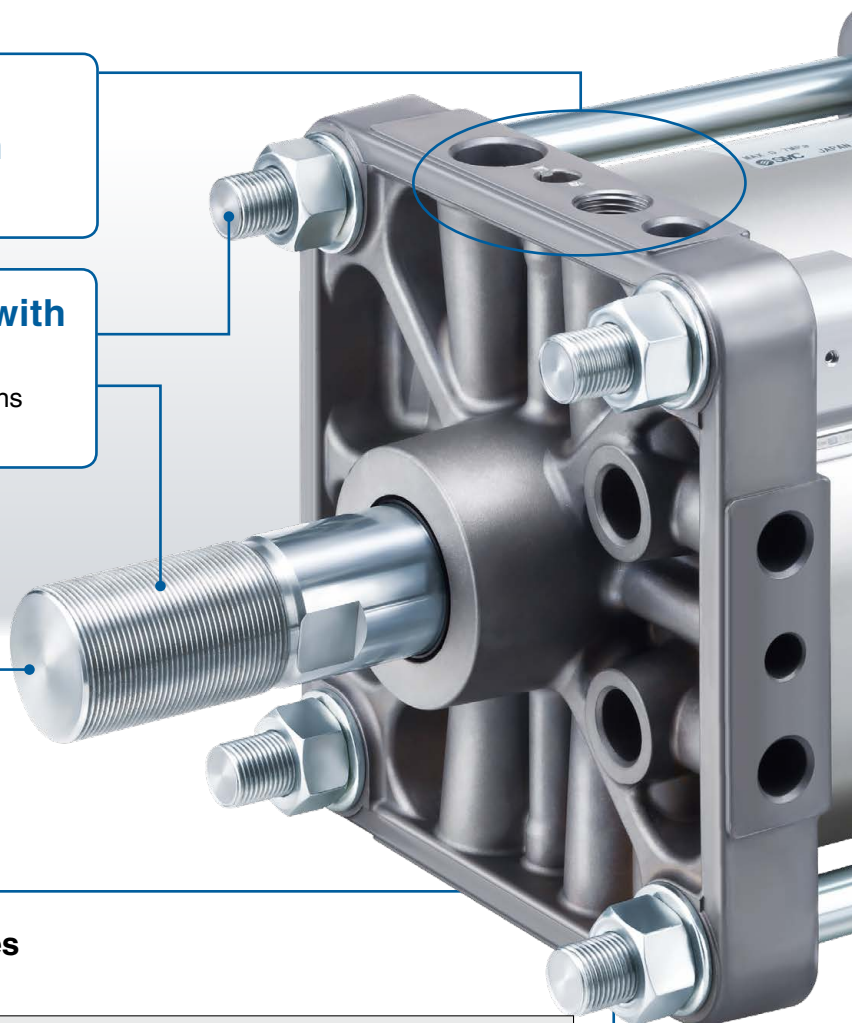
* Compared at a 100 mm stroke

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
 320	56.4	128.1 (CS1 ø300)	65

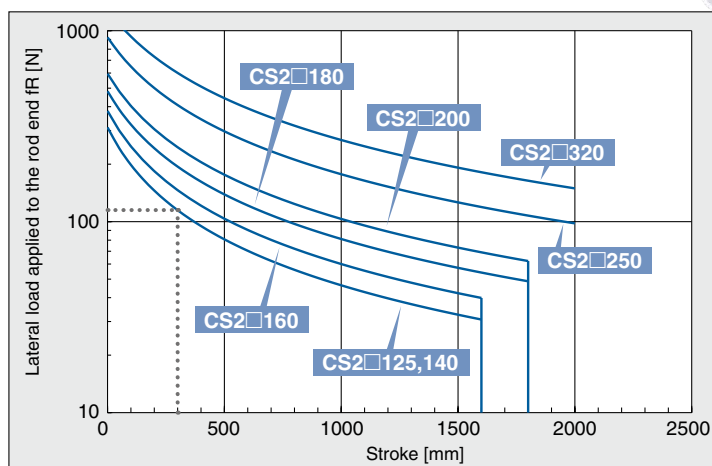
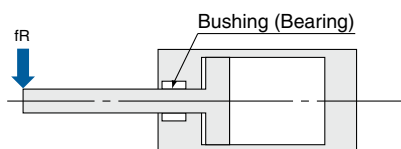
Ease of piping improved by placing the piping and cushion valve on the same side

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

($\phi 320$, 100 mm stroke, with piston rod extended)

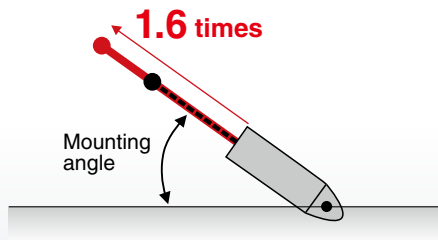
■ When using a rotating bracket:

Max. stroke increased by 1.6 times

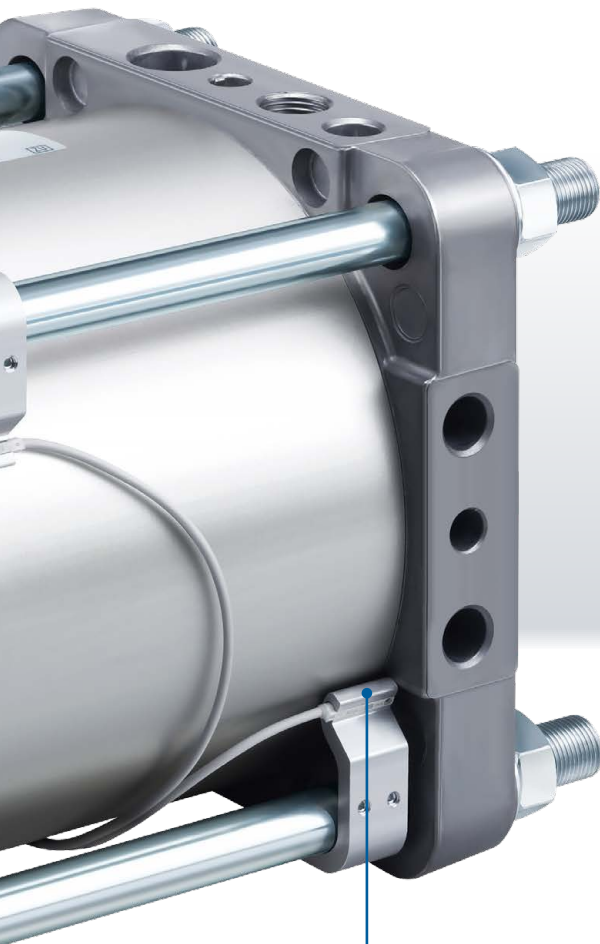
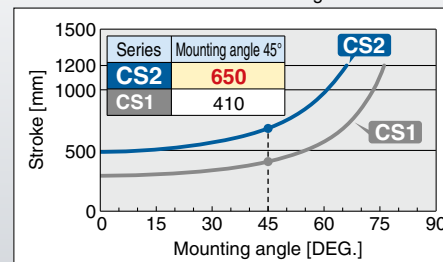
410 mm stroke $\rightarrow$ **650 mm** stroke

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. ($\phi 180$, $\phi 200$, $\phi 250$, and $\phi 320$ only)

Auto switches can be mounted on $\phi 125$ to $\phi 320$.

- Solid state auto switch: D-M9□
- Reed auto switch: D-A9□
- Magnetic field-resistant auto switch: D-P3DWA ($\phi 125$ to $\phi 200$ only)

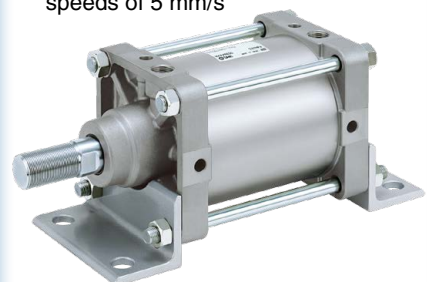


Smooth Cylinder

CS2Y Series

($\phi 125$ to $\phi 160$ only)

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

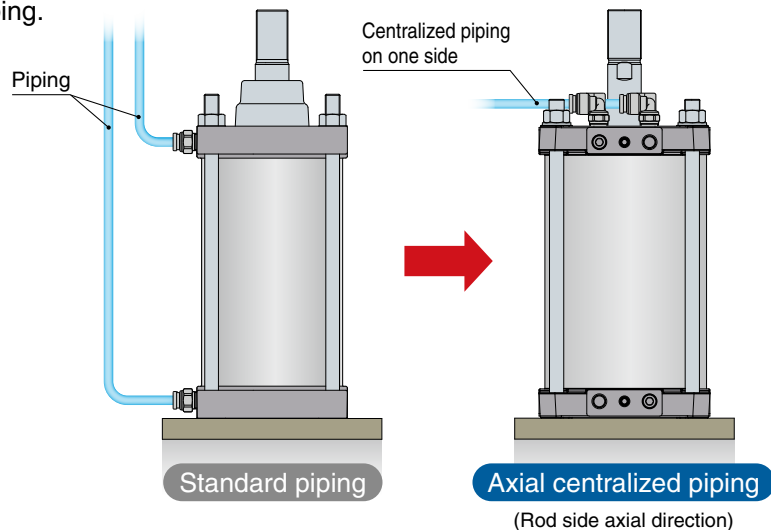
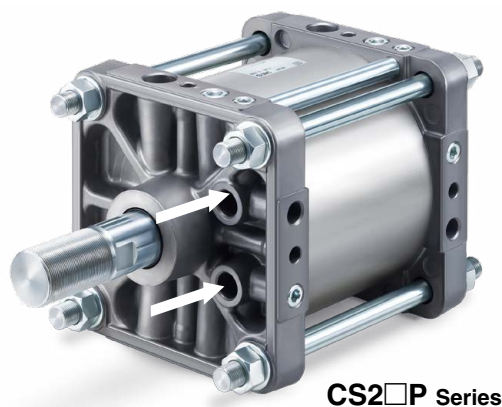


For details, refer to the **Web Catalog**.

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.



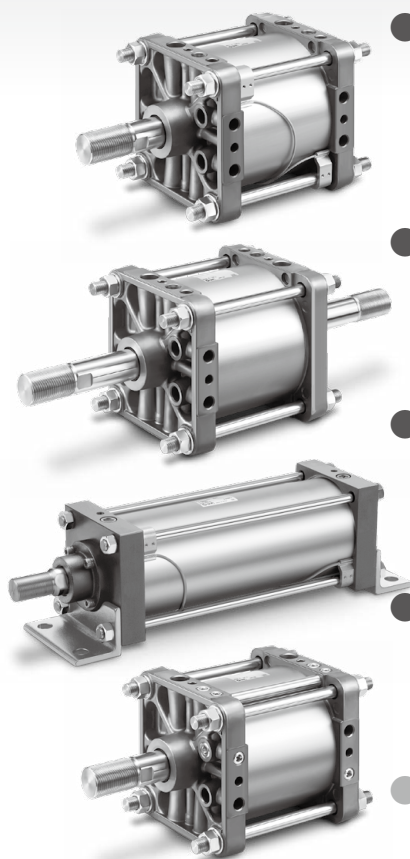
Series Variations

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	125 140 160 180 200 250 320	• Change of rod end shape • Oversized rod cylinder • 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			27
Long stroke CS2-V 	Double acting	Single rod	Standard piping	●		180 200 250 320	• 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).

CONTENTS

Air Cylinder **CS2 Series**



Combination of Standard Products and Made to Order Specifications p. 5

● **Standard Type: Double Acting, Single Rod CS2 Series**

How to Order p. 6
 Specifications p. 7
 Construction p. 10
 Dimensions p. 12
 Accessory Brackets p. 26

● **Standard Type: Double Acting, Double Rod CS2W Series**

How to Order p. 27
 Specifications p. 28
 Construction p. 30
 Dimensions p. 32

● **Long Stroke Type: Double Acting, Single Rod CS2-V Series**

How to Order p. 40
 Specifications p. 41
 Construction p. 43
 Dimensions p. 44

● **Axial Centralized Piping Type: Double Acting, Single Rod CS2□P Series**

How to Order p. 51
 Specifications p. 52
 Construction p. 54
 Dimensions p. 55

● **Auto Switch Mounting** p. 59

Specific Product Precautions p. 64-1

● **Simple Specials/Made to Order Common Specifications** p. 65

For details, refer to the "Simple Specials/Made to Order Common Specifications" section of the **Web Catalog**.

• Simple Specials

- XA**□ Change of Rod End Shape
- XC14** Change of Trunnion Bracket Mounting Position
- XC15** Change of Tie-rod Length

• Made to Order Common Specifications

- XB5** Oversized rod cylinder
- 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
- 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

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

Combination of Standard Products and Made to Order Specifications

CS2 Series

- : Standard
- ◎ : Made to order
- : Special product
- : Not available

● : Standard ◎ : Made to order ○ : Special product — : Not available		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		
Symbol	Specifications	Applicable bore size	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 ø250	◎	○	◎	○	○	○
25A	Copper (Cu) and Zinc (Zn)-free		◎	◎*3	○	○	○	○
-XA□	Change of rod end shape	ø125 to ø320	◎	◎	◎	◎	◎	◎
-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		◎	◎*3	◎	○	○	○
-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		◎	◎*3	◎	○	○	○
-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."

*3 Applicable I.D.: ø180 to ø250, ø320 is available upon request for special order.

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

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.

Auto switch

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

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

Number of auto switches

Nil	2
3	3
S	1
n	n

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)

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) CDS2B125-200

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

*3 The load voltage used is 24 VDC.

* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW 3 m..... L (Example) M9NWL
1 m..... M (Example) M9NWM 5 m..... Z (Example) M9NWLZ

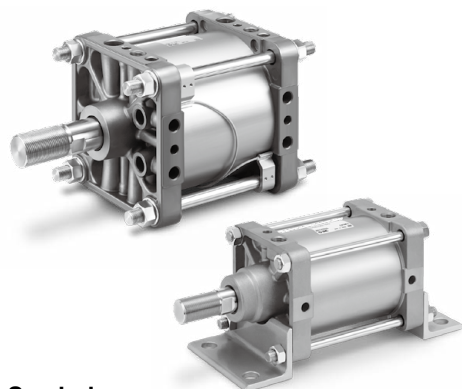
* Auto switches marked with a "O" are produced upon receipt of order.

* 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.)

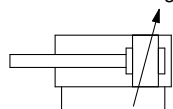
* D-G39/K39/A3□/A44 auto switches (band mounting type) can only be mounted on ø125 to ø160.

CS2 Series



Symbol

Double acting, Air cushion



Made to Order Specifications

[Click here for details](#)

Symbol	Specifications
-XA□	Change of rod end shape
-XB5	Oversized rod cylinder
-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.

			[mm]
Bore size	Mounting bracket	Maximum stroke	
		Basic, Head flange, Single clevis, Double clevis, Center trunnion	Foot, Rod flange
125		1000 or less	1600 or less
140			
160		1200 or less	1569 or less
180			
200		998 or less	
250		813 or less	
320		495 or less	

* For bore sizes ø180 to ø320, 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 ø320 class 2 pressure vessel is available as a special product.

* For bore size ø180, 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	—	—	—	—	—	●	—
	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 ø320.



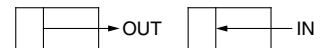
Weight (Guide)

Bore size [mm]		125	140	160	180	200	250	320
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]
- $$12.5 + 2.3 \times 500/100 = 24.0 \text{ [kg]}$$

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	—	—	—

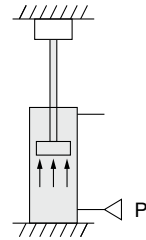
CS2 Series

Relationship between Cylinder Size and Maximum Stroke

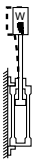
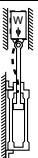
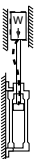
The below table shows the applicable maximum stroke (in cm units), found by calculation assuming the case where the force generated by the cylinder itself acts as buckling force on the piston rod, or piston rod and cylinder tube.

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.

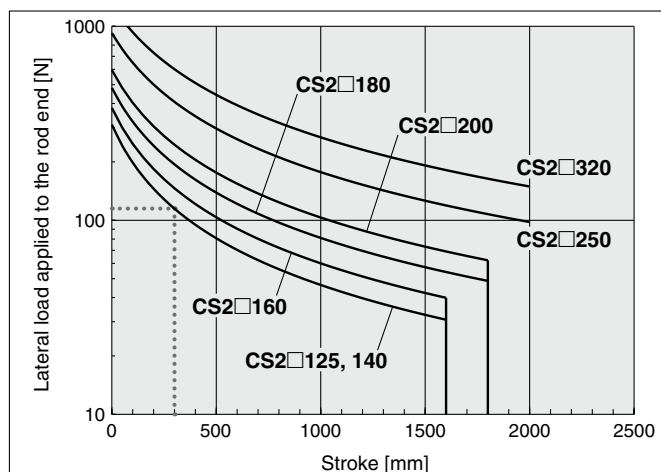
[Reference] If it is stopped with the external stopper on the cylinder extension side, even with a light load, the maximum generated force of the cylinder will act on the cylinder itself.



[cm]

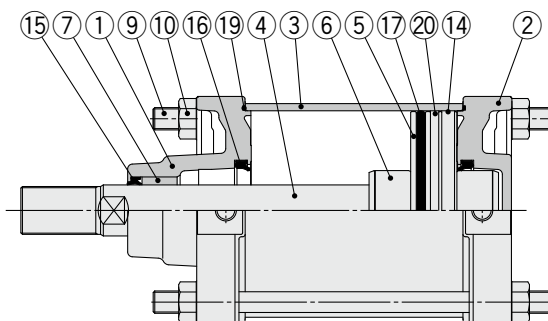
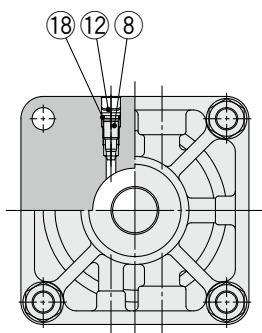
Mounting			Nominal symbol	Operating pressure [MPa]	Applicable maximum stroke according to buckling strength						
Support bracket nominal symbol and schematic diagram					125	140	160	180	200	250	320
Foot: L	Rod flange: F	Head flange: G	L, F	0.3	103	92	113	108	124	155	162
				0.5	79	70	86	81	94	118	122
				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	C, D	0.3	96	83	106	102	118	147	152
		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	L, F	0.3	301	267	330	324	370	460	483
				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	L, F	0.3	433	386	476	462	528	655	688
				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)

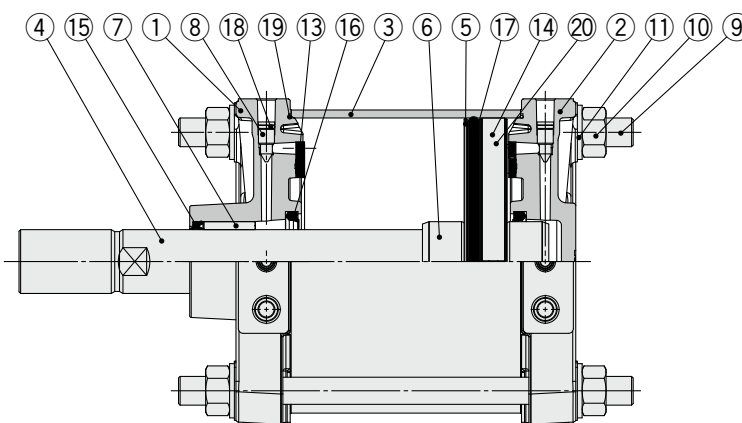
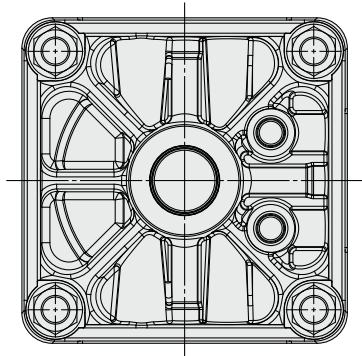


Construction

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.

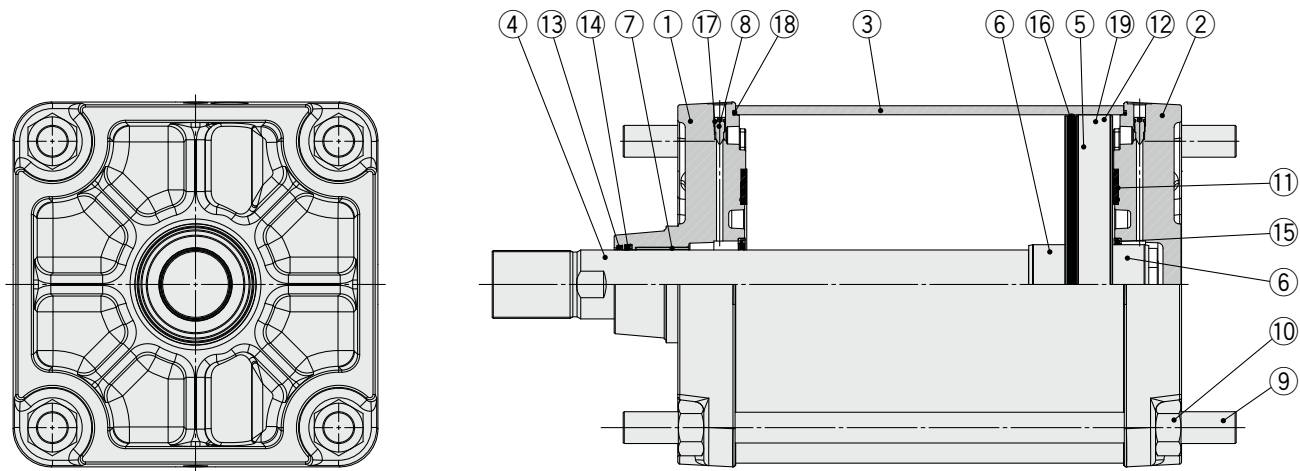
* Please contact SMC to order the common made-to-order specification -XA□ (Change of rod end shape), in which the rod seal of bore sizes ø180 to ø250 can be replaced.

* Trunnion type should not be disassembled. (Refer to page 76.)

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

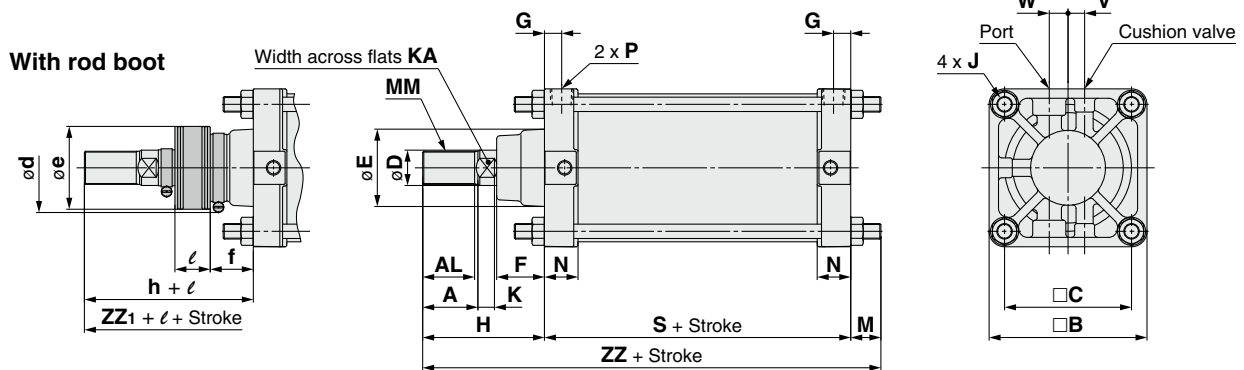
No.	Description	Material	Qty.
13	Scraper	NBR	1
14	Rod seal	NBR	1
15	Cushion seal	NBR	2
16	Piston seal	NBR	1
17	Cushion valve seal	NBR	2
18	Cylinder tube gasket	NBR	2
19	Magnet	—	(1)

Replacement Parts/Seal Kit

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

Dimensions

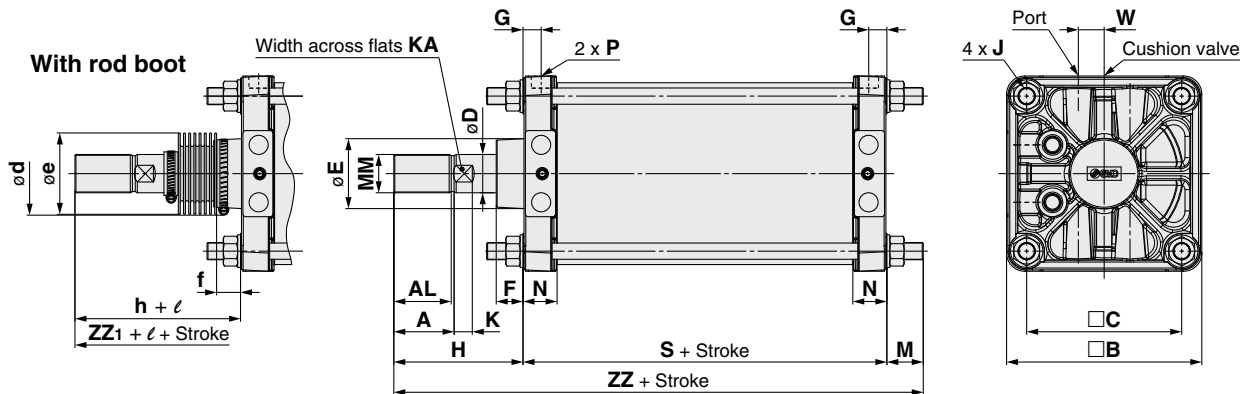
Basic: CS2B ø125 to ø160



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	ZZ1
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

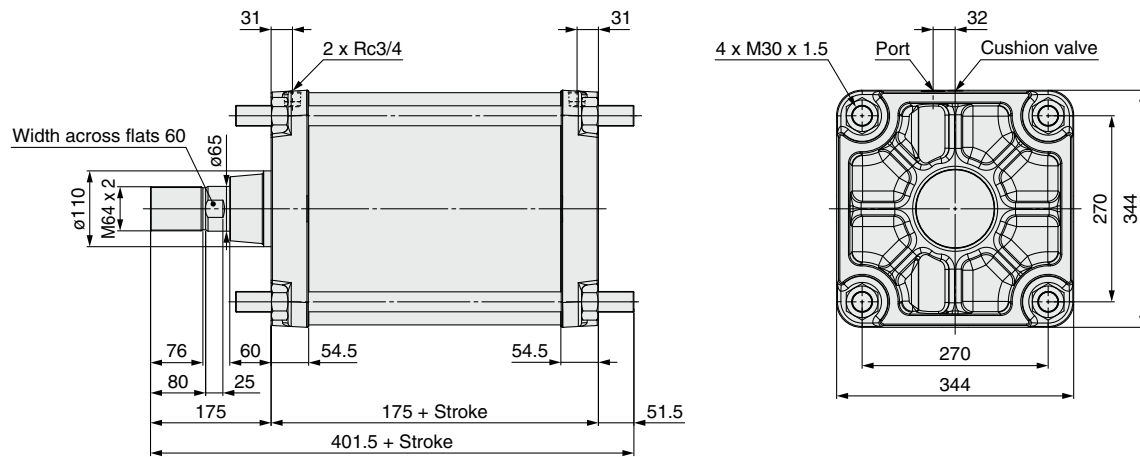
Bore size	S	W	Without rod boot		With rod boot					
			H	ZZ	d	e	f	h	ℓ	ZZ1
180	115	27	135	285	92	85	25	153	1/5 stroke	303
200	120	27	135	290	96	90	29	153	1/5 stroke	308
250	141	32	160	342.5	108	105	36	176	1/6 stroke	358.5

CS2 Series

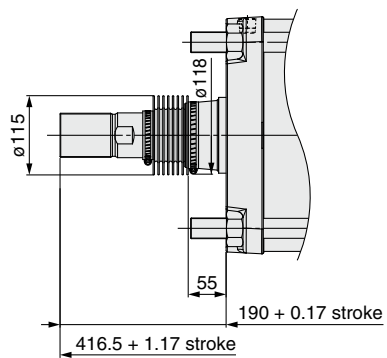
Dimensions

Basic: CS2B

Ø320



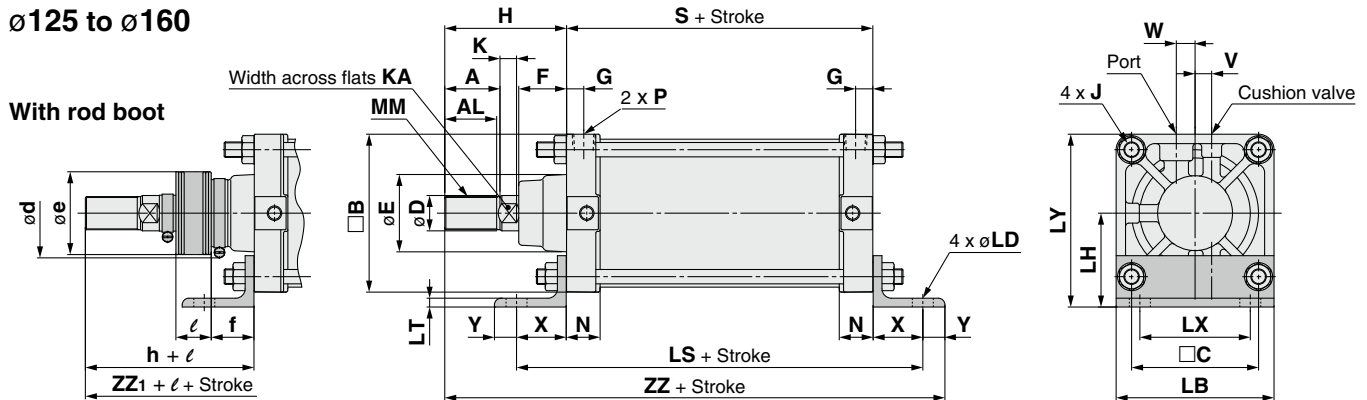
With rod boot



Dimensions

Foot: CS2L
ø125 to ø160

With rod boot

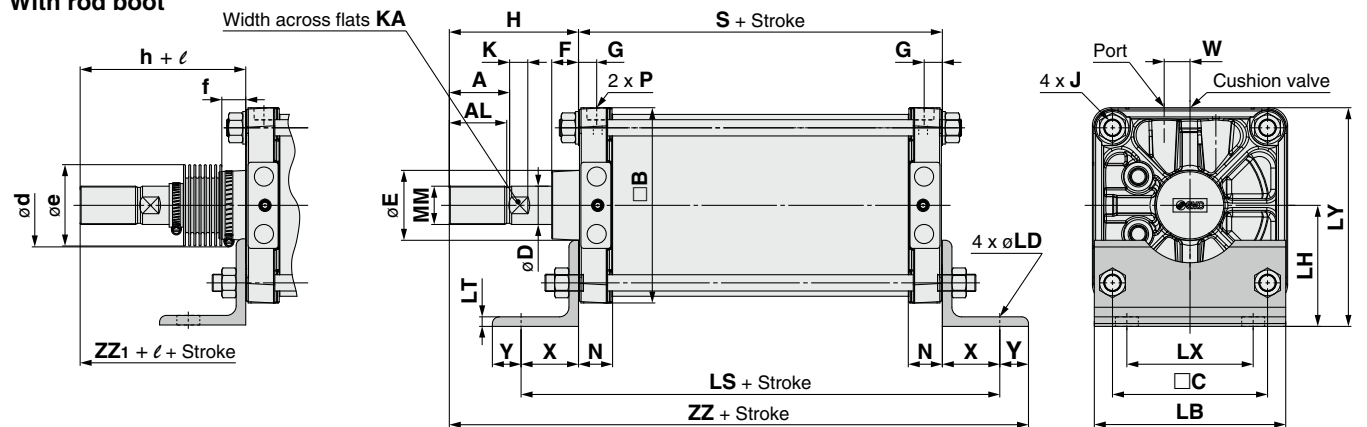


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	LB	LD	LH	LS
125	Up to 1600	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	143	19	85	188
140	Up to 1600	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	157	19	100	188
160	Up to 1600	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	177	19	106	206

Bore size	LT	LX	LY	MM	N	P	S	X	Y	Without rod boot		With rod boot						ZZ1
										H	ZZ	d	e	f	h	ℓ		
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

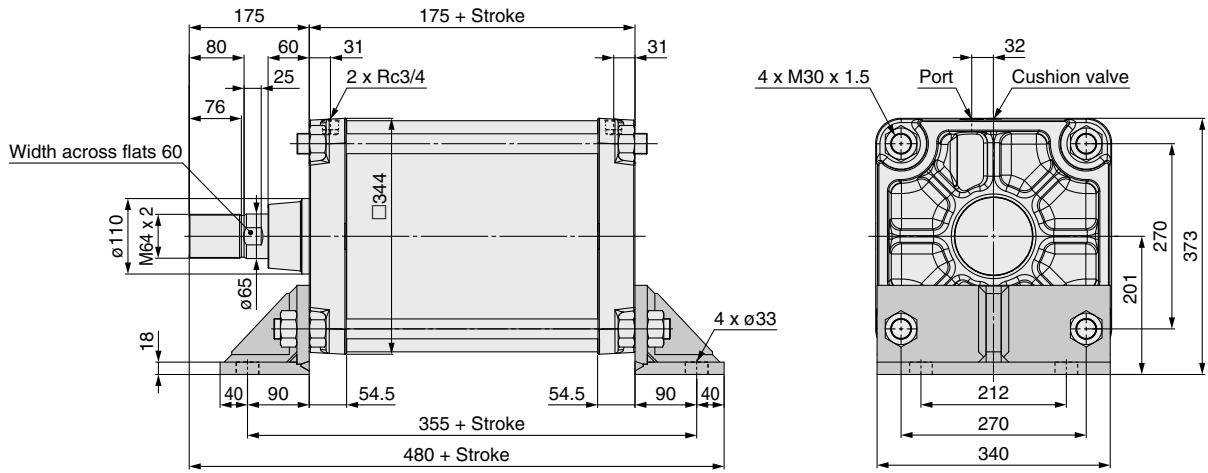
Bore size	LY	MM	N	P	S	W	X	Y	Without rod boot		With rod boot						ZZ1
									H	ZZ	d	e	f	h	ℓ		
180	227	M40 x 1.5	35.6	1/2	115	27	60	30	135	340	92	85	25	153	1/5 stroke		358
200	245	M45 x 1.5	35.6	1/2	120	27	60	30	135	345	96	90	29	153	1/5 stroke		363
250	298.5	M56 x 2	45.6	3/4	141	32	80	40	160	421	108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

CS2 Series

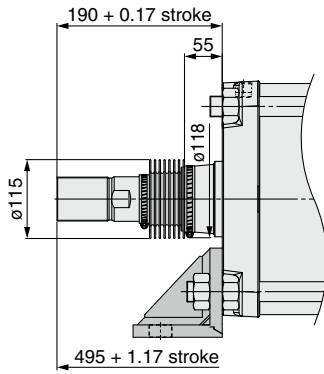
Dimensions

Foot: CS2L

Ø320



With rod boot

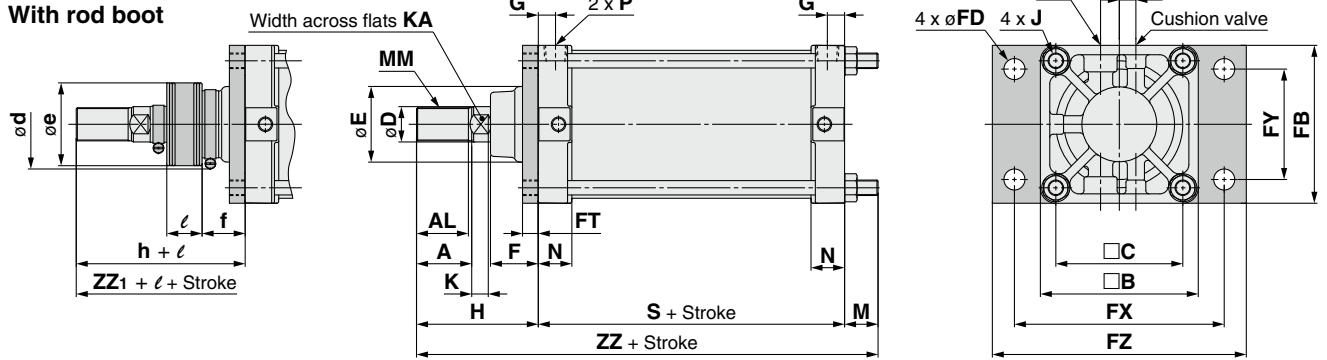


Dimensions

Rod flange: CS2F

ø125 to ø160

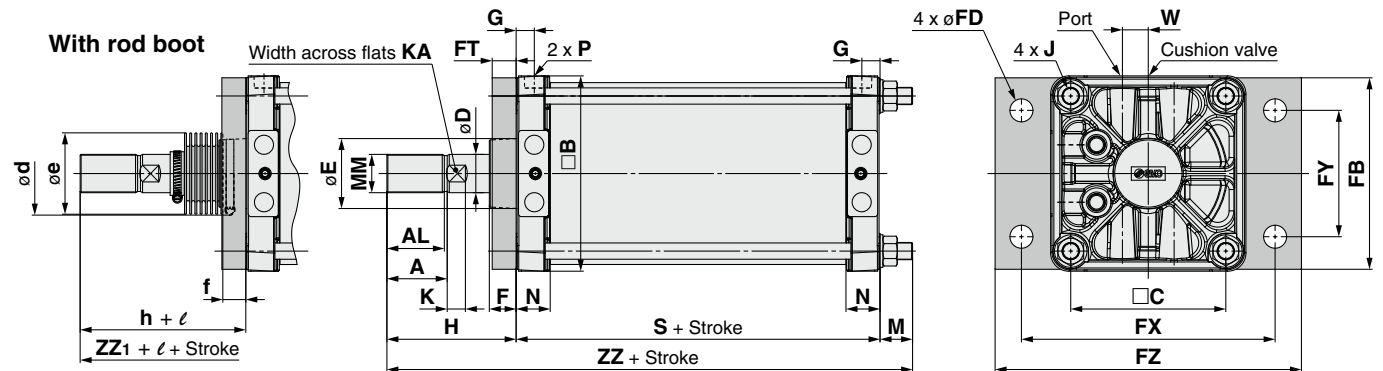
With rod boot



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

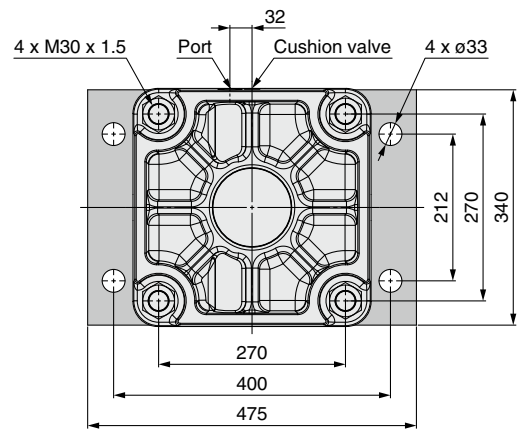
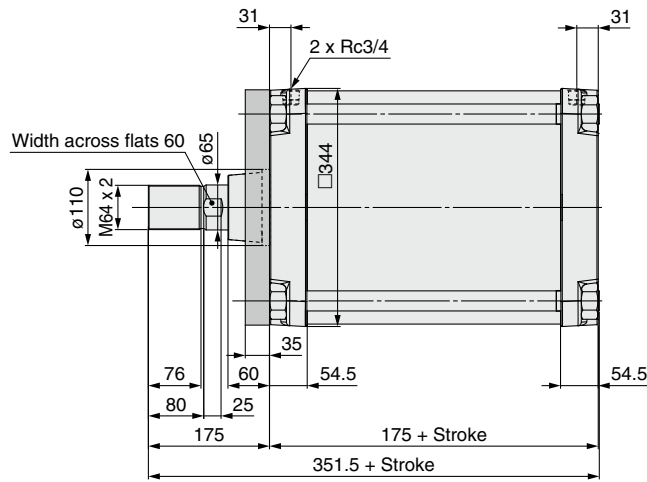
Bore size	KA	M	MM	N	P	S	W	Without rod boot		With rod boot						
								H	ZZ	d	e	f	h	ℓ	ZZ1	
180	36	31	M40 x 1.5	35.6	1/2	115	27	135	281	92	85	25	153	1/5 stroke	299	
200	41	31	M45 x 1.5	35.6	1/2	120	27	135	286	96	90	29	153	1/5 stroke	304	
250	50	35	M56 x 2	45.6	3/4	141	32	160	336	108	105	36	176	1/6 stroke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

CS2 Series

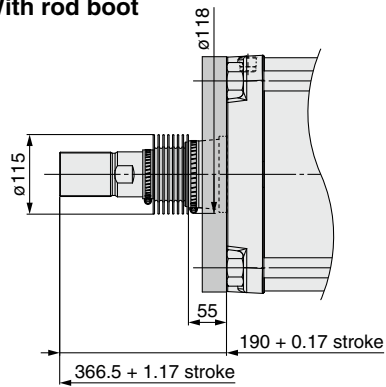
Dimensions

Rod flange: CS2F

Ø320



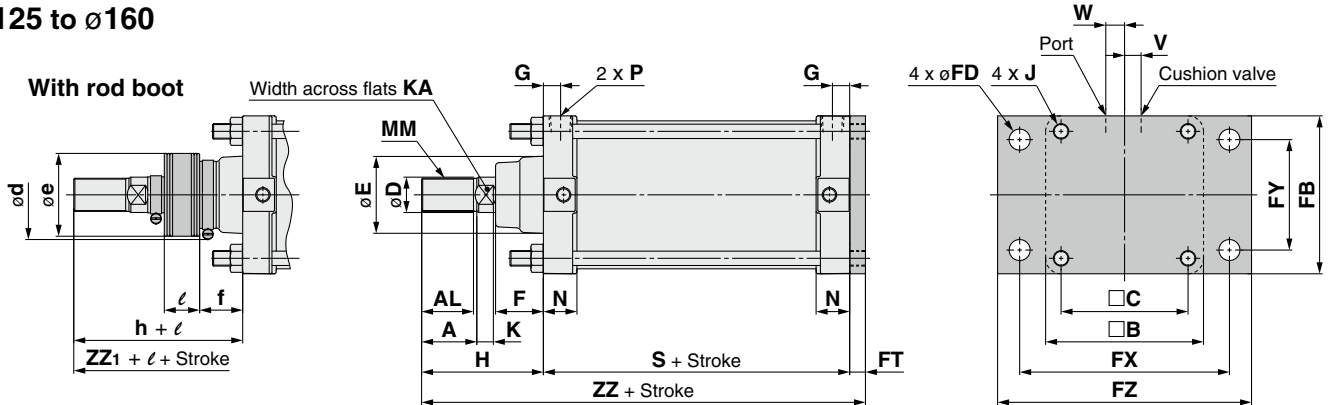
With rod boot



Dimensions

Head flange: CS2G

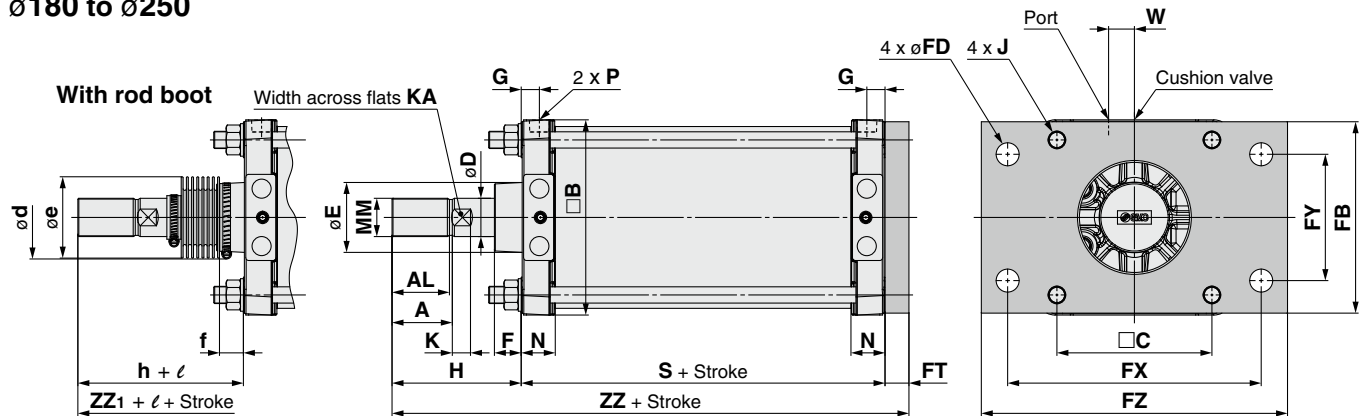
ø125 to ø160



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

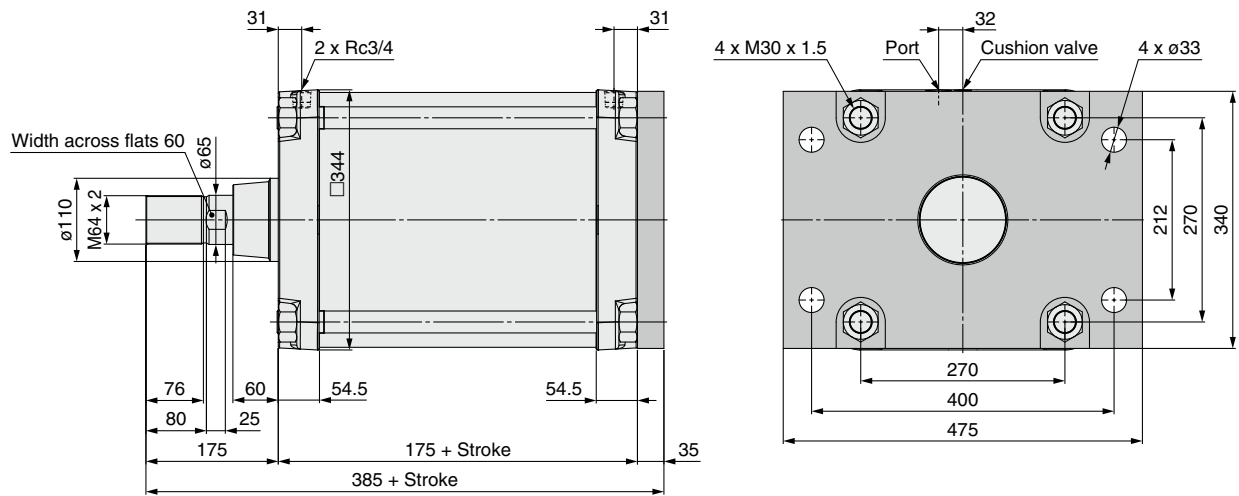
Bore size	KA	MM	N	P	S	W	Without rod boot		With rod boot						
							H	ZZ	d	e	f	h	l	ZZ1	
180	36	M40 x 1.5	35.6	1/2	115	27	135	275	92	85	25	153	1/5 stroke	293	
200	41	M45 x 1.5	35.6	1/2	120	27	135	280	96	90	29	153	1/5 stroke	298	
250	50	M56 x 2	45.6	3/4	141	32	160	331	108	105	36	176	1/6 stroke	347	

CS2 Series

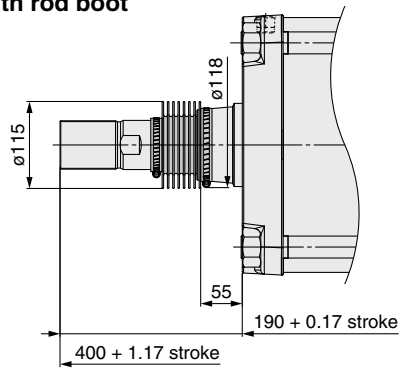
Dimensions

Head flange: CS2G

Ø320



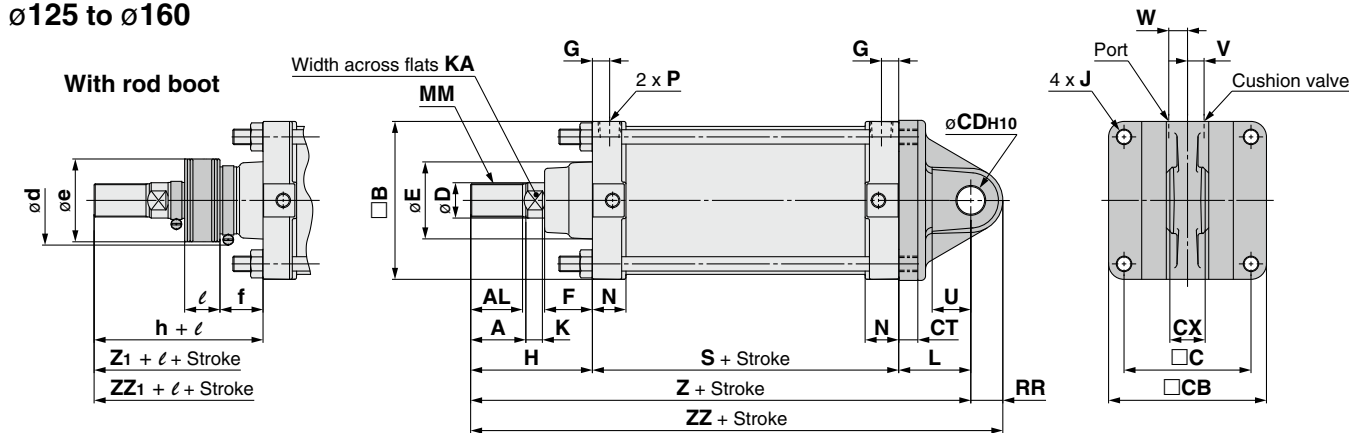
With rod boot



Dimensions

Single clevis: CS2C

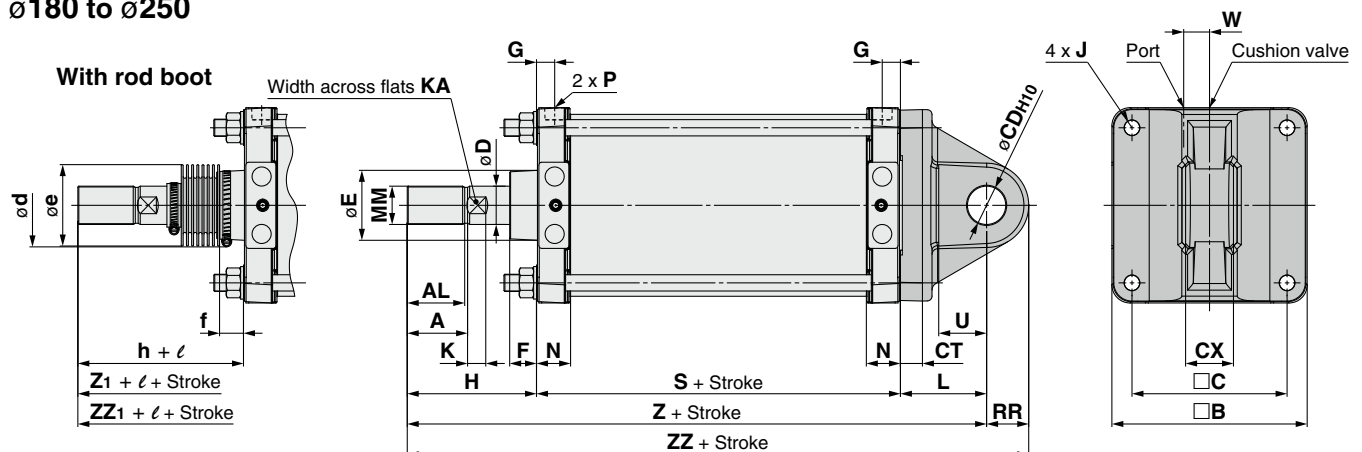
ø125 to ø160



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

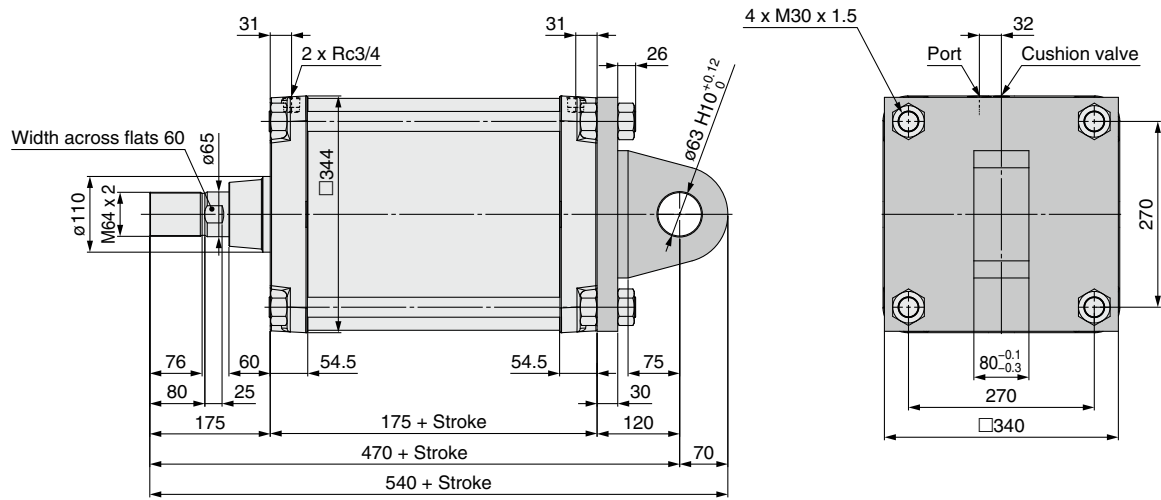
Bore size	MM	N	P	RR	S	U	W	Without rod boot			With rod boot						
								H	Z	ZZ	d	e	f	h	l	Z1	ZZ1
180	M40 x 1.5	35.6	1/2	44	115	50	27	135	340	384	92	85	25	153	1/5 stroke	358	402
200	M45 x 1.5	35.6	1/2	44	120	50	27	135	345	389	96	90	29	153	1/5 stroke	363	407
250	M56 x 2	45.6	3/4	55	141	65	32	160	411	466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

CS2 Series

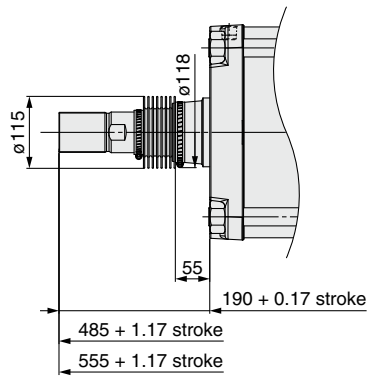
Dimensions

Single clevis: CS2C

Ø320



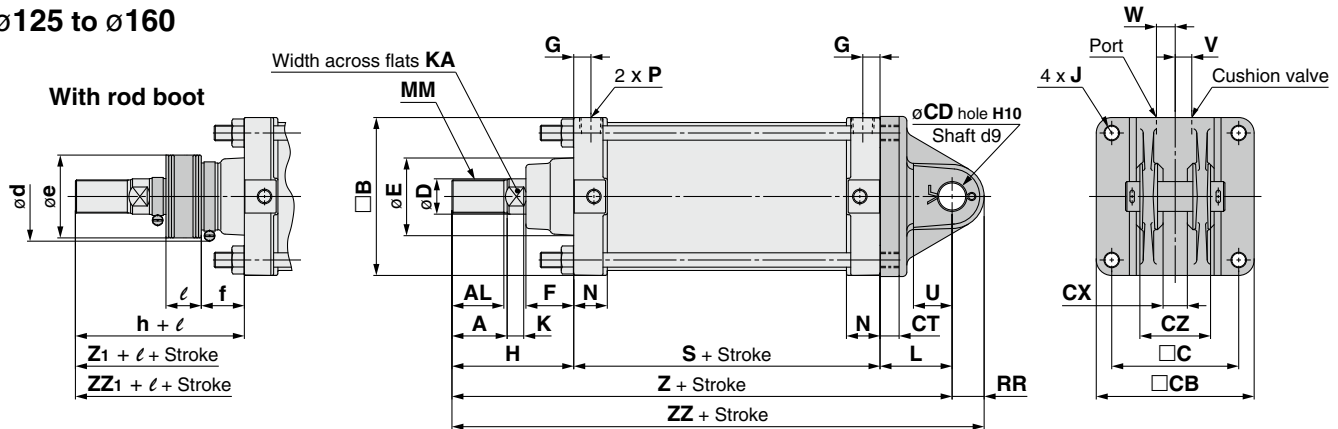
With rod boot



Dimensions

Double clevis: CS2D

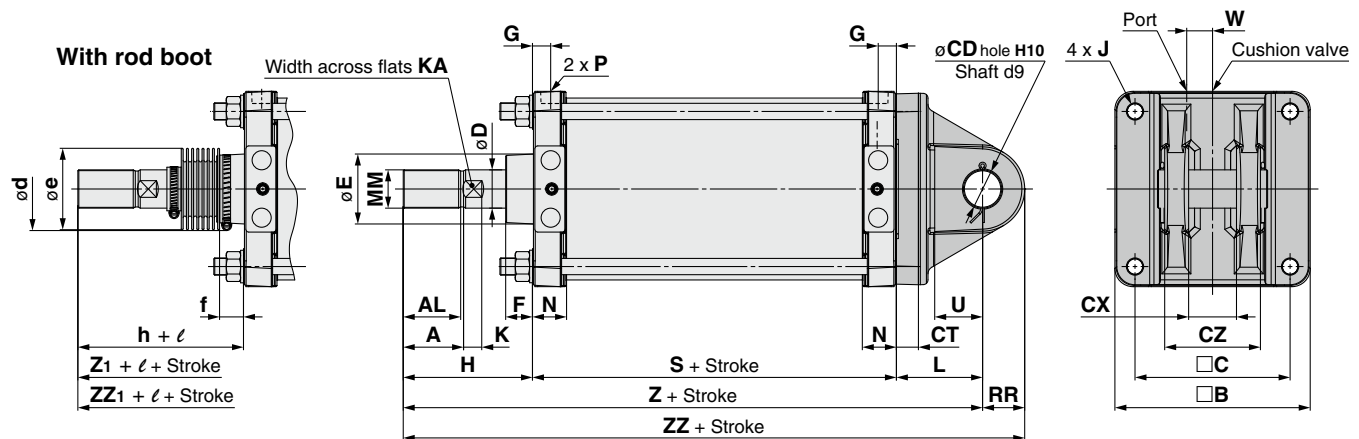
ø125 to ø160



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 ^{+0.084} ₀	17	32 ^{+0.3} _{-0.1}	64 ⁰ _{-0.2}	32	71	43	15	M14 x 1.5	15	17
140	Up to 1000	50	47	157	128	160	28 ^{+0.084} ₀	17	36 ^{+0.3} _{-0.1}	72 ⁰ _{-0.2}	32	71	43	15	M14 x 1.5	15	17
160	Up to 1200	56	53	177	144	180	32 ^{+0.100} ₀	20	40 ^{+0.3} _{-0.1}	80 ⁰ _{-0.2}	38	78.5	42	18	M16 x 1.5	15	20

[mm]																			
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 ^{+0.100} ₀	23	50 ^{+0.3} _{-0.1}	100 ^{-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 ^{+0.3} _{-0.1}	100 ^{-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 ^{+0.3} _{-0.1}	126 ^{-0.1} _{-0.3}	56	91	43	23	M24 x 1.5	22	50	110

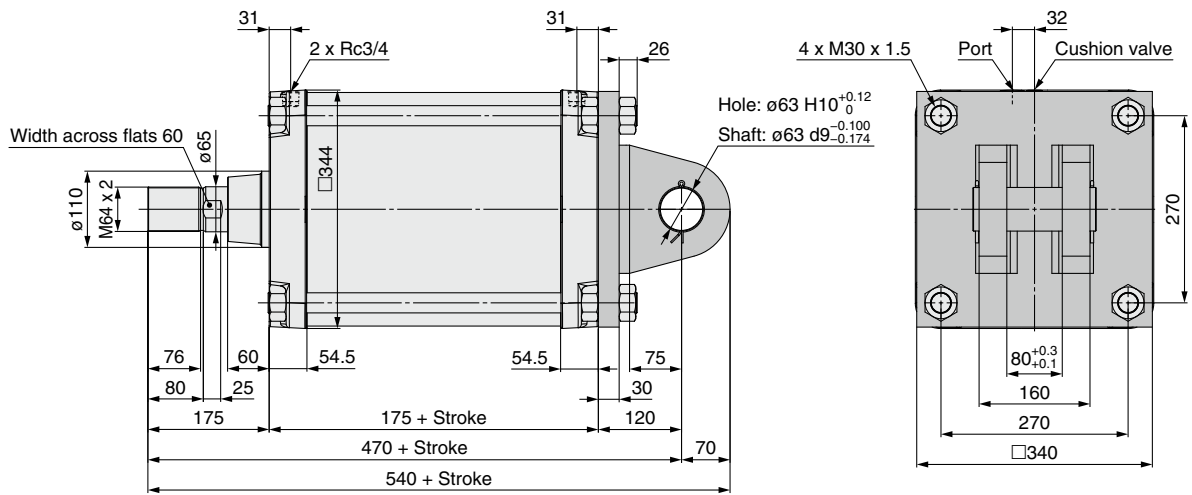
																	[mm]
Bore size	MM	N	P	RR	S	U	W	Without rod boot			With rod boot						
								H	Z	ZZ	d	e	f	h	ℓ	Z ₁	ZZ ₁
180	M40 x 1.5	35.6	1/2	44	115	50	27	135	340	384	92	85	25	153	1/5 stroke	358	402
200	M45 x 1.5	35.6	1/2	44	120	50	27	135	345	389	96	90	29	153	1/5 stroke	363	407
250	M56 x 2	45.6	3/4	55	141	65	32	160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

CS2 Series

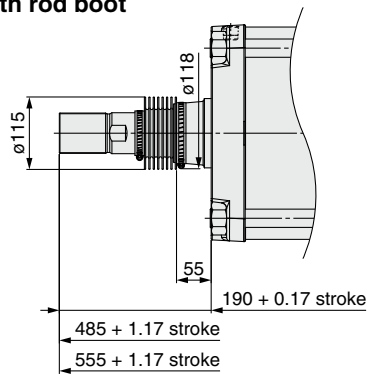
Dimensions

Double clevis: CS2D

Ø320



With rod boot

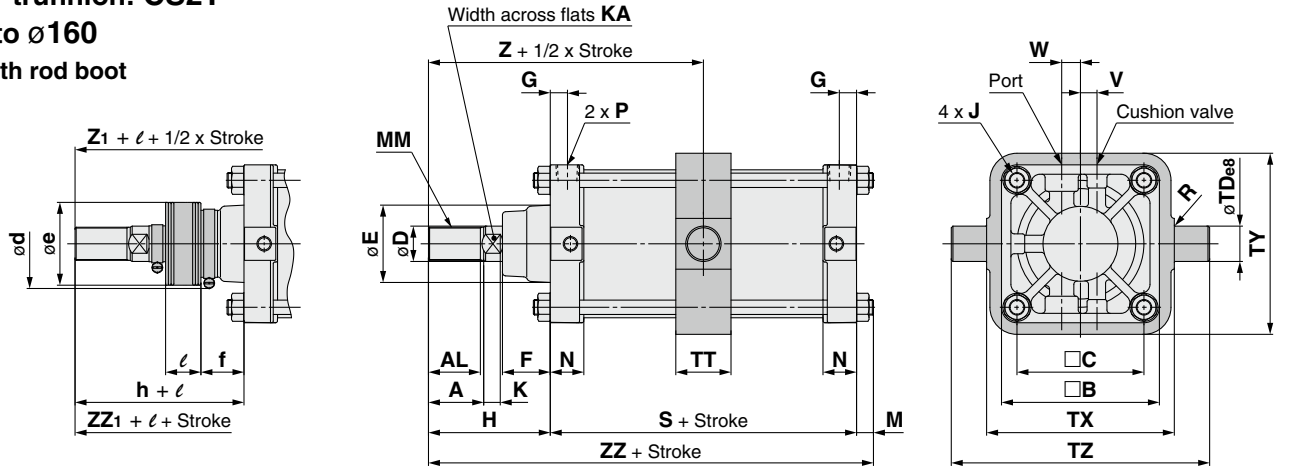


Dimensions

Center trunnion: CS2T

ø125 to ø160

With rod boot

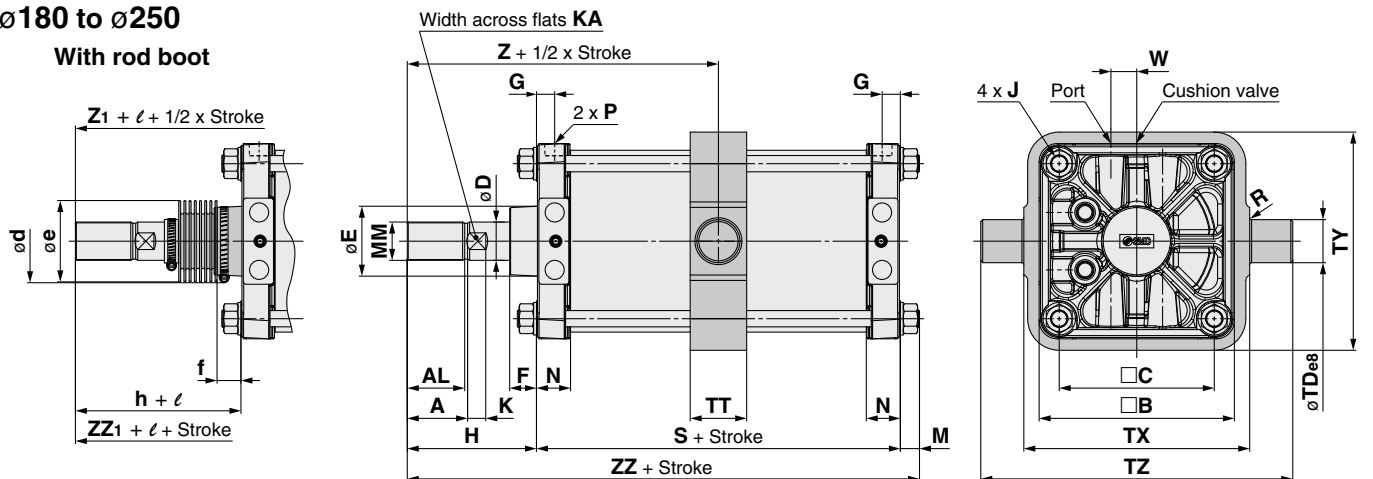


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	M	MM	N
125	25 to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5
140	30 to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5
160	35 to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34	15	M36 x 1.5	34.5

Bore size	P	R	S	TDe8	TT	TX	TY	TZ	Without rod boot			With rod boot						
									H	Z	ZZ	d	e	f	h	ℓ	Z1	ZZ1
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

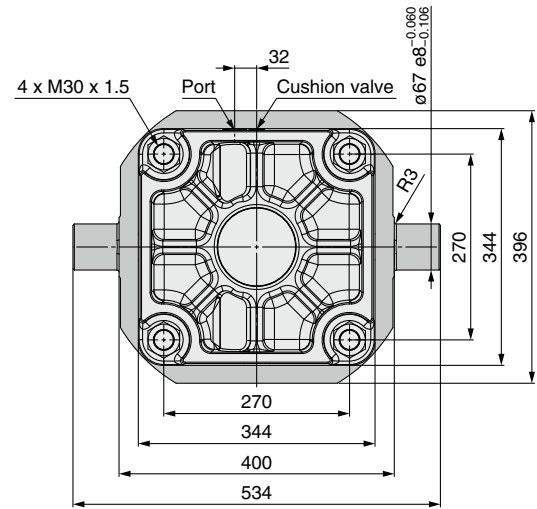
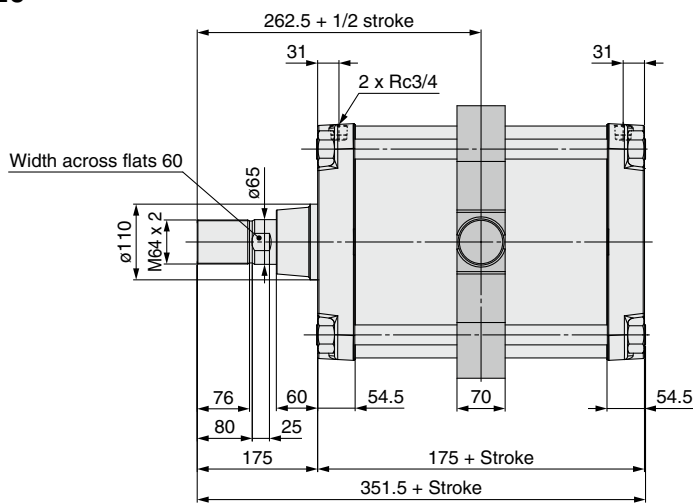
																	[mm]
Bore size	S	TDe8	TT	TX	TY	TZ	W	Without rod boot			With rod boot						
								H	Z	ZZ	d	e	f	h	ℓ	Z1	ZZ1
180	115	45 ^{-0.050} _{-0.089}	59	236	228	326	27	135	192.5	270	92	85	25	153	1/5 stroke	210.5	288
200	120	45 ^{-0.050} _{-0.089}	59	265	257	355	27	135	195	276	96	90	29	153	1/5 stroke	213	294
250	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

CS2 Series

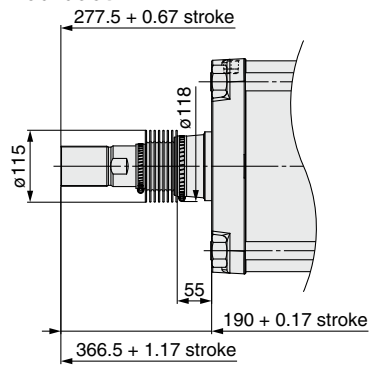
Dimensions

Center trunnion: CS2T

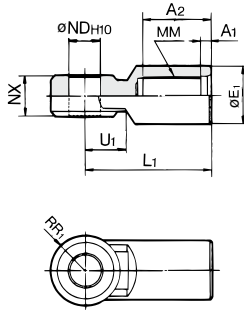
Ø320



With rod boot



I Type Single Knuckle Joint

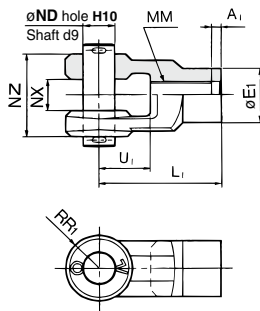


Material: Cast iron

Part no.	Applicable bore size [mm]	A ₁	A ₂	E ₁	L ₁	MM	NDH ₁₀	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

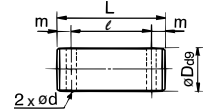


Material: Cast iron

Part no.	Applicable bore size [mm]	A ₁	E ₁	L ₁	MM	NDH ₁₀	NX	NZ	RR ₁	U ₁
Y-12A	125	8	46	100	M30 x 1.5	25 ^{+0.084} ₀	32 ^{+0.1} _{-0.3}	64 ^{+0.1} _{-0.3}	27	42
Y-14A	140	8	48	105	M30 x 1.5	28 ^{+0.084} ₀	36 ^{+0.1} _{-0.3}	72 ^{+0.1} _{-0.3}	30	47
Y-16A	160	8	55	110	M36 x 1.5	32 ^{+0.1} ₀	40 ^{+0.1} _{-0.3}	80 ^{+0.1} _{-0.3}	34	46
Y-18A	180	8	70	125	M40 x 1.5	40 ^{+0.1} ₀	50 ^{+0.1} _{-0.3}	100 ^{+0.1} _{-0.3}	42.5	54
Y-20A	200	8	70	125	M45 x 1.5	40 ^{+0.1} ₀	50 ^{+0.1} _{-0.3}	100 ^{+0.1} _{-0.3}	42.5	54
Y-25A	250	9	86	160	M56 x 2	50 ^{+0.1} ₀	63 ^{+0.1} _{-0.3}	126 ^{+0.1} _{-0.3}	53	81
Y-32A	320	9	105	175	M64 x 2	63 ^{+0.12} ₀	80 ^{+0.1} _{-0.3}	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

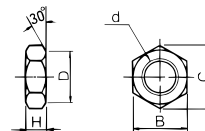


Material: Carbon steel

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

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	Yes	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		3-wire (NPN)				24 V	5 V, 12 V	—	M9NW	—	●		●		●	○	○
				3-wire (PNP)	M9PW	—	●				●	●	○	○					
				2-wire	M9BW	—	●				●	●	○	○	—				
				Water resistant (2-color indicator)	3-wire (NPN)	24 V	5 V, 12 V	—	M9NA*1	—	○	○	●	○	○		IC circuit		
	3-wire (PNP)				M9PA*1				—	○	○	●	○	○					
	2-wire			M9BA*1	—				○	○	●	○	○	—					
	With diagnostic output (2-color indicator)			Grommet	4-wire (NPN)	24 V	5 V, 12 V	—	F59F	—	●	—	●	○	○		IC circuit		
			2-wire (Non-polar)		P3DWA*2				—	●	—	●	●	○	—				
Magnetic field resistant (2-color indicator)		3-wire (NPN equivalent)	—	5 V	—				A96	—	●	●	●	●	○	IC circuit		—	
Reed auto switch	—	Grommet	Yes	2-wire	24 V	12 V	100 V	A93	—	●	●	●	●	○*3	—	Relay, PLC			
								No	5 V, 12 V	100 V or less	A90	—	●	●	●		●	○*3	IC circuit
								Yes	12 V	100 V, 200 V	A54	—	●	—	●		—	—	—
								No		200 V or less	A64	—	●	—	●		—	—	
		Terminal conduit	Yes			12 V	100 V, 200 V	—	A33	—	—	—	—	—	PLC				
								—	A34	—	—	—	—	—					
		DIN terminal	Grommet			Yes	12 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.

*3 The load voltage used is 24 VDC.

* 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

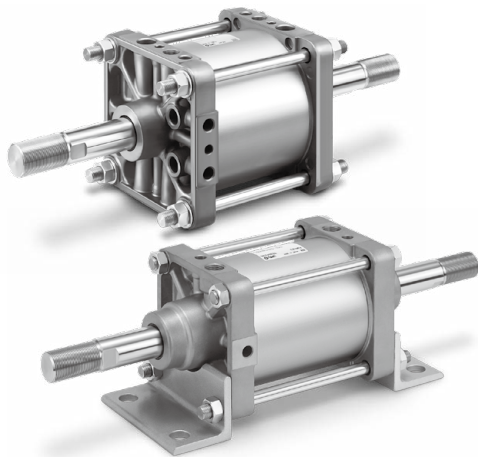
* Auto switches marked with a "O" are produced upon receipt of order.

* 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.)

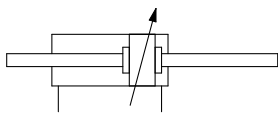
* D-G39/K39/A3□/A44 auto switches (band mounting type) can only be mounted on ø125 to ø160.

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



Symbol

Double acting, Air cushion



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

Symbol	Specifications
-XA□	Change of rod end shape
-XB5	Oversized rod cylinder
-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.

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	+2.8 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 ø200 to ø320 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 ø320.

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.

CS2W Series

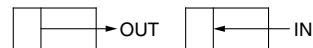
Weight (Guide)

Bore size [mm]		[kg]						
		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

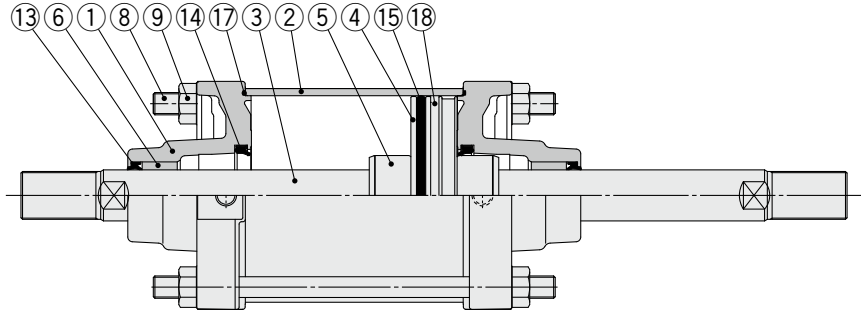
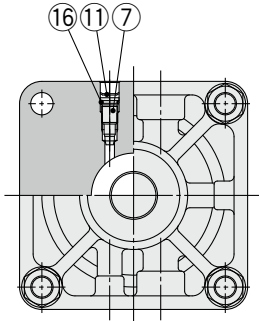


Unit: N

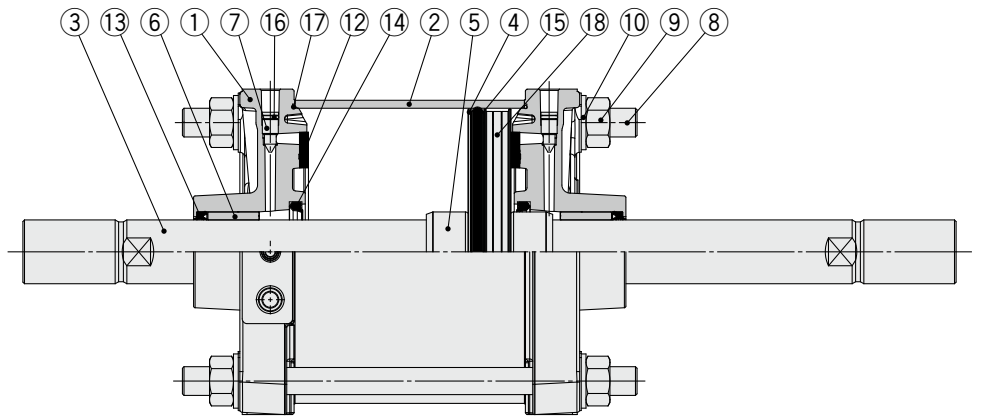
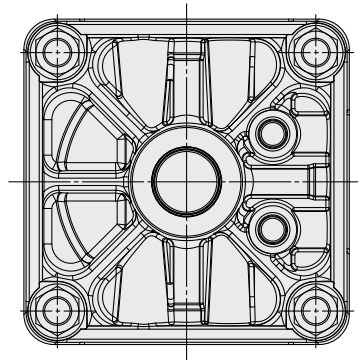
Bore size [mm]	Rod size [mm]	Piston area [mm ²]	Operating pressure [MPa]								
			0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	32	11500	2300	3450	4600	5750	6900	8050	9200	10350	11500
140		14600	2920	4380	5840	7300	8760	10220	11680	13140	14600
160	38	19000	3800	5700	7600	9500	11400	13300	15200	17100	19000
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.

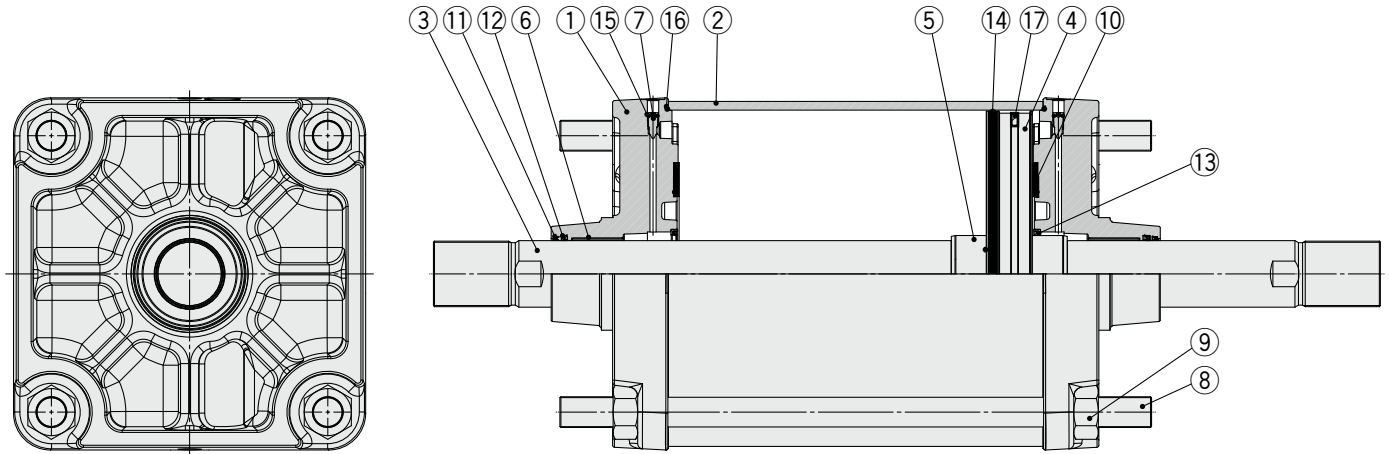
* Please contact SMC to order the common made-to-order specification -XA□ (Change of rod end shape), in which the seal of bore sizes ø180 to ø250 can be replaced.

* Trunnion type should not be disassembled. (Refer to page 76.)

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)

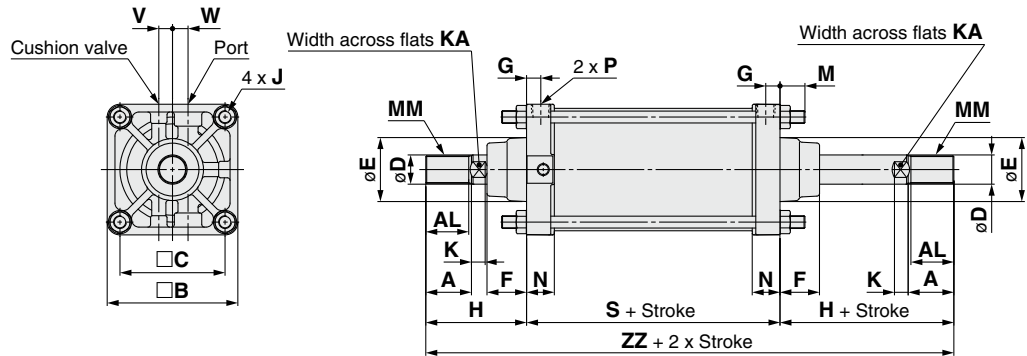
Replacement Parts/Seal Kit

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

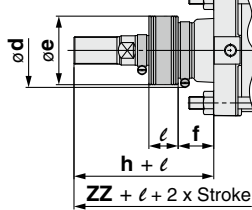
* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.
Grease pack part number: GR-S-010 (10 g), GR-S-020 (20 g)

Dimensions

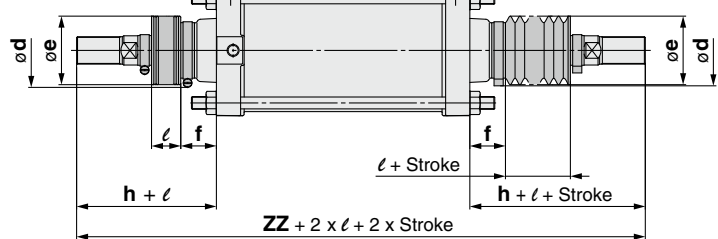
Basic: CS2WB ø125 to ø160



With rod boot (One side)



With rod boot (Both sides)

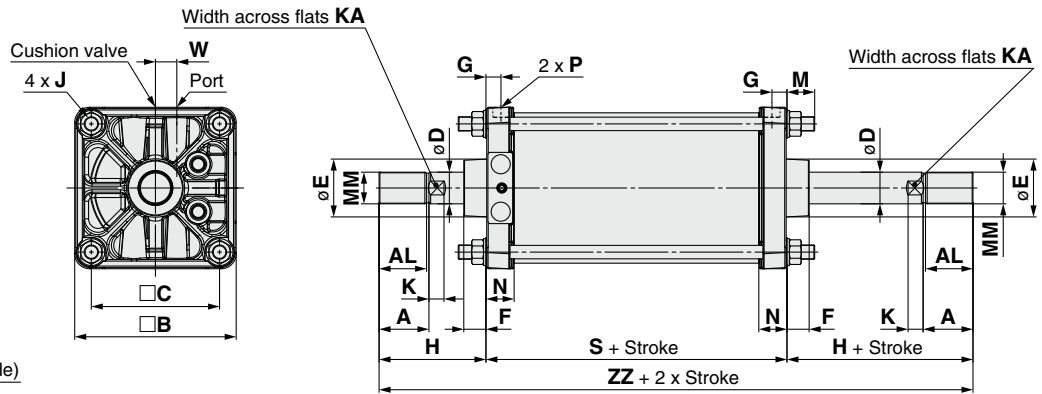
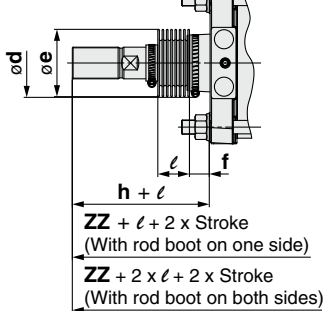


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	M	MM	N	P	S
125	Up to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	27	M30 x 1.5	30.5	1/2	98
140	Up to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	27	M30 x 1.5	30.5	1/2	98
160	Up to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15	20	17	34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

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

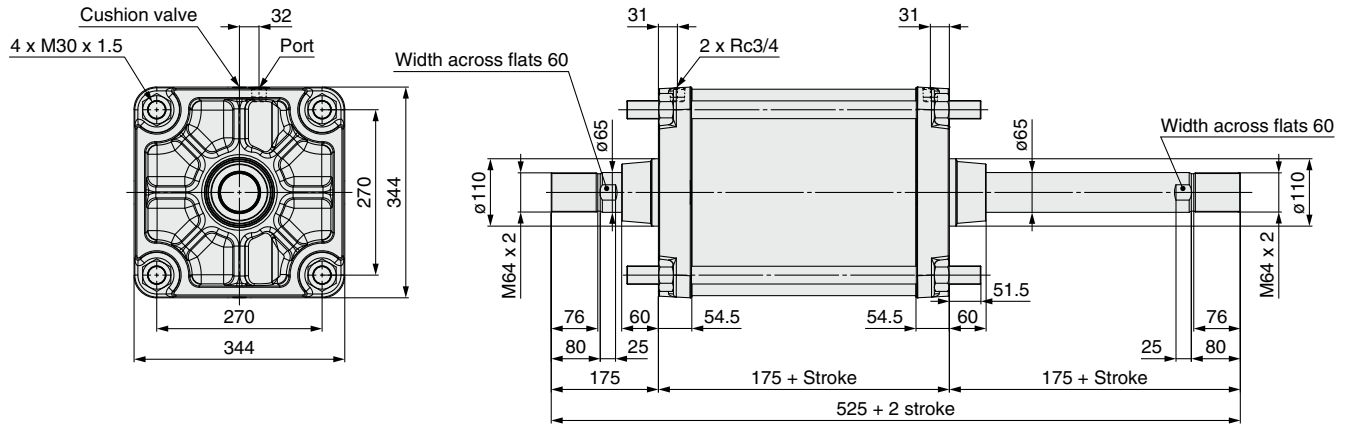
Bore size	Without rod boot		With rod boot (One side)						(Both sides)	
	H	ZZ	d	e	f	h	l	ZZ	ZZ	ZZ
180	135	385	92	85	25	153	1/5 stroke	403	421	421
200	135	390	96	90	29	153	1/5 stroke	408	426	426
250	160	461	108	105	36	176	1/6 stroke	477	493	493

CS2W Series

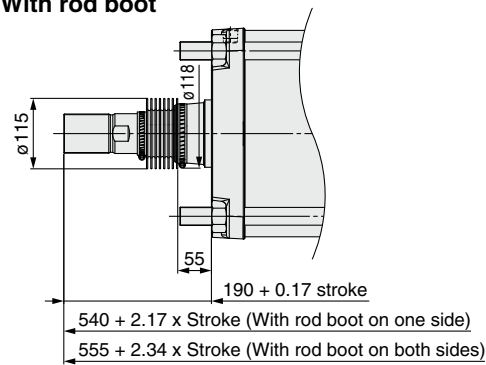
Dimensions

Basic: CS2WB

Ø320

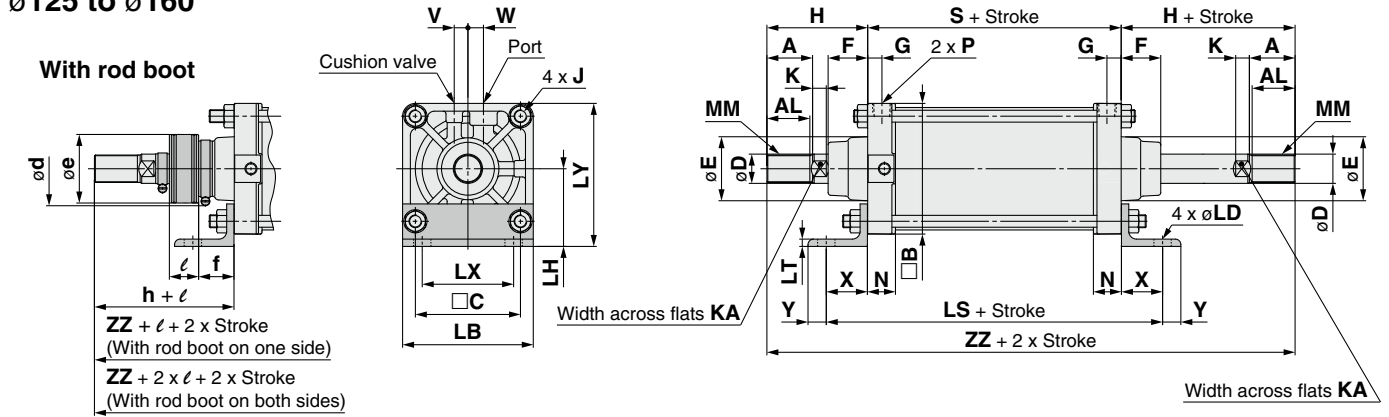


With rod boot



Dimensions

Foot: CS2WL
ø125 to ø160

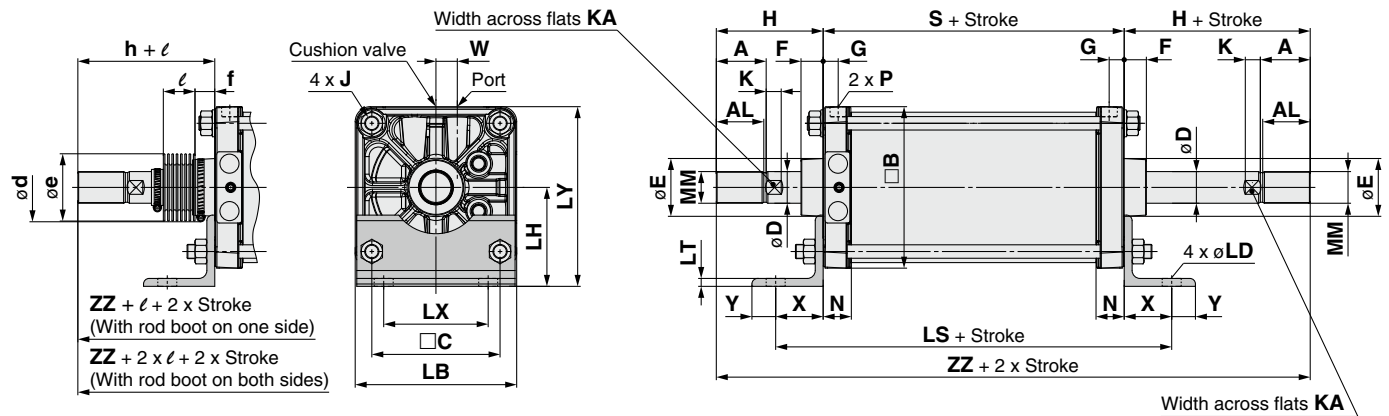


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	LB	LD	LH	LS	LT	LX	LY
125	Up to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	143	19	85	188	8	100	156.5
140	Up to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	157	19	100	188	9	112	178.5
160	Up to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5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

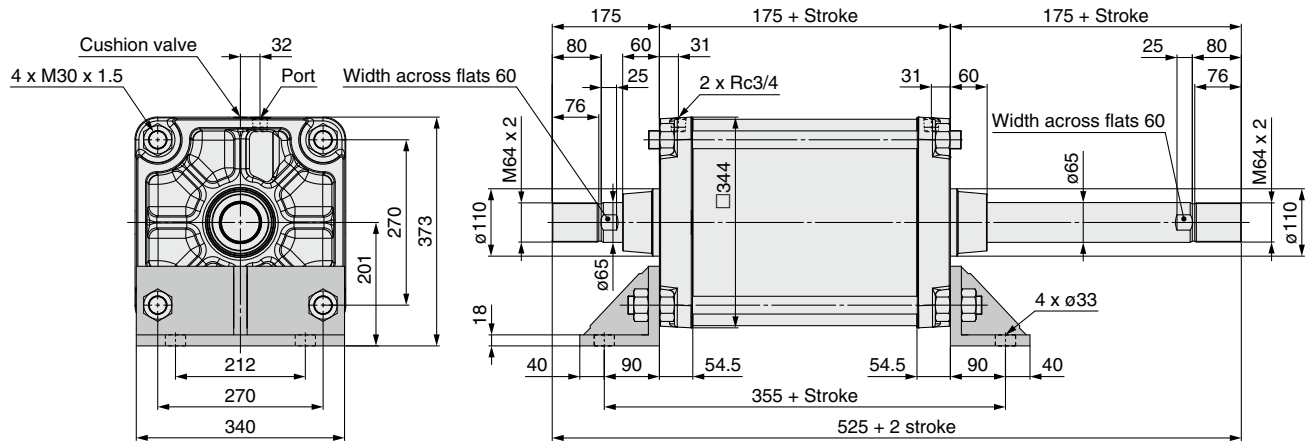
																[mm]	
Bore size	MM	N	P	S	W	X	Y	Without rod boot		With rod boot (One side)						(Both sides)	
								H	ZZ	d	e	f	h	ℓ	ZZ	ZZ	
180	M40 x 1.5	35.6	1/2	115	27	60	30	135	385	92	85	25	153	1/5 stroke	403	421	
200	M45 x 1.5	35.6	1/2	120	27	60	30	135	390	96	90	29	153	1/5 stroke	408	426	
250	M56 x 2	45.6	3/4	141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

CS2W Series

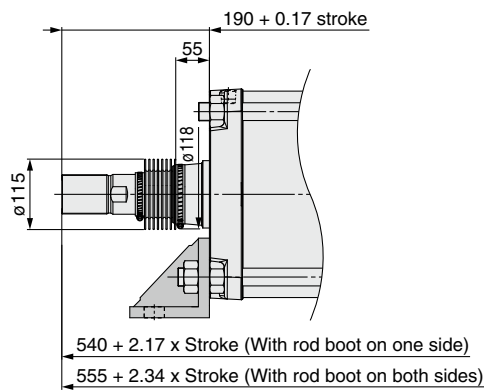
Dimensions

Foot: CS2WL

ø320



With rod boot

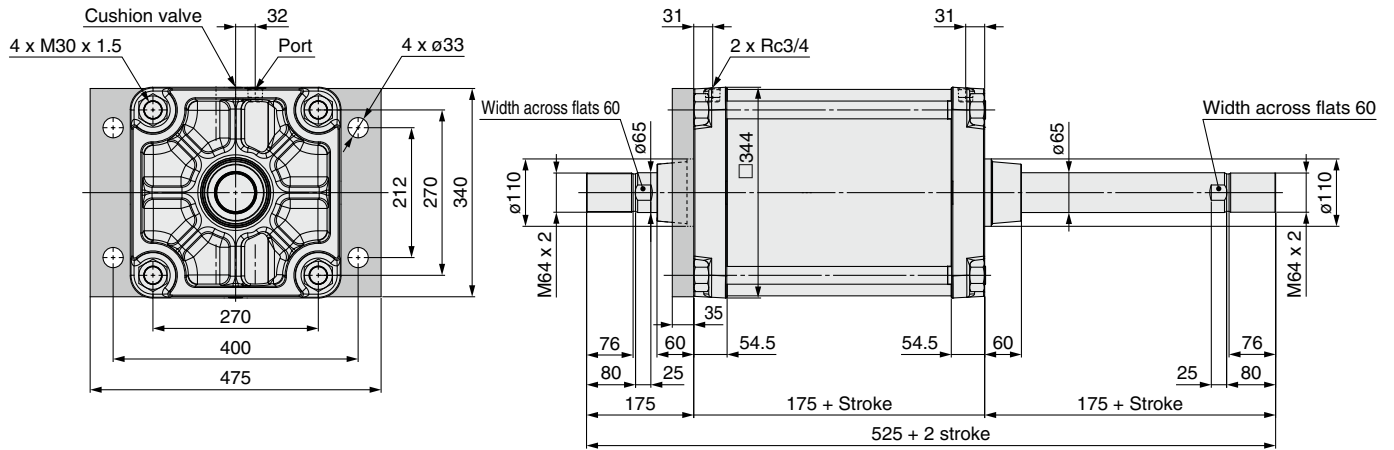


CS2W Series

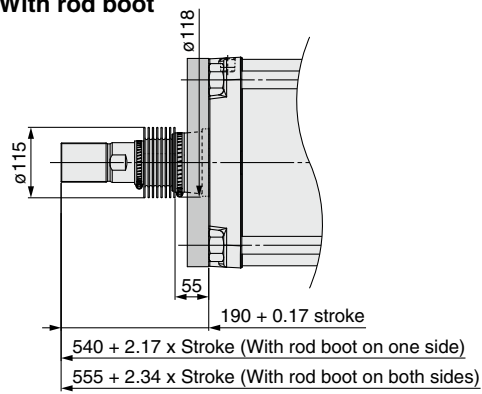
Dimensions

Flange: CS2WF

Ø320



With rod boot

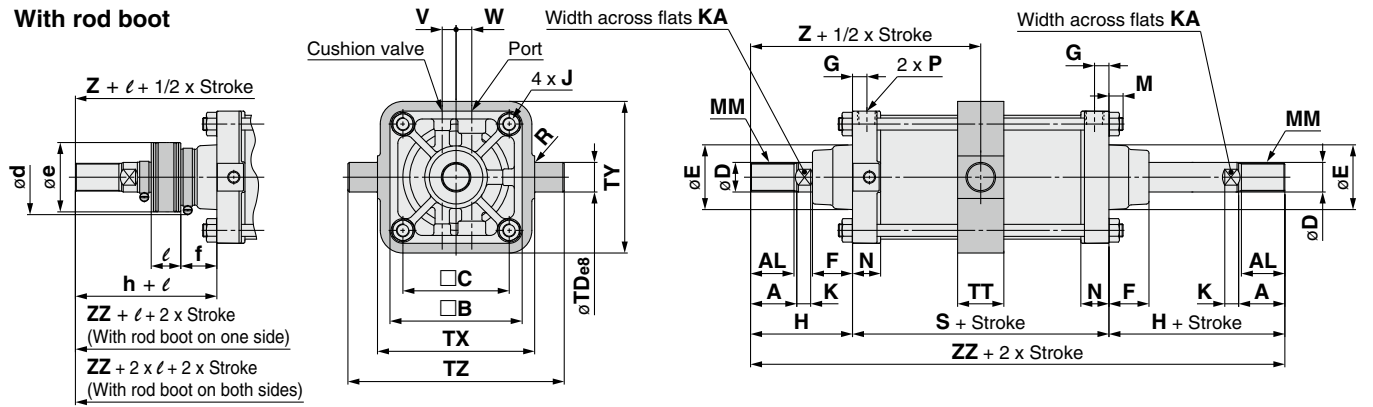


Dimensions

Center trunnion: CS2WT

ø125 to ø160

With rod boot

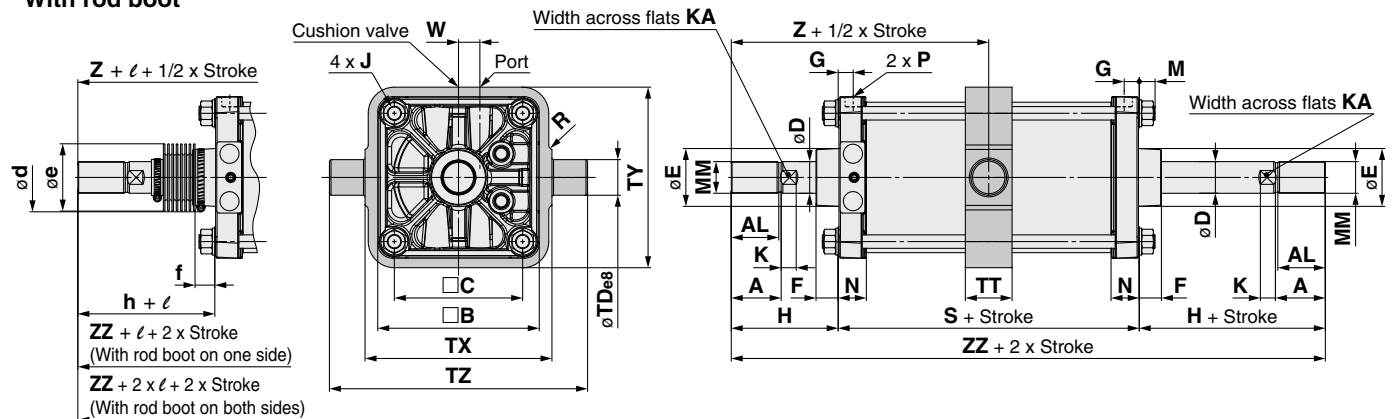


Bore size	Stroke range	A	AL	B	C	D	E	F	G	J	V	W	K	KA	M	MM	N	P	R	S
125	25 to 1000	50	47	143	115	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5	1/2	1	98
140	30 to 1000	50	47	157	128	32	71	43	15	M14 x 1.5	15	17	15	27	13	M30 x 1.5	30.5	1/2	1.5	98
160	35 to 1200	56	53	177	144	38	78.5	42	18	M16 x 1.5	15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

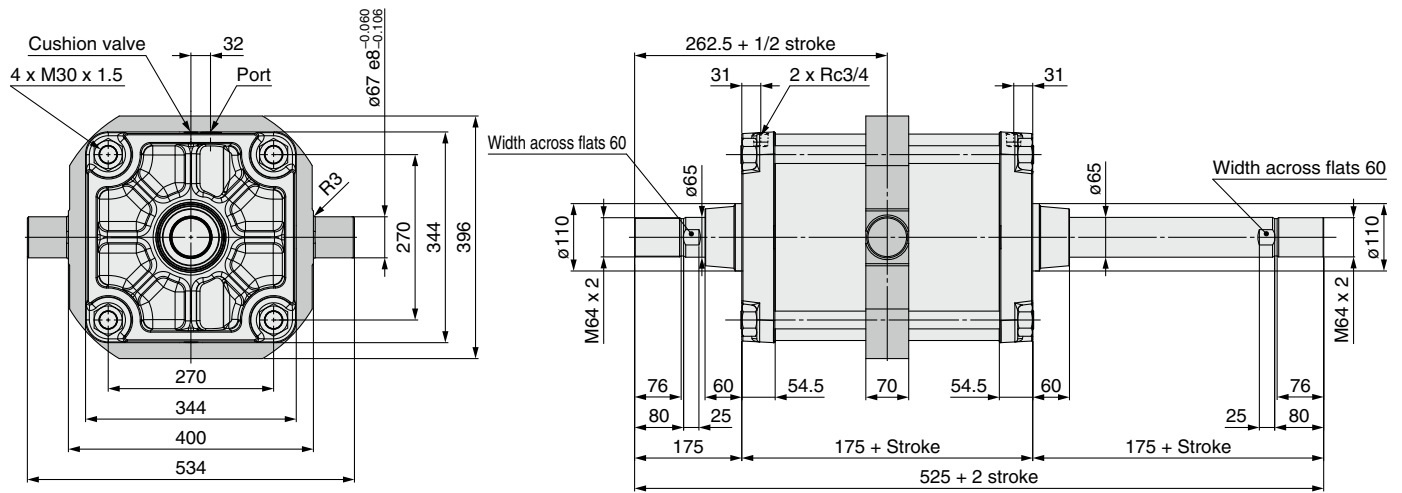
Bore size	TT	TX	TY	TZ	W	Without rod boot												With rod boot (One side)			(Both sides)		
						H	Z	ZZ	d	e	f	h	l	Z	ZZ	ZZ							
180	59	236	228	326	27	135	192.5	388	92	85	25	153	1/5 stroke	210.5	403	421							
200	59	265	257	355	27	135	195	393	96	90	29	153	1/5 stroke	213	408	426							
250	69	335	325	447	32	160	230.5	465	108	105	36	176	1/6 stroke	246.5	477	493							

CS2W Series

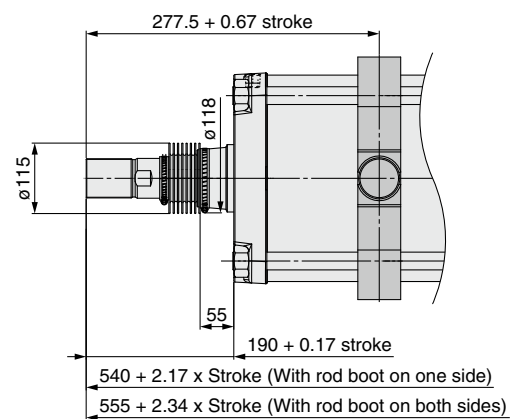
Dimensions

Center trunnion: CS2WT

ø320



With rod boot



Air Cylinder: Long Stroke Type Double Acting, Single Rod

CS2-V Series

ø180, ø200, ø250, ø320

RoHS

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

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

Made to order
Refer to page 41 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	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	●	●	●	○	○				
	Water resistant (2-color indicator)			2-wire				M9BW	●	●	●	○	○	——			
				3-wire (NPN)				M9NA*1	○	○	●	○	○			IC circuit	
				3-wire (PNP)				M9PA*1	○	○	●	○	○				
				2-wire				M9BA*1	○	○	●	○	○	——			
				With diagnostic output (2-color indicator)				4-wire (NPN)	5 V, 12 V	F59F	●	—	●	○		○	IC circuit
				Magnetic field resistant (2-color indicator)				2-wire (Non-polar)	——	P3DWA*2	●	—	●	●		○	——
	Reed auto switch			——	Grommet	Yes	3-wire (NPN equivalent)	——	5 V	——	A96	●	●	●		●	○
2-wire		24 V	12 V				100 V				A93	●	●	●	●	○*3	——
			5 V, 12 V			100 V or less	A90	●	●	●	●	○*3	IC circuit				
			12 V			100 V, 200 V	A54	●	—	●	●	—	——				
						200 V or less	A64	●	—	●	—	—					
Diagnostic indication (2-color indicator)		Yes	——			——	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.

*3 The load voltage used is 24 VDC.

* Lead wire length symbols: 0.5 m.....Nil (Example) M9NW 3 m.....L (Example) M9NWL
1 m.....M (Example) M9NWM 5 m.....Z (Example) M9NWW

* 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.

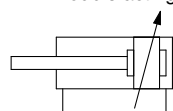
* D-A9□/M9□/M9□W/M9□A/P3DWA□ auto switches are shipped together with the product but do not come assembled. (Only the auto switch mounting brackets are assembled before shipment.)

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.

			[mm]
Bore size	Mounting bracket	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	●	●	●	●	●	●	●
	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.

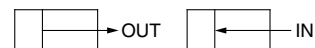
Weight (Guide)

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

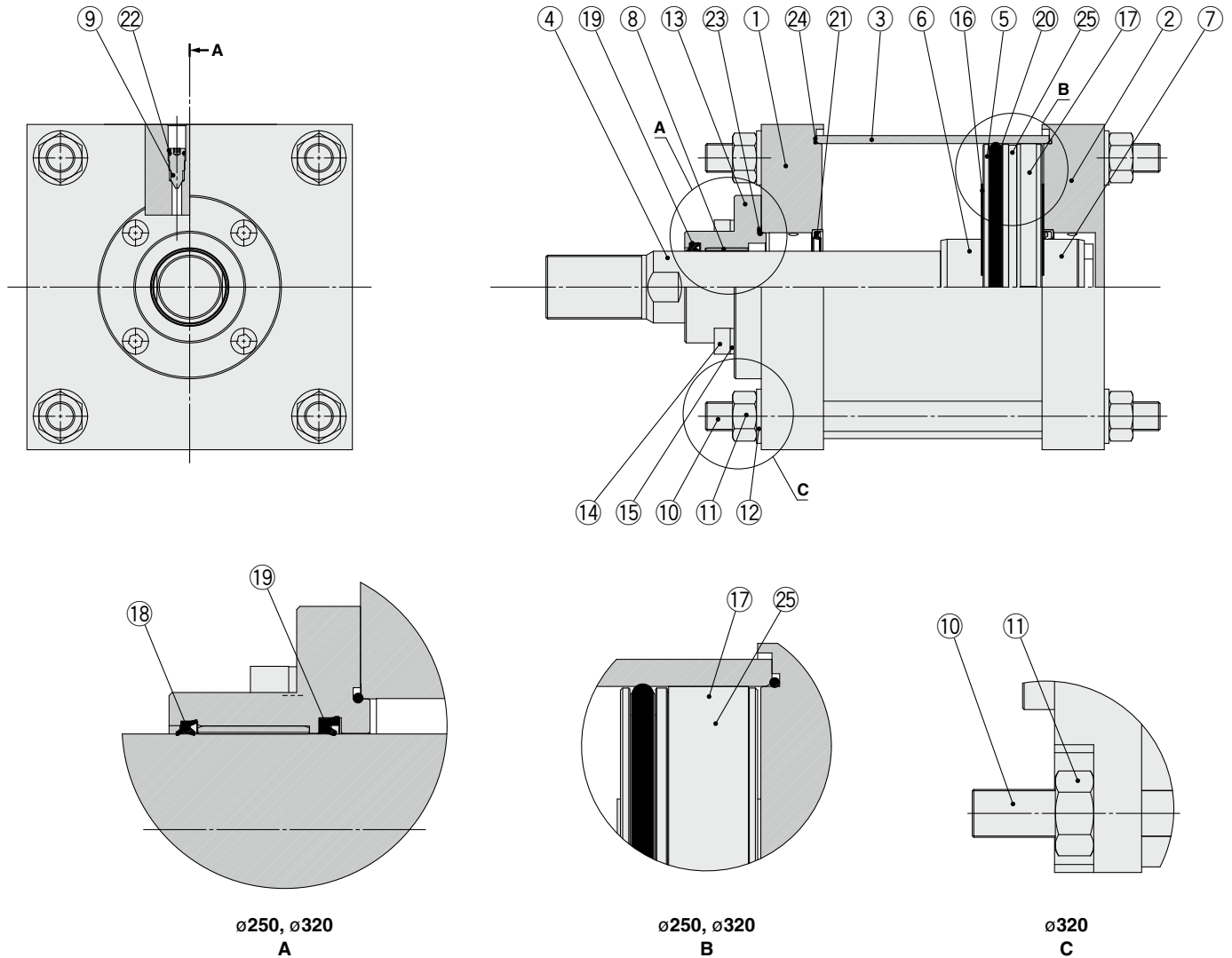


Unit: N

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
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

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	

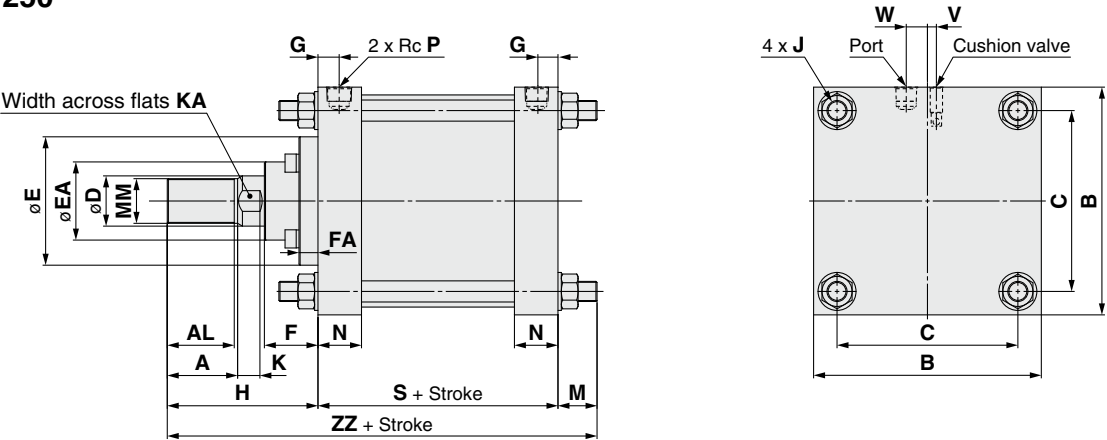
* The seal kit includes a grease pack (40 g). Order with one of the following part numbers when only the grease pack is required.

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

* Trunnion type should not be disassembled. (Refer to page 76.)

Dimensions

Basic: CS2B-V
ø180 to ø250



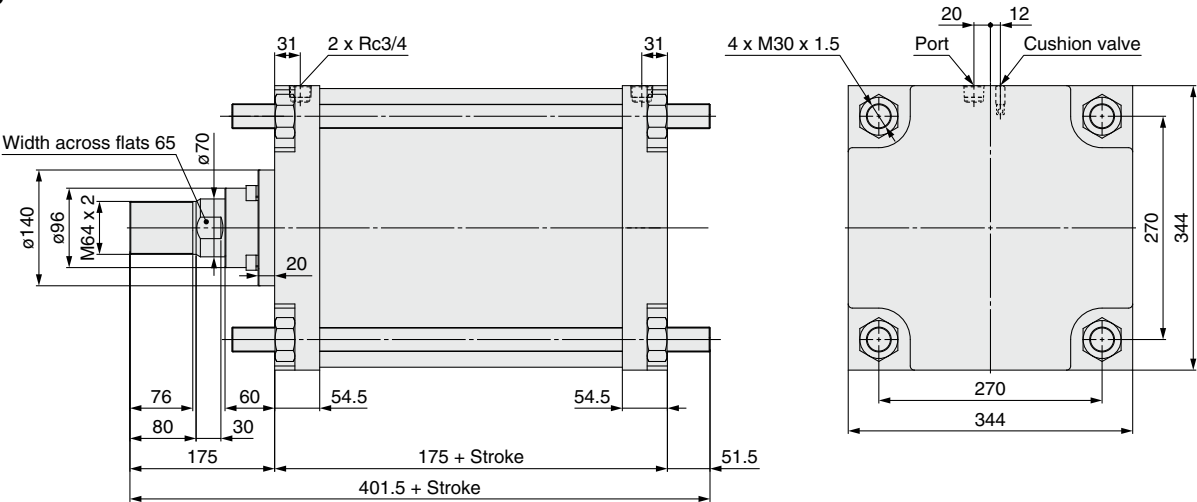
[mm]

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

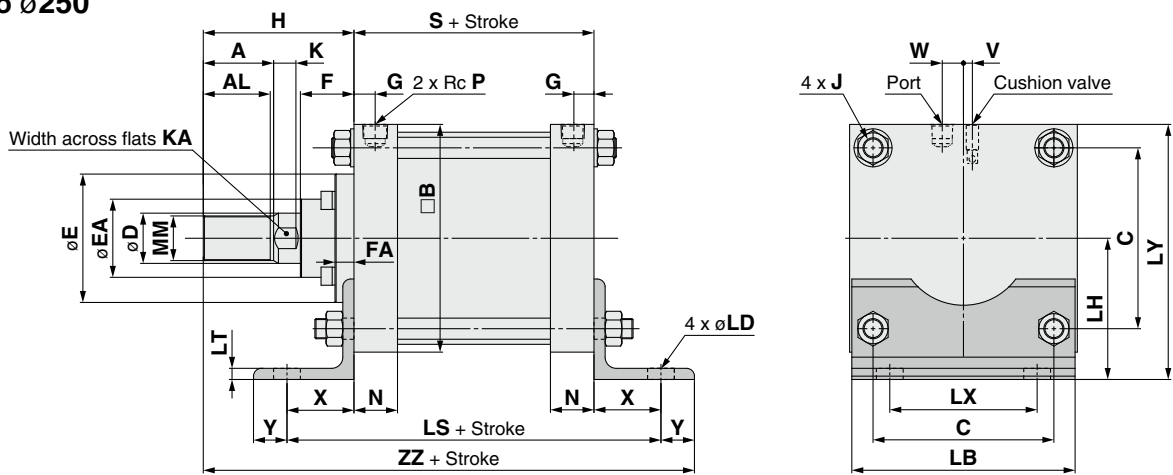
Auto Switch

Made to Order

CS2-V Series

Dimensions

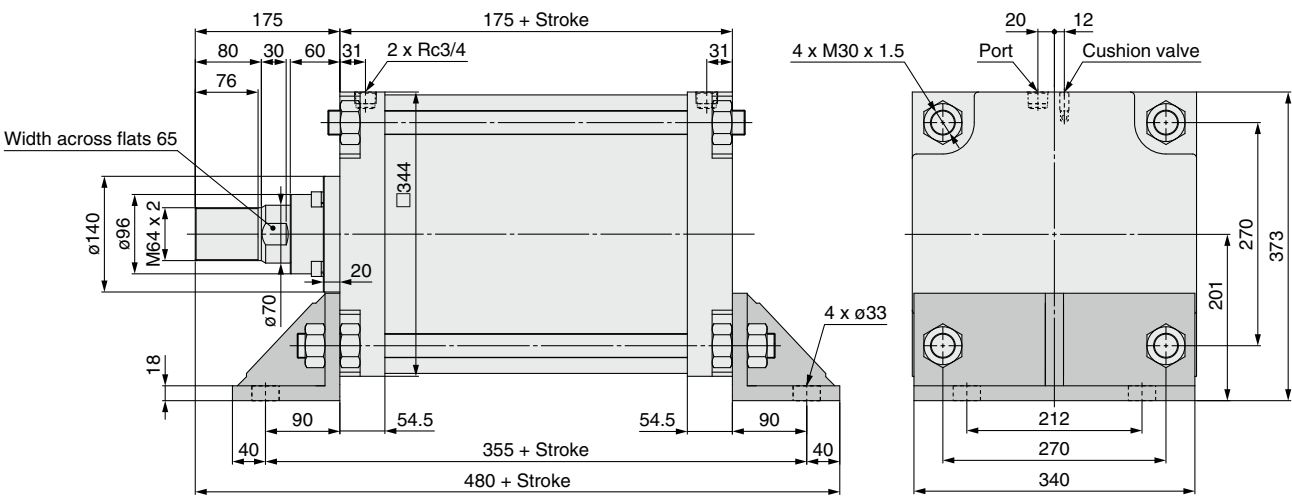
Foot: CS2L-V
ø180 to ø250



[mm]																	
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

[mm]													
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

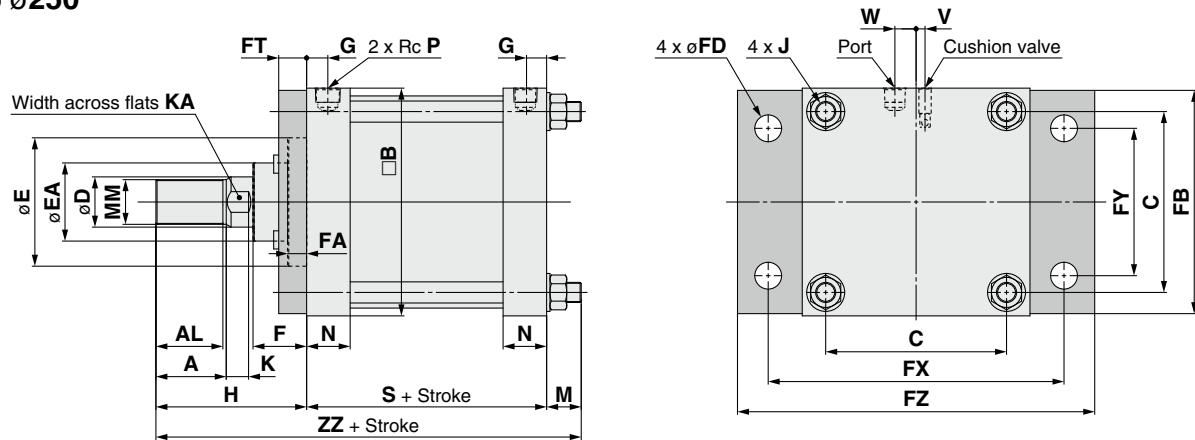
ø320



Dimensions

Rod flange: CS2F-V

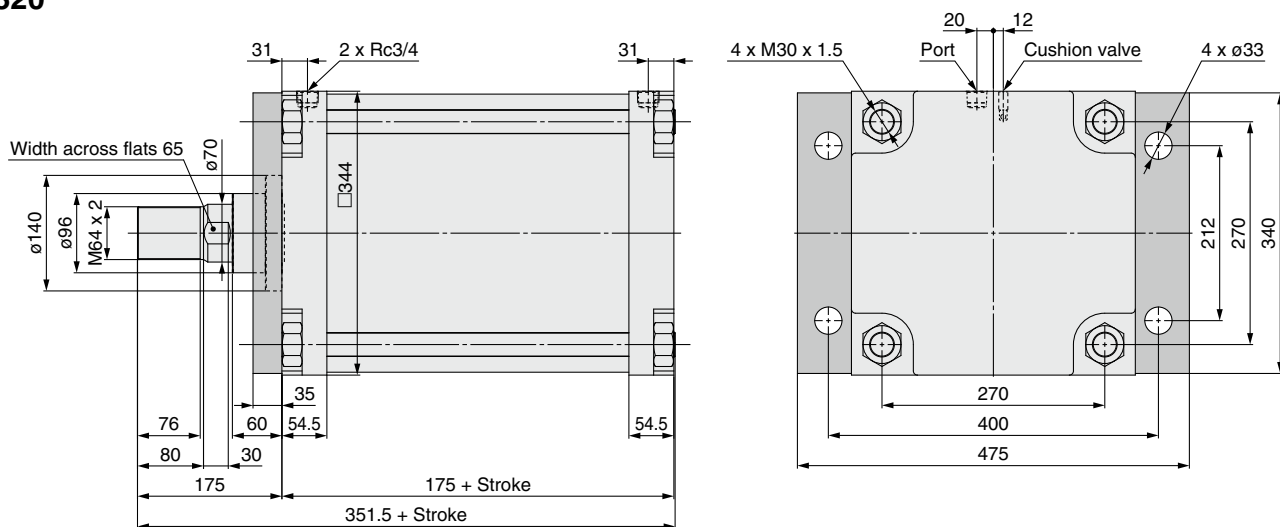
ø180 to ø250



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

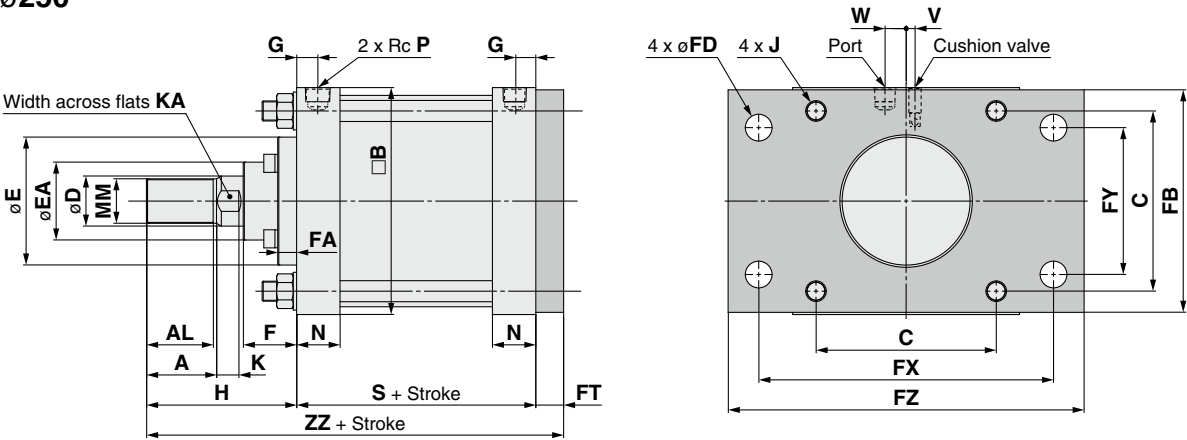
ø320



CS2-V Series

Dimensions

Head flange: CS2G-V
 ø180 to ø250



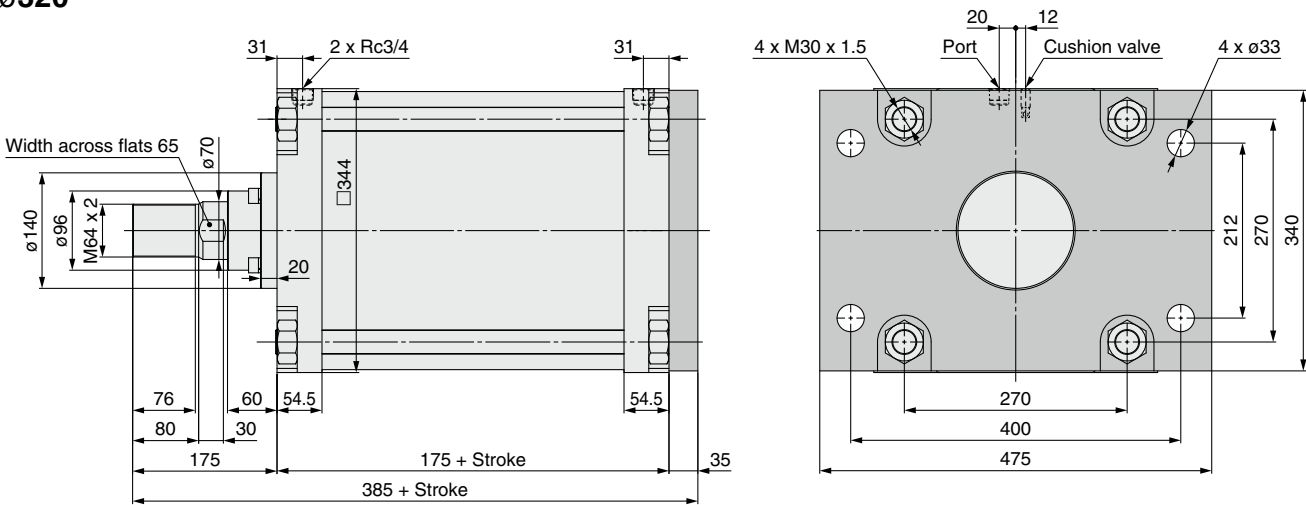
[mm]

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

[mm]

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

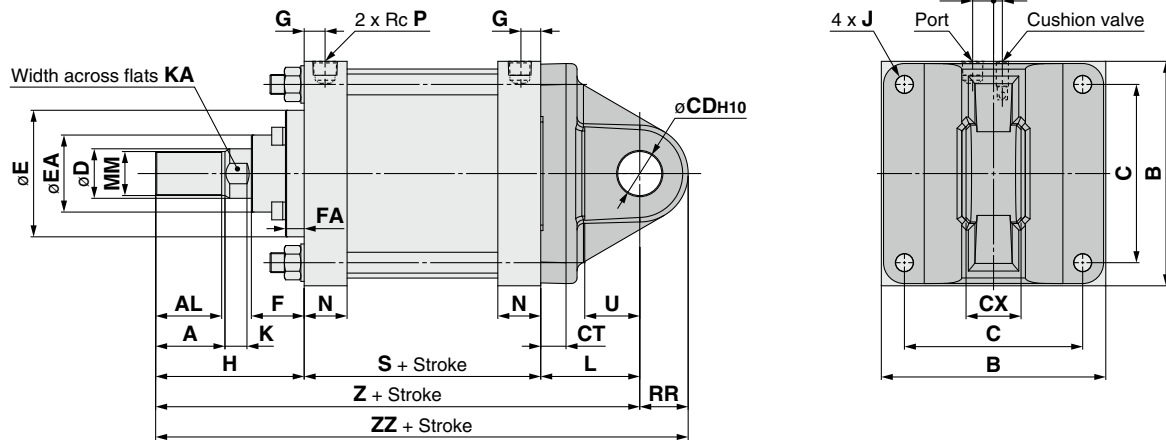
ø320



Dimensions

Single clevis: CS2C-V

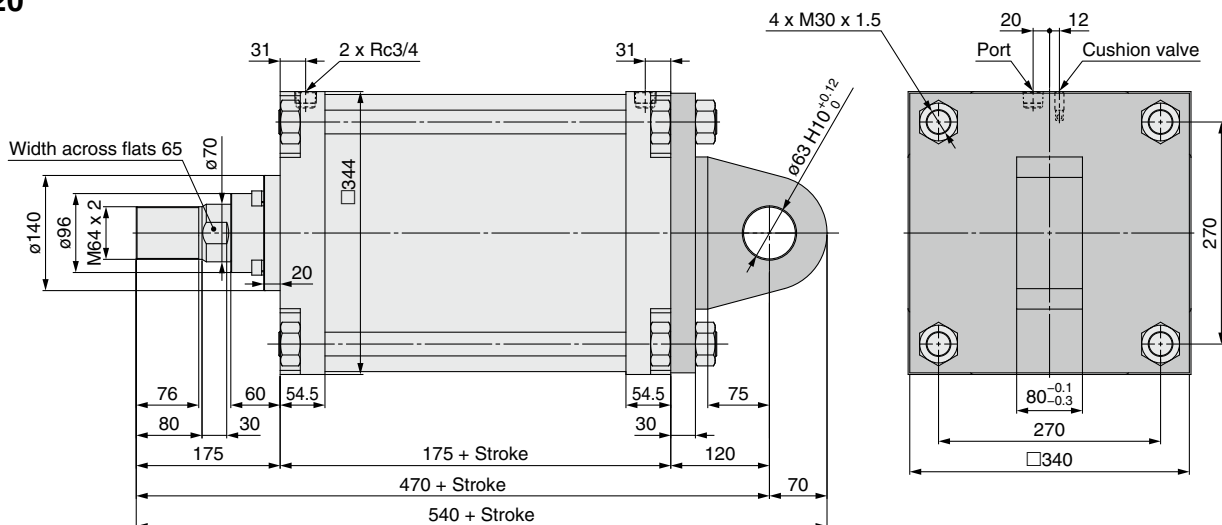
ø180 to ø250



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

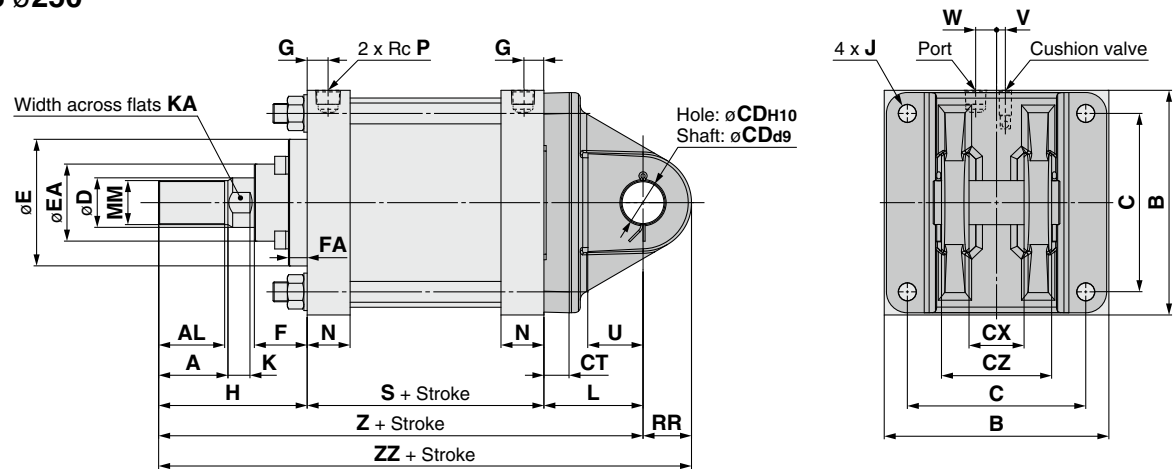
ø320



CS2-V Series

Dimensions

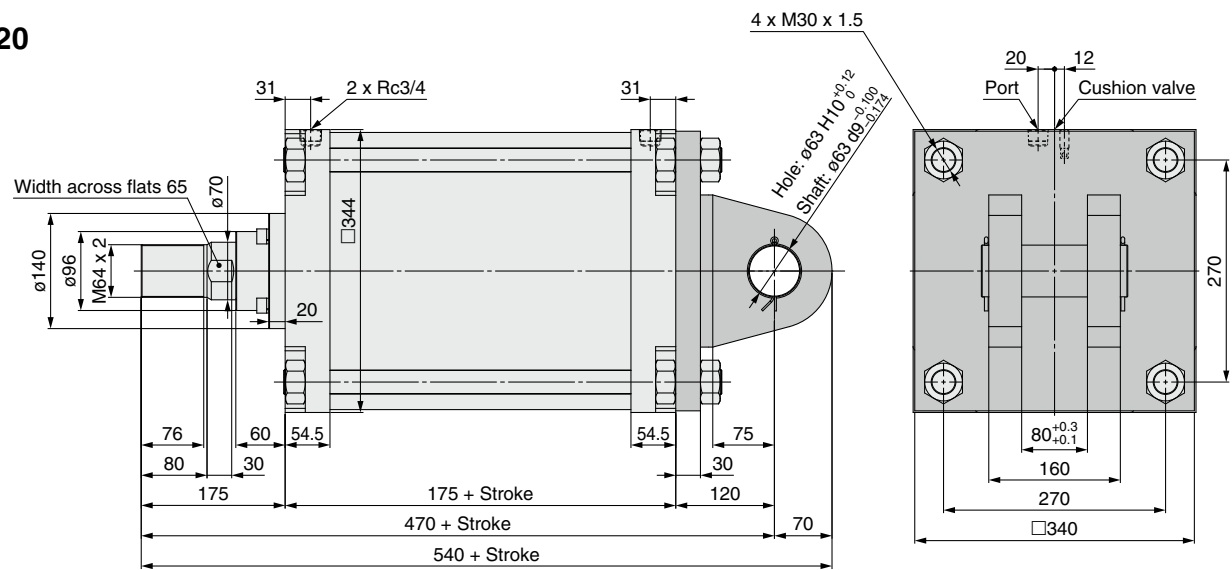
Double clevis: CS2D-V
ø180 to ø250



[mm]																
Bore size	A	AL	B	C	CDH10	CDd9	CT	CX	CZ	D	E	EA	F	FA	G	H
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
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
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

[mm]													
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

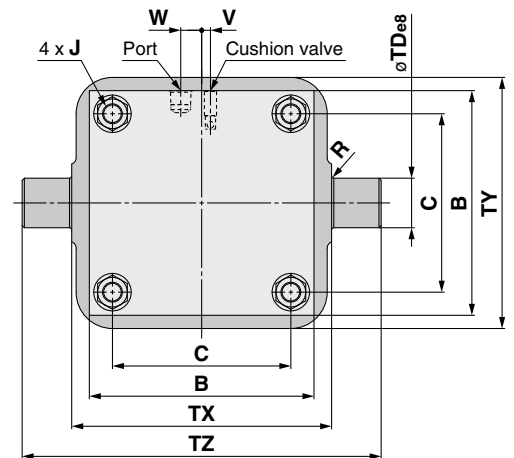
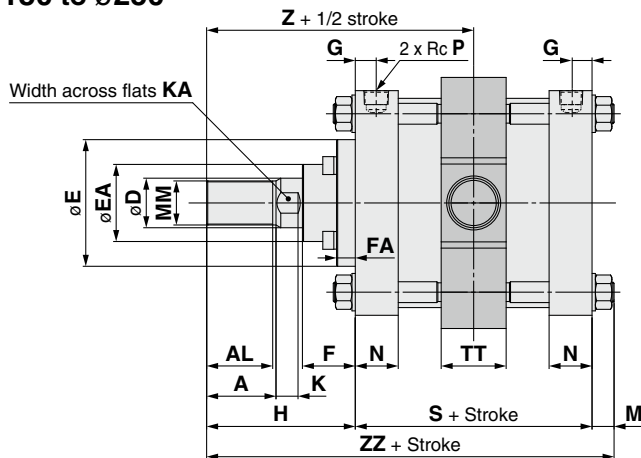
ø320



Dimensions

Center trunnion: CS2T-V

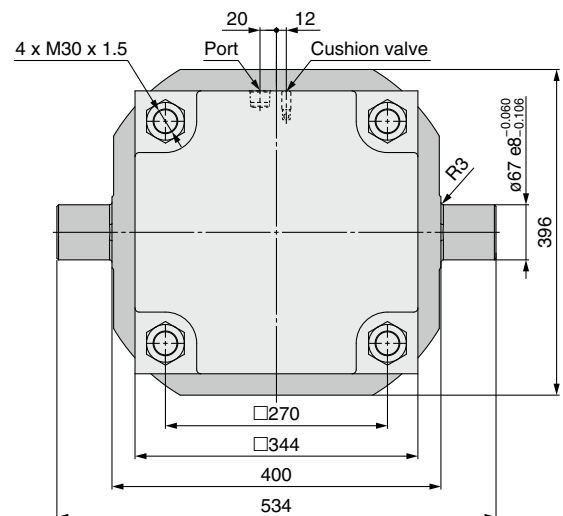
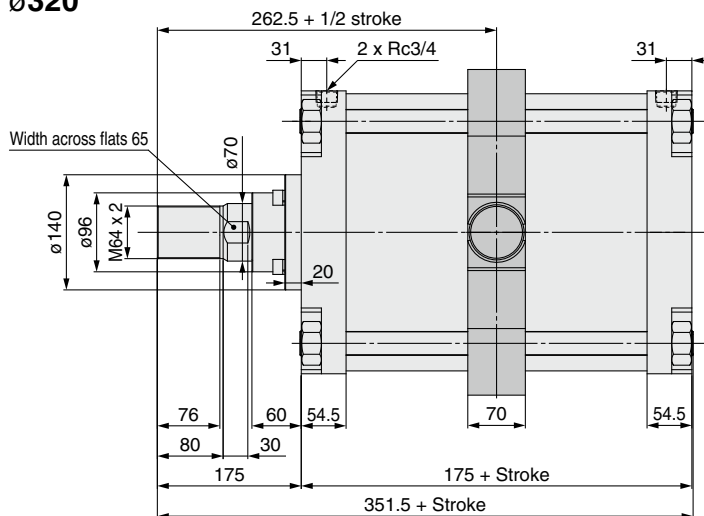
ø180 to ø250



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	TDe8	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



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

CS2□P Series

ø180, ø200, ø250

RoHS

How to Order

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

With auto switch (Built-in magnet) **CDS2** **L** **180** **P** **H** - **300** **□** - **M9BW** **□** - **□**

Mounting

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

* Only the head side axial direction is available for the rod flange type, and only the rod side axial direction is available for the head flange and clevis types.

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

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 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	—	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)				5 V, 12 V	M9NW	●	●	●	○	○		IC circuit
				3-wire (PNP)					M9PW	●	●	●	○	○		
	Water resistant (2-color indicator)			2-wire				M9BW	●	●	●	○	○	—		
				3-wire (NPN)				5 V, 12 V	M9NA*1	○	○	●	○			○
	3-wire (PNP)			M9PA*1					○	○	●	○	○			
	With diagnostic output (2-color indicator)			2-wire				12 V	M9BA*1	○	○	●	○	○		—
				4-wire (NPN)					5 V, 12 V	F59F	●	—	●	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)				—		P3DWA*2	●	—	●	●		○
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96	●	●	●	●	○	IC circuit	—	
			No	2-wire	24 V	12 V	100 V	A93	●	●	●	●	○*3	—	Relay, PLC	
			5 V, 12 V			100 V or less	A90	●	●	●	●	○*3	IC circuit			
			Yes			12 V	100 V, 200 V	A54	●	—	●	●	—	—		
			No				200 V or less	A64	●	—	●	—	—			
			Yes	—	—	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.

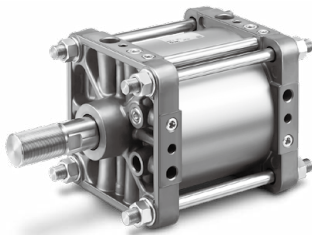
*3 The load voltage used is 24 VDC.

* 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

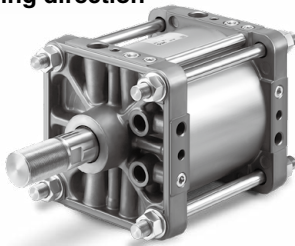
* Auto switches marked with a "○" are produced upon receipt of order.

* 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.)



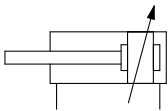
Head side piping direction



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

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
Option	Standard equipment	Clevis pin, Split pin	—	—	—	—	●	—
		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.

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.

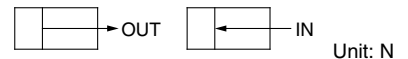
Weight (Guide)

Bore size [mm]		[kg]		
		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]
- $$15.7 + 2.5 \times 500/100 = 28.2 \text{ [kg]}$$

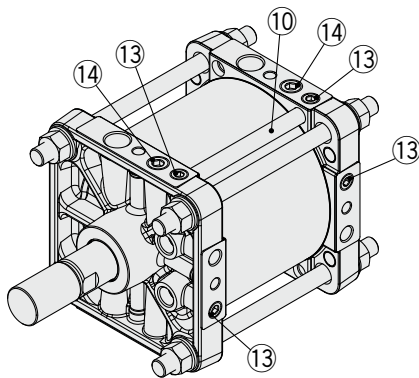
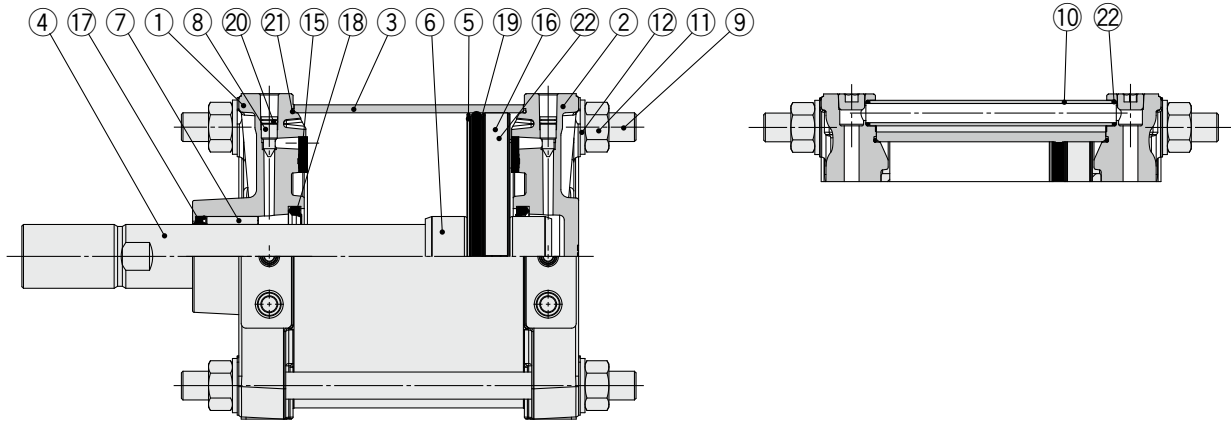
Theoretical Output



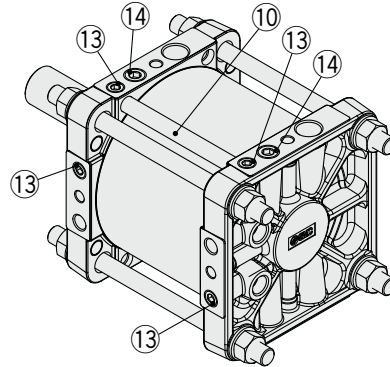
Bore size [mm]	Rod size [mm]	Operating direction	Piston area [mm ²]	Operating pressure [MPa]					
				0.2	0.3	0.4	0.5	0.6	0.7
180	40	OUT	25400	5080	7620	10200	12700	15200	17800
		IN	24200	4840	7260	9680	12100	14520	16940
200	45	OUT	31400	6280	9420	12600	15700	18800	22000
		IN	29800	5960	8940	11930	14910	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. 18, 19, 21, 22
200	CS2P200A-PS	
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.

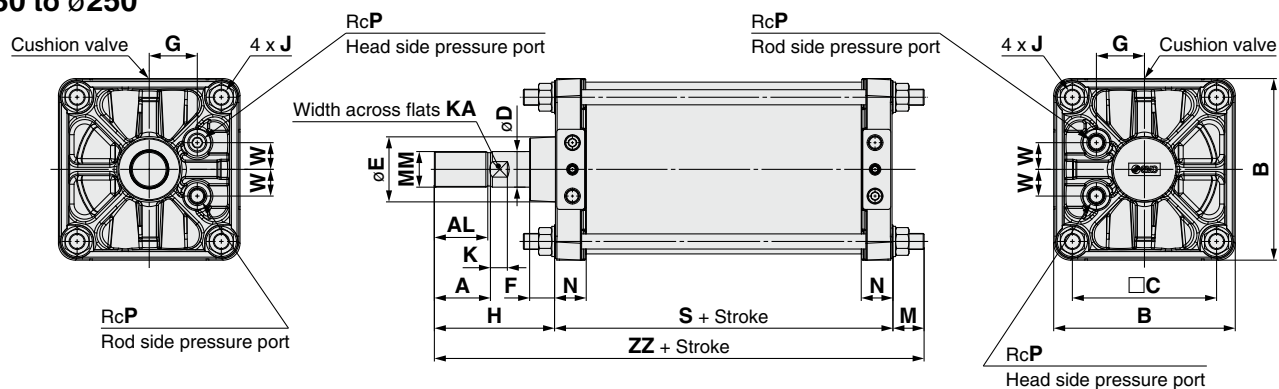
* Trunnion type should not be disassembled. (Refer to page 76.)

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

Ø180 to Ø250



Rod side axial direction

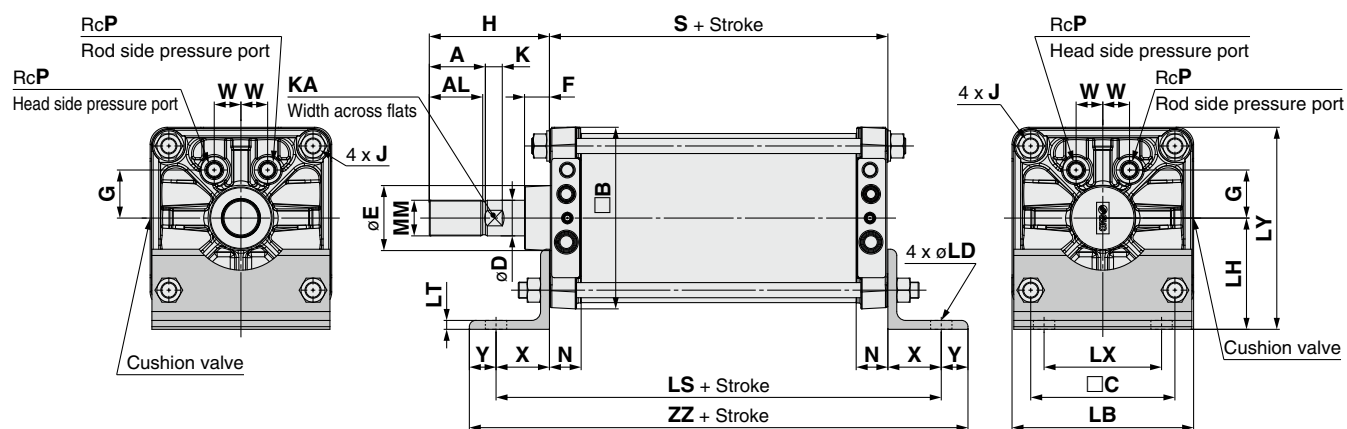
Head side axial direction

																[mm]
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

Ø180 to Ø250



Rod side axial direction

Head side axial direction

[mm]																		
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

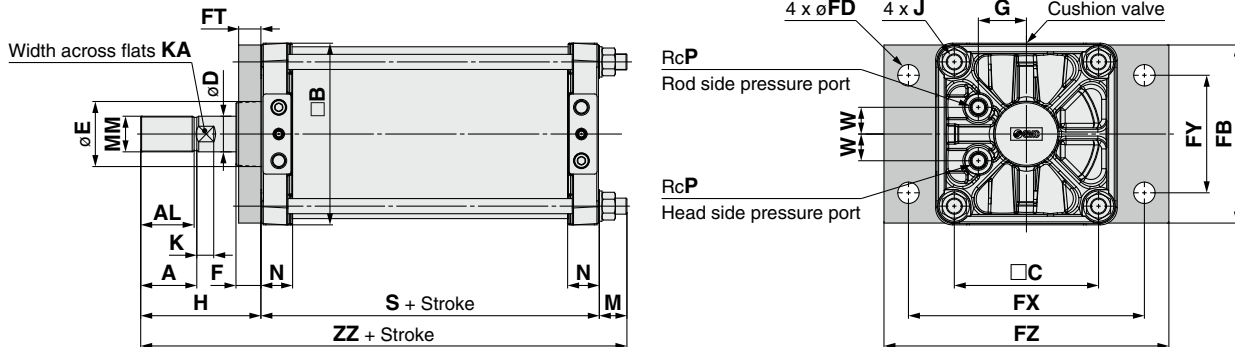
	[mm]									
Bore size	LX	LY	MM	N	P	S	W	X	Y	ZZ
180	132	227	M40 x 1.5	35.6	1/2	115	30	60	30	340
200	150	245	M45 x 1.5	35.6	1/2	120	30	60	30	345
250	180	298.5	M56 x 2	45.6	3/4	141	45	80	40	421

Dimensions

Rod flange: CS2F□P

ø180 to ø250

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.

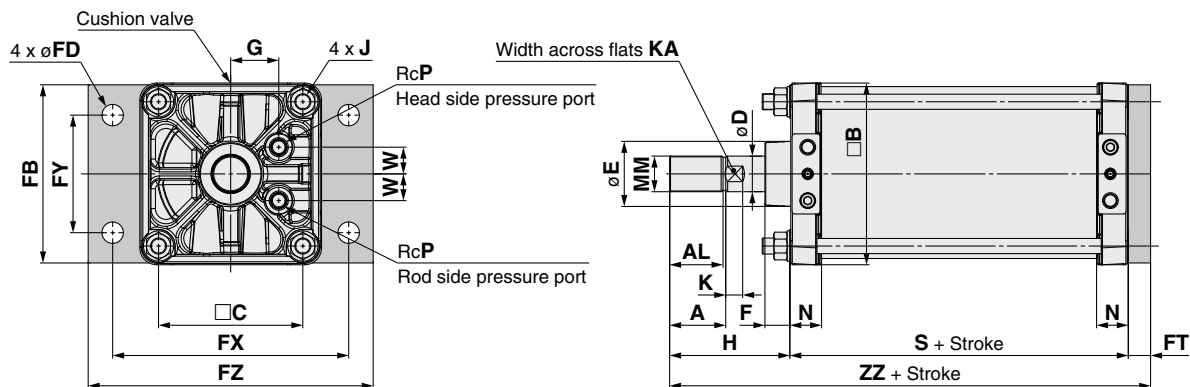


Bore size	Stroke range	A	AL	B	C	D	E	F	FB	FD	FT	FX	FY	FZ	G	H	J	K
180	Up to 1200	63	60	204	162	40	73	28	200	24	25	265	132	320	54	135	M18 x 1.5	17
200	Up to 998	63	60	226	182	45	78.5	32	225	24	25	280	150	335	60	135	M20 x 1.5	20
250	Up to 813	71	67	277	225	56	91	41	275	29	30	355	180	420	78	160	M24 x 1.5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

ø180 to ø250



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

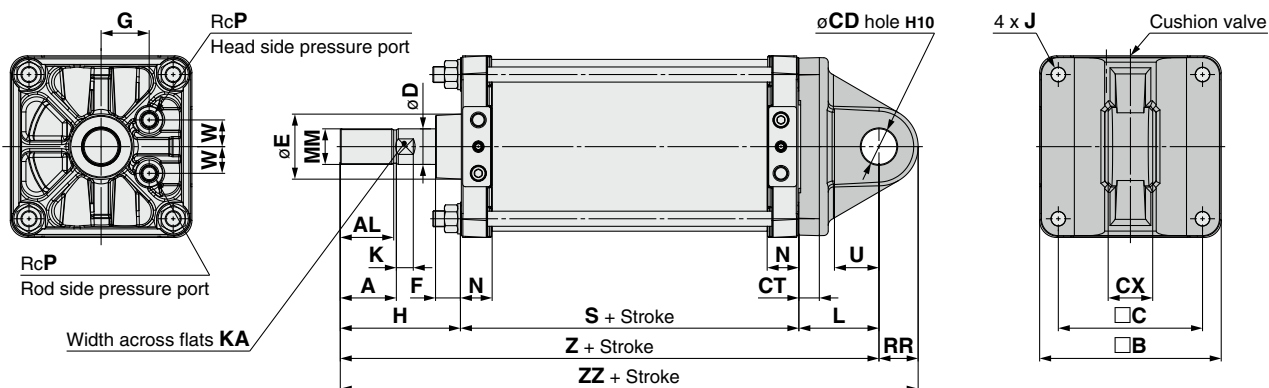
CS2□P Series

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.

Single clevis: CS2C□P

ø180 to ø250

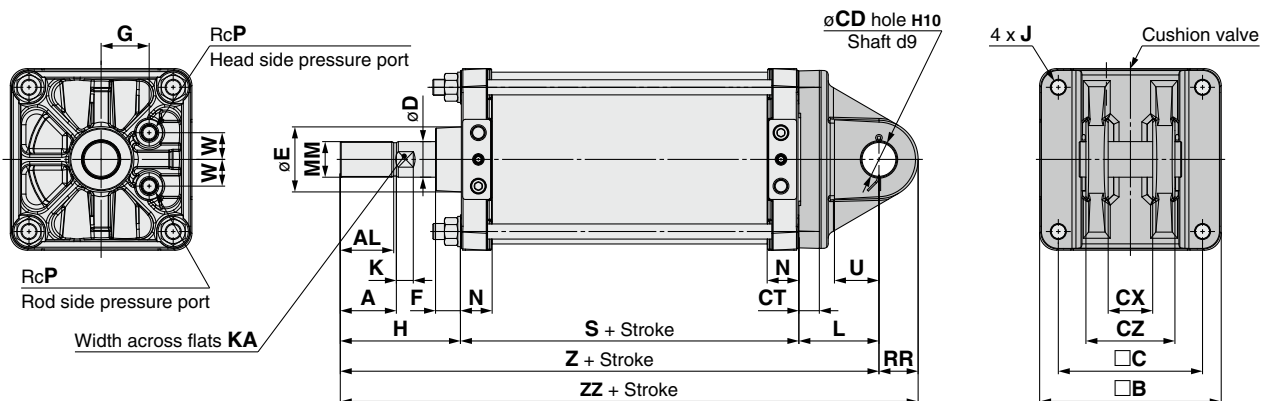


Bore size	Stroke range	A	AL	B	C	CDH10	CT	CX	D	E	F	G	H	J	K	KA	L
180	Up to 1200	63	60	204	162	40 ^{+0.100} ₀	23	50 ^{-0.1} _{-0.3}	40	73	28	54	135	M18 x 1.5	17	36	90
200	Up to 998	63	60	226	182	40 ^{+0.100} ₀	25	50 ^{-0.1} _{-0.3}	45	78.5	32	60	135	M20 x 1.5	20	41	90
250	Up to 813	71	67	277	225	50 ^{+0.100}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

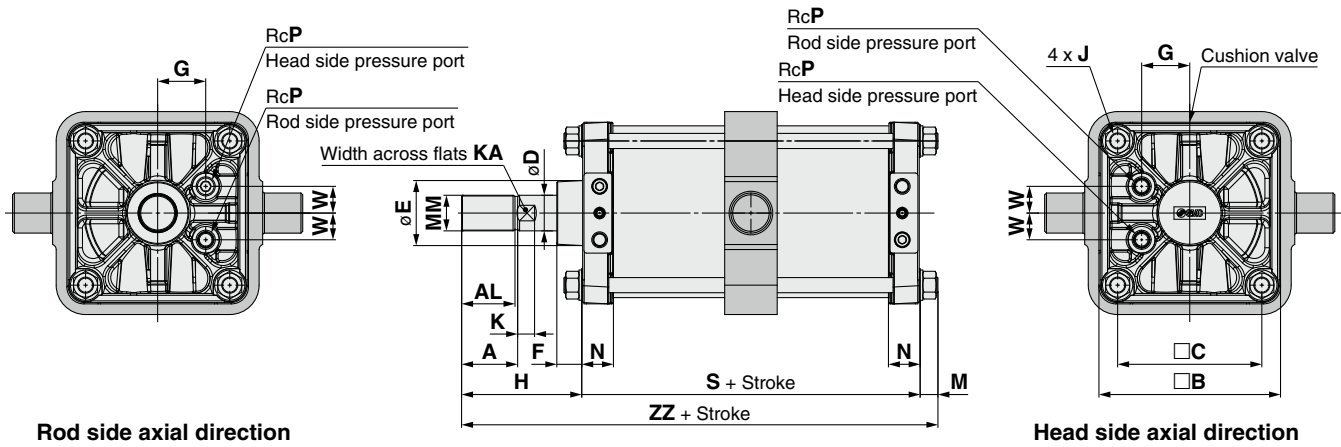
Bore size	MM	N	P	RR	S	U	W	Z	ZZ
180	M40 x 1.5	35.6	1/2	44	115	50	30	340	384
200	M45 x 1.5	35.6	1/2	44	120	50	30	345	389
250	M56 x 2	45.6	3/4	55	141	65	45	411	466

Dimensions

Center trunnion: **CS2T□P**

ø180 to ø250

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.



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

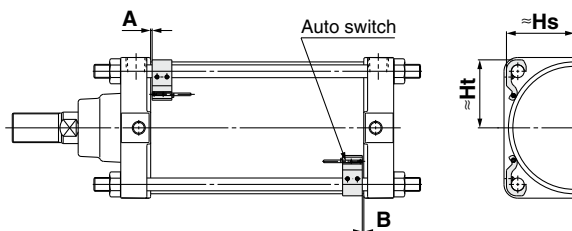
CS2 Series

Auto Switch Mounting

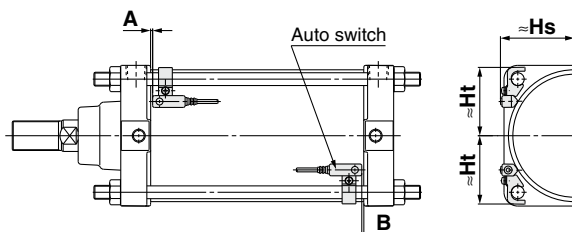
Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height

<Tie-rod mounting>

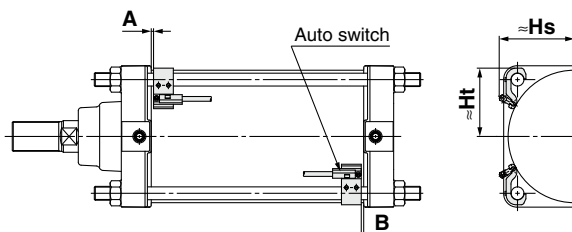
D-M9□/M9□V **D-Z7□/Z80**
D-M9□W/M9□WV **D-Y59□/Y69□/Y7P/Y7PV**
D-M9□A/M9□AV **D-Y7□W/Y7□WV**
D-A9□/A9□V **D-Y7BA**



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

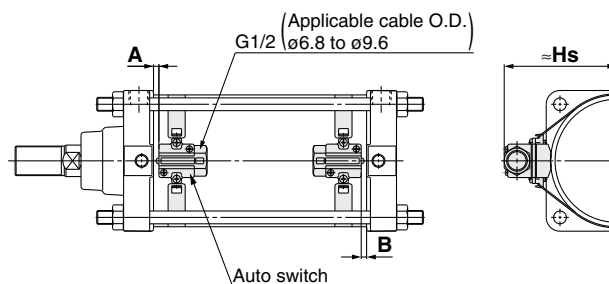


D-P3DWA

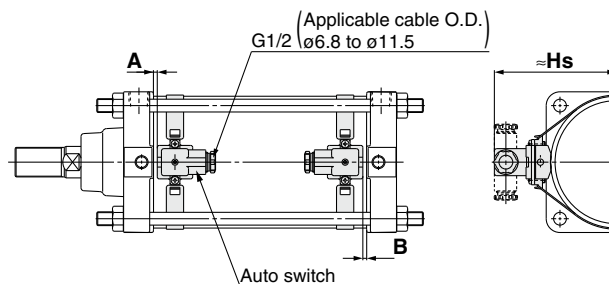


<Band mounting>

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 Bore size	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 Bore size	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 Bore size	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	Hs	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 Bore size	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

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
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	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	$120 + 40 \frac{(n-4)}{2}$ (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	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	$105 + 30 \frac{(n-4)}{2}$ (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	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	$150 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	—	—
D-F5NT	2 (Different surfaces, same surface), 1	35	145	155	165	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	$165 + 55 \frac{(n-4)}{2}$ (n = 4, 8, 12, 16...)*2	—	—
D-G39 D-K39 D-A3□	2 Different surfaces	35	110					
	Same surface	100	110					
	n Different surfaces	$35 + 30 (n - 2)$ (n = 2, 3, 4, 5...)	$110 + 30 (n - 2)$ (n = 2, 4, 6, 8...)*1					
	n Same surface	$100 + 100 (n - 2)$ (n = 2, 3, 4, 5...)	$110 + 100 (n - 2)$ (n = 2, 4, 6, 8...)*1					
D-A44	2 Different surfaces	35	110					
	Same surface	55	110					
	n Different surfaces	$35 + 30 (n - 2)$ (n = 2, 3, 4, 5...)	$110 + 30 (n - 2)$ (n = 2, 4, 6, 8...)*1					
	n Same surface	$55 + 55 (n - 2)$ (n = 2, 3, 4, 5...)	$110 + 50 (n - 2)$ (n = 2, 4, 6, 8...)*1					
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-F5BA/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]

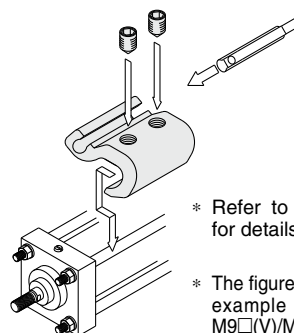
The following stainless steel mounting screw kit (including set screws) is available. Use it in accordance with the operating environment. (Since the auto switch mounting bracket is not included, order it separately.)

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		—
	D-F5NT	Grommet (Perpendicular)	2-color indicator
	D-M9NV, M9PV, M9BV		Water-resistant (2-color indicator)
	D-Y69A, Y69B, Y7PV		Without indicator light
	D-M9NWV, M9PWV, M9BWV		—
	D-Y7NWV, Y7PWV, Y7BWV		Without indicator light
Reed	D-M9NAV, M9PAV, M9BAV	Grommet (Perpendicular)	—
	D-A90V	Grommet (In-line)	Without indicator light
	D-A93V, A96V		—
	D-Z73, Z76		Without indicator light
	D-A53, A56		—
	D-A67		Without indicator light
	D-Z80		Without indicator light

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

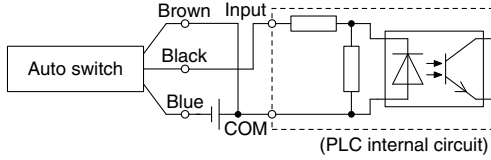
* Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)/D-Y7G/Y7H) are also available. For details, refer to the **Web Catalog**.

Prior to Use

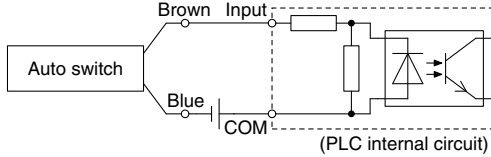
Auto Switch Connections and Examples

Sink Input Specifications

3-wire, NPN

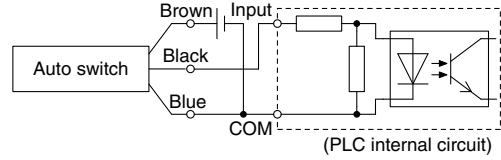


2-wire

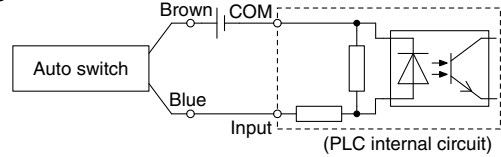


Source Input Specifications

3-wire, PNP



2-wire

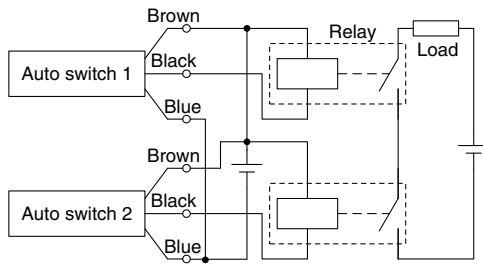


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

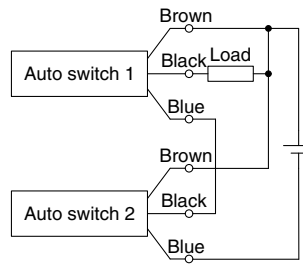
Examples of AND (Series) and OR (Parallel) Connections

* 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.

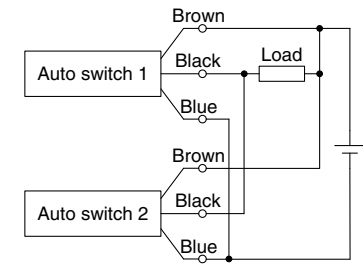
3-wire AND connection for NPN output (Using relays)



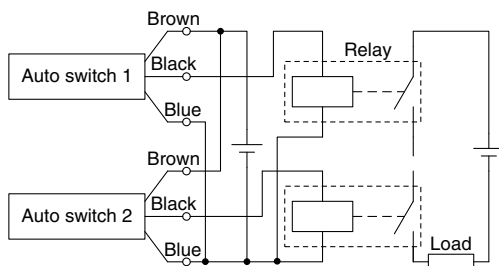
(Performed with auto switches only)



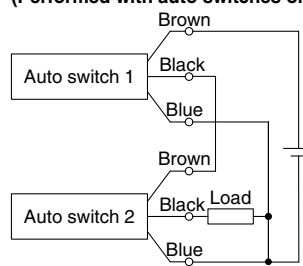
3-wire OR connection for NPN output



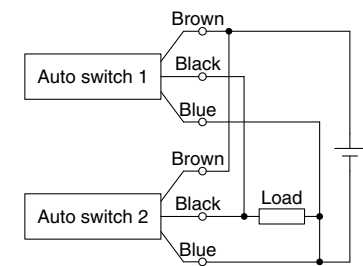
3-wire AND connection for PNP output (Using relays)



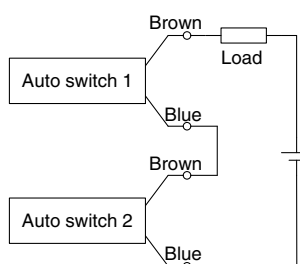
(Performed with auto switches only)



3-wire OR connection for PNP output



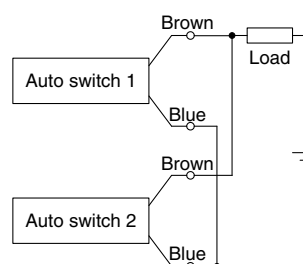
2-wire AND connection



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



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

(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.



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.

3. The trunnion type cylinder requires accuracy in assembly.

The trunnion type cylinder may lose dimensional accuracy and malfunction when it is disassembled and reassembled because the axial center of the trunnion and that of the cylinder will not be aligned easily.

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.

1. 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.
2. 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.
3. 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.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. 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.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. 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

1. 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.
2. 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.
3. 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

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. 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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Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

D-G