Compact Hydraulic Cylinder

Series CHQ

Series CHQ

Nominal pressure: **3.5 MPa**

Bore size (mm): 20, 32, 40, 50, 63, 80, 100

Compact Hydraulic Cylinder
Double Acting/Single Rod
Series CH□QB

3.5 MPa

ø20, ø32, ø40, ø50, ø63, ø80, ø100

How to Order

CHQB 50 – 30 D □ – □

With Auto Switch **CHDQB 50 – 30 D □ – M9BW □ – □**

- **With auto switch (built-in magnet)**
- **Mounting: Basic style**
- **Bore size**

20	20 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

- **Cylinder stroke (mm)** Refer to the standard stroke table on page 1263.
- **Action: Double acting**
- **Rod end thread type**

Nil	Female thread
M	Male thread

∗ Rod end nut is provided standard for male thread type.

- **Auto switch type**

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

- **Number of auto switches**

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

- **Made to order specifications** For details, refer to page 1263.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDQB50-100D

Applicable Auto Switches /Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	———	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
		Connector					J79C	—	●	—	●	●	●	—		
	Diagnostic indication (2-color display)	Grommet		3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		M9NAV∗1	M9NA∗1	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV∗1	M9PA∗1	○	○	●	○	—	○		
				2-wire	12 V		M9BAV∗1	M9BA∗1	○	○	●	○	—	○	—	
	Diagnostic output (2-color display)			4-wire	5 V, 12 V		—	F79F	●	—	●	○	—	○	IC circuit	
Reed auto switch	———	Grommet	Yes	3-wire (NPN equiv.)	—	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
				2-wire		200 V	A72	A72H	●	—	●	—	—	—	—	
					24 V	12 V	100 V	A93V∗2	A93	●	●	●	●	—	—	
			No			5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—	IC circuit	Relay PLC
		Connector	Yes			12 V	—	A73C	—	●	—	●	●	●	—	
			No			5 V, 12 V	24 V or less	A80C	—	●	—	●	●	●	—	IC circuit
	Diagnostic indication (2-color display)	Grommet	Yes			—	—	A79W	—	●	—	●	—	—	—	—

∗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.

∗2 1 m type lead wire is only applicable to D-A93.

∗ 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
None ····· N (Example) J79CN

∗ Solid state auto switches marked "○" are produced upon receipt of order.

∗ Since there are applicable auto switches other than listed, refer to page 1278 for details.

∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.

∗ For mounting D-A9□(V), M9□(V), M9□W(V), M9□A(V) with ø32 to ø50 to a surface other than the port surface, order an auto switch mounting bracket separately. Refer to page 1279 for details.

Specifications

Bore size (mm)	20	32	40	50	63	80	100
Action	Double acting/Single rod						
Fluid	Hydraulic fluid						
Nominal pressure	3.5 MPa						
Proof pressure	5.0 MPa						
Maximum allowable pressure	3.5 MPa						
Minimum operating pressure	0.3 MPa						
Ambient and fluid temperature	Without auto switch: –10° to 80°C						
	With auto switch: –10° to 60°C						
Piston speed	8 to 100 mm/s						
Cushion	None						
Rod end thread	Standard: Female thread, Male thread						
Stroke length tolerance	$^{+1.0}_{0}$ mm						
Mounting style	Basic style						
Mounting	Through hole						

Note) Refer to page 1234 for definitions of terms related to pressure.

Made to Order **Made to order specifications**
(For details, refer to page 1269)

Symbol	Specifications
-XB10	Intermediate stroke (Using exclusive body)

Standard Strokes

Bore size (mm)	Standard strokes (mm)
20	5, 10, 15, 20, 25, 30, 35, 40, 45, 50
32	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
40	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
50	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
63	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
80	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100

Note) Consult with SMC regarding the manufacture of strokes other than the above.

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	Not compatible
Phosphate hydraulic fluid	Not compatible

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)					
				1	1.5	2	2.5	3	3.5
20	10	OUT	314	314	471	628	785	942	1099
		IN	235	235	352	470	587	705	822
32	16	OUT	804	804	1206	1608	2010	2412	2814
		IN	603	603	904	1206	1507	1809	2110
40	16	OUT	1256	1256	1884	2512	3140	3768	4396
		IN	1055	1055	1582	2110	2637	3165	3692
50	20	OUT	1963	1963	2944	3926	4907	5889	6870
		IN	1649	1649	2473	3298	4122	4947	5771
63	20	OUT	3117	3117	4675	6234	7792	9351	10909
		IN	2803	2803	4204	5606	7007	8409	9810
80	25	OUT	5026	5026	7539	10052	12565	15078	17591
		IN	4535	4535	6802	9070	11337	13605	15872
100	30	OUT	7853	7853	11779	15706	19632	23559	27485
		IN	7147	7147	10720	14294	17867	21441	25014

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

Unit: g

Bore size (mm)	Cylinder stroke (mm)												Male thread additional weight
	5	10	15	20	25	30	35	40	45	50	75	100	
20	180	200	220	240	260	280	300	320	340	360	—	—	10
32	330	350	370	390	410	430	450	470	490	510	610	710	52
40	480	500	520	540	560	580	600	620	640	660	760	860	52
50	—	860	890	920	950	980	1010	1040	1070	1100	1250	1400	100
63	—	1250	1290	1330	1370	1410	1450	1490	1530	1570	1770	1970	100
80	—	2380	2470	2560	2650	2740	2830	2920	3010	3100	3550	4000	172
100	—	3520	3630	3740	3850	3960	4070	4180	4290	4400	4950	5500	283

⚠Specific Product Precautions

Be sure to read before handling. Refer to front matter 38 for Safety Instructions, and pages 1234 to 1241 for precautions for hydraulic cylinder and auto switch.

Usage

⚠Caution

1. **Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting. (ø20: 2 pcs.; ø32 to ø100: 4 pcs.)**
2. **Since a lateral load (eccentric load) cannot be applied to the piston rod, build the mounting jig in such a way that a lateral load will not be applied to the piston rod.**
3. **Make sure that the interlocking length of the rod end thread (male or female thread) and the mounting material is at least 80% of the thread diameter.**
4. **When operating a cylinder for the first time, be sure to release the air inside the cylinder and the piping. When the air release is complete, operate the cylinder at reduced pressure, then gradually increase it to the normal operating pressure.**
5. **Since Series CH□QB does not have an air release plug, release air from other components (e.g. from piping, etc.) as well.**
6. **When mounting the cylinder body with mounting bolts, use the tightening torques in the table at right as a guide.**

Body mounting bolt tightening torques

Bore size (mm)	Mounting bolt		Tightening torque
	Size	Qty.	N·m
20	M5 x 0.8	2	3
32	M5 x 0.8	4	3
40	M5 x 0.8	4	3
50	M6 x 1	4	6
63	M8 x 1.25	4	11.5
80	M10 x 1.5	4	24
100	M10 x 1.5	4	34

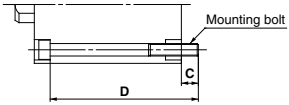
7. **Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.**
8. **When the cylinder head side contains hydraulic fluid or is in a normally pressurized condition, the applied load must not be allowed to strike the piston rod end. Avoid such applications.**

Mounting Bolts for CH□QB

Mounting: Through hole type mounting bolts are available.
Refer to the following for ordering procedures.
Order the actual number of bolts that will be used.

Example) CQ-M5x55L 4 pcs.

Mounting bolt diagram

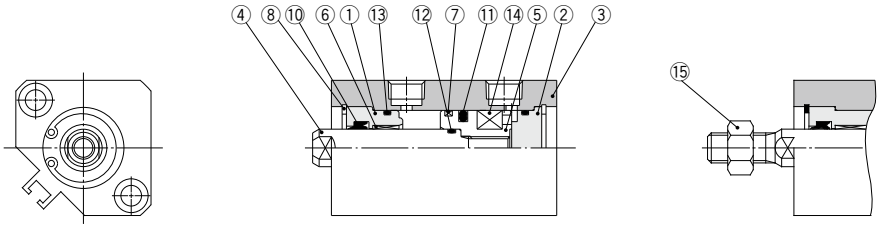


Model	C	D	Mounting bolt part no.
CH□QB20-5D (M)	7	55	CQ-M5 x 55L
-10D (M)		60	x 60L
-15D (M)		65	x 65L
-20D (M)		70	x 70L
-25D (M)		75	x 75L
-30D (M)		80	x 80L
-35D (M)		85	x 85L
-40D (M)		90	x 90L
-45D (M)		95	x 95L
-50D (M)		100	x 100L
CH□QB32-5D (M)	7	70	CQ-M5 x 70L
-10D (M)		75	x 75L
-15D (M)		80	x 80L
-20D (M)		85	x 85L
-25D (M)		90	x 90L
-30D (M)		95	x 95L
-35D (M)		100	x 100L
-40D (M)		105	x 105L
-45D (M)		110	x 110L
-50D (M)		115	x 115L
-75D (M)		140	x 140L
-100D (M)		165	x 165L
CH□QB40-5D (M)	10	75	CQ-M5 x 75L
-10D (M)		80	x 80L
-15D (M)		85	x 85L
-20D (M)		90	x 90L
-25D (M)		95	x 95L
-30D (M)		100	x 100L
-35D (M)		105	x 105L
-40D (M)		110	x 110L
-45D (M)		115	x 115L
-50D (M)		120	x 120L
-75D (M)		145	x 145L
-100D (M)		170	x 170L
CH□QB50-10D (M)	12	90	CQ-M6 x 90L
-15D (M)		95	x 95L
-20D (M)		100	x 100L
-25D (M)		105	x 105L
-30D (M)		110	x 110L
-35D (M)		115	x 115L
-40D (M)		120	x 120L
-45D (M)		125	x 125L
-50D (M)		130	x 130L
-75D (M)		155	x 155L
-100D (M)		180	x 180L

Model	C	D	Mounting bolt part no.
CH□QB63-10D (M)	15.5	95	CQ-M8 x 95L
-15D (M)		100	x 100L
-20D (M)		105	x 105L
-25D (M)		110	x 110L
-30D (M)		115	x 115L
-35D (M)		120	x 120L
-40D (M)		125	x 125L
-45D (M)		130	x 130L
-50D (M)		135	x 135L
-75D (M)		160	x 160L
-100D (M)		185	x 185L
CH□QB80-10D (M)	14.5	100	CQ-M10 x 100L
-15D (M)		105	x 105L
-20D (M)		110	x 110L
-25D (M)		115	x 115L
-30D (M)		120	x 120L
-35D (M)		125	x 125L
-40D (M)		130	x 130L
-45D (M)		135	x 135L
-50D (M)		140	x 140L
-75D (M)		165	x 165L
-100D (M)		190	x 190L
CH□QB100-10D (M)	13.5	105	CQ-M10 x 105L
-15D (M)		110	x 110L
-20D (M)		115	x 115L
-25D (M)		120	x 120L
-30D (M)		125	x 125L
-35D (M)		130	x 130L
-40D (M)		135	x 135L
-45D (M)		140	x 140L
-50D (M)		145	x 145L
-75D (M)		170	x 170L
-100 (M)		195	x 195L

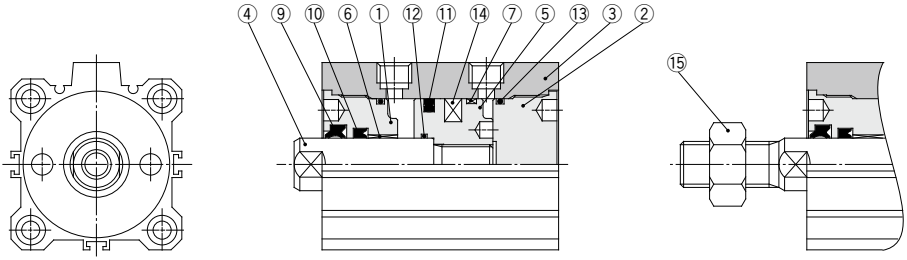
Construction

CH□QB20



Rod end male thread

CH□QB32 to CH□QB100



Rod end male thread

Parts List

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Black anodized
2	**Head cover**	Aluminum alloy	Black anodized
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	ø20: Stainless steel ø32 to ø100: Carbon steel	Hard chromium electroplated
5	**Piston**	Aluminum alloy	Chromated
6	**Bushing**	Copper alloy	
7	**Wear ring**	Resin	
8	**Retaining ring (ø20 only)**	Carbon tool steel	Black zinc chromated
9	**Scraper**	NBR	
10	**Rod seal**	NBR	
11	**Piston seal**	NBR	
12	**Piston gasket**	NBR	
13	**Tube gasket**	NBR	
14	**Magnet**	—	
15	**Rod end nut**	Carbon steel	Nickel plated

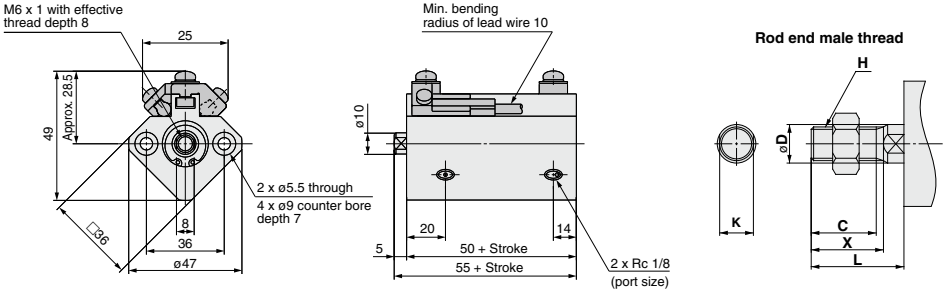
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.	Content
20	CHQ20-PS	Nos. ⑨, ⑩, ⑪ and ⑬ from the chart at left
32	CHQ32-PS	
40	CHQ40-PS	
50	CHQ50-PS	
63	CHQ63-PS	
80	CHQ80-PS	
100	CHQ100-PS	

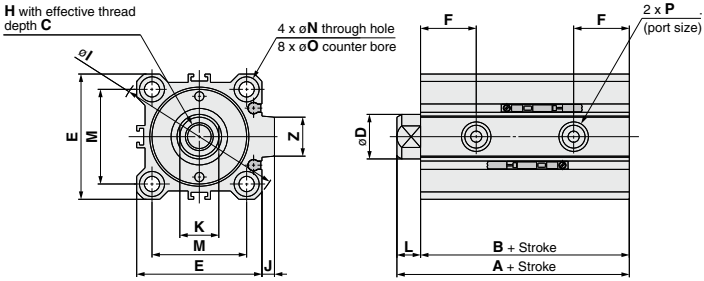
* Seal kit consists of items ⑨, ⑩, ⑪ and ⑬ and can be ordered by using the seal kit number for each bore size.
* Special tool required for disassembly. Contact SMC for recommended tool designs and dimensions.

Dimensions

ø20



ø32 to ø100



Note) The auto switches above are shown for a D-M9□(W) solid state auto switch.

(mm)

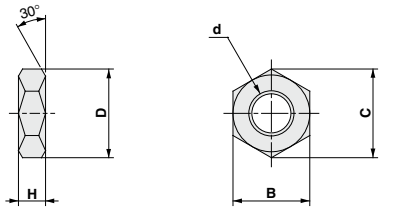
Bore size (mm)	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	S	U	Z
32	73.5	65	12	16	45	20	M10 x 1.5	60	4.5	14	8.5	34	5.5	9 depth 7	Rc1/8	58.5	31.5	14
40	75.5	67	12	16	52	22	M10 x 1.5	69	5	14	8.5	40	5.5	9 depth 7	Rc1/8	66	35	14
50	87	76	15	20	64	25	M12 x 1.75	86	7	18	11	50	6.6	11 depth 8	Rc1/4	80	41	19
63	91	80	15	20	77	27	M12 x 1.75	103	7	18	11	60	9	14 depth 10.5	Rc1/4	93	47.5	19
80	100	89	20	25	98	28	M16 x 2	132	6	22	11	77	11	17.5 depth 13.5	Rc3/8	112.5	57.5	26
100	107	95	24	30	117	29	M20 x 2.5	156	6.5	26	12	94	11	17.5 depth 13.5	Rc3/8	132.5	67.5	26

Rod end male threads (mm)

Bore size (mm)	C	X	D	H	L	K
20	15.5	18	10	M8 x 1.25	23	8
32	27	30	16	M14 x 1.5	38.5	14
40	27	30	16	M14 x 1.5	38.5	14
50	32	35	20	M18 x 1.5	46	18
63	32	35	20	M18 x 1.5	46	18
80	37	40	25	M22 x 1.5	51	22
100	37	40	30	M26 x 1.5	52	26

Accessory (Standard)

Rod end nut



Material: Carbon steel

Part no.	Bore size (mm)	B	C	d	D	H
NT-02	20	13	15	M8 x 1.25	12.5	5
NT-04	32	22	25.4	M14 x 1.5	21	8
NT-04	40	22	25.4	M14 x 1.5	21	8
NT-05	50	27	31.2	M18 x 1.5	26	11
NT-05	63	27	31.2	M18 x 1.5	26	11
NT-08	80	32	37	M22 x 1.5	31	13
NT-10	100	41	47.3	M26 x 1.5	39	16

Series CH□QB
Made to Order Specifications:

Please consult with SMC for detailed specifications, delivery and prices.

Made to Order

Symbol
-XB10

1 Intermediate Strokes (Using Exclusive Body)

CH □ QB | Bore size | – | Stroke | D □ – XB10

Rod end thread type

Nil	Female thread
M	Male thread

∗ Rod end nut is provided as standard for male thread type.

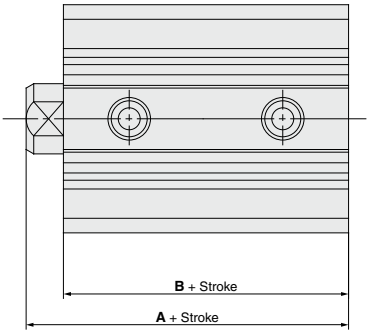
Intermediate stroke (Using exclusive body)

Specifications

Model	CH□QB
Action	Double acting/Single rod
Bore size (mm)	32, 40, 50, 63, 80, 100
Mounting	Through hole
Auto switch	Mountable
Other specifications	Same as standard double acting single rod

When using an intermediate stroke other than the compact hydraulic cylinder (Series CH□QB) standard strokes, it is possible to shorten the overall length and reduce the mounting space by using an exclusive body that does not have spacers installed.

Dimensions



(mm)

Bore size (mm)	A	B
	55 to 100 mm strokes	55 to 100 mm strokes
32	73.5	65
40	75.5	67
50	87	76
63	91	80
80	100	89
100	107	95

∗ Dimensions other than the above are the same as the standard double acting single rod type.
Note) Applicable strokes are available in 5 mm increments.

Compact Hydraulic Cylinder
Double Acting/Double Rod
Series CH□QWB

3.5 MPa

ø20, ø32, ø40, ø50, ø63, ø80, ø100

How to Order

CHQ W B 50 – 30 D □

With Auto Switch **CHDQ W B 50 – 30 D □ – M9BW □**

- **With auto switch (built-in magnet)**
- **Model: Double acting/Double rod**
- **Mounting: Basic style**
- **Bore size**

20	20 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

- **Cylinder stroke (mm)**
  Refer to the standard stroke table on page 1271.
- **Action: Double acting**
- **Rod end thread type**

Nil	Female thread
M	Male thread

∗ Rod end nut is provided standard for male thread type.

- **Auto switch type**

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

- **Number of auto switches**

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

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDQWB50-100D

Applicable Auto Switches

/Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V		**M9NV**	**M9N**	●	●	●	○	—	○	IC circuit	Relay PLC
				3-wire (PNP)			**M9PV**	**M9P**	●	●	●	○	—	○		
				2-wire	12 V		**M9BV**	**M9B**	●	●	●	○	—	○	—	
		Connector					**J79C**	—	●	—	●	●	●	—		
	Diagnostic indication (2-color display)	Grommet		3-wire (NPN)	5 V, 12 V	—	**M9NWV**	**M9NW**	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			**M9PWV**	**M9PW**	●	●	●	○	—	○		
				2-wire	12 V		**M9BWV**	**M9BW**	●	●	●	○	—	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		**M9NAV**∗1	**M9NA**∗1	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			**M9PAV**∗1	**M9PA**∗1	○	○	●	○	—	○		
				2-wire	12 V		**M9BAV**∗1	**M9BA**∗1	○	○	●	○	—	○	—	
	Diagnostic output (2-color display)			4-wire	5 V, 12 V		—	**F79F**	●	—	●	○	—	○	IC circuit	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equiv.)	5 V	—	**A96V**	**A96**	●	—	●	—	—	—	IC circuit	—
				2-wire	—	200 V	**A72**	**A72H**	●	—	●	—	—	—	—	Relay PLC
			No		12 V	100 V	**A93V**∗2	**A93**	●	●	●	●	—	—	—	
					5 V, 12 V	100 V or less	**A90V**	**A90**	●	—	●	—	—	—	IC circuit	
		Connector	Yes		12 V	—	**A73C**	—	●	—	●	●	●	—	—	
			No		5 V, 12 V	24 V or less	**A80C**	—	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color display)	Grommet	Yes		—	—	**A79W**	—	●	—	●	—	—	—	—	

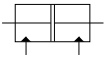
∗1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.
∗2 1 m type lead wire is only applicable to D-A93.

∗ 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
None ····· N (Example) J79CN

∗ Solid state auto switches marked "○" are produced upon receipt of order.

∗ Since there are applicable auto switches other than listed, refer to page 1278 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.
∗ For mounting D-A9□(V), M9□(V), M9□W(V), M9□A(V) with ø32 to ø50 to a surface other than the port surface, order an auto switch mounting bracket separately. Refer to page 179 for details.

Double acting/Double rod



Specifications

Bore size (mm)	20	32	40	50	63	80	100
Action	Double acting/Double rod						
Fluid	Hydraulic fluid						
Nominal pressure	3.5 MPa						
Proof pressure	5.0 MPa						
Maximum allowable pressure	3.5 MPa						
Minimum operating pressure	0.3 MPa						
Ambient and fluid temperature	Without auto switch: –10° to 80°C						
	With auto switch: –10° to 60°C						
Piston speed	8 to 100 mm/s						
Cushion	None						
Rod end thread	Standard: Female thread, Male thread						
Stroke length tolerance	$^{+1.0}_{0}$ mm						
Mounting style	Basic style						
Mounting	Through hole						

Note) Refer to page 1234 for definitions of terms related to pressure.

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	Not compatible
Phosphate hydraulic fluid	Not compatible

Standard Strokes

Bore size (mm)	Standard strokes (mm)
20	5, 10, 15, 20, 25, 30, 35, 40, 45, 50
32	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
40	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
50	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
63	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
80	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100

Note) Consult with SMC regarding the manufacture of strokes other than the above.

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Piston area (mm^2)	Operating pressure (MPa)					
			1.0	1.5	2.0	2.5	3.0	3.5
20	10	235	235	352	470	587	705	822
32	16	603	603	904	1206	1507	1809	2110
40	16	1055	1055	1582	2110	2637	3165	3692
50	20	1649	1649	2473	3298	4122	4947	5771
63	20	2803	2803	4204	5606	7007	8409	9810
80	25	4535	4535	6802	9070	11337	13605	15872
100	30	7147	7147	10720	14294	17867	21441	25014

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

Unit: g

Bore size (mm)	Cylinder stroke (mm)												Male thread additional weight
	5	10	15	20	25	30	35	40	45	50	75	100	
20	205	230	255	280	305	330	355	380	405	430	—	—	20
32	410	445	480	515	550	585	620	655	690	725	900	1075	104
40	570	605	640	675	710	745	780	815	850	885	1060	1235	104
50	—	1030	1080	1130	1180	1230	1280	1330	1380	1430	1680	1930	200
63	—	1430	1485	1540	1595	1650	1705	1760	1815	1870	2145	2420	200
80	—	2680	2805	2930	3055	3180	3305	3430	3555	3680	4305	4930	344
100	—	4075	4235	4395	4555	4715	4875	5035	5195	5355	6155	6955	566

⚠Specific Product Precautions

Be sure to read before handling. Refer to front matter 38 for Safety Instructions, and pages 1234 to 1241 for precautions for hydraulic cylinder and auto switch.

Usage

⚠Caution

1. **Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting. (ø20: 2pcs, ø32 to ø100: 4pcs.)**
2. **Since a lateral load (eccentric load) cannot be applied to the piston rod, build your mounting jig in such a way that a lateral load will not be applied to the piston rod.**
3. **Make sure that the interlocking length of the rod end threads (male or female thread) and the mounting material is at least 80% of the thread diameter.**
4. **Be sure to release the air inside the cylinder and the piping before operating the cylinder for the first time. When the air release is complete, operate the cylinder at reduced pressure, then gradually increase it to the normal operating pressure.**
5. **Since Series CH□QWB does not have an air release plug, release air from components other than the cylinder (e.g. from piping, etc.) as well.**
6. **When mounting the cylinder body with mounting bolts, use tightening torques in the table below as a guide.**

Body mounting bolt tightening torques

Bore size (mm)	Mounting bolt		Tightening torque
	Size	No.	N·m
20	M5 x 0.8	2	3
32	M5 x 0.8	4	3
40	M5 x 0.8	4	3
50	M6 x 1	4	6
63	M8 x 1.25	4	11.5
80	M10 x 1.5	4	24
100	M10 x 1.5	4	34

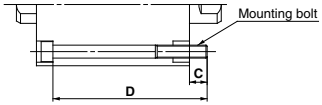
7. **When tightening the piston rod end threads, be sure to use the wrench flats of the rod on the side where the threads are being tightened. Use care, as damage may occur if rotational force is applied to both ends of the piston rod.**
8. **Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.**
9. **When the cylinder head contains fluid or is in a normally pressurized condition, the load should not be allowed to strike the piston rod end. Avoid such applications.**

Mounting Bolts for CH□QWB

Mounting: Through hole type mounting bolts are available.
Refer to the following for ordering procedures.
Order the actual number of bolts that will be used.

Example) CQ-M5x65L 4 pcs.

Mounting bolt diagram



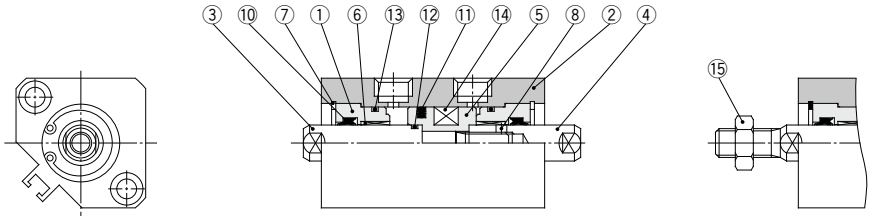
Mounting Bolts

Model	C	D	Mounting bolt part no.
CH□QWB20-5D (M)	10	65	CQ-M5 x 65L
-10D (M)		70	x 70L
-15D (M)		75	x 75L
-20D (M)		80	x 80L
-25D (M)		85	x 85L
-30D (M)		90	x 90L
-35D (M)		95	x 95L
-40D (M)		100	x 100L
-45D (M)		105	x 105L
-50D (M)		110	x 110L
CH□QWB32-5D (M)	7	70	CQ-M5 x 70L
-10D (M)		75	x 75L
-15D (M)		80	x 80L
-20D (M)		85	x 85L
-25D (M)		90	x 90L
-30D (M)		95	x 95L
-35D (M)		100	x 100L
-40D (M)		105	x 105L
-45D (M)		110	x 110L
-50D (M)		115	x 115L
-75D (M)		140	x 140L
-100D (M)		165	x 165L
CH□QWB40-5D (M)	10	75	CQ-M5 x 75L
-10D (M)		80	x 80L
-15D (M)		85	x 85L
-20D (M)		90	x 90L
-25D (M)		95	x 95L
-30D (M)		100	x 100L
-35D (M)		105	x 105L
-40D (M)		110	x 110L
-45D (M)		115	x 115L
-50D (M)		120	x 120L
-75D (M)		145	x 145L
-100D (M)		170	x 170L
CH□QWB50-10D (M)	12	90	CQ-M6 x 90L
-15D (M)		95	x 95L
-20D (M)		100	x 100L
-25D (M)		105	x 105L
-30D (M)		110	x 110L
-35D (M)		115	x 115L
-40D (M)		120	x 120L
-45D (M)		125	x 125L
-50D (M)		130	x 130L
-75D (M)		155	x 155L
-100D (M)		180	x 180L

Model	C	D	Mounting bolt part no.
CH□QWB63-10D (M)	15.5	95	CQ-M8 x 95L
-15D (M)		100	x 100L
-20D (M)		105	x 105L
-25D (M)		110	x 110L
-30D (M)		115	x 115L
-35D (M)		120	x 120L
-40D (M)		125	x 125L
-45D (M)		130	x 130L
-50D (M)		135	x 135L
-75D (M)		160	x 160L
-100D (M)		185	x 185L
CH□QWB80-10D (M)	14.5	100	CQ-M10 x 100L
-15D (M)		105	x 105L
-20D (M)		110	x 110L
-25D (M)		115	x 115L
-30D (M)		120	x 120L
-35D (M)		125	x 125L
-40D (M)		130	x 130L
-45D (M)		135	x 135L
-50D (M)		140	x 140L
-75D (M)		165	x 165L
-100D (M)		190	x 190L
CH□QWB100-10D (M)	13.5	105	CQ-M10 x 105L
-15D (M)		110	x 110L
-20D (M)		115	x 115L
-25D (M)		120	x 120L
-30D (M)		125	x 125L
-35D (M)		130	x 130L
-40D (M)		135	x 135L
-45D (M)		140	x 140L
-50D (M)		145	x 145L
-75D (M)		170	x 170L
-100D (M)		195	x 195L

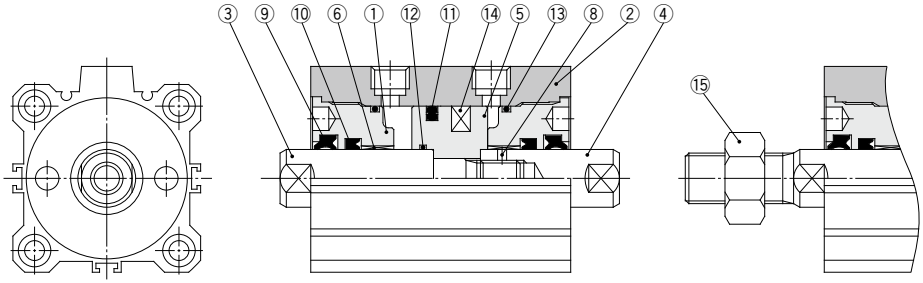
Construction

CH□QWB20



Rod end male thread

CH□QWB32 to CH□QWB100



Rod end male thread

Parts List

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Black anodized
2	**Cylinder tube**	Aluminum alloy	Hard anodized
3	**Piston rod A**	ø20: Stainless steel ø32 to ø100: Carbon steel	Hard chromium electroplated
4	**Piston rod B**	ø20: Stainless steel ø32 to ø100: Carbon steel	Hard chromium electroplated
5	**Piston**	Aluminum alloy	Chromated
6	**Bushing**	Copper alloy	
7	**Retaining ring (ø20 only)**	Carbon tool steel	Black zinc chromated
8	**Spring pin**		
9	**Scraper**	NBR	
10	**Rod seal**	NBR	
11	**Piston seal**	NBR	
12	**Piston gasket**	NBR	
13	**Tube gasket**	NBR	
14	**Magnet**	—	
15	**Rod end nut**	Carbon steel	Nickel plated

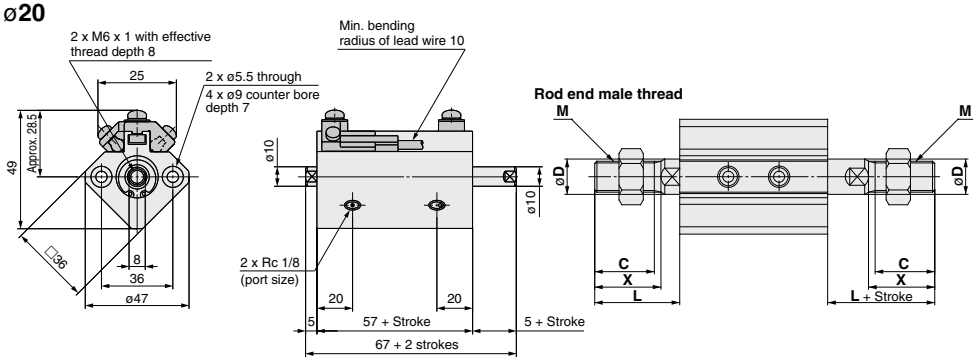
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.	Content
20	CHQW20-PS	Nos. ⑨, ⑩, ⑪ and ⑬ from the chart at left
32	CHQW32-PS	
40	CHQW40-PS	
50	CHQW50-PS	
63	CHQW63-PS	
80	CHQW80-PS	
100	CHQW100-PS	

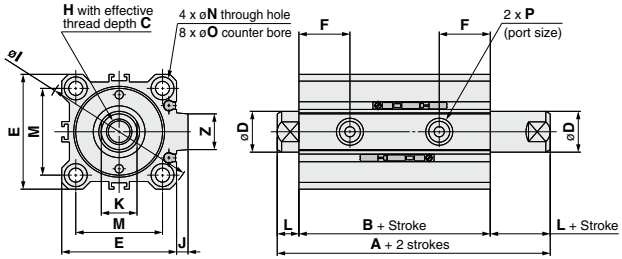
∗ Seal kit consists of items ⑨, ⑩, ⑪ and ⑬ and can be ordered by using the seal kit number for each bore size.
∗ Special tool required for disassembly. Contact SMC for recommended tool designs and dimensions.

Dimensions

ø20



ø32 to ø100



Note) The auto switches above are shown for a D-M9□(W) solid state auto switch.

(mm)

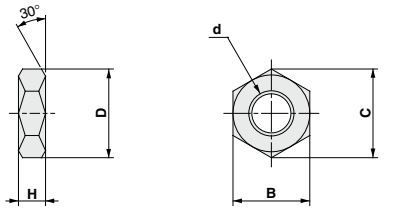
Bore size (mm)	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	S	U	Z
32	82	65	12	16	45	20	M10 x 1.5	60	4.5	14	8.5	34	5.5	9 depth 7	Rc1/8	58.5	31.5	14
40	84	67	12	16	52	22	M10 x 1.5	69	5	14	8.5	40	5.5	9 depth 7	Rc1/8	66	35	14
50	98	76	15	20	64	25	M12 x 1.75	86	7	18	11	50	6.6	11 depth 8	Rc1/4	80	41	19
63	102	80	15	20	77	27	M12 x 1.75	103	7	18	11	60	9	14 depth 10.5	Rc1/4	93	47.5	19
80	111	89	20	25	98	28	M16 x 2	132	6	22	11	77	11	17.5 depth 13.5	Rc3/8	112.5	57.5	26
100	119	95	24	30	117	29	M20 x 2.5	156	6.5	26	12	94	11	17.5 depth 13.5	Rc3/8	132.5	67.5	26

Rod end male threads (mm)

Bore size (mm)	C	X	D	H	L	K
20	15.5	18	10	M8 x 1.25	23	8
32	27	30	16	M14 x 1.5	38.5	14
40	27	30	16	M14 x 1.5	38.5	14
50	32	35	20	M18 x 1.5	46	18
63	32	35	20	M18 x 1.5	46	18
80	37	40	25	M22 x 1.5	51	22
100	37	40	30	M26 x 1.5	52	26

Accessory (Standard)

Rod end nut



Material: Carbon steel

Part no.	Bore size (mm)	B	C	d	D	H
NT-02	20	13	15	M8 x 1.25	12.5	5
NT-04	32	22	25.4	M14 x 1.5	21	8
NT-04	40	22	25.4	M14 x 1.5	21	8
NT-05	50	27	31.2	M18 x 1.5	26	11
NT-05	63	27	31.2	M18 x 1.5	26	11
NT-08	80	32	37	M22 x 1.5	31	13
NT-10	100	41	47.3	M26 x 1.5	39	16

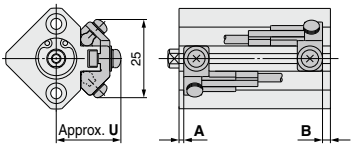
Series CH□QB/CH□QWB
Auto Switch Mounting

Refer to pages 1451 to 1510 for detailed specifications.

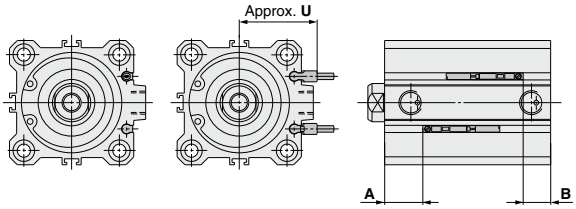
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

D-M9□ **D-M9□V**
D-M9□W **D-M9□WV**
D-M9□AL **D-M9□AVL**
D-A9□ **D-A9□V**

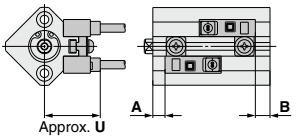
ø20



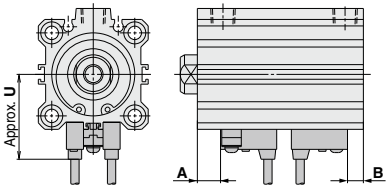
ø32 to ø100



D-F7□ **D-F7□V**
D-F7□W **D-F7□WV**
D-J79 **D-F7BA**
D-J79W **D-F7BAV**
D-A7□ **D-F7NT**
D-A7□H **D-F79F**
D-A8□ **D-J79C**
D-A8□H **D-A73C**
D-A80C



ø32 to ø100



Auto Switch Proper Mounting Positions

(mm)

Bore size (mm)	Solid state auto switch						Reed auto switch							
	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-F7□/J79 D-F7□V/J79C D-F7□W/F7□WV D-F7BA/F7BAV D-F79F/J79W		D-F7NT		D-A9□/A9□V		D-A73/A80		D-A7□H/A80H D-A73C/A80C D-A72		D-A79W	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	24.5	10.5	23.5	9.5	28.5	14.5	20.5	6.5	23	9	23.5	9.5	20.5	6.5
32	30	23	27.5	20.5	32.5	25.5	26	19	27	20	27.5	20.5	24.5	17.5
40	29	26	26.5	23.5	31.5	28.5	25	22	26	23	26.5	23.5	23.5	20.5
50	36.5	27.5	34	25	39	30	32.5	23.5	33.5	24.5	34	25	31	22
63	36.5	31.5	34	29	39	34	32.5	27.5	33.5	28.5	34	29	31	26
80	44	33	41.5	30.5	46.5	35.5	40	29	41	30	41.5	30.5	38.5	27.5
100	47.5	35.5	45	33	50	38	43.5	31.5	44.5	32.5	45	33	42	30

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Heights

(mm)

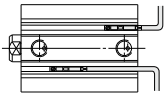
Bore size (mm)	D-M9□ D-M9□W D-M9□A D-A9□	D-M9□V D-M9□WV D-M9□AV	D-A9□V	D-A7□ D-A80	D-F7□ D-F7□W D-J79 D-J79W D-F7BA D-F7NT D-F79F D-A7□H D-A80H	D-A73C D-A80C	D-F7□V D-F7□WV D-F7BAV	D-J79C	D-A79W
	U	U	U	U	U	U	U	U	U
20	26.5	26.5	26.5	24.5	25.5	31.5	28	31	27
32	24.5	29	27	31.5	32.5	38.5	35	38	34
40	28	32.5	30.5	35	36	42	38.5	41.5	37.5
50	34	38.5	36.5	41	42	48	44.5	47.5	43.5
63	37.5	42	40	47.5	48.5	54.5	51	54	50
80	47.5	52	50	57.5	58.5	64.5	61	64	60
100	57.5	62	60	67.5	68.5	74.5	71	74	70

Minimum Auto Switch Mounting Stroke

(mm)

Auto switch mounting number	D-M9□ D-M9□V D-F7□V D-J79C	D-A9□ D-A9□V D-A7□ D-A80 D-A7□H D-A80H D-A73C D-A80C	D-F7□ D-J79	D-M9□WV D-M9□AV D-F7□W D-F7□WV D-J79W D-F7BAV	D-M9□W D-M9□A D-F7BAL D-F7NT D-F79F	D-A79W
1 pc.	5	5	10(5)	10	15(10)	15
2 pcs.	5	10	10	15	15	20

Note) The dimension stated in ( ) shows the minimum stroke for the auto switch mounting when the auto switch does not project from the end surface of the cylinder body and hinder the lead wire bending space. (Refer to the figure below.) The auto switch and auto switch mounting bracket are ordered separately.



Operating Range

(mm)

Auto switch model	Bore size						
	20	32	40	50	63	80	100
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	5.5	6.5	6	6.5	6	7	7.5
D-F7□/J79 D-F7□V/J79C D-F7□W/F7□WV D-F7BA/F7BAV D-F79F/J79W/F7NT	5.5	6	5.5	6	6.5	6.5	6.5
D-A9□/A9□V	9	9	9	8.5	10.5	10	10.5
D-A7□/A80 D-A7□H/A80H D-A73C/A80C	11.5	11.5	11.5	11.5	13.5	12.5	14
D-A79W	15	15	15	15	17	16	17.5

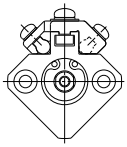
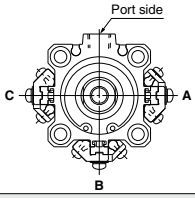
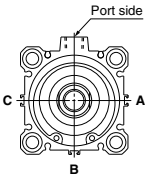
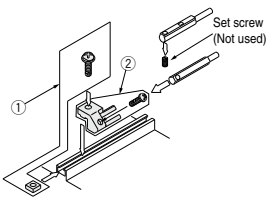
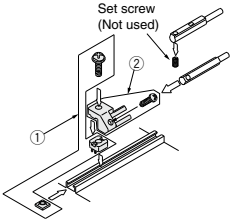
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

Besides the models listed in “How to Order,” the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

Auto switch type	Part no.	Electrical entry	Features
Solid state	D-F7NV, F7PV, F7BV	Grommet (perpendicular)	—
	D-F7NWV, F7BWV		Diagnostic indication (2-color display)
	D-F7BAV		Water resistant (2-color display)
	D-F79, F7P, J79	Grommet (in-line)	—
	D-F79W, F7PW, J79W		Diagnostic indication (2-color display)
	D-F7BA		Water resistant (2-color display)
	D-F7NT		With timer
Reed	D-A73	Grommet (perpendicular)	—
	D-A80		Without indicator light
	D-A73H, A76H	Grommet (in-line)	—
	D-A80H		Without indicator light

∗ Solid state switches are also available with pre-wired connector. Refer to pages 1494 and 1495 for details.
∗ Normally closed (N.C. = b contact), solid state auto switches (D-F9G, F9H) are also available. For details, refer to page 1463.

Auto Switch Mounting Brackets: Part Nos.

<table>
<tr><td rowspan="2">Auto switch mounting surface
Auto switch models</td><td colspan="3">Bore size (mm)</td></tr>
<tr><td>ø20</td><td colspan="2">ø32, ø40, ø50</td><td>ø63, ø80, ø100</td></tr>
<tr><td></td><td>  </td><td colspan="2">  </td><td>  </td></tr>
<tr><td></td><td>Auto switch mounting surface</td><td colspan="2">Auto switch mounting surface</td><td>Auto switch mounting surface</td></tr>
<tr><td></td><td>Auto switch mounting rail surface only</td><td>Port side</td><td>A, B, C</td><td>Port, A, B, C sides</td></tr>
<tr><td>D-M9□
D-M9□V
D-M9□W
D-M9□WV
D-M9□A
D-M9□AV
D-A9□
D-A9□V</td><td>①BQ-1
②BQ2-012
Two types of auto switch mounting bracket are used as a set.
  </td><td>Auto switch mounting bracket not required.</td><td>①BQ-2
②BQ2-012
Two types of auto switch mounting bracket are used as a set.
  </td><td>Auto switch mounting bracket not required.</td></tr>
</table>

Note 1) To mount a compact auto switch on either of the three sides (A, B, and C above) other than the port side, mounting brackets are required separately other than the auto switch mounting brackets in the table above, so please order them separately from the cylinder.
(This is the same for when mounting a compact auto switch using an auto switch mounting rail, instead of using a compact auto switch mounting groove for ø63 to ø100.)
Example
CHDQB32-50-M9NW·····1 unit
BQ-2·····2 pcs.
BQ2-012·····2 pcs.

Note 2) Auto switch mounting brackets and auto switches are packed together at cylinder shipment.

Auto switch models	Bore size (mm)	
	ø20	**ø32 to ø100**
D-F7□/J79 **D-F7□V** **D-J79C** **D-F7□W/J79W** **D-F7□WV** **D-F7BAL/F7BAV** **D-F79F/F7NT** **D-A7□/A80** **D-A73C/A80C** **D-A7□H/A80H** **D-A79W**	BQ-1	BQ-2

Note 3) Auto switch mounting brackets and auto switches are packed together at cylinder shipment.

[Stainless steel mounting screw kits]

The following stainless mounting screw kits (including nuts) are available for use depending on the operating environment. (Auto switch spacers (for BQ-2) are not included. Please order BQ-2 separately.)
BBA2: For D-A7/A8/F7/J7 types
When D-F7BA and F7BAV auto switches are shipped mounted on a cylinder, the above stainless steel screws are used. Also when switches are shipped separately, BBA2 is included.

Note 4) Refer to the table below for details on BBA2.

Note 5) When an additional D-M9□A(V) is required, order stainless steel screw kit BBA2 or BQ2-012S as a set separately.

Stainless mounting screw kit details

Part no.	Contents				Applicable auto switch mounting bracket part nos.	Applicable auto switches
	No.	Description	Size	Pcs.		
BBA2	**1**	Auto switch mounting screws	M3 x 0.5 x 6L	1	BMU-1-025	D-A7/A8 D-F7/J7
			M3 x 0.5 x 8L	1	BQ-1	
			M3 x 0.5 x 10L	1	BQ-2	
	2	Auto switch mounting nuts (square nut)	M3 x 0.5	1	BQ-1	
	3	Auto switch mounting nuts (convex)	M3 x 0.5	1	BQ-2	

Note 6) Spacers (black resin) for BQ-2 are not included.

Note 7) Also when using BQ2-012 with D-A9□(V)/M9□(V)/M9□W(V), or M9□A(V) auto switches, use stainless steel screws equivalent to the auto switch mounting brackets appropriate for each cylinder series.

Weight of auto switch mounting bracket

Mounting bracket part no.	Applicable cylinder I.D.	Weight (g)
BQ-1	ø20	1.5
BQ-2	ø32 to ø100	1.5
BQ2-012	ø20	5

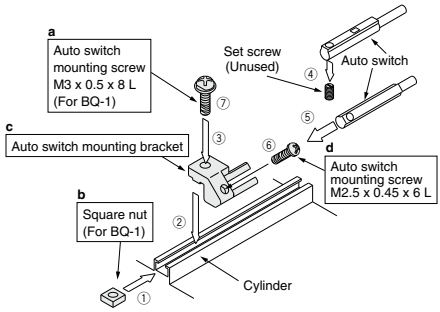
How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ····· D-M9N(V), D-M9P(V), D-M9B(V)
D-M9NW(V), D-M9PW(V), D-M9BW(V)
D-M9NA(V), D-M9PA(V), D-M9BA(V)
Reed ····· D-A90(V), A93(V), A96(V)

ø20

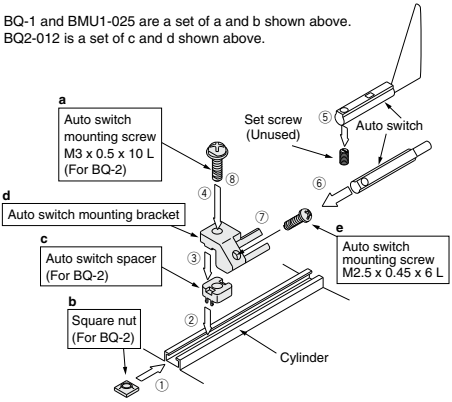
1. Insert the square nut for BQ-1 in the auto switch mounting rail and set it at the approximate auto switch mounting position.
2. Fit the convex part of the auto switch mounting bracket arm over the concave part of the rail, and slide the arm to the nut position.
3. Push the auto switch mounting screw (M3 for BQ-1) lightly into the square nut through the hole of the auto switch mounting arm.
4. Remove the set screw (M2.5) attached to the auto switch.
5. Insert the auto switch in the auto switch attachment part of the auto switch mounting bracket.
6. Secure the auto switch mounting screw (M2.5). (Tightening torque of M2.5 screw: 0.1 to 0.2 N·m)
7. Secure the auto switch mounting screw (3) after confirming the detecting position. (Tightening torque of M3 screw: 0.5 to 0.7 N·m)
8. Modify the detecting position while the auto switch is secured at the position of (3) in the figure.



• BQ-1 and BMU1-025 are a set of a and b shown above.
• BQ2-012 is a set of c and d shown above.

ø32 to ø100

1. Insert the square nut for BQ-2 in the auto switch mounting rail and set it at the approximate auto switch mounting position.
2. Fit the protruding part of the auto switch mounting spacer over the concave part of the rail, and slide the spacer to the nut position.
3. Fit the convex part of the auto switch mounting bracket arm over the concave part of the switch spacer.
4. Turn the auto switch mounting screw (M3 for BQ-2) lightly into the square nut through the mounting holes of the auto switch mounting arm and switch spacer.
5. Remove the set screw (M2.5) attached to the auto switch.
6. Insert the auto switch in the auto switch attachment part of the auto switch mounting bracket.
7. Secure the auto switch mounting screw (M2.5). (Tightening torque of M2.5 screw: 0.1 to 0.2 N·m)
8. Secure the auto switch mounting screw (4) after confirming the detecting position. (Tightening torque of M3 screw: 0.5 to 0.7 N·m)
9. Modify the detecting position while the auto switch is secured at the position of (4) in the figure.

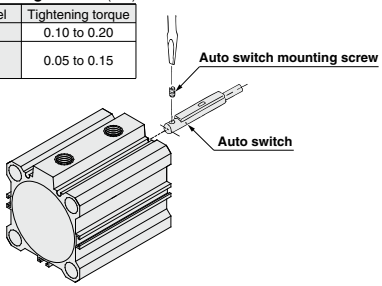


• BQ-2 is a set of a, b and c shown above.
• BQ2-012 is a set of d and e shown above.

ø32 to ø100
• When tightening an auto switch mounting screw, use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.

Tightening torque for auto switch mounting screw (N·m)

Auto switch model	Tightening torque
D-A9□(V)	0.10 to 0.20
D-M9□(V) **D-M9□W(V)**	0.05 to 0.15



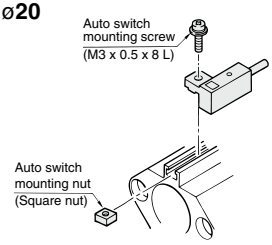
<Applicable auto switch>

Solid state ····· D-F79, D-F7P, D-J79, D-F7NV
D-F7PV, D-F7BV, D-J79C
D-F79W, D-F7PW, D-J79W
D-F7NWV, D-F7BWV
D-F79F, D-F7BA, D-F7BAV
D-F7NT

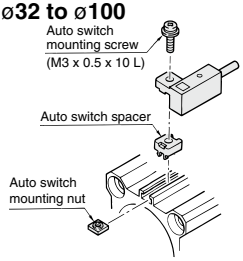
Reed ····· D-A72, D-A73, D-A80, D-A72H
D-A73H, D-A76H, D-A80H
D-A73C, D-A80C, D-A79W

1. Slide the auto switch mounting nut inserted into the mounting rail and set it at the auto switch mounting position.
2. Fit the convex part of auto switch mounting arm into the concave part of auto switch mounting rail. Then slide the switch over the nut.
   (Series CDQ2: Fit the convex part of auto switch mounting arm through the auto switch spacer into the concave part of auto switch mounting rail.)
3. Push the auto switch mounting screw lightly into the mounting nut through the hole of auto switch mounting arm.
4. After reconfirming the detecting position, tighten the mounting screw to secure the auto switch. (Tightening torque of M3 screw should be 0.5 to 0.7 N·m.)
5. Modification of the detecting position should be made in the condition of 3.

ø20



ø32 to ø100



Round Type Hydraulic Cylinder

Series CHM

***Series* CHM**

Nominal pressure: **3.5 MPa**

Bore size (mm): 20, 25, 32, 40

Round Type Hydraulic Cylinder

Series CH□M

3.5 MPa

ø20, ø25, ø32, ø40

How to Order

CHM L 25 – 100

With Auto Switch **CHDM L 25 – 100 – M9BW □ – C**

With auto switch (built-in magnet)

Mounting style

B	Basic style
L	Axial foot style
F	Rod flange style
G	Head flange style
C	Single clevis style

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm

Cylinder stroke (mm)
Refer to the standard stroke table on page 1337.

Auto switch type

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

Number of auto switches

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

Auto switch mounting bracket Note)
Note) This symbol is indicated when the D-A9□ or M9□ type auto switch is specified.
This mounting bracket does not apply to other auto switches (D-C7□ and H7□, etc.)

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDMB20-100

Applicable Auto Switches/

Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	———	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	—	●	○	—	○	IC circuit	Relay PLC
				3-wire (PNP)			M9PV	M9P	●	—	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	—	●	○	—	○	—	
		Connector					—	H7C	●	—	●	●	●	—		
		Terminal conduit		3-wire (NPN)	5 V, 12 V		—	G39	—	—	—	—	●	—	IC circuit	
				2-wire	12 V		—	K39	—	—	—	—	●	—	—	
	Diagnostic indication (2-color display)	Grommet		3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		M9NAV∗1	M9NA∗1	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV∗1	M9PA∗1	○	○	●	○	—	○		
				2-wire	12 V		M9BAV∗1	M9BA∗1	○	○	●	○	—	○	—	
	Diagnostic output (2-color display)			4-wire (NPN)	5 V, 12 V		—	H7NF	●	—	●	○	—	○	IC circuit	
Reed auto switch	———	Grommet	Yes	3-wire (NPN equiv.)	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	12 V	100 V	A93V∗2	A93	●	●	●	●	—	—	—	Relay PLC
						100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	
			Yes			100 V, 200 V	—	B54	●	—	●	●	—	—	—	
			No			200 V or less	—	B64	●	—	●	—	—	—		
		Connector	Yes			—	—	C73C	●	—	●	●	●	—		
			No			24 V or less	—	C80C	●	—	●	●	●	—	IC circuit	
		Terminal conduit	Yes			—	—	A33	—	—	—	—	●	—	—	PLC
		DIN terminal				100 V, 200 V	—	A34	—	—	—	—	●	—		Relay PLC
							—	A44	—	—	—	—	●	—		
	Diagnostic indication (2-color display)	Grommet			—	—	—	B59W	●	—	●	—	—	—		

∗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.
∗2 1 m type lead wire is only applicable to D-A93.

∗ 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
None ····· N (Example) H7CN

∗ Solid state auto switches marked "○" are produced upon receipt of order.
∗ Do not indicate lead wire length symbol N (none) for types D-A3□, D-A44, D-G-39 or D-K39.

∗ Since there are applicable auto switches other than listed, refer to page 1346 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.
∗ D-A9□, M9□, M9□W, M9□A are shipped together (but not assembled). (Only auto switch mounting brackets are assembled at the time of shipment.)

SMC

Specifications

Bore size (mm)	20	25	32	40
Action	Double acting/Single rod			
Fluid	Hydraulic fluid			
Nominal pressure	3.5 MPa			
Proof pressure	5.0 MPa			
Maximum allowable pressure	3.5 MPa			
Minimum operating pressure	0.3 MPa			
Ambient and fluid temperature	Without auto switch: –10° to 80°C			
	With auto switch: –10° to 60°C			
Piston speed	8 to 300 mm/s			
Cushion	None			
Stroke length tolerance	to 250 mm $^{+1.0}_{0}$ 250 to 800 mm $^{+1.4}_{0}$			
Mounting style	Basic style, Axial foot style Head flange style, Rod flange style Single clevis style			

Note) Refer to page 1234 for definitions of terms related to pressure.

Accessories

	Mounting bracket	Basic style	Axial foot style	Head flange style	Rod flange style	Single clevis style
Standard	Mounting nut	● (2 pcs.)	● (2 pcs.)	● (1 pc.)	● (1 pc.)	—
	Rod end nut	●	●	●	●	●

Optional

I-type single knuckle joint Y-type double knuckle joint Bracket for clevis style Knuckle pin Bracket pin	Refer to page 1343

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	Not compatible
Phosphate hydraulic fluid	Not compatible

Standard Strokes:

Refer to page 1345 regarding minimum strokes for auto switch mounting.

Bore size (mm)	Standard strokes (mm)
20	25 to 800
25	
32	
40	

∗ Orders of the standard strokes above can be supplied with a minimum lead time.
Please consult with SMC regarding the manufacture of strokes other than the above.

Mounting Brackets: Part Nos.

Bore size (mm)	20	25	32	40
Axial foot∗	CHM-L020	CHM-L025	CHM-L032	CHM-L040
Flange	CHM-F020	CHM-F025	CHM-F032	CHM-F040

∗ When ordering the axial foot type, order 2 pcs. for each cylinder.

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)					
				1	1.5	2	2.5	3	3.5
20	10	OUT	314	314	471	628	785	942	1099
		IN	235	235	352	470	587	705	822
25	12	OUT	490	490	735	980	1225	1470	1715
		IN	377	377	565	754	942	1131	1319
32	16	OUT	804	804	1206	1608	2010	2412	2814
		IN	603	603	904	1206	1507	1809	2110
40	18	OUT	1256	1256	1884	2512	3140	3768	4396
		IN	1002	1002	1503	2004	2505	3006	3507

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

Unit: kg

Bore size (mm)		**20**	**25**	**32**	**40**
Basic weight	Basic type	0.20	0.29	0.50	0.82
	Axial foot type	0.44	0.55	0.88	1.36
	Flange type	0.29	0.46	0.69	1.03
	Clevis type	0.18	0.37	0.64	0.77
Additional weight per 50 mm		0.06	0.08	0.12	0.16

- Calculation method
  (Example) **CHML20-100**
  (Foot type ø20/100 mm stroke)
- Basic weight·····0.44 kg
- Additional weight···0.06/50 mm
- Cylinder stroke·····100 mm
  0.44 + 0.06 x 100/50 = 0.56 kg

⚠ Specific Product Precautions

Be sure to read before handling. Refer to front matter 38 for Safety Instructions, and pages 1234 to 1241 for precautions for hydraulic cylinder and auto switch.

Air Release

⚠ Caution

1. Since Series CH□M does not have an air release valve, release air from components other than the cylinder (e.g. from piping, etc.).
2. When operating a cylinder for the first time, be sure to release the air at low pressure. When the air release is complete, operate the cylinder at reduced pressure, then gradually increase it to the normal operating pressure. However, the piston speed at this time should be adjusted to the minimum speed.

Mounting

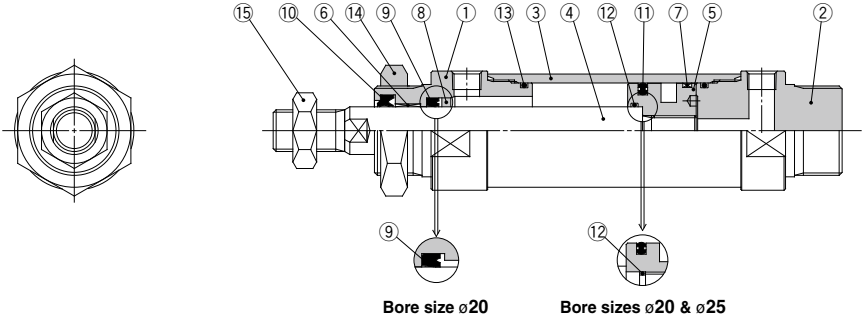
⚠ Caution

1. When mounting with bracket mounting nuts, tighten them using the tightening torques in the table below as a guide.

Bore size (mm)	Mounting nut thread	Mounting nut width across flats (mm)	Tightening torque (N·m)
20	M22 x 1.5	26	45
25	M24 x 1.5	32	60
32	M30 x 1.5	38	85
40	M33 x 1.5	41	110

2. When mounted with one side attached and one side free (basic type, flange type) and operating at high speed, the bending moment acts on the cylinder due to oscillation at the stroke end, which may cause cylinder damage. In this type of situation, install brackets to suppress the oscillation of the cylinder body, or reduce the piston speed enough so that the cylinder body does not oscillate at the stroke end.

Construction



Bore size ø20 **Bore sizes ø20 & ø25**

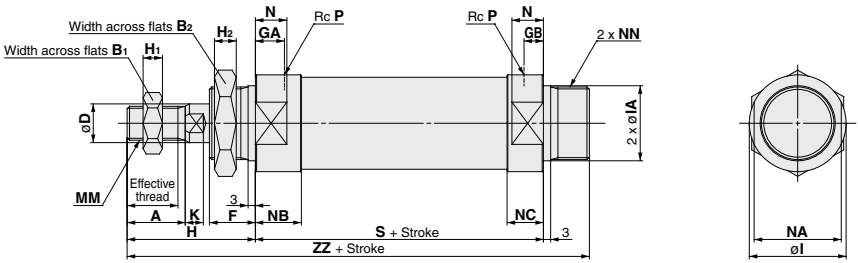
Parts List

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Hard black anodized
2	**Head cover**	Aluminum alloy	Hard black anodized
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Carbon steel	Hard chromium electroplated*
5	**Piston**	Aluminum alloy	Chromated
6	**Bushing**	Oil impregnated alloy	
7	**Wear ring**	Resin	
8	**Retainer**	Copper alloy	
9	**Rod seal**	NBR	
10	**Wiper ring**	NBR	
11	**Piston seal**	NBR	
12	**Piston gasket**	NBR	
13	**Tube gasket**	NBR	
14	**Mounting nut**	Carbon steel	Black zinc chromated
15	**Rod end nut**	Rolled steel	Nickel plated

* In case of cylinder bore sizes ø20 and ø25 for built-in magnet type, the piston rod material is stainless steel when equipped with auto switches.

Dimensions

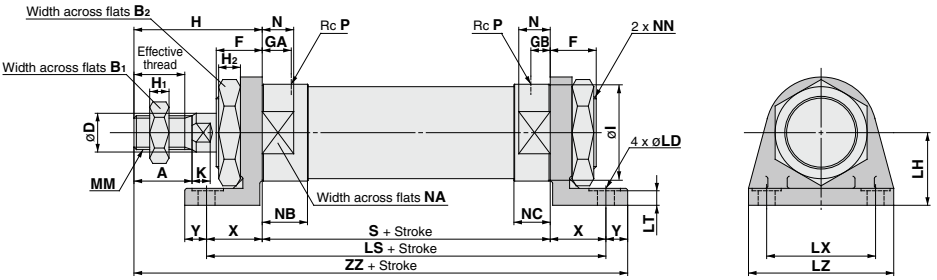
Basic style: CHMB



(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B1	B2	D	F	GA	GB	H	H1	H2	I	IA (tolerance)	K	MM	P	S	NN	N	NA	NB	NC	ZZ
20	Up to 800	15.5	18	13	26	10	16	12	8	41	5	8	30	23 f8 $^{-0.020}_{-0.053}$	5	M8 x 1.25	1/8	81	M22 x 1.5	13	26	19	15	138
25	Up to 800	19.5	22	17	32	12	16	12	8	46	6	8	32	25 f8 $^{-0.020}_{-0.053}$	5.5	M10 x 1.25	1/8	81	M24 x 1.5	13	28	19	15	143
32	Up to 800	21	24	22	38	16	19	12	8	53	8	9	40	31 f8 $^{-0.025}_{-0.064}$	7.5	M14 x 1.5	1/8	87	M30 x 1.5	13	36	19	15	159
40	Up to 800	21	24	24	41	18	21	14	11	54	10	11	48	34 f8 $^{-0.025}_{-0.064}$	7.5	M16 x 1.5	1/4	108	M33 x 2	19	44	24	21	183

Axial foot style: CHML



(mm)

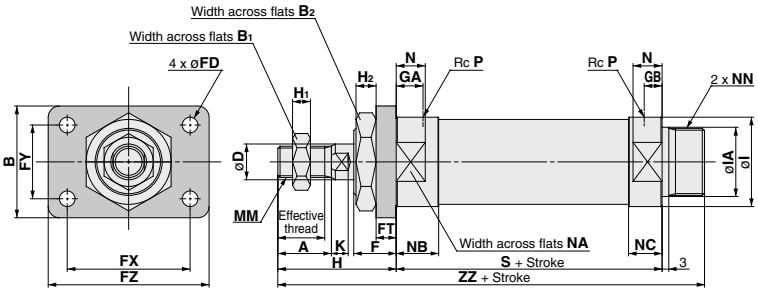
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B1	B2	D	F	GA	GB	H	H1	H2	I	K	LD	LH	LS	LT	LX	LZ	MM	N	NA	NB	NC
20	Up to 800	15.5	18	13	26	10	16	12	8	41	5	8	30	5	7	25	121	5.5	40	55	M8 x 1.25	13	26	19	15
25	Up to 800	19.5	22	17	32	12	16	12	8	46	6	8	32	5.5	7	28	121	5.5	40	55	M10 x 1.25	13	28	19	15
32	Up to 800	21	24	22	38	16	19	12	8	53	8	9	40	7.5	7	30	133	6	45	60	M14 x 1.5	13	36	19	15
40	Up to 800	21	24	24	41	18	21	14	11	54	10	11	48	7.5	9	35	158	6	55	75	M16 x 1.5	19	44	24	21

(mm)

Bore size (mm)	NN	P	S	X	Y	ZZ
20	M22 x 1.5	1/8	81	20	9	151
25	M24 x 1.5	1/8	81	20	9	156
32	M30 x 1.5	1/8	87	23	9	172
40	M33 x 2	1/4	108	25	11	198

∗ Foot bracket plate thickness is dimension LT + 1 mm.

Rod flange style: CHMF



(mm)

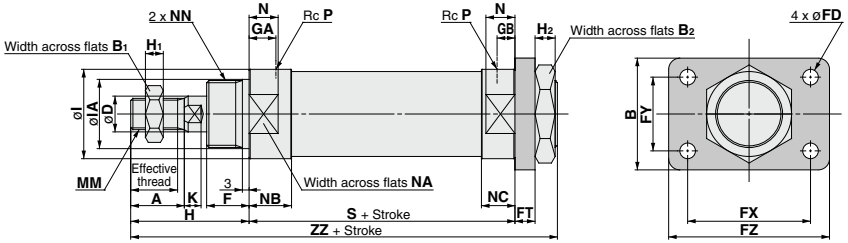
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B	B_1	B_2	D	F	FD	FT	FX	FY	FZ	GA	GB	H	H_1	H_2	I	IA (tolerance)	K	MM	N	NA
20	Up to 800	15.5	18	38	13	26	10	16	7	6	51	21	68	12	8	41	5	8	30	23 f8 $^{-0.020}_{-0.053}$	5	M8 x 1.25	13	26
25	Up to 800	19.5	22	44	17	32	12	16	7	9	53	27	70	12	8	46	6	8	32	25 f8 $^{-0.020}_{-0.053}$	5.5	M10 x 1.25	13	28
32	Up to 800	21	24	50	22	38	16	19	7	9	55	33	72	12	8	53	8	9	40	31 f8 $^{-0.025}_{-0.064}$	7.5	M14 x 1.5	13	36
40	Up to 800	21	24	60	24	41	18	21	9	9	66	36	84	14	11	54	10	11	48	34 f8 $^{-0.025}_{-0.064}$	7.5	M16 x 1.5	19	44

(mm)

Bore size (mm)	NB	NC	NN	P	S	ZZ
20	19	15	M22 x 1.5	1/8	81	138
25	19	15	M24 x 1.5	1/8	81	143
32	19	15	M30 x 1.5	1/8	87	159
40	24	21	M33 x 2	1/4	108	183

Dimensions

Head flange style: CHMG



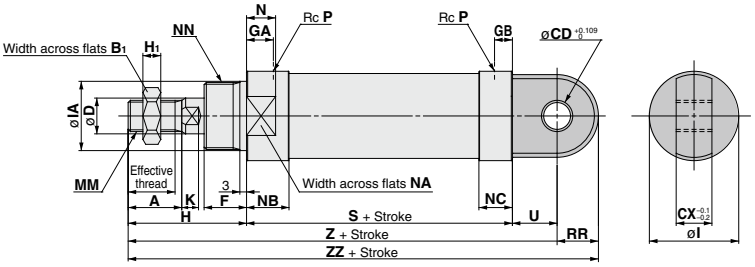
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B	B1	B2	D	F	FD	FT	FX	FY	FZ	GA	GB	H	H1	H2	I	IA (tolerance)	K	MM	N	NA
20	Up to 800	15.5	18	38	13	26	10	16	7	6	51	21	68	12	8	41	5	8	30	23 f8 $^{-0.020}_{-0.053}$	5	M8 x 1.25	13	26
25	Up to 800	19.5	22	44	17	32	12	16	7	9	53	27	70	12	8	46	6	8	32	25 f8 $^{-0.020}_{-0.053}$	5.5	M10 x 1.25	13	28
32	Up to 800	21	24	50	22	38	16	19	7	9	55	33	72	12	8	53	8	9	40	31 f8 $^{-0.025}_{-0.064}$	7.5	M14 x 1.5	13	36
40	Up to 800	21	24	60	24	41	18	21	9	9	66	36	84	14	11	54	10	11	48	34 f8 $^{-0.025}_{-0.064}$	7.5	M16 x 1.5	19	44

(mm)

Bore size (mm)	NB	NC	NN	P	S	ZZ
20	19	15	M22 x 1.5	1/8	81	138
25	19	15	M24 x 1.5	1/8	81	143
32	19	15	M30 x 1.5	1/8	87	159
40	24	21	M33 x 2	1/4	108	183

Single clevis style: CHMC

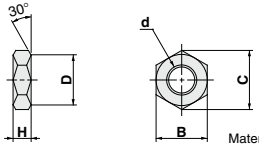


(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B1	CD	CX	D	F	GA	GB	H	H1	I	IA (tolerance)	K	MM	N	NA	NB	NC	NN	P	RR	S	U	Z	ZZ
20	Up to 800	15.5	18	13	10	16	10	16	12	8	41	5	30	23 f8 $^{-0.020}_{-0.053}$	5	M8 x 1.25	13	26	19	15	M22 x 1.5	1/8	13.5	81	14	136	149.5
25	Up to 800	19.5	22	17	10	16	12	16	12	8	46	6	32	25 f8 $^{-0.020}_{-0.053}$	5.5	M10 x 1.25	13	28	19	15	M24 x 1.5	1/8	14.5	81	15	142	156.5
32	Up to 800	21	24	22	12	16	16	19	12	8	53	8	40	31 f8 $^{-0.025}_{-0.064}$	7.5	M14 x 1.5	13	36	19	15	M30 x 1.5	1/8	18.5	87	20	160	178.5
40	Up to 800	21	24	24	12	24	18	21	14	11	54	10	48	34 f8 $^{-0.025}_{-0.064}$	7.5	M16 x 1.5	19	44	24	21	M33 x 2	1/4	22.5	108	20	182	204.5

Accessories (Standard)

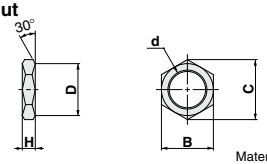
Rod end nut



Material: Carbon steel

Part no.	Applicable bore size (mm)	d	H	B	C	D
NT-02	20	M8 x 1.25	5	13	15.0	12.5
NT-03	25	M10 x 1.25	6	17	19.6	16.5
NT-04	32	M14 x 1.5	8	22	25.4	21.0
AC-NI-50	40	M16 x 1.5	10	24	27.7	23

Mounting nut



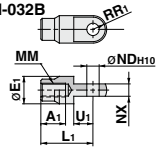
Material: Carbon steel

Part no.	Applicable bore size (mm)	d	H	B	C	D
SO-02	20	M22 x 1.5	8	26	30	26
SO-03	25	M24 x 1.5	8	32	36.9	32
SO-04	32	M30 x 1.5	9	38	43.9	38
SO-05	40	M33 x 2.0	11	41	47.3	41

Accessory Brackets (Optional)

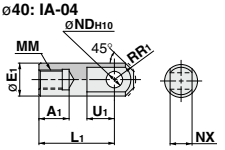
I-type single knuckle joint

ø20: I-020B
ø25: I-032B



Material: Rolled steel

ø32: I-04A
ø40: IA-04

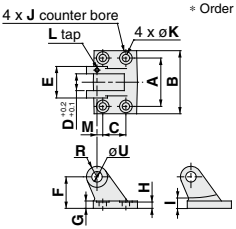


Material: Cast iron

Part no.	Applicable bore size (mm)	A1	E1	L1	MM	R1	U1	NDH10	NX
I-020B	20	16	20	36	M8 x 1.25	10	14	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$
I-032B	25	18	20	38	M10 x 1.25	10	14	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$
I-04A	32	22	24	55	M14 x 1.5	15.5	20	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$
IA-04	40	22	24	55	M16 x 1.5	15.5	20	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$

Bracket

∗ Order bracket pin separately.

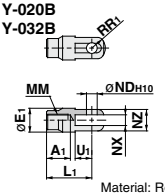


Material: Cast iron

Part no.	Applicable bore size (mm)	A	B	C	D	U (H8) Size	U (H8) Tolerance	E	F	G	H	I	J	K	L	M	R	Note
AD-FI-20	20	46	60	22	16	10	$^{+0.027}_{0}$	30	28	6.5	5.5	10	12	7	M4	5.5	10	M4 set screw (1 pc.)
AD-FI-25	25	46	60	22	16	10	$^{+0.027}_{0}$	30	30	6.5	5.5	10	12	7	M4	5.5	10	
AD-FI-32	32	56	80	30	16	12	$^{+0.027}_{0}$	36	40	10	9	13	12	7	M5	7	12	M5 set screw (1 pc.)
AD-FI-40	40	64	88	30	24	12	$^{+0.027}_{0}$	44	43	10	9	13	16	9	M5	10	12	

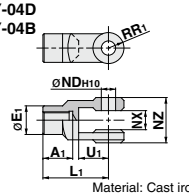
Y-type double knuckle joint

ø20: Y-020B
ø25: Y-032B



Material: Rolled steel

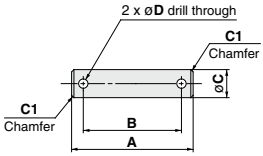
ø32: Y-04D
ø40: Y-04B



Material: Cast iron

Part no.	Applicable bore size (mm)	A1	E1	L1	MM	R1	U1	NDH10	NX	NZ	Note
Y-020B	20	16	20	36	M8 x 1.25	5	14	$9^{+0.058}_{0}$	$9^{+0.2}_{+0.1}$	18	With CDP-1
Y-032B	25	18	20	38	M10 x 1.25	5	14	$9^{+0.058}_{0}$	$9^{+0.2}_{+0.1}$	18	
Y-04D	32	22	24	55	M14 x 1.5	13	25	$12^{+0.070}_{0}$	$16^{+0.3}_{+0.1}$	38	With CDP-3
Y-04B	40	22	24	55	M16 x 1.5	13	25	$12^{+0.070}_{0}$	$16^{+0.3}_{+0.1}$	38	

Bracket pin

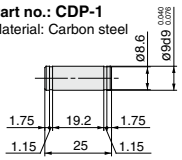


Material: Carbon steel

Part no.	Applicable bore size (mm)	A	B	C (f8) Size	C (f8) Tolerance	D	Note
AD-EI-20	20	45.5	35.5	10	$^{-0.013}_{-0.035}$	3.2	Cotter pin ø3.2 x 15 ℓ (2 pcs.)
AD-EI-25	25	45.5	35.5	10	$^{-0.013}_{-0.035}$	3.2	
AD-EI-32	32	52	42	12	$^{-0.016}_{-0.043}$	4	Cotter pin ø4 x 20 ℓ (2 pcs.)
AD-EI-40	40	60	50	12	$^{-0.016}_{-0.043}$	4	

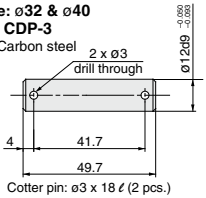
Clevis pin & Knuckle pin

Bore size: ø20 & ø25
Part no.: CDP-1
Material: Carbon steel



Retaining ring: C type, ø9 size for shaft

Bore size: ø32 & ø40
Part no.: CDP-3
Material: Carbon steel



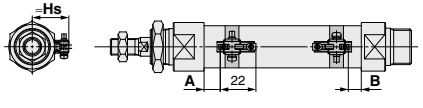
Cotter pin: ø3 x 18 ℓ (2 pcs.)

Auto Switch Mounting

Refer to pages 1451 to 1510 for detailed specifications.

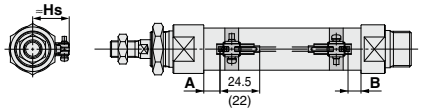
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

D-A9□V



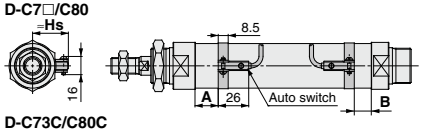
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

D-A9□

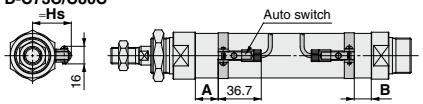


∗ Values inside ( ) are for D-M9□AV.
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

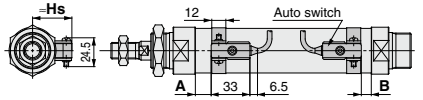
D-C7□/C80



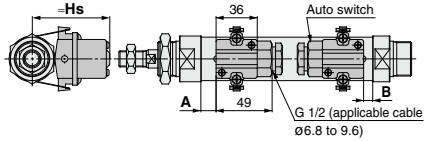
D-C73C/C80C



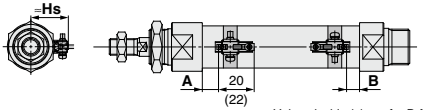
D-B5□/B64/B59W



D-A3□/G39/K39

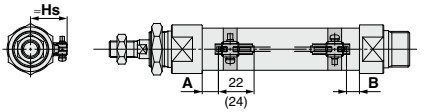


D-M9□V/M9□WV/M9□AV



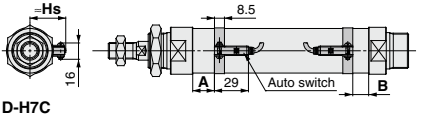
∗ Values inside ( ) are for D-M9□AV.
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

D-M9□/M9□W/M9□A

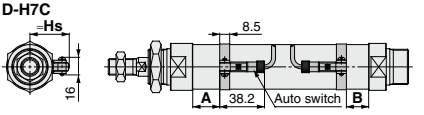


∗ Values inside ( ) are for D-M9□AV.
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

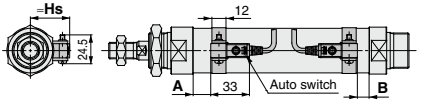
D-H7□/H7□W/H7□F/H7BA



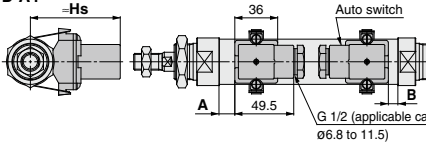
D-H7C



D-G5□/K59/G5□W/K59W/G5BA/G59F/G5NT



D-A4



Auto Switch Proper Mounting Positions

(mm)

Bore size (mm)	Solid state auto switch								Reed auto switch									
	D-M9□(V) D-M9□W(V) D-M9□A(V)		D-H7□ D-H7□W/H7C D-H7NF/H7BA		D-G5□/K59 D-G5□W/K59W D-G59F/G5BA D-G5NT		D-G39/K39		D-A9□(V)		D-C7□/C80 D-C73C/C80C		D-B5□/B64		D-B59W		D-A3□/A44	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	18	17	13.5	12.5	10	9	8	7	14	13	14.5	13.5	8.5	7.5	11.5	10.5	8	7
25	16	19	11.5	14.5	8	11	6	9	12	15	12.5	15.5	6.5	9.5	9.5	12.5	6	9
32	23	18	18.5	13.5	15	10	13	8	19	14	19.5	14.5	13.5	8.5	16	11.5	13	8
40	27.5	23.5	23	19	19.5	15.5	17.5	13.5	23.5	19.5	24	20	18	14	21	17	17.5	13.5

Note) When setting an auto switch, be sure to check its operation before adjusting.

Auto Switch Mounting Heights

(mm)

Bore size (mm)	D-M9□(V) D-M9□W(V) D-M9□A(V) D-A9□(V)	D-H7□/H7□W D-H7NF/H7BA D-C7□/C80	D-C73C/C80C	D-G5□/K59 D-G5□W/K59W D-G59F/G5BA D-G5NT/H7C D-B5□/B64 D-B59W	D-G39/K39 D-A3□	D-A44
	Hs	Hs	Hs	Hs	Hs	Hs
20	26	25.5	27	27.5	62	72
25	28.5	28	29.5	30	64.5	74.5
32	32	31.5	33	33.5	68	78
40	36.5	36	37.5	38	72.5	82.5

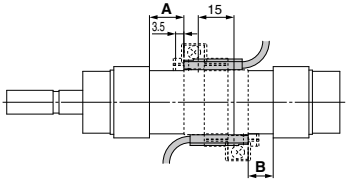
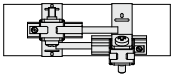
Minimum Auto Switch Mounting Stroke

(mm)

Auto switch model	Number of auto switches mounted				
	1 pc.	2 pcs.		n pcs.	
		Different surfaces	Same surface	Different surfaces	Same surface
D-M9□	5	20	55	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	55 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-M9□W	10	20	55	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	55 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-M9□A	10	25	60	$25 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	60 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-A9□	5	15	50	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	50 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-M9□V	5	20	35	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	35 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-A9□V	5	15	25	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	25 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-M9□WV **D-M9□AV**	10	20	35	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	35 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-H7□/H7□W **D-H7NF/H7BA**	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	60 + 45 (n – 2) (n = 2, 3, 4, 5···)
D-C7□ **D-C80**	10	15	50	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	50 + 45 (n – 2) (n = 2, 3, 4, 5···)
D-H7C **D-C73C** **D-C80C**	10	15	65	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	65 + 50 (n – 2) (n = 2, 3, 4, 5···)
D-G5□/K59 **D-G5□W/K59W** **D-G59F/G5BA/G5NT** **D-B5□/B64**	10	15	75	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	75 + 55 (n – 2) (n = 2, 3, 4, 5···)
D-B59W	15	20	75	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	75 + 55 (n – 2) (n = 2, 3, 4, 5···)
D-G39/K39 **D-A3□/A44**	10	35	100	35 + 30 (n – 2) (n = 2, 3, 4, 5···)	100 + 100 (n – 2) (n = 2, 3, 4, 5···)

Note 3) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

Note 1) Auto switch mounting

Auto switch model	Auto switches — 2 pcs.	
	Different surfaces	Same surface
	 Correct auto switch mounting position is 3.5 mm from the back face of the switch holder.	 Mount auto switches offset (in circumferential direction of cylinder tube) so that auto switch units and lead wires do not run up against each other.
D-M9□ **D-M9□W**	Less than 20 stroke Note 2)	Less than 55 stroke Note 2)
D-M9□A	Less than 25 stroke Note 2)	Less than 60 stroke Note 2)
D-A9□	—	Less than 50 stroke Note 2)

Note 2) Minimum stroke for auto switch mounting in styles other than those mentioned in Note 1.

Operating Range

(mm)

Auto switch model	Bore size			
	20	**25**	**32**	**40**
D-M9□(V) **D-M9□W(V)** **D-M9□A(V)**	4.5	6.5	4.5	6.5
D-H7□/H7C **D-H7□W** **D-H7NF/H7BA**	4.5	5.5	5	5.5
D-G5□/K59/G59F **D-G5□W/K59W** **D-G5BA/G5NT**	5	5	5	5.5

(mm)

Auto switch model	Bore size			
	20	**25**	**32**	**40**
D-G39/K39	9	8.5	10	10.5
D-A9□(V)	7	6	8	8
D-C7□/C80 **D-C73C/C80C**	8	10	9	10
D-B5□/B64	8	10	9	10
D-B59W	13	13	14	14
D-A3□/A44	9	10	10	11

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

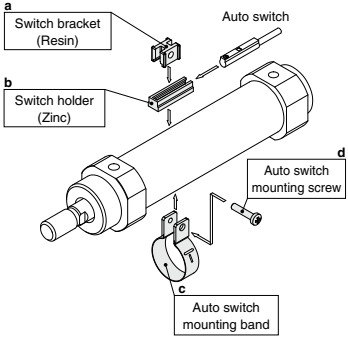
Auto Switch Mounting Brackets: Part Nos.

Auto switch model	Bore size (mm)			
	ø20	ø25	ø32	ø40
D-A9□(V) **D-M9□(V)** **D-M9□W(V)**	Note 1) BMA3-020	Note 1) BMA3-025	Note 1) BMA3-032	Note 1) BMA3-040
D-M9□A(V)	Note 2) BMA3-020S	Note 2) BMA3-025S	Note 2) BMA3-032S	Note 2) BMA3-040S
D-H7□ **D-H7□W** **D-H7NF** **D-H7BA** **D-C7□/C80** **D-C73C/C80C**	BMA2-020A	BMA2-025A	BMA2-032A	BMA2-040A
D-G5□/G5□W **D-G59F** **D-G5BA/G5NT** **D-B5□/B64** **D-B59W**	BA-01	BA-02	BA-32	BA-04
D-G39/K39 **D-A3□/A44**	BD1-01M	BD1-02M	BD1-02	BD1-04M

Note 1) Set part number which includes the auto switch mounting band (BMA2-□□□A) and the holder kit (BJ5-1/Switch bracket: Transparent).
Since the switch bracket (made from nylon) are affected in an environment where alcohol, chloroform, methylamines, hydrochloric acid or sulfuric acid is splashed over, so it cannot be used. Please consult SMC regarding other chemicals.

Note 2) Set part number which includes the auto switch mounting band ,stainless steel screw and the holder kit (BJ4-1/Switch bracket: White).

Note 3) For the D-M9□A(V) type auto switch, do not install the switch bracket on the indicator light.



(1) BJ□-1 is a set of “a” and “b”.
(2) BM2-□□□A(S) is a set of “c” and “d”.
Band (c) is mounted so that the projected part is on the internal side (contact side with the tube).
BJ4-1 (Switch bracket: White)
BJ5-1 (Switch bracket: Transparent)

[Stainless steel mounting screw kits]

The following stainless steel mounting screw kits are available for use depending on the operating environment. (Switch mounting bands are not included and should be ordered separately.)
BBA3: D-G5, K5, B5, B6
BBA4: D-C7, C8, H7
Note) Refer to the table below for details on BBA3, BBA4.
The above stainless steel screws are used when a cylinder is shipped with the D-G5BA auto switches.
When only an auto switch is shipped independently, the BBA3 or BBA4 is attached.

Stainless mounting screw kit details

Part no.	Contents			Applicable auto switch mounting bracket part nos.	Applicable auto switches
	Description	Size	Pcs.		
BBA3	Auto switch mounting screws	M4 x 0.7 x 22L	1	BA-01, BA-02, BA-32, BA-04, BA-05, BA-06, BA-08, BA-10	D-B5, B6 D-G5, K5
				BA2-020, BA2-025, BA2-032, BA2-040	
				BA5-050, BHN2-025, BSG1-032	
				BH2-040, BH2-050, BH2-080, BH2-100	
				BAF-32, BAF-04, BAF-05, BAF-06, BAF-08, BAF-10	
BBA4		M3 x 0.5 x 14L	1	BJ2-006, BJ2-010, BJ2-016	D-C7, C8 D-H7
				BM2-020A, BM2-025A, BM2-032A, BM2-040A	
				BMA2-020A, BMA2-025A, BMA2-032A, BMA2-040A, BMA2-050A, BMA2-063A	
				BHN3-025A, BHN3-032A, BHN3-040A	

Besides the models listed in “How to Order,” the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

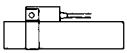
Auto switch type	Part no.	Electrical entry	Features
Solid state	D-H7A1, H7A2, H7B	Grommet (in-line)	—
	D-G59, G5P, K59		
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color display)
	D-G59W, G5PW, K59W		
	D-G5BA, H7BA		Water resistant (2-color display)
	D-G5NT		With timer
	D-G59F		Diagnostic output (2-color display)
Reed	D-C73, C76, B53	Grommet (in-line)	—
	D-C80		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Refer to pages 1494 and 1495 for details.
∗ Normally closed (N.C. = b contact), solid state auto switches (D-F9G, F9H) are also available. For details, refer to page 1463.

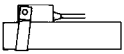
How to Mount and Move the Auto Switch

⚠ Caution

1. Tighten the screw under the specified torque when mounting auto switch.
2. Set the auto switch mounting band perpendicularly to cylinder tube.



Mounting correctly



Mounting incorrectly

<Applicable auto switch>

Solid state ····· D-M9N, M9P, M9B, M9NV, M9PV, M9BV
D-M9NW, M9PW, M9BW, M9NWV, M9PWV, M9BWV
D-M9NA, M9PA, M9BA, M9NAV, M9PAV, M9BAV
Reed····· D-A90, A93, A96, A90V, A93V, A96V

How to Mount and Move the Auto Switch

Mounting the Auto Switch

1. Mount the auto switch mounting band around the auto switch setting position on the cylinder tube.
2. Place the switch holder in the opening of the auto switch mounting band (1).
3. Make the concave part of the switch bracket faced downward and set the switch bracket on the switch holder (2).
Set the switch bracket so that both ends of the auto switch mounting band enter the portion between the ribs on both side surfaces of the switch bracket.
For the D-M9□A(V) type auto switch, do not install the switch bracket on the indicator light.
4. Pass the auto switch mounting screw (M3) supplied with the auto switch mounting band from the through-hole side of the auto switch mounting band and engage it with the M3 female thread of the auto switch mounting band through the through-hole in the switch bracket.
5. Tighten the auto switch mounting screw with the specified tightening torque (0.6 to 0.7 N·m).
6. Insert the auto switch into the auto switch mounting groove of the switch holder (2).
7. After checking the detection position, tighten the set screw (M2.5) supplied with the auto switch to secure the auto switch.

Tightening torque for the set screw (M2.5) supplied with the auto switch (N·m)

Auto switch model	Tightening torque
D-M9□(V) **D-M9□W(V)** **D-M9□A(V)**	0.05 to 0.15
D-A9□(V)	0.1 to 0.2

When tightening the set screw supplied with the auto switch, use a watchmaker's screw driver with a handle diameter of 5 to 6 mm.

Adjustment the Auto Switch Position

(1) To make the fine adjustment, loosen the set screw (M2.5) supplied with the auto switch and slide the auto switch inside the auto switch mouthing groove to adjust the position.
(2) To move the auto switch setting position largely, loosen the screw (M3) that secures the auto switch mounting band and slide the auto switch together with the switch holder on the cylinder tube to adjust the position.

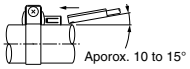
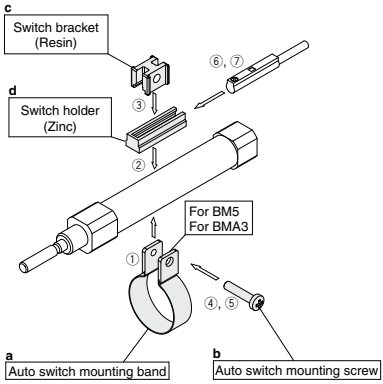
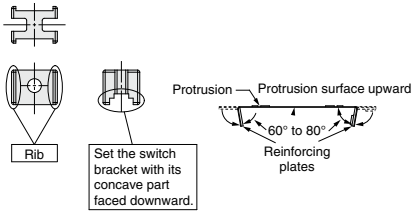


Figure 1. Switch insert angle



<Switch bracket>



Note) When removing the screw connection part with the auto switch mounting screw after the auto switch mounting band has been assembled, be careful not to drop the switch bracket, switch holder, auto switch mounting screw, or auto switch mounting band.

How to Mount and Move the Auto Switch

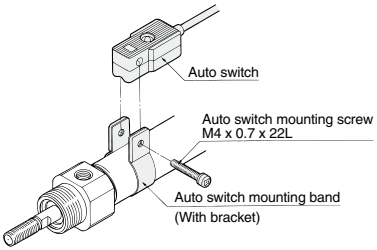
⚠ Caution

1. Tighten the screw under the specified torque when mounting auto switch.
2. Set the auto switch mounting band perpendicularly to cylinder tube.

Mounting correctly **Mounting incorrectly**

<Applicable auto switch>

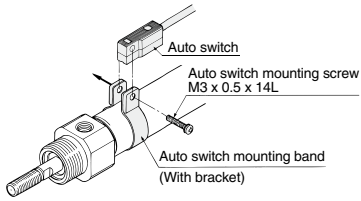
Solid state ····· D-G59, D-G5P, D-K59, D-G5BA
D-G59W, D-G5PW, D-K59W
D-G59F, D-G5NT, D-G5NB
Reed ····· D-B53, D-B54, D-B64, D-B59W



1. Put an auto switch mounting band on the cylinder tube and set it at the auto switch mounting position.
2. Put the mounting section of the auto switch between the auto switch mounting band mounting holes, then adjust the position of mounting holes of switch to those of mounting band.
3. Lightly thread the auto switch mounting screw through the mounting hole into the thread part of band fitting.
4. After reconfirming the detection position, tighten the auto switch mounting screw to secure the auto switch while properly contacting the auto switch bottom part and the cylinder tube.
(The tightening torque of M4 screw should be about 1 to 1.2 N·m.)
5. Modification of the detection position should be made in the condition of 3.

<Applicable auto switch>

Solid state ····· D-H7A1, D-H7A2, D-H7B, D-H7BA
D-H7C, D-H7NF, D-H7NW, D-H7PW,
D-H7BW
Reed ····· D-C73, D-C76, D-C80, D-C73C, D-C80C

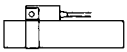


1. Put an auto switch mounting band on the cylinder tube and set it at the auto switch mounting position.
2. Put the mounting section of the auto switch between the auto switch mounting band mounting holes, then adjust the position of mounting holes of switch to those of mounting band.
3. Lightly thread the auto switch mounting screw through the mounting hole into the thread part of the auto switch mounting band fitting.
4. After setting the whole body to the detecting position by sliding, tighten the auto switch mounting screw to secure the auto switch while properly contacting the auto switch bottom part and the cylinder tube. (Tightening torque of M3 screw should be 0.8 to 1 N·m.)
5. Modification of the detection position should be made in the condition of 3.

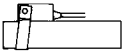
How to Mount and Move the Auto Switch

⚠ Caution

1. Tighten the screw under the specified torque when mounting auto switch.
2. Set the auto switch mounting band perpendicularly to cylinder tube.



Mounting correctly

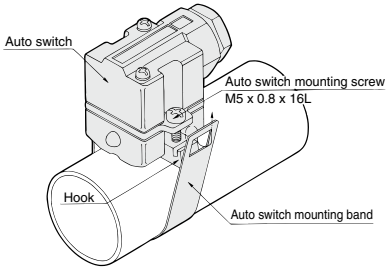


Mounting incorrectly

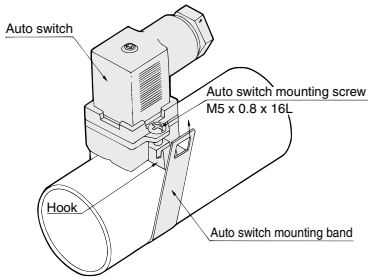
<Applicable auto switch>
Solid state ····· D-G39, D-K39
Reed ····· D-A33, D-A34, D-A44

How to Mount and Move the Auto Switch

D-A3, D-G3/K3 type



D-A4



1. Loosen the auto switch mounting screws at both sides to pull down the hook.
2. Put an auto switch mounting band on the cylinder tube and set it at the auto switch mounting position, and then hook the band.
3. Screw lightly the auto switch mounting screw.
4. Set the whole body to the detecting position by sliding, tighten the auto switch mounting screw to secure the auto switch. (The tightening torque should be about 2 to 3 N·m.)
5. Modification of the detecting position should be made in the condition of 3.

Small Bore Hydraulic Cylinder

Series ***CHN***

Series CHN

Nominal pressure: **7 MPa**

Bore size (mm): 20, 25, 32, 40

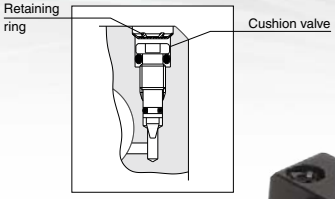
Stainless Steel Tube

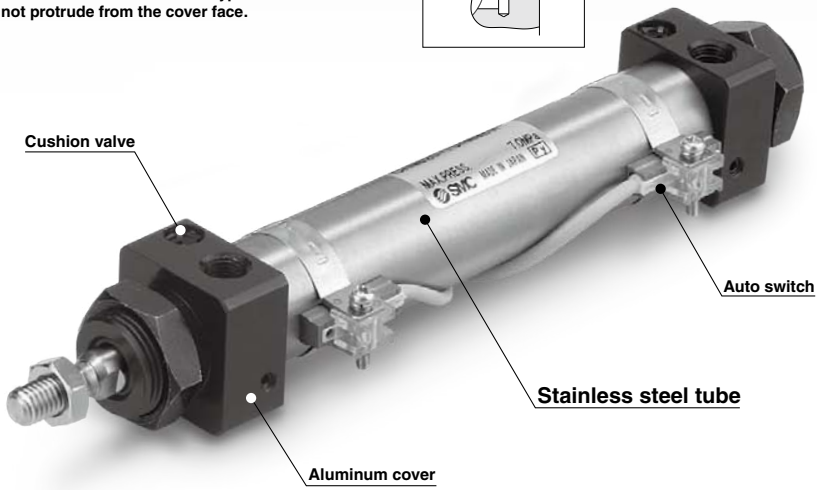
Small Bore Hydraulic Cylinder for 7 MPa

Series CHN ø20, ø25, ø32, ø40

Equipped with cushion mechanism

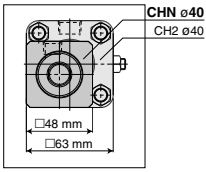
- A cushion seal system mechanism is now a standard feature.
- Cushion valves are enhanced with a non-slip retaining mechanism.
- The cushion valve is a discreet type valve that does not protrude from the cover face.





Reduced cross sectional area

When compared to the same size tie-rod cylinder, the cross sectional area of our Series CHN cylinder projects less than 45%, thereby attaining better space savings.



Lightweight

Using aluminum alloy for both the rod cover and head cover reduces overall weight.

Model	Weight (kg)
CHNB20-100	0.51
CHNB25-100	0.63
CHNB32-100	0.89
CHNB40-100	1.51

Basic type with a 100 mm stroke

Built-in magnet

All cylinders come with a built-in magnet as a standard feature. This makes possible the mounting of an auto switch for piston position sensing even after the cylinder has been installed.

Series Variations

Series	Nominal pressure	Bore size (mm)	Mounting bracket	Auto Switches
CHN	7.0 MPa	20	Basic style Axial foot style Rod flange style Head flange style Single clevis style	Band mounting type Reed type Solid state type
		25		
		32		
		40		

Hydraulic Cylinder
Series CHN
7 MPa
ø20, ø25, ø32, ø40

How to Order

CHN L 25 – 100 – M9BW □ – C

Mounting style

B	Basic style
L	Axial foot style
F	Rod flange style
G	Head flange style
C	Single clevis style

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm

Cylinder stroke (mm)
Refer to the standard stroke table on page 1318.

Auto switch type

Nil	Without auto switch (built-in magnet)

∗ Select applicable auto switches from the table below.

Number of auto switches

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

Auto switch mounting bracket Note)

Note) This symbol is indicated when the D-A9□ or M9□ type auto switch is specified.
This mounting bracket does not apply to other auto switches (D-C7□ and H7□, etc.)
Applicable to ø20 only.

Applicable Auto Switches/ Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	—	●	○	—	○	IC circuit	Relay PLC
				3-wire (PNP)			M9PV	M9P	●	—	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	—	●	○	—	○	—	
		Connector					—	H7C	●	—	●	●	●	—		
		Terminal conduit		3-wire (NPN)	5 V, 12 V		—	G39	—	—	—	—	●	—	IC circuit	
				2-wire	12 V		—	K39	—	—	—	—	●	—	—	
	Diagnostic indication (2-color display)			3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		M9NAV∗1	M9NA∗1	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV∗1	M9PA∗1	○	○	●	○	—	○		
				2-wire	12 V		M9BAV∗1	M9BA∗1	○	○	●	○	—	○	—	
	With diagnostic output (2-color display)			4-wire (NPN)	5 V, 12 V		—	H7NF	●	—	●	○	—	○	IC circuit	
Reed auto switch	——	Grommet	Yes	3-wire (NPN equiv.)	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			Yes	2-wire	12 V	100 V	A93V∗2	A93	●	●	●	●	—	—	—	Relay PLC
			No			100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	
			Yes			100 V, 200 V	—	B54	●	—	●	●	—	—	—	
			No			200 V or less	—	B64	●	—	●	—	—	—		
		Connector	Yes			—	—	C73C	●	—	●	●	●	—		
			No			24 V or less	—	C80C	●	—	●	●	●	—	IC circuit	
		Terminal conduit	Yes			—	—	A33	—	—	—	—	●	—	—	PLC
		DIN terminal				100 V, 200 V	—	A34	—	—	—	—	●	—		Relay PLC
	Diagnostic indication (2-color display)	Grommet			—	—	—	B59W	●	—	●	—	—	—		

∗1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. ···(Applicable to ø20 only.)
Consult with SMC regarding water resistant types with the above model numbers.
∗2 1 m type lead wire is only applicable to D-A93.

∗ 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
None ····· N (Example) H7CN

∗ Solid state auto switches marked "○" are produced upon receipt of order.
∗ You do not need to specify "N" (i.e., without lead wire) for D-A3□, D-A44, D-G39, and D-K39.
This is the only standard specification automatically available for these models.
∗ D-A9□V, M9□V, M9□WV, and M9□A(V) models cannot be mounted on ø25 to ø40.

∗ Since there are applicable auto switches other than listed, refer to page 1330 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.
∗ D-A9□, M9□, and M9□W type auto switches are shipped with the hydraulic cylinder (but not assembled). (However, they are auto switch mounting brackets are shipped with the mounting brackets mounted already).

Specifications

Bore size (mm)	20	25	32	40
Action	Double acting/Single rod			
Fluid	Hydraulic fluid			
Nominal pressure	7 MPa			
Proof pressure	10.5 MPa			
Maximum allowable pressure	9 MPa			
Minimum operating pressure	0.3 MPa			
Ambient and fluid temperature	Without auto switch: –10° to 80°C			
	With auto switch: –10° to 60°C			
Piston speed	8 to 300 mm/s			
Cushion	Cushion seal			
Stroke length tolerance	to 250 mm $^{+1.0}_{0}$ 251 to 800 mm $^{+1.4}_{0}$			
Mounting style	Basic style, Axial foot style Head flange style, Rod flange style Single clevis style			

Note) Refer to page 1234 for definitions of terms related to pressure.

Accessories

	Mounting style	Basic	Axial foot	Head flange	Rod flange	Single clevis
Standard	Mounting nut	● (2 pcs.)	● (2 pcs.)	● (1 pc.)	● (1 pc.)	—
	Rod end nut	●	●	●	●	●

Option

I-type single knuckle joint Y-type double knuckle joint Bracket for clevis type Knuckle pin Bracket pin	Refer to page 1327

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluids	Compatible
O/W hydraulic fluids	Compatible
Water/Glycol hydraulic fluids	*
Phosphate hydraulic fluids	Not compatible

* Consult with SMC.

Standard Strokes: Refer to page 1329 for minimum strokes for auto switch mounting.

Bore size (mm)	Standard strokes (mm)	Long stroke
20	25 to 300	800
25	25 to 400	
32	25 to 500	
40		

* Standard strokes above have a minimal delivery time.
Consult with SMC for the manufacture of strokes other than the above.

Mounting Brackets: Part Nos.

Bore size (mm)	20	25	32	40
Axial foot *	CHN-L020	CHN-L025	CHN-L032	CHN-L040
Flange	CHN-F020	CHN-F025	CHN-F032	CHN-F040

* When ordering the axial foot type, order 2 pieces for each cylinder.

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)			
				1	3	5	7
20	10	OUT	314	314	942	1570	2198
		IN	235	235	705	1175	1645
25	12	OUT	490	490	1470	2450	3430
		IN	377	377	1131	1885	2639
32	16	OUT	804	804	2412	4020	5628
		IN	603	603	1809	3015	4221
40	18	OUT	1256	1256	3768	6280	8792
		IN	1002	1002	3006	5010	7014

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

Unit: kg

Bore size (mm)		**20**	**25**	**32**	**40**
Basic Weight	Basic style	0.27	0.37	0.53	1.05
	Axial foot style	0.51	0.63	0.91	1.59
	Flange style	0.36	0.54	0.72	1.26
	Clevis style	0.25	0.45	0.67	1.00
Additional weight per 50 mm		0.12	0.13	0.18	0.23

- Calculation method
  (Example) **CHNL20-100**
  (Foot type, ø20, 100 mm stroke)
- Basic weight ····· 0.51 kg
- Additional weight ··· 0.12/50 mm
- Cylinder stroke ····· 100 mm

  0.51 + 0.12/50 x 100 = 0.75 kg

⚠ Specific Product Precautions

Be sure to read before handling. Refer to front matter 38 for Safety Instructions, and pages 1234 to 1241 for precautions for hydraulic cylinder and auto switch.

⚠ Caution

When operating a cylinder for the first time, make sure to release the air at low pressure. When the air release is complete, operate the cylinder at reduced pressure, gradually increasing it to the normal operating pressure. However, the piston speed at this time should be adjusted to the minimum speed.

Mounting

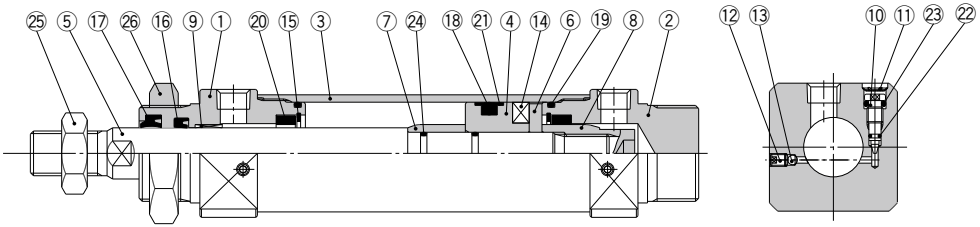
⚠ Caution

1. When mounting with bracket mounting nuts, tighten them using the tightening torques in the table below as a guide.

Bore size (mm)	Mounting nut thread	Mounting nut width across flats (mm)	Tightening torque (N·m)
20	M22 x 1.5	26	45
25	M24 x 1.5	32	60
32	M30 x 1.5	38	85
40	M33 x 1.5	41	110

2. When mounted with one side attached and one side unattached (basic type and flange type) and operating at high speed, bending moment acts on the cylinder due to oscillation at the stroke end, which may cause cylinder damage. In this case, install brackets to suppress the oscillation of the cylinder body, or reduce the piston speed enough so that the cylinder body does not oscillate at the stroke end.

Construction



Parts List

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Black anodized
2	**Head cover**	Aluminum alloy	Black anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston**	Stainless steel	
5	**Piston rod**	ø20, 25: Stainless steel ø32, 40: Carbon steel	Hard chromium electro plating
6	**Magnet plate**	Stainless steel	
7	**Cushion ring A**	Carbon steel	
8	**Cushion ring B**	Carbon steel	
9	**Bushing**	Lead bronze	
10	**Cushion valve**	Carbon steel	
11	**Retaining ring**	Spring steel	
12	**Air release valve**	Alloy steel	
13	**Check ball**	Bearing steel	

Parts List

No.	Description	Material	Note
14	**Magnet**	—	
15	**Retaining ring**	Spring steel	
16	**Rod seal**	NBR	
17	**Scraper**	NBR	
18	**Piston seal**	NBR	
19	**Tube gasket**	NBR	
20	**Cushion seal**	—	
21	**Back-up ring**	Resin	
22	**Cushion valve seal A**	NBR	
23	**Cushion valve seal B**	NBR	
24	**Piston gasket**	NBR	
25	**Rod end nut**	Carbon steel	
26	**Mounting nut**	Carbon steel	

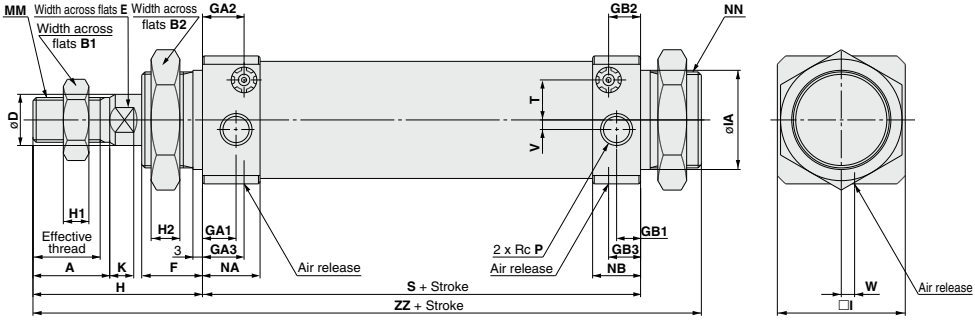
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.	Content
20	CHN20-PS	Nos. ⑯ to ㉑ from the chart
25	CHN25-PS	
32	CHN32-PS	
40	CHN40-PS	

∗ Seal kit consists of items ⑯ to ⑳ and ㉒ and can be ordered by using the seal kit number for each bore size.

Dimensions

Basic style: CHNB



CHQ
CHK□
CHN
CHM
CHS□
CH2□
CHA
Related Equipment
D-□

(mm)

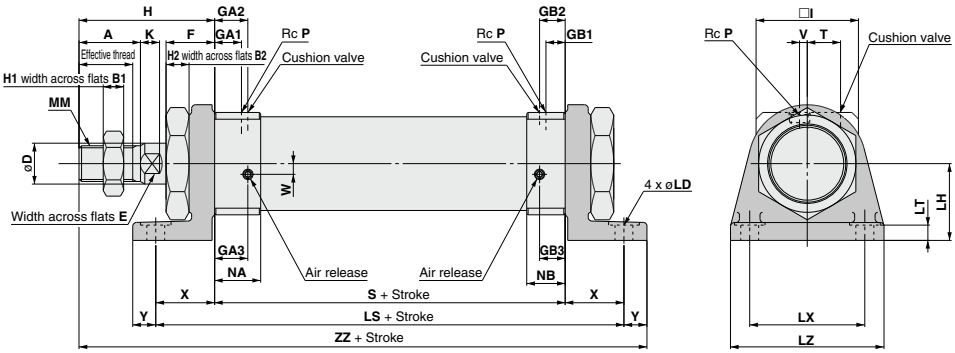
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B1	B2	D	E	F	GA1	GA2	GA3	GB1	GB2	GB3	H	H1	H2	I
20	25 to 300	15.5	18	13	26	10	8	16	10	12	12	8	10	10	41	5	8	31
25	25 to 400	19.5	22	17	32	12	10	16	10	12	12	8	10	10	46	6	8	34
32	25 to 500	21	24	22	38	16	14	19	11	13	13	8	10	10	53	8	9	40
40	25 to 500	21	24	24	41	18	16	21	12	17	17	11	16	16	54	10	11	48

(mm)

Bore size (mm)	IA	K	MM	NA	NB	NN	P	S	T	V	W	ZZ
20	$23f8^{-0.020}_{-0.053}$	5	M8 x 1.25	17	15	M22 x 1.5	1/8	81	9.5	4.5	6.5	138
25	$25f8^{-0.020}_{-0.053}$	5.5	M10 x 1.25	17	15	M24 x 1.5	1/8	81	11	3.5	5.5	143
32	$31f8^{-0.025}_{-0.064}$	7.5	M14 x 1.5	18	15	M30 x 1.5	1/8	87	13	3	4	159
40	$34f8^{-0.025}_{-0.064}$	7.5	M16 x 1.5	22	21	M33 x 2	1/4	108	16	5	0	183

Dimensions

Axial foot style: CHNL



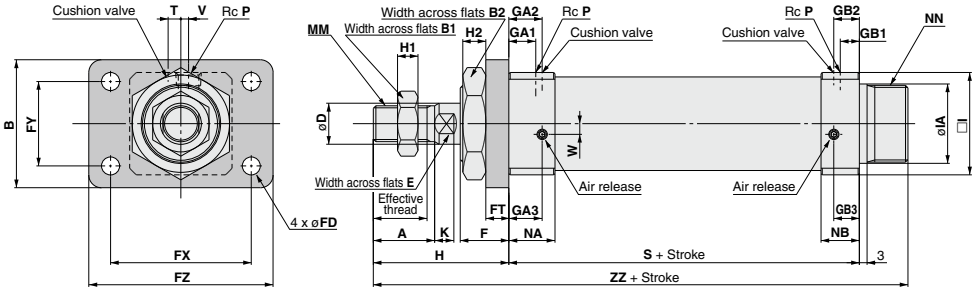
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B1	B2	D	E	F	GA1	GA2	GA3	GB1	GB2	GB3	H	H1	H2	I	K
20	25 to 300	15.5	18	13	26	10	8	16	10	12	12	8	10	10	41	5	8	31	5
25	25 to 400	19.5	22	17	32	12	10	16	10	12	12	8	10	10	46	6	8	34	5.5
32	25 to 500	21	24	22	38	16	14	19	11	13	13	8	10	10	53	8	9	40	7.5
40	25 to 500	21	24	24	41	18	16	21	12	17	17	11	16	16	54	10	11	48	7.5

(mm)

Bore size (mm)	LD	LH	LS	LT	LX	LZ	MM	NA	NB	P	S	T	V	W	X	Y	ZZ
20	7	25	121	5.5	40	55	M8 x 1.25	17	15	1/8	81	9.5	4.5	6.5	20	9	151
25	7	28	121	5.5	40	55	M10 x 1.25	17	15	1/8	81	11	3.5	5.5	20	9	156
32	7	30	133	6	45	60	M14 x 1.5	18	15	1/8	87	13	3	4	23	9	172
40	9	35	158	6	55	75	M16 x 1.5	22	21	1/4	108	16	5	0	25	11	198

Rod flange style: CHNF



(mm)

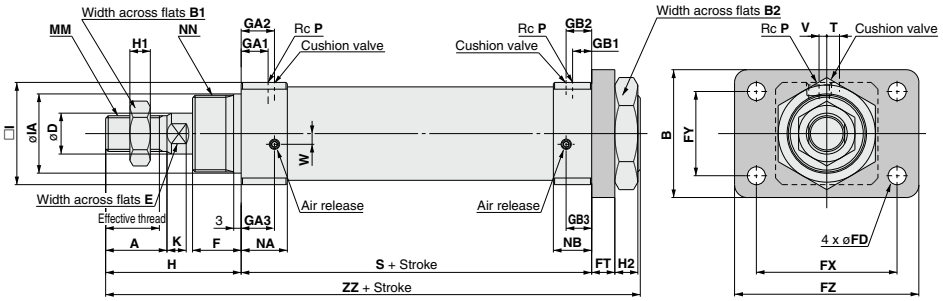
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B	B1	B2	D	E	F	FD	FT	FX	FY	FZ	GA1	GA2	GA3	GB1	GB2
20	25 to 300	15.5	18	38	13	26	10	8	16	7	6	51	21	68	10	12	12	8	10
25	25 to 400	19.5	22	44	17	32	12	10	16	7	9	53	27	70	10	12	12	8	10
32	25 to 500	21	24	50	22	38	16	14	19	7	9	55	33	72	11	13	13	8	10
40	25 to 500	21	24	60	24	41	18	16	21	9	9	66	36	84	12	17	17	11	16

(mm)

Bore size (mm)	GB3	H	H1	H2	I	IA	K	MM	NA	NB	NN	P	S	T	V	W	ZZ
20	10	41	5	8	31	$23f8^{-0.020}_{-0.053}$	5	M8 x 1.25	17	15	M22 x 1.5	1/8	81	9.5	4.5	6.5	138
25	10	46	6	8	34	$25f8^{-0.020}_{-0.053}$	5.5	M10 x 1.25	17	15	M24 x 1.5	1/8	81	11	3.5	5.5	143
32	10	53	8	9	40	$31f8^{-0.025}_{-0.064}$	7.5	M14 x 1.5	18	15	M30 x 1.5	1/8	87	13	3	4	159
40	16	54	10	11	48	$34f8^{-0.025}_{-0.064}$	7.5	M16 x 1.5	22	21	M33 x 2	1/4	108	16	5	0	183

Dimensions

Head flange style: CHNG



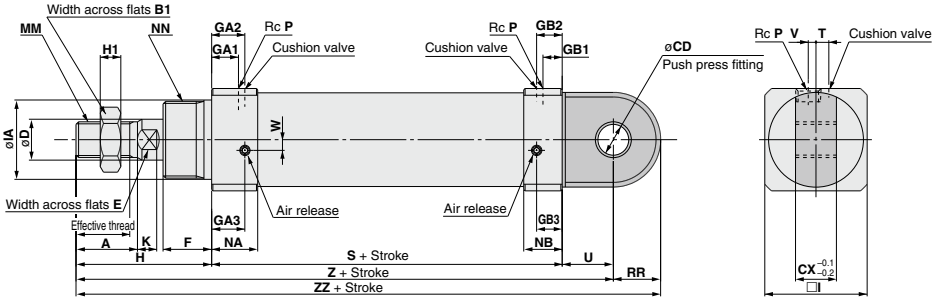
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B	B1	B2	D	E	F	FD	FT	FX	FY	FZ	GA1	GA2	GA3	GB1	GB2
20	25 to 300	15.5	18	38	13	26	10	8	16	7	6	51	21	68	10	12	12	8	10
25	25 to 400	19.5	22	44	17	32	12	10	16	7	9	53	27	70	10	12	12	8	10
32	25 to 500	21	24	50	22	38	16	14	19	7	9	55	33	72	11	13	13	8	10
40	25 to 500	21	24	60	24	41	18	16	21	9	9	66	36	84	12	17	17	11	16

(mm)

Bore size (mm)	GB3	H	H1	H2	I	IA	K	MM	NA	NB	NN	P	S	T	V	W	ZZ
20	10	41	5	8	31	$23f8^{-0.020}_{-0.053}$	5	M8 x 1.25	17	15	M22 x 1.5	1/8	81	9.5	4.5	6.5	138
25	10	46	6	8	34	$25f8^{-0.020}_{-0.053}$	5.5	M10 x 1.25	17	15	M24 x 1.5	1/8	81	11	3.5	5.5	143
32	10	53	8	9	40	$31f8^{-0.025}_{-0.064}$	7.5	M14 x 1.5	18	15	M30 x 1.5	1/8	87	13	3	4	159
40	16	54	10	11	48	$34f8^{-0.025}_{-0.064}$	7.5	M16 x 1.5	22	21	M33 x 2	1/4	108	16	5	0	183

Single clevis style: CHNC



(mm)

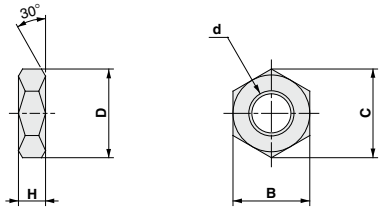
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B1	CD	CX	D	E	F	GA1	GA2	GA3	GB1	GB2	GB3	H	H1	I
20	25 to 300	15.5	18	13	$10^{+0.109}_{0}$	16	10	8	16	10	12	12	8	10	10	41	5	31
25	25 to 400	19.5	22	17	$10^{+0.109}_{0}$	16	12	10	16	10	12	12	8	10	10	46	6	34
32	25 to 500	21	24	22	$12^{+0.109}_{0}$	16	16	14	19	11	13	13	8	10	10	53	8	40
40	25 to 500	21	24	24	$16^{+0.034}_{-0.015}$	24	18	16	21	12	17	17	11	16	16	54	10	48

(mm)

Bore size (mm)	IA	K	MM	NA	NB	NN	P	RR	S	T	U	V	W	Z	ZZ
20	$23f8^{-0.020}_{-0.053}$	5	M8 x 1.25	17	15	M22 x 1.5	1/8	13.5	81	9.5	14	4.5	6.5	136	149.5
25	$25f8^{-0.020}_{-0.053}$	5.5	M10 x 1.25	17	15	M24 x 1.5	1/8	14.5	81	11	15	3.5	5.5	142	156.5
32	$31f8^{-0.025}_{-0.064}$	7.5	M14 x 1.5	18	15	M30 x 1.5	1/8	18.5	87	13	20	3	4	160	178.5
40	$34f8^{-0.025}_{-0.064}$	7.5	M16 x 1.5	22	21	M33 x 2	1/4	22.5	108	16	20	5	0	182	204.5

Accessories (Standard)

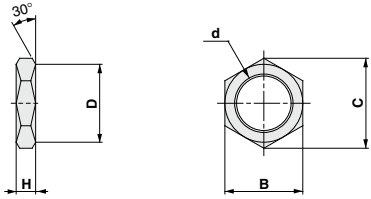
Rod end nut



Material: Carbon steel

Part no.	Applicable bore size (mm)	d	H	B	C	D
NT-02	20	M8 x 1.25	5	13	15.0	12.5
NT-03	25	M10 x 1.25	6	17	19.6	16.5
NT-04	32	M14 x 1.5	8	22	25.4	21.0
AC-NI-50	40	M16 x 1.5	10	24	27.7	23

Mounting nut



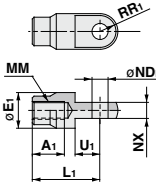
Material: Carbon steel

Part no.	Applicable bore size (mm)	d	H	B	C	D
SO-02	20	M22 x 1.5	8	26	30	26
SO-03	25	M24 x 1.5	8	32	36.9	32
SO-04	32	M30 x 1.5	9	38	43.9	38
SO-05	40	M33 x 2.0	11	41	47.3	41

Accessory Brackets (Optional)

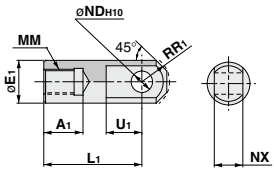
I-type single knuckle joint

ø20: I-02
ø25: I-03



Material: Rolled steel plate

ø32: I-04
ø40: IHN-04

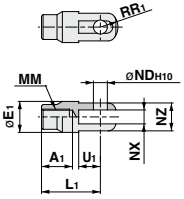


Material: Rolled steel plate

Part no.	Applicable bore size (mm)	A_1	E_1	L_1	MM	R_1	U_1	ND^{H10}	NX
I-02	20	16	20	36	M8 x 1.25	10	14	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$
I-03	25	18	20	38	M10 x 1.25	10	14	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$
I-04	32	22	24	55	M14 x 1.5	15.5	20	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$
IHN-04	40	22	24	55	M16 x 1.5	15.5	20	$15^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$

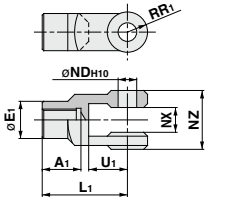
Y-type double knuckle joint

ø20: Y-02
ø25: Y-03



Material: Rolled steel plate

ø32: Y-04C
ø40: YHN-04

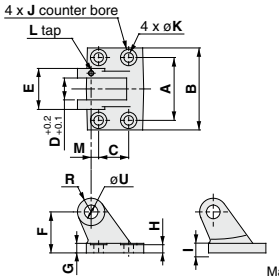


Material: Cast iron

Part no.	Applicable bore size (mm)	A_1	E_1	L_1	MM	R_1	U_1	ND^{H10}	NX
Y-02	20	16	20	36	M8 x 1.25	12	14	$9^{+0.058}_{0}$	$9^{+0.2}_{+0.1}$
Y-03	25	18	20	38	M10 x 1.25	12	14	$9^{+0.058}_{0}$	$9^{+0.2}_{+0.1}$
Y-04C	32	22	24	55	M14 x 1.5	13	25	$12^{+0.070}_{0}$	$16^{+0.3}_{+0.1}$
YHN-04	40	22	24	55	M16 x 1.5	13	25	$15^{+0.070}_{0}$	$16^{+0.3}_{+0.1}$

Part no.	NZ	Note
Y-02	18	With CDP-1 (with retaining ring)
Y-03	18	
Y-04C	38	With CDP-3 (with cotter pin)
YHN-04	38	With CDPN-4 (with cotter pin)

Bracket for clevis type

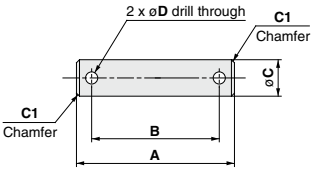


Material: Cast iron

Part no.	Applicable bore size (mm)	A	B	C	D	U (H8) Size	U (H8) Tolerance	E	F	G	H	I
AD-FI-20	20	46	60	22	16	10	$^{+0.027}_{0}$	30	28	6.5	5.5	10
AD-FI-25	25	46	60	22	16	10	$^{+0.027}_{0}$	30	30	6.5	5.5	10
AD-FI-32	32	56	80	30	16	12	$^{+0.027}_{0}$	36	40	10	9	13
AD-CHN-40	40	64	88	30	24	16	$^{+0.027}_{0}$	44	43	10	9	13

Part no.	J	K	L	M	R	Note
AD-FI-20	12	7	M4	5.5	10	With AD-EI-20 (with cotter pin), and M4 set screws (once)
AD-FI-25	12	7	M4	5.5	10	With AD-EI-25 (with cotter pin), and M4 set screws (once)
AD-FI-32	12	7	M5	7	12	With AD-EI-32 (with cotter pin), and M5 set screws (once)
AD-CHN-40	16	9	M5	10	12	With AD-CHN-40 (with cotter pin), and M5 set screws (once)

Bracket pin

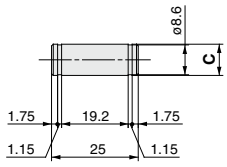


Material: Carbon steel

Part no.	Applicable bore size (mm)	A	B	C (f7) Size	C (f7) Tolerance	D	Note
AD-EI-20	20	45.5	35.5	10	$^{-0.016}_{-0.034}$	3.2	with (2) cotter pins ø3.2 x 15ℓ
AD-EI-25	25	45.5	35.5	10	$^{-0.016}_{-0.034}$	3.2	
AD-EI-32	32	52	42	12	$^{-0.016}_{-0.034}$	4	with (2) cotter pins ø4 x 20ℓ
AE-CHN-40	40	60	50	16	$^{-0.016}_{-0.034}$	4	

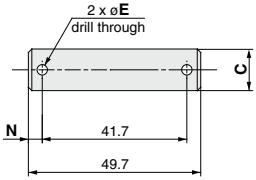
Knuckle pin

ø20, ø25
Part no.: CDP-1
Material: Carbon steel



Retaining ring: C type 9 for shaft

ø32 ø40
Part no.: CDP-3 CDPN-4
Material: Carbon steel



Cotter pin: ø3 x 18ℓ

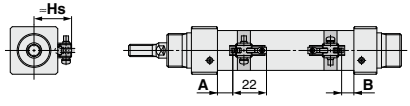
Part no.	Applicable bore size (mm)	C (d9) Size	C (d9) Tolerance	N	E	Note
CDP-1	20	9	$^{-0.040}_{-0.076}$	—	—	with (2) retaining rings: C type 9
	25					
CDP-3	32	12	$^{-0.050}_{-0.093}$	4	3	with (2) cotter pins ø3 x 18ℓ
CDPN-4	40	15		5	3.2	with (2) cotter pins ø3.2 x 20ℓ

Series CHN
Auto Switch Mounting

Refer to pages 1451 to 1510 for detailed auto switch specifications.

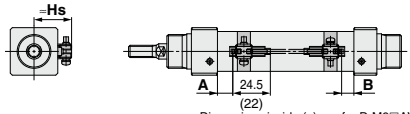
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

D-A9□V



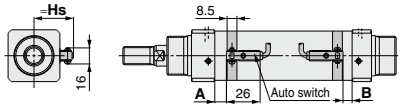
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

D-A9□

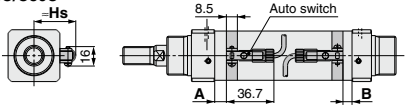


∗ Dimensions inside ( ) are for D-M9□AV.
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

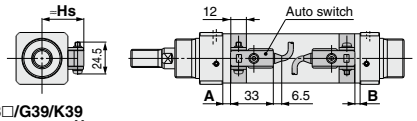
D-C□7/C80



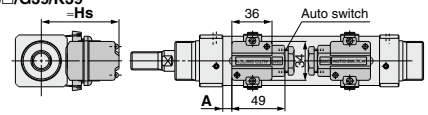
D-C73C/C80C



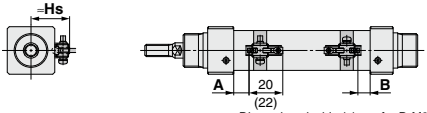
D-B5□/B64/B59W



D-A3□/G39/K39

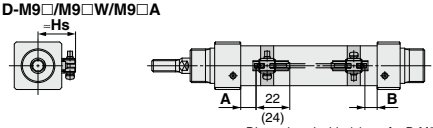


D-M9□V/M9□WV/M9□AV



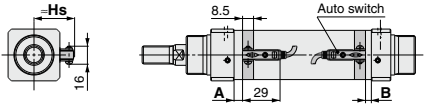
∗ Dimensions inside ( ) are for D-M9□AV.
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

D-M9□/M9□W/M9□A

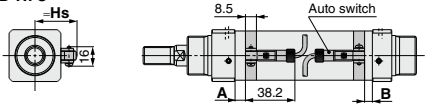


∗ Dimensions inside ( ) are for D-M9□AV.
A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

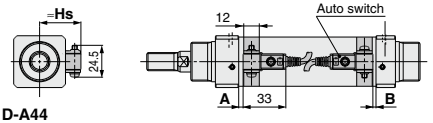
D-H7□/H7□W/H7NF/H7BA



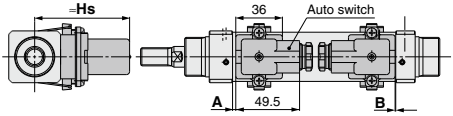
D-H7C



D-G5□/K59/G5□W/K59W/G5BA/G59F/G5NT



D-A44



Auto Switch Proper Mounting Positions

(mm)

Bore size (mm)	Solid state auto switch								Reed auto switch									
	D-M9□(V) D-M9□W(V) D-M9□A(V)		D-H7□ D-H7□W/H7C D-H7NF/H7BA		D-G5□/K59 D-G5□W/K59W D-G59F/G5BA D-G5NT		D-G39/K39		D-A9□(V)		D-C7□/C80 D-C73C/C80		D-B5□/B64		D-B59W		D-A3□/A44	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	23	14	18.5	9.5	15	6	13	4	19	10	19.5	10.5	13.5	4.5	16.5	7.5	13	4
25	23.5	13.5	19	9	15.5	5.5	13.5	3.5	19.5	9.5	20	10	14	4	17	7	13.5	3.5
32	25.5	16.5	21	12	17.5	8.5	15.5	6.5	21.5	12.5	22	13	16	7	19	10	15.5	6.5
40	31.5	21.5	27	17	23.5	13.5	21.5	11.5	27.5	17.5	28	18	22	12	25	15	21.5	11.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Heights

(mm)

Bore size (mm)	D-M9□(V) D-M9□W(V) D-M9□A(V) D-A9□(V)	D-H7□/H7□W D-H7NF/H7BA D-C7□/C80	D-C73C/C80C	D-G5□/K59 D-G5□W/K59W D-G59F/G5BA D-G5NT/H7C D-B5□/B64 D-B59W	D-G39/K39 D-A3□	D-A44
	Hs	Hs	Hs	Hs	Hs	Hs
20	26	25.5	27	27.5	62	72
25	28	27.5	29	29.5	64	74
32	31.5	31	32.5	33	67.5	77.5
40	35.5	35	36.5	37	71.5	81.5

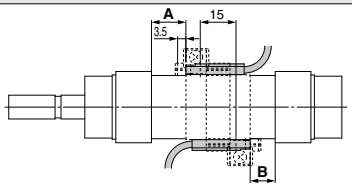
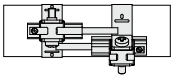
Minimum Auto Switch Mounting Stroke

(mm)

Auto switch model	Number of auto switches mounted				
	1 pc.	2 pcs.		n pcs.	
		Different surfaces	Same surface	Different surfaces	Same surface
D-M9□	5	20	55	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	55 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-M9□W	10	20	55	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	55 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-M9□A	10	25	60	$25 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	60 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-A9□	5	15	50	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	50 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-M9□V	5	20	35	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	35 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-A9□V	5	15	25	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	25 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-M9□WV **D-M9□AV**	10	20	35	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	35 + 35 (n − 2) (n = 2, 3, 4, 5···)
D-H7□/H7□W **D-H7NF/H7BA**	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	60 + 45 (n − 2) (n = 2, 3, 4, 5···)
D-C7□ **D-C80**	10	15	50	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	50 + 45 (n − 2) (n = 2, 3, 4, 5···)
D-H7C **D-C73C** **D-C80C**	10	15	65	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	65 + 50 (n − 2) (n = 2, 3, 4, 5···)
D-G5□/K59 **D-G5□W/K59W** **D-G59F/G5BA/G5NT** **D-B5□/B64**	10	15	75	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	75 + 55 (n − 2) (n = 2, 3, 4, 5···)
D-B59W	15	20	75	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···) Note 3)	75 + 55 (n − 2) (n = 2, 3, 4, 5···)
D-G39/K39 **D-A3□/A44**	10	35	100	35 + 30 (n − 2) (n = 2, 3, 4, 5···)	100 + 100 (n − 2) (n = 2, 3, 4, 5···)

Note 3) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

Note 1) Auto switch mounting

Auto switch model	Auto switches — 2 pcs.	
	Different surfaces	Same surface
	 Correct auto switch mounting position is 3.5 mm from the back face of the switch holder.	 Mount auto switches offset (in circumferential direction of cylinder tube) so that auto switch units and lead wires do not run up against each other.
D-M9□ **D-M9□W**	Less than 20 stroke Note 2)	Less than 55 stroke Note 2)
D-M9□A	Less than 25 stroke Note 2)	Less than 60 stroke Note 2)
D-A9□	—	Less than 50 stroke Note 2)

Note 2) Minimum stroke for auto switch mounting in styles other than those mentioned in Note 1.

Operating Range

(mm)

Auto switch model	Bore size			
	20	25	32	40
D-M9□(V) **D-M9□W(V)** **D-M9□A(V)**	4.5	4	4	4.5
D-H7□/H7C **D-H7□W** **D-H7NF/H7BA**	4.5	5	4.5	5
D-G5□/K59/G59F **D-G5□W/K59W** **D-G5BA/G5NT**	5.5	5	4.5	5

(mm)

Auto switch model	Bore size			
	20	25	32	40
D-G39/K39	9	8.5	10	10.5
D-A9□(V)	8	7.5	7	8
D-C7□/C80 **D-C73C/C80C**	10.5	9.5	8.5	10
D-B5□/B64	13.5	11.5	10	12
D-B59W	13.5	13	11.5	13.5
D-A3□/A44	11.5	10	9	10.5

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

Auto Switch Mounting Brackets: Part Nos.

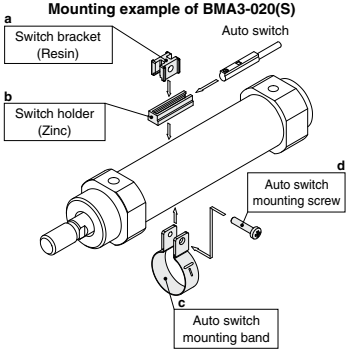
Auto switch models	Bore size (mm)			
	ø20	ø25	ø32	ø40
D-A9□(V) D-M9□(V) D-M9□W(V)	Note 1) BMA3-020	BJ3-1 + BHN3-025	BJ3-1 + BHN3-032	BJ3-1 + BHN3-040
D-M9□A(V)	Note 2) BMA3-020S	—	—	—
D-H7□ D-H7□W D-H7NF D-H7BA D-C7□/C80 D-C73C/C80C	BMA2-020A	BHN3-025	BHN3-032	BHN3-040
D-G5□/G5□W D-G59F D-G5BA/G5NT D-B5□/B64 D-B59W	BA-01	BHN2-025	BGS1-032	BH2-040
D-G39/K39 D-A3□/A44	BD1-01M	BD1-02M	BHN1-032	BDS-04M

Note 1) Set part number which includes the auto switch mounting band (BMA2-020A) and the holder kit (BJ5-1/Switch bracket: Transparent).
Since the switch bracket (made from nylon) are affected in an environment where alcohol, chloroform, methylamines, hydrochloric acid or sulfuric acid is splashed over, so it cannot be used. Please consult SMC regarding other chemicals.

Note 2) Set part number which includes the auto switch mounting band, stainless steel screw and the holder kit (BJ4-1/Switch bracket: White).

Note 3) For the D-M9□A(V) type auto switch, do not install the switch bracket on the indicator light.

Mounting example of BMA3-020(S)



(1) BJ□-1 is a set of "a" and "b".
(2) BMA2-020A(S) is a set of "c" and "d".
Band (c) is mounted so that the projected part is on the internal side (contact side with the tube).
BJ4-1 (Switch bracket: White)
BJ5-1 (Switch bracket: Transparent)

[Stainless steel mounting screw kits]

The following stainless steel mounting screw kits are available for use depending on the operating environment. (Switch mounting bands are not included and should be ordered separately.)
BBA3: D-G5, K5, B5, B6
BBA4: D-C7, C8, H7
Note) Refer to the table below for details on BBA3, BBA4.
The above stainless steel screws are used when a cylinder is shipped with the D-H7BA or G5BA auto switches.
When only an auto switch is shipped independently, the BBA3 or BBA4 is attached.

Stainless steel mounting screw kit details.

Part no.	Contents			Applicable auto switch mounting bracket part nos.	Applicable auto switches
	Description	size	pcs.		
BBA3	Auto switch mounting screw set	M4 x 0.7 x 22L	1	BA-01, BA-02, BA-32, BA-04, BA-05, BA-06, BA-08, BA-10	D-B5, B6 D-G5, K5
				BA2-020, BA2-025, BA2-032, BA2-040	
				BA5-050, BHN2-025, BSG1-032	
				BH2-040, BH2-050, BH2-080, BH2-100	
				BAF-32, BAF-04, BAF-05, BAF-06, BAF-08, BAF-10	
BBA4		M3 x 0.5 x 14L	1	BJ2-006, BJ2-010, BJ2-016	D-C7, C8 D-H7
				BM2-020A, BM2-025A, BM2-032A, BM2-040A	
				BMA2-020A, BMA2-025A, BMA2-032A, BMA2-040A, BMA2-050A, BMA2-063A	
				BHN3-025, BHN3-032, BHN3-040	

Besides the models listed in "How to Order," the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

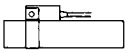
Auto switch type	Part no.	Electrical entry	Features
Solid state	D-H7A1, H7A2, H7B	Grommet (in-line)	—
	D-G59, G5P, K59		
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color display)
	D-G59W, G5PW, K59W		
	D-G5BA, H7BA		Water resistant (2-color display)
	D-G5NT		With timer
	D-G59F		With diagnostic output (2-color display)
Reed	D-C73, C76, B53	Grommet (in-line)	—
	D-C80		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Refer to pages 1494 and 1495 for details.
∗ Normally closed (N.C. = b contact), solid state auto switches (D-F9G, F9H) are also available. For details, refer to page 1463.

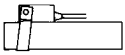
How to Mount and Move the Auto Switch

⚠ Caution

1. Tighten the screw under the specified torque when mounting auto switch.
2. Set the auto switch mounting band perpendicularly to cylinder tube.



Mounting correctly



Mounting incorrectly

<Applicable auto switch>

Solid state ····· D-M9N, M9P, M9B, M9NV, M9PV, M9BV
D-M9NW, M9PW, M9BW, M9NWV, M9PWV, M9BWV
D-M9NA, M9PA, M9BA, M9NAV, M9PAV, M9BAV
Reed ····· D-A90, A93, A96, A90V, A93V, A96V

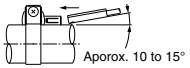


Figure 1. Switch insert angle

How to Mount and Move the Auto Switch

Mounting the Auto Switch

1. Mount the auto switch mounting band around the auto switch setting position on the cylinder tube.
2. Place the switch holder in the opening of the auto switch mounting band (1).
3. Make the concave part of the switch bracket faced downward and set the switch bracket on the switch holder (2).
Set the switch bracket so that both ends of the auto switch mounting band enter the portion between the ribs on both side surfaces of the switch bracket.
For the D-M9□A (V) type auto switch, do not install the switch bracket on the indicator light.
4. Pass the auto switch mounting screw (M3) supplied with the auto switch mounting band from the through-hole side of the auto switch mounting band and engage it with the M3 female thread of the auto switch mounting band through the through-hole in the switch bracket.
5. Tighten the auto switch mounting screw with the specified tightening torque (0.6 to 0.7 N·m).
6. Insert the auto switch into the auto switch mounting groove of the switch holder (2).
7. After checking the detection position, tighten the set screw (M2.5) supplied with the auto switch to secure the auto switch.

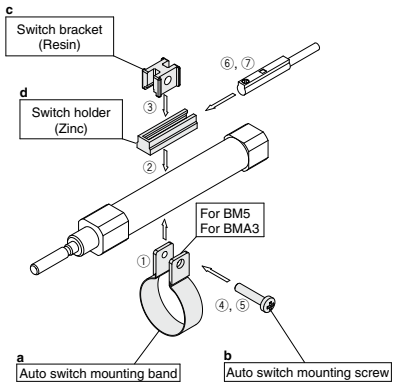
Tightening torque for the set screw (M2.5) supplied with the auto switch (N·m)

Auto switch model	Tightening torque
D-M9□(V) **D-M9□W(V)** **D-M9□A(V)**	0.05 to 0.15
D-A9□(V)	0.1 to 0.2

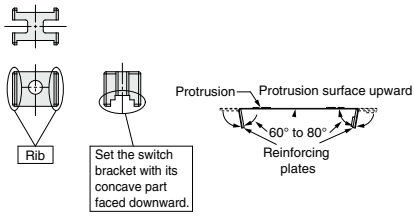
When tightening the set screw supplied with the auto switch, use a watchmaker's screw driver with a handle diameter of 5 to 6 mm.

Adjustment the Auto Switch Position

1. To make the fine adjustment, loosen the set screw (M2.5) supplied with the auto switch and slide the auto switch inside the auto switch mouthing groove to adjust the position.
2. To move the auto switch setting position largely, loosen the screw (M3) that secures the auto switch mounting band and slide the auto switch together with the switch holder on the cylinder tube to adjust the position.



<Switch bracket>

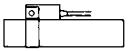


Note) When removing the screw connection part with the auto switch mounting screw after the auto switch mounting band has been assembled, be careful not to drop the switch bracket, switch holder, auto switch mounting screw, or auto switch mounting band.

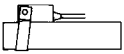
How to Mount and Move the Auto Switch

⚠ Caution

1. Tighten the screw under the specified torque when mounting auto switch.
2. Set the auto switch mounting band perpendicularly to cylinder tube.



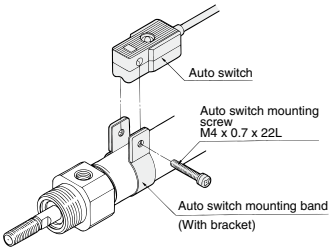
Mounting correctly



Mounting incorrectly

<Applicable auto switch>

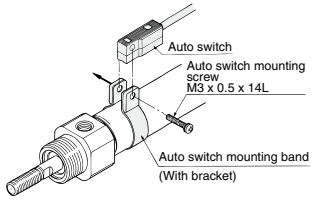
Solid state ····· D-G59, D-G5P, D-K59, D-G5BA
D-G59W, D-G5PW, D-K59W
D-G59F, D-G5NT, D-G5NB
Reed ····· D-B53, D-B54, D-B64, D-B59W



1. Put an auto switch mounting band on the cylinder tube and set it at the auto switch mounting position.
2. Put the mounting section of the auto switch between the auto switch mounting band mounting holes, then adjust the position of mounting holes of switch to those of mounting band.
3. Lightly thread the auto switch mounting screw through the mounting hole into the thread part of band fitting.
4. After reconfirming the detection position, tighten the auto switch mounting screw to secure the auto switch while properly contacting the auto switch bottom part and the cylinder tube.
(The tightening torque of M4 screw should be about 1 to 1.2 N·m.)
5. Modification of the detection position should be made in the condition of 3.

<Applicable auto switch>

Solid state ····· D-H7A1, D-H7A2, D-H7B, D-H7BA
D-H7C, D-H7NF, D-H7NW, D-H7PW
D-H7BW
Reed ····· D-C73, D-C76, D-C80, D-C73C, D-C80C



1. Put a mounting band on the cylinder tube and set it at the auto switch mounting position.
2. Put the mounting section of the auto switch between the auto switch mounting band mounting holes, then adjust the position of mounting holes of switch to those of mounting band.
3. Lightly thread the auto switch mounting screw through the mounting hole into the thread part of the auto switch mounting band fitting.
4. After setting the whole body to the detecting position by sliding, tighten the auto switch mounting screw to secure the auto switch while properly contacting the auto switch bottom part and the cylinder tube. (Tightening torque of M3 screw should be 0.8 to 1 N·m.)
5. Modification of the detection position should be made in the condition of 3.

How to Mount and Move the Auto Switch

⚠ Caution

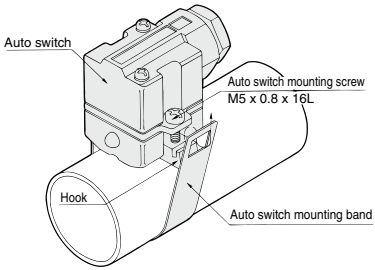
1. Tighten the screw under the specified torque when mounting auto switch.
2. Set the auto switch mounting band perpendicularly to cylinder tube.

Mounting correctly **Mounting incorrectly**

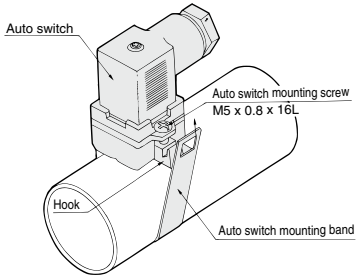
<Applicable auto switch>
Solid state ····· D-G39, D-K39
Reed ····· D-A33, D-A34, D-A44

How to Mount and Move the Auto Switch

D-A3, D-G3/K3 type



D-A4

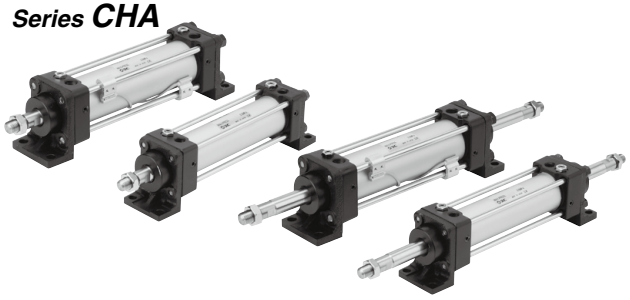


1. Loosen the auto switch mounting screws at both sides to pull down the hook.
2. Put an auto switch mounting band on the cylinder tube and set it at the auto switch mounting position, and then hook the band.
3. Screw lightly the auto switch mounting screw.
4. Set the whole body to the detecting position by sliding, tighten the mounting screw to secure the auto switch. (The tightening torque should be about 2 to 3 N·m.)
5. Modification of the detecting position should be made in the condition of 3.

Tie-rod Type Hydraulic Cylinder

Series CHA

Series CHA



Nominal pressure: **3.5 MPa**

Bore size (mm): 40, 50, 63, 80, 100, 125, 160

Tie-rod Type Hydraulic Cylinder
Double Acting/Single Rod
Series CHA

3.5 MPa

ø40, ø50, ø63, ø80, ø100, ø125, ø160

How to Order

Bore size

40	40 mm	Aluminum tube
50	50 mm	
63	63 mm	
80	80 mm	
100	100 mm	
125	125 mm	Steel tube
160	160 mm	

Cylinder options

Rod boot	Nil	Without rod boot
	J	Nylon tarpaulin
	K	Neoprene cloth
Cushion	Nil	Both sides
	N	Without cushion
	R	With rod cushion
	H	With head cushion

∗ Indicate in alphabetical order.

Tube material

Nil	Aluminum alloy
F	Steel tube

Without Auto Switch CHA L □ 40 – 100 □ – □

With Auto Switch CHDA L 40 – 100 □ – M9BW □ – □

With auto switch (built-in magnet)

Mounting style

B	Basic style
L	Axial foot style
F	Rod flange style
G	Head flange style
C	Single clevis style
D	Double clevis style
T	Center trunnion style
U	Rod trunnion style

Bore size

40	40 mm	Aluminum tube
50	50 mm	
63	63 mm	
80	80 mm	
100	100 mm	

Auto switch type

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

Cylinder stroke (mm)
Refer to the standard stroke table on page 1417.

Number of auto switches

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

Made to Order specifications
For details, refer to page 1417.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDAB50-100

Applicable Auto Switches/Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Tie-rod mount	Band mount	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None	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
							—	G59**	●	—	●	○	—	○		
				3-wire (PNP)			M9P	—	●	●	●	○	—	○		
							—	G5P**	●	—	●	○	—	○		
				2-wire	12 V		M9B	—	●	●	●	○	—	○	—	
							—	K59**	●	—	●	○	—	○		
		Terminal conduit		3-wire (NPN)	5 V, 12 V		—	G39	—	—	—	—	●	—	IC circuit	
				2-wire	12 V		—	K39	—	—	—	—	●	—	—	
	Diagnostic indication (2-color display)	Grommet		3-wire (NPN)	5 V, 12 V		M9NW	—	●	●	●	○	—	○	IC circuit	
							—	G59W**	●	—	●	○	—	○		
				3-wire (PNP)			M9PW	—	●	●	●	○	—	○		
							—	G5PW**	●	—	●	○	—	○		
				2-wire	12 V		M9BW	—	●	●	●	○	—	○	—	
							—	K59W**	●	—	●	○	—	○		
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		M9NA*1	—	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PA*1	—	○	○	●	○	—	○		
				2-wire	12 V		M9BA*1	—	○	○	●	○	—	○	—	
							—	G5BA**	—	—	●	○	—	○		
	Diagnostic output (2-color display)			4-wire (NPN)	5 V, 12 V		F59F	G59F**	●	—	●	○	—	○	IC circuit	
Reed auto switch	———	Grommet	Yes	3-wire (NPN equiv.)	5 V	—	A96	—	●	—	●	—	—	—	IC circuit	—
				2-wire	12 V	100 V	A93	—	●	●	●	●	—	—	—	
			No			100 V or less	A90	—	●	—	●	—	—	—	IC circuit	Relay PLC
			Yes			100 V, 200 V	A54	B54**	●	—	●	●	—	—	—	
			No			200 V or less	A64	B64**	●	—	●	—	—	—		
		Terminal conduit	Yes			—	—	A33	—	—	—	—	●	—	—	PLC
		DIN terminal				100 V, 200 V	—	A34	—	—	—	—	●	—		Relay PLC
							—	A44	—	—	—	—	●	—		
	Diagnostic indication (2-color display)	Grommet			—	—	A59W	B59W**	●	—	●	—	—	—		

∗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

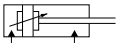
∗ Solid state auto switches marked "○" are produced upon receipt of order.

∗∗ Types D-G5□, K59, G5□W, K59W, G5BA, G59F, G5NT, B5□, B64, and B59W cannot be mounted on ø63 bore size cylinders.

∗ Since there are applicable auto switches other than listed, refer to page 1433 for details.

∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.

∗ D-A9□, M9□, M9□W, M9□A auto switches are shipped together (not assembled). (Only auto switch mounting brackets are packed assembled.)



Made to Order

Made to Order specifications
For details, refer to page 1435.

Symbol	Specifications
-XC22	Fluororubber seals

Models

Model	Tube material	Bore size (mm)
CHA	Aluminum alloy	40, 50, 63, 80, 100
CHAF	Steel	40, 50, 63, 80, 100, 125, 160

Specifications

Action	Double acting/Single rod
Fluid	Hydraulic fluid
Nominal pressure	3.5 MPa
Proof pressure	5.0 MPa
Maximum allowable pressure	3.5 MPa
Minimum operating pressure	0.25 MPa
Ambient and fluid temperature	Without auto switch: –10° to 80°C
	With auto switch: –10° to 60°C
Piston speed	8 to 300 mm/s
Cushion	Cushion seal
Stroke length tolerance	to 100st $^{+0.8}_{0}$, 100 to 250st $^{+1.0}_{0}$, 250 to 630st $^{+1.25}_{0}$ 630 to 1000st $^{+1.4}_{0}$, 1000 to 1500st $^{+1.8}_{0}$
Mounting	Basic style (B), Axial foot style (L), Rod flange style (F) Head flange style (G), Single clevis style (C), Double clevis style (D), Center trunnion style (T), Rod trunnion style (U)

Note) Refer to page 1234 for definitions of terms related to pressure.

Standard Strokes

Bore size (mm)	Standard strokes (mm)
40	25 to 1000
50	25 to 1000
63	25 to 1000
80	25 to 1300
100	25 to 1500
125	50 to 1300
160	50 to 1500

Note) Refer to pages 1252 and 1253 to determine stroke limitation depending on the type of mounting brackets that will be used. Then make your selection.

Cushion Strokes (For Rod Side and Head Side)

Bore size (mm)	Effective cushion stroke (mm)
40	15
50	15
63	17
80	20
100	20
125	20
160	22

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	Not compatible
Phosphate hydraulic fluid	Not compatible

Rod Boot Material

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

∗ Maximum ambient temperature for the rod boot itself.

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)					
				1	1.5	2	2.5	3	3.5
40	18	OUT	1257	1257	1886	2514	3143	3771	4400
		IN	1002	1002	1503	2004	2505	3006	3507
50	20	OUT	1963	1963	2945	3926	4908	5889	6871
		IN	1649	1649	2474	3298	4123	4947	5772
63	22.4	OUT	3117	3117	4676	6234	7793	9351	10910
		IN	2723	2723	4085	5446	6808	8169	9531
80	28	OUT	5027	5027	7541	10054	12568	15081	17595
		IN	4411	4411	6617	8822	11028	13233	15439
100	35.5	OUT	7854	7854	11781	15708	19635	23562	27489
		IN	6864	6864	10296	13728	17160	20592	24024
125	35.5	OUT	12272	12272	18408	24544	30680	36816	42952
		IN	11282	11282	16923	22564	28205	33846	39487
160	45	OUT	20106	20106	30159	40212	50265	60318	70371
		IN	18516	18516	27774	37032	46290	55548	64806

Weight

Series CH□A (Built-in magnet)

Unit: kg

Bore size (mm)			**40**	**50**	**63**	**80**	**100**
(0 mm stroke) Basic weight	Basic style	(B)	1.3	2.0	2.6	4.3	6.5
	Axial foot style	(L)	1.8	2.9	3.8	6.4	10.0
	Flange style	(F, G)	1.6	2.4	3.2	5.2	8.2
	Single clevis style	(C)	1.7	2.6	3.6	5.8	9.0
	Double clevis style	(D)	1.8	2.9	3.8	6.5	9.9
	Rod trunnion style	(U)	1.6	2.4	3.1	6.0	9.4
	Center trunnion style	(T)	1.7	2.8	3.4	5.8	9.2
Additional weight per 10 mm stroke			0.05	0.07	0.09	0.12	0.16

Calculation (Example) **CHAL50-100**
- Basic weight ····· 2.9 (foot type, ø50)
- Additional weight ····· 0.07/10 mm stroke
- Cylinder stroke ····· 100 mm

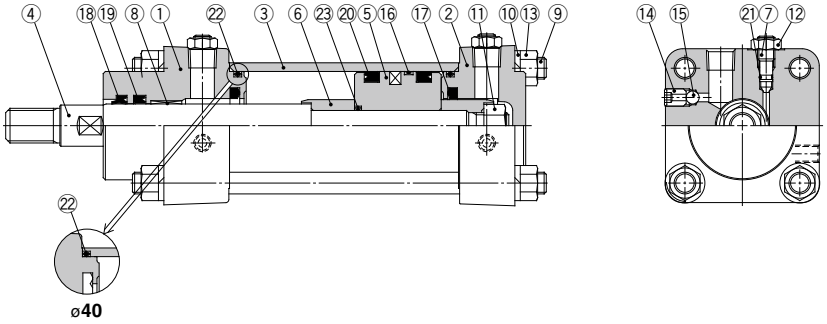
2.9 + 0.07 x 100 / 10 = 3.6 kg

Series CHA□F (Steel tube)

Unit: kg

Bore size (mm)			**40**	**50**	**63**	**80**	**100**	**125**	**160**
(0 mm stroke) Basic weight	Basic style	(B)	1.5	2.1	2.7	4.7	7.1	9.2	15.8
	Axial foot style	(L)	2.0	3.1	3.9	6.8	10.6	15.8	26.5
	Flange style	(F, G)	1.7	2.6	3.2	5.7	8.8	12.1	26.7
	Single clevis style	(C)	1.9	2.8	3.6	6.3	9.6	13.0	22.9
	Double clevis style	(D)	2.0	3.1	3.9	7.0	10.5	14.7	25.6
	Rod trunnion style	(U)	1.7	2.6	3.2	6.5	10.0	13.7	23.6
	Center trunnion style	(T)	1.9	2.9	3.4	6.2	9.8	12.9	22.7
Additional weight per 10 mm stroke			0.09	0.08	0.10	0.19	0.24	0.31	0.47

Construction



Parts List

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	70% flat black
2	**Head cover**	Aluminum alloy	70% flat black
3	**Cylinder tube**	Aluminum alloy	Hard anodized
		Carbon steel	
4	**Piston rod**	Carbon steel	Hard chromium electroplated
5	**Piston**	Aluminum alloy	
6	**Cushion ring**	Rolled steel	
7	**Needle valve**	Rolled steel	
8	**Bushing**	Lead bronze	
9	**Tie-rod**	Carbon steel	
10	**Tie-rod washer**	Steel wire	
11	**Piston nut**	Rolled steel	
12	**Needle valve nut**	Carbon steel	
13	**Tie-rod nut**	Carbon steel	
14	**Air release valve**	Alloy steel	
15	**Check ball**	Bearing steel	
16	**Wear ring**	Resin	
17	**Cushion seal**	—	
18	**Wiper ring**	NBR	
19	**Rod seal**	NBR	
20	**Piston seal**	NBR	
21	**Needle valve seal**	NBR	
22	**Cylinder tube gasket**	NBR	
23	**Piston gasket**	NBR	

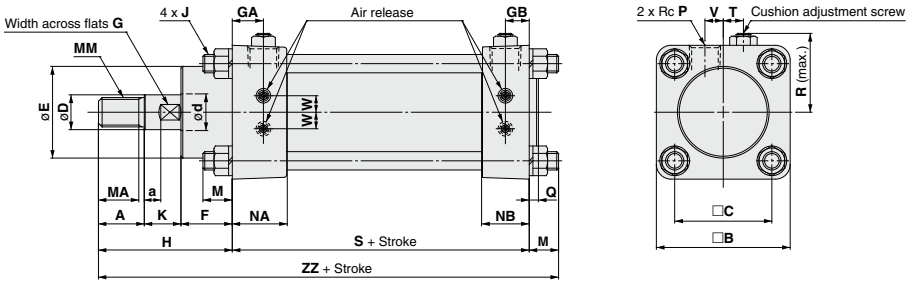
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.	Content
40	CHA40-PS	Nos. ⑰ to ㉒ from the chart at left
50	CHA50-PS	
63	CHA63-PS	
80	CHA80-PS	
100	CHA100-PS	
125	CHA125-PS	
160	CHA160-PS	

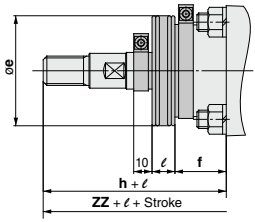
∗ Seal kit consists of items ⑰ through ㉒ and can be ordered using the seal kit number for each bore size.

Dimensions

Basic style: CHAB



With rod boot



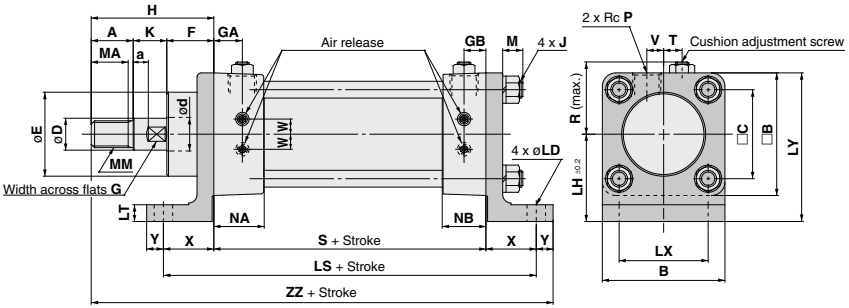
(mm)

Bore size (mm)	A	a	□B	□C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	Q	R	S	T	V	W
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	9.5	M8 x 1.25	18	13	20	M14 x 1.5	30	22	1/4	5	37	106	11	7.5	8
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	13	M10 x 1.5	20	16	22	M16 x 1.5	30	26	3/8	5	43	112	11	10	9
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	13	M10 x 1.5	22	16	25	M18 x 1.5	30	26	3/8	5	47	116	11	12	10
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	15	M12 x 1.75	26	19	29	M22 x 1.5	35	30	1/2	5	57	127	11	16	13
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M12 x 1.75	27	21	34	M27 x 2	35	32	1/2	8	66	137	12	20	16
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M14 x 2	27	24	34	M27 x 2	35	32	1/2	8	77	137	12	20	16
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	18	M16 x 2	28	27	38	M33 x 2	40	36	3/4	8	94	155	12	24	20

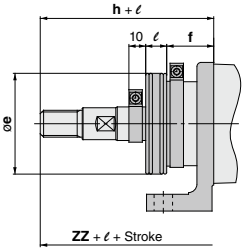
(mm)

Bore size (mm)	Without rod boot		With rod boot				
	H	**ZZ**	**e**	**f**	**h**	**ℓ**	**ZZ**
40	66	185	55	25	92	1/4 stroke	211
50	73	201	60	28	99		227
63	80	212	65	30	106		238
80	90	236	80	32	116		262
100	100	258	100	35	123	1/5 stroke	281
125	100	261	100	35	123		284
160	108	290	120	38	131		313

Foot style: CHAL



With rod boot



(mm)

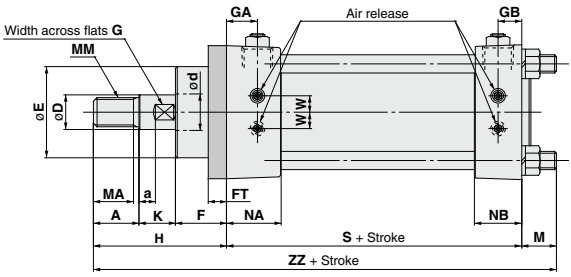
Bore size (mm)	A	a	B	□B	□C	D	d	E	F	G	GA	GB	J	K	LD	LH	LS	LT	LX	LY	M	MA	MM	NA	NB
40	23	10	60	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	9.5	M8 x 1.25	18	9	47	160	8	44	77	10	20	M14 x 1.5	30	22
50	25	9	73	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	13	M10 x 1.5	20	11	52	172	10	53	88.5	12	22	M16 x 1.5	30	26
63	28	8	80	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	13	M10 x 1.5	22	11	55	190	10	60	95	12	25	M18 x 1.5	30	26
80	32	8	100	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	15	M12 x 1.75	26	13	65	207	12	75	115	14	29	M22 x 1.5	35	30
100	38	6.5	118	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M12 x 1.75	27	13	80	231	14	90	139	14	34	M27 x 2	35	32
125	38	6.5	140	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M14 x 2	27	15	100	247	16	112	170	16	34	M27 x 2	35	32
160	42	9	174	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	18	M16 x 2	28	17	110	275	18	140	197	18	38	M33 x 2	40	36

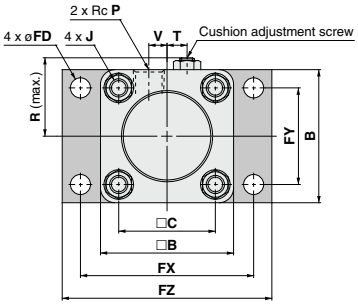
(mm)

Bore size (mm)	P	R	S	T	V	W	X	Y	Without rod boot		With rod boot				
									H	ZZ	e	f	h	ℓ	ZZ
40	1/4	37	106	11	7.5	8	27	8	66	207	55	25	92		233
50	3/8	43	112	11	10	9	30	10	73	225	60	28	99	1/4 stroke	251
63	3/8	47	116	11	12	10	37	10	80	243	65	30	106		269
80	1/2	57	127	11	16	13	40	13	90	270	80	32	116		296
100	1/2	66	137	12	20	16	47	13	100	297	100	35	123		322
125	1/2	77	137	12	20	16	55	15	100	307	100	35	123	1/5 stroke	328
160	3/4	94	155	12	24	20	60	20	108	343	120	38	131		366

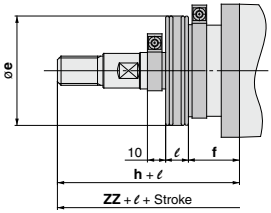
Dimensions

Rod flange style: CHAF





With rod boot



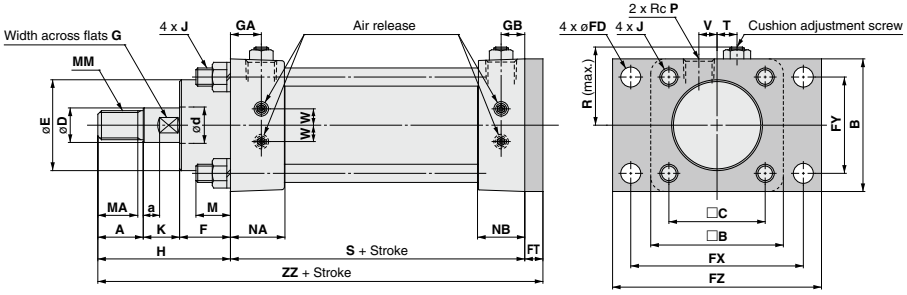
(mm)

Bore size (mm)	A	a	B	□B	□C	D	d	E	F	FD	FT	FX	FY	FZ	G	GA	GB	J	K	M	MA	MM	NA	NB	P
40	23	10	60	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	9	10	77	44	95	14	17.5	9.5	M8 x 1.25	18	16	20	M14 x 1.5	30	22	1/4
50	25	9	73	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	11	10	95	53	115	17	17	13	M10 x 1.5	20	22	22	M16 x 1.5	30	26	3/8
63	28	8	80	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	11	12	102	60	122	17	17	13	M10 x 1.5	22	20	25	M18 x 1.5	30	26	3/8
80	32	8	100	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	13	12	130	75	155	22	20	15	M12 x 1.75	26	26	29	M22 x 1.5	35	30	1/2
100	38	6.5	118	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	13	16	145	90	172	27	19	16	M12 x 1.75	27	26	34	M27 x 2	35	32	1/2
125	38	6.5	140	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	15	18	170	112	200	27	19	16	M14 x 2	27	30	34	M27 x 2	35	32	1/2
160	42	9	174	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	17	20	205	140	240	36	22	18	M16 x 2	28	34	38	M33 x 2	40	36	3/4

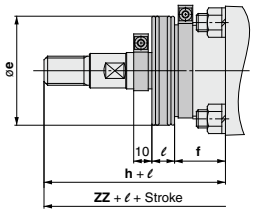
(mm)

Bore size (mm)	R	S	T	V	W	Without rod boot		With rod boot				
						H	ZZ	e	f	h	ℓ	ZZ
40	37	106	11	7.5	8	66	188	55	25	92	1/4 stroke	214
50	43	112	11	10	9	73	207	60	28	99		233
63	47	116	11	12	10	80	216	65	30	106		242
80	57	127	11	16	13	90	243	80	32	116		269
100	66	137	12	20	16	100	263	100	35	123	1/5 stroke	286
125	77	137	12	20	16	100	267	100	35	123		290
160	94	155	12	24	20	108	297	120	38	131		320

Head flange style: CHAG



With rod boot



(mm)

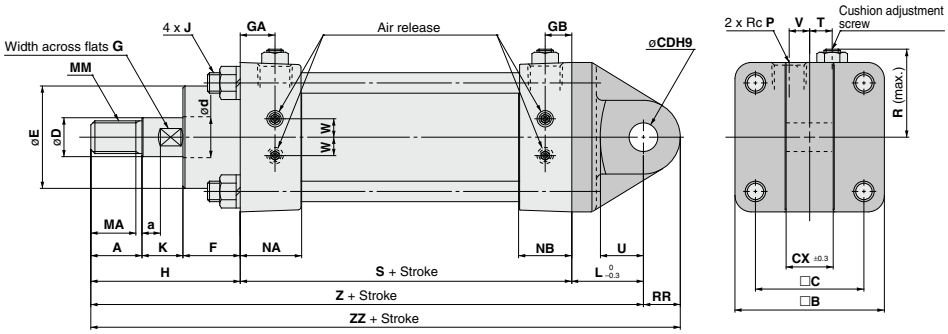
Bore size (mm)	A	a	□B	□C	D	d	E	F	FD	FT	FX	FY	FZ	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	9	10	77	44	95	14	17.5	9.5	M8 x 1.25	18	16	20	M14 x 1.5	30	22	1/4	37
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	11	10	95	53	115	17	17	13	M10 x 1.5	20	22	22	M16 x 1.5	30	26	3/8	43
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	11	12	102	60	122	17	17	13	M10 x 1.5	22	20	25	M18 x 1.5	30	26	3/8	47
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	13	12	130	75	155	22	20	15	M12 x 1.75	26	26	29	M22 x 1.5	35	30	1/2	57
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	13	16	145	90	172	27	19	16	M12 x 1.75	27	26	34	M27 x 2	35	32	1/2	66
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	15	18	170	112	200	27	19	16	M14 x 2	27	30	34	M27 x 2	35	32	1/2	77
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	17	20	205	140	240	36	22	18	M16 x 2	28	34	38	M33 x 2	40	36	3/4	94

(mm)

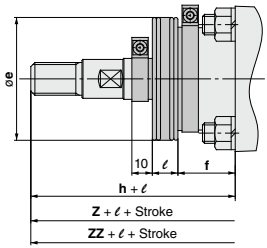
Bore size (mm)	S	T	V	W	Without rod boot		With rod boot				
					H	ZZ	e	f	h	ℓ	ZZ
40	106	11	7.5	8	66	182	55	25	92	1/4 stroke	208
50	112	11	10	9	73	195	60	28	99		221
63	116	11	12	10	80	208	65	30	106		234
80	127	11	16	13	90	229	80	32	116		255
100	137	12	20	16	100	253	100	35	123	1/5 stroke	276
125	137	12	20	16	100	255	100	35	123		278
160	155	12	24	20	108	283	120	38	131		306

Dimensions

Single clevis style: CHAC



With rod boot



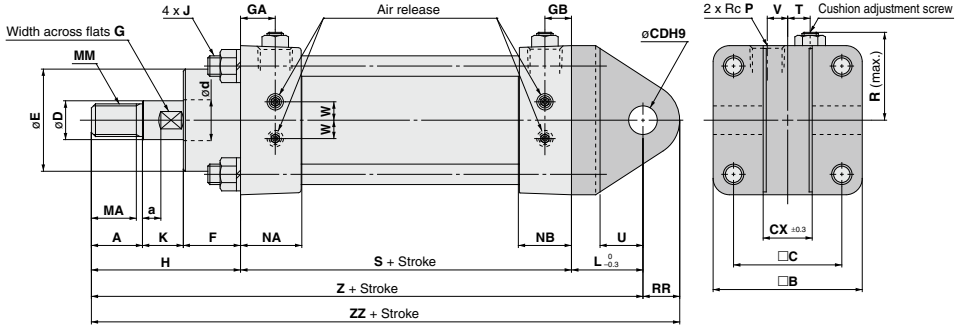
(mm)

Bore size (mm)	A	a	□B	□C	CDH9	CX	D	d	E	F	G	GA	GB	J	K	L	MA	MM	NA	NB	P	R	RR	S
40	23	10	60	44	$12^{+0.043}_{0}$	21	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	9.5	M8 x 1.25	18	32	20	M14 x 1.5	30	22	1/4	37	15	106
50	25	9	73	53	$14^{+0.043}_{0}$	23	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	13	M10 x 1.5	20	35	22	M16 x 1.5	30	26	3/8	43	18	112
63	28	8	80	60	$16^{+0.043}_{0}$	27	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	13	M10 x 1.5	22	40	25	M18 x 1.5	30	26	3/8	47	20	116
80	32	8	100	75	$18^{+0.043}_{0}$	31	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	15	M12 x 1.75	26	45	29	M22 x 1.5	35	30	1/2	57	22	127
100	38	6.5	118	90	$20^{+0.052}_{0}$	35	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M12 x 1.75	27	50	34	M27 x 2	35	32	1/2	66	24	137
125	38	6.5	140	112	$22^{+0.052}_{0}$	41	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M14 x 2	27	55	34	M27 x 2	35	32	1/2	77	26	137
160	42	9	174	140	$25^{+0.052}_{0}$	54	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	18	M16 x 2	28	65	38	M33 x 2	40	36	3/4	94	30	155

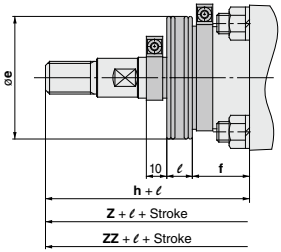
(mm)

Bore size (mm)	T	U	V	W	Without rod boot			With rod boot					
					H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	11	18	7.5	8	66	204	219	55	25	92	1/4 stroke	230	245
50	11	21	10	9	73	220	238	60	28	99		246	264
63	11	23	12	10	80	236	258	65	30	106		262	284
80	11	26	16	13	90	262	284	80	32	116		288	310
100	12	30	20	16	100	287	311	100	35	123	1/5 stroke	310	334
125	12	30	20	16	100	292	318	100	35	123		315	341
160	12	40	24	20	108	328	358	120	38	131		351	381

Double clevis style: CHAD



With rod boot



(mm)

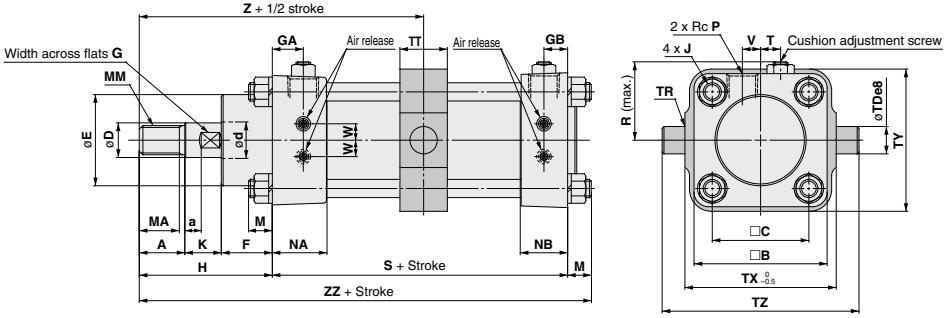
Bore size (mm)	A	a	□B	□C	CDH9	CX	D	d	E	F	G	GA	GB	J	K	L	MA	MM	NA	NB	P	R	RR	S
40	23	10	60	44	ø12H9 $^{+0.043}_{0}$	22	17 $^{0}_{-0.018}$	18	45 $^{0}_{-0.062}$	25	14	17.5	9.5	M8 x 1.25	18	32	20	M14 x 1.5	30	22	1/4	37	15	106
50	25	9	73	53	ø14H9 $^{+0.043}_{0}$	24	19 $^{0}_{-0.021}$	20	50 $^{0}_{-0.062}$	28	17	17	13	M10 x 1.5	20	35	22	M16 x 1.5	30	26	3/8	43	18	112
63	28	8	80	60	ø16H9 $^{+0.043}_{0}$	28	21 $^{0}_{-0.021}$	22.4	55 $^{0}_{-0.074}$	30	17	17	13	M10 x 1.5	22	40	25	M18 x 1.5	30	26	3/8	47	20	116
80	32	8	100	75	ø18H9 $^{+0.043}_{0}$	32	26 $^{0}_{-0.021}$	28	65 $^{0}_{-0.074}$	32	22	20	15	M12 x 1.75	26	45	29	M22 x 1.5	35	30	1/2	57	22	127
100	38	6.5	118	90	ø20H9 $^{+0.052}_{0}$	36	34 $^{0}_{-0.025}$	35.5	80 $^{0}_{-0.074}$	35	27	19	16	M12 x 1.75	27	50	34	M27 x 2	35	32	1/2	66	24	137
125	38	6.5	140	112	ø22H9 $^{+0.052}_{0}$	42	34 $^{0}_{-0.025}$	35.5	80 $^{0}_{-0.074}$	35	27	19	16	M14 x 2	27	55	34	M27 x 2	35	32	1/2	77	26	137
160	42	9	174	140	ø25H9 $^{+0.052}_{0}$	55	43 $^{0}_{-0.025}$	45	100 $^{0}_{-0.087}$	38	36	22	18	M16 x 2	28	65	38	M33 x 2	40	36	3/4	94	30	155

(mm)

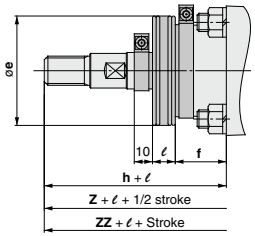
Bore size (mm)	T	U	V	W	Without rod boot			With rod boot					
					H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	11	18	7.5	8	66	204	219	55	25	92	1/4 stroke	230	245
50	11	21	10	9	73	220	238	60	28	99		246	264
63	11	23	12	10	80	236	258	65	30	106		262	284
80	11	26	16	13	90	262	284	80	32	116		288	310
100	12	30	20	16	100	287	311	100	35	123	1/5 stroke	310	334
125	12	30	20	16	100	292	318	100	35	123		315	341
160	12	40	24	20	108	328	358	120	38	131		351	381

Dimensions

Center trunnion style: CHAT



With rod boot



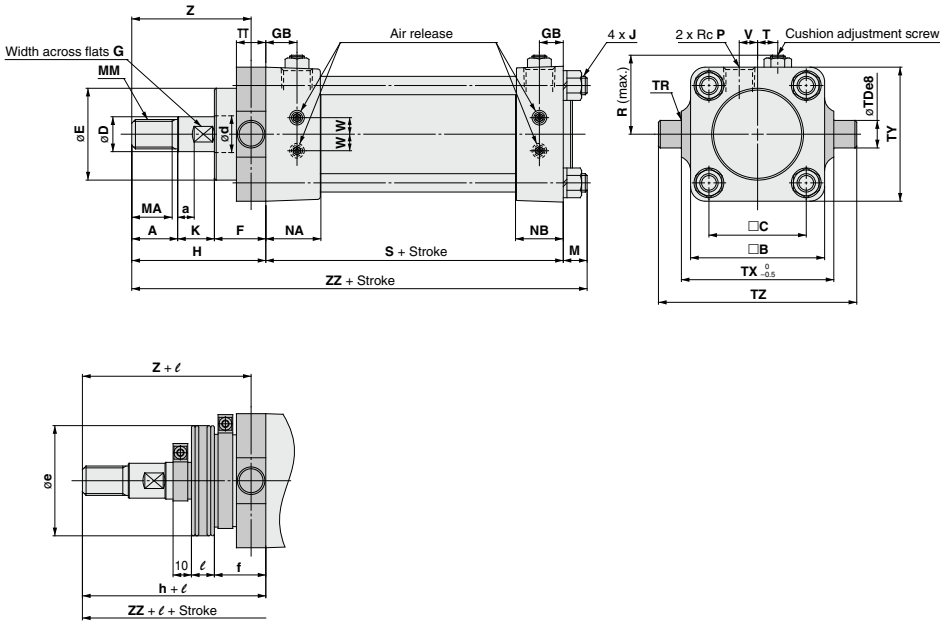
(mm)

Bore size (mm)	A	a	□B	□C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R	S	T	Tde8
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	9.5	M8 x 1.25	18	10	20	M14 x 1.5	30	22	1/4	37	106	11	$15^{-0.032}_{-0.059}$
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	13	M10 x 1.5	20	10	22	M16 x 1.5	30	26	3/8	43	112	11	$15^{-0.032}_{-0.059}$
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	13	M10 x 1.5	22	10	25	M18 x 1.5	30	26	3/8	47	116	11	$15^{-0.032}_{-0.059}$
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	15	M12 x 1.75	26	13	29	M22 x 1.5	35	30	1/2	57	127	11	$25^{-0.040}_{-0.073}$
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M12 x 1.75	27	13	34	M27 x 2	35	32	1/2	66	137	12	$32^{-0.050}_{-0.089}$
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M14 x 2	27	15	34	M27 x 2	35	32	1/2	77	137	12	$32^{-0.050}_{-0.089}$
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	18	M16 x 2	28	17	38	M33 x 2	40	36	3/4	94	155	12	$36^{-0.050}_{-0.089}$

(mm)

Bore size (mm)	TR	TT	TX	TY	TZ	V	W	Without rod boot			With rod boot					
								H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	R0.5	24	70	65	95	7.5	8	66	123	182	55	25	92	1/4 stroke	149	208
50	R0.5	26	83	78	108	10	9	73	131	195	60	28	99		157	221
63	R0.5	26	90	86	115	12	10	80	140	206	65	30	106		166	232
80	R2.5	36	112	106	162	16	13	90	156	230	80	32	116		182	256
100	R2.5	42	140	130	204	20	16	100	170	250	100	35	123	1/5 stroke	193	273
125	R2.5	42	170	162	234	20	16	100	170	252	100	35	123		193	275
160	R2.5	52	212	200	284	24	20	108	187.5	280	120	38	131		210.5	303

Rod trunnion style: CHAU



(mm)

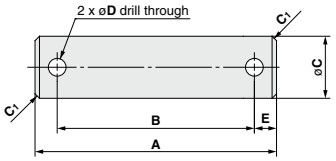
Bore size (mm)	A	a	□B	□C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R	S	T	Tde8
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	9.5	M8 x 1.25	18	10	20	M14 x 1.5	30	22	1/4	37	106	11	$15^{-0.032}_{-0.059}$
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	13	M10 x 1.5	20	16	22	M16 x 1.5	30	26	3/8	43	112	11	$15^{-0.032}_{-0.059}$
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	13	M10 x 1.5	22	16	25	M18 x 1.5	30	26	3/8	47	116	11	$15^{-0.032}_{-0.059}$
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	15	M12 x 1.75	26	13	29	M22 x 1.5	35	30	1/2	57	127	11	$25^{-0.040}_{-0.073}$
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M12 x 1.75	27	13	34	M27 x 2	35	32	1/2	66	137	12	$32^{-0.050}_{-0.089}$
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	16	M14 x 2	27	15	34	M27 x 2	35	32	1/2	77	137	12	$32^{-0.050}_{-0.089}$
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	18	M16 x 2	28	17	38	M33 x 2	40	36	3/4	94	155	12	$36^{-0.050}_{-0.089}$

(mm)

Bore size (mm)	TR	TT	TX	TY	TZ	V	W	Without rod boot			With rod boot					
								H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	R0.5	16	70	60	95	7.5	8	66	58	182	55	25	92	1/4 stroke	84	208
50	R0.5	16	83	73	108	10	9	73	65	201	60	28	99		91	227
63	R0.5	16	90	80	115	12	10	80	72	212	65	30	106		98	238
80	R2.5	30	112	100	162	16	13	90	75	230	80	32	116		101	256
100	R2.5	34	140	118	204	20	16	100	83	250	100	35	123	1/5 stroke	106	273
125	R2.5	34	170	140	234	20	16	100	83	252	100	35	123		106	275
160	R2.5	38	212	174	284	24	20	108	89	280	120	38	131		112	303

Accessories (Options)

Bracket pin

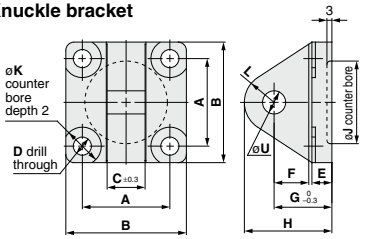


Material: Carbon steel

Bore size (mm)	A	B	C (f8) Size	C (f8) Tolerance	D	E	Flat washer	Cotter pin	Applicable cylinder type	Order no.
40	80	70	12	−0.016 −0.043	3	5	Polished round 12SPCC	ø3 x 18ℓ SWRM	ø40 clevis type	AC-C1- bore size
50	94	84	14	−0.016 −0.043	4	5	Polished round 14SPCC	ø4 x 22ℓ SWRM	ø50 clevis type	
63	102	92	16	−0.016 −0.043	4	5	Polished round 16SPCC	ø4 x 22ℓ SWRM	ø63 clevis type	
80	123	113	18	−0.016 −0.043	5	5	Polished round 18SPCC	ø5 x 28ℓ SWRM	ø80 clevis type	
100	147	132	20	−0.020 −0.053	5	7.5	Polished round 20SPCC	ø5 x 30ℓ SWRM	ø100 clevis type	
125	169	154	22	−0.020 −0.053	5	7.5	Polished round 22SPCC	ø5 x 35ℓ SWRM	ø125 clevis type	
160	205	190	25	−0.020 −0.053	5	7.5	Polished round 24SPCC	ø5 x 35ℓ SWRM	ø160 clevis type	

Note) Does not come with other accessories.

Knuckle bracket

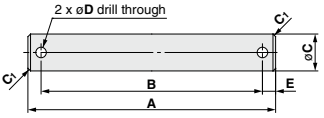


Material: Cast iron

Bore size (mm)	A	B	C	D	E	F	G	H	J	K	L	U(H8) Size	U(H8) Tolerance	Hexagon mounting bolt	Applicable cylinder type	Order no.
40	44	60	21	9	12	18	32	47	45	19	R15	12	+0.027 0	M8 x 20	ø40 double clevis type	AC-A1- bore size
50	53	73	23	11	12	21	35	53	50	23	R18	14	+0.027 0	M10 x 22	ø50 double clevis type	
63	60	80	27	11	15	23	40	60	55	23	R20	16	+0.027 0	M10 x 25	ø63 double clevis type	
80	75	100	31	13	16	26	45	67	65	28	R22	18	+0.027 0	M12 x 28	ø80 double clevis type	
100	90	118	35	13	17	30	50	74	80	28	R24	20	+0.033 0	M12 x 32	ø100 double clevis type	
125	112	140	41	15	20	30	55	81	90	31	R26	22	+0.033 0	M14 x 36	ø125 double clevis type	
160	140	174	54	17	22	40	65	95	100	34	R30	25	+0.033 0	M16 x 40	ø160 double clevis type	

Note) Does not come with other accessories.

Knuckle pin

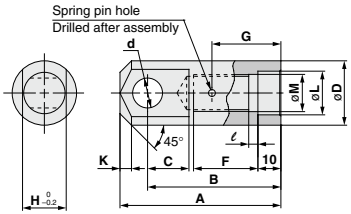


Material: Carbon steel

Bore size (mm)	A	B	C (f8) Size	C (f8) Tolerance	D	E	Flat washer	Cotter pin	Applicable cylinder type	Order no.
40	51.5	41.5	13	−0.016 −0.043	3	5	Polished round 12SPCC	ø3 x 18ℓ SWRM	ø40 all types	AC-D1- bore size
50	54.5	44.5	13	−0.016 −0.043	3	5	Polished round 14SPCC	ø3 x 18ℓ SWRM	ø50 all types	
63	64.5	54.5	16	−0.016 −0.043	4	5	Polished round 16SPCC	ø4 x 22ℓ SWRM	ø63 all types	
80	71.5	61.5	16	−0.016 −0.043	4	5	Polished round 18SPCC	ø4 x 22ℓ SWRM	ø80 all types	
100	82	72	20	−0.020 −0.053	5	5	Polished round 20SPCC	ø5 x 30ℓ SWRM	ø100, ø125 all types	
160	94	79	20	−0.020 −0.053	5	7.5	Polished round 22SPCC	ø5 x 30ℓ SWRM	ø160 all types	

Note) Does not come with other accessories.

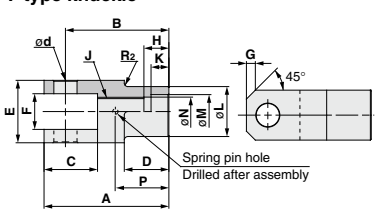
Knuckle



Material: Carbon steel

Bore size (mm)	A	B	C	D	d (H8) Size	d (H8) Tolerance	E	F	Reference G	H	K	L(F8) Size	L(F8) Tolerance	M	ℓ	Spring pin	Applicable cylinder type	Order no.
40	67	55	15	25	13	+0.027 0	M14 x 1.5	26	28	17	4	17	+0.043 +0.016	14.2	4	3 x 25AW	ø40 all types	AC-B1- bore size
50	70	58	18	28	13	+0.027 0	M16 x 1.5	28	30	19	5	19	+0.053 +0.020	16.2	4	3 x 28AW	ø50 all types	
63	80	65	20	30	16	+0.027 0	M18 x 1.5	32	32	22	6	21	+0.053 +0.020	18.3	4	4 x 28AW	ø63 all types	
80	95	78	22	35	16	+0.027 0	M22 x 1.5	40	36	27	7	26	+0.053 +0.020	22.3	4	4 x 36AW	ø80 all types	
100	110	90	26	42	20	+0.033 0	M27 x 2	45	40	32	8	34	+0.064 +0.025	27.5	5	5 x 40AW	ø100, ø125 all types	
160	120	100	30	50	22	+0.033 0	M33 x 2	50	44	36	10	43	+0.064 +0.025	34	5	5 x 50AW	ø160 all types	

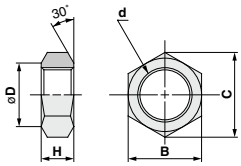
Y-type knuckle



Material: Carbon steel

Bore size (mm)	A	B	C	D	d (H8) Size	d (H8) Tolerance	E	F Size	F Tolerance	G	H	J	K	L	M Size	M Tolerance	N	P	Spring pin	Applicable cylinder type	Order no.
40	67	55	27	29	13	+0.027 0	32	18	+0.2 0	4	14	M14 x 1.5	10	25	17	+0.043 +0.016	14.2	28	3 x 25 AW	ø40 all types	AC-3Y- bore size
50	70	58	30	25	13	+0.027 0	35	20	+0.2 0	5	14	M16 x 1.5	10	28	19	+0.053 +0.020	16.2	30	3 x 28 AW	ø50 all types	
63	80	65	35	30	16	+0.027 0	43	23	+0.2 0	6	14	M18 x 1.5	10	30	21	+0.053 +0.020	18.3	32	4 x 28 AW	ø63 all types	
80	95	78	39	35	16	+0.027 0	50	28	+0.2 0	7	14	M22 x 1.5	10	35	26	+0.053 +0.020	22.3	36	4 x 36 AW	ø80 all types	
100	110	90	46	43	20	+0.033 0	59	33	+0.2 0	8	15	M27 x 2	10	42	34	+0.064 +0.025	27.5	40	5 x 40 AW	ø100, ø125 all types	
160	120	100	50	45	22	+0.033 0	66	37	+0.2 0	10	15	M33 x 2	10	50	43	+0.064 +0.025	34	44	5 x 50 AW	ø160 all types	

Rod end nut



(mm)

Bore size (mm)	B	C	D	d	H	Applicable cylinder type	Order no.
40	22	25.4	21	M14×1.5	8	ø40all types	AC-N1- bore size
50	24	27.7	23	M16×1.5	10	ø50all types	
63	27	31.2	26	M18×1.5	11	ø63all types	
80	32	37	31	M22×1.5	13	ø80all types	
100	41	47.3	39	M27×2	16	ø100, ø125all types	
160	50	57.7	48	M33×2	20	ø160all types	

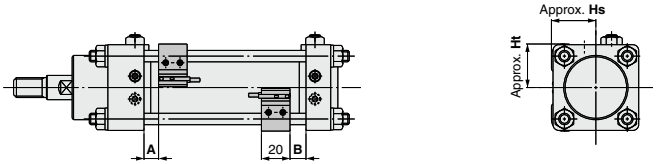
Auto Switch Mounting

Refer to pages 1451 to 1510 for detailed specifications.

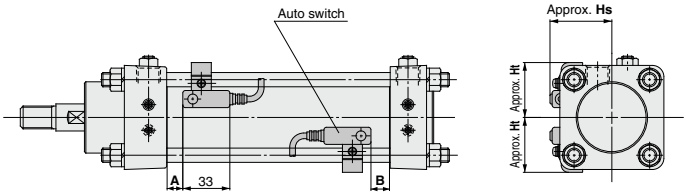
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

<Tie-rod mount type>

D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-A9□/A9□V

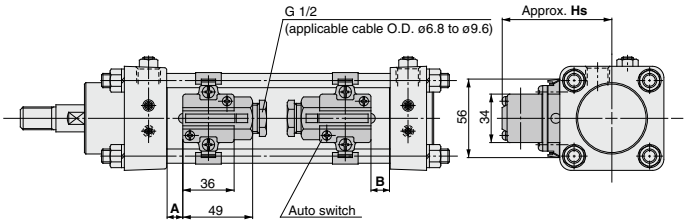


D-F5□/J59
D-F5NT
D-F5□W/J59W
D-F5BA/F59F
D-A5□/A6□
D-A59W

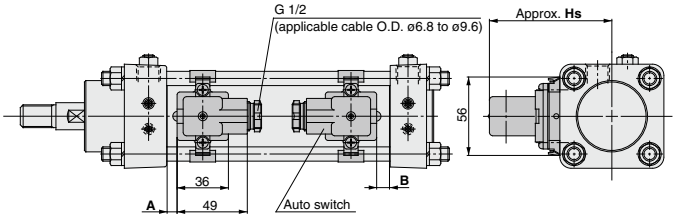


<Band mount type>

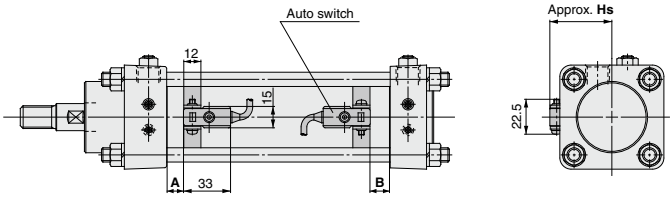
D-G39/K39
D-A3□



D-A44



D-B5□/B6□



Auto Switch Proper Mounting Positions

(mm)

Bore size (mm)	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-F5□/J59 D-F5□W/J59W D-F59F/F5BA		D-F5NT		D-G5□/K59 D-G5□W/K59W D-G59F/G5BA D-G5NT		D-G39□/K39□		D-A9□/A9□V		D-A5□/A6□		D-A59W		D-B5□/B64		D-B59W		D-A3□/A44	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
40	20.5	21.5	17	18	22	23	12.5	13.5	10.5	11.5	16.5	17.5	10.5	11.5	14.5	15.5	11	12	13.5	15	10.5	11.5
50	21	23	17.5	19.5	22.5	24.5	13	15	11	13	17	19	11	13	15	17	11.5	13.5	14	16.5	11	13
63	23.5	24.5	20	21	25	26	—	—	13.5	14.5	19.5	20.5	13.5	14.5	17.5	18.5	—	—	—	—	13.5	14.5
80	23.5	26.5	20	23	25	28	15.5	18.5	13.5	16.5	19.5	22.5	13.5	16.5	17.5	20.5	14	17	16.5	20	13.5	16.5
100	27	31	23.5	27.5	28.5	32.5	19	23	17	21	23	27	17	21	21	25	17.5	21.5	20	24.5	17	21

Note 1) The auto switches listed below cannot be mounted on ø63.
D-G5□, K59, G5□W, K59W, G5BA, G59F, G5NT, B5□, B64, and B59W
Note 2) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Heights

(mm)

Bore size (mm)	D-M9□/M9□W D-A9□A D-A9□		D-M9□V/M9□WV D-M9□AV D-A9□V		D-F5□/J59 D-F5□W/J59W D-F59F/F5BA D-F5NT		D-A5□/A6□ D-A59W		D-G5□/K59 D-G5□W/K59W D-G59F/G5BA D-G5NT D-B5□/B64 D-B59W	D-G39□/K39□ D-A3□	D-A44
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Hs	Hs
40	31	31	36	31	38	33.5	39.5	33.5	38	72.5	82.5
50	36.5	36.5	40	36.5	43	39	44	39	43.5	78	88
63	40	40	45	40	48.5	43	50	43	—	85	95
80	50	50	55.5	50	56	51	57	51	59	93.5	104
100	59	59	63	59	63.5	58.5	65	58.5	70	104	114

∗ The auto switches listed below cannot be mounted on ø63.
D-G5□, K59, G5□W, K59W, G5BA, G59F, G5NT, B5□, B64, and B59W

Operating Range

(mm)

Auto switch model	Bore size				
	40	**50**	**63**	**80**	**100**
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	3.5	3.5	5	4.5	5.5
D-F5□/J59/F59F D-F5□W/J59W D-F5BA/F5NT	4.5	4	4.5	4.5	4.5
D-G5□/K59/G59F D-G5□W/K59W D-G5BA/G5NT	5	5	—	6.5	6.5
D-G39/K39	9.5	9.5	10	10	10
D-A9□/A9□V	7.5	8	8.5	9	9
D-A5□/A6□	9	9	9.5	9.5	9.5
D-A59W	13.5	13.5	14	14	14
D-B5□/B64	11.5	12	—	13.5	14.5
D-B59W	12	12.5	—	14.5	15
D-A3□/A44	10	10	11.5	11.5	12

∗ The auto switches listed below cannot be mounted on ø63.
D-G5□, K59, G5□W, K59W, G5BA, G59F, G5NT, B5□, B64, and B59W
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

Minimum Strokes for Auto Switch Mounting

n: Number of auto switches

Auto switch types	Number of auto switches		Mounting brackets other than center trunnion	Center trunnion type				
				ø40	ø50	ø63	ø80	ø100
D-M9□/M9□W	1 or 2 pcs. (different surfaces/same surface)		15	80	80	85	90	95
	"n" pcs. (same surface)		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-M9□V/M9□WV	1 or 2 pcs. (different surfaces/same surface)		10	55	55	60	65	70
	"n" pcs. (same surface)		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$70 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-M9□A	1 or 2 pcs. (different surfaces/same surface)		15	85	85	90	95	100
	"n" pcs. (same surface)		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-M9□AV	1 or 2 pcs. (different surfaces/same surface)		15	60	65	65	75	75
	"n" pcs. (same surface)		$15 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-A9□	1 or 2 pcs. (different surfaces/same surface)		15	75	75	80	85	90
	"n" pcs. (same surface)		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-A9□V	1 or 2 pcs. (different surfaces/same surface)		10	50	50	55	60	65
	"n" pcs. (same surface)		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$50 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$50 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-A5□, A6□ D-F5□, J59	1 or 2 pcs. (different surfaces/same surface)		10	100		100	110	120
	"n" pcs. (same surface)		$10 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)		$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-A59W	2 pcs. (different surfaces/same surface)		20	100		100	110	120
	"n" pcs. (same surface)		$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)		$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
	1 pc.		15	100		100	110	120
D-F5□W, J59W D-F5BA D-F59F D-F5NT	1 or 2 pcs. (different surfaces/same surface)		15	120		120	130	140
	"n" pcs. (same surface)		$15 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)		$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	$140 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)
D-B5□, B64	2 pcs.	Different surfaces	15	90		—	120	
		Same surface	75	90		—	120	
	"n" pcs.	Different surfaces	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)		—	$120 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	
		Same surface	75 + 50 (n − 2) (n = 2, 3, 4 ···)	90 + 50 (n − 2) (n = 2, 4, 6, 8 ···)Note 1)		—	120 + 50 (n − 2) (n = 2, 4, 6, 8 ···)Note 1)	
	1 pc.		10	90		—	120	
D-B59W	2 pcs.	Different surfaces	20	90		—	120	
		Same surface	75	90		—	120	
	"n" pcs.	Different surfaces	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8 ···)Note 1)	$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)		—	$120 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16 ···)Note 2)	
		Same surface	75 + 50 (n − 2) (n = 2, 3, 4 ···)	90 + 50 (n − 2) (n = 2, 4, 6 ···)Note 1)		—	120 + 50 (n − 2) (n = 2, 4, 6, 8 ···)Note 1)	
	1 pc.		15	90		—	120	
D-A3□ D-G39 D-K39	2 pcs.	Different surfaces	35	75		80	90	
		Same surface	100					
	"n" pcs.	Different surfaces	35 + 30 (n − 2) (n = 2, 3, 4 ···)	75 + 30 (n − 2) (n = 2, 4, 6, 8 ···)		80 + 30 (n − 2) (n = 2, 4, 6, 8 ···)	90 + 30 (n − 2) (n = 2, 4, 6, 8 ···)	
		Same surface	100 + 100 (n − 2) (n = 2, 3, 4 ···)			100 + 100 (n − 2) (n = 2, 4, 6, 8 ···)		
	1 pc.		10	75		80	90	
D-A44	2 pcs.	Different surfaces	35	75		80	90	
		Same surface	55	75		80	90	
	"n" pcs.	Different surfaces	35 + 30 (n − 2) (n = 2, 3, 4 ···)	75 + 30 (n − 2) (n = 2, 4, 6, 8 ···)		80 + 30 (n − 2) (n = 2, 4, 6, 8 ···)	90 + 30 (n − 2) (n = 2, 4, 6, 8 ···)	
		Same surface	55 + 50 (n − 2) (n = 2, 3, 4 ···)	75 + 50 (n − 2) (n = 2, 4, 6, 8 ···)		80 + 50 (n − 2) (n = 2, 6, 8 ···)	90 + 50 (n − 2) (n = 2, 4, 6, 8 ···)	
	1 pc.		10	75		80	90	

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.

Auto Switch Mounting Brackets: Part Nos.

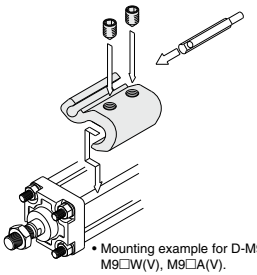
<Tie-rod mounting>

Auto switch models	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-M9□/M9□V/M9□W/M9□WV D-M9□A/M9□AV/A9□/A9□V	BA7-040	BA7-063	BA7-063	BA7-080	BA7-080
D-F5□/J59/F5□W/J59W D-F5BA/F59F/F5NT D-A5□/A6□/A59W	BT-04	BT-06	BT-06	BT-08	BT-08

<Band mounting>

Auto switch models	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-G39/K39/A3□/A44	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M
D-G5□/K59 D-G5□W/K59W/G5BA/G59F D-G5NT/B5□/B64/B59W Note 1)	BA-04	BA-05	—	BA-08	BA-10

Note 1) The auto switches listed below cannot be mounted on ø63.
D-G5□, K59, G5□W, K59W, G5BA, G59F, G5NT, B5□, B64, and B59W



• Mounting example for D-M9□(V), M9□W(V), M9□A(V).

[Stainless steel mounting screw kits]

The following stainless steel mounting screw kits are available for use depending on the operating environment. (Switch mounting bands are not included and should be ordered separately.)

BBA1 : D-F5, J5, A5, A6
BBA3 : D-G5, K5, B5, B6

Note 2) Refer to the table below for details on BBA1, BBA3.

Stainless mounting screw kit details

Part no.	Contents				Applicable auto switch mounting bracket part nos.	Applicable auto switches
	No.	Description	Size	Pcs.		
BBA1	1	Auto switch mounting screws	M4 x 0.7 x 8L	1	BT-□□	D-A5, A6 D-F5, J5
	2	Set screw	M4 x 0.7 x 6L	2	BT-03, BT-04, BT-05 BT-06, BT-08, BT-12	
					BA4-040, BA4-063, BA4-080 BMB4-032, BMB4-050	D-Z7, Z8 D-Y5, Y6, Y7
					BMB5-032 BA7-040, BA7-063, BA7-080	D-A9 D-M9
	3	Set screw	M4 x 0.7 x 8L	2	BT-16, BT-18A, BT-20	D-A5, A6 D-F5, J5
					BS4-125, BS4-160 BS4-180, BS4-200	D-Z7, Z8 D-Y5, Y6, Y7
					BS5-125, BS5-160 BS5-180, BS5-200	D-A9 D-M9
BBA3	4	Auto switch mounting screws	M4 x 0.7 x 22L	1	BA-01, BA-02, BA-32, BA-04 BA-05, BA-06, BA-08, BA-10	D-B5, B6 D-G5, K5
					BA2-020, BA2-025 BA2-032, BA2-040	
					BA5-050, BHN2-025, BSG1-032	
					BH2-040, BH2-050 BH2-080, BH2-100	
					BAF-32, BAF-04, BAF-05 BAF-06, BAF-08, BAF-10	

When D-F5BA and G5BA auto switches are shipped mounted on a cylinder, the above stainless steel screws are used.
Also when switches are shipped separately, BBA1, BBA3 are included.

Note 3) When using D-M9□A(V), order stainless mounting screw kit BBA1 instead of the iron auto switch mounting brackets (BA7-□□□, BS5-□□□) in the table above, and use the M4 x 6L stainless set screws included.

Besides the models listed in "How to Order," the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

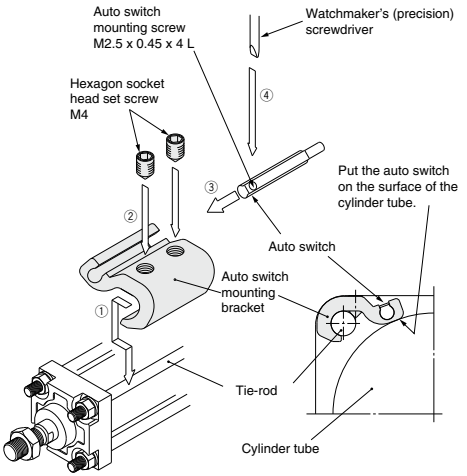
Auto switch type	Part no.	Electrical entry	Features
Solid state	D-M9NV, M9PV, M9BV	Grommet (perpendicular)	—
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color display)
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-color display)
	D-F59, F5P, J59	Grommet (in-line)	—
	D-F59W, F5PW, J59W		Diagnostic indication (2-color display)
	D-F5BA		Water resistant (2-color display)
	D-F5NT, G5NT		With timer
Reed	D-A93V, A96V	Grommet (perpendicular)	—
	D-A90V		Without indicator light
	D-A53, A56, B53	Grommet (in-line)	—
	D-A67		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Refer to pages 1494 and 1495 for details.
∗ Normally closed (N.C. = b contact), solid state auto switches (D-F9G, F9H) are also available. For details, refer to page 1463.

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ····· D-M9N(V), D-M9P(V), D-M9B(V)
D-M9NW(V), D-M9PW(V), D-M9BW(V)
D-M9NA(V), D-M9PA(V), D-M9BA(V)

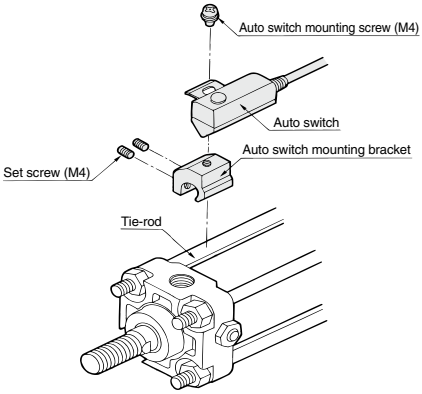


1. Fix it to the detecting position with a set screw by installing an auto switch mounting bracket in cylinder tie-rod and letting the bottom surface of an auto switch mounting bracket contact the cylinder tube firmly.
2. Fix it to the detecting position with a hexagon socket head set screw (M4).
   (Use a hexagon wrench.)
3. Fit an auto switch into the auto switch mounting groove to set it roughly to the mounting position for an auto switch.
4. After confirming the detecting position, tighten up the mounting screw (M2.5) attached to an auto switch, and secure the auto switch.
5. When changing the detecting position, carry out in the state of 3.

Note 1) To protect auto switches, ensure that main body of an auto switch should be embedded into auto switch mounting groove with a depth of 15 mm or more.
Note 2) Set the tightening torque of a hexagon socket head set screw (M4) to be 1 to 1.2 N·m.
Note 3) When tightening an auto switch mounting screw (M2.5), use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.
Also, set the tightening torque to be 0.05 to 0.15 N·m. As a guide, turn 90° from the position where it comes to feel tight.

<Applicable auto switch>

Solid state ····· D-F59, D-F5P
D-J59, D-F5BA
D-F59W, D-F5PW, D-J59W
D-F59F, D-F5NT
Reed ····· D-A53, D-A54, D-A56, D-A64, D-A67
D-A59W



1. Fix the auto switch on the auto switch mounting bracket with the auto switch mounting screw (M4) and install the set screw.
2. Fit the auto switch mounting bracket into the cylinder tie-rod and then fix the auto switch at the detecting position with the hexagonal wrench. (Be sure to put the auto switch on the surface of cylinder tube.)
3. When changing the detecting position, loosen the set screw to move the auto switch and then re-fix the auto switch on the cylinder tube. (Tightening torque of M4 screw should be 1 to 1.2 N·m.)

Made to Order specifications

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

Made to Order

Symbol

1 Fluororubber Seals -XC22

How to Order

Standard model no. -XC22

Fluororubber seals

Specifications

Seal material	Fluororubber
Ambient temperature range	Note 1) With auto switch :–10 to 60 Without auto switch :–10 to 80

Specifications other than above and external dimensions	Same as standard type for each series

Note 1) Please confirm with SMC, as the type of chemical and the operating temperature may not allow the use of this product.

Note 2) Cylinders with auto switches can also be produced; however, auto switch related parts (auto switch units, mounting brackets, built-in magnets) are the same as standard products. Before using these, please contact SMC regarding their suitability for the operating environment.

Tie-rod Type Hydraulic Cylinder
Double Acting/Double Rod
Series CHAW

3.5 MPa

ø40, ø50, ø63, ø80, ø100, ø125, ø160

How to Order

Without Auto Switch CHAW L □ 40 – 100 □

With Auto Switch CHDAW L 40 – 100 □ – M9BW □

Bore size

40	40 mm	Aluminum tube
50	50 mm	
63	63 mm	
80	80 mm	
100	100 mm	
125	125 mm	Steel tube
160	160 mm	

Tube material

Nil	Aluminum alloy
F	Steel tube

Auto switch type

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

Number of auto switches

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

Built-in magnet

Mounting style

B	Basic style
L	Axial foot style
F	Rod flange style
T	Center trunnion style
U	Rod trunnion style

Bore size

40	40 mm	Aluminum tube
50	50 mm	
63	63 mm	
80	80 mm	
100	100 mm	

Cylinder stroke (mm)
Refer to the standard stroke table on page 1437.

Cylinder option

Cushion	Nil	Both sides
	N	Without cushion
	R	With rod cushion
	H	With head cushion

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDAWB50-100□

Applicable Auto Switches/Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Tie-rod mount	Band mount	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	—	●	●	●	○	—	○	IC circuit	Relay PLC
				3-wire (PNP)			—	G59**	●	—	●	○	—	○		
				2-wire	12 V		M9P	—	●	●	●	○	—	○		
							—	G5P**	●	—	●	○	—	○		
							M9B	—	●	●	●	○	—	○	—	
							—	K59**	●	—	●	○	—	○		
		Terminal conduit		3-wire (NPN)	5 V, 12 V		—	G39	—	—	—	—	●	—	IC circuit	
				2-wire	12 V		—	K39	—	—	—	—	●	—	—	
	Diagnostic indication (2-color display)	Grommet		3-wire (NPN)	5 V, 12 V		M9NW	—	●	●	●	○	—	○	IC circuit	
							—	G59W**	●	—	●	○	—	○		
				3-wire (PNP)			M9PW	—	●	●	●	○	—	○		
							—	G5PW**	●	—	●	○	—	○		
				2-wire	12 V		M9BW	—	●	●	●	○	—	○	—	
							—	K59W**	●	—	●	○	—	○		
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		M9NA*1	—	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PA*1	—	○	○	●	○	—	○		
				2-wire	12 V		M9BA*1	—	○	○	●	○	—	○	—	
							—	G5BA**	—	—	●	○	—	○		
	Diagnostic output (2-color display)			4-wire (NPN)	5 V, 12 V		F59F	G59F**	●	—	●	○	—	○	IC circuit	
Reed auto switch	——	Grommet	Yes	3-wire (NPN equiv.)	5 V	—	A96	—	●	—	●	—	—	—	IC circuit	—
			No	2-wire	12 V	100 V	A93	—	●	●	●	●	—	—	—	
			Yes			100 V or less	A90	—	●	—	●	—	—	—	IC circuit	Relay PLC
			No			100 V, 200 V	A54	B54**	●	—	●	●	—	—	—	
			Yes			200 V or less	A64	B64**	●	—	●	—	—	—	—	
		Terminal conduit				—	—	A33	—	—	—	—	●	—	—	PLC
		DIN terminal				100 V, 200 V	—	A34	—	—	—	—	●	—	—	Relay PLC
							—	A44	—	—	—	—	●	—	—	
	Diagnostic indication (2-color display)	Grommet			—	—	A59W	B59W**	●	—	●	—	—	—	—	

∗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 "○" are produced upon receipt of order.

∗∗ Types D-G5□, K59, G5□W, K59W, G5BA, G59F, G5NT, B5□, B64, and B59W cannot be mounted on ø63 bore size cylinders.

∗ Since there are applicable auto switches other than listed, refer to page 1433 for details.

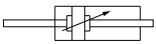
∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1450.

∗ D-A9□, M9□, M9□W, M9□A auto switches are shipped together (not assembled). (Only auto switch mounting brackets are packed assembled.)

Light
Principle parts are light weight aluminum alloy.

Easy position detection: with auto switches
Aluminum cylinder sizes ø40 to ø100 are auto switch capable for easy stroke position detection.

Smooth cushioning
Cushioning nearly equal to a shock absorber is achieved with a unique cushion ring configuration and cushion seal design.



Specifications with included auto switch are the same for Double Acting/Single Rod. Refer to pages 1430 to 1434.

- Minimum Strokes for Auto Switch Mounting
- Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection
- Operating Range
- Auto Switch Mounting Brackets: Part Nos.

Models

Model	Tube material	Bore size (mm)
CHAW	Aluminum alloy	40, 50, 63, 80, 100
CHAFW	Steel	40, 50, 63, 80, 100, 125, 160

Specifications

Action	Double acting/Double rod
Fluid	Hydraulic fluid
Nominal pressure	3.5 MPa
Proof pressure	5.0 MPa
Maximum allowable pressure	3.5 MPa
Minimum operating pressure	0.25 MPa
Ambient and fluid temperature	Without auto switch: –10° to 80°C
	With auto switch: –10° to 60°C
Piston speed	8 to 300 mm/s
Cushion	Cushion seal
Stroke length tolerance	to 100st $^{+0.8}_{0}$, 100 to 250st $^{+1.0}_{0}$, 250 to 630st $^{+1.25}_{0}$ 630 to 1000st $^{+1.4}_{0}$, 1000 to 1200st $^{+1.8}_{0}$
Mounting	Basic style (B), Axial foot style (L), Rod flange style (F) Center trunnion style (T), Rod trunnion style (U)

Note) Refer to page 1234 for definitions of terms related to pressure.

Standard Strokes

Bore size (mm)	Standard strokes (mm)
40	25 to 800
50	25 to 800
63	25 to 800
80	25 to 1000
100	25 to 1000
125	50 to 1000
160	50 to 1200

Note) Refer to pages 1252 and 1253 to determine stroke limitation depending on the type of mounting brackets that will be used. Then make your selection.

Cushion Strokes (For Rod Side and Head Side)

Bore size (mm)	Effective cushion stroke (mm)
40	15
50	15
63	17
80	20
100	20
125	20
160	22

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	Not compatible
Phosphate hydraulic fluid	Not compatible

Accessories (Option)

Refer to page 1428.

Knuckle, Y type knuckle, Knuckle pin

Note) Maximum ambient temperature:
Nylon tarpaulin (60°C)
Neoprene cloth (110°C)

Weight

Series CH□AW (Built-in magnet)

Unit: kg

Bore size (mm)		40	50	63	80	100
(0 mm stroke) Basic weight	Basic style	1.44	2.16	2.78	4.58	6.90
	Foot style	1.95	3.08	4.02	6.71	10.34
	Flange style	1.69	2.56	3.35	5.54	8.60
	Rod trunnion style	1.71	2.57	3.28	3.40	9.80
	Center trunnion style	1.86	2.89	3.55	3.67	9.59
Additional weight per 10 mm stroke		0.1	0.14	0.18	0.24	0.32

Calculation (Example) **CHAWL50-100**
- Basic weight ····· 3.08 (foot type, ø50)
- Additional weight ····· 0.14/10 mm stroke
- Cylinder stroke ····· 100 mm

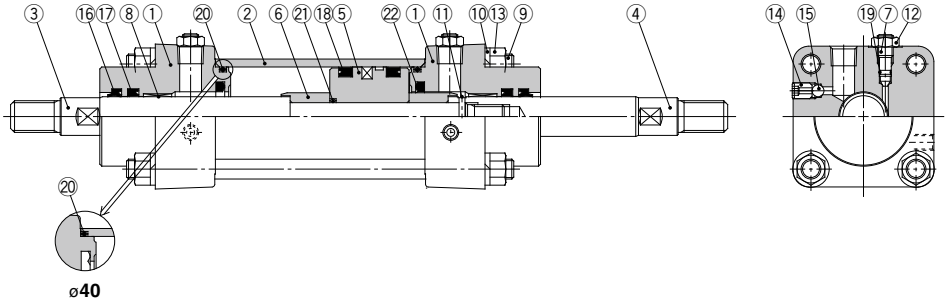
3.08 + 0.14 x 100/10 = 4.48 kg

Series CHAW□F

Unit: kg

Bore size (mm)		40	50	63	80	100	125	160
(0 mm stroke) Basic weight	Basic style	1.59	2.27	2.85	5.01	7.49	9.55	16.55
	Foot style	2.10	3.23	4.09	7.14	10.93	16.14	27.25
	Flange style	1.84	2.71	3.42	5.97	9.19	12.51	27.42
	Rod trunnion style	1.86	2.72	3.35	6.77	10.39	14.05	24.39
	Center trunnion style	2.01	2.99	3.62	6.52	10.18	13.31	23.46
Additional weight per 10 mm stroke		0.18	0.16	0.20	0.38	0.48	0.62	0.94

Construction



Parts List

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	70% flat black
2	**Cylinder tube**	Aluminum alloy	Hard anodized
		Carbon steel	
3	**Piston rod A**	Carbon steel	Hard chromium electronplated
4	**Piston rod B**	Carbon steel	Hard chromium electronplated
5	**Piston**	Aluminum alloy	
6	**Cushion ring**	Rolled steel	
7	**Needle valve**	Rolled steel	
8	**Bushing**	Lead bronze	
9	**Tie-rod**	Carbon steel	
10	**Tie-rod washer**	Steel wire	
11	**Spring pin**	Rolled steel	
12	**Needle valve nut**	Carbon steel	
13	**Tie-rod nut**	Carbon steel	
14	**Air release valve**	Alloy steel	
15	**Check ball**	Bearing steel	
16	**Wiper ring**	NBR	
17	**Rod seal**	NBR	
18	**Piston seal**	NBR	
19	**Needle valve seal**	NBR	
20	**Cylinder tube gasket**	NBR	
21	**Piston gasket**	NBR	
22	**Cushion seal**	—	

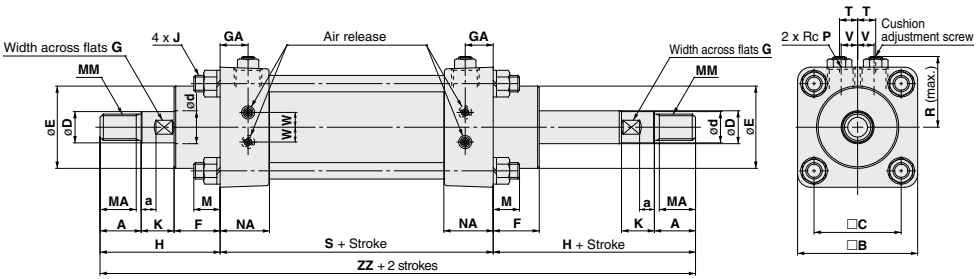
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.	Content
40	CHAW40-PS	Nos. ⑯ through ⑳ and ㉒ from the chart at left
50	CHAW50-PS	
63	CHAW63-PS	
80	CHAW80-PS	
100	CHAW100-PS	
125	CHAW125-PS	
160	CHAW160-PS	

∗ Seal kit consists of items of ⑯ through ⑳ and ㉒ and can be ordered by using the seal kit number for each bore size.

Dimensions

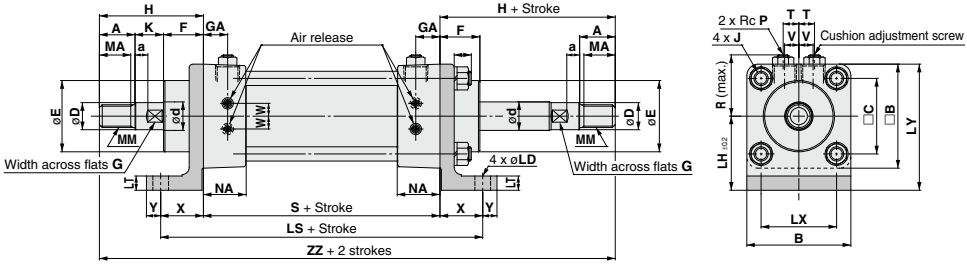
Basic style: CHAWB



(mm)

Bore size (mm)	A	a	□B	□C	D	d	E	F	G	GA	J	K	M	MA	MM	NA	P	R	S	T	V	W	H	ZZ
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	M8 x 1.25	18	13	20	M14 x 1.5	30	1/4	37	114	11	7.5	8	66	246
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	M10 x 1.5	20	16	22	M16 x 1.5	30	3/8	43	116	11	10	9	73	262
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	M10 x 1.5	22	16	25	M18 x 1.5	30	3/8	47	120	11	12	10	80	280
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	M12 x 1.75	26	19	29	M22 x 1.5	35	1/2	57	132	11	16	13	90	312
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	M12 x 1.75	27	21	34	M27 x 2	35	1/2	66	140	12	20	16	100	340
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	M14 x 2	27	24	34	M27 x 2	35	1/2	77	140	12	20	16	100	340
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	M16 x 2	28	27	38	M33 x 2	40	3/4	94	159	12	24	20	108	375

Foot style: CHAWL



CHQ
CHK□
CHN
CHM
CHS□
CH2□
CHA
Related Equipment
D-□

(mm)

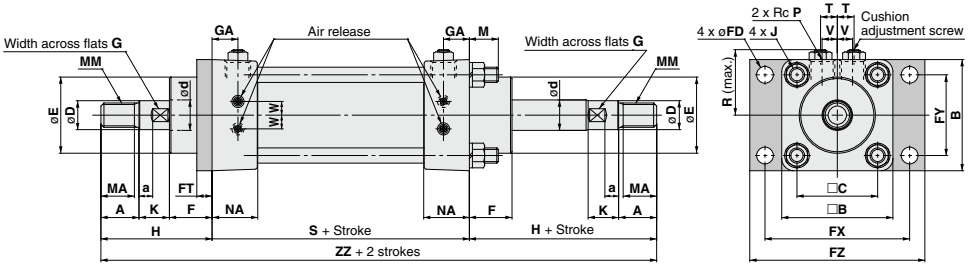
Bore size (mm)	A	a	B	□B	□C	D	d	E	F	G	GA	H	J	K	LD	LH	LS	LT	LX	LY	M	MA	MM	NA
40	23	10	60	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	66	M8 x 1.25	18	9	47	168	8	44	77	10	20	M14 x 1.5	30
50	25	9	73	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	73	M10 x 1.5	20	11	52	176	10	53	88.5	12	22	M16 x 1.5	30
63	28	8	80	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	80	M10 x 1.5	22	11	55	194	10	60	95	12	25	M18 x 1.5	30
80	32	8	100	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	90	M12 x 1.75	26	13	65	212	12	75	115	14	29	M22 x 1.5	35
100	38	6.5	118	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	100	M12 x 1.75	27	13	80	234	14	90	139	14	34	M27 x 2	35
125	38	6.5	140	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	100	M14 x 2	27	15	100	250	16	112	170	16	34	M27 x 2	35
160	42	9	174	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	108	M16 x 2	28	17	110	279	18	140	197	18	38	M33 x 2	40

(mm)

Bore size (mm)	P	R	S	T	V	W	X	Y	ZZ
40	1/4	37	114	11	7.5	8	27	8	246
50	3/8	43	116	11	10	9	30	10	262
63	3/8	47	120	11	12	10	37	10	280
80	1/2	57	132	11	16	13	40	13	312
100	1/2	66	140	12	20	16	47	13	340
125	1/2	77	140	12	20	16	55	15	340
160	3/4	94	159	12	24	20	60	20	375

Dimensions

Rod flange style: CHAWF



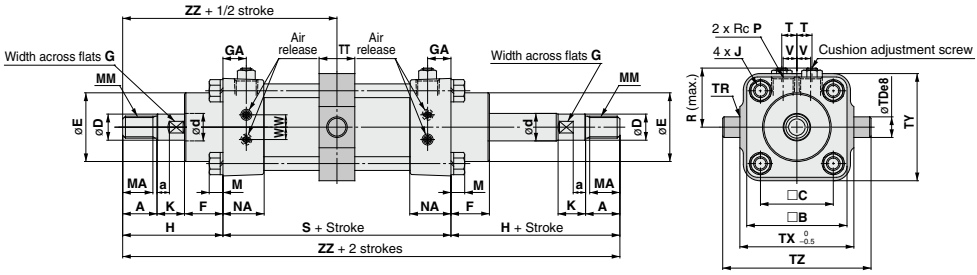
(mm)

Bore size (mm)	A	a	B	□B	□C	D	d	E	F	FD	FT	FX	FY	FZ	G	GA	H	J	K	M	MA	MM	NA	P
40	23	10	60	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	9	10	77	44	95	14	17.5	66	M8 x 1.25	18	16	20	M14 x 1.5	30	1/4
50	25	9	73	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	11	10	95	53	115	17	17	73	M10 x 1.5	20	22	22	M16 x 1.5	30	3/8
63	28	8	80	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	11	12	102	60	122	17	17	80	M10 x 1.5	22	20	25	M18 x 1.5	30	3/8
80	32	8	100	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	13	12	130	75	155	22	20	90	M12 x 1.75	26	26	29	M22 x 1.5	35	1/2
100	38	6.5	118	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	13	16	145	90	172	27	19	100	M12 x 1.75	27	26	34	M27 x 2	35	1/2
125	38	6.5	140	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	15	18	170	112	200	27	19	100	M14 x 2	27	30	34	M27 x 2	35	1/2
160	42	9	174	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	17	20	205	140	240	36	22	108	M16 x 2	28	34	38	M33 x 2	40	3/4

(mm)

Bore size (mm)	R	S	T	V	W	ZZ
40	37	114	11	7.5	8	246
50	43	116	11	10	9	262
63	47	120	11	12	10	280
80	57	132	11	16	13	312
100	66	140	12	20	16	340
125	77	140	12	20	16	340
160	94	159	12	24	20	375

Center trunnion style: CHAWT



CHQ
CHK□
CHN
CHM
CHS□
CH2□
CHA
Related Equipment
D-□

(mm)

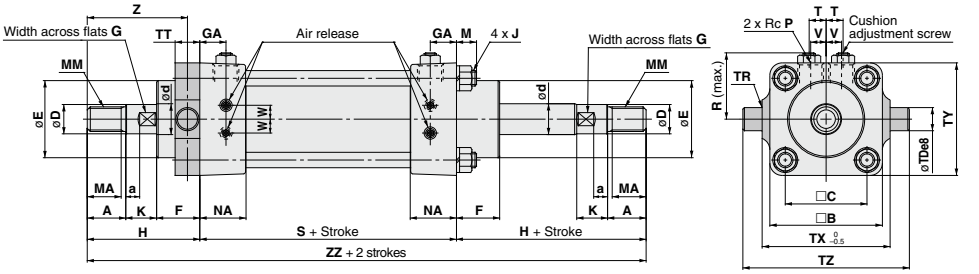
Bore size (mm)	A	a	□B	□C	D	d	E	F	G	GA	H	J	K	M	MA	MM	NA	P	R	S	T	TDe8	TR
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	66	M8 x 1.25	18	10	20	M14 x 1.5	30	1/4	37	114	11	$15^{-0.032}_{-0.059}$	R0.5
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	73	M10 x 1.5	20	10	22	M16 x 1.5	30	3/8	43	116	11	$15^{-0.032}_{-0.059}$	R0.5
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	80	M10 x 1.5	22	10	25	M18 x 1.5	30	3/8	47	120	11	$15^{-0.032}_{-0.059}$	R0.5
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	90	M12 x 1.75	26	13	29	M22 x 1.5	35	1/2	57	132	11	$25^{-0.040}_{-0.073}$	R2.5
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	100	M12 x 1.75	27	13	34	M27 x 2	35	1/2	66	140	12	$32^{-0.050}_{-0.089}$	R2.5
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	100	M14 x 2	27	15	34	M27 x 2	35	1/2	77	140	12	$32^{-0.050}_{-0.089}$	R2.5
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	108	M16 x 2	28	17	38	M33 x 2	40	3/4	94	159	12	$36^{-0.050}_{-0.089}$	R2.5

(mm)

Bore size (mm)	TT	TX	TY	TZ	V	W	Z	ZZ
40	24	70	65	95	7.5	8	123	246
50	26	83	78	108	10	9	131	262
63	26	90	86	115	12	10	140	280
80	36	112	106	162	16	13	156	312
100	42	140	130	204	20	16	170	340
125	42	170	162	234	20	16	170	340
160	52	212	200	284	24	20	187.5	375

Dimensions

Rod trunnion style: CHAWU



(mm)

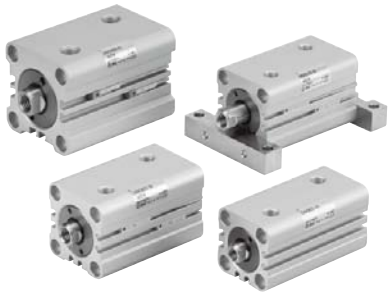
Bore size (mm)	A	a	□B	□C	D	d	E	F	G	GA	H	J	K	M	MA	MM	NA	P	R	S	T	TDe8	TR
40	23	10	60	44	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	66	M8 x 1.25	18	10	20	M14 x 1.5	30	1/4	37	114	11	$15^{-0.032}_{-0.059}$	R0.5
50	25	9	73	53	$19^{0}_{-0.021}$	20	$50^{0}_{-0.062}$	28	17	17	73	M10 x 1.5	20	13	22	M16 x 1.5	30	3/8	43	116	11	$15^{-0.032}_{-0.059}$	R0.5
63	28	8	80	60	$21^{0}_{-0.021}$	22.4	$55^{0}_{-0.074}$	30	17	17	80	M10 x 1.5	22	15	25	M18 x 1.5	30	3/8	47	120	11	$15^{-0.032}_{-0.059}$	R0.5
80	32	8	100	75	$26^{0}_{-0.021}$	28	$65^{0}_{-0.074}$	32	22	20	90	M12 x 1.75	26	13	29	M22 x 1.5	35	1/2	57	132	11	$25^{-0.040}_{-0.073}$	R2.5
100	38	6.5	118	90	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	100	M12 x 1.75	27	13	34	M27 x 2	35	1/2	66	140	12	$32^{-0.050}_{-0.089}$	R2.5
125	38	6.5	140	112	$34^{0}_{-0.025}$	35.5	$80^{0}_{-0.074}$	35	27	19	100	M14 x 2	27	15	34	M27 x 2	35	1/2	77	140	12	$32^{-0.050}_{-0.089}$	R2.5
160	42	9	174	140	$43^{0}_{-0.025}$	45	$100^{0}_{-0.087}$	38	36	22	108	M16 x 2	28	17	38	M33 x 2	40	3/4	94	159	12	$36^{-0.050}_{-0.089}$	R2.5

(mm)

Bore size (mm)	TT	TX	TY	TZ	V	W	Z	ZZ
40	16	70	60	95	7.5	8	58	246
50	16	83	73	108	10	9	65	262
63	16	90	80	115	12	10	72	280
80	30	112	100	162	16	13	75	312
100	34	140	118	204	20	16	83	340
125	34	170	140	234	20	16	83	340
160	38	212	174	284	24	20	89	375

Series CHKD/CHKG

Series CHKD



Nominal pressure: **10 MPa**

Bore size (mm): 20, 25, 32, 40, 50, 63, 80, 100

Series CHKG

Nominal pressure: **16 MPa**

Bore size (mm): 20, 25, 32, 40, 50, 63, 80, 100

JIS Standard Compact Hydraulic Cylinder

Series CH□KD

10 MPa

ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

How to Order

CHKD B 32 □ - 30 □ - □

With Auto Switch **CHDKD B 32 □ - 30 □ - M9BW □ - □**

With auto switch (built-in magnet)

Mounting bracket style

Symbol	Style	Port position Note)
B	Basic style	—
L	Foot style	Top / Foot bracket
LB	Foot style	Right
LD	Foot style	Left

Note) Indicates the relative position of the foot bracket and port, as seen from the rod side.

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT

Cylinder stroke (mm)

Refer to the standard stroke table on page 1285.

Rod end thread type

Nil	Female thread
M	Male thread

∗ Rod end thread type is an optional product. (Refer to page 1286).

Auto switch type

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

Number of auto switches

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

Made to Order specifications

For details, refer to page 1285.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDKDB50-100

Applicable Auto Switches

/Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model: Electrical entry direction Perpendicular	Auto switch model: Electrical entry direction In-line	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)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color display)			3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V, 12 V		M9NAV∗1	M9NA∗1	○	○	●	○	○	IC circuit	
				3-wire (PNP)			M9PAV∗1	M9PA∗1	○	○	●	○	○		
				2-wire	12 V		M9BAV∗1	M9BA∗1	○	○	●	○	○	—	
Reed auto switch	———	Grommet	Yes	3-wire (NPN)	5 V	—	A96V∗∗	A96∗∗	●	—	●	—	—	IC circuit	—
				2-wire	12 V	100 V	A93V∗∗ ∗2	A93∗∗	●	●	●	●	—	—	Relay PLC
			No			100 V or less	A90V∗∗	A90∗∗	●	—	●	—	—	IC circuit	

∗1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. A water resistant type cylinder is recommended for use in an environment which requires water resistance. Consult with SMC regarding water resistant type for foot style.

∗2 1 m type lead wire is only applicable to D-A93.

∗ 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

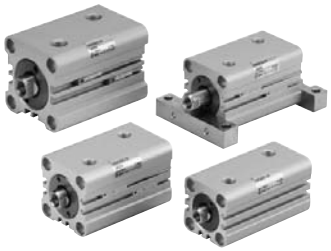
∗ Solid state auto switches marked "○" are produced upon receipt of order.

∗∗ The D-A9 model cannot be mounted on ø50.

∗ For ø32 to ø100, there are applicable auto switches other than listed. Refer to page 1293 for details.

∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.

∗ Cylinders with auto switch will be shipped together with the auto switch and auto switch mounting bracket (ø32 to ø50) (not assembled).



Specifications

Bore size (mm)	20	25	32	40	50	63	80	100
Action	Double acting/Single rod							
Fluid	Hydraulic fluid							
Nominal pressure	10 MPa							
Proof pressure	15 MPa							
Maximum allowable pressure	13 MPa							
Minimum operating pressure	0.3 MPa							
Ambient and fluid temperature	Without auto switch: –10° to 80°C							
	With auto switch: –10° to 60°C							
Piston speed	8 to 100 mm/s							
Cushion	None							
Rod end thread	Female thread, Male thread							
Stroke length tolerance	$^{+0.8}_{0}$ mm							
Mounting style	Basic style (through hole), Foot style							

Note) Refer to page 1234 for definitions of terms related to pressure.

Made to Order

Made to Order specifications
(For details, refer to pages 1295 to 1298)

Symbol	Specifications
-XA□	Change of rod end shape
-XC61	Compatible with CHQHB series (14 MPa)
-XC63	Intermediate stroke type (Built-in spacer type)
-XC64	With air release valve

Standard Strokes

Bore size (mm) \ Stroke (mm)	5	10	15	20	25	30	35	40	45	50	75					100				
											Intermediate stroke [XC63] (Built-in spacer type)					Intermediate stroke [XC63] (Built-in spacer type)				
											55	60	65	70		80	85	90	95	
20, 25	○	○	○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—	—	—
32	○	○	○	○	○	○	○	○	○	○	□	□	□	□	○	—	—	—	—	—
40, 50, 63 80, 100	○	○	○	○	○	○	○	○	○	○	□	□	□	□	○	□	□	□	□	○

○: Standard stroke (dedicated cylinder tube)
□: Intermediate stroke XC63 (built-in spacer type)

Manufacture of Intermediate Stroke Cylinders [XC63] (Built-in spacer type)

Intermediate strokes in 5 mm increments can be manufactured by installing spacers inside standard stroke cylinders.
55, 60, 65 and 70 mm stroke cylinders have the same overall length as a 75 mm stroke cylinder, and 80, 85, 90 and 95 mm stroke cylinders have the same length as a 100 mm stroke cylinder.
Refer to the Made to Order Specifications on page 1297 for the ordering procedure.

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	*
Phosphate hydraulic fluid	Not compatible

* Consult with SMC.

Theoretical Output

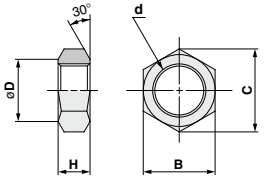
Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)		
				3.5	7	10
20	12	OUT	314	1099	2198	3140
		IN	201	704	1407	2010
25	14	OUT	490	1715	3430	4900
		IN	336	1176	2352	3360
32	18	OUT	804	2814	5628	8040
		IN	549	1922	3843	5490
40	22.4	OUT	1256	4396	8792	12560
		IN	862	3017	6034	8620
50	28	OUT	1963	6871	13741	19630
		IN	1347	4715	9429	13470
63	35.5	OUT	3117	10910	21819	31170
		IN	2127	7445	14889	21270
80	45	OUT	5026	17591	35182	50260
		IN	3436	12026	24052	34360
100	56	OUT	7853	27486	54971	78530
		IN	5390	18865	37730	53900

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Optional Parts

Rod end nut



(mm)

Part no.	Bore size (mm)	B	C	d	D	H
NTH-020	**20**	13	15	M8 x 1	12.5	5
NTH-025	**20**	17	19.6	M10 x 1.25	16.5	6
NTH-032	**25**	19	21.9	M12 x 1.25	18	7
NTH-040	**32**	22	25.4	M16 x 1.5	21	10
NTH-050	**40**	27	31.2	M20 x 1.5	26	12
NTH-060	**50**	32	37	M24 x 1.5	31	14
NTH-080	**63**	41	47.3	M30 x 1.5	40	17
NTH-100	**80**	55	63.5	M39 x 1.5	54	20
NTH-125	**100**	70	80.8	M48 x 1.5	69	26

Note) There may be a slight difference between the part numbers and the corresponding bore size.

Weight

CH□KDB/Basic style

Unit: g

Bore size (mm)	Standard stroke (mm)											
	5	10	15	20	25	30	35	40	45	50	75	100
20	218	240	262	282	304	326	348	370	392	414	—	—
25	299	327	355	383	411	439	467	495	523	551	—	—
32	515	558	601	644	687	730	773	816	859	902	1117	1332
40	729	784	839	894	949	1004	1059	1114	1169	1224	1499	1774
50	1065	1139	1213	1287	1361	1435	1509	1583	1657	1731	2101	2471
63	1773	1882	1991	2100	2209	2318	2427	2536	2645	2754	3299	3844
80	3216	3379	3542	3868	4031	4194	4357	4520	4683	4846	5661	6476
100	6142	6384	6626	6868	7110	7352	7594	7836	8078	8320	9530	10740

CH□KDL/Foot style

Unit: g

Bore size (mm)	Standard stroke (mm)											
	5	10	15	20	25	30	35	40	45	50	75	100
20	465	490	510	535	560	580	605	630	650	675	—	—
25	570	600	630	660	690	720	750	780	810	840	—	—
32	880	925	970	1015	1060	1100	1150	1190	1235	1280	1505	1730
40	1375	1435	1495	1550	1610	1670	1725	1785	1845	1900	2195	2485
50	2200	2280	2360	2435	2515	2595	2675	2755	2835	2910	3310	3705
63	3845	3960	4075	4195	4310	4425	4545	4660	4775	4895	5475	6060
80	6555	6725	6900	7235	7410	7580	7755	7930	8100	8275	9150	10010
100	11355	11610	11865	12120	12375	12630	12885	13140	13400	13655	14930	16210

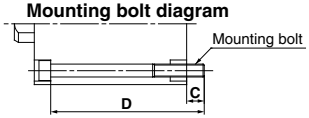
Mounting Bolts for CH□KDB

The mounting bolts shown below conform to JIS B 1176, strength class 10.9 or higher.

Through hole type mounting bolts are available.
Refer to the following for ordering procedures.
Order the actual number of bolts that will be used.

Example) CQ-M5x55L 4 pcs.

Mounting bolt diagram



Model	C	D	Mounting bolt part no.
CH□KDB20-5 (M)	12.4	55	CQ-M5 x 55L
-10 (M)		60	x 60L
-15 (M)		65	x 65L
-20 (M)		70	x 70L
-25 (M)		75	x 75L
-30 (M)		80	x 80L
-35 (M)		85	x 85L
-40 (M)		90	x 90L
-45 (M)		95	x 95L
-50 (M)		100	x 100L
CH□KDB25-5 (M)	10.4	55	CQ-M5 x 55L
-10 (M)		60	x 60L
-15 (M)		65	x 65L
-20 (M)		70	x 70L
-25 (M)		75	x 75L
-30 (M)		80	x 80L
-35 (M)		85	x 85L
-40 (M)		90	x 90L
-45 (M)		95	x 95L
-50 (M)		100	x 100L
CH□KDB32-5 (M)	10.5	60	CQ-M6 x 60L
-10 (M)		65	x 65L
-15 (M)		70	x 70L
-20 (M)		75	x 75L
-25 (M)		80	x 80L
-30 (M)		85	x 85L
-35 (M)		90	x 90L
-40 (M)		95	x 95L
-45 (M)		100	x 100L
-50 (M)		105	x 105L
-75 (M)		130	x 130L
CH□KDB40-5 (M)	13.5	65	CQ-M8 x 65L
-10 (M)		70	x 70L
-15 (M)		75	x 75L
-20 (M)		80	x 80L
-25 (M)		85	x 85L
-30 (M)		90	x 90L
-35 (M)		95	x 95L
-40 (M)		100	x 100L
-45 (M)		105	x 105L
-50 (M)		110	x 110L
-75 (M)		135	x 135L
-100 (M)		160	x 160L

Model	C	D	Mounting bolt part no.
CH□KDB50-5 (M)	15.8	70	CQ-M10 x 70L
-10 (M)		75	x 75L
-15 (M)		80	x 80L
-20 (M)		85	x 85L
-25 (M)		90	x 90L
-30 (M)		95	x 95L
-35 (M)		100	x 100L
-40 (M)		105	x 105L
-45 (M)		110	x 110L
-50 (M)		115	x 115L
-75 (M)		140	x 140L
-100 (M)		165	x 165L
CH□KDB63-5 (M)	16	75	CQ-M12 x 75L
-10 (M)		80	x 80L
-15 (M)		85	x 85L
-20 (M)		90	x 90L
-25 (M)		95	x 95L
-30 (M)		100	x 100L
-35 (M)		105	x 105L
-40 (M)		110	x 110L
-45 (M)		115	x 115L
-50 (M)		120	x 120L
-75 (M)		145	x 145L
-100 (M)		170	x 170L
CH□KDB80-5 (M)	22.2	90	CQ-M14 x 90L
-10 (M)		95	x 95L
-15 (M)		100	x 100L
-20 (M)		105	x 105L
-25 (M)		110	x 110L
-30 (M)		115	x 115L
-35 (M)		120	x 120L
-40 (M)		125	x 125L
-45 (M)		130	x 130L
-50 (M)		135	x 135L
-75 (M)		160	x 160L
-100 (M)		185	x 185L
CH□KDB100-5 (M)	26.5	110	CQ-M16 x 110L
-10 (M)		115	x 115L
-15 (M)		120	x 120L
-20 (M)		125	x 125L
-25 (M)		130	x 130L
-30 (M)		135	x 135L
-35 (M)		140	x 140L
-40 (M)		145	x 145L
-45 (M)		150	x 150L
-50 (M)		155	x 155L
-75 (M)		180	x 180L
-100 (M)		205	x 205L

Water Resistant Type

A special scraper is installed on the basic cylinder to prevent liquid in the surrounding area from entering the cylinder.
It can be used in environments where exposure to machine tool coolants is likely, as well as in environments where water spray and splashing is frequent, such as in food processing machinery and car washing equipment.

CHDKDB | **Bore size** | **Port thread type** | **R** | – | **Stroke** | **Rod end thread type** | – | **M9□A(V)L**

With auto switch (Built-in magnet)

Water resistant cylinder

R	NBR Seal (Nitrile rubber)
V	FKM Seal (Fluororubber)

Water resistant solid state auto switch with 2-color display

M9□A(V)L	ø20 to ø100

Some of the parts are different from the dimensions of the basic type.
Refer to Best Pneumatics No. 2 for details.

⚠ Specific Product Precautions

Be sure to read before handling. Refer to front matter 38 for Safety Instructions, and pages 1234 to 1241 for precautions for hydraulic cylinder and auto switch.

Usage

⚠ Caution

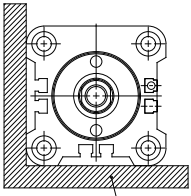
1. **Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting.**
2. **Since a lateral load (eccentric load) cannot be applied to the piston rod, build the mounting jig in such a way that a lateral load will not be applied to the piston rod.**
3. **Make sure that the interlocking length of the rod end thread (male or female thread) and the mounting material is at least 80% of the thread diameter.**
4. **When operating a cylinder for the first time, be sure to release the air inside the cylinder and the piping. When the air release is complete, operate the cylinder at reduced pressure, then gradually increase it to the normal operating pressure.**

Body mounting bolt tightening torques

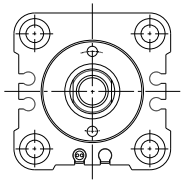
Bore size (mm)	Mounting bolt size	Tightening torque (N·m)
20	M5	2.5
25	M5	4
32	M6	7
40	M8	16
50	M10	30
63	M12	40
80	M14	70
100	M16	100

5. **Since Series CH□KDB does not have an air release plug, release air from other components (e.g. from piping, etc.) as well.**
6. **Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.**
7. **When the cylinder head side contains hydraulic fluid or is in a normally pressurized condition, the applied load must not be allowed to strike the piston rod end. Avoid such applications.**
8. **When mounting the cylinder body with mounting bolts, use tightening torques in the table at left as a guide.**

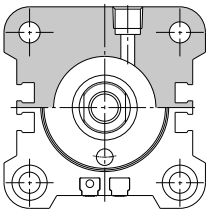
Consult with SMC when using a cylinder in close proximity to a magnetic body (including proximity on any side) as shown in the figure below, as the operation of auto switches may become unstable.



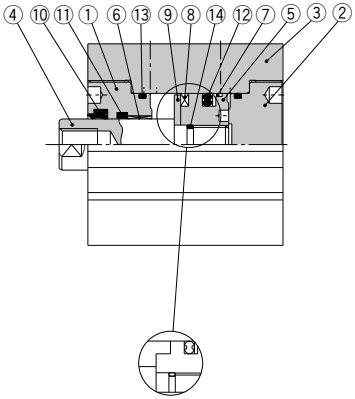
Construction



ø20 to ø25



ø32 to ø100



Without auto switch

Parts List

No.	Description	Material		Note
1	**Rod cover**	Aluminum alloy		Black anodized
2	**Head cover**	Aluminum alloy		Black anodized
3	**Cylinder tube**	Aluminum alloy		Hard anodized
4	**Piston rod**	ø20, ø25	Stainless steel	Hard chromium electroplated
		ø32 to ø100	Carbon steel	
5	**Piston**	Stainless steel		
6	**Bushing**	Copper alloy		
7	**Back-up ring**	Resin		
8	**Magnet**	—		With auto switch only
9	**Magnet plate**	Stainless steel		With auto switch only
10	**Scraper**	NBR		
11	**Rod seal**			
12	**Piston seal**			
13	**Tube gasket**			
14	**Piston gasket**			

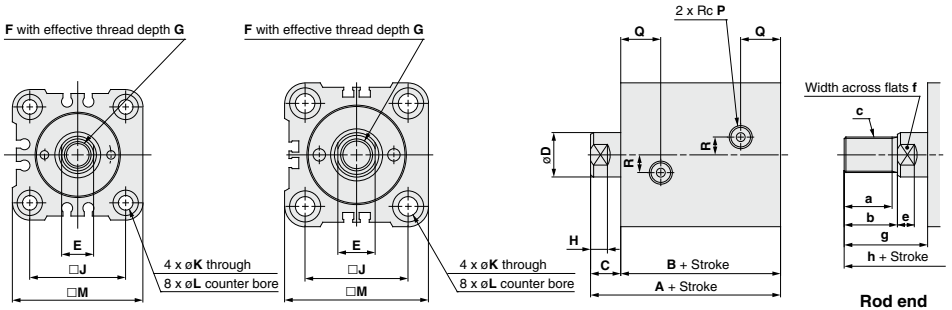
Replacement Parts/Seal Kit

Bore size (mm)	Seal kit no.	Content
20	CHKD20-PS	Nos. ⑦, ⑩, ⑪, ⑫, and ⑬ from the chart at left
25	CHKD25-PS	
32	CHKD32-PS	
40	CHKD40-PS	
50	CHKD50-PS	
63	CHKD63-PS	
80	CHKD80-PS	
100	CHKD100-PS	

* Seal kit consists of items ⑦, ⑩, ⑪, ⑫ and ⑬, and can be ordered by using the seal kit number for each bore size.
* Special tools are necessary for disassembly. Contact SMC for recommended tool designs and dimensions. Furthermore, ø80 and ø100 are tightened with a large tightening torque, so disassembly will be difficult. Contact SMC if disassembly is required.

Dimensions

Basic style/CH□KDB

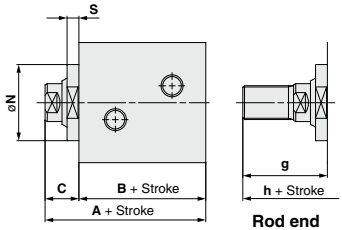


CH□KDB20, 25

CH□KDB32 to 100

Rod end male thread

Water resistant type



Rod end male thread

(mm)

Bore size (mm)	A	B	C	D	E	F	G	H	J	K	L	M	P	Q	R
20	51	43	8	12	10	M8 x 1.25	10	6	30	5.5	9.5 depth 5.4	43	1/8	16.5	6
25	53	45	8	14	12	M10 x 1.5	12	6	36	5.5	9.5 depth 5.4	49	1/8	17	8
32	61	51	10	18	14	M12 x 1.75	15	7	47	6.6	11 depth 6.5	63	1/4	19.5	10
40	65	55	10	22.4	19	M16 x 2	20	7	52	9	14 depth 8.6	71	1/4	20.5	10
50	71	60	11	28	24	M20 x 2.5	24	8	58	11	17.5 depth 10.8	81	1/4	22	10
63	80	67	13	35.5	30	M27 x 3	33	9	69	13	20 depth 13	97	1/4	25.5	10
80	95	78	17	45	41	M30 x 3.5	36	14	86	15	23 depth 15.2	117	3/8	30	15
100	122	96	26	56	50	M39 x 4	45	21	106	17	26 depth 17.5	142	3/8	36	15

Note 1) Body dimensions are the same with or without auto switches.

Rod end male threads (mm)

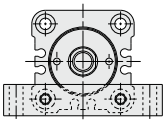
Bore size (mm)	a	b	c	e	f	g	h
20	12.5	15	M10 x 1.25	6	10	23	66
25	15.5	18	M12 x 1.25	6	12	26	71
32	22	25	M16 x 1.5	7	14	35	86
40	27	30	M20 x 1.5	7	19	40	95
50	32	35	M24 x 1.5	8	24	46	106
63	42	45	M30 x 1.5	9	30	58	125
80	57	60	M39 x 1.5	14	41	77	155
100	72	75	M48 x 1.5	21	50	101	197

Water resistant type (mm)

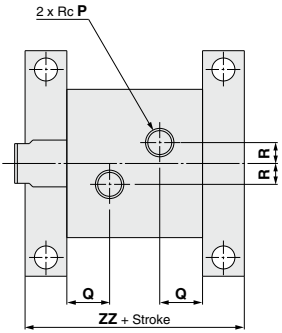
Bore size (mm)	A	B	C	N	S	g	h
20	61	43	18	26.5	6	33	76
25	63	45	18	30	6	36	81
32	71	51	20	38	7	45	96
40	75	55	20	45	7	50	105
50	81	60	21	55	7	56	116
63	90	67	23	66	7	68	135
80	105	78	27	86	7	87	165
100	132	96	36	104	7	111	207

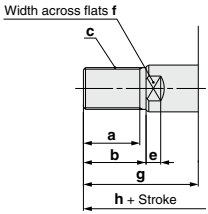
Dimensions

Foot style/CH□KDL

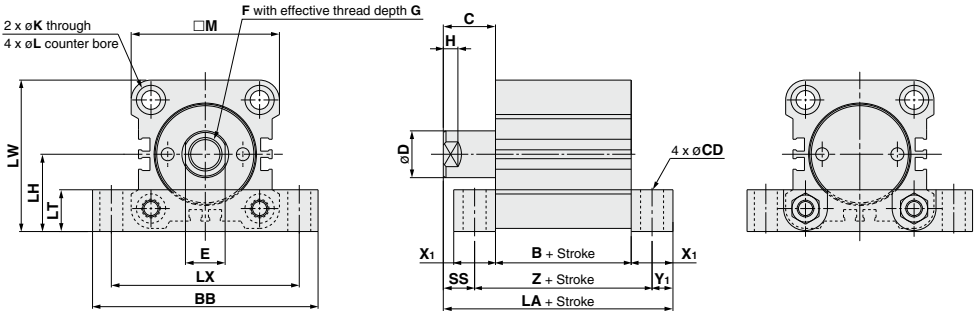


ø20 to ø25





Rod end male thread



ø32 to ø100

(mm)

Bore size (mm)	LA	B	BB	C	CD	D	E	F	G	H	K	L	LH	LT	LX
20	76	43	70	18	6.6	12	10	M8 x 1.25	10	6	5.5	9.5 depth 5.4	23	15	58
25	78	45	76	18	6.6	14	12	M10 x 1.5	12	6	5.5	9.5 depth 5.4	26	15	64
32	86	51	94	19	9	18	14	M12 x 1.75	15	7	6.6	11 depth 6.5	33	16	79
40	98	55	108	23	11	22.4	19	M16 x 2	20	7	9	14 depth 8.6	37	20	90
50	111	60	126	27	14	28	24	M20 x 2.5	24	8	11	17.5 depth 10.8	43	24	104
63	130	67	146	33	16	35.5	30	M27 x 3	33	9	13	20 depth 13	52	30	121
80	151	78	172	38	18	45	41	M30 x 3.5	36	14	15	23 depth 15.2	63	35	144
100	179	96	208	43	22	56	50	M39 x 4	45	21	17	26 depth 17.5	76	40	174

Note 1) Body dimensions are the same with or without auto switches.

(mm)

Bore size (mm)	LW	M	P	Q	R	SS	X_1	Y_1	Z	ZZ
20	44.5	43	1/8	16.5	6	10.5	15	7.5	58	73
25	50.5	49	1/8	17	8	10.5	15	7.5	60	75
32	64.5	63	1/4	19.5	10	11	16	8	67	83
40	72.5	71	1/4	20.5	10	13	20	10	75	95
50	83.5	81	1/4	22	10	15	24	12	84	108
63	100.5	97	1/4	25.5	10	18	30	15	97	127
80	121.5	117	3/8	30	15	20.5	35	17.5	113	148
100	147	142	3/8	36	15	23	40	20	136	176

Rod end male threads

(mm)

Bore size (mm)	a	b	c	e	f	g	h
20	12.5	15	M10 x 1.25	6	10	33	91
25	15.5	18	M12 x 1.25	6	12	36	96
32	22	25	M16 x 1.5	7	14	44	111
40	27	30	M20 x 1.5	7	19	53	128
50	32	35	M24 x 1.5	8	24	62	146
63	42	45	M30 x 1.5	9	30	78	175
80	57	60	M39 x 1.5	14	41	98	221
100	72	75	M48 x 1.5	21	50	118	254

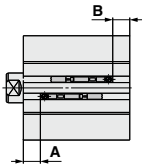
Auto Switch Mounting

Refer to pages 1451 to 1510 for detailed specifications.

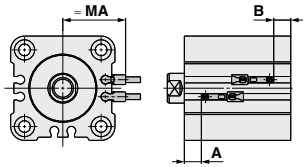
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

ø20, ø25

D-M9□
D-M9□W
D-M9□A
D-A9□



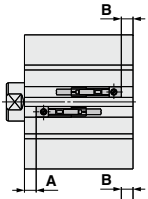
D-M9□V
D-M9□WV
D-M9□AV
D-A9□V



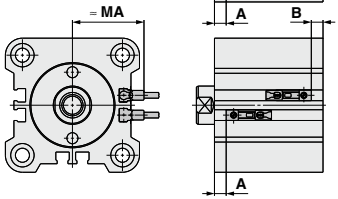
ø32 to ø100

D-M9□
D-M9□W
D-M9□A
D-A9□

D-Y5□
D-Y7□
D-Y7□W
D-Y7BA
D-Z7□
D-Z80



D-M9□V
D-M9□WV
D-M9□AV
D-Y6□
D-Y7□V
D-Y7□WV
D-A9□V



Auto Switch Proper Mounting Positions

(mm)

Bore size (mm)	Solid state auto switch				Reed auto switch			
	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-Y59□/Y69□ D-Y7□/Y7□V D-Y7□W/Y7□WV D-Y7BA		D-A9□/A9□V		D-Z7□/Z80	
	A	B	A	B	A	B	A	B
20	12	19	—	—	8	15	—	—
25	13	20	—	—	9	16	—	—
32	15	21.5	10	16.5	11	17.5	10	16.5
40	17	23.5	12	18.5	13	19.5	12	18.5
50	18	27.5	13	22.5	—	—	13	22.5
63	21.5	31	16.5	26	17.5	27	16.5	26
80	23.5	40	18.5	35	19.5	36	18.5	35
100	31.5	49.5	26.5	44.5	27.5	45.5	26.5	44.5

Note 1) D-A9□/A9□V models cannot be mounted on ø50.
Note 2) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Heights

(mm)

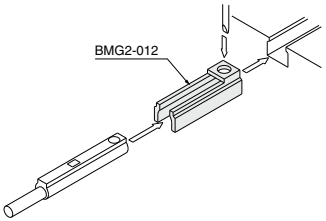
Bore size (mm)	D-M9□ D-M9□W D-M9□A D-A9□	D-M9□V D-M9□WV D-M9□AV	D-A9□V	D-Y59□ D-Y7P D-Y7□W D-Y7BA D-Z7□ D-Z80	D-Y69□ D-Y7PV D-Y7□WV
	U	U	U	U	U
20	21.5	28	25.5	—	—
25	24.5	30	27.5	—	—
32	31.5	34	31.5	31.5	31.5
40	35.5	38.5	36	35.5	35.5
50	40.5 Note)	44.5	— Note)	40.5	41.5
63	48.5	53	50.5	48.5	50
80	58.5	63.5	61	58.5	60.5
100	71	76	73.5	71	73

Note 1) D-A9□/A9□V models cannot be mounted on ø50.

Auto Switch Mounting Brackets: Part Nos.

Auto switch models	Bore size (mm)
	ø32 to ø100
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV** **D-A9□/A9□V**	BMG2-012

Note 1) D-A9□/A9□V models cannot be mounted on ø50.



∗ Examples of D-A9□(V), M9□(V), M9□W(V), M9□A(V) models mounted on CHKD.

Minimum Auto Switch Mounting Stroke

(mm)

Auto Switch Mounting Number	**D-M9□** **D-M9□V** **D-Y59□** **D-Y69□** **D-Y7P** **D-Y7PV**	**D-A9□** **D-A9□V** **D-Z7□** **D-Z80**	**D-Y7□W** **D-Y7□WV**	**D-M9□W** **D-M9□WV** **D-M9□A** **D-M9□AV**	**D-Y7BA**
1 pc.	5	5	10	10	15
2 pcs.	5	10	10	15	15

Operating Range

(mm)

Auto switch models	Bore size							
	20	**25**	**32**	**40**	**50**	**63**	**80**	**100**
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV**	4.5	4.5	4	7	5	5.5	7.5	11
D-Y59□/Y69□ **D-Y7□/Y7□V** **D-Y7□W/Y7□WV** **D-Y7BA**	—	—	8	9.5	11.5	11.5	16	17
D-A9□/A9□V	12	11	9	9.5	—	11.5	15	17
D-Z7□/Z80	—	—	9.5	11	12	14	16	20

Note) D-A9□/A9□V models cannot be mounted on ø50

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

For ø32 to ø100, besides the models listed in "How to Order," the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

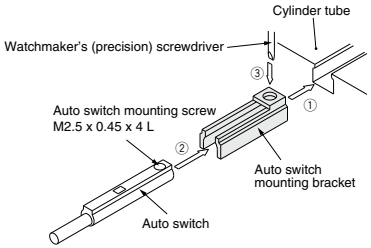
Auto switch type	Part no.	Electrical entry	Features
Solid state	D-Y69A, Y69B, Y7PV	Grommet (perpendicular)	—
	D-Y7NWV, Y7PWV, Y7BWV		Diagnostic indication (2-color display)
	D-Y59A, Y59B, Y7P	Grommet (in-line)	—
	D-Y7NW, Y7PW, Y7BW		Diagnostic indication (2-color display)
	D-Y7BA		Water resistant (2-color display)
Reed	D-Z73, Z76	Grommet (in-line)	—
	D-Z80		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Refer to pages 1494 and 1495 for details.
∗ Normally closed (N.C. = b contact), solid state auto switches (D-F9G, F9H, Y7G, Y7H) are also available. For details, refer to pages 1463 and 1465.

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ····· D-M9N(V), D-M9P(V), D-M9B(V), D-M9NW(V), D-M9PW(V), D-M9BW(V) D-M9NA(V), D-M9PA(V), D-M9BA(V)
Reed ····· D-A90(V), D-A93(V), D-A96(V)



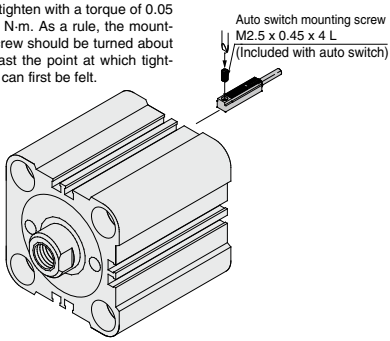
1. Insert the auto switch mounting bracket into the auto switch mounting groove to set it roughly to the auto switch mounting position.
2. Insert the auto switch into the attachment part of the auto switch mounting bracket.
3. After confirming the detecting position, secure the auto switch by tightening the set screw (M2.5) attached to the auto switch.
4. When changing the detecting position, carry out in the state of 2.

Note) When tightening the auto switch mounting screw, use a watchmaker's screw driver with a grip diameter of 5 to 6 mm.
Also, tighten with a torque of 0.1 to 0.15 N·m. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.

<Applicable auto switch>

Solid state ····· D-Y59$^{A}_{B}$, D-Y69$^{A}_{B}$, D-Y7P(V) D-Y7NW(V), D-Y7PW(V), D-Y7BW(V) D-Y7BA
Reed ····· D-Z73, D-Z76, D-Z80

Note) When tightening the auto switch mounting screw, use a watchmaker's screw driver with a grip diameter of 5 to 6 mm.
Also, tighten with a torque of 0.05 to 0.1 N·m. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.



1. Insert the auto switch into the mounting groove and set it at the auto switch mounting position.
2. After reconfirming the detecting position, tighten the mounting screw to secure the auto switch.
3. Modification of the detecting position should be made in the condition of 1.

Simple Specials

These changes are dealt with Simple Specials System.

Made to Order

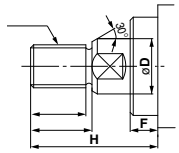
1 Change of Rod End Shape

Symbol: **-XA1/2/7/18/20/22/31/32/33/34**

CH (D) KD | Mounting type | Bore size | Rod size series | – | Stroke | Suffix for auto switch | – X | A0

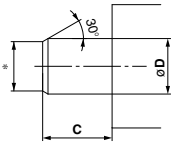
Indicate the rod end shape pattern symbol

A0

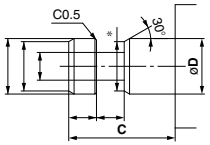


Note) Male thread effective length should be no more than 100 mm.

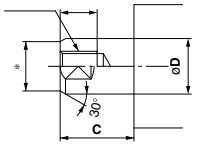
A1



A2

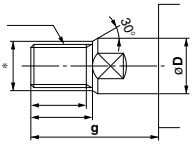


A7



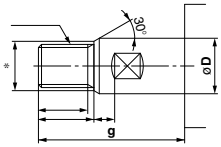
Note) Male thread effective length should be no more than 100 mm.

A18



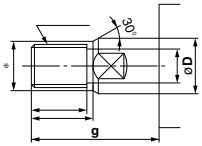
Note) Male thread effective length should be no more than 100 mm.

A20



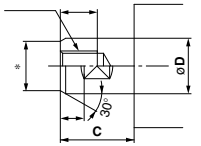
Note) Male thread effective length should be no more than 100 mm.

A22



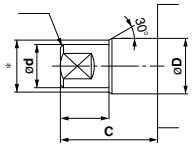
Note) Male thread effective length should be no more than 100 mm.

A31

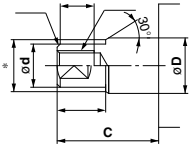


Note) Female thread effective depth should be no more than twice the thread diameter.

A32

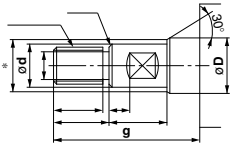


A33



Note) Female thread effective depth should be no more than twice the thread diameter.

A34



Note) Male thread effective length should be no more than 100 mm.

Note 1) Dimensions indicated with an asterisk (*) in the patterns A1, A2, A18, A20, A22, A31, A32, A33, and A34 are provided in the table below.

Note 2) The tolerance and finish values not indicated in the figures above are the same as for standard products, or may be at the discretion of SMC.

Pattern	Dimension for *
A1	øD-2
A2	
A7	
A18	
A20	
A22	
A31	
A32	
A33	
A34	

If dimensions other than the above are necessary, please indicate as such.

Made to Order Specifications 1

Please consult with SMC for detailed specifications, delivery and prices.

Made to Order

2 Series CHQHB (14 MPa) Interchangeable Parts

Symbol
-XC61

CH□KDB | Bore size | – | Stroke | Rod end thread type | – | Auto switch | Suffix for auto switch | – **XC61** | □

CH□QHB interchangeable parts

Interchangeable contents	Overall length End thread size

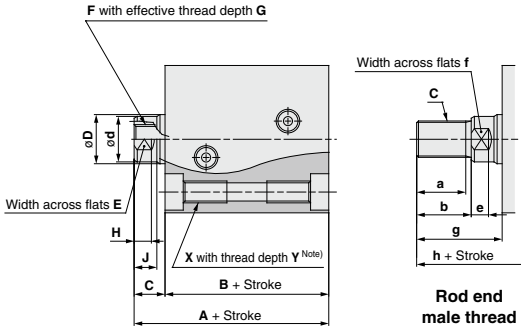
Cylinder mounting

Nil	Through hole
R	Front taps
H	Rear taps
W	Double side taps

∗ Built-in spacer types are required for intermediate strokes.
(Example) The overall length of the cylinder tube for CHDKDB50-60-XC61, is equivalent to 75 strokes.

Dimensions

CH□KDB□-□-XC61□



Bore size (mm)	A	B	C	D	d	E	F	G	H	J	X	Y
20	53	43	10	12	11	10	M6 x 1	8	5.5	6.5	M6 x 1	12
25	56	45	11	14	13	12	M8 x 1.25	10	6.5	7.5	M6 x 1	12
32	63	51	12	18	15	13	M10 x 1.5	12	7	8.5	M8 x 1.25	16
40	69	55	14	22.4	19	16	M12 x 1.75	15	8	10	M10 x 1.5	20
50	75	60	15	28	24	21	M16 x 2	20	9.5	11.5	M12 x 1.75	24
63	85	67	18	35.5	31	27	M20 x 2.5	24	11.5	14	M16 x 2	24
80	99	78	21	45	39	36	M27 x 3	33	15	17	M18 x 2.5	27
100	122	96	26	56	48	41	M30 x 3.5	36	17.5	22	M20 x 2.5	30

Rod end male threads

Bore size (mm)	a	b	c	e	f	g	h
20	12	14	M8 x 1	5.5	10	24	67
25	14.5	17	M10 x 1.25	6.5	12	28	73
32	17.5	20	M12 x 1.25	7	13	32	83
40	22	25	M16 x 1.5	8	16	39	94
50	27	30	M20 x 1.5	9.5	21	45	105
63	32	35	M24 x 1.5	11.5	27	53	120
80	40	43	M30 x 1.5	15	36	64	142
100	47	50	M39 x 1.5	17.5	41	76	172

Part no. suffix	X & Y dimensions
-XC61	None
-XC61R	4 places on front side
-XC61H	4 places on rear side
-XC61W	8 places on both sides

Note) The relationship between the mounting taps (X and Y dimensions) provided on cylinder tubes and their order numbers is as shown above.

Made to Order Specifications 2

Please consult with SMC for detailed specifications, delivery and prices.

Made to Order

Symbol

3 Intermediate Stroke Type (Built-in spacer type) -XC63

Intermediate strokes in 5mm increments can be manufactured by installing spacers inside standard stroke cylinders.

CH□KDB Bore size – Stroke Rod end thread type – Auto switch Suffix for auto switch – **XC63**

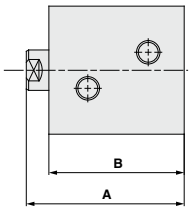
CH□KDL Bore size – Stroke Rod end thread type – Auto switch Suffix for auto switch – **XC63**

Intermediate stroke

Bore size (mm)	Applicable stroke	Applicable cylinder tube
32	55, 60, 65, 70	For 75 mm stroke
40 **50** **63**	55, 60, 65, 70	For 75 mm stroke
80 **100**	80, 85, 90, 95	For 100 mm stroke

Dimensions

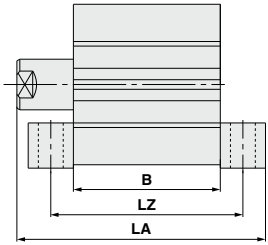
CH□KDB□-□-XC63



Bore size (mm) \ Stroke	55, 60, 65, 70		80, 85, 90, 95	
	A	**B**	**A**	**B**
32	136	126	—	—
40	140	130	165	155
50	146	135	171	160
63	155	142	180	167
80	170	153	195	178
100	197	171	222	196

Note) Dimensions other than those highlighted above are standard.

CH□KDL□-□-XC63



Bore size (mm) \ Stroke	55, 60, 65, 70			80, 85, 90, 95		
	LA	**B**	**LZ**	**LA**	**B**	**LZ**
32	161	126	142	—	—	—
40	173	130	150	198	155	175
50	186	135	159	211	160	184
63	205	142	172	230	167	197
80	226	153	188	251	178	213
100	254	171	211	279	196	236

Made to Order Specifications 3

Please consult with SMC for detailed specifications, delivery and prices.

Made to Order

Symbol

4 With Air Release Valve -XC64

Air release valves are provided on cylinder tube surfaces machined for ports.

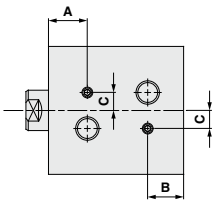
CH□KDB | Bore size | – | Stroke | Rod end thread type | – | Auto switch | Suffix for auto switch | – | XC64

CH□KDL | Bore size | – | Stroke | Rod end thread type | – | Auto switch | Suffix for auto switch | – | XC64

With air release valve

Dimensions

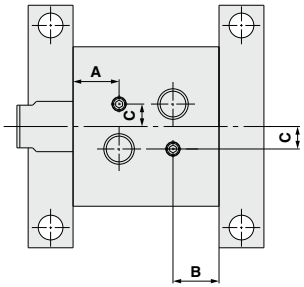
CH□KDB□-□-XC64



Bore size (mm)	A	B	C
20	16.5	14.5	7
25	17	15	8
32	19.5	17	10
40	20.5	17.5	10
50	22	19.5	10
63	25.5	22	10
80	30	26.5	15
100	36	33	15

Note) Dimensions other than those highlighted above are standard.

CH□KDL□-□-XC64



Compact Hydraulic Cylinder

Series CH□KG

16 MPa

ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

How to Order

CHKG B 32 □ - 30 □ - □

With Auto Switch **CHDKG B 32 □ - 30 □ - M9BW □ - □**

With auto switch (built-in magnet)

Mounting bracket style

Symbol	Style	Port position Note)
B	Basic style	—
L	Foot style	Top / Foot bracket
LB		Right
LD		Left

Note) Indicates the relative position of the foot bracket and port, as seen from the rod side.

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT

Cylinder stroke (mm)

Refer to the standard stroke table on page 1300.

Rod end thread type

Nil	Female thread
M	Male thread

∗ Rod end thread type is an optional product. (Refer to page 1301).

Auto switch type

Nil	Without auto switch

∗ Select applicable auto switch models from the table below.

Number of auto switches

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

Made to Order specifications

For details, refer to page 1300.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDKGB50-100

Applicable Auto Switches/Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular ø20, ø25	Perpendicular ø32 to ø100	In-line ø20, ø25	In-line ø32 to ø100	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)	5 V, 12 V	—	M9NV		M9N		●	●	●	○	○	IC circuit	Relay PLC
				3-wire (PNP)			M9PV		M9P		●	●	●	○	○		
				2-wire	12 V		M9BV		M9B		●	●	●	○	○	—	
	Diagnostic indication (2-color display)			3-wire (NPN)	5 V, 12 V		M9NWV		M9NW		●	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PWV		M9PW		●	●	●	○	○		
				2-wire	12 V		M9BWV		M9BW		●	●	●	○	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V,12 V		M9NAV∗1		M9NA∗1		○	○	●	○	○	IC circuit	
				3-wire (PNP)			M9PAV∗1		M9PA∗1		○	○	●	○	○		
				2-wire	12 V		M9BAV∗1		M9BA∗1		○	○	●	○	○	—	
Reed auto switch	——	Grommet	Yes	3-wire (NPN)	5 V	—	A96V	—	A96	Z76	●	—	●	—	—	IC circuit	—
				2-wire	12 V	100 V	A93V∗2	—	A93	—	●	●	●	●	—	—	Relay PLC
			No			100 V or less	—	—	—	Z73	●	—	●	●	—		
							A90V	—	A90	Z80	●	—	●	—	—	IC circuit	

∗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.

∗2 1 m type lead wire is only applicable to D-A93.

∗ 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 "○" are produced upon receipt of order.

∗ For ø32 to ø100, there are applicable auto switches other than listed. Refer to page 1308 for details.

∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.

∗ Cylinders with auto switch will be shipped together with the auto switch and auto switch mounting bracket (ø32 to ø50) (not assembled).

Specifications

Bore size (mm)	20	25	32	40	50	63	80	100
Action	Double acting/Single rod type							
Fluid	Hydraulic fluid							
Nominal pressure	16 MPa							
Proof pressure	24 MPa							
Maximum allowable pressure	16 MPa							
Minimum operating pressure	0.3 MPa							
Ambient and fluid temperature	Without auto switch: –10° to 80°C							
	With auto switch: –10° to 60°C							
Piston speed	8 to 100 mm/s							
Cushion	None							
Rod end thread	Female thread, Male thread							
Stroke length tolerance	$^{+0.8}_{0}$ mm							
Mounting style	Basic style (through hole), Foot style							

Note) Refer to page 1234 for definitions of terms related to pressure.

Made to Order

Made to Order specifications
(For details, refer to pages 1310 to 1313)

Symbol	Specifications
-XA□	Change of rod end shape
-XC62	Compatible with series CHQHB series (14 MPa)
-XC63	Intermediate stroke type (Built-in spacer type)
-XC64	With air release valve

Standard Strokes

Bore size (mm) \ Stroke (mm)	5	10	15	20	25	30	35	40	45	50	75	100	125	150	175
20, 25	○	○	○	○	○	○	○	○	○	○	○	○	—	—	—
32	○	○	○	○	○	○	○	○	○	○	○	○	○	○	—
40, 50, 63 80, 100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Bore size (mm) \ Stroke (mm)	75					100					125				
	Intermediate stroke [XC63] (Built-in spacer type)					Intermediate stroke [XC63] (Built-in spacer type)					Intermediate stroke [XC63] (Built-in spacer type)				
	55	60	65	70		80	85	90	95		105	110	115	120	
20, 25	□	□	□	□	○	□	□	□	□	○	—	—	—	—	—
32	□	□	□	□	○	□	□	□	□	○	□	□	□	□	○
40, 50, 63 80, 100	□	□	□	□	○	□	□	□	□	○	□	□	□	□	○

Bore size (mm) \ Stroke (mm)	150					175				
	Intermediate stroke [XC63] (Built-in spacer type)					Intermediate stroke [XC63] (Built-in spacer type)				
	130	135	140	145		155	160	165	170	
20, 25	—	—	—	—	—	—	—	—	—	—
32	□	□	□	□	○	—	—	—	—	—
40, 50, 63 80, 100	□	□	□	□	○	□	□	□	□	○

○: Standard stroke (dedicated cylinder tube)
□: Intermediate stroke XC63 (built-in spacer type)

Manufacture of Intermediate Stroke Cylinders [XC63] (Built-in spacer type)

Intermediate strokes in 5 mm increments can be manufactured by installing spacers inside standard stroke cylinders.
55, 60, 65 and 70 mm stroke cylinders have the same overall length as a 75 mm stroke cylinder, and 80, 85, 90 and 95 mm stroke cylinders have the same length as a 100 mm stroke cylinder, 105, 110, 115 and 120 mm stroke cylinders, have the same overall length as a 125 mm stroke cylinder, 130, 135, 140 and 145 mm stroke cylinders have the same overall length as a 150 mm stroke cylinder, 155, 160, 165 and 170 mm stroke cylinders have the same overall length as a 175 mm stroke cylinder.
Refer to the Made to Order Specifications on page 1312 for the ordering procedure.

Hydraulic Fluid Compatibility

Hydraulic fluid	Compatibility
Standard mineral hydraulic fluid	Compatible
W/O hydraulic fluid	Compatible
O/W hydraulic fluid	Compatible
Water/Glycol hydraulic fluid	*
Phosphate hydraulic fluid	Not compatible

* Consult with SMC.

Theoretical Output

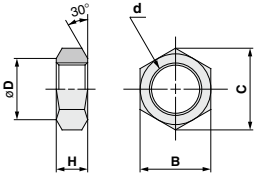
Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)			
				3.5	7	10	16
20	12	OUT	314	1099	2198	3140	5024
		IN	201	704	1407	2010	3216
25	14	OUT	490	1715	3430	4900	7840
		IN	336	1176	2352	3360	5376
32	18	OUT	804	2814	5628	8040	12864
		IN	549	1922	3843	5490	8784
40	22.4	OUT	1256	4396	8792	12560	20096
		IN	862	3017	6034	8620	13792
50	28	OUT	1963	6871	13741	19630	31408
		IN	1347	4715	9429	13470	21552
63	35.5	OUT	3117	10910	21819	31170	49872
		IN	2127	7445	14889	21270	34032
80	45	OUT	5026	17591	35182	50260	80416
		IN	3436	12026	24052	34360	54976
100	56	OUT	7853	27486	54971	78530	125648
		IN	5390	18865	37730	53900	86240

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Optional Parts

Rod end nut



(mm)

Part no.	Bore size (mm)	B	C	d	D	H
NTH-020	**20**	13	15	M8 x 1	12.5	5
NTH-025	**20**	17	19.6	M10 x 1.25	16.5	6
NTH-032	**25**	19	21.9	M12 x 1.25	18	7
NTH-040	**32**	22	25.4	M16 x 1.5	21	10
NTH-050	**40**	27	31.2	M20 x 1.5	26	12
NTH-060	**50**	32	37	M24 x 1.5	31	14
NTH-080	**63**	41	47.3	M30 x 1.5	40	17
NTH-100	**80**	55	63.5	M39 x 1.5	54	20
NTH-125	**100**	70	80.8	M48 x 1.5	69	26

Note) There may be a slight difference between the part numbers and the corresponding bore size.

Weight

CH□KGB/Basic style

Unit: g

Bore size (mm)	Standard stroke (mm)											
	5	10	15	20	25	30	35	40	45	50	75	100
20	221	242	263	284	305	326	347	368	389	410	—	—
25	312	339	366	393	420	447	474	501	528	555	—	—
32	581	625	669	713	757	801	845	889	933	977	1197	1417
40	927	986	1045	1104	1163	1222	1281	1340	1399	1458	1753	2048
50	1351	1430	1509	1588	1667	1746	1825	1904	1983	2062	2457	2852
63	1813	1936	2059	2182	2305	2428	2551	2674	2797	2920	3535	4150
80	3870	4053	4236	4419	4602	4785	4968	5151	5334	5517	6432	7347
100	7188	7457	7726	7995	8264	8533	8802	9071	9340	9609	10954	12299

CH□KGL/Foot style

Unit: g

Bore size (mm)	Standard stroke (mm)														
	5	10	15	20	25	30	35	40	45	50	75	100	125	150	175
20	465	490	515	535	560	580	605	625	650	670	785	890	—	—	—
25	585	610	640	670	700	725	755	785	815	840	985	1130	—	—	—
32	945	990	1040	1085	1130	1175	1220	1265	1310	1360	1585	1815	2045	2270	—
40	1580	1645	1705	1770	1830	1895	1955	2015	2080	2140	2455	2765	3075	3390	3700
50	2495	2580	2665	2750	2835	2915	3000	3085	3170	3255	3675	4095	4515	4935	5355
63	3900	4030	4160	4290	4420	4550	4685	4815	4945	5075	5730	6380	7035	7685	8340
80	7225	7420	7615	7805	8000	8195	8385	8580	8775	8965	9935	10990	11870	12835	13800
100	12425	12710	12990	13275	13555	13840	14120	14405	14685	14970	16385	17795	19210	20625	22035

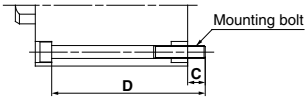
Mounting Bolts for CH□KGB

The mounting bolts shown below conform to JIS B 1176, strength class 10.9 or higher.

Through hole type mounting bolts are available.
Refer to the following for ordering procedures.
Order the actual number of bolts that will be used.

Example) CQ-M5x55L 4 pcs.

Mounting bolt diagram



Model	C	D	Mounting bolt part no.
CH□KGB20-5 (M)	12.4	55	CQ-M5 x 55L
-10 (M)		60	x 60L
-15 (M)		65	x 65L
-20 (M)		70	x 70L
-25 (M)		75	x 75L
-30 (M)		80	x 80L
-35 (M)		85	x 85L
-40 (M)		90	x 90L
-45 (M)		95	x 95L
-50 (M)		100	x 100L
-75 (M)		125	x 125L
-100 (M)		150	x 150L
CH□KGB25-5 (M)	10.4	55	CQ-M5 x 55L
-10 (M)		60	x 60L
-15 (M)		65	x 65L
-20 (M)		70	x 70L
-25 (M)		75	x 75L
-30 (M)		80	x 80L
-35 (M)		85	x 85L
-40 (M)		90	x 90L
-45 (M)		95	x 95L
-50 (M)		100	x 100L
-75 (M)		125	x 125L
-100 (M)		150	x 150L
CH□KGB32-5 (M)	10.5	65	CQ-M6 x 65L
-10 (M)		70	x 70L
-15 (M)		75	x 75L
-20 (M)		80	x 80L
-25 (M)		85	x 85L
-30 (M)		90	x 90L
-35 (M)		95	x 95L
-40 (M)		100	x 100L
-45 (M)		105	x 105L
-50 (M)		110	x 110L
-75 (M)		135	x 135L
-100 (M)		160	x 160L
-125 (M)		185	x 185L
-150 (M)		210	x 210L
CH□KGB40-5 (M)	13.5	75	CQ-M8 x 75L
-10 (M)		80	x 80L
-15 (M)		85	x 85L
-20 (M)		90	x 90L
-25 (M)		95	x 95L
-30 (M)		100	x 100L
-35 (M)		105	x 105L
-40 (M)		110	x 110L
-45 (M)		115	x 115L
-50 (M)		120	x 120L
-75 (M)		145	x 145L
-100 (M)		170	x 170L
-125 (M)		195	x 195L
-150 (M)		220	x 220L
-175 (M)		245	x 245L

Model	C	D	Mounting bolt part no.
CH□KGB50-5 (M)	15.5	80	CQ-M10 x 80L
-10 (M)		85	x 85L
-15 (M)		90	x 90L
-20 (M)		95	x 95L
-25 (M)		100	x 100L
-30 (M)		105	x 105L
-35 (M)		110	x 110L
-40 (M)		115	x 115L
-45 (M)		120	x 120L
-50 (M)		125	x 125L
-75 (M)		150	x 150L
-100 (M)		175	x 175L
-125 (M)		200	x 200L
-150 (M)		225	x 225L
-175 (M)		250	x 250L
CH□KGB63-5 (M)	16	85	CQ-M12 x 85L
-10 (M)		90	x 90L
-15 (M)		95	x 95L
-20 (M)		100	x 100L
-25 (M)		105	x 105L
-30 (M)		110	x 110L
-35 (M)		115	x 115L
-40 (M)		120	x 120L
-45 (M)		125	x 125L
-50 (M)		130	x 130L
-75 (M)		155	x 155L
-100 (M)		180	x 180L
-125 (M)		205	x 205L
-150 (M)		230	x 230L
-175 (M)		255	x 255L
CH□KGB80-5 (M)	22	100	CQ-M14 x 100L
-10 (M)		105	x 105L
-15 (M)		110	x 110L
-20 (M)		115	x 115L
-25 (M)		120	x 120L
-30 (M)		125	x 125L
-35 (M)		130	x 130L
-40 (M)		135	x 135L
-45 (M)		140	x 140L
-50 (M)		145	x 145L
-75 (M)		170	x 170L
-100 (M)		195	x 195L
-125 (M)		220	x 220L
-150 (M)		245	x 245L
-175 (M)		270	x 270L
CH□KGB100-5 (M)	26.5	120	CQ-M16 x 120L
-10 (M)		125	x 125L
-15 (M)		130	x 130L
-20 (M)		135	x 135L
-25 (M)		140	x 140L
-30 (M)		145	x 145L
-35 (M)		150	x 150L
-40 (M)		155	x 155L
-45 (M)		160	x 160L
-50 (M)		165	x 165L
-75 (M)		190	x 190L
-100 (M)		215	x 215L
-125 (M)		240	x 240L
-150 (M)		265	x 265L
-175 (M)		290	x 290L

⚠ Specific Product Precautions

Be sure to read before handling. Refer to front matter 38 for Safety Instructions, and pages 1234 to 1241 for precautions for hydraulic cylinder and auto switch.

Usage

⚠ Caution

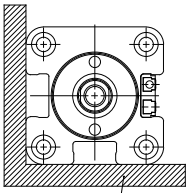
1. **Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting.**
2. **Since a lateral load (eccentric load) cannot be applied to the piston rod, build the mounting jig in such a way that a lateral load will not be applied to the piston rod.**
3. **Make sure that the interlocking length of the rod end thread (male or female thread) and the mounting material is at least 80% of the thread diameter.**
4. **When operating a cylinder for the first time, be sure to relase the air inside the cylinder and the piping. When the air release is complete, operate the cylinder at reduced pressure, then gradually increase it to the normal operating pressure.**

Body mounting bolt tightening torques

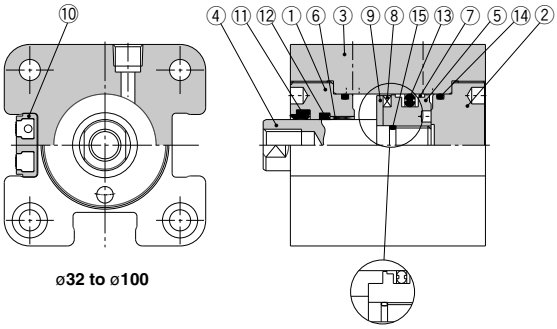
Bore size (mm)	Mounting bolt size	Tightening torque (N·m)
20	M5	3.0
25	M5	4.9
32	M6	10
40	M8	20
50	M10	40
63	M12	50
80	M14	80
100	M16	120

5. **Since Series CH□KGB does not have an air release plug, release air from other components (e.g. from piping, etc.) as well.**
6. **Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.**
7. **When the cylinder head side contains hydraulic fluid or is in a normally pressurized condition, the applied load must not be allowed to strike the piston rod end. Avoid such applications.**
8. **When mounting the cylinder body with mounting bolts, use tightening torques in the table at left as a guide.**

Consult with SMC when using a cylinder in close proximity to a magnetic body (including proximity on any side) as shown in the figure below, as the operation of auto switches may become unstable.

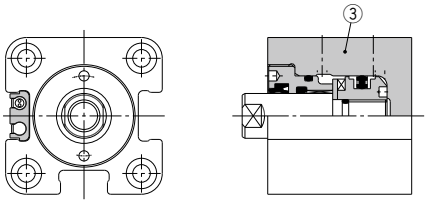


Construction



ø32 to ø100

Without auto switch



ø20 to ø25

Parts List

No.	Description	Material		Note
1	**Rod cover**	Aluminum alloy		Black anodized
2	**Head cover**	Aluminum alloy		Black anodized
3	**Cylinder tube**	Aluminum alloy		Hard anodized
4	**Piston rod**	ø20, ø25	Stainless steel	Hard chromium electroplated
		ø32 to ø100	Carbon steel	
5	**Piston**	Stainless steel		
6	**Bushing**	Copper alloy		
7	**Back-up ring**	Resin		
8	**Magnet**	—		With auto switch only
9	**Magnet plate**	Stainless steel		With auto switch only
10	**Switch mounting bracket**	Aluminum alloy		With auto switch only
11	**Scraper**	NBR		
12	**Rod seal**			With back-up ring
13	**Piston seal**			
14	**Tube gasket**			
15	**Piston gasket**			

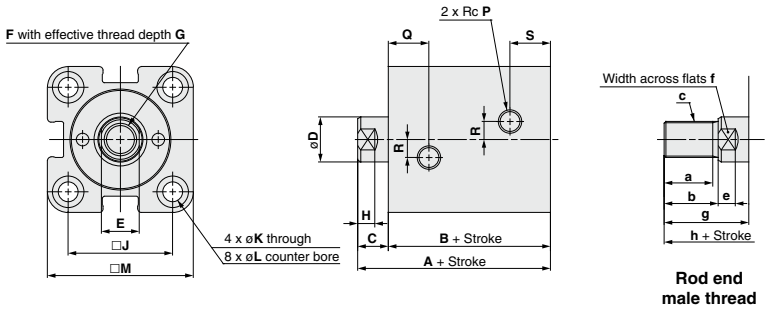
Replacement Parts/Seal kit

Bore size (mm)	Seal kit no.	Content
20	CHKG20-PS	Nos. ⑦, ⑪, ⑫, ⑬ and ⑭ from the chart at left
25	CHKG25-PS	
32	CHKG32-PS	
40	CHKG40-PS	
50	CHKG50-PS	
63	CHKG63-PS	
80	CHKG80-PS	
100	CHKG100-PS	

* Seal kit consists of items ⑦, ⑪, ⑫, ⑬ and ⑭ and can be ordered by using the seal kit number for each bore size.
* Special tools are necessary for disassembly. Contact SMC for recommended tool designs and dimensions. Furthermore, ø80 and ø100 are tightened with a large tightening torque, so disassembly will be difficult. Contact SMC if disassembly is required.

Dimensions

Basic style/CH□KGB



(mm)

Bore size (mm)	A	B	C	D	E	F	G	H	J	K	L	M	P	Q	R	S
20	51	43	8	12	10	M8 x 1.25	10	6	30	5.5	9.5 depth 5.4	43	1/8	16.5	6	11.5
25	53	45	8	14	12	M10 x 1.5	12	6	36	5.5	9.5 depth 5.4	49	1/8	17	8	12
32	66	56	10	18	14	M12 x 1.75	15	7	47	6.6	11 depth 6.5	63	1/4	19.5	10	19.5
40	75	65	10	22.4	19	M16 x 2	20	7	52	9	14 depth 8.6	71	1/4	21.5	10	21.5
50	81	70	11	28	24	M20 x 2.5	24	8	58	11	17.5 depth 10.8	81	1/4	24	10	24
63	90	77	13	35.5	30	M27 x 3	33	9	69	13	20 depth 13	100	1/4	27.5	10	27.5
80	105	88	17	45	41	M30 x 3.5	36	14	86	15	23 depth 15.2	121	3/8	31	15	31
100	132	106	26	56	50	M39 x 4	45	21	106	17	26 depth 17.5	146	3/8	36	15	36

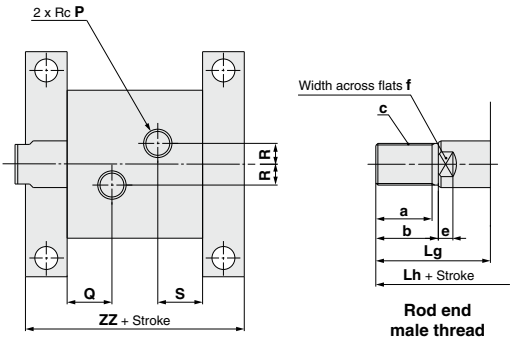
Note 1) Body dimensions are the same with or without auto switches.

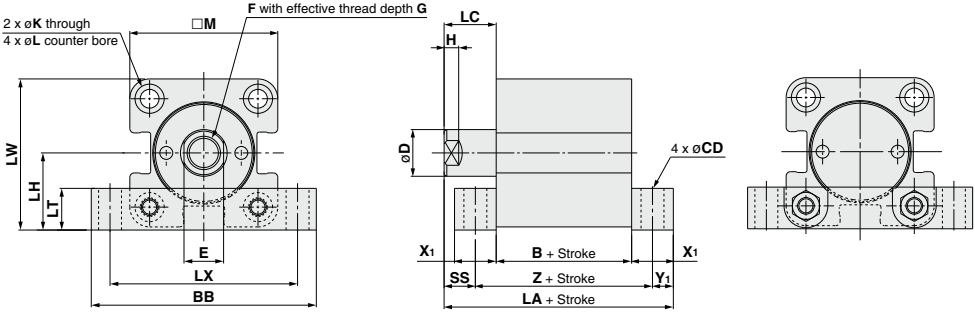
Rod end male threads (mm)

Bore size (mm)	a	b	c	e	f	g	h
20	12.5	15	M10 x 1.25	6	10	23	66
25	15.5	18	M12 x 1.25	6	12	26	71
32	22	25	M16 x 1.5	7	14	35	91
40	27	30	M20 x 1.5	7	19	40	105
50	32	35	M24 x 1.5	8	24	46	116
63	42	45	M30 x 1.5	9	30	58	135
80	57	60	M39 x 1.5	14	41	77	165
100	72	75	M48 x 1.5	21	50	101	207

Dimensions

Foot style/CH□KGL





(mm)

Bore size (mm)	LA	B	BB	LC	CD	D	E	F	G	H	K	L	LH	LT	LX	LW
20	76	43	70	18	6.6	12	10	M8 x 1.25	10	6	5.5	9.5 depth 5.4	23	15	58	44.5
25	78	45	76	18	6.6	14	12	M10 x 1.5	12	6	5.5	9.5 depth 5.4	26	15	64	50.5
32	91	56	94	19	9	18	14	M12 x 1.75	15	7	6.6	11 depth 6.5	33	16	79	64.5
40	108	65	108	23	11	22.4	19	M16 x 2	20	7	9	14 depth 8.6	37	20	90	72.5
50	121	70	126	27	14	28	24	M20 x 2.5	24	8	11	17.5 depth 10.8	43	24	104	83.5
63	140	77	146	33	16	35.5	30	M27 x 3	33	9	13	20 depth 13	52	30	121	102
80	161	88	172	38	18	45	41	M30 x 3.5	36	14	15	23 depth 15.2	63	35	144	123.5
100	189	106	208	43	22	56	50	M39 x 4	45	21	17	26 depth 17.5	76	40	174	149

Note 1) Body dimensions are the same with or without auto switches.

(mm)

Bore size (mm)	M	P	Q	R	S	SS	X_1	Y_1	Z	ZZ
20	43	1/8	16.5	6	11.5	10.5	15	7.5	58	73
25	49	1/8	17	8	12	10.5	15	7.5	60	75
32	63	1/4	19.5	10	19.5	11	16	8	72	88
40	71	1/4	21.5	10	21.5	13	20	10	85	105
50	81	1/4	24	10	24	15	24	12	94	118
63	100	1/4	27.5	10	27.5	18	30	15	107	137
80	121	3/8	31	15	31	20.5	35	17.5	123	158
100	146	3/8	36	15	36	23	40	20	146	186

Rod end male threads

(mm)

Bore size (mm)	a	b	c	e	f	Lg	Lh
20	12.5	15	M10 x 1.25	6	10	33	91
25	15.5	18	M12 x 1.25	6	12	36	96
32	22	25	M16 x 1.5	7	14	44	116
40	27	30	M20 x 1.5	7	19	53	138
50	32	35	M24 x 1.5	8	24	62	156
63	42	45	M30 x 1.5	9	30	78	185
80	57	60	M39 x 1.5	14	41	98	221
100	72	75	M48 x 1.5	21	50	118	264

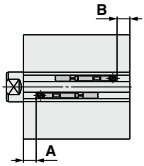
Series CH□KG
Auto Switch Specifications

Refer to pages 1451 to 1510 for detailed specifications.

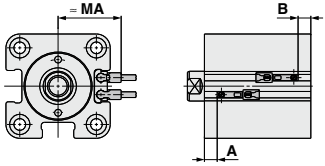
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

ø20, ø25

D-M9□
D-M9□W
D-M9□A
D-A9□

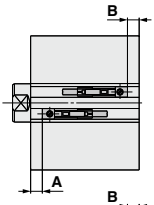


D-M9□V
D-M9□WV
D-M9□AV
D-A9□V

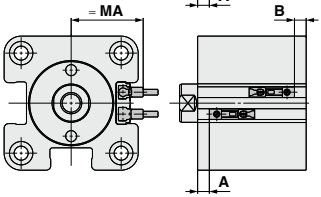


ø32 to ø100

D-M9□ **D-Y5□**
D-M9□W **D-Y7□**
D-M9□A **D-Y7□W**
D-A9□ **D-Y7BA**
D-Z7□
D-Z80



D-M9□V
D-M9□WV
D-M9□AV
D-Y6□
D-Y7□V
D-Y7□WV
D-A9□V



Auto Switch Proper Mounting Positions

(mm)

Bore size (mm)	Solid state auto switch				Reed auto switch			
	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-Y59□/Y69□ D-Y7□/Y7□V D-Y7□W/Y7□WV D-Y7BA		D-A9□/A9□V		D-Z7□/Z80	
	A	B	A	B	A	B	A	B
20	16	15	—	—	12	11	—	—
25	17	16	—	—	13	12	—	—
32	18.5	23	13.5	18	—	—	13.5	18
40	24	26.5	19	21.5	—	—	19	21.5
50	24	31.5	19	26.5	—	—	19	26.5
63	26.5	36	21.5	31	—	—	21.5	31
80	29.5	44	24.5	39	—	—	24.5	39
100	39.5	51.5	34.5	46.5	—	—	34.5	46.5

Note 1) D-A9□/A9□V models cannot be mounted on ø32 to ø100.
Note 2) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Heights

(mm)

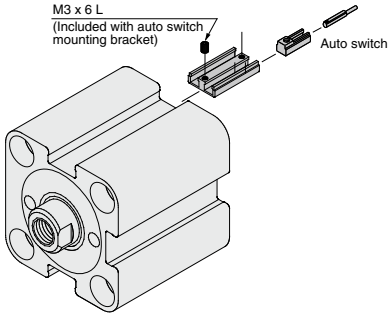
Bore size (mm)	D-M9□ D-M9□W D-M9□A D-A9□	D-M9□V D-M9□WV D-M9□AV	D-A9□V	D-Y59□ D-Y7P D-Y7□W D-Y7BA D-Z7□ D-Z80	D-Y69□ D-Y7PV D-Y7□WV
	U	U	U	U	U
20	22	28	25.5	—	—
25	24.5	30	27.5	—	—
32	31.5	34.5	—	31.5	31.5
40	35.5	39	—	35.5	36
50	40.5	45	—	40.5	42
63	50	53.5	—	50	50.5
80	60.5	64	—	60.5	61
100	73	76.5	—	73	73.5

∗ D-A9□/A9□V models cannot be mounted on ø32 to ø100.

Auto Switch Mounting Brackets: Part Nos.

Auto switch models	Bore size (mm)	
	ø20, 25	ø32 to ø100
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV** **D-A9□/A9□V**	BHK1-020	Note1) ①BHK2-032 ②BMG2-012
D-Y59□/Y69□ **D-Y7□/Y7□V** **D-Y7□W/Y7□WV** **D-Y7BA** **D-Z7□/Z80**	—	BHK2-032

Note 1) Two types of mounting brackets are used as a set.
Note 2) D-A9□/A9□V models cannot be mounted on ø32 to ø100.



Minimum Auto Switch Mounting Stroke

(mm)

Auto Switch Mounting Number	D-M9□ D-M9□V D-Y59□ D-Y69□ D-Y7P D-Y7PV	D-A9□ D-A9□V D-Z7□ D-Z80	D-Y7□W D-Y7□WV	D-M9□W D-M9□WV D-M9□A D-M9□AV	D-Y7BA
1 pc.	5	5	10	10	15
2 pcs.	5	10	10	15	15

Operating Range

(mm)

Auto switch models	Bore size							
	20	25	32	40	50	63	80	100
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV**	6	5.5	4.5	5.5	5.5	6.5	8.5	9.5
D-Y59□/Y69□ **D-Y7□/Y7□V** **D-Y7□W/Y7□WV** **D-Y7BA**	—	—	8	9.5	11.5	11.5	16	17
D-A9□/A9□V	12	11	—	—	—	—	—	—
D-Z7□/Z80	—	—	9.5	11	12	14	16	20

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

For ø32 to ø100, besides the models listed in "How to Order," the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

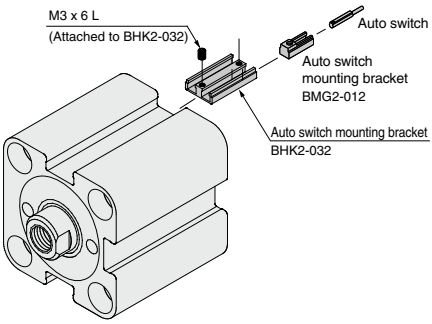
Auto switch type	Part no.	Electrical entry	Features
Solid state	D-Y69A, Y69B, Y7PV	Grommet (Perpendicular)	—
	D-Y7NWV, Y7PWV, Y7BWV		Diagnostic indication (2-color display)
	D-Y59A, Y59B, Y7P	Grommet (In-line)	—
	D-Y7NW, Y7PW, Y7BW		Diagnostic indication (2-color display)
	D-Y7BA		Water resistant (2-color display)
Reed	D-Z73, Z76	Grommet (In-line)	—
	D-Z80		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Refer to pages 1494 and 1495 for details.
∗ Normally closed (N.C. = b contact), solid state auto switches (D-F9G, F9H, Y7G, Y7H) are also available. For details, refer to pages 1463 and 1465.

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ..... D-M9N(V), D-M9P(V), D-M9B(V)
D-M9NW(V), D-M9PW(V), D-M9BW(V)
D-M9NA(V), D-M9PA(V), D-M9BA(V)
Reed ..... D-A90(V), D-A93(V), D-A96(V)

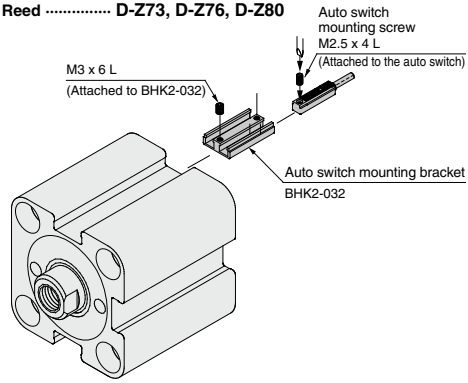


1. Set BMG2-012 into the auto switch mounting bracket (BHK2-032).
2. Set the auto switch into the auto switch mounting part of BMG2-012, then insert it into the cylinder's auto switch installing groove.
3. In the above state, set the approximate auto switch mounting sections, then, using a hexagonal wrench, tighten the mounting screw (M3 x 6L) that is an accessory to BHK-032.
4. After confirming the detecting position, tighten the mounting screw (M2.5) for the auto switch to keep it in place.

When tightening the auto switch mounting screw, use a watchmaker's screw driver with a grip diameter of 5 to 6 mm. When tightening the mounting bracket screw included with BHK-032, use a 1.5 mm hexagon wrench.
Also, tighten with a torque of 0.1 to 0.15 N·m. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.

<Applicable auto switch>

Solid state ..... D-Y59$^{A}_{B}$, D-Y69$^{A}_{B}$, D-Y7P(V)
D-Y7NW(V), D-Y7PW(V), D-Y7BW(V)
D-Y7BA
Reed D-Z73, D-Z76, D-Z80



When tightening the auto switch mounting screw, use a watchmaker's screw driver with a grip diameter of 5 to 6 mm. When tightening the mounting bracket screw, use a 1.5 mm hexagon wrench.
Also, tighten with a torque of 0.1 to 0.15 N·m. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.

Made to Order

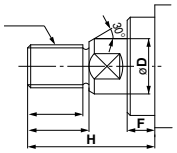
1 Change of Rod End Shape

Symbol
-XA1/2/7/18/20/22/31/32/33/34

CH (D) KG | Mounting type | Bore size | Rod size series | – | Stroke | Suffix for auto switch | – X | A0 |

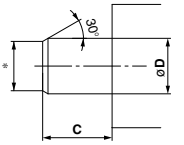
Indicate the rod end shape pattern symbol

A0

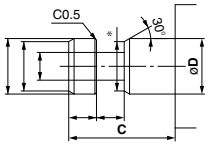


Note) Male thread effective length should be no more than 100 mm.

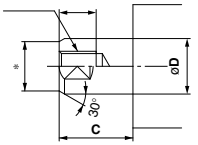
A1



A2

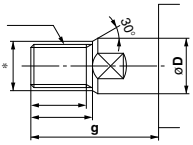


A7



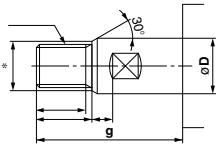
Note) Male thread effective length should be no more than 100 mm.

A18



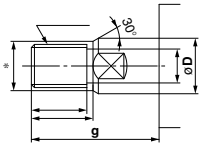
Note) Male thread effective length should be no more than 100 mm.

A20



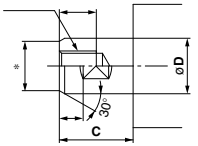
Note) Male thread effective length should be no more than 100 mm.

A22



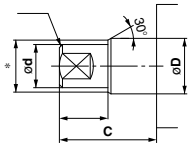
Note) Male thread effective length should be no more than 100 mm.

A31

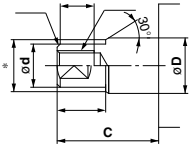


Note) Female thread effective depth should be no more than twice the thread diameter.

A32

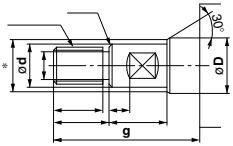


A33



Note) Female thread effective depth should be no more than twice the thread diameter.

A34



Note) Male thread effective length should be no more than 100 mm.

Note 1) Dimensions indicated with an asterisk (*) in the patterns A1, A2, A7, A18, A20, A22, A31, A32, A33, and A34 are provided in the table below.

Note 2) The tolerance and finish values not indicated in the figures above are the same as for standard products, or may be at the discretion of SMC.

Pattern	Dimension for *
A1	øD-2
A2	
A7	
A18	
A20	
A22	
A31	
A32	
A33	
A34	

If dimensions other than the above are necessary, please indicate as such.

SMC

Made to Order Specifications 1

Please consult with SMC for detailed specifications, delivery and prices.

Made to Order

2 Series CHQHB (14 MPa) Interchangeable Parts

Symbol **-XC62**

CH□KGB | Bore size | – | Stroke | Rod end thread type | – | Auto switch | Suffix for auto switch | – **XC62** | □

CH□QHB Interchangeable parts Note)

Interchangeable contents	Piston rod C dimension End thread size F dimension

Note) The interchangeable contents are the "C" dimension (from the front end surface to the rod end) and the "F" dimension (rod end thread size).

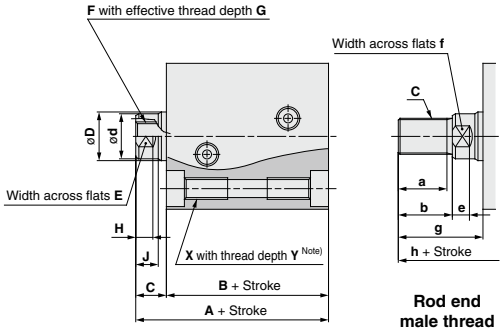
Cylinder mounting

Nil	Through hole
R	Front taps
H	Rear taps
W	Double side taps

∗ Built-in spacer types are required for intermediate strokes.
(Example) The overall length of the cylinder tube for CHDKGB50-60-XC62, is equivalent to 75 strokes.

Dimensions

CH□KGB□-□-XC62□



Bore size (mm)	A	B	C	D	d	E	F	G	H	J	X	Y
20	53	43	10	12	11	10	M6 x 1	8	5.5	6.5	M6 x 1	12
25	56	45	11	14	13	12	M8 x 1.25	10	6.5	7.5	M6 x 1	12
32	68	56	12	18	15	13	M10 x 1.5	12	7	8.5	M8 x 1.25	16
40	79	65	14	22.4	19	16	M12 x 1.75	15	8	10	M10 x 1.5	20
50	85	70	15	28	24	21	M16 x 2	20	9.5	11.5	M12 x 1.75	24
63	95	77	18	35.5	31	27	M20 x 2.5	24	11.5	14	M16 x 2	24
80	109	88	21	45	39	36	M27 x 3	33	15	17	M18 x 2.5	27
100	132	106	26	56	48	41	M30 x 3.5	36	17.5	22	M20 x 2.5	30

Rod end male threads

Bore size (mm)	a	b	c	e	f	g	h
20	12	14	M8 x 1	5.5	10	24	67
25	14.5	17	M10 x 1.25	6.5	12	28	73
32	17.5	20	M12 x 1.25	7	13	32	88
40	22	25	M16 x 1.5	8	16	39	104
50	27	30	M20 x 1.5	9.5	21	45	115
63	32	35	M24 x 1.5	11.5	27	53	130
80	40	43	M30 x 1.5	15	36	64	152
100	47	50	M39 x 1.5	17.5	41	76	182

Part no. suffix	X & Y dimensions
-XC62	None
-XC62R	4 places on front side
-XC62H	4 places on rear side
-XC62W	8 places on both sides

Note) The relationship between the mounting taps (X & Y dimensions) provided on cylinder tubes and their order numbers is as shown above.

Made to Order Specifications 2

Made to Order

Please consult with SMC for detailed specifications, delivery and prices.

Symbol

3 Intermediate Stroke Type (Built-in spacer type) -XC63

Intermediate strokes in 5 mm increments can be manufactured by installing spacers inside standard stroke cylinders.

CH□KGB [Bore size] – [Stroke] [Rod end thread type] – [Auto switch] [Suffix for auto switch] – **XC63**

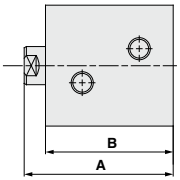
CH□KGL [Bore size] – [Stroke] [Rod end thread type] – [Auto switch] [Suffix for auto switch] – **XC63**

Intermediate stroke

Bore size (mm)	Applicable stroke	Applicable cylinder tube
32	55, 60, 65, 70	For 75 mm stroke
	80, 85, 90, 95	For 100 mm stroke
	105, 110, 115, 120	For 125 mm stroke
	130, 135, 140, 145	For 150 mm stroke
40 50 63 80 100	55, 60, 65, 70	For 75 mm stroke
	80, 85, 90, 95	For 100 mm stroke
	105, 110, 115, 120	For 125 mm stroke
	130, 135, 140, 145	For 150 mm stroke
	155, 160, 165, 170	For 175 mm stroke

Dimensions

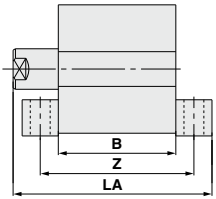
CH□KGB□-□-XC63



Bore size (mm) \ Stroke / Dimensions	55, 60, 65, 70		80, 85, 90, 95		105, 110, 115, 120		130, 135, 140, 145		155, 160, 165, 170	
	A	B	A	B	A	B	A	B	A	B
32	141	131	166	156	191	181	216	206	—	—
40	150	140	175	165	200	190	225	215	250	240
50	156	145	181	170	206	195	231	220	256	245
63	165	152	190	177	215	202	240	227	265	252
80	180	163	205	188	230	213	255	238	280	263
100	207	181	232	206	257	231	282	256	307	281

Note) Dimensions other than those highlighted above are standard.

CH□KGL□-□-XC63



Bore size (mm) \ Stroke	55, 60, 65, 70			80, 85, 90, 95			105, 110, 115, 120			130, 135, 140, 145			155, 160, 165, 170		
	LA	B	Z	LA	B	Z	LA	B	Z	LA	B	Z	LA	B	Z
32	166	131	147	191	156	172	216	181	197	241	206	222	—	—	—
40	183	140	160	208	165	185	233	190	210	258	215	235	283	240	260
50	196	145	169	221	170	194	246	195	219	271	220	244	296	245	269
63	215	152	182	240	177	207	265	202	232	290	227	257	315	252	282
80	236	163	198	261	188	223	286	213	248	311	238	273	336	263	298
100	264	181	221	289	206	246	314	231	271	339	256	296	364	281	321

Made to Order Specifications 3

Made to Order

Please consult with SMC for detailed specifications, delivery and prices.

Symbol

4 With Air Release Valve -XC64

Air release valves are provided on cylinder tube surfaces machined for ports.

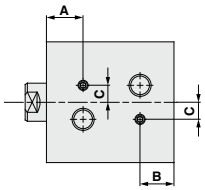
CH□KGB | Bore size | – | Stroke | Rod end thread type | – | Auto switch | Suffix for auto switch | – XC64

CH□KGL | Bore size | – | Stroke | Rod end thread type | – | Auto switch | Suffix for auto switch | – XC64

With air release valve

Dimensions

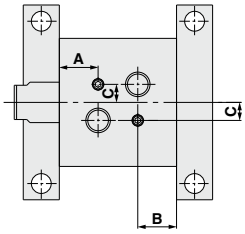
CH□KGB□-□-XC64



Bore size (mm)	A	B	C
20	16.5	9.5	7
25	17	10	8
32	19.5	17	10
40	21.5	18.5	10
50	24	21.5	10
63	27.5	24	10
80	31	27.5	15
100	36	33	15

Note) Dimensions other than those highlighted above are standard.

CH□KGL□-□-XC64



ISO Standard Hydraulic Cylinder

Series ***CHSD/CHSG***

Series ***CHSD***

Nominal pressure: **10 MPa**

Bore size (mm): 40, 50, 63, 80, 100

Series ***CHSG***

Nominal pressure: **16 MPa**

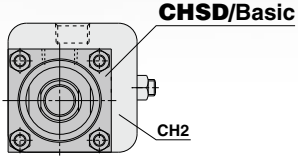
Bore size (mm): 32, 40, 50, 63, 80, 100

ISO Standard

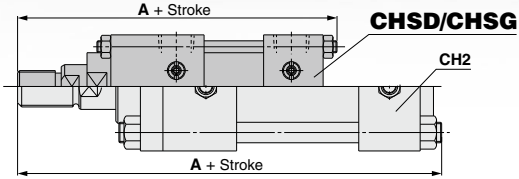
Hydraulic Cylinder

Series CHS Nominal pressure 10 MPa/16 MPa

Reduced projection area: 76% or less



Reduced overall length



- **Maximum weight: no more than 50%* or 52%* of series CH2**
  (CHSD) (CHSG)
  ✻ Compared to series CH2, the tie-rod type cylinder of same size.
- **Cylinder with built-in cover and mounting bracket allows easy disassembly and assembly.**

Tube size (mm)	Overall length (A size)		
	CHSD	CHSG	CH2
32	—	153	207
40	163	184	212
50	177	200	231
63	199	217	257
80	225	251	295
100	260	275	325

Conforming to ISO 10762 (JIS B 8367-5:2002)

***Series CHSD*/10 MPa**

ø40, ø50, ø63, ø80, ø100

Conforming to ISO 6020-2 (JIS B 8367-2:2002)

***Series CHSG*/16 MPa**

ø32, ø40, ø50, ø63, ø80, ø100

ISO Standard Hydraulic Cylinder

Series CHSD

10 MPa

ø40, ø50, ø63, ø80, ø100

How to Order

CHDSDB40 – 100 – M9BW

Magnet for auto switch

Nil	Without
D	Built-in

Series type

Symbol	Nominal pressure
D	10 MPa

Mounting style

B	Basic
LA	Transaxial foot style
FY	Rod rectangular flange style
FZ	Head rectangular flange style
CB	Double clevis
TA	Rod trunnion

Bore size

40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	GF

Stroke

Refer to the standard stroke table on page 1354.

Cylinder suffix

Rod end nut	Nil	Without rod end nut
	A	With rod end nut
Presence of cusion	Nil	With cushion on both sides
	N	Without cushion
	R	With front bumper
	H	With rear bumper

Note) When more than one symbol is to be specified, indicate them in alphabetical order.

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ Select an applicable auto switch model from the table below.

Port position

Symbol	Position	Port and cushion valve location viewed from the side of piston rod end thread
Nil	Port on top, cushion valve on the right	
A	Port on top, cushion valve on the left	
B	Port on top, cushion valve down	
C	Port on the right, cushion valve down	
D	Port on the right, cushion valve on top	
E	Port on the right, cushion valve on the left	

Piping port ┆ Cushion valve

Note 1) Refer to table 1 for manufacturability.
Note 2) Diagrams illustrate the view from the rod on the left side of the cylinder dimensions.
Note 3) For mounting types FY, FZ, or TA, indicate port position with the symbol B.

Table 1 Manufacturability Check List by Mounting Type and Port Position

Port position \ Mounting bracket	B	LA	FY FZ	CB	TA
Nil	◎	◎	○	◎	–
A	◎	◎	○	◎	–
B	◎	○	◎	◎	◎
C	◎	–	○	○	–
D	◎	–	○	○	–
E	◎	–	○	○	–

◎: Standard product ○: Made to Order
–: Not available due to size limitation.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDSDB50-100

Applicable Auto Switches/

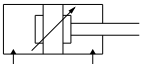
Refer to pages 1451 to 1510 for further details on each auto switch.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model	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	●	●	●	○	○	—	
	Diagnostic indication (2-color display)			3-wire (NPN)	5 V, 12 V		M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	○		
				2-wire	12 V		M9BW	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	24 V, 5 V, 12 V	—	M9NA**	○	○	●	○	○	IC circuit	
				3-wire (PNP)			M9PA**	○	○	●	○	○		
				2-wire	12 V		M9BA**	○	○	●	○	○	—	
	Diagnostic output (2-color display)			4-wire (NPN)	5 V, 12 V		F59F	●	—	●	○	○	IC circuit	
Reed auto switch	———	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	Z76	●	—	●	—	—	IC circuit	—
				2-wire	24 V, 12 V	100 V	Z73	●	—	●	—	—	—	Relay PLC
			No			100 V or less	Z80	●	—	●	—	—	IC circuit	
			Yes			100 V, 200 V	A54*	●	—	●	●	—	—	
			No			200 V or less	A64*	●	—	●	—	—		
	Diagnostic output (2-color display)		Yes		—	—	A59W*	●	—	●	—	—		

** 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.
∗ D-A5□/A6□/A59W can not be mounted to ø40, 50.
∗ Besides the models in the above table, there are some other auto switches that are applicable. For more information, refer to page 1360.
∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.
∗ D-M9□, M9□W, M9□A, Z7□, Z80 auto switches are shipped together, (not assembled). (Only auto switch mounting brackets are packed assembled.)



Specifications

Bore size (mm)		40	50	63	80	100
Action		Double Acting: Single Rod				
Fluid		General mineral hydraulic fluid				
Nominal pressure		10 MPa				
Maximum allowable pressure		12 MPa				
Proof pressure		15 MPa				
Minimum operating pressure	**With pressure at front side**	0.25 MPa				
	With pressure at rear side	0.15 MPa				
Ambient and fluid temperature	**Without magnet**	-10 to 80°C				
	Built-in magnet	-10 to 60°C				
Piston speed		8 to 300 mm/s				
Cushion		Cushion seal				
Thread tolerance		JIS 6 g/6 H				
Stroke length tolerance		From 100st $^{+0.8}_{0}$, 101 to 250st $^{+1.0}_{0}$, 251 to 630st $^{+1.25}_{0}$, 631 to 1000st $^{+1.4}_{0}$				

Note) Refer to page 1234 for definitions of terms related to pressure.

Standard Stroke

Bore size (mm)	Standard stroke (mm)
40	25 to 800
50	25 to 800
63	25 to 800
80	25 to 800
100	25 to 1000

Theoretical Output

OUT IN

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)		
				3.5	7	10
40	22	OUT	1256	4396	8792	12560
		IN	876	3066	6132	8760
50	28	OUT	1963	6871	13741	19630
		IN	1347	4715	9429	13470
63	36	OUT	3117	10910	21819	31170
		IN	2099	7346	14693	20990
80	45	OUT	5026	17591	35182	50260
		IN	3436	12026	24052	34360
100	56	OUT	7853	27486	57971	78530
		IN	5390	18865	37730	53900

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

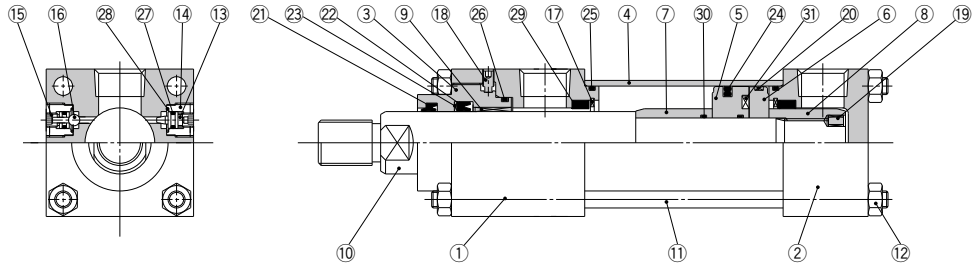
Weight

Unit: kg

Bore size (mm)			40	50	63	80	100
Basic weight (0 stroke)	Basic	B	2.10	3.20	5.10	8.90	14.5
	Transaxial foot	LA	2.40	3.60	5.50	9.70	16.0
	Rod flange	FY	2.60	3.80	5.90	10.1	16.0
	Head flange	FZ	2.50	3.80	6.00	10.0	16.4
	Double clevis	CB	2.30	3.50	6.10	9.90	16.2
	Rod trunnion	TA	2.10	3.40	5.40	9.40	15.5
Additional weight per 10 strokes			0.06	0.09	0.13	0.21	0.32

Construction

CH□SDB



Parts List

No.	Description	Material
1	**Rod cover**	Carbon steel
2	**Head cover**	Carbon steel
3	**Seal holder**	Carbon steel
4	**Cylinder tube**	Stainless steel
5	**Piston**	Stainless steel
6	**Magnet plate**	Stainless steel
7	**Cushion ring**	Carbon steel
8	**Cushion ring nut**	Carbon steel
9	**Bushing**	Copper alloy
10	**Piston rod**	Carbon steel
11	**Tie-rod**	Chromium molybdenum steel
12	**Tie-rod nut**	Carbon steel
13	**Cushion valve**	Alloy steel
14	**Valve holder**	Carbon steel
15	**Air release valve**	Alloy steel
16	**Check ball**	Bearing steel

No.	Description	Material
17	**Retaining ring**	Carbon tool steel
18	**Set screw**	Alloy steel
19	**Pin**	Stainless steel
20	**Wear ring**	Resin
21	**Scraper**	NBR
22	**Rod seal**	NBR
23	**Back-up ring**	Resin
24	**Piston seal**	NBR
25	**Cylinder tube gasket**	NBR
26	**Holder gasket**	NBR
27	**Valve seal**	NBR
28	**Valve holder gasket**	NBR
29	**Cushion seal**	—
30	**Piston gasket**	NBR
31	**Magnet**	—

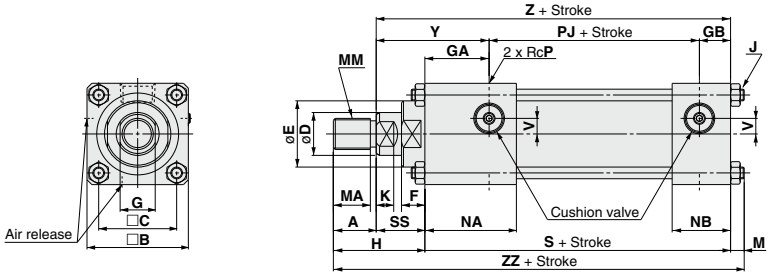
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.
40	CHSD40-PS
50	CHSD50-PS
63	CHSD63-PS
80	CHSD80-PS
100	CHSD100-PS

∗ Seal kit consists of items ㉑ to ㉕ and ㉙, and can be ordered by using the seal kit number for each bore size.

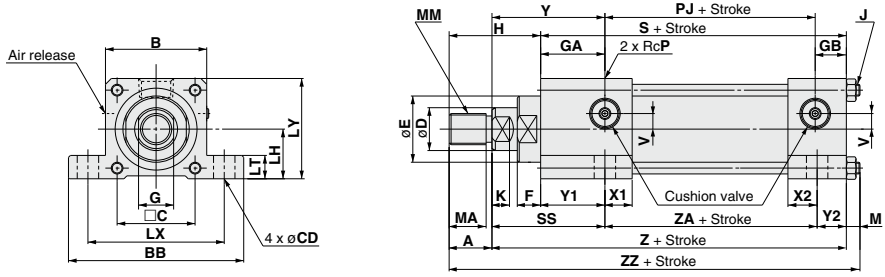
Dimensions

Basic: CHSDB



Bore size (mm)	Stroke range	A	B	C	D	E	F	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ	S	SS	V	Y	Z	ZZ
40	25 to 800	22	52	40	22	34	12	19	33	16	47	M6 x 1	8	7.5	19	M16 x 1.5	46	29	3/8	58	107	25	6.5	58	132	161.5
50	25 to 800	28	65	50	28	42	15	24	34	16	59	M8 x 1	11	9	25	M20 x 1.5	46.5	28.5	3/8	58	108	31	8	65	139	176
63	25 to 800	36	77	58	36	50	19	30	31	18	74	M8 x 1	13	9	32	M27 x 2	46	33	1/2	66	115	38	12	69	153	198
80	25 to 800	45	96	75	45	60	13	41	42	17	80	M10 x 1.25	17	10.5	41	M33 x 2	57	32	1/2	74	133	35	15	77	168	223.5
100	25 to 1000	56	115	90	56	72	16	50	38	22	97	M14 x 1.5	19	14.5	52	M42 x 2	58	42	3/4	86	146	41	15	79	187	257.5

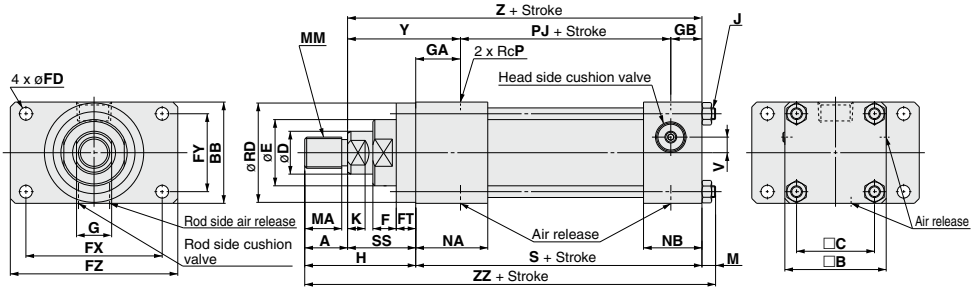
Transaxial foot: CHSDLA



Bore size (mm)	Stroke range	A	B	BB	C	CD	D	E	F	G	GA	GB	H	J	K	LH	LT	LX	LY	M	MA	MM	P	PJ	S	SS
40	25 to 800	22	52	90	40	11	22	34	12	19	33	16	47	M6 x 1	8	25.5	12	70	51.5	7.5	19	M16 x 1.5	3/8	58	107	58
50	25 to 800	28	65	103	50	11	28	42	15	24	34	16	59	M8 x 1	11	32	12	83	64.5	9	25	M20 x 1.5	3/8	58	108	65
63	25 to 800	36	77	115	58	11	36	50	19	30	31	18	74	M8 x 1	13	38	12	95	76.5	9	32	M27 x 2	1/2	66	115	68
80	25 to 800	45	96	147	75	14	45	60	13	41	42	17	80	M10 x 1.25	17	47.5	18	121	95.5	10.5	41	M33 x 2	1/2	74	133	77
100	25 to 1000	56	115	179	90	18	56	72	16	50	38	22	97	M14 x 1.5	19	57	25	145	114.5	14.5	52	M42 x 2	3/4	86	146	79

Bore size (mm)	V	X1	X2	Y	Y1	Y2	ZA	Z	ZZ
40	6.5	13	14	58	33	15	59	132	161.5
50	8	12.5	13.5	65	34	15	59	139	176
63	12	16	16	69	30	17	68	153	198
80	15	15	15	77	42	17	74	168	223.5
100	15	20	20	79	38	22	86	187	257.5

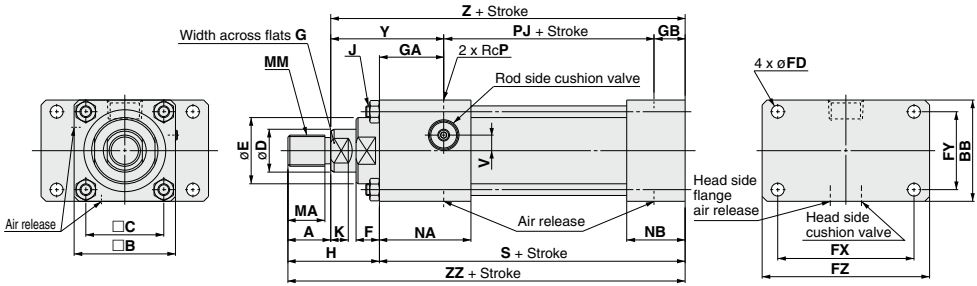
Rod flange: CHSDFY



Bore size (mm)	Stroke range	A	B	BB	C	D	E	F	FD	FT	FX	FY	FZ	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ
40	25 to 800	22	52	52	40	22	34	12	6.6	10	70	40	86	19	23	16	57	M6 x 1	8	7.5	19	M16 x 1.5	36	29	3/8	58
50	25 to 800	28	65	65	50	28	42	15	9	10	86	50	105	24	24	16	69	M8 x 1	11	9	25	M20 x 1.5	36.5	28.5	3/8	58
63	25 to 800	36	77	77	58	36	50	19	9	10	98	56	118	30	21	18	84	M8 x 1	13	9	32	M27 x 2	36	33	1/2	66
80	25 to 800	45	96	96	75	45	60	13	11	16	119	70	143	41	26	17	96	M10 x 1.25	17	10.5	41	M33 x 2	41	32	1/2	74
100	25 to 1000	56	115	115	90	56	72	16	13.5	16	138	90	162	50	22	22	113	M14 x 1.5	19	14.5	52	M42 x 2	42	42	3/4	86

Bore size (mm)	RD		S	SS	V	Y	Z	ZZ
40	51	-0.030 -0.076	97	35	6.5	58	132	161.5
50	62		98	41	8	65	139	176
63	72		105	48	12	69	153	198
80	92	-0.036 -0.090	117	51	15	77	168	223.5
100	110		130	57	15	79	187	257.5

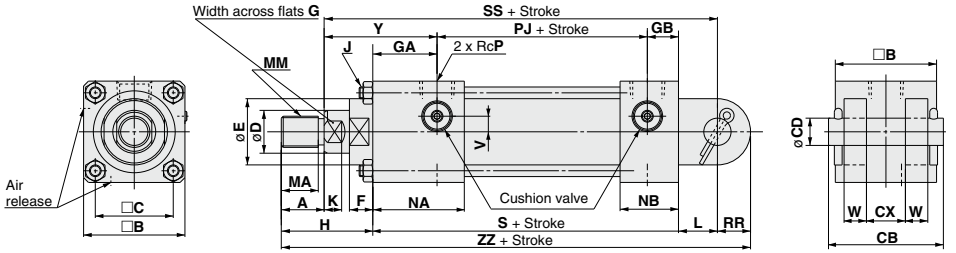
Head flange: CHSDFZ



Bore size (mm)	Stroke range	A	B	BB	C	D	E	F	FD	FX	FY	FZ	G	GA	GB	H	J	K	MA	MM	NA	NB	P	PJ	S	V	Y	Z	ZZ
40	25 to 800	22	52	52	40	22	34	12	6.6	70	40	86	19	33	16	47	M6 x 1	8	19	M16 x 1.5	46	29	3/8	58	107	6.5	58	132	154
50	25 to 800	28	65	65	50	28	42	15	9	86	50	105	24	34	16	59	M8 x 1	11	25	M20 x 1.5	46.5	28.5	3/8	58	108	8	65	139	167
63	25 to 800	36	77	77	58	36	50	19	9	98	56	118	30	31	18	74	M8 x 1	13	32	M27 x 2	46	33	1/2	66	115	12	69	153	189
80	25 to 800	45	96	96	75	45	60	13	11	119	70	143	41	42	17	80	M10 x 1.25	17	41	M33 x 2	57	32	1/2	74	133	15	77	168	213
100	25 to 1000	56	115	115	90	56	72	16	13.5	138	90	162	50	38	22	97	M14 x 1.5	19	52	M42 x 2	58	42	3/4	86	148	15	79	187	243

Dimensions

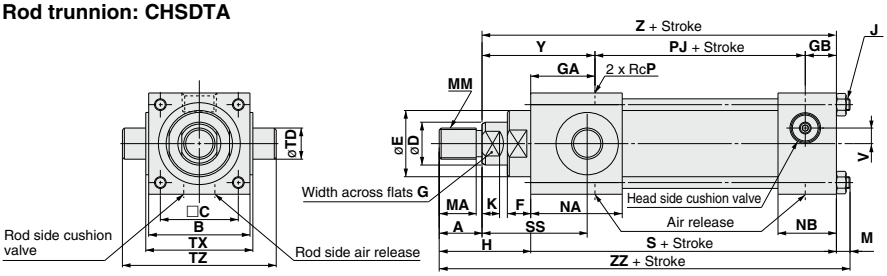
Double clevis: CHSDCB



Bore size (mm)	Stroke range	A	B	C	CB	CD		CX	D	E	F	G	GA	GB	H	J	K	L	MA	MM	NA	NB	P	PJ	RR	S
40	25 to 800	22	52	40	64	14		20	22	34	12	19	33	16	47	M6 x 1	8	19	19	M16 x 1.5	46	29	3/8	58	17	107
50	25 to 800	28	65	50	64	14	+0.043 0	20	28	42	15	24	34	16	59	M8 x 1	11	19	25	M20 x 1.5	46.5	28.5	3/8	58	17	108
63	25 to 800	36	77	58	93	20		30	36	50	19	30	31	18	74	M8 x 1	13	32	32	M27 x 2	46	33	1/2	66	29	115
80	25 to 800	45	96	75	93	20		30	45	60	13	41	42	17	80	M10 x 1.25	17	32	41	M33 x 2	57	32	1/2	74	29	133
100	25 to 1000	56	115	90	113	28	+0.052 0	40	56	72	16	50	38	22	97	M14 x 1.5	19	39	52	M42 x 2	58	42	3/4	86	34	146

Bore size (mm)	SS	V	W	Y	ZZ
40	151	6.5	11.5	58	190
50	158	8	11.5	65	203
63	185	12	17.5	69	250
80	200	15	17.5	77	274
100	226	15	21.5	79	316

Rod trunnion: CHSDTA

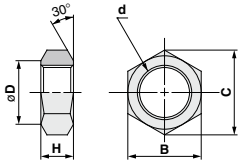


Bore size (mm)	Stroke range	A	B	C	D	E	F	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ	S	SS	TD	TX	TZ
40	25 to 800	22	52	40	22	34	12	19	33	16	47	M6 x 1	8	7.5	19	M16 x 1.5	46	29	3/8	58	107	54	16 -0.016 -0.043	55	79
50	25 to 800	28	65	50	28	42	15	24	34	16	59	M8 x 1	11	9	25	M20 x 1.5	46.5	28.5	3/8	58	108	61	20 -0.020 -0.053	68	100
63	25 to 800	36	77	58	36	50	19	30	31	18	74	M8 x 1	13	9	32	M27 x 2	46	33	1/2	66	115	67	25 -0.025 -0.053	80	120
80	25 to 800	45	96	75	45	60	13	41	42	17	80	M10 x 1.25	17	10.5	41	M33 x 2	57	32	1/2	74	133	73	32 -0.025 -0.064	100	150
100	25 to 1000	56	115	90	56	72	16	50	38	22	97	M14 x 1.5	19	14.5	52	M42 x 2	58	42	3/4	86	146	79	40 -0.064	120	184

Bore size (mm)	V	Z	ZZ
40	6.5	132	161.5
50	8	139	176
63	12	153	198
80	15	168	223.5
100	15	187	257.5

Accessory (Option)

Rod end nut



Material: Carbon steel

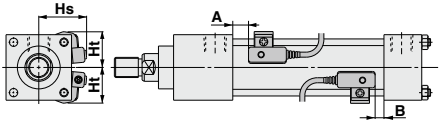
Part no.	Bore size (mm)	B	C	d	D	H
NTH-040	40	22	25.4	M16 x 1.6	21	10
NTH-050	50	27	31.2	M20 x 1.5	26	12
NTH-060S	63	41	47.3	M27 x 2	39	16
NTH-080S	80	50	57.7	M33 x 2	48	20
NTH-100S	100	65	75	M42 x 2	62	25

Series CHSD
Auto Switch Mounting

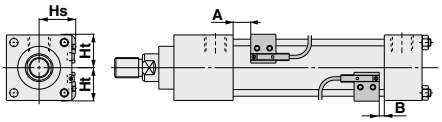
Refer to pages 1451 to 1510 for detailed specifications.

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

D-A5□/A6□
D-F5□(W)/J59(W)/F5BA



D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-Z7□/Z80



Auto Switch Proper Mounting Position

Bore size (mm)	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-F5□/J59 D-F5□W/J59W D-F59F D-F5BA		D-F5NT		D-Z7□/Z80		D-A5□/A6□		D-A59W	
	A	B	A	B	A	B	A	B	A	B	A	B
40	11.5	8.5	8	5	13	10	5	2	–	–	–	–
50	13	8	9.5	4.5	14.5	9.5	6.5	1.5	–	–	–	–
63	14.5	9.5	11	6	16	11	8	3	4.5	0	8.5	3.5
80	18.5	13.5	15	10	20	15	12	7	8.5	3.5	12.5	7.5
100	18.5	15.5	15	12.5	20	17.5	12	9.5	8.5	6	12.5	10

Note 1) D-A5□/A6□/A59W cannot be mounted to ø40, ø50.
Note 2) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

Bore size (mm)	D-M9□/M9□W D-M9□A		D-M9□V/M9□WV D-M9□AV		D-F5□/J59 D-F5□W/J59W D-F59F/F5BA D-F5NT		D-A5□/A6□ D-A59W		D-Z7□/Z80	
	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs
40	27	28.5	27	34	35.5	28.5	–	–	29	27
50	33	33.5	33	38.5	39.5	34.5	–	–	33	33
63	38.5	38	38.5	43.5	45	38.5	47.5	38.5	28	37
80	48	47	48	52	51	48	54	48	46.5	46
100	57.5	59	57.5	62.5	63.5	58	66.5	58	59	57

∗ D-A5□/A6□/A59W cannot be mounted to ø40, ø50.

Operating Range

Auto switch model	Bore size (mm)				
	40	50	63	80	100
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV**	4.5	5	6	7.5	9
D-F5□/J59/F59F **D-F5□W/J59W** **D-F5BA/F5NT**	4	4.5	4.5	5.5	5.5
D-A5□/A6□	–	–	10.5	12	14.5
D-A59W	–	–	14	16	18
D-Z7□/Z80	8	9	10	12	14.5

∗ D-A5□/A6□/A59W cannot be mounted to ø40, ø50.
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

Minimum Auto Switch Mounting Stroke

Auto switch model	2 pcs. (Different surfaces and same surface), 1 pc.	"n" pcs.
D-M9□ **D-M9□W** **D-M9□A**	20	$20 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
D-M9□V **D-M9□WV** **D-M9□AV**	20	$20 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
D-F5□/J59/F5□W **D-J59W/F5BA** **D-F59F/A5□/A6□**	20	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
D-D-F5NT	25	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
D-A59W	30	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
D-Z7□/Z80	20	$20 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)

∗ D-A5□/A6□/A59W cannot be mounted to ø40, ø50.
Note 1) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

Besides the models listed in "How to Order," the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

Auto switch type	Part no.	Electrical entry	Features
Solid state	D-M9NV, M9PV, M9BV	Grommet (perpendicular)	—
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color display)
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-color display)
	D-F59, F5P, J59	Grommet (in-line)	—
	D-F59W, F5PW, J59W		Diagnostic indication (2-color display)
	D-F5BA		Water resistant (2-color display)
	D-F5NT		With timer
Reed	D-A53, A56	Grommet (in-line)	—
	D-A67		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Contact SMC for detailed auto switch specifications.
Refer to pages 1494 and 1495 for details.

Auto Switch Mounting Brackets: Part Nos.

Auto switch models	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV**	BMB5-032	BA7-040	BA7-040	BA7-063	BS5-125
D-F5□/J59 **D-F5□W/J59W** **D-F5BA/F59F/F5NT** **D-A5□/A6□/A59W**	BT-03	BT-04	BT-04	BT-06	BT-12
D-Z7□/Z80	BMB4-032	BA4-040	BA4-040	BA4-063	BS4-125

Note 1) D-A5□/A6□/A59W cannot be mounted to ø40, ø50.

[Stainless steel mounting screw kits]

The following stainless steel mounting screw kits are available for use depending on the operating environment. (Switch mounting bands are not included and should be ordered separately.)

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

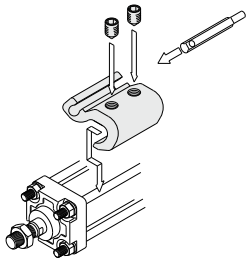
Note 2) Refer to the table below for details on BBA1.

Stainless mounting screw kit details

Part no.	Contents				Applicable auto switch mounting bracket part nos.	Applicable auto switches
	No.	Description	Size	Pcs.		
BBA1	1	Auto switch mounting screws	M4 x 0.7 x 8L	1	BT-□□	D-A5, A6 D-F5, J5
	2	Set screw	M4 x 0.7 x 6L	2	BT-03, BT-04, BT-05 BT-06, BT-08, BT-12	
					BA4-040, BA4-063, BA4-080 BMB4-032, BMB4-050	D-Z7, Z8 D-Y5, Y6, Y7
					BMB5-032 BA7-040, BA7-063, BA7-080	D-A9 D-M9
	3	Set screw	M4 x 0.7 x 8L	2	BT-16, BT-18A, BT-20	D-A5, A6 D-F5, J5
					BS4-125, BS4-160 BS4-180, BS4-200	D-Z7, Z8 D-Y5, Y6, Y7
					BS5-125, BS5-160 BS5-180, BS5-200	D-A9 D-M9

When D-F5BA auto switch is shipped mounted on a cylinder, the above stainless steel screws are used. Also when switches are shipped separately, BBA1 is included.

Note 3) When using D-M9□A(V), order stainless mounting screw kit BBA1 instead of the iron auto switch mounting brackets (BMB5-032, BA7-□□□, BS5-125) in the table above, and use the M4 x 6L stainless set screws included.

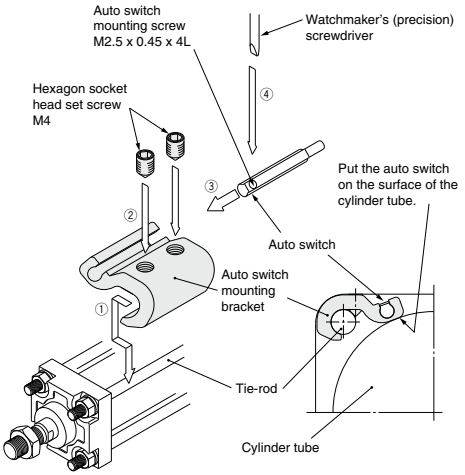


• Mounting example for D-M9□(V), M9□W(V), M9□A(V).

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ····· D-M9N(V), D-M9P(V), D-M9B(V)
D-M9NW(V), D-M9PW(V), D-M9BW(V)
D-M9NA(V), D-M9PA(V), D-M9BA(V)

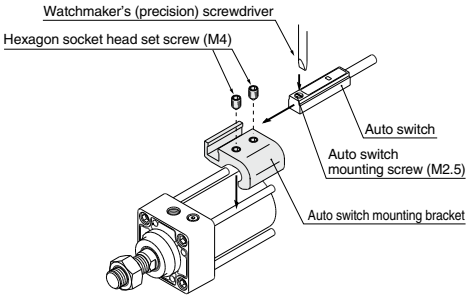


1. Fix it to the detecting position with a set screw by installing an auto switch mounting bracket in cylinder tie-rod and letting the bottom surface of an auto switch mounting bracket contact the cylinder tube firmly.
2. Fix it to the detecting position with a hexagon socket head set screw (M4).
(Use a hexagon wrench.)
3. Fit an auto switch into the auto switch mounting groove to set it roughly to the mounting position for an auto switch.
4. After confirming the detecting position, tighten up the mounting screw (M2.5) attached to an auto switch, and secure the auto switch.
5. When changing the detecting position, carry out in the state of 3.

Note 1) To protect auto switches, ensure that main body of an auto switch should be embedded into auto switch mounting groove with a depth of 15 mm or more.
Note 2) Set the tightening torque of a hexagon socket head set screw (M4) to be 1 to 1.2 N·m.
Note 3) When tightening an auto switch mounting screw (M2.5), use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.
Also, set the tightening torque to be 0.05 to 0.15 N·m. As a guide, turn 90° from the position where it comes to feel tight.

<Applicable auto switch>

Reed ····· D-Z73, D-Z76, D-Z80



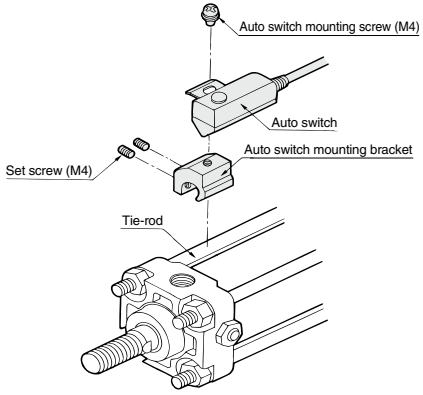
1. Fix it to the detecting position with a hexagon socket head set screw (M4) by installing an auto switch mounting bracket in cylinder tie-rod and letting the bottom surface of an auto switch mounting bracket contact the cylinder tube firmly. (Use a hexagon wrench)
2. Fit an auto switch into the auto switch mounting groove to set it roughly to the auto switch mounting position for an auto switch.
3. After confirming the detecting position, tighten up the mounting screw (M2.5) attached to an auto switch, and secure the switch.
4. When changing the detecting position, carry out in the state of 2.

Note 1) To protect auto switches, ensure that main body of an auto switch should be embedded into auto switch mounting groove with a depth of 15 mm or more.
Note 2) Set the tightening torque of a hexagon socket head set screw (M4) to be 1 to 1.2 N·m.
Note 3) When tightening an auto switch mounting screw (M2.5), use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.
Also, set the tightening torque to be 0.05 to 0.15 N·m. As a guide, turn 90° from the position where it comes to feel tight.

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state D-F59, D-F5P
D-J59, D-F5BA
D-F59W, D-F5PW, D-J59W
D-F59F, D-F5NT
Reed D-A53, D-A54, D-A56, D-A64, D-A67
D-A59W



1. Fix the auto switch on the auto switch mounting bracket with the auto switch mounting screw (M4) and install the set screw.
2. Fit the auto switch mounting bracket into the cylinder tie-rod and then fix the auto switch at the detecting position with the hexagonal wrench. (Be sure to put the auto switch on the surface of cylinder tube.)
3. When changing the detecting position, loosen the set screw to move the auto switch and then re-fix the auto switch on the cylinder tube. (Tightening torque of M4 screw should be 1 to 1.2 N·m.)

ISO Standard Hydraulic Cylinder

Series CHSG

16 MPa

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

CH D SG B 40 – 100 – M9BW

Magnet for auto switch

Nil	Without
D	Built-in

Series type

Symbol	Nominal pressure
G	16 MPa

Mounting style

B	Basic
LA	Transaxial foot style
FY	Rod rectangular flange style
FZ	Head rectangular flange style
CA	Single clevis
CB	Double clevis
TA	Rod trunnion
TC	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	GF

Stroke

Refer to the standard stroke table on the next page 1365.

Cylinder suffix

Rod end nut	Nil	Without rod end nut
	A	With rod end nut
Presence of cusion	Nil	With cushion on both sides
	N	Without cushion
	R	With front bumper
	H	With rear bumper

Note) When more than one symbol is to be specified, indicate them in alphabetical order.

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ Select an applicable auto switch model from the table below.

Port position

Symbol	Position	Port and cushion valve location viewed from the side of piston rod end thread
Nil	Port on top, cushion valve on the right	
A	Port on top, cushion valve on the left	
B	Port on top, cushion valve down	
C	Port on the right, cushion valve down	
D	Port on the right, cushion valve on top	
E	Port on the right, cushion valve on the left	

Piping port | Cushion valve

Note 1) Refer to table 1 for manufacturability.
Note 2) Diagrams illustrate the view from the rod on the left side of the cylinder dimensions.
Note 3) For mounting types FY, FZ, or TA, indicate port position with the symbol B.

Table 1 Manufacturability Check List by Mounting Type and Port Position

Port position \ Mounting bracket	B	LA	FY FZ	CA CB	TA	TC
Nil	◎	◎	○	◎	–	◎
A	◎	◎	○	◎	–	◎
B	◎	○	◎	◎	◎	◎
C	◎	–	○	○	–	◎
D	◎	–	○	○	–	◎
E	◎	–	○	○	–	◎

◎: Standard product ○: Made to Order
–: Not available due to size limitation.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CHDSGB50-100

Applicable Auto Switches/ Refer to pages 1451 to 1510 for further details on each auto switch.

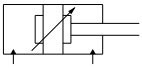
Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model ø32	Auto switch model ø40 to ø80	Auto switch model ø100	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—		M9N	—	●	●	○	○	IC circuit	Relay PLC
							—		F59	●	—	●	○	○		
				3-wire (PNP)					M9P	—	●	●	○	○		
							—		F5P	●	—	●	○	○		
				2-wire		12 V			M9B	—	●	●	○	○	—	
									J59	●	—	●	○	○		
	Diagnostic indication (2-color display)			3-wire (NPN)		5 V, 12 V			M9NW	—	●	●	○	○	IC circuit	
							—		F59W	●	—	●	○	○		
				3-wire (PNP)					M9PW	—	●	●	○	○		
							—		F5PW	●	—	●	○	○		
				2-wire		12V			M9BW	—	●	●	○	○	—	
							—		J59W	●	—	●	○	○		
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V			M9NA**	—	○	●	○	○	IC circuit	
				3-wire (PNP)					M9PA**	—	○	●	○	○		
				2-wire		12 V			M9BA**	—	○	●	○	○	—	
							—		F5BA	○	—	●	○	○		
	Diagnostic output (2-color display)			4-wire (NPN)		5 V, 12 V			F59F	●	—	●	○	○	IC circuit	
Reed auto switch	——	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	—	—	Z76	●	—	●	—	—	IC circuit	Relay PLC
			Yes	2-wire	24 V	12 V	100 V	—	Z73	●	—	●	—	—	—	
			No				100 V or less	—	Z80	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	—	A54	●	—	●	●	—		
			No				200 V or less	—	A64	●	—	●	—	—	—	
	Diagnostic output (2-color display)		Yes			—	—	—	A59W	●	—	●	—	—		

** 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.

∗ Besides the models in the above table, there are some other auto switches that are applicable. For more information, refer to page 1373.
∗ For details about auto switches with pre-wired connector, refer to pages 1494 and 1495.
∗ D-M9□, M9□W, M9□A, Z7□, Z80 auto switches are shipped together, (not assembled). (Only auto switch mounting brackets are packed assembled.)



Specifications

Bore size (mm)		32	40	50	63	80	100
Action		Double Acting: Single Rod					
Fluid		General mineral hydraulic fluid					
Nominal pressure		16 MPa					
Maximum allowable pressure		20 MPa					
Proof pressure		24 MPa					
Minimum operating pressure	**With pressure at rod side**	0.25 MPa					
	With pressure at head side	0.15 MPa					
Ambient and fluid temperature	**Without magnet**	-10 to 80°C					
	Built-in magnet	-10 to 60°C					
Piston speed		8 to 300 mm/s					
Cushion		Cushion seal					
Thread tolerance		JIS 6 g/6 H					
Stroke length tolerance		From 100st $^{+0.8}_{0}$, 101 to 250st $^{+1.0}_{0}$, 251 to 630st $^{+1.25}_{0}$, 631 to 1000st $^{+1.4}_{0}$					

Note) Refer to page 1234 for definitions of terms related to pressure.

Standard Stroke

Bore size (mm)	Standard stroke (mm)
32	25 to 800
40	25 to 800
50	25 to 800
63	25 to 800
80	25 to 800
100	25 to 1000

Theoretical Output

OUT IN

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm²)	Operating pressure (MPa)			
				3.5	7	10	16
32	18	OUT	804	2814	5628	8040	12864
		IN	549	1922	3843	5490	8784
40	22	OUT	1256	4396	8792	12560	20096
		IN	876	3066	6132	8760	14016
50	28	OUT	1963	6871	13741	19630	31408
		IN	1347	4715	9429	13470	21552
63	36	OUT	3117	10910	21819	31170	49872
		IN	2099	7346	14693	20990	33584
80	45	OUT	5026	17591	35182	50260	80416
		IN	3436	12026	24052	34360	54976
100	56	OUT	7853	27486	54971	78530	125648
		IN	5390	18865	37730	53900	86240

Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

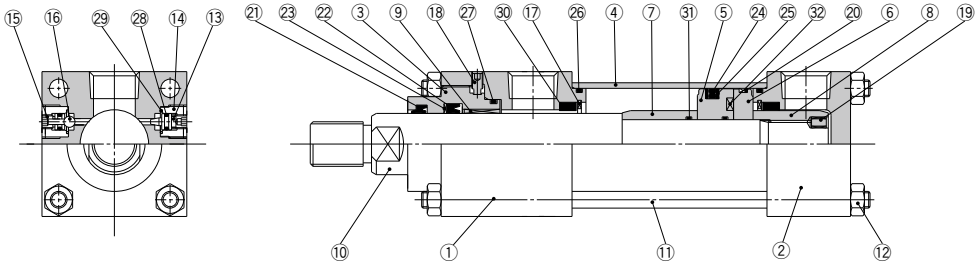
Weight

Unit: kg

Bore size (mm)			32	40	50	63	80	100
Basic weight (0 stroke)	Basic	B	1.60	3.20	4.70	7.80	14.7	20.8
	Transaxial foot	LA	1.80	4.00	5.70	8.65	17.0	23.3
	Rod flange	FY	1.90	4.10	6.00	9.10	16.7	22.9
	Head flange	FZ	1.70	3.90	5.60	8.20	16.4	24.8
	Single clevis	CA	1.60	3.40	5.60	8.20	16.4	24.8
	Double clevis	CB	1.60	3.40	5.60	8.20	16.4	24.8
	Rod trunnion	TA	1.70	3.40	5.20	8.40	15.9	22.5
	Center trunnion	TC	1.90	3.90	5.80	9.40	18.2	25.4
Additional weight per 10 strokes			0.05	0.07	0.12	0.18	0.28	0.42

Construction

CH□SGB



Parts List

No.	Description	Material
1	**Rod cover**	Carbon steel
2	**Head cover**	Carbon steel
3	**Seal holder**	Carbon steel
4	**Cylinder tube**	Stainless steel
5	**Piston**	Stainless steel
6	**Magnet plate**	Stainless steel
7	**Cushion ring**	Carbon steel
8	**Cushion ring nut**	Carbon steel
9	**Bushing**	Copper alloy
10	**Piston rod**	Carbon steel
11	**Tie-rod**	Chromium molybdenum steel
12	**Tie-rod nut**	Carbon steel
13	**Cushion valve**	Alloy steel
14	**Valve holder**	Carbon steel
15	**Air release valve**	Alloy steel
16	**Check ball**	Bearing steel

No.	Description	Material
17	**Retaining ring**	Carbon tool steel
18	**Set screw**	Alloy steel
19	**Pin**	Stainless steel
20	**Wear ring**	Resin
21	**Scraper**	NBR
22	**Rod seal**	NBR
23	**Back-up ring**	Resin
24	**Piston seal**	NBR
25	**Back-up ring**	Resin
26	**Cylinder tube gasket**	NBR
27	**Holder gasket**	NBR
28	**Valve seal**	NBR
29	**Valve holder gasket**	NBR
30	**Cushion seal**	—
31	**Piston gasket**	NBR
32	**Magnet**	—

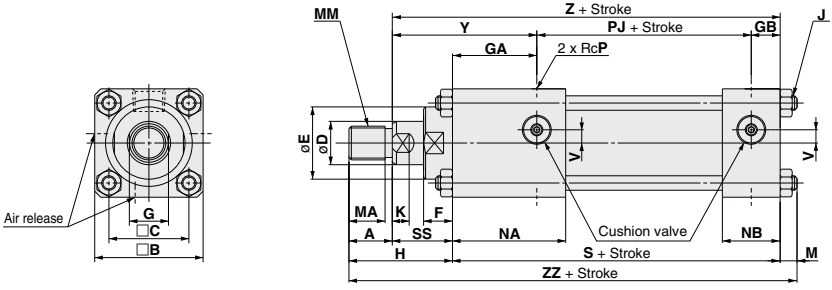
Replacement Parts: Seal Kit

Bore size (mm)	Seal kit no.
32	CHSG32-PS
40	CHSG40-PS
50	CHSG50-PS
63	CHSG63-PS
80	CHSG80-PS
100	CHSG100-PS

∗ Seal kit consists of items ㉑ to ㉖ and ㉚, and can be ordered by using the seal kit number for each bore size.

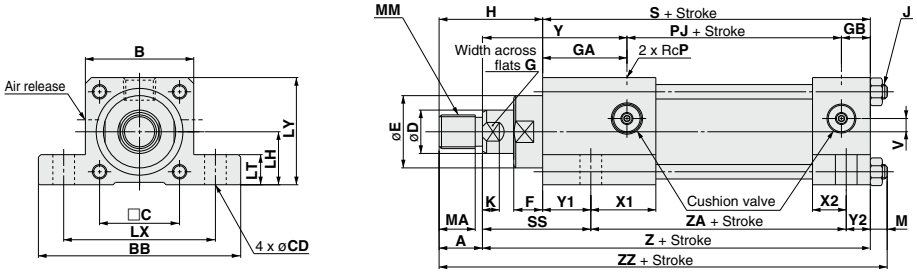
Dimensions

Basic: CHSGB



Bore size (mm)	Stroke range	A	B	C	D	E	F	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ	S	SS	V	Y	Z	ZZ
32	25 to 800	18	45	33.2	18	30	12	14	35	12	43	M6 x 1	7	7.5	15	M14 x 1.5	46	23	1/4	56	103	25	5.5	60	128	153.5
40	25 to 800	22	63	41.7	22	34	12	19	37	18	47	M8 x 1	9	10	19	M16 x 1.5	51	32	3/8	73	128	25	6.5	62	153	185
50	25 to 800	28	75	52.3	28	42	9	24	42	18	53	M12 x 1.25	11	12	25	M20 x 1.5	57	33	1/2	74	134	25	7	67	159	199
63	25 to 800	36	90	64.3	36	50	13	30	39	17	68	M12 x 1.25	13	12	32	M27 x 2	55	33	1/2	80	136	32	12	71	168	216
80	25 to 800	45	115	82.7	45	60	9	41	46	20	76	M16 x 1.5	17	16	41	M33 x 2	66	40	3/4	93	159	31	15	77	190	251
100	25 to 1000	56	130	96.9	56	72	10	50	47	20	91	M16 x 1.5	19	16	52	M42 x 2	67	40	3/4	101	168	35	15	82	203	275

Transaxial foot: CHSGLA

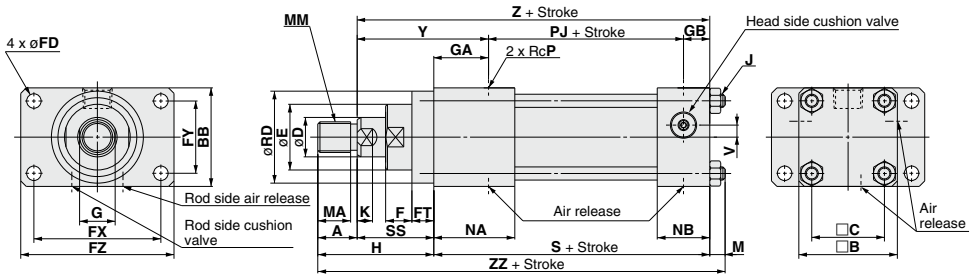


Bore size (mm)	Stroke range	A	B	BB	C	CD	D	E	F	G	GA	GB	H	J	K	LH	LT	LX	LY	M	MA	MM	P	PJ	S	SS
32	25 to 800	18	45	84	33.2	9	18	30	12	14	35	12	43	M6 x 1	7	22	12.5	63	44.5	7.5	15	M14 x 1.5	1/4	56	103	45
40	25 to 800	22	63	103	41.7	11	22	34	12	19	37	18	47	M8 x 1	9	31	12.5	83	62.5	10	19	M16 x 1.5	3/8	73	128	45
50	25 to 800	28	75	127	52.3	14	28	42	9	24	42	18	53	M12 x 1.25	11	37	19	102	74.5	12	25	M20 x 1.5	1/2	74	134	54
63	25 to 800	36	90	161	64.3	18	36	50	13	30	39	17	68	M12 x 1.25	13	44	26	124	89	12	32	M27 x 2	1/2	80	136	65
80	25 to 800	45	115	186	82.7	18	45	60	9	41	46	20	76	M16 x 1.5	17	57	26	149	114.5	16	41	M33 x 2	3/4	93	159	68
100	25 to 1000	56	130	216	96.9	26	56	72	10	50	47	20	91	M16 x 1.5	19	63	32	172	128	16	52	M42 x 2	3/4	101	168	79

Bore size (mm)	V	X1	X2	Y	Y1	Y2	ZA	Z	ZZ
32	5.5	26	13	60	20	10	73	128	153.5
40	6.5	31	22	62	20	10	98	153	185
50	7	28	20	67	29	13	92	159	199
63	12	22	16	71	33	17	86	168	216
80	15	29	23	77	37	17	105	190	251
100	15	23	18	82	44	22	102	203	275

Dimensions

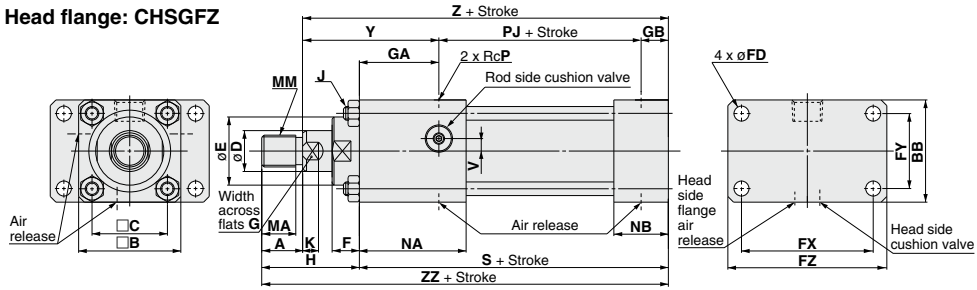
Rod flange: CHSGFY



Bore size (mm)	Stroke range	A	B	BB	C	D	E	F	FD	FT	FX	FY	FZ	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ
32	25 to 800	18	45	45	33.2	18	30	12	6.6	10	58	33	70	14	25	12	53	M6 x 1	7	7.5	15	M14 x 1.5	36	23	1/4	56
40	25 to 800	22	63	63	41.7	22	34	12	11	10	87	41	110	19	27	18	57	M8 x 1	9	10	19	M16 x 1.5	41	32	3/8	73
50	25 to 800	28	75	75	52.3	28	42	9	14	16	105	52	130	24	26	18	69	M12 x 1.25	11	12	25	M20 x 1.5	41	33	1/2	74
63	25 to 800	36	90	90	64.3	36	50	13	14	16	117	65	145	30	23	17	84	M12 x 1.25	13	12	32	M27 x 2	39	33	1/2	80
80	25 to 800	45	115	115	82.7	45	60	9	18	20	149	83	180	41	26	20	96	M16 x 1.5	17	16	41	M33 x 2	46	40	3/4	93
100	25 to 1000	56	130	130	96.9	56	72	10	18	22	162	97	200	50	25	20	113	M16 x 1.5	19	16	52	M42 x 2	45	40	3/4	101

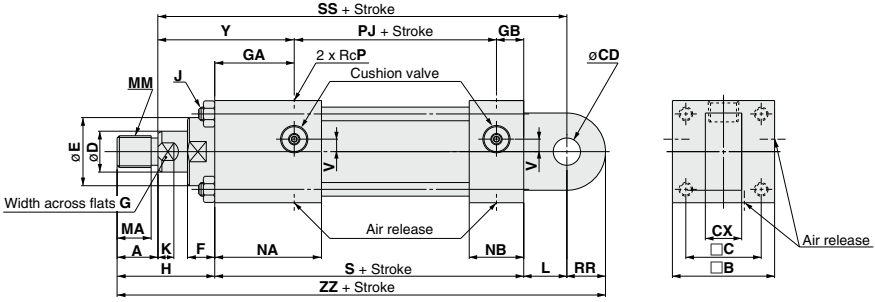
Bore size (mm)	RD		S	SS	V	Y	Z	ZZ
32	42	-0.025 -0.064	93	35	5.5	60	128	153.5
40	62	-0.030 -0.076	118	35	6.5	62	153	185
50	74		118	41	7	67	159	199
63	82		120	48	12	71	168	216
80	92	-0.036 -0.090	139	51	15	77	190	251
100	105		146	57	15	82	203	275

Head flange: CHSGFZ



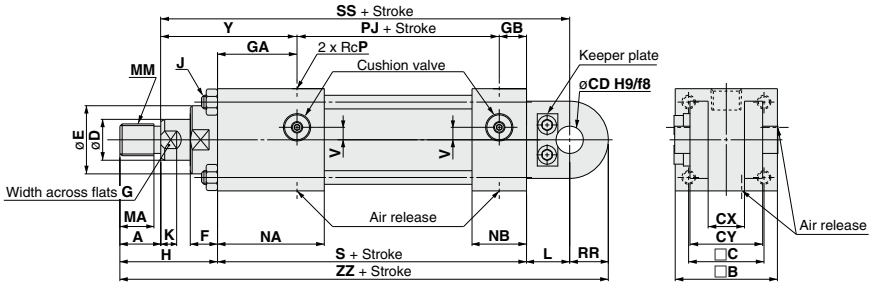
Bore size (mm)	Stroke range	A	B	BB	C	D	E	F	FD	FX	FY	FZ	G	GA	GB	H	J	K	MA	MM	NA	NB	P	PJ	S	V	Y	Z	ZZ
32	25 to 800	18	45	45	33.2	18	30	12	6.6	58	33	70	14	35	12	43	M6 x 1	7	15	M14 x 1.5	46	23	1/4	56	103	5.5	60	128	146
40	25 to 800	22	63	63	41.7	22	34	12	11	87	41	110	19	37	18	47	M8 x 1	9	19	M16 x 1.5	51	32	3/8	73	128	6.5	62	153	175
50	25 to 800	28	75	75	52.3	28	42	9	14	105	52	130	24	42	18	53	M12 x 1.25	11	25	M20 x 1.5	57	33	1/2	74	134	7	67	159	187
63	25 to 800	36	90	90	64.3	36	50	13	14	117	65	145	30	39	17	68	M12 x 1.25	13	32	M27 x 2	55	33	1/2	80	136	12	71	168	204
80	25 to 800	45	115	115	82.7	45	60	9	18	149	83	180	41	46	20	76	M16 x 1.5	17	41	M33 x 2	66	40	3/4	93	159	15	77	190	235
100	25 to 1000	56	130	130	96.9	56	72	10	18	162	97	200	50	47	20	91	M16 x 1.5	19	52	M42 x 2	67	40	3/4	101	168	15	82	203	259

Single clevis: CHSGCA



Bore size (mm)	Stroke range	A	B	C	CD	CX	D	E	F	G	GA	GB	H	J	K	L	MA	MM	NA	NB	P	PJ	RR	S	SS	V	Y	ZZ
32	25 to 800	18	45	33.2	12 $^{+0.043}_{0}$	16	18	30	12	14	35	12	43	M6 x 1	7	19	15	M14 x 1.5	46	23	1/4	56	17	103	147	5.5	60	182
40	25 to 800	22	63	41.7	14	20	22	34	12	19	37	18	47	M8 x 1	9	19	19	M16 x 1.5	51	32	3/8	73	17	128	172	6.5	62	211
50	25 to 800	28	75	52.3	20	30	28	42	9	24	42	18	53	M12 x 1.25	11	32	25	M20 x 1.5	57	33	1/2	74	29	134	191	7	67	248
63	25 to 800	36	90	64.3	20 $^{+0.052}_{0}$	30	36	50	13	30	39	17	68	M12 x 1.25	13	32	32	M27 x 2	55	33	1/2	80	29	136	200	12	71	265
80	25 to 800	45	115	82.7	28	40	45	60	9	41	46	20	76	M16 x 1.5	17	39	41	M33 x 2	66	40	3/4	93	34	159	229	15	77	308
100	25 to 1000	56	130	96.9	36 $^{+0.062}_{0}$	50	56	72	10	50	47	20	91	M16 x 1.5	19	54	52	M42 x 2	67	40	3/4	101	50	168	257	15	82	363

Double clevis: CHSGCB



Bore size (mm)	Stroke range	A	B	C	CD	CX	CY	D	E	F	G	GA	GB	H	J	K	L	MA	MM	NA	NB	P	PJ	RR
32	25 to 800	18	45	33.2	12	16	32	18	30	12	14	35	12	43	M6 x 1	7	19	15	M14 x 1.5	46	23	1/4	56	17
40	25 to 800	22	63	41.7	14	20	43	22	34	12	19	37	18	47	M8 x 1	9	19	19	M16 x 1.5	51	32	3/8	73	17
50	25 to 800	28	75	52.3	20	30	60	28	42	9	24	42	18	53	M12 x 1.25	11	32	25	M20 x 1.5	57	33	1/2	74	29
63	25 to 800	36	90	64.3	20	30	60	36	50	13	30	39	17	68	M12 x 1.25	13	32	32	M27 x 2	55	33	1/2	80	29
80	25 to 800	45	115	82.7	28	40	80	45	60	9	41	46	20	76	M16 x 1.5	17	39	41	M33 x 2	66	40	3/4	93	34
100	25 to 1000	56	130	96.9	36	50	100	56	72	10	50	47	20	91	M16 x 1.5	19	54	52	M42 x 2	67	40	3/4	101	50

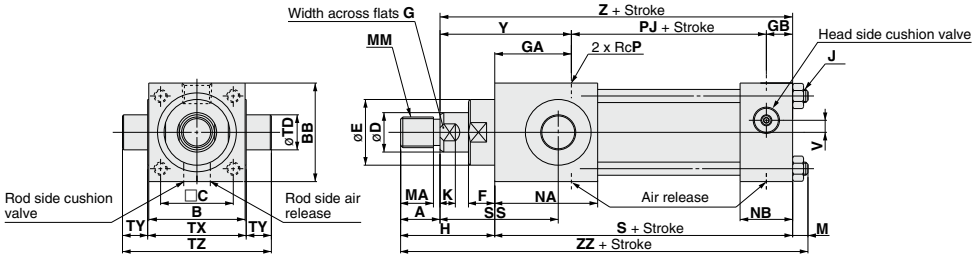
Bore size (mm)	S	SS	V	Y	ZZ
32	103	147	5.5	60	182
40	128	172	6.5	62	211
50	134	191	7	67	248
63	136	200	12	71	265
80	159	229	15	77	308
100	168	257	15	82	363

Tolerances

Bore size (mm)	CD	
	H9	f8
32	$^{+0.043}_{0}$	$^{-0.016}_{-0.043}$
40		
50		
63	$^{+0.052}_{0}$	$^{-0.020}_{-0.053}$
80		
100	$^{+0.062}_{0}$	$^{-0.025}_{-0.064}$

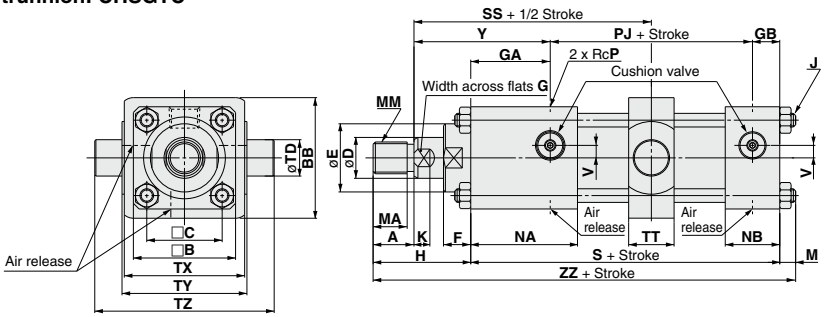
Dimensions

Rod trunnion: CHSGTA



Bore size (mm)	Stroke range	A	B	BB	C	D	E	F	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ	TD	TX	TZ	S	SS	V	Y	Z	ZZ
32	25 to 800	18	44	45	33.2	18	30	12	14	35	12	43	M6 x 1	7	7.5	15	M14 x 1.5	46	23	1/4	56	16 -0.016 -0.043	45	68	103	54	5.5	60	128	153.5
40	25 to 800	22	61	63	41.7	22	34	12	19	37	18	47	M8 x 1	9	10	19	M16 x 1.5	51	32	3/8	73	20	63	95	128	57	6.5	62	153	185
50	25 to 800	28	75	75	52.3	28	42	9	24	42	18	53	M12 x 1.25	11	12	25	M20 x 1.5	57	33	1/2	74	25 -0.020 -0.053	76	116	134	64	7	67	159	199
63	25 to 800	36	87	90	64.3	36	50	13	30	39	17	68	M12 x 1.25	13	12	32	M27 x 2	55	33	1/2	80	32	89	139	136	70	12	71	168	216
80	25 to 800	45	112	115	82.7	45	60	9	41	46	20	76	M16 x 1.5	17	16	41	M33 x 2	66	40	3/4	93	40 -0.025 -0.064	114	178	159	76	15	77	190	251
100	25 to 1000	56	125	130	96.9	56	72	10	50	47	20	91	M16 x 1.5	19	16	52	M42 x 2	67	40	3/4	101	50	127	207	168	71	15	82	203	275

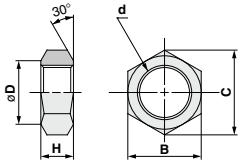
Center trunnion: CHSGTC



Bore size (mm)	Stroke range	A	B	BB	C	D	E	F	G	GA	GB	H	J	K	M	MA	MM	NA	NB	P	PJ	S	SS	TD	TT	TX	TY	TZ	V	Y	ZZ
32	25 to 800	18	45	57	33.2	18	30	12	14	35	12	43	M6 x 1	7	7.5	15	M14 x 1.5	46	23	1/4	56	103	88	16 0 -0.033	20	53	55	79	5.5	60	153.5
40	25 to 800	22	63	65	41.7	22	34	12	19	37	18	47	M8 x 1	9	10	19	M16 x 1.5	51	32	3/8	73	128	98.5	20	26	72	76	108	6.5	62	185
50	25 to 800	28	75	75	52.3	28	42	9	24	42	18	53	M12 x 1.25	11	12	25	M20 x 1.5	57	33	1/2	74	134	104	25 -0.004 -0.043	29	88	89	129	7	67	199
63	25 to 800	36	90	90	64.3	36	50	13	30	39	17	68	M12 x 1.25	13	12	32	M27 x 2	55	33	1/2	80	136	111	32	36	90	100	150	12	71	216
80	25 to 800	45	115	115	82.7	45	60	9	41	46	20	76	M16 x 1.5	17	16	41	M33 x 2	66	40	3/4	93	159	123.5	40 -0.009 -0.054	44	123	127	191	15	77	251
100	25 to 1000	56	130	130	96.9	56	72	10	50	47	20	91	M16 x 1.5	19	16	52	M42 x 2	67	40	3/4	101	168	132.5	50	54	130	140	220	15	82	275

Accessory (Option)

Rod end nut



Material: Carbon steel

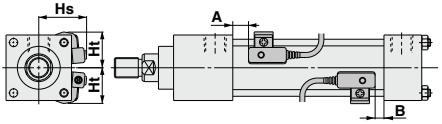
Part no.	Bore size (mm)	B	C	d	D	H
NTH-32S	32	22	25.4	M14 x 1.5	21	8
NTH-040	40	22	25.4	M16 x 1.6	21	10
NTH-050	50	27	31.2	M20 x 1.5	26	12
NTH-060S	63	41	47.3	M27 x 2	39	16
NTH-080S	80	50	57.7	M33 x 2	48	20
NTH-100S	100	65	75	M42 x 2	62	25

Series CHSG
Auto Switch Mounting

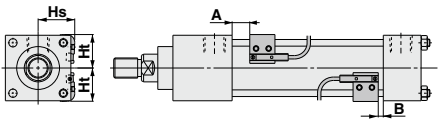
Refer to pages 1451 to 1510 for detailed specifications.

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

D-A5□/A6□
D-F5□(W)/J59(W)/F5BA



D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-Z7□/Z80



Proper Auto Switch Mounting Position

Bore size (mm)	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV		D-F5□/J59 D-F5□W/J59W D-F59F D-F5BA		D-F5NT		D-Z7□/Z80		D-A5□/A6□		D-A59W	
	A	B	A	B	A	B	A	B	A	B	A	B
32	14	8	10.5	4.5	15.5	9.5	–	–	–	–	–	–
40	22.5	10.5	19	7	24	12	16	4	12.5	0.5	16.5	4.5
50	22.5	9.5	19	6	24	11	16	3	12.5	0	16.5	3.5
63	24.5	11.5	21	8	26	13	18	5	14.5	1.5	18.5	5.5
80	27.5	13.5	24	10	29	15	21	7	17.5	3.5	21.5	7.5
100	–	–	27.5	14.5	32.5	19.5	24.5	11.5	21	8	25	12

Note 1) D-M9□, M9□V, M9□W, M9□WV, M9□A, M9□AV cannot be mounted to ø100.
Note 2) D-A5□, A6□, A59W, Z7□, Z80 cannot be mounted to ø32.
Note 3) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

Bore size (mm)	D-M9□/M9□W D-M9□A		D-M9□V/M9□WV D-M9□AV		D-F5□/J59 D-F5□W/J59W D-F59F/F5BA D-F5NT		D-A5□/A6□ D-A59W		D-Z7□/Z80	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	25	23	31	23	32.5	25	–	–	–	–
40	29	28.5	34	28.5	36	30	38.5	30	29	28.5
50	37	36	41	36	41	37.5	43.5	37.5	37	36
63	43	42	47.5	42	46.5	43.5	49	43.5	42.5	42
80	54	54	55.5	54	57	56.5	59.5	56.5	54	54.5
100	–	–	–	–	66	64.5	69	64.5	62.5	61.5

Note 1) D-M9□, M9□V, M9□W, M9□WV, M9□A, M9□AV cannot be mounted to ø100.
Note 2) D-A5□, A6□, A59W, Z7□, Z80 cannot be mounted to ø32.

Operating Range

Auto switch model	Bore size (mm)					
	32	**40**	**50**	**63**	**80**	**100**
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	4	4.5	5.5	7.5	8.5	–
D-F5□/J59/F59F D-F5□W/J59W D-F5BA/F5NT	4	4.5	5	4	5.5	6.5
D-A5□/A6□	–	9	10	11	14	17.5
D-A59W	–	12.5	13	14.5	17.5	22
D-Z7□/Z80	–	8.5	9.5	10.5	14.5	19.5

∗ D-M9□, M9□V, M9□W, M9□WV, M9□A, M9□AV cannot be mounted to ø100.
∗ D-A5□, A6□, A59W, Z7□, Z80 cannot be mounted to ø32.
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

Minimum Auto Switch Mounting Stroke

Auto switch model	Auto switch mounting number	Mounting bracket other than center trunnion	Center trunnion					
			32	**40**	**50**	**63**	**80**	**100**
D-M9□/M9□W	2 (Different surfaces and same surface), 1	20	85	95	100	105	115	–
	"n" pcs.	$20 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	–
D-M9□V/M9□WV	2 (Different surfaces and same surface), 1	20	65	75	80	85	95	–
	"n" pcs.	$20 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$95 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	–
D-M9□A	2 (Different surfaces and same surface), 1	25	100	115	120	125	135	–
	"n" pcs.	$25 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$120 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$125 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$135 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	–
D-M9□AV	2 (Different surfaces and same surface), 1	25	100	115	120	125	135	–
	"n" pcs.	$25 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	$100 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$115 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$120 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$125 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$135 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	–
D-F5□/J59 **D-F5□W/J59W** **D-F5BA/F59F**	2 (Different surfaces and same surface), 1	20	110	125	130	135	140	150
	"n" pcs.	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$125 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$135 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$140 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$150 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)
D-F5NT	2 (Different surfaces and same surface), 1	25	125	140	145	150	155	165
	"n" pcs.	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	$125 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$140 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$145 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$150 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$155 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$165 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)
D-A5□/A6□	2 (Different surfaces and same surface), 1	25	–	120	120	130	135	145
	"n" pcs.	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	–	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$135 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$145 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)
D-A59W	2 (Different surfaces and same surface), 1	30	–	125	130	135	145	155
	"n" pcs.	$30 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	–	$125 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$135 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$145 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$155 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)
D-Z7□/Z80	2 (Different surfaces and same surface), 1	25	–	95	100	105	115	125
	"n" pcs.	$25 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 3)	–	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)	$125 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 4)

Note 1) D-M9□, M9□V, M9□W, M9□WV, M9□A, M9□AV cannot be mounted to ø100.
Note 2) D-A5□, A6□, A59W, Z7□, Z80 cannot be mounted to ø32.
Note 3) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.
Note 4) When "n" is an odd number, a multiple of 4 that is larger than this odd number is used for the calculation.

Besides the models listed in "How to Order," the following auto switches are applicable.
Refer to pages 1451 to 1510 for detailed auto switch specifications.

Auto switch type	Part no.	Electrical entry	Features
Solid state	D-M9NV, M9PV, M9BV	Grommet (perpendicular)	—
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color display)
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-color display)
	D-F59, F5P, J59	Grommet (in-line)	—
	D-F59W, F5PW, J59W		Diagnostic indication (2-color display)
	D-F5BA		Water resistant (2-color display)
	D-F5NT		With timer
Reed	D-A53, A56	Grommet (in-line)	—
	D-A67		Without indicator light

∗ Solid state auto switches are also available with pre-wired connector. Contact SMC for detailed auto switch specifications.
Refer to pages 1494 and 1495 for details.

Auto Switch Mounting Brackets: Part Nos.

Auto switch models	Bore size (mm)					
	ø32	ø40	ø50	ø63	ø80	ø100
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	BMB5-032	BA7-040	BA7-080	BA7-080	BS5-160	–
D-F5□/J59 D-F5□W/J59W D-F5BA/F59F/F5NT D-A5□/A6□/A59W	BT-03	BT-04	BT-08	BT-08	BT-16	BT-16
D-Z7□/Z80	–	BMB4-050	BA4-080	BA4-080	BS4-160	BS4-160

Note 1) D-M9 cannot be mounted to ø100.
Note 2) D-A5□/A6□/A59W/Z7□/Z80 cannot be mounted to ø32.

[Stainless steel mounting screw kits]
The following stainless steel mounting screw kits are available for use depending on the operating environment. (Switch mounting bands are not included and should be ordered separately.)
BBA1 : D-F5, J5, A5, A6

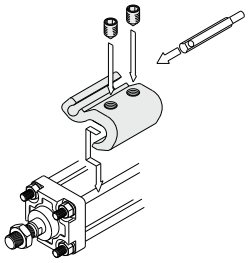
Note 3) Refer to the table below for details on BBA1.

Stainless mounting screw kit details

Part no.	Contents				Applicable auto switch mounting bracket part nos.	Applicable auto switches
	No.	Description	Size	Pcs.		
BBA1	1	Auto switch mounting screws	M4 x 0.7 x 8L	1	BT-□□	D-A5, A6 D-F5, J5
	2	Set screw	M4 x 0.7 x 6L	2	BT-03, BT-04, BT-05 BT-06, BT-08, BT-12	
					BA4-040, BA4-063, BA4-080 BMB4-032, BMB4-050	D-Z7, Z8 D-Y5, Y6, Y7
					BMB5-032 BA7-040, BA7-063, BA7-080	D-A9 D-M9
	3	Set screw	M4 x 0.7 x 8L	2	BT-16, BT-18A, BT-20	D-A5, A6 D-F5, J5
					BS4-125, BS4-160 BS4-180, BS4-200	D-Z7, Z8 D-Y5, Y6, Y7
					BS5-125, BS5-160 BS5-180, BS5-200	D-A9 D-M9

When D-F5BA auto switch is shipped mounted on a cylinder, the above stainless steel screws are used. Also when switches are shipped separately, BBA1 is included.

Note 4) When using D-M9□A(V), order stainless mounting screw kit BBA1 instead of the iron auto switch mounting brackets (BMB5-032, BA7-□□□, BS5-160) in the table above, and use the M4 x 6L stainless set screws included.

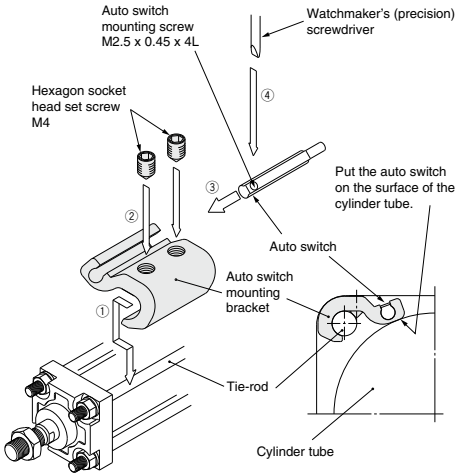


• Mounting example for D-M9□(V), M9□W(V), M9□A(V).

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ····· D-M9N(V), D-M9P(V), D-M9B(V)
D-M9NW(V), D-M9PW(V), D-M9BW(V)
D-M9NA(V), D-M9PA(V), D-M9BA(V)

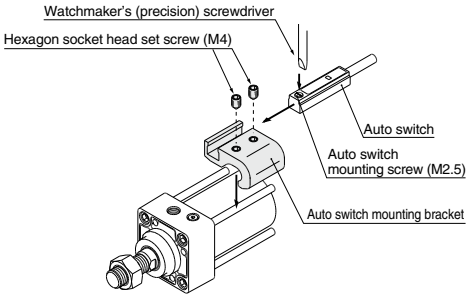


1. Fix it to the detecting position with a set screw by installing an auto switch mounting bracket in cylinder tie-rod and letting the bottom surface of an auto switch mounting bracket contact the cylinder tube firmly.
2. Fix it to the detecting position with a hexagon socket head set screw (M4).
(Use a hexagon wrench.)
3. Fit an auto switch into the auto switch mounting groove to set it roughly to the mounting position for an auto switch.
4. After confirming the detecting position, tighten up the mounting screw (M2.5) attached to an auto switch, and secure the auto switch.
5. When changing the detecting position, carry out in the state of 3.

Note 1) To protect auto switches, ensure that main body of an auto switch should be embedded into auto switch mounting groove with a depth of 15 mm or more.
Note 2) Set the tightening torque of a hexagon socket head set screw (M4) to be 1 to 1.2 N·m.
Note 3) When tightening an auto switch mounting screw (M2.5), use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.
Also, set the tightening torque to be 0.05 to 0.15 N·m. As a guide, turn 90° from the position where it comes to feel tight.

<Applicable auto switch>

Reed ····· D-Z73, D-Z76, D-Z80



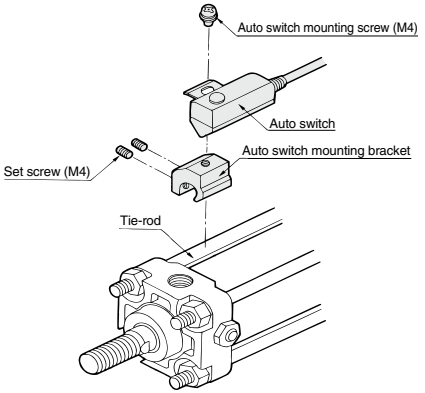
1. Fix it to the detecting position with a hexagon socket head set screw (M4) by installing an auto switch mounting bracket in cylinder tie-rod and letting the bottom surface of an auto switch mounting bracket contact the cylinder tube firmly. (Use a hexagon wrench)
2. Fit an auto switch into the auto switch mounting groove to set it roughly to the auto switch mounting position for an auto switch.
3. After confirming the detecting position, tighten up the mounting screw (M2.5) attached to an auto switch, and secure the switch.
4. When changing the detecting position, carry out in the state of 2.

Note 1) To protect auto switches, ensure that main body of an auto switch should be embedded into auto switch mounting groove with a depth of 15 mm or more.
Note 2) Set the tightening torque of a hexagon socket head set screw (M4) to be 1 to 1.2 N·m.
Note 3) When tightening an auto switch mounting screw (M2.5), use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.
Also, set the tightening torque to be 0.05 to 0.15 N·m. As a guide, turn 90° from the position where it comes to feel tight.

How to Mount and Move the Auto Switch

<Applicable auto switch>

Solid state ····· D-F59, D-F5P
D-J59, D-F5BA
D-F59W, D-F5PW, D-J59W
D-F59F, D-F5NT
Reed ····· D-A53, D-A54, D-A56, D-A64, D-A67
D-A59W



1. Fix the auto switch on the auto switch mounting bracket with the auto switch mounting screw (M4) and install the set screw.
2. Fit the auto switch mounting bracket into the cylinder tie-rod and then fix the auto switch at the detecting position with the hexagonal wrench. (Be sure to put the auto switch on the surface of cylinder tube.)
3. When changing the detecting position, loosen the set screw to move the auto switch and then re-fix the auto switch on the cylinder tube. (Tightening torque of M4 screw should be 1 to 1.2 N·m.)