Cylinder with Lock
Double Acting, Single Rod
CNS Series
ø125, ø140, ø160

How to Order

CNS L □ 125 □ – 100 □ – D – □

With auto switch **CDNS** L □ 125 □ – 100 □ – D – M9BW □ – □

With auto switch
(Built-in magnet)

Mounting type

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

Tubing material

Symbol	Bore size	Without magnet	Built-in magnet
		Tubing material	Tubing material
Nil	ø125, ø140	Aluminum tube (1000 st or less)	Aluminum tube
		Steel tube (1001 st or more)	
	ø160	Aluminum tube (1200 st or less)	
		Steel tube (1201 st or more)	
F ∗1	ø125 to ø160	Steel tube	

∗ 1 Auto switches are not available with steel tube.

Bore size

125	125 mm
140	140 mm
160	160 mm

Thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 957 for maximum stroke.

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ Select applicable auto switch part numbers from the table below.

Locking direction

D	Both directions

Made to Order
Refer to page 957 for details.

With rod boot/cushion

Rod boot	Nil	Without rod boot
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	Nil	With double-side cushion
	N	Without cushion
	R	With rod cushion
	H	With head cushion

∗ When the symbols are two or more, indicate them alphabetically.

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) CDNSL140-100-D

Applicable Auto Switches/Refer to pages 1119 to 1245 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
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		12 V		M9B	—	●	●	●	○	—	—	
		Terminal conduit		3-wire (NPN)		5 V, 12 V		—	G39	—	—	—	—	—	IC circuit	
				2-wire		12 V		—	K39	—	—	—	—	—	—	
	Diagnostic indication (2-color indicator)	Grommet		3-wire (NPN)		5 V, 12 V		M9NW	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
				2-wire	24 V	12 V	—	M9BW	—	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NA∗1	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PA∗1	—	○	○	●	○	○		
				2-wire		12 V		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	—	●	—	●	●	○	—	
Reed auto switch	—	—	Yes	3-wire (NPN equivalent)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—
	—		No	2-wire	24 V	12 V	100 V	A93	—	●	●	●	●	—	—	Relay, PLC
						5 V, 12 V	100 V or less	A90	—	●	—	●	—	—	IC circuit	
			Yes			12 V	100 V, 200 V	A54	—	●	—	●	●	—	—	
		Terminal conduit					—	—	A33	—	—	—	—	—	—	PLC
		DIN terminal					100 V, 200 V	—	A34	—	—	—	—	—	—	Relay, PLC
								—	A44	—	—	—	—	—	—	
	Diagnostic indication (2-color indicator)	Grommet				—	—	A59W	—	●	—	—	●	—	—	

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

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

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ There are other applicable auto switches than listed above. For details, refer to page 971.
∗ For details about auto switches with pre-wired connector, refer to pages 1192 and 1193.
∗ D-A9□/M9□/M9□W/M9□A/P3DWA□ auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment.)

Cylinder Specifications

Bore size (mm)	125	140	160
Lube	Not required (Non-lube)		
Fluid	Air		
Proof pressure	1.57 MPa		
Max. operating pressure	0.97 MPa		
Min. operating pressure	0.08 MPa		
Piston speed	50 to 500 mm/s ✳		
Ambient and fluid temperature	Without auto switch: 0 to 70°C (No freezing) With auto switch: 0 to 60°C (No freezing)		
Cushion	Air cushion		
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$, 1501 to 1600: $^{+2.2}_{0}$		
Mounting	Basic type, Axial foot type, Rod side flange type, Head side flange type, Single clevis type, Double clevis type, Center trunnion type		

✳ Load limits exist depending upon piston speed when locked, mounting direction and operating pressure.

Lock Specifications

Bore size (mm)	125	140	160
Locking action	Spring locking (Exhaust lock)		
Unlocking pressure	0.25 MPa or more		
Lock starting pressure	0.20 MPa or less		
Operating pressure range	0.25 to 0.7 MPa		
Locking direction	Both directions		
Holding force (max. static load) kN ✳	8.4	10.5	13.8

✳ The holding force (max. static load) shows the maximum capability and does not show the normal holding capability. So, select an appropriate cylinder while referring to page 954.

Cylinder Stroke

(mm)

Tube material	Aluminum alloy	Carbon steel pipe	
Bore size (mm)	Basic type, Head side flange type, Single clevis type, Double clevis type, Center trunnion type	Basic type, Head side flange type, Single clevis type, Double clevis type, Center trunnion type	Foot type, Rod side flange type
125, 140	Up to 1000	Up to 1000	Up to 1600
160	Up to 1200	Up to 1200	Up to 1600

Cylinder Stroke/Auto Switch Mounting on Cylinder Unit (Built-in Magnet)

Refer to the minimum auto switch mounting stroke (page 970) for those with an auto switch.

(mm)

Bore size (mm)	Basic type, Head side flange type, Single clevis type, Double clevis type, Center trunnion type	Foot type, Rod side flange type
125, 140	Up to 1000	Up to 1400
160	Up to 1200	Up to 1400

Stopping Accuracy

(mm)

Lock type	Piston speed (mm/s)		
	100	300	500
Spring locking	±0.5	±1.0	±2.0

Condition: Lateral, Supply pressure P = 0.5 MPa
Load mass ····· Upper limit of allowed value
Solenoid valve for locking ···· Mounted directly to unlocking port
Maximum value of stopping position dispersion from 100 measurements

Made to Order

Made to Order Specifications
Click here for details

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

Refer to pages 969 to 971 for cylinders with auto switches.

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

Mounting Bracket Part No.

Bore size (mm)	125	140	160
Foot type (1)	CS1-L12	CS1-L14	CS1-L16
Rod side flange type (2)	CS1-FL12	CS1-FL14	CS1-FL16
Head side flange type	CS1-F12	CS1-F14	CS1-F16
Single clevis type	CS1-C12	CS1-C14	CS1-C16
Double clevis type (3)	CS1-D12	CS1-D14	CS1-D16

Note 1) When ordering foot bracket, order 2 pieces per cylinder.
Note 2) ø125 to ø160 rod side flange type use CS1 series long stroke flanges.
Note 3) Clevis pin and cotter pin (2 pcs.) are shipped together with double clevis type.

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Accessory

Mounting bracket		Basic type	Foot type	Rod side type / Flange side type	Head side flange type	Single clevis type	Double clevis type	Center trunnion type
Standard equipment	Clevis pin	—	—	—	—	—	●	—
Option	Rod end nut	●	●	●	●	●	●	●
	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●	●

* Refer to page 967 for the accessory bracket dimensions. (For rod boots, refer to page 960.)
** Refer to page 968 when the rod end nut, and the single and double knuckle joints are used together.

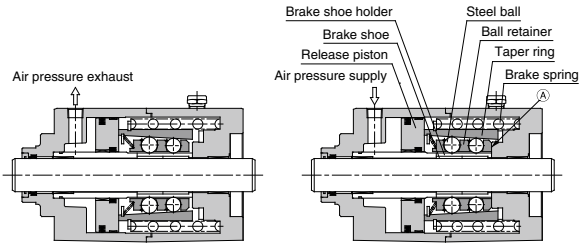
Weight / ( ) : Denotes the values for steel tube.

(kg)

Bore size (mm)		125	140	160
Lock unit weight		14.40	20.20	30.60
Basic weight	Basic type	28.79 (30.26)	37.67 (39.48)	55.31 (57.52)
	Foot type	30.42 (31.89)	40.19 (42.00)	58.11 (60.32)
	Flange type	31.47 (32.94)	42.67 (44.48)	61.70 (63.91)
	Single clevis type	31.86 (33.33)	41.96 (43.77)	60.80 (63.01)
	Double clevis type (Including clevis pin and cotter pin)	32.32 (33.79)	42.71 (44.52)	61.65 (63.86)
	Trunnion type	32.92 (34.39)	43.40 (45.21)	62.71 (64.92)
Additional weight per each 100 mm of stroke		1.77 (2.66)	1.96 (3.01)	2.39 (3.58)
Accessory bracket	Single knuckle joint	0.91	1.16	1.56
	Double knuckle joint (With pin)	1.37	1.81	2.48
	Rod end nut	0.16	0.16	0.23

Calculation: (Example) **CNSL140-100-D**
Basic weight····· 40.19 (Foot type, ø140)
Additional weight ···· 1.96/100 stroke
Cylinder stroke····· 100 stroke
40.19 + 1.96 x 100/100 = 42.15 kg

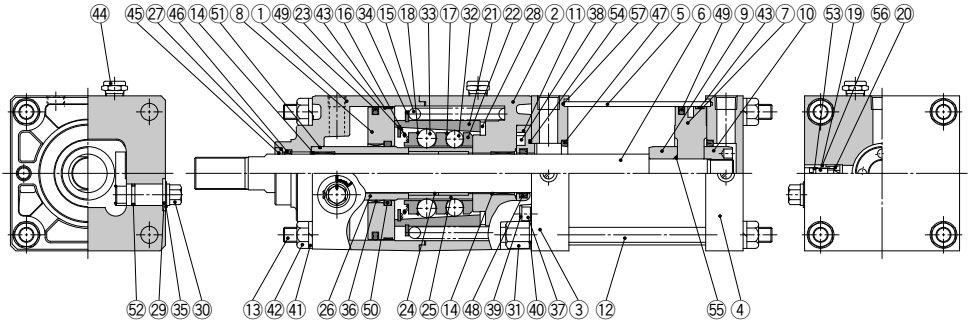
Construction Principle



Locked state **Unlocked state**

Spring locking (Exhaust lock)
The spring force which acts upon the taper ring is magnified by a wedge effect, and is conveyed to all of the numerous steel balls which are arranged in two circles. These act on the brake shoe holder and brake, which locks the piston rod by tightening against it with a large force.
Unlocking is accomplished when air pressure is supplied to the unlocking port. The release piston and taper ring oppose the spring force, moving to the right side, and the ball retainer strikes the cover section A. The braking force is released as the steel balls are removed from the taper ring by the ball retainer.

Construction



Component Parts

No.	Description	Material	Note
1	**Cover A**	Aluminum alloy	Hard anodized and painted
2	**Cover B**	Aluminum alloy	Hard anodized and painted
3	**Rod cover**	Rolled steel plate	Black painted
4	**Head cover**	Rolled steel plate	Black painted
5	**Cylinder tube**	Aluminum alloy	Hard anodized
6	**Piston rod**	Carbon steel	Hard chrome plated
7	**Piston**	Aluminum alloy casted	Chromated
8	**Release piston**	Aluminum alloy	Chromated
9	**Cushion ring A**	Rolled steel	Zinc chromated
10	**Cushion ring B**	Rolled steel	Zinc chromated
11	**Retaining plate B**	Aluminum alloy	
12	**Tie-rod A**	Carbon steel	Chromated
13	**Unit holding tie-rod**	Carbon steel	Chromated
14	**Bushing**	Bearing alloy	
15	**Brake spring**	Steel wire	Black painted
16	**Pre-load spring**	Steel wire	Zinc chromated
17	**Clip A**	Stainless steel wire	
18	**Clip B**	Stainless steel wire	
19	**Cushion valve**	Rolled steel	Electroless nickel plated
20	**Valve guide**	Brass	
21	**Taper ring**	Carbon steel	Heat treated
22	**Ball retainer**	Aluminum alloy	
23	**Tooth ring**	Stainless steel	
24	**Brake shoe**	Babbitt	
25	**Brake shoe holder**	Special steel	Heat treated
26	**Piston guide**	Carbon steel	Zinc chromated
27	**Coil scraper mounting plate**	Aluminum alloy	Anodized
28	**Bumper**	Polyurethane rubber	
29	**Washer**	Carbon steel	Zinc chromated

Component Parts

No.	Description	Material	Note
30	**Unlocking cam**	Carbon steel	Zinc chromated
31	**Wing nut**	Carbon steel	
32	**Steel ball A**	Carbon steel	
33	**Steel ball B**	Carbon steel	
34	**Type C retaining ring for shaft (for taper ring)**	Carbon steel	
35	**Type C retaining ring for axis (for unlocking cam)**	Carbon steel	
36	**Bushing (for release piston)**	Bearing alloy	
37	**Hexagon socket head cap screw**	Chromium molybdenum steel	
38	**Hexagon socket head cap screw**	Chromium molybdenum steel	
39	**Conical spring washer**	Spring steel	
40	**Conical spring washer**	Spring steel	
41	**Spring washer**	Steel wire	
42	**Hexagon nut**	Rolled steel	
43	**Wear ring**	Resin	
44	**BC element**		
45	**Coil scraper**	Phosphor bronze	
46	**Wiper ring**	NBR	
47	**Cushion seal**	NBR	
48	**Rod seal**	NBR	
49	**Piston seal**	NBR	
50	**O-ring (for release piston)**	NBR	
51	**O-ring (for piston guide)**	NBR	
52	**O-ring (for unlocking cam)**	NBR	
53	**Valve seal**	NBR	
54	**Retaining plate gasket**	NBR	
55	**Piston gasket**	NBR	
56	**Guide gasket**	NBR	
57	**Tube gasket**	NBR	

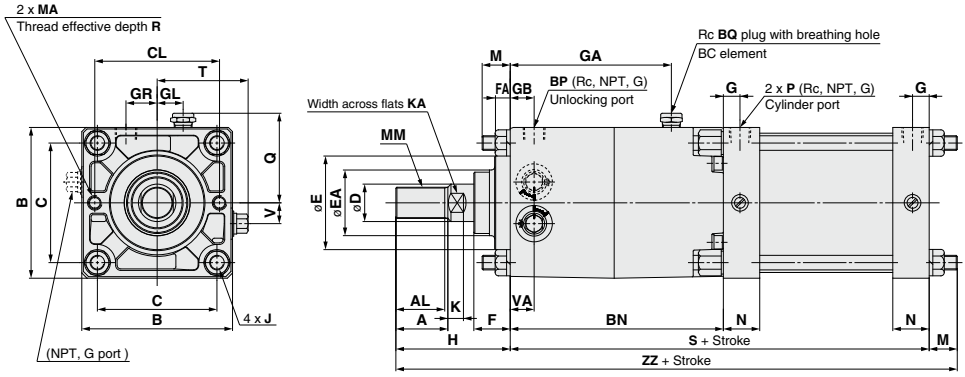
Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
125	CS1N125A-PS	Set of above nos. ㊻, ㊽, ㊾, ㊸, ㊹, ㊼
140	CS1N140A-PS	
160	CS1N160A-PS	

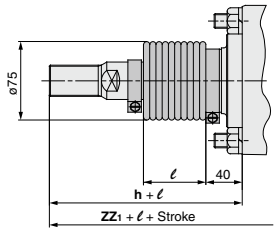
∗ Since the lock section for the CNS series is normally replaced as a unit, kits are for the cylinder section only. These can be ordered using the order number for each bore size.
∗ Seal kit includes ㊻, ㊽, ㊾, ㊸, ㊹, ㊼. Order the seal kit, based on each bore size.
∗ Seal kit includes a grease pack (40 g).
Order with the following part number when only the grease pack is needed.
Grease pack part no.: GR-S-010 (10 g), **GR-S-020** (20 g)

Dimensions

Basic type (B): CNSB



With rod boot



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BN	BP	BQ	C	CL	D	E	EA	F	FA	G	GA	GB	GL	GR	J
125	Up to 1000	50	47	145	205	1/2	3/8	115	120	36	90	63	35	14	16	155	23	25	30	M14 x 1.5
140	Up to 1000	50	47	161	245	1/2	3/8	128	136	36	90	63	35	14	16	180	28	30	30	M14 x 1.5
160	Up to 1200	56	53	182	290	1/2	3/8	144	144	40	90	63	43	14	18.5	215	35	35	35	M16 x 1.5

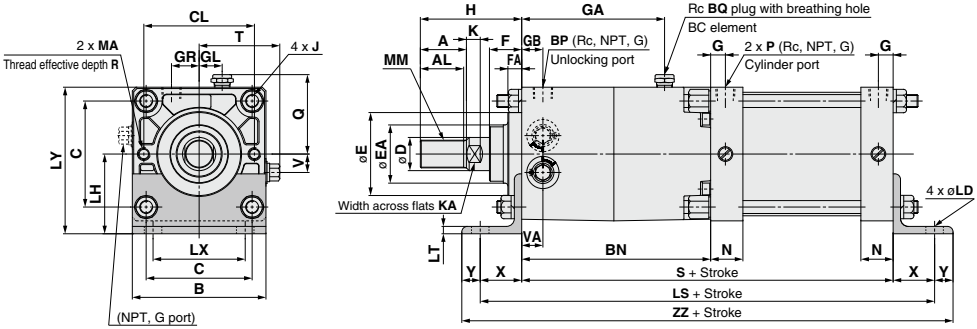
(mm)

Bore size (mm)	K	KA	M	MA	MM	N	P	Q	R	S	T	V	VA	H	ZZ
125	15	31	27	M12 x 1.75	M30 x 1.5	35	1/2	85.5	25	303	87.5	20	23	110	440
140	15	31	27	M12 x 1.75	M30 x 1.5	35	1/2	93.5	25	343	95	20	28	110	480
160	17	36	30.5	M12 x 1.75	M36 x 1.5	39	3/4	104	25	396	109	25	35	120	546.5

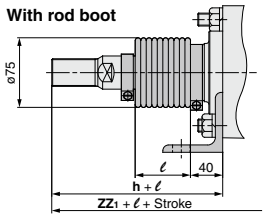
With Rod Boot (mm)

Bore size (mm)	Stroke range (mm)	ZZ_1	ℓ	h
125	30 to 1000	463	1/5 stroke	133
140	30 to 1000	503		133
160	30 to 1200	567.5		141

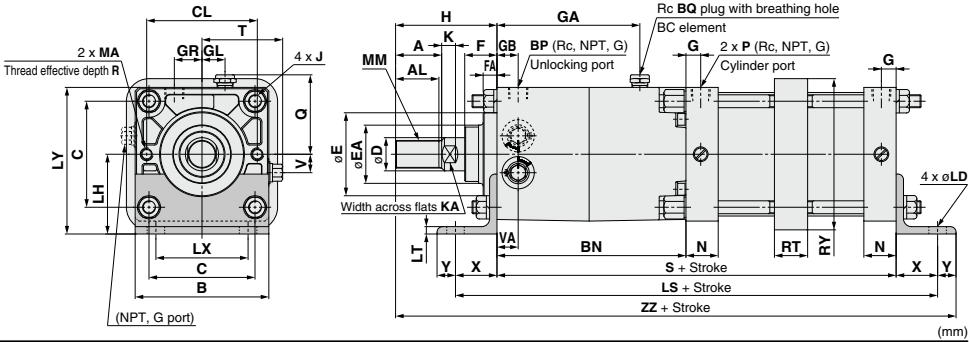
Foot type (L): CNSL



With rod boot



Long stroke



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BN	BP	BQ	C	CL	D	E	EA	F	FA	G	GA	GB	GL	GR	J
125	Up to 1400	50	47	145	205	1/2	3/8	115	120	36	90	63	35	14	16	155	23	25	30	M14 x 1.5
140	Up to 1400	50	47	161	245	1/2	3/8	128	136	36	90	63	35	14	16	180	28	30	30	M14 x 1.5
160	Up to 1400	56	53	182	290	1/2	3/8	144	144	40	90	63	43	14	18.5	215	35	35	35	M16 x 1.5

(mm)

Bore size (mm)	K	KA	LD	LH	LS	LT	LX	LY	MA	MM	N	P	Q	R	S	T	V	VA	X	Y	H	ZZ
125	15	31	19	85	393	8	100	157.5	M12 x 1.75	M30 x 1.5	35	1/2	85.5	25	303	87.5	20	23	45	20	110	478
140	15	31	19	100	433	9	112	180.5	M12 x 1.75	M30 x 1.5	35	1/2	93.5	25	343	95	20	28	45	30	110	528
160	17	36	19	106	496	9	118	197	M12 x 1.75	M36 x 1.5	39	3/4	104	25	396	109	25	35	50	25	120	591

With Rod Boot (mm)

Bore size (mm)	Stroke range (mm)	ZZ_1	ℓ	h
125	30 to 1400	501	1/5 stroke	133
140	30 to 1400	551		133
160	30 to 1400	612		141

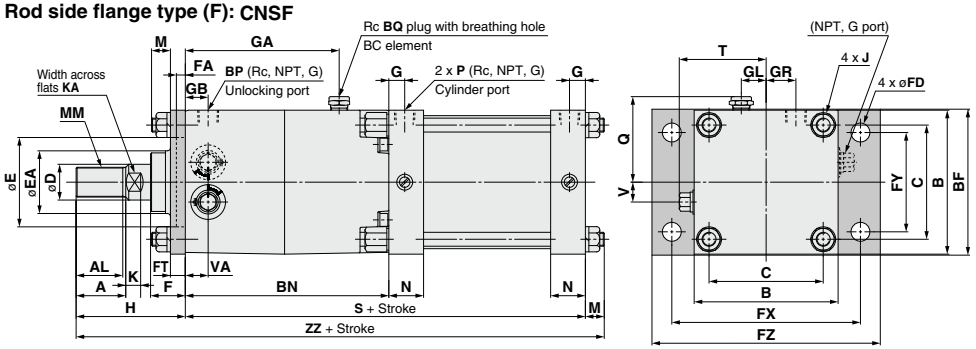
Long Stroke (mm)

Bore size (mm)	Stroke range (mm)	RT	RY
125	1401 to 1600	36	164
140	1401 to 1600	36	184
160	1401 to 1600	45	204

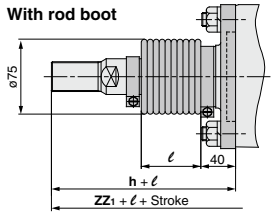
∗ Not available with auto switches.

Dimensions

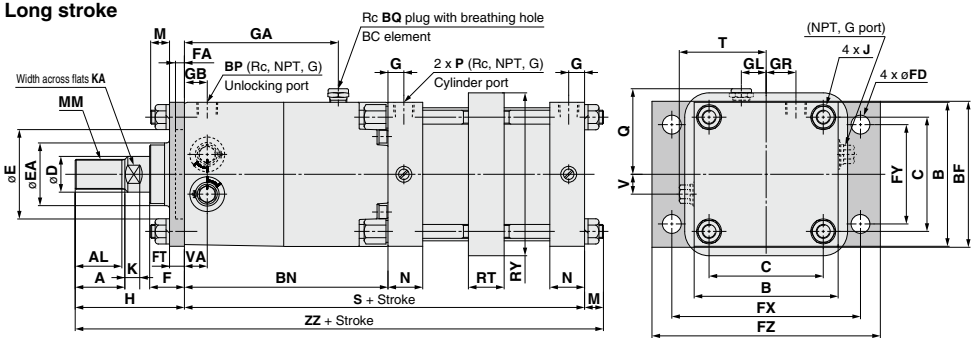
Rod side flange type (F): CNSF



With rod boot



Long stroke



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BF	BN	BP	BQ	C	D	E	EA	F	FA	FD	FT	FX	FY	FZ	G	GA
125	Up to 1400	50	47	145	145	205	1/2	3/8	115	36	90	63	35	14	19	14	190	100	230	16	155
140	Up to 1400	50	47	161	160	245	1/2	3/8	128	36	90	63	35	14	19	20	212	112	255	16	180
160	Up to 1400	56	53	182	180	290	1/2	3/8	144	40	90	63	43	14	19	20	236	118	275	18.5	215

(mm)

Bore size (mm)	GB	GL	GR	J	K	KA	M	MM	N	P	Q	S	T	V	VA	H	ZZ
125	23	25	30	M14 x 1.5	15	31	19	M30 x 1.5	35	1/2	85.5	303	87.5	20	23	110	432
140	28	30	30	M14 x 1.5	15	31	19	M30 x 1.5	35	1/2	93.5	343	95	20	28	110	472
160	35	35	35	M16 x 1.5	17	36	22	M36 x 1.5	39	3/4	104	396	109	25	35	120	538

With Rod Boot (mm)

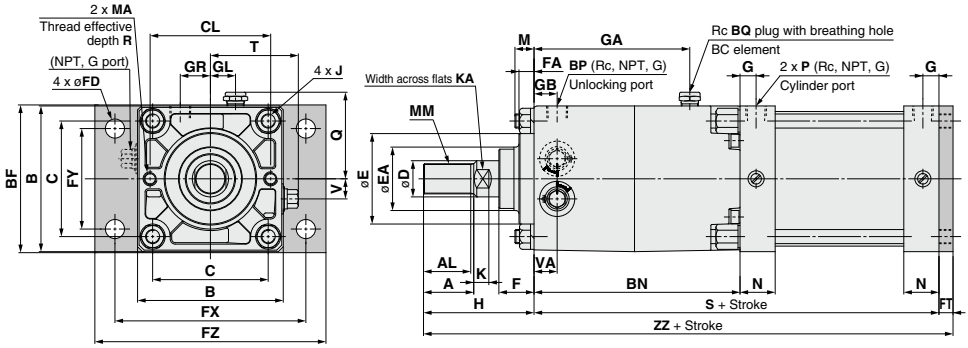
Bore size (mm)	Stroke range (mm)	ZZ_1	ℓ	h
125	30 to 1400	455	1/5 stroke	133
140	30 to 1400	495		133
160	30 to 1400	559		141

Long Stroke (mm)

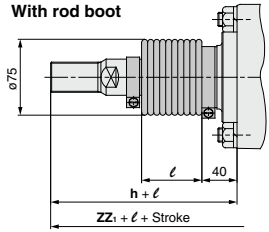
Bore size (mm)	Stroke range (mm)	RT	RY
125	1401 to 1600	36	164
140	1401 to 1600	36	184
160	1401 to 1600	45	204

* Not available with auto switches.

Head side flange type (G): CNSG



With rod boot



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BF	BN	BP	BQ	C	CL	D	E	EA	F	FA	FD	FT	FX	FY	FZ	G	GA
125	Up to 1000	50	47	145	145	205	1/2	3/8	115	120	36	90	63	35	14	19	14	190	100	230	16	155
140	Up to 1000	50	47	161	160	245	1/2	3/8	128	136	36	90	63	35	14	19	20	212	112	255	16	180
160	Up to 1200	56	53	182	180	290	1/2	3/8	144	144	40	90	63	43	14	19	20	236	118	275	18.5	215

(mm)

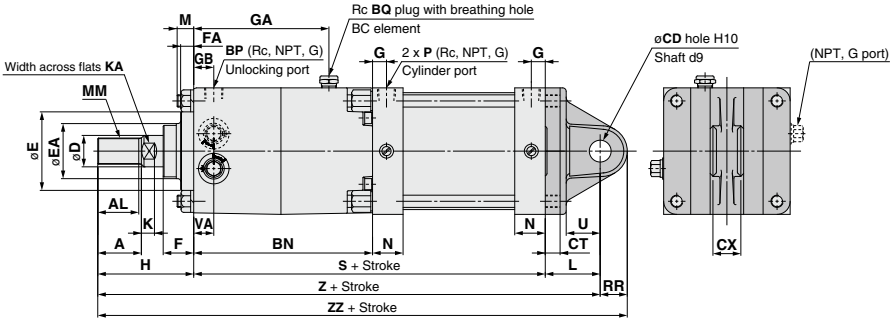
Bore size (mm)	GB	GL	GR	J	K	KA	M	MA	MM	N	P	Q	R	S	T	V	VA	H	ZZ
125	23	25	30	M14 x 1.5	15	31	19	M12 x 1.75	M30 x 1.5	35	1/2	85.5	25	303	87.5	20	23	110	427
140	28	30	30	M14 x 1.5	15	31	19	M12 x 1.75	M30 x 1.5	35	1/2	93.5	25	343	95	20	28	110	473
160	35	35	35	M16 x 1.5	17	36	22	M12 x 1.75	M36 x 1.5	39	3/4	104	25	396	109	25	35	120	536

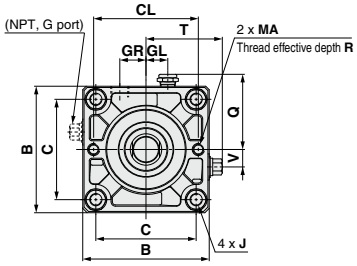
With Rod Boot (mm)

Bore size (mm)	Stroke range (mm)	ZZ_1	ℓ	h
125	30 to 1000	450	1/5 stroke	133
140	30 to 1000	496		133
160	30 to 1200	557		141

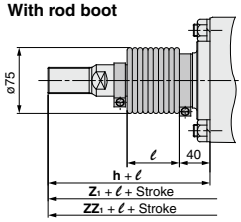
Dimensions

Single clevis type (C): CNSC





With rod boot



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BN	BP	BQ	C	CD_{H10}	CL	CT	CX	D	E	EA	F	FA	G	GA	GB	GL
125	Up to 1000	50	47	145	205	1/2	3/8	115	$25^{+0.084}_{0}$	120	17	$32^{-0.1}_{-0.3}$	36	90	63	35	14	16	155	23	25
140	Up to 1000	50	47	161	245	1/2	3/8	128	$28^{+0.084}_{0}$	136	17	$36^{-0.1}_{-0.3}$	36	90	63	35	14	16	180	28	30
160	Up to 1200	56	53	182	290	1/2	3/8	144	$32^{+0.100}_{0}$	144	20	$40^{-0.1}_{-0.3}$	40	90	63	43	14	18.5	215	35	35

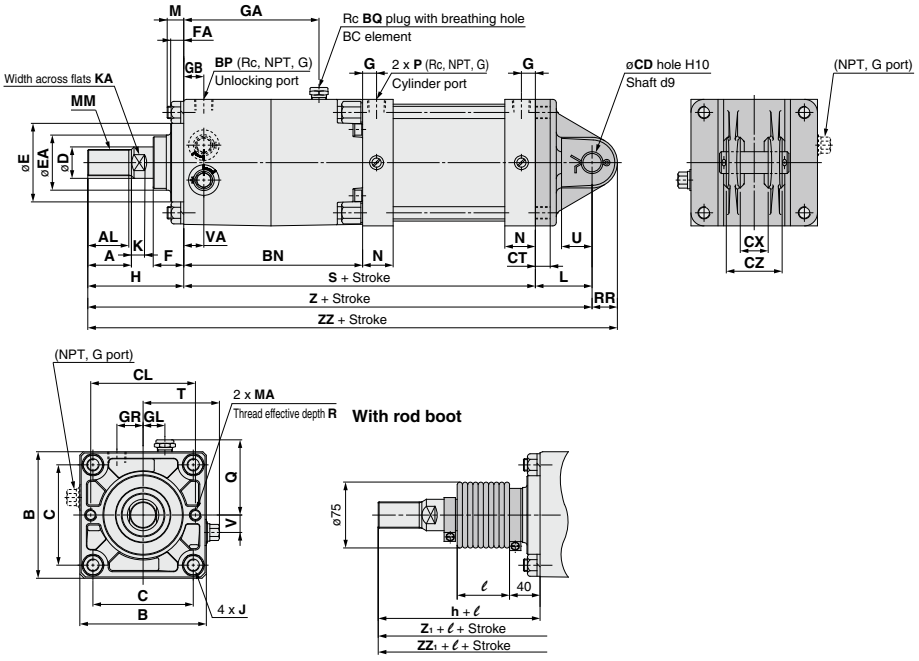
(mm)

Bore size (mm)	GR	J	K	KA	L	M	MA	MM	N	P	Q	R	RR	S	T	U	V	VA	H	Z	ZZ
125	30	M14 x 1.5	15	31	65	19	M12 x 1.75	M30 x 1.5	35	1/2	85.5	25	29	303	87.5	35	20	23	110	478	507
140	30	M14 x 1.5	15	31	75	19	M12 x 1.75	M30 x 1.5	35	1/2	93.5	25	32	343	95	40	20	28	110	528	560
160	35	M16 x 1.5	17	36	80	22	M12 x 1.75	M36 x 1.5	39	3/4	104	25	36	396	109	45	25	35	120	596	632

With Rod Boot (mm)

Bore size (mm)	Stroke range (mm)	Z_1	ZZ_1	ℓ	h
125	30 to 1000	501	530	1/5 stroke	133
140	30 to 1000	551	583		133
160	30 to 1200	617	653		141

Double clevis type (D): CNSD



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BN	BP	BQ	C	CD_{H10}	CL	CT	CX	CZ	D	E	EA	F	FA
125	Up to 1000	50	47	145	205	1/2	3/8	115	$25^{+0.084}_{0}$	120	17	$32^{+0.3}_{+0.1}$	$64^{0}_{-0.2}$	36	90	63	35	14
140	Up to 1000	50	47	161	245	1/2	3/8	128	$28^{+0.084}_{0}$	136	17	$36^{+0.3}_{+0.1}$	$72^{0}_{-0.2}$	36	90	63	35	14
160	Up to 1200	56	53	182	290	1/2	3/8	144	$32^{+0.100}_{0}$	144	20	$40^{+0.3}_{+0.1}$	$80^{0}_{-0.2}$	40	90	63	43	14

(mm)

Bore size (mm)	G	GA	GB	GL	GR	J	K	KA	L	M	MA	MM	N	P	Q	R	RR	S	T
125	16	155	23	25	30	M14 x 1.5	15	31	65	19	M12 x 1.75	M30 x 1.5	35	1/2	85.5	25	29	303	87.5
140	16	180	28	30	30	M14 x 1.5	15	31	75	19	M12 x 1.75	M30 x 1.5	35	1/2	93.5	25	32	343	95
160	18.5	215	35	35	35	M16 x 1.5	17	36	80	22	M12 x 1.75	M36 x 1.5	39	3/4	104	25	36	396	109

(mm)

Bore size (mm)	U	V	VA	H	Z	ZZ
125	35	20	23	110	478	507
140	40	20	28	110	528	560
160	45	25	35	120	596	632

With Rod Boot

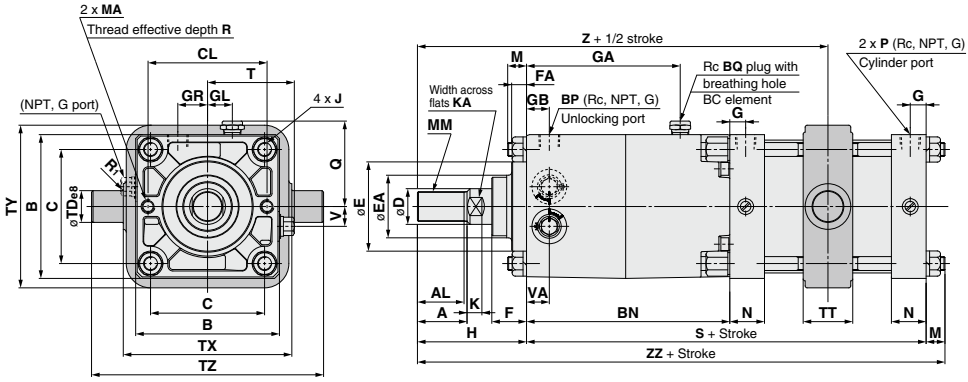
(mm)

Bore size (mm)	Stroke range (mm)	Z_1	ZZ_1	ℓ	h
125	30 to 1000	501	530	1/5 stroke	133
140	30 to 1000	551	583		133
160	30 to 1200	617	653		141

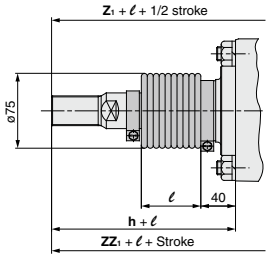
∗ Clevis pin and cotter pin are shipped together.

Dimensions

Center trunnion type (T): CNST



With rod boot



(mm)

Bore size (mm)	Stroke range (mm)	A	AL	B	BN	BP	BQ	C	CL	D	E	EA	F	FA	G	GA	GB	GL	GR	J	K	KA
125	25 to 1000	50	47	145	205	1/2	3/8	115	120	36	90	63	35	14	16	155	23	25	30	M14 x 1.5	15	31
140	30 to 1000	50	47	161	245	1/2	3/8	128	136	36	90	63	35	14	16	180	28	30	30	M14 x 1.5	15	31
160	35 to 1200	56	53	182	290	1/2	3/8	144	144	40	90	63	43	14	18.5	215	35	35	35	M16 x 1.5	17	36

(mm)

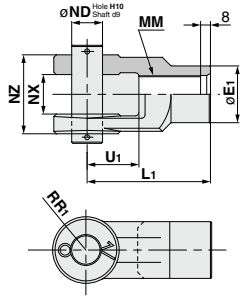
Bore size (mm)	M	MA	MM	N	P	Q	R	R_1	S	T	TD_{e8}	TT	TX	TY	TZ	V	VA	H	Z	ZZ
125	19	M12 x 1.75	M30 x 1.5	35	1/2	85.5	25	1	303	87.5	$32^{-0.050}_{-0.089}$	50	170	164	234	20	23	110	364	432
140	19	M12 x 1.75	M30 x 1.5	35	1/2	93.5	25	1.5	343	95	$36^{-0.050}_{-0.089}$	55	190	184	262	20	28	110	404	472
160	22	M12 x 1.75	M36 x 1.5	39	3/4	104	25	1.5	396	109	$40^{-0.050}_{-0.089}$	60	212	204	292	25	35	120	463	538

With Rod Boot (mm)

Bore size (mm)	Stroke range (mm)	Z_1	ZZ_1	ℓ	h
125	30 to 1000	387	455	1/5 stroke	133
140	30 to 1000	427	495		133
160	35 to 1200	484	559		141

Accessory Bracket Dimensions 1

Y Type Double Knuckle Joint



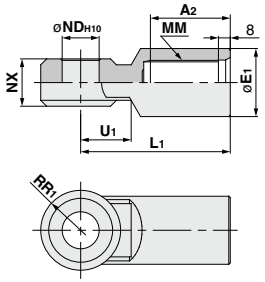
Material: Cast iron

(mm)

Part no.	Applicable bore size (mm)	E_1	L_1	MM	ND_{H10}	NX	NZ	RR_1	U_1
Y-12	**125**	46	100	M30 x 1.5	$25^{+0.084}_{0}$	$32^{+0.3}_{+0.1}$	$64^{-0.1}_{-0.3}$	27	42
Y-14	**140**	48	105	M30 x 1.5	$28^{+0.084}_{0}$	$36^{+0.3}_{+0.1}$	$72^{-0.1}_{-0.3}$	30	47
Y-16	**160**	55	110	M36 x 1.5	$32^{+0.1}_{0}$	$40^{+0.3}_{+0.1}$	$80^{-0.1}_{-0.3}$	34	46

∗ Knuckle pins and cotter pins are included.

I Type Single Knuckle Joint

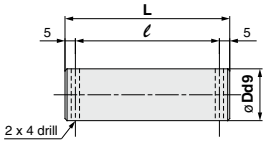


Material: Cast iron

(mm)

Part no.	Applicable bore size (mm)	A_2	E_1	L_1	MM	ND_{H10}	NX	RR_1	U_1
I-12	**125**	54	46	100	M30 x 1.5	$25^{+0.084}_{0}$	$32^{-0.1}_{-0.3}$	27	33
I-14	**140**	54	48	105	M30 x 1.5	$28^{+0.084}_{0}$	$36^{-0.1}_{-0.3}$	30	39
I-16	**160**	60	55	110	M36 x 1.5	$32^{+0.1}_{0}$	$40^{-0.1}_{-0.3}$	34	39

Clevis Pin/Knuckle Pin



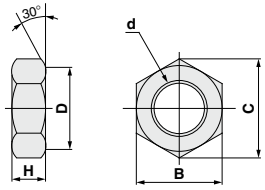
Material: Carbon steel

(mm)

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

∗ Cotter pins (2 pcs.) are included.

Rod End Nut



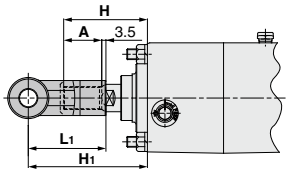
Material: Rolled steel

(mm)

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

Accessory Bracket Dimensions 2

Single/Double Knuckle Joint Mounting



(mm)

Bore size (mm) \ Symbol	H	A	L_1	H_1	Applicable knuckle joint part no.	
					I type single knuckle	Y type double knuckle
125	110	50	100	156.5	I-12	Y-12
140	110	50	105	161.5	I-14	Y-14
160	120	56	110	170.5	I-16	Y-16

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

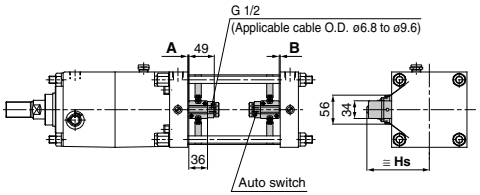
Bore size (mm)	A	H
125	65	125
140	65	125
160	76	140

* Single knuckle joint and double knuckle joint should be used separately. (Fasten by screwing completely into the rod end threads.)
* Extend the dimensions of **A** and **H,** when using a single/double knuckle joint together with a rod end nut. For extension of **A** and **H** dimensions, refer to the table above and specify "Simple Specials **-XA0**" (page 1254).

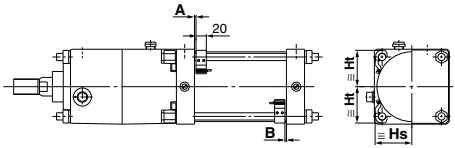
Auto Switch Mounting 1

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

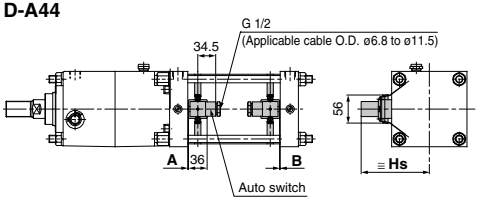
<Band mounting type>
D-A3□
D-G39/K39



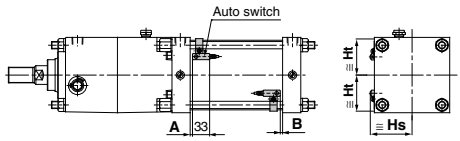
<Tie-rod mounting type>
D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-A9□/A9□V
D-Z7□/Z80
D-Y59□/Y69□/Y7P/Y7PV
D-Y7□W/Y7□WV
D-Y7BA



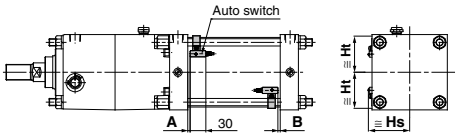
D-A44



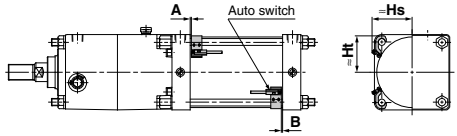
D-A5□/A6□



D-F5□/J59/D-F5NTL
D-F5BA/F59F
D-F5□W/J59W



D-P3DWA



Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	D-M9□ D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-Z7□/Z80 D-Y5□/Y6□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-A5□ D-A6□ D-A3□ D-A44 D-G39 D-K39		D-A59W		D-F5□W D-J59W D-F5BA D-F5□ D-J59 D-F59F		D-F5NT		D-P3DWA	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
125	8	8	4	4	1.5	1.5	0	0	2	2	4.5	4.5	9.5	9.5	3.5	3.5
140	8	8	4	4	1.5	1.5	0	0	2	2	4.5	4.5	9.5	9.5	3.5	3.5
160	8	8	4	4	1.5	1.5	0	0	2	2	4.5	4.5	9.5	9.5	3.5	3.5

∗ The above shown are the proper auto switch mounting positions for detection at stroke end. Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

(mm)

Auto switch model / Bore size (mm)	D-M9□ D-M9□W D-M9□A D-A9□ D-A9□V		D-M9□V D-M9□WV D-M9□AV		D-Z7□/Z80 D-Y5□/Y6□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-A3□ D-G39 D-K39	D-A44	D-A5□ D-A6□ D-A59W		D-F5□ D-J59 D-F5□W D-J59W D-F5BA D-F59F D-F5NT		D-P3DWA	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	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

Auto Switch Mounting 2

Minimum Stroke for Auto Switch Mounting

n: Number of auto switch (mm)

Auto switch model	No. of auto switches mounted		Mounting brackets other than center trunnion	Center trunnion		
				ø125	ø140	ø160
D-M9□ D-M9□W	2 (Different surfaces, Same surface) 1		15	105	110	115
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$110 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-M9□V D-M9□WV	2 (Different surfaces, Same surface) 1		10	80	85	90
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$90 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-M9□A	2 (Different surfaces, Same surface) 1		20	115	120	
	n		$20 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$120 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	
D-M9□AV	2 (Different surfaces, Same surface) 1		15	90	95	
	n		$15 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$90 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$95 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	
D-A9□	2 (Different surfaces, Same surface) 1		15	100	105	110
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$110 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-A9□V	2 (Different surfaces, Same surface) 1		10	75	80	85
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-A5/A6 D-A59W D-F5□/J59 D-F5□W D-J59W D-F5BA D-F59F	2 (Different surfaces, Same surface) 1		25	125	135	
	n (Same surface)		$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$125 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$135 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	
D-F5NT	2 (Different surfaces, Same surface) 1		35	145	155	
	n (Same surface)		$35 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$145 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$155 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	
D-A3□ D-G39 D-K39	2	Different surfaces	35	110		
		Same surface	100			
	n	Different surfaces	35 + 30 (n – 2) (n = 2, 3, 4, 5 ···)	110 + 30 (n – 2) (n = 2, 4, 6, 8 ···) Note 1)		
		Same surface	100 + 100 (n – 2) (n = 2, 3, 4, 5 ···)	110 + 100 (n – 2) (n = 2, 4, 6, 8 ···) Note 1)		
	1		15	110		
D-A44	2	Different surfaces	35	110		
		Same surface	55			
	n	Different surfaces	35 + 30 (n – 2) (n = 2, 3, 4, 5 ···)	110 + 30 (n – 2) (n = 2, 4, 6, 8 ···) Note 1)		
		Same surface	55 + 55 (n – 2) (n = 2, 3, 4, 5 ···)	110 + 50 (n – 2) (n = 2, 4, 6, 8 ···) Note 1)		
	1		15	110		
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	2 (Different surfaces, Same surface) 1		15	105	110	115
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$110 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, Same surface) 1		10	90	95	100
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$90 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$95 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$100 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-Y7BA	2 (Different surfaces, Same surface) 1		20	115	120	125
	n		$20 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$115 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$120 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$125 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)
D-P3DWA	2 (Different surfaces, Same surface) 1		20	110	115	120
	n		$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···) Note 1)	$110 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$115 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)	$120 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···) Note 2)

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

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

Operating Range

(mm)

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

∗ Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket: Part No.

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

[Mounting screw set made of stainless steel]

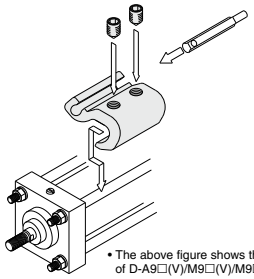
The following set of mounting screws made of stainless steel (including nuts) is available. Use it in accordance with the operating environment. (Please order the auto switch mounting bracket separately, since it is not included.)

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

D-F5BA auto switch is set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA1 is attached.

Note 1) Refer to page 1233 for the details of BBA1.

Note 2) When using D-M9□A(V)/Y7BA, do not use the steel set screws which is included with the auto switch mounting brackets above (BS5-□□□, BS4-□□□). Order a stainless steel screw set (BBA1) separately, and select and use the M4 x 8L stainless steel set screws included in the BBA1.



• The above figure shows the mounting example of 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 can be mounted. For detailed specifications, refer to pages 1119 to 1245.

Auto switch type	Model	Electrical entry (Fetching direction)	Features
Reed	D-A90V	Grommet (Perpendicular)	Without indicator light
	D-A93V, A96V		—
	D-Z73, Z76	Grommet (In-line)	
	D-A53, A56		
	D-A64, A67		Without indicator light
	D-Z80		
Solid state	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	—
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		2-color indicator
	D-Y7NWV, Y7PWV, Y7BWV		
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-color indicator)
	D-F59, F5P, J59	Grommet (In-line)	—
	D-Y59A, Y59B, Y7P		
	D-F59W, F5PW, J59W		2-color indicator
	D-Y7NW, Y7PW, Y7BW		
	D-F5BA, Y7BA		Water resistant (2-color indicator)
	D-F5NT		With timer

∗ With pre-wired connector is available for solid state auto switches. For details, refer to pages 1192 and 1193.

∗ Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)/Y7G/Y7H) are also available. For details, refer to pages 1592-1 and 1139.