



General Catalog

Hydraulic Cylinders

Series CHA
Nominal pressure: 3.5MPa



Series CHM
Nominal pressure: 3.5MPa



Series CHQB
Nominal pressure:
3.5MPa

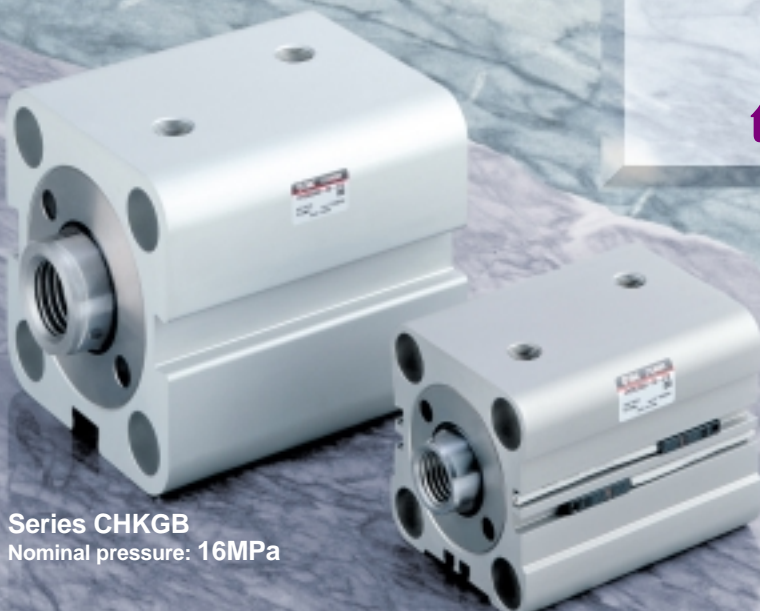


Series CH2E/CH2F/CH2G/CH2H
Nominal pressure: 3.5, 7, 14MPa



New

Now boasting
cushion seal &
the addition of $\phi 32$ bore size.



Series CHKGB
Nominal pressure: 16MPa

Series CHKDB
Nominal pressure: 10MPa

New
High pressure
compact type

SMC Hydraulic Cylinders

High

New

Compact Hydraulic Cylinder Series CHKGB



Pg. 13

Nominal pressure	16MPa
Bore sizes (mm)	20, 25, 32, 40, 50, 63, 80, 100

High pressure compact type

New

JIS Standard Compact Hydraulic Cylinder Series CHKDB



Pg. 1

Nominal pressure	10MPa
Bore sizes (mm)	20, 25, 32, 40, 50, 63, 80, 100

Selection by Pressure

Compact Hydraulic Cylinder Series CHQB



Pg. 25

Nominal pressure	3.5MPa
Bore sizes (mm)	20, 32, 40, 50, 63, 80, 100

Low

Selection by Function

Type	Series	Function					Bore sizes (mm)			
		Auto switch	Cushion	Double rod end	Rod boot	Water resistant	20	25	32	40
Compact type	CHKGB						●	●	●	●
	CHKDB					■	●	●	●	●
	CHQB			■			●		●	●
Round type	CHM						●	●	●	●
JIS type	CH2H		■		■				●	●
	CH2G					■			●	●
	CH2F		■	■	■	■			●	●
	CH2E		■	■	■				●	●
Tie-rod type	CHA			■	■					●

Round Type Low Pressure Hydraulic Cylinder Series CHM



Pg. 45

Nominal pressure	3.5MPa
Bore sizes (mm)	20, 25, 32, 40

Compact Type

Round Type

JIS Standard Hydraulic Cylinder Series CH2□

A new cushion seal and a $\varnothing 32$ bore size are now added to these products.

New

JIS Standard Hydraulic Cylinder Series CH2G/CH2H



Pg. 55

Nominal pressure	14MPa
Bore sizes (mm)	32, 40, 50, 63, 80, 100

New

JIS Standard Hydraulic Cylinder Series CH2F



Pg. 55

Nominal pressure	7MPa
Bore sizes (mm)	32, 40, 50, 63, 80, 100

New

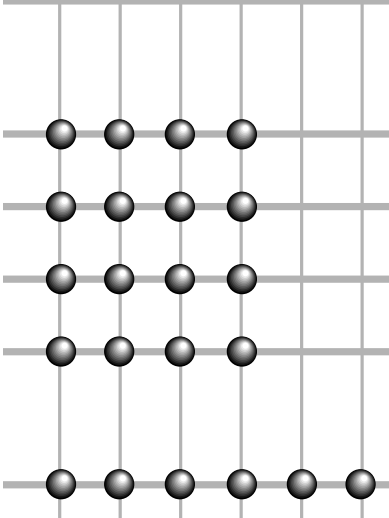
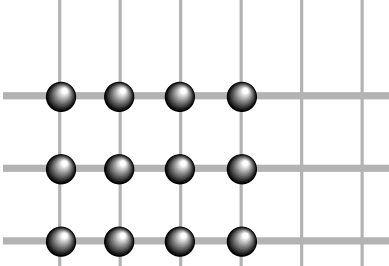
JIS Standard Hydraulic Cylinder Series CH2E



Pg. 55

Nominal pressure	3.5MPa
Bore sizes (mm)	32, 40, 50, 63, 80, 100

Bore sizes (mm)					
50	63	80	100	125	160



Tie-rod Type Hydraulic Cylinder Series CHA



Pg. 87

Nominal pressure	3.5MPa
Bore sizes (mm)	40, 50, 63, 80, 100, 125, 160

Page

Features.....	Features 1, 2
Series CHKDB	1
Series CHKGB	13
Series CHQB	25
Series CHM	45
Series CH2E/CH2F/CH2G/CH2H	55
Series CHA.....	87
Auto Switch Specifications	115
Hydraulic Cylinder Technical Data	
• Bore Size Selection	120
• Stroke Selection	123
• Relationship between Load Weight and Speed	128
• Piston Speed, Required Fluid Volume and Piping Size Selection	133
Safety Instructions	135
Hydraulic Cylinder Precautions	136
Auto Switch Precautions	139

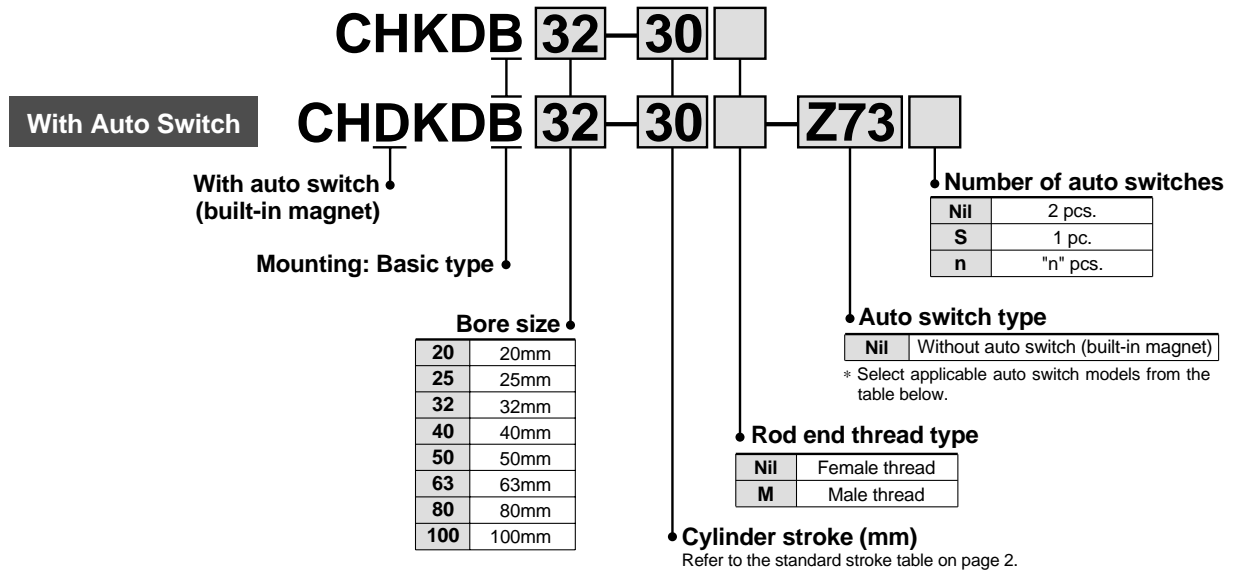
10MPa

JIS Standard Compact Hydraulic Cylinder

Series **CH** **KDB**

∅20, ∅25, ∅32, ∅40, ∅50, ∅63, ∅80, ∅100

How to Order



Applicable Auto Switches: Refer to "Auto Switch Guide" CAT. E274-A for further details on each auto switch. Refer to pages 117 and 118 for auto switch circuit diagrams.

Bore sizes ∅20 and ∅25

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length (m)*			Applicable load		
					DC	AC	Electrical entry direction	Perpendicular	In-line	0.5 (Nil)	3 (L)			5 (Z)
Reed switch	—	Grommet	No	2-wire	24V	5V, 12V	100V or less	A90V	A90	●	●	—	IC circuit	Relay PLC
			Yes	3-wire (NPN equiv.)	—	5V	—	A93V	A93	●	●	—	—	—
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F9NV	F9N	●	●	○	IC circuit	Relay PLC
				3-wire (PNP)				F9PV	F9P	●	●	○	—	
				2-wire				F9BV	F9B	●	●	○	—	
	Diagnostic indication (2-color display)		3-wire (NPN)	24V	5V, 12V	—	F9NWV	F9NW	●	●	○	IC circuit		
	3-wire (PNP)		F9PWV				F9PW	●	●	○	—			
	Water resistant (2-color display)		2-wire	12V	—	F9BWV	F9BW	●	●	○	—			
—	—	—	—	F9BA	—	●	○	—						

* Lead wire length symbols: 0.5m Nil (Example) A93
 3m L (Example) A93L
 5m Z (Example) F9NWZ

Note) Solid state switches marked "○" are produced upon receipt of order.

Bore sizes ∅32 to ∅100

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length (m)*			Applicable load		
					DC	AC	Electrical entry direction	Perpendicular	In-line	0.5 (Nil)	3 (L)			5 (Z)
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	24V	5V	—	—	Z76	●	●	—	IC circuit	—
				2-wire				12V	100V	—	Z73	●	●	●
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	Y69A	Y59A	●	●	○	IC circuit	Relay PLC
				3-wire (PNP)				Y7PV	Y7P	●	●	○	—	
				2-wire				Y69B	Y59B	●	●	○	—	
	Diagnostic indication (2-color display)		3-wire (NPN)	24V	5V, 12V	—	Y7NWV	Y7NW	●	●	○	IC circuit		
	3-wire (PNP)		Y7PWV				Y7PW	●	●	○	—			
	Water resistant (2-color display)		2-wire	12V	—	Y7BWV	Y7BW	●	●	○	—			
—	—	—	—	Y7BA	—	●	○	—						

* Lead wire length symbols: 0.5m Nil (Example) Y59A
 3m L (Example) Y59AL
 5m Z (Example) Y59AZ

Note) • Solid state switches marked "○" are produced upon receipt of order.

• Auto switches are not mounted on the cylinder at the time of the shipment, but rather packaged together with the cylinder for shipment.

Specifications

- Light and compact aluminum body.
- Auto switches can be mounted.
- Auto switch mounting does not affect overall length.
- A wide range of operating pressures, bore sizes, and standard strokes make more selections possible to suit your individual needs.



Action	Double acting/Single rod type
Fluid	Hydraulic fluid
Nominal pressure	10MPa
Proof pressure	15MPa
Maximum allowable pressure	13MPa
Minimum operating pressure	0.3MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C
	With auto switch: -10° to 60°C
Piston speed	8 to 100mm/s
Cushion	None
Rod end thread	Female thread, Male thread
Thread tolerance	JIS class 2
Stroke length tolerance	+ ^{0.8} ₀ mm
Mounting type	Basic type
Mounting	Through hole

Note) Refer to page 136 for definitions of terms related to pressure.

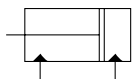
Standard Strokes

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



Pages 10 to 12

JIS symbol



Manufacture of Intermediate Stroke Cylinders

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

55, 60, 65 and 70mm stroke cylinders have the same overall length as a 75mm stroke cylinder, and 80, 85, 90 and 95mm stroke cylinders have the same length as a 100mm stroke cylinder.

Refer to the Made to Order Specifications on page 11 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

* Contact SMC.

Minimum Strokes for Auto Switch Mounting

∅20 & ∅25

No. of auto switches	Auto switch type		
	D-A9□, D-F9□W D-A9□V, D-F9□WV	D-F9□ D-F9□V	D-F9BAL
1 pc.	5	5	20
2 pcs.	10	5	20

∅32 to ∅100

No. of auto switches	Auto switch type			
	D-Z7 D-Z8	D-Y5, D-Y6 D-Y7 D-Y7□V	D-Y7□W D-Y7□WV	D-Y7BAL
1 pc.	5	5	10	15
2 pcs.	10	5	10	15

Theoretical Output

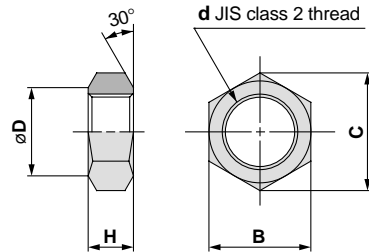
Unit: N

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 (mm²)

Optional Parts

Rod end nut



(mm)

Part no.	Bore size (mm)	B	C	d	D	H
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

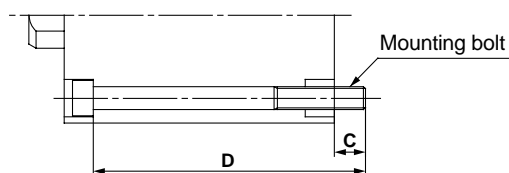
Weights

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	—
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

Mounting Bolts for CH□KDB

Through hole type mounting bolts are available.
 How to order: Add "Bolt" in front of the bolts to be used.
 Example: M8 x 80 / 4 pcs.

Mounting bolt diagram


Model	C	D	Mounting bolt
CH□KDB20 -5 (M)	12.4	55	M5 x 55 /
		60	x 60 /
		65	x 65 /
		70	x 70 /
		75	x 75 /
		80	x 80 /
		85	x 85 /
		90	x 90 /
		95	x 95 /
		100	x 100 /
		CH□KDB25 -5 (M)	10.4
60	x 60 /		
65	x 65 /		
70	x 70 /		
75	x 75 /		
80	x 80 /		
85	x 85 /		
90	x 90 /		
95	x 95 /		
100	x 100 /		
CH□KDB32 -5 (M)	10.5		
		65	x 65 /
		70	x 70 /
		75	x 75 /
		80	x 80 /
		85	x 85 /
		90	x 90 /
		95	x 95 /
		100	x 100 /
		105	x 105 /
		130	x 130 /
CH□KDB40 -5 (M)	13.5	65	M8 x 65 /
		70	x 70 /
		75	x 75 /
		80	x 80 /
		85	x 85 /
		90	x 90 /
		95	x 95 /
		100	x 100 /
		105	x 105 /
		110	x 110 /
		135	x 135 /
160	x 160 /		

Model	C	D	Mounting bolt		
CH□KDB50 -5 (M)	15.8	70	M10 x 70 /		
		75	x 75 /		
		80	x 80 /		
		85	x 85 /		
		90	x 90 /		
		95	x 95 /		
		100	x 100 /		
		105	x 105 /		
		110	x 110 /		
		115	x 115 /		
		140	x 140 /		
		165	x 165 /		
		CH□KDB63 -5 (M)	16	75	M12 x 75 /
				80	x 80 /
85	x 85 /				
90	x 90 /				
95	x 95 /				
100	x 100 /				
105	x 105 /				
110	x 110 /				
115	x 115 /				
120	x 120 /				
145	x 145 /				
170	x 170 /				
CH□KDB80 -5 (M)	22.2			90	M14 x 90 /
				95	x 95 /
		100	x 100 /		
		105	x 105 /		
		110	x 110 /		
		115	x 115 /		
		120	x 120 /		
		125	x 125 /		
		130	x 130 /		
		135	x 135 /		
		160	x 160 /		
		185	x 185 /		
		CH□KDB100 -5 (M)	26.5	110	M16 x 110 /
				115	x 115 /
120	x 120 /				
125	x 125 /				
130	x 130 /				
135	x 135 /				
140	x 140 /				
145	x 145 /				
150	x 150 /				
155	x 155 /				
180	x 180 /				
205	x 205 /				

Series CH□KDB

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.

CH□KDB Bore size R Stroke Rod end thread type Y7BA S

Water resistant cylinder

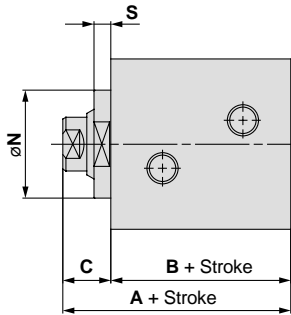
R	NBR Seal (nitrile rubber)
V	FKM Seal (fluoro rubber)

Water resistant solid state switch with 2-color display

ø20 and 25	F9BA
ø32 to ø100	Y7BA

Auto switch symbol

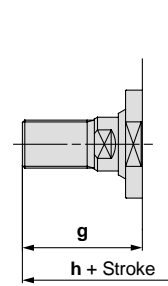
Refer to page 2 for specifications.



(mm)

Bore size (mm)	A	B	C	N	S
20	61	43	18	26.5	6
25	63	45	18	30	6
32	71	51	20	38	7
40	75	55	20	45	7
50	81	60	21	55	7
63	90	67	23	66	7
80	105	78	27	86	7
100	132	96	36	104	7

Note) For all dimensions other than the above, please refer to page 7.



Rod end male thread

(mm)

Bore size (mm)	g	h
20	33	76
25	36	81
32	45	96
40	50	105
50	56	116
63	68	135
80	87	165
100	111	207

Note) For all dimensions other than the above, please refer to page 7.

⚠ Specific Product Precautions

Be sure to read before handling. Refer to pages 135 through 141 for safety instructions, hydraulic cylinder precautions and auto switch precautions.

Usage

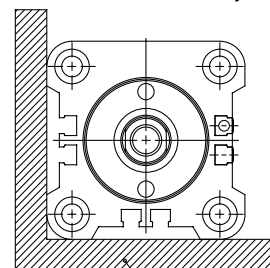
⚠ Caution

- Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting.
- 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.
- 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.
- 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.
- Since Series CH□KDB does not have an air release plug, release air from other components (e.g. from piping, etc.) as well.
- Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.
- 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.
- When mounting the cylinder body with mounting bolts, use tightening torques in the table at left as a guide.

Body mounting bolt tightening torques

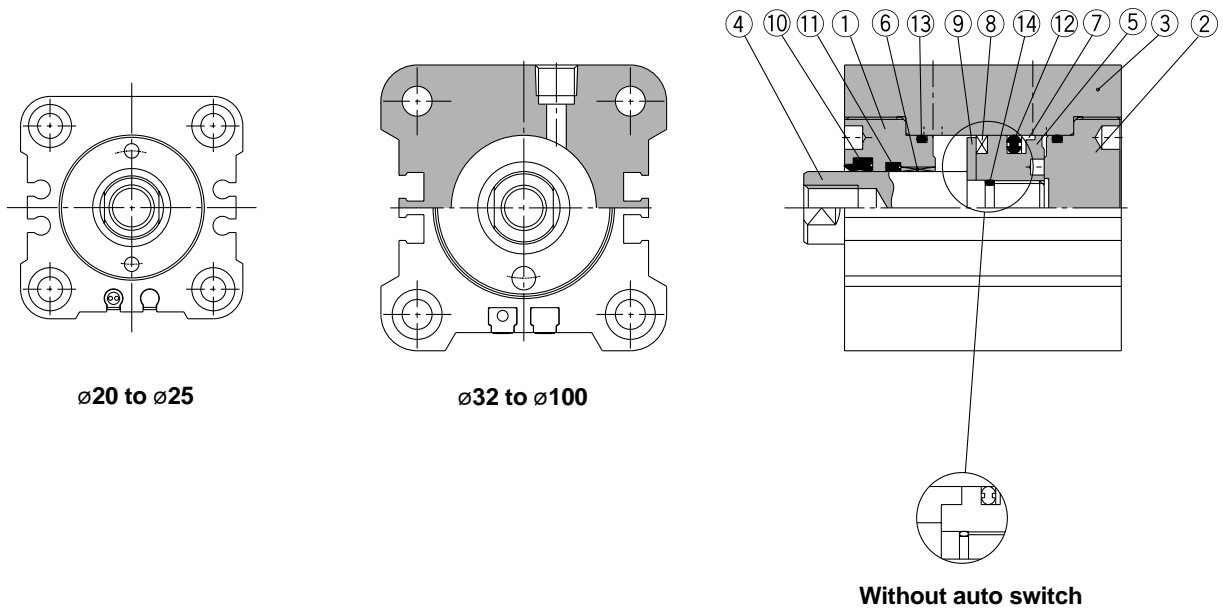
Bore size (mm)	Mounting bolt size	Tightening torque (N·m)
20	M5	2.5
25	M5	4
32	M6	7
40	M8	16
50	M10	30
63	M12	40
80	M14	70
100	M16	100

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.



Magnetic body (steel plate, etc.)

Construction



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 ø32 to ø100: Carbon steel	Hard chromium electroplated
5	Piston	Stainless steel	
6	Bushing	Copper alloy	
7	Back-up ring	Resin	
8	Magnet	—	With switch only
9	Magnet plate	Stainless steel	With switch only
10	Scraper	NBR	
11	Rod seal		
12	Piston seal		
13	Tube gasket		
14	Piston gasket		

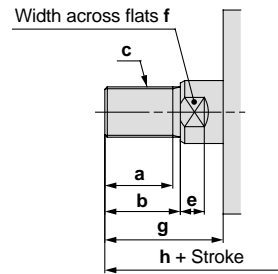
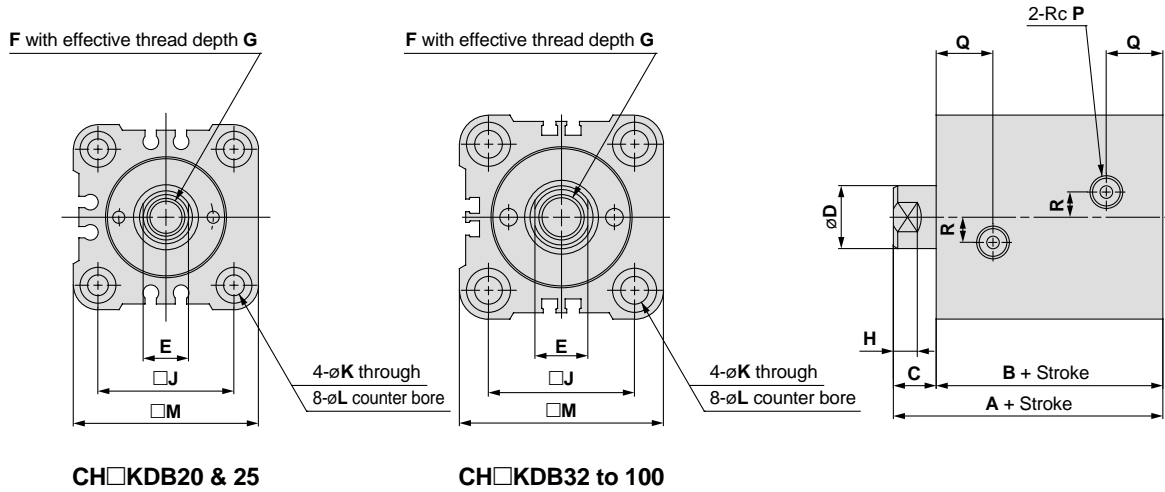
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.	Kit components
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 kits consist of items 7, 10, 11, 12 and 13, and can be ordered by using the seal kit number for each bore size.

Series CH□KDB

Dimensions



Rod end male thread

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.

Bore size (mm)	a	b	c	e	f	g	h
20	11	15	M10 x 1.25	6	10	23	66
25	14	18	M12 x 1.25	6	12	26	71
32	21	25	M16 x 1.5	7	14	35	86
40	26	30	M20 x 1.5	7	19	40	95
50	31	35	M24 x 1.5	8	24	46	106
63	41	45	M30 x 1.5	9	30	58	125
80	56	60	M39 x 1.5	14	41	77	155
100	71	75	M48 x 1.5	21	50	101	197

Series CH□KDB Auto Switch Specifications

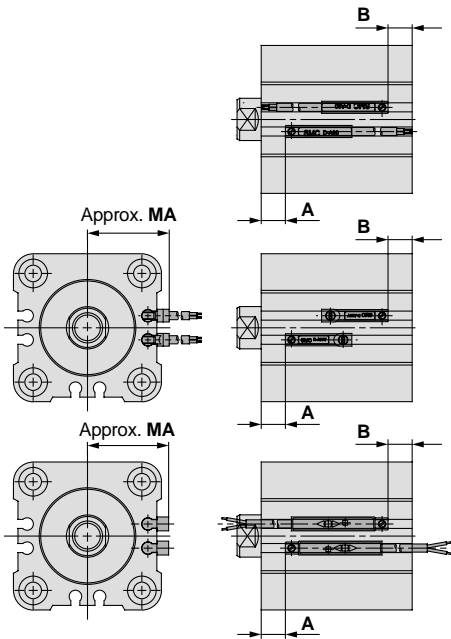
Refer to "Auto Switch Guide" CAT.E274-A for detailed specifications.



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

ø20 & ø25

D-A9□
D-F9□
D-F9□W



Proper auto switch mounting positions (mm)

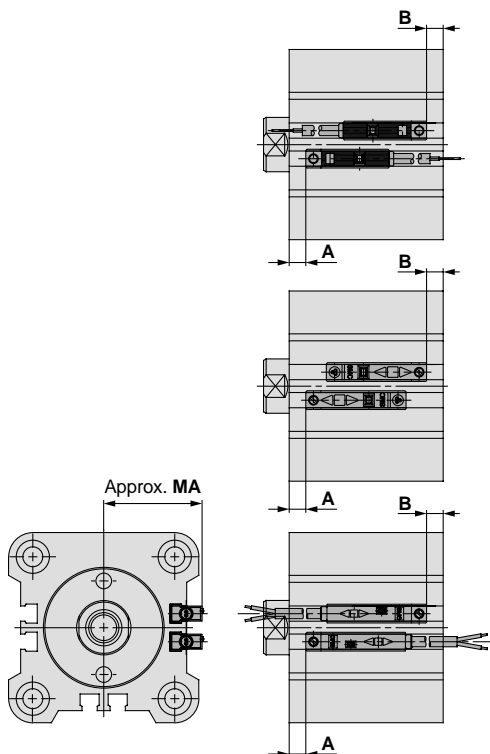
Bore size (mm)	D-A9□ D-A9□V		D-F9□ D-F9□V D-F9□W D-F9□WV		D-F9BAL	
	A	B	A	B	A	B
20	8	15	12	19	11	18
25	9	16	13	20	12	19

Auto switch mounting heights (mm)

Bore size (mm)	D-A9□V	D-F9□V D-F9□WV	D-F9BAL
	MA	MA	MA
20	25	27.5	25
25	27	29.5	27

ø32 to ø100

D-Z7
D-Z8
D-Y5□
D-Y7□
D-Y7□W



Proper auto switch mounting positions (mm)

Bore size (mm)	D-Z7, D-Z8, D-Y5 D-Y, D-Y7 D-Y7□V, D-Y7□WV D-Y7BAL	
	A	B
32	10	16.5
40	12	18.5
50	13	22.5
63	16.5	26
80	18.5	35
100	26.5	44.5

Auto switch mounting heights (mm)

Bore size (mm)	D-Y7BAL
	MA
32	32.5
40	37
50	43
63	51.5
80	62
100	74.5

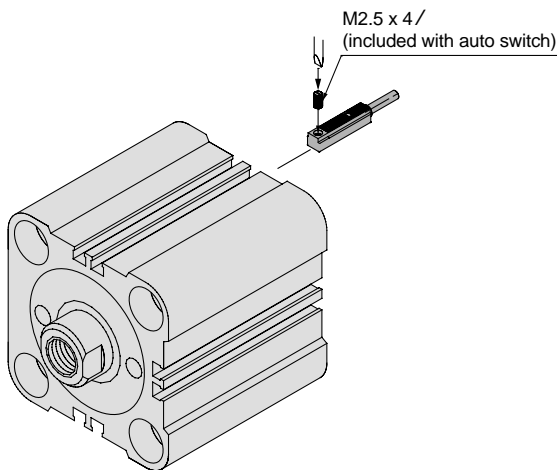
Auto Switch Mounting

When mounting auto switches, they should be inserted into the cylinder's switch mounting groove from the direction shown in the drawing below. After setting in the mounting position, use a flat head watchmakers screw driver to tighten the set screw that is included.

⚠ Caution

When tightening the auto switch mounting screw, use a watchmakers screw driver with a handle about 5 to 6mm in diameter.

Also, tighten with a torque of 0.1 to 0.2N·m for types D-A9 and D-F9, and 0.05 to 0.1N·m for types D-Z7, D-Z8, D-Y5, D-Y6 and D-Y7. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.



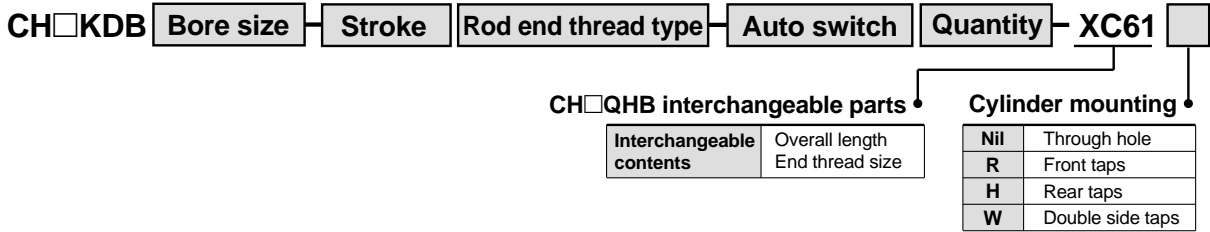
Series CH□KDB

Made to Order Specifications 1

Contact SMC for detailed specifications, lead times, and prices.

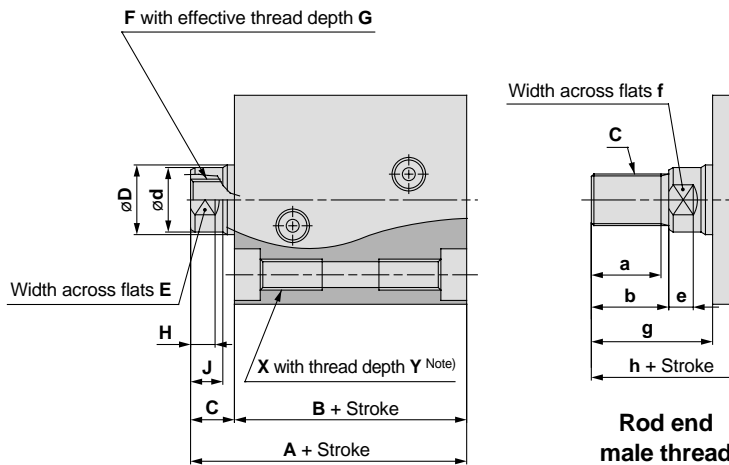


1 Series CHQHB (14MPa compatible) Interchangeable Parts



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.

Series CH □ KDB

Made to Order Specifications 2

Contact SMC for detailed specifications, lead times, and prices.



2 Intermediate Stroke Type

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

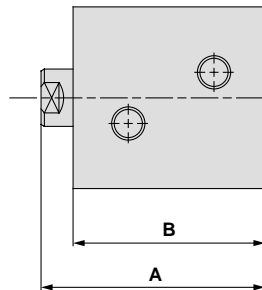
CH□KDB [Bore size] [Stroke] [Rod end thread type] [Auto switch] [Quantity] -XC63

Intermediate stroke ●

Stroke	Applicable tube
55, 60, 65, 70	For 75mm stroke
80, 85, 90, 95	For 100mm 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.

Series CH□KDB

Made to Order Specifications 3

Contact SMC for detailed specifications, lead times, and prices.



3 With Air Release Valve

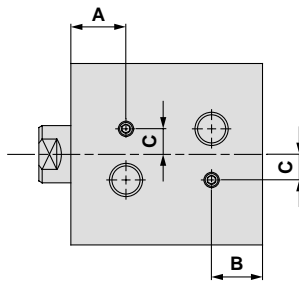
Air release valves are provided on cylinder tube surfaces machined for ports.

CH□KDB Bore size Stroke Rod end thread type Auto switch Quantity 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.

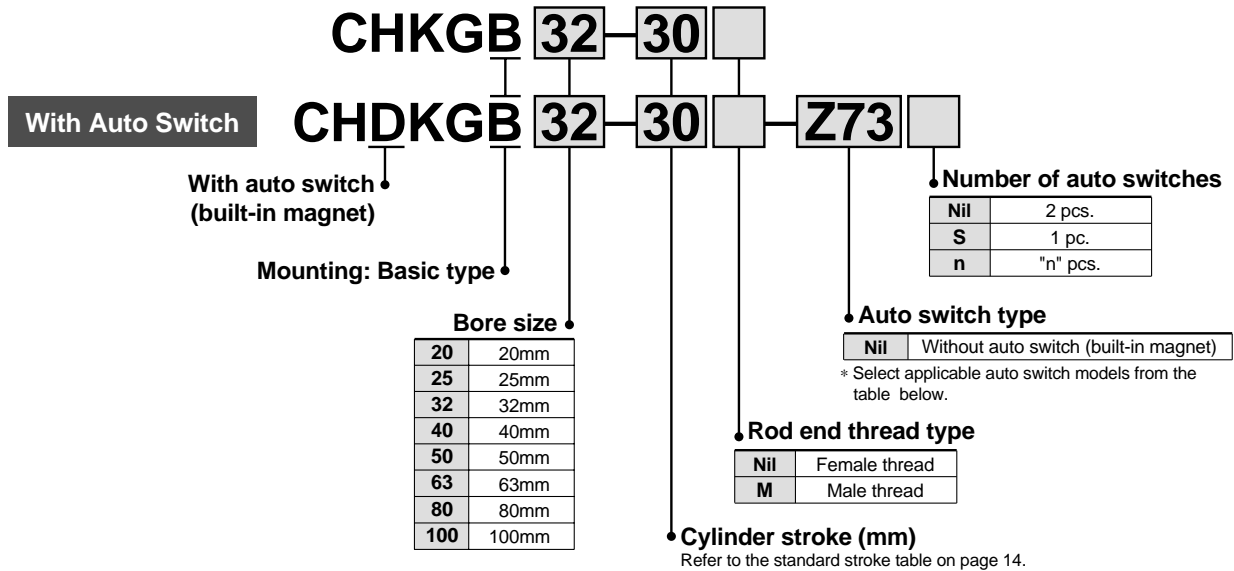
16MPa

Compact Hydraulic Cylinder

Series **CH** **KGB**

∅20, ∅25, ∅32, ∅40, ∅50, ∅63, ∅80, ∅100

How to Order



Applicable Auto Switches: Refer to "Auto Switch Guide" CAT.E-274-A for further details on each auto switch. Refer to pages 117 and 118 for auto switch circuit diagrams.

Bore sizes ∅20 and ∅25

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length (m)*			Applicable load		
					DC	AC	Electrical entry direction	In-line	0.5 (Nil)	3 (L)	5 (Z)			
Reed switch	—	Grommet	No	2-wire	24V	5V, 12V	100V or less	A90V	A90	●	●	—	IC circuit	Relay
						12V	100V	A93V	A93	●	●	—	—	PLC
				Yes	3-wire (NPN equiv.)	—	5V	—	A96V	A96	●	●	—	—
Solid state switch	—	Grommet	No	3-wire (NPN)	24V	5V, 12V	—	F9NV	F9N	●	●	○	IC circuit	Relay PLC
				3-wire (PNP)				F9PV	F9P	●	●	○	—	
				2-wire				F9BV	F9B	●	●	○	—	
	Diagnostic indication (2-color display)	Grommet	Yes	3-wire (NPN)	F9NVV	F9NW	●	●	○	—	—			
				3-wire (PNP)	F9PWW	F9PW	●	●	○	IC circuit				
				2-wire	F9BWW	F9BW	●	●	○	—				
				—	F9BA	—	●	○	—	—				
Water resistant (2-color display)	Grommet	No	2-wire	—	—	—	F9BA	—	●	○	—	—		

* Lead wire length symbols: 0.5m Nil (Example) A93
3m L (Example) A93L
5m Z (Example) F9NWWZ

Note) Solid state switches marked "○" are produced upon receipt of order.

Auto switch mounting bracket (screws) part nos.

Bore sizes (mm)	Mounting bracket part no.	Applicable switches	
		Reed switches	Solid state switches
20 & 25	BHK1-020	D-A9□ D-A9□V	D-F9□ D-F9□V D-F9□W D-F9□WV D-F9BAL
32 to 100	BHK2-032	D-Z7□ D-Z8□	D-Y5□ D-Y6□ D-Y7□ D-Y7□V D-Y7□W D-Y7□WV D-Y7BAL

Note) For cylinders with auto switches, the switches (already attached to mounting brackets) are packed together with the cylinder for shipment, but are not mounted on the cylinder.

Bore sizes ∅32 to ∅100

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length (m)*			Applicable load		
					DC	AC	Electrical entry direction	In-line	0.5 (Nil)	3 (L)	5 (Z)			
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	24V	5V	—	—	Z76	●	●	—	IC circuit	Relay PLC
				2-wire				—	Z73	●	●	●	—	
Solid state switch	—	Grommet	No	3-wire (NPN)	24V	5V, 12V	—	100V or less	—	Z80	●	●	—	IC circuit
				3-wire (PNP)				Y69A	Y59A	●	●	○	IC circuit	
				2-wire				Y7PV	Y7P	●	●	○	—	
	Diagnostic indication (2-color display)	Grommet	Yes	3-wire (NPN)	Y7NVV	Y7NW	●	●	○	—	—			
				3-wire (PNP)	Y7PWW	Y7PW	●	●	○	IC circuit				
				2-wire	Y7BWW	Y7BW	●	●	○	—				
				—	Y7BA	—	●	○	—	—				
Water resistant (2-color display)	Grommet	No	2-wire	—	—	—	Y7BA	—	●	○	—	—		

* Lead wire length symbols: 0.5m Nil (Example) Y59A
3m L (Example) Y59AL
5m Z (Example) Y59AZ

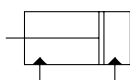
Note) Solid state switches marked "○" are produced upon receipt of order.

- Light and compact aluminum body.
- Auto switch can be mounted.
- Auto switch mounting does not affect overall length.
- A wide range of operating pressures, bore sizes, and standard strokes make wide selections possible.



Pages 22 to 24

JIS symbol



Specifications

Action	Double acting/Single rod type
Fluid	Hydraulic fluid
Nominal pressure	16MPa
Proof pressure	24MPa
Maximum allowable pressure	16MPa
Minimum operating pressure	0.3MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C
	With auto switch: -10° to 60°C
Piston speed	8 to 100mm/s
Cushion	None
Rod end thread	Female thread, Male thread
Thread tolerance	JIS class 2
Stroke length tolerance	+0.8 0 mm
Mounting type	Basic type
Mounting	Through hole

Note) Refer to page 136 for definitions of terms related to pressure.

Standard Strokes

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

Manufacture of Intermediate Stroke Cylinders

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

55, 60, 65 and 70mm stroke cylinders have the same overall length as a 75mm stroke cylinder, and 80, 85, 90 and 95mm stroke cylinders have the same length as a 100mm stroke cylinder.

Refer to the Made to Order Specifications on page 23 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

* Contact SMC.

Minimum Strokes for Auto Switch Mounting

ø20 & ø25

No. of auto switches	Auto switch type		
	D-A9□, D-F9□W D-A9□V, D-F9□WV	D-F9□ D-F9□V	D-F9BAL
1 pc.	5	5	15
2 pcs.	10	5	15

ø32 to ø100

No. of auto switches	Auto switch type			
	D-Z7 D-Z8	D-Y7□W D-Y7□WV	D-Y5, D-Y7□V D-Y6 D-Y7	D-Y7BAL
1 pc.	5	10	5	15
2 pcs.	10	10	5	15

Theoretical Output

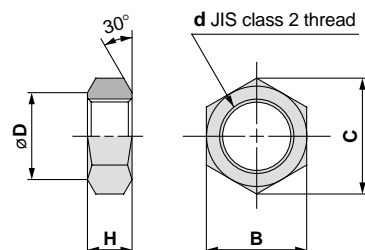
Unit: N

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 (mm²)

Optional Parts

Rod end nut



(mm)

Part no.	Bore size (mm)	B	C	d	D	H
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

Weights

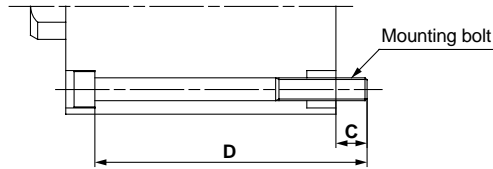
Unit: g

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	—
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

Mounting Bolts for CH□KGB

Through hole type mounting bolts are available.
 How to order: Add "Bolt" in front of the bolts to be used.
 Example: M8 x 80 / 4 pcs.

Mounting bolt diagram



Model	C	D	Mounting bolt		
CH□KGB20 -5 (M)	12.4	55	M5 x 55/		
		60	x 60/		
		65	x 60/		
		70	x 70/		
		75	x 75/		
		80	x 80/		
		85	x 85/		
		90	x 90/		
		95	x 95/		
		100	x 100/		
		CH□KGB25 -5 (M)	10.4	55	M5 x 55/
				60	x 60/
65	x 60/				
70	x 70/				
75	x 75/				
80	x 80/				
85	x 85/				
90	x 90/				
95	x 95/				
100	x 100/				
CH□KGB32 -5 (M)	10.5			65	M6 x 65/
				70	x 70/
		75	x 75/		
		80	x 80/		
		85	x 85/		
		90	x 90/		
		95	x 95/		
		100	x 100/		
		105	x 105/		
		110	x 110/		
		135	x 135/		
		CH□KGB40 -5 (M)	13.5	75	M8 x 75/
80	x 80/				
85	x 85/				
90	x 90/				
95	x 95/				
100	x 100/				
105	x 105/				
110	x 110/				
115	x 115/				
120	x 120/				
145	x 145/				
170	x 170/				

Model	C	D	Mounting bolt		
CH□KGB50 -5 (M)	15.5	80	M10 x 80/		
		85	x 85/		
		90	x 90/		
		95	x 95/		
		100	x 100/		
		105	x 105/		
		110	x 110/		
		115	x 115/		
		120	x 120/		
		125	x 125/		
		150	x 150/		
		175	x 175/		
		CH□KGB63 -5 (M)	16	85	M12 x 85/
				90	x 90/
				95	x 95/
100	x 100/				
105	x 105/				
110	x 110/				
115	x 115/				
120	x 120/				
125	x 125/				
130	x 130/				
155	x 155/				
180	x 180/				
CH□KGB80 -5 (M)	22	100	M14 x 100/		
		105	x 105/		
		110	x 110/		
		115	x 115/		
		120	x 120/		
		125	x 125/		
		130	x 130/		
		135	x 135/		
		140	x 140/		
		145	x 145/		
		170	x 170/		
		195	x 195/		
		CH□KGB100 -5 (M)	26.5	120	M16 x 120/
				125	x 125/
				130	x 130/
135	x 135/				
140	x 140/				
145	x 145/				
150	x 150/				
155	x 155/				
160	x 160/				
165	x 165/				
190	x 190/				
215	x 215/				

⚠ Specific Product Precautions

Be sure to read before handling. Refer to pages 135 through 141 for safety instructions, hydraulic cylinder and auto switch precautions.

Usage

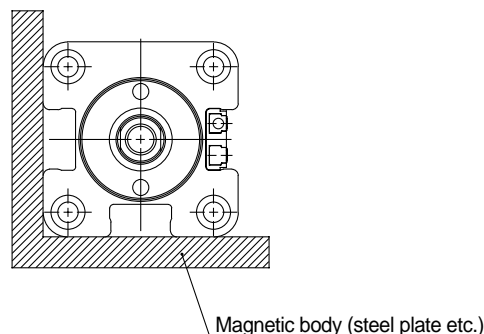
⚠ Caution

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.
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.

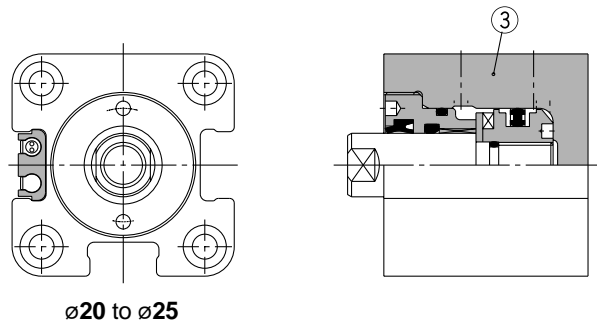
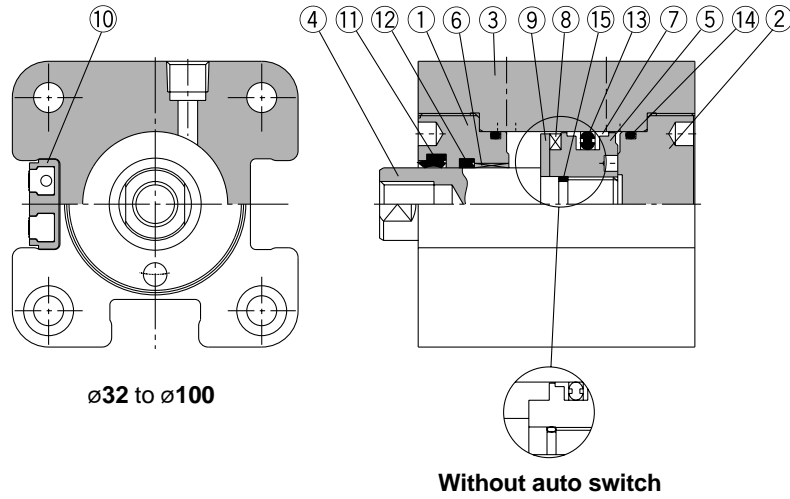
Body mounting bolt tightening torques

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

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



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 ø32 to ø100: Carbon steel	Hard chromium electroplated
5	Piston	Stainless steel	
6	Bushing	Copper alloy	
7	Back-up ring	Resin	
8	Magnet	—	With switch only
9	Magnet plate	Stainless steel	With switch only
10	Switch mounting bracket	Aluminum alloy	With switch only
11	Scraper	NBR	
12	Rod seal		With back-up ring
13	Piston seal		
14	Tube gasket		
15	Piston gasket		

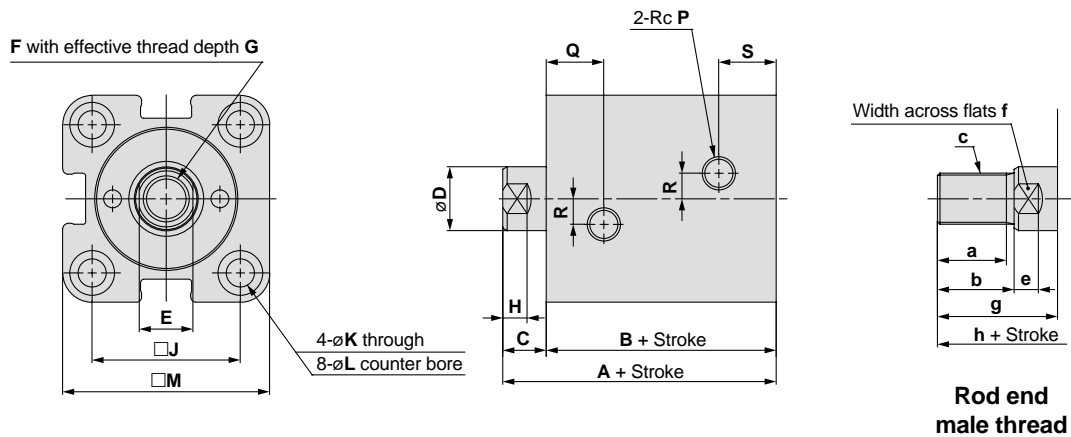
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.	Kit components
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 kits consist of items 7, 11, 12, 13 and 14 and can be ordered by using the seal kit number for each bore size.

Series CH□KGB

Dimensions



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

Bore size (mm)	a	b	c	e	f	g	h
20	11	15	M10 x 1.25	6	10	23	66
25	14	18	M12 x 1.25	6	12	26	71
32	21	25	M16 x 1.5	7	14	35	91
40	26	30	M20 x 1.5	7	19	40	105
50	31	35	M24 x 1.5	8	24	46	116
63	41	45	M30 x 1.5	9	30	58	135
80	56	60	M39 x 1.5	14	41	77	165
100	71	75	M48 x 1.5	21	50	101	207

Series CH□KGB Auto Switch Specifications

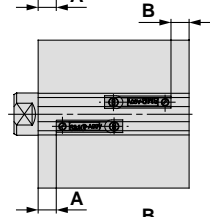
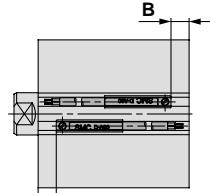
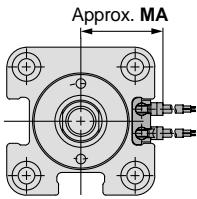
Refer to "Auto Switch Guide" CAT.E274-A for detailed specifications.



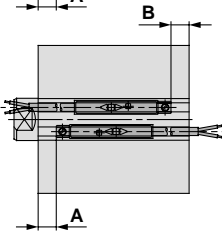
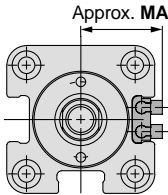
Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

ø20 & ø25

D-A9□
D-F9□
D-F9□W



D-A9□V
D-F9□V
D-F9□WV



D-F9BAL

Proper auto switch mounting positions (mm)

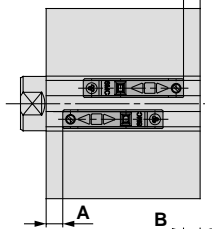
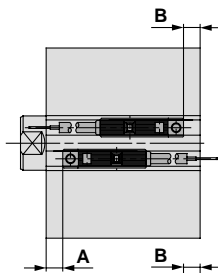
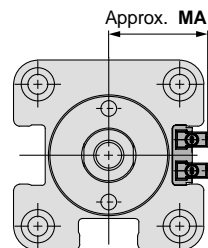
Bore size (mm)	D-A9□ D-A9□V		D-F9□ D-F9□V D-F9□W D-F9□WV		D-F9BAL	
	A	B	A	B	A	B
20	12	11	16	15	15	14
25	13	12	17	16	16	15

Auto switch mounting heights (mm)

Bore size (mm)	D-A9□V	D-F9□V D-F9□WV	D-F9BAL
	MA	MA	MA
20	25.5	28	25.5
25	27.5	30	27.5

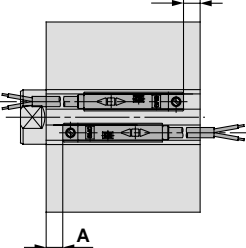
ø32 to ø100

D-Z7
D-Z8
D-Y5□
D-Y7□
D-Y7□W



D-Y6□
D-Y7□V
D-Y7□WV

D-Y7BAL



Proper auto switch mounting positions (mm)

Bore size (mm)	D-Z7, D-Z8, D-Y5 D-Y6, D-Y7 D-Y7□V, D-Y7□WV D-Y7BAL	
	A	B
32	13.5	18
40	19	21.5
50	19	26.5
63	21.5	31
80	24.5	39
100	34.5	46.5

Auto switch mounting heights (mm)

Bore size (mm)	D-Y7BAL
	MA
32	33
40	37.5
50	43.5
63	52
80	62.5
100	75

Series CH□KGB

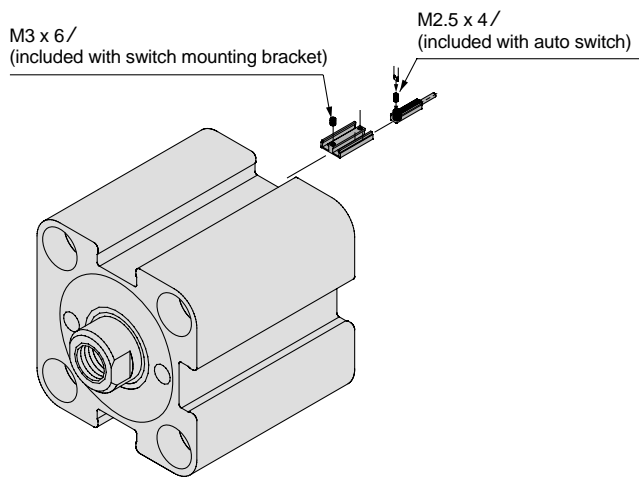
Auto Switch Mounting

When mounting auto switches, they should first be set into the mounting bracket and inserted into the cylinder's switch mounting groove from the direction shown in the drawing below. After setting in the mounting position, use a hexagon wrench to tighten the switch mounting bracket screw that is included.

⚠ Caution

When tightening the auto switch mounting screw, use a watchmakers screw driver with a handle about 5 to 6 mm in diameter.

When tightening the mounting bracket screw, use a 1.5mm hexagon wrench. The tightening torque should be approximately 0.1 to 0.2N·m for types D-A9 and D-F9, and 0.05 to 0.1N·m for types D-Z7, D-Z8, D-Y5, D-Y6 and D-Y7. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.



Series CH□KGB

Made to Order Specifications 1

Contact SMC for detailed specifications, lead times, and prices.



1

Series CHQHB (14MPa) Interchangeable Parts

CH□KGB Bore size Stroke Rod end thread type Auto switch Quantity -XC62

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).

CH□QHB Interchangeable parts Note)

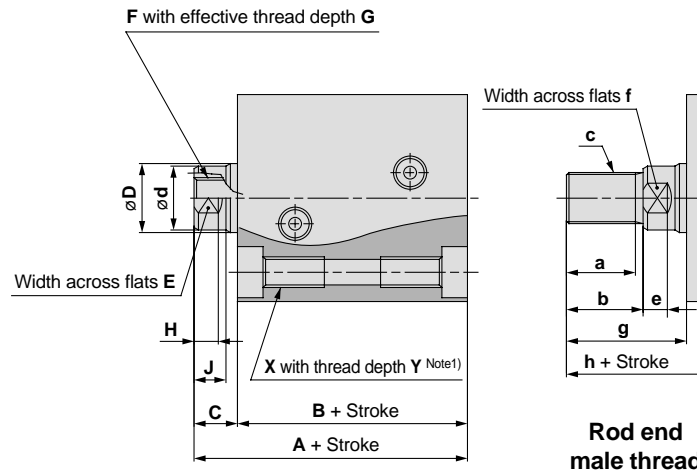
Interchangeable contents	Piston rod C dimension End thread size F dimension
--------------------------	---

Cylinder mounting

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

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.

Series CH□KGB

Made to Order Specifications 2

Contact SMC for detailed specifications, lead times, and prices.



2 Intermediate Stroke Type

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

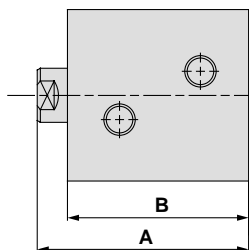
CH□KGB Bore size Stroke Rod end thread type Auto switch Quantity XC63

Intermediate stroke

Strokes	Applicable tube
55, 60, 65, 70	For 75mm stroke
80, 85, 90, 95	For 100mm stroke

Dimensions

CH□KGB□-□-XC63



Bore size (mm) \ Stroke	55, 60, 65, 70		80, 85, 90, 95	
	A	B	A	B
32	141	131	—	—
40	150	140	175	165
50	156	145	181	170
63	165	152	190	177
80	180	163	205	188
100	207	181	232	206

Note) Dimensions other than those highlighted above are standard.

Series CH□KGB

Made to Order Specifications 3

Contact SMC for detailed specifications, lead times, and prices.



3

With Air Release Valve

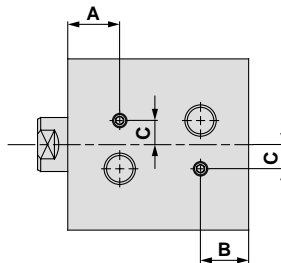
Air release valves are provided on cylinder tube surfaces machined for ports.

CH□KGB Bore size Stroke Rod end thread type Auto switch Quantity 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

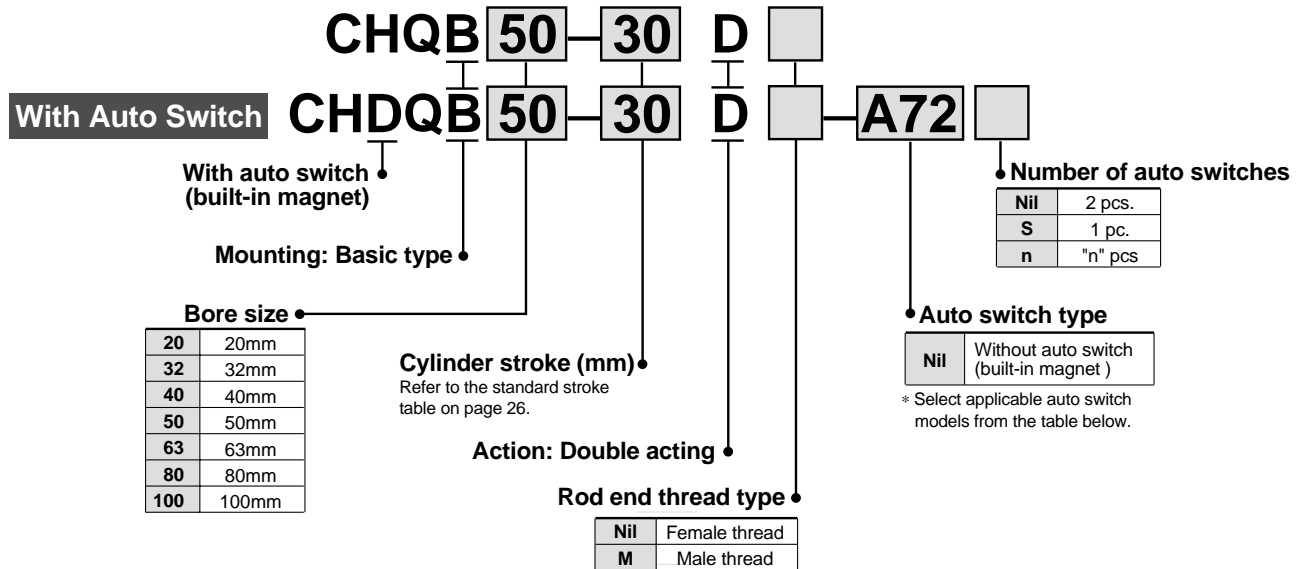
Note) Dimensions other than those highlighted above are standard.

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

ø20, ø32, ø40, ø50, ø63, ø80, ø100

3.5MPa

How to Order



Applicable Auto Switches: Refer to "Auto Switch Guide" CAT.E274-A for further details on each auto switch. Refer to pages 117 and 118 for auto switch circuit diagrams.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type				Lead wire length (m)*				Applicable load																				
					DC	AC	Rail mount		Direct mount		0.5 (Nil)	3 (L)	5 (Z)	None (N)	IC circuit	Relay PLC																			
							ø20 to ø100	ø32 to ø100	Perpendicular	In-line							Perpendicular	In-line																	
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5V	—	A76H	A96V	A96	●	●	—	—	IC circuit	—																			
											Connector	2-wire	24V	12V			100V	—	A73	A73H	—	—	●	●	●	—									
																							Yes	5V, 12V	100V or less	A80	A80H	A90V	A90	●	●	—	—		
		No																												12V	—	A73C	—	—	—
		Diagnostic indication (2-color display)									Grommet	Yes	2-wire	24V			5V, 12V	24V or less	A80C	—	—	—	●	●	●	●	IC circuit	—							
																							Grommet	Yes	3-wire (NPN)	5V, 12V	—	A79W	—	—	—	●	●	—	—
Connector	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	●					●	—																—	—	—	
		Solid state switch								—	Grommet	Yes	3-wire (NPN)	5V, 12V	—	F7NV	F79	F9NV	F9N	●	●	○	—	IC circuit	Relay PLC										
Connector	2-wire		12V	—	—	—	—	—	—											—	●	●	○	—											
																					Grommet	Yes	3-wire (NPN)	5V, 12V		—	—	—	—	—	—	●	●	○	—
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—											—												●	●	○	—
																																Connector	Yes	2-wire	12V
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
																				Grommet	Yes	3-wire (PNP)	5V, 12V	—		—	—	—	—	—	●				
Grommet	Yes		2-wire	12V	—	—	—	—	—		—																				●	●	○	—	
																				Grommet	Yes	3-wire (NPN)	5V, 12V	—		—	—	—	—	—	●	●	○	—	
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—																				●	●	○	—	
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		2-wire	12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		2-wire	12V	—	—	—	—	—		—									●	●	○	—												
		Grommet								Yes		3-wire (NPN)	5V, 12V	—	—	—	—	—	—	●	●	○	—												
Grommet	Yes		3-wire (PNP)	5V, 12V	—	—	—	—	—		—									●															

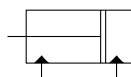
Specifications

- 3.5MPa hydraulic cylinder with short overall length
- Makes more compact jigs and equipment a reality
- Auto switch can be mounted.
- Auto switch mounting does not affect overall length.



Page 34

JIS symbol



Action	Double acting/Single rod
Fluid	Hydraulic fluid
Nominal pressure	3.5MPa
Proof pressure	5.0MPa
Maximum allowable pressure	3.5MPa
Minimum operating pressure	0.3MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C
	With auto switch: -10° to 60°C
Piston speed	8 to 100mm/s
Cushion	None
Rod end thread	Standard: Female thread, Male thread
Thread tolerance	JIS class 2
Stroke length tolerance	+1.0 0 mm
Mounting type	Basic type
Mounting	Through hole

Note) Refer to page 136 for definitions of terms related to pressure.

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

Minimum Strokes for Auto Switch Mounting

No. of auto switches	(mm)						
	D-F7□V D-J79C D-F9□ D-F9□V	D-A7□ D-A80 D-A73C D-A80C D-A7□H D-A80H D-A9□ D-A9□V	D-F9□W D-F9□WV D-F7□W D-F7□WV D-J79W D-F9BAL D-F7BAVL	D-F7□ D-J79	D-A79W	D-F7BAL D-F7NTL D-F79F	D-F7LF
1 pc.	5	5	10	10	15	15	20
2 pcs.	5	10	15	10	20	15	20

Auto Switch Mounting Bracket Part Nos.

Bore sizes (mm)	Mounting bracket part no.	Note	Applicable Auto Switches	
			Reed Switches	Solid State Switches
20	BQ - 1	• Switch mounting screw (M3 x 0.5 x 8) • Square nut	D-A7□, D-A80 D-A73C, D-A80C	D-F7□, D-J79 D-F7□V, D-J79C
32, 40, 50 63, 80, 100	BQ - 2	• Switch mounting screw (M3 x 0.5 x 10) • Switch spacer • Switch mounting nut	D-A7□H, D-A80H D-A79W	D-F7□W, D-J79W D-F7□WV, D-F7BA□ D-F7□F, D-F7NTL

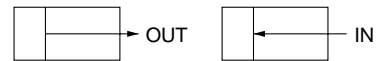
[Stainless Steel Mounting Screw Kit]

The following stainless steel mounting screw kit (including nuts) is available to meet special operating environment conditions. (Please note that auto switch spacers are not included and must be ordered separately.)

Stainless steel mounting screw kit: BBA2 for D-A7, D-A8, D-F7, and D-J7 auto switches

When a cylinder is ordered with waterproof type D-F7BAL switches, they are mounted on the cylinder with stainless steel screws. When the same switches are ordered separately, the above mounting screw kits BBA2 are automatically included with the switches.

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 (mm²)

Weights

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 pages 135 through 141 for safety instructions, hydraulic cylinder precautions and auto switch precautions.

Usage

⚠ Caution

- Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting. (ø20: 2 pcs.; ø32 to ø100: 4 pcs.)
- 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.
- 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.

- 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.
- Since Series CH□QB does not have an air release plug, release air from other components (e.g. from piping, etc.) as well.
- 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

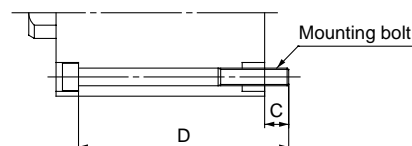
Bore size (mm)	Mounting bolt		Tightening torque N·m
	Size	Qty.	
20	M5 x 0.8	2	3
32	M5 x 0.8	4	3
40	M5 x 0.8	4	3
50	M6 x 1	4	6
63	M8 x 1.25	4	11.5
80	M10 x 1.5	4	24
100	M10 x 1.5	4	34

- Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.
- 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.
 How to order: Add "Bolt" in front of the bolts to be used.
 Example: M5 x 50/ 4 pcs.

Mounting bolt diagram

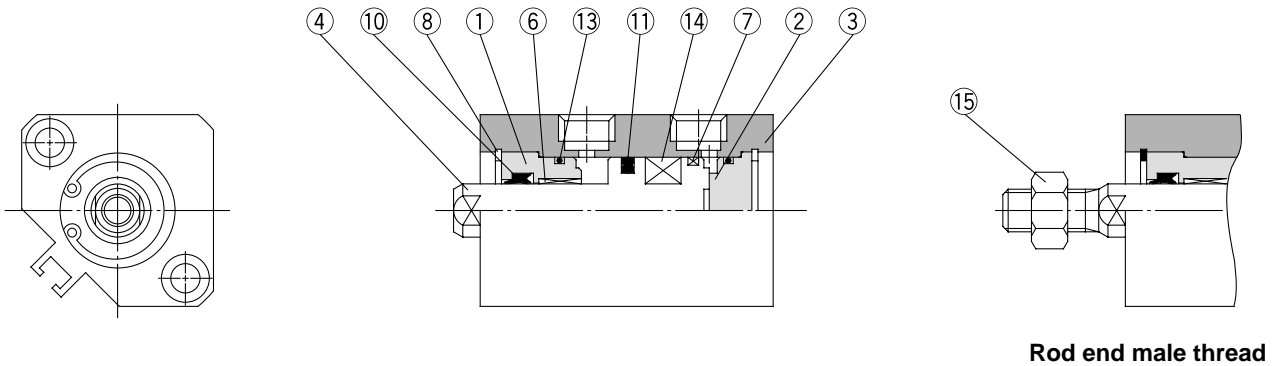


Model	C	D	Mounting bolt	Model	C	D	Mounting bolt		
CH □QB20 -5D (M)	7	55	M5 x 55/	CH□QB63 -10D (M)	15.5	95	M8 x 95/		
		-10D (M)	60			x 60/	-15D (M)	100	x 100/
		-15D (M)	65			x 65/	-20D (M)	105	x 105/
		-20D (M)	70			x 70/	-25D (M)	110	x 110/
		-25D (M)	75			x 75/	-30D (M)	115	x 115/
		-30D (M)	80			x 80/	-35D (M)	120	x 120/
		-35D (M)	85			x 85/	-40D (M)	125	x 125/
		-40D (M)	90			x 90/	-45D (M)	130	x 130/
		-45D (M)	95			x 95/	-50D (M)	135	x 135/
		-50D (M)	100			x 100/	-75D (M)	160	x 160/
							-100D (M)	185	x 185/
CH □QB32 -5D (M)	7	70	M5 x 70/	CH□QB80 -10D (M)	14.5	100	M10 x 100/		
		-10D (M)	75			x 75/	-15D (M)	105	x 105/
		-15D (M)	80			x 80/	-20D (M)	110	x 110/
		-20D (M)	85			x 85/	-25D (M)	115	x 115/
		-25D (M)	90			x 90/	-30D (M)	120	x 120/
		-30D (M)	95			x 95/	-35D (M)	125	x 125/
		-35D (M)	100			x 100/	-40D (M)	130	x 130/
		-40D (M)	105			x 105/	-45D (M)	135	x 135/
		-45D (M)	110			x 110/	-50D (M)	140	x 140/
		-50D (M)	115			x 115/	-75D (M)	165	x 165/
		-75D (M)	140			x 140/	-100D (M)	190	x 190/
		-100D (M)	165			x 165/			
		CH □QB40 -5D (M)	10			75	M5 x 75/	CH□QB100 -10D (M)	13.5
-10D (M)	80			x 80/	-15D (M)	110	x 110/		
-15D (M)	85			x 85/	-20D (M)	115	x 115/		
-20D (M)	90			x 90/	-25D (M)	120	x 120/		
-25D (M)	95			x 95/	-30D (M)	125	x 125/		
-30D (M)	100			x 100/	-35D (M)	130	x 130/		
-35D (M)	105			x 105/	-40D (M)	135	x 135/		
-40D (M)	110			x 110/	-45D (M)	140	x 140/		
-45D (M)	115			x 115/	-50D (M)	145	x 145/		
-50D (M)	120			x 120/	-75D (M)	170	x 170/		
-75D (M)	145			x 145/	-100 (M)	195	x 195/		
-100D (M)	170			x 170/					
CH □QB50 -10D (M)	12			90	M6 x 90/				
		-15D (M)	95	x 95/					
		-20D (M)	100	x 100/					
		-25D (M)	105	x 105/					
		-30D (M)	110	x 110/					
		-35D (M)	115	x 115/					
		-40D (M)	120	x 120/					
		-45D (M)	125	x 125/					
		-50D (M)	130	x 130/					
		-75D (M)	155	x 155/					
		-100D (M)	180	x 180/					

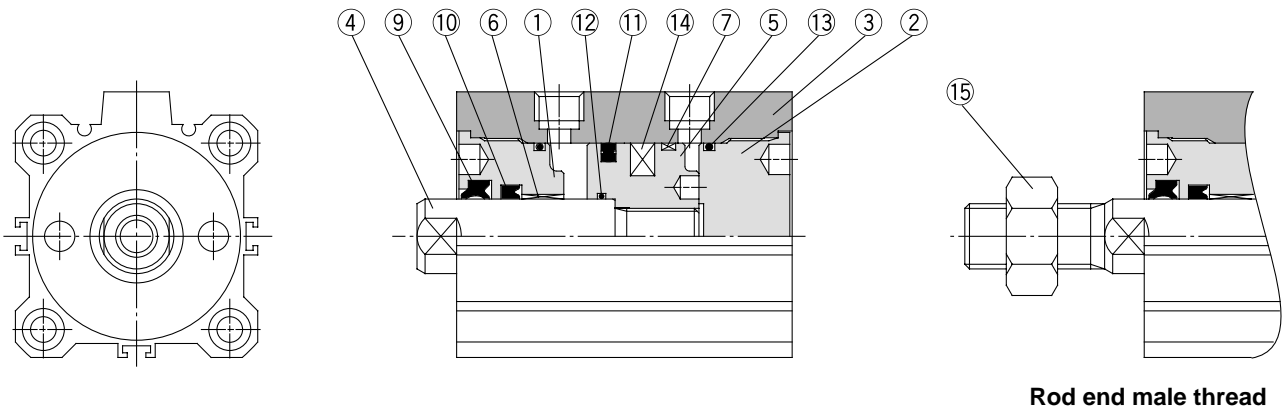
Series CH□QB

Construction

CH□QB20



CH□QB32 to CH□QB100



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	Snap 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	Rubber magnet	NBR	
15	Rod end nut	Carbon steel	Nickel plated

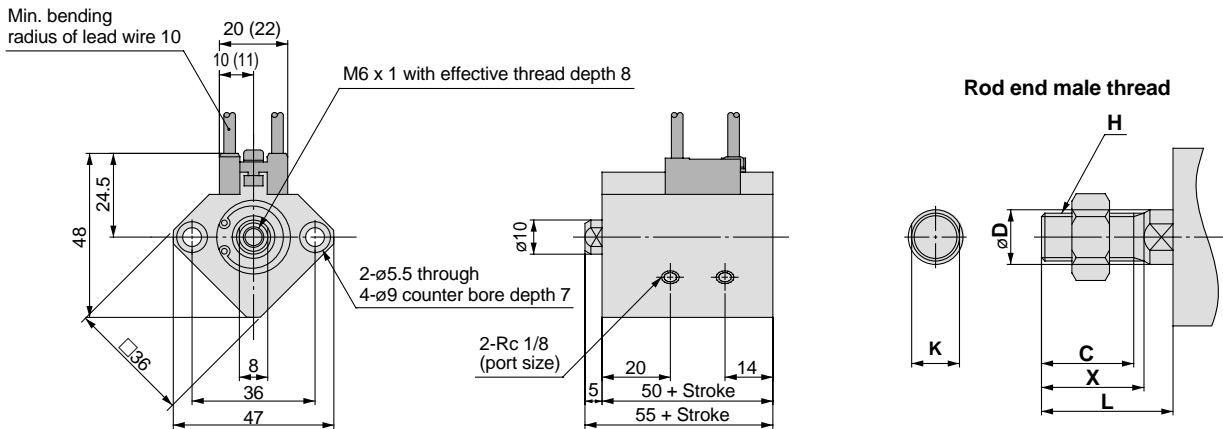
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.	Kit components
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	

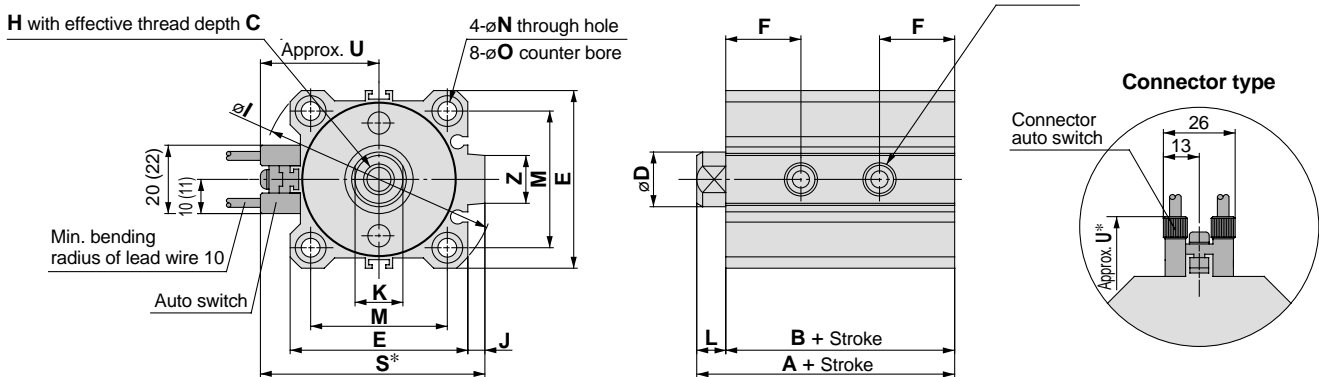
* Seal kits consist of items 9, 10, 11 and 13 and can be ordered by using the seal kit number for each bore size.

Dimensions

ø20



ø32 to ø100



Note) • This drawings above show type D-A7 and D-A8 reed switches.
• The values shown inside () are for switches other than types D-A7 and D-A8.
* S and U dimensions for connector type auto switches (D-A7C, D-A80C, and D-J79C) are 7mm greater.

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	Rc 1/8	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	Rc 1/8	66	35	14
50	87	76	15	20	64	25	M12 x 1.75	86	7	18	11	50	6.6	11 depth 8	Rc 1/4	80	41	19
63	91	80	15	20	77	27	M12 x 1.75	103	7	18	11	60	9	14 depth 10.5	Rc 1/4	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	Rc 3/8	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	Rc 3/8	132.5	67.5	26

Rod end male threads

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

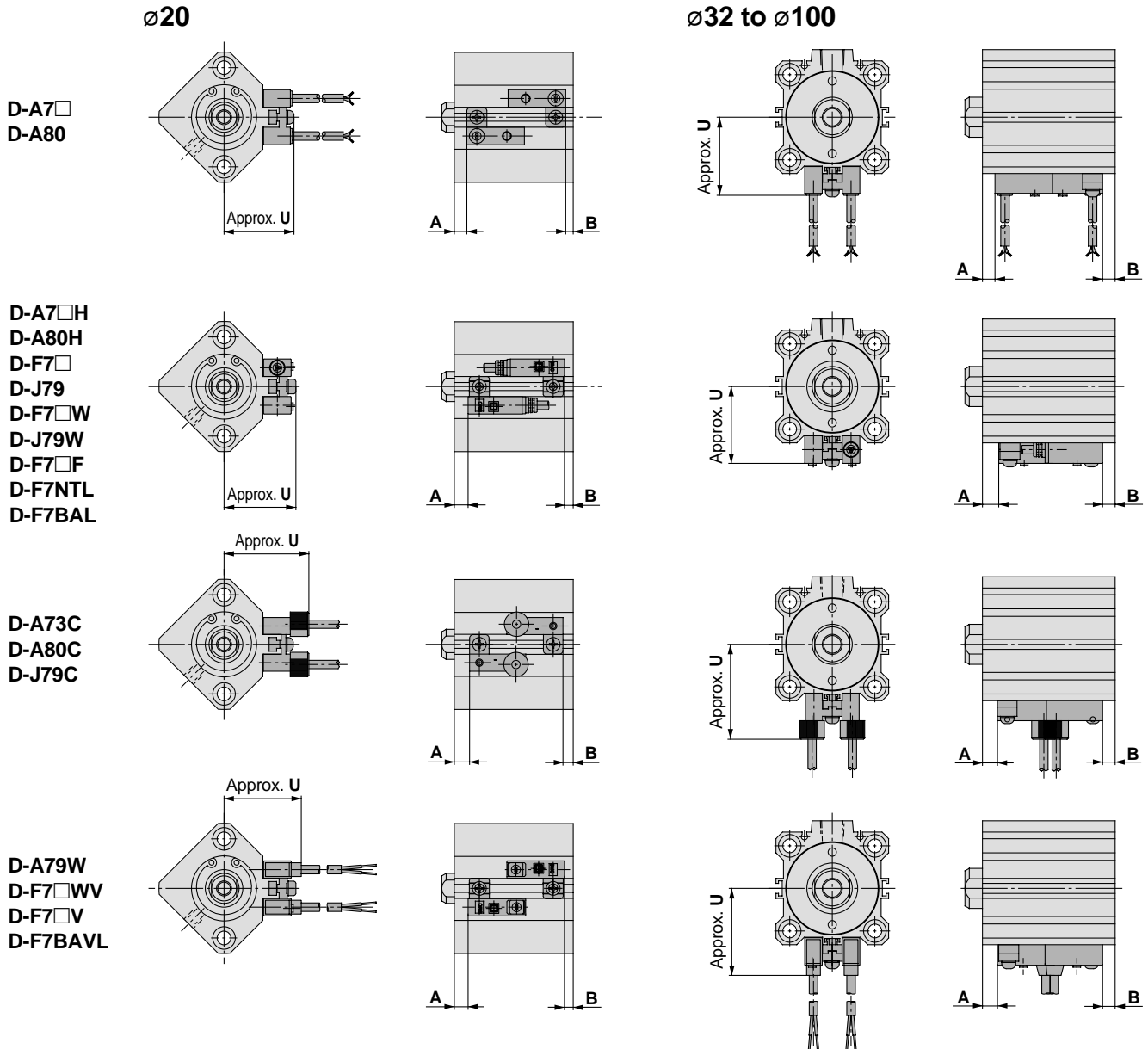
Series CH□QB

Auto Switch Specifications

Refer to "Auto Switch Guide" CAT.E 274-A for detailed specifications.



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



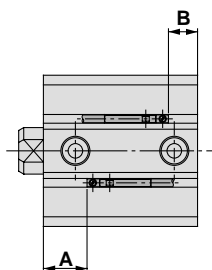
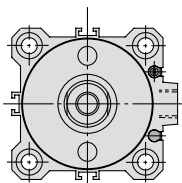
Proper auto switch mounting positions

(mm)

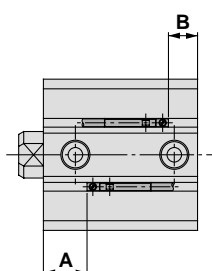
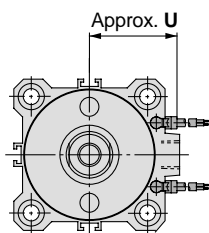
Bore size (mm)	D-A7□ D-A80		D-A7□H, D-A80H D-A73C, D-A80C D-F7□ D-F7□V D-F7□W, D-F7□WV D-J79 D-J79C, D-J79W D-F7BA□		D-A79W		D-F7□F		D-A9□ D-A9□V		D-F9□ D-F9□V D-F9□W D-F9□WV		D-F9BAL		D-F7NTL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	20.5	11.5	21	12	18	9	25	16	—	—	—	—	—	—	26	17
32	27	20	27.5	20.5	24.5	17.5	31.5	24.5	26	19	30	23	29	22	32.5	25.5
40	26	23	26.5	23.5	23.5	20.5	30.5	27.5	25	22	29	26	28	25	31.5	28.5
50	33.5	24.5	34	25	31	22	38	29	32.5	23.5	36.5	27.5	35.5	26.5	39	30
63	33.5	28.5	34	29	31	26	38	33	32.5	27.5	36.5	31.5	35.5	30.5	39	34
80	40.5	30	41	30.5	38	27.5	45	34.5	39.5	29	43.5	33	42.5	32	46	35.5
100	44.5	32.5	45	33	42	30	49	37	43.5	31.5	47.5	35.5	46.5	34.5	50	38

ø32 to ø100

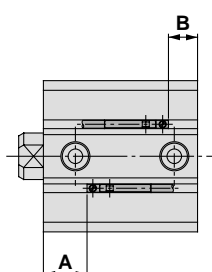
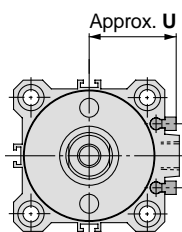
D-A9□
 D-F9□
 D-F9□W



D-A9□V
 D-F9□V
 D-F9□WV



D-F9BAL



Auto switch mounting heights

(mm)

Bore size (mm)	D-A7□ D-A80	D-A7□H D-A80H D-J79 D-J79W D-F7□ D-F7□F D-F7NTL D-F7BAL D-F7□W	D-A73C D-A80C D-F7□WV	D-F7□V D-F7BAVL	D-J79C	D-A79W	D-A9□V	D-F9□V D-F9□WV	D-F9BAL
	U	U	U	U	U	U	U	U	U
20	24.5	25.5	31.5	28	31	27	—	—	—
32	31.5	32.5	38.5	35	38	34	27	29	26.5
40	35	36	42	38.5	41.5	37.5	30.5	32.5	30
50	41	42	48	44.5	47.5	43.5	36.5	38.5	36
63	47.5	48.5	54.5	51	54	50	40	42	39.5
80	57.5	58.5	64.5	61	64	60	50	52	49.5
100	67.5	68.5	74.5	71	74	70	60	62	59.5

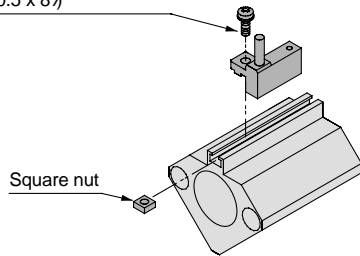
Series CH□QB

Auto Switch Mounting

Mount auto switches in accordance with the procedures shown in the figures below.

∅20

Auto switch mounting screw
(M3 x 0.5 x 8)

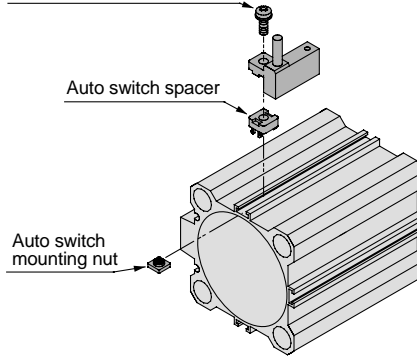


∅32 to ∅100

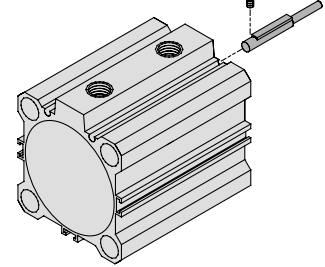
Auto switch mounting screw
(M3 x 0.5 x 10)

Auto switch spacer

Auto switch
mounting nut



Set screw





1 Intermediate Strokes (Using Special Body)

Symbol
-XB10

CH □ QB Bore size Stroke - XB10

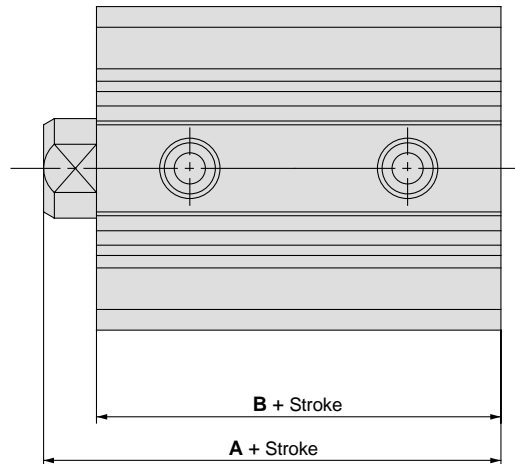
Intermediate stroke (using special body)

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 a special body that does not have spacers installed.

Specifications

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

Dimensions



(mm)

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

Notes) • Dimensions other than the above are the same as the standard double acting single rod type.

• Applicable strokes are available in 5mm increments.

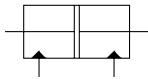
Compact Hydraulic Cylinder
Double Acting/Double Rod: 3.5MPa Series CH□QWB

Specifications

- 3.5MPa hydraulic cylinder with short overall length
- Makes more compact jigs and equipment a reality
- Auto switch can be mounted.
- Auto switch mounting does not affect overall length.



JIS symbol
 Double acting/Double rod



Action	Double acting/Double rod
Fluid	Hydraulic fluid
Nominal pressure	3.5MPa
Proof pressure	5.0MPa
Maximum allowable pressure	3.5MPa
Minimum operating pressure	0.3MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C
	With auto switch: -10° to 60°C
Piston speed	8 to 100mm/s
Cushion	None
Rod end thread	Standard: Female thread, Male thread
Thread tolerance	JIS class 2
Stroke length tolerance	+1.0 0 mm
Mounting type	Basic type
Mounting	Through hole

Note) Refer to page 136 for definitions of terms related to pressure.

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 fluids	Compatible
O/W hydraulic fluids	Compatible
Water/Glycol hydraulic fluids	Not compatible
Phosphate hydraulic fluids	Not compatible

Minimum Strokes for Auto Switch Mounting

No. of auto switches	(mm)						
	D-F7□V D-J79C D-F9□ D-F9□V	D-A7□ D-A80 D-A73C D-A80C D-A7□H D-A80H D-A9□ D-A9□V	D-F9BAL D-F7□WV D-F9□W D-F9□WV D-F7□W D-J79W D-F7BAVL	D-F7□ D-J79	D-A79W	D-F7BAL D-F7NTL D-F79F	D-F7LF
1 pc.	5	5	10	10	15	15	20
2 pcs.	5	10	15	10	20	15	20

Auto Switch Mounting Bracket Part Nos.

Bore size (mm)	Mounting bracket no.	Note	Applicable auto switches	
			Reed switches	Solid state switches
20	BQ-1	<ul style="list-style-type: none"> • Switch mounting screw (M3 x 0.5 x 8) • Square nut 	D-A7□, D-A80 D-A73C, D-A80C	D-F7□, D-J79 D-F7□V, D-J79C
32, 40, 50 63, 80, 100	BQ-2	<ul style="list-style-type: none"> • Switch mounting screw (M3 x 0.5 x 10) • Switch spacer • Switch mounting nut 	D-A7□H, D-A80H D-A79W	D-F7□W, D-J79W D-F7□WV, D-F7BA□ D-F7□F, D-F7NTL

[Stainless Steel Mounting Screw Kits]

The following stainless steel mounting screw kit (including nuts) is available to meet special operating environment conditions. (Please note that auto switch spacers are not included and must be ordered separately.)

Stainless steel mounting screw kit: BBA2 for D-A7, D-A8, D-F7, and D-J7

When a cylinder is ordered with waterproof type D-F7BAL switches, they are mounted on the cylinder with stainless steel screws. When the same switches are ordered separately, the above mounting screw kits BBA2 are automatically included with the switches..

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Piston area (mm ²)	Operating pressure (MPa)					
			1	1.5	2	2.5	3	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 (mm²)

Weights

Unit: g

Bore size (mm)	Cylinder strokes (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 pages 135 through 141 for safety instructions, hydraulic cylinder precautions, and auto switch precautions.

Usage

⚠ Caution

- Use hexagon socket head cap screws (JISB1176, strength class 10.9 or higher) for cylinder mounting. (ø20: 2pcs, ø32 to ø100: 4pcs.)
- 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.
- 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.
- 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.

- 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.
- When mounting the cylinder body with mounting bolts, use tightening torques in the table below as a guide.

Body mounting bolt tightening torques

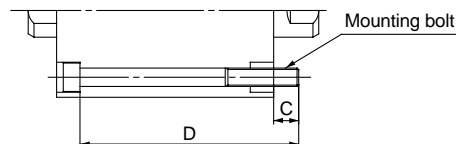
Bore size (mm)	Mounting bolt		Tightening torque N·m
	Size	No.	
20	M5 x 0.8	2	3
32	M5 x 0.8	4	3
40	M5 x 0.8	4	3
50	M6 x 1	4	6
63	M8 x 1.25	4	11.5
80	M10 x 1.5	4	24
100	M10 x 1.5	4	34

- 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.
- Do not use two cylinders facing one another horizontally or vertically in such a way that their piston rods strike each other.
- 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.
How to order: Add "Bolt" in front of the bolts to be used.
Example: M5 x 50 / 4pcs.

Mounting bolt diagram



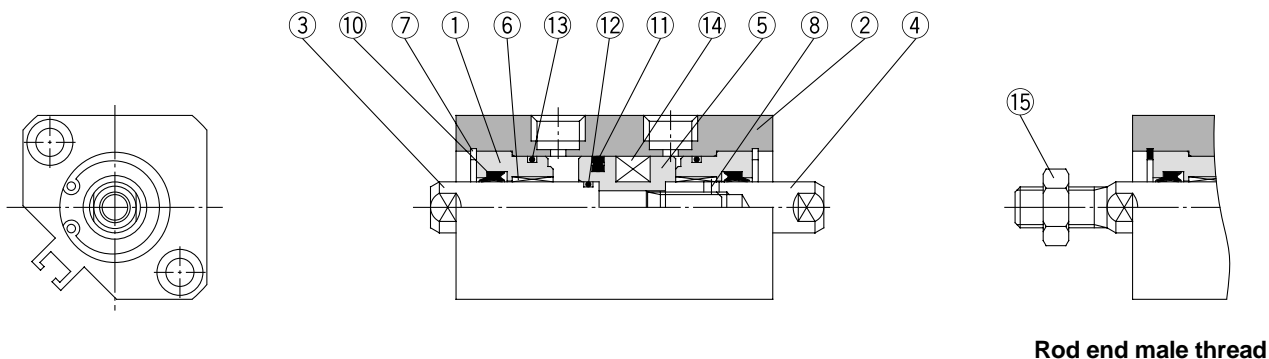
Mounting bolts

Model	C	D	Mounting bolt	Model	C	D	Mounting bolt
CH□QWB20 -5D (M)	10	65	M5 x 65/	CH□QWB63 -10D (M)	15.5	95	M8 x 95/
-10D (M)		70	x 70/	-15D (M)		100	x 100/
-15D (M)		75	x 75/	-20D (M)		105	x 105/
-20D (M)		80	x 80/	-25D (M)		110	x 110/
-25D (M)		85	x 85/	-30D (M)		115	x 115/
-30D (M)		90	x 90/	-35D (M)		120	x 120/
-35D (M)		95	x 95/	-40D (M)		125	x 125/
-40D (M)		100	x 100/	-45D (M)		130	x 130/
-45D (M)		105	x 105/	-50D (M)		135	x 135/
-50D (M)		110	x 110/	-75D (M)		160	x 160/
				-100D (M)	185	x 185/	
CH□QWB32 -5D (M)	7	70	M5 x 70/	CH□QWB80 -10D (M)	14.5	100	M10 x 100/
-10D (M)		75	x 75/	-15D (M)		105	x 105/
-15D (M)		80	x 80/	-20D (M)		110	x 110/
-20D (M)		85	x 85/	-25D (M)		115	x 115/
-25D (M)		90	x 90/	-30D (M)		120	x 120/
-30D (M)		95	x 95/	-35D (M)		125	x 125/
-35D (M)		100	x 100/	-40D (M)		130	x 130/
-40D (M)		105	x 105/	-45D (M)		135	x 135/
-45D (M)		110	x 110/	-50D (M)		140	x 140/
-50D (M)		115	x 115/	-75D (M)		165	x 165/
-75D (M)	140	x 140/	-100D (M)	190	x 190/		
-100D (M)	165	x 165/					
CH□QWB40 -5D (M)	10	75	M5 x 70/	CH□QWB100 -10D (M)	13.5	105	M10 x 105/
-10D (M)		80	x 80/	-15D (M)		110	x 110/
-15D (M)		85	x 85/	-20D (M)		115	x 115/
-20D (M)		90	x 90/	-25D (M)		120	x 120/
-25D (M)		95	x 95/	-30D (M)		125	x 125/
-30D (M)		100	x 100/	-35D (M)		130	x 130/
-35D (M)		105	x 105/	-40D (M)		135	x 135/
-40D (M)		110	x 110/	-45D (M)		140	x 140/
-45D (M)		115	x 115/	-50D (M)		145	x 145/
-50D (M)		120	x 120/	-75D (M)		170	x 170/
-75D (M)	145	x 145/	-100D (M)	195	x 195/		
-100D (M)	170	x 170/					
CH□QWB50 -10D (M)	12	90	M6 x 90/				
-15D (M)		95	x 95/				
-20D (M)		100	x 100/				
-25D (M)		105	x 105/				
-30D (M)		110	x 110/				
-35D (M)		115	x 115/				
-40D (M)		120	x 120/				
-45D (M)		125	x 125/				
-50D (M)		130	x 130/				
-75D (M)		155	x 155/				
-100D (M)	180	x 180/					

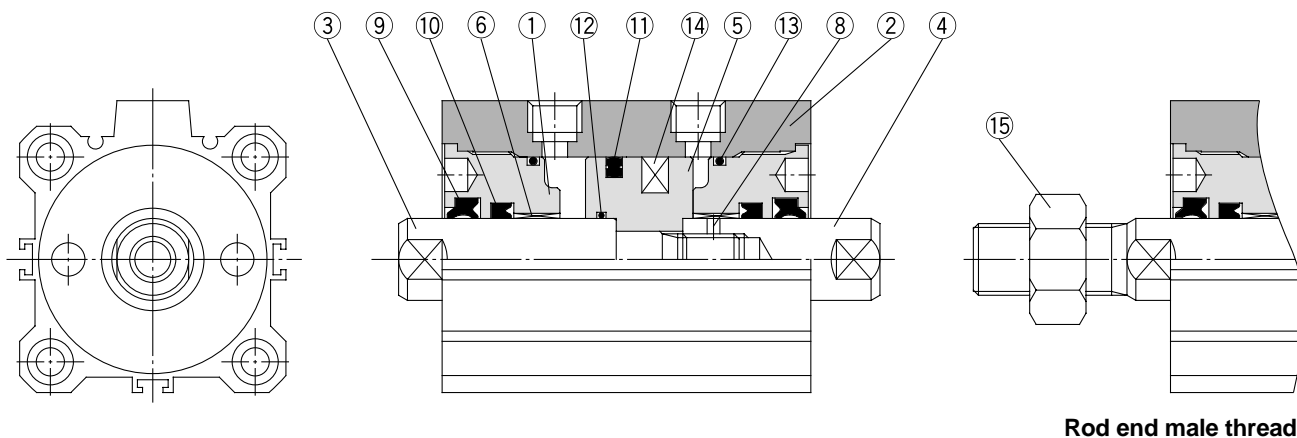
Series CH□QWB

Construction

CH□QWB20



CH□QWB32 to CH□QWB100



Parts list

No.	Description	Material	Note
1	Rod cover	Aluminum alloy	Black anodized
2	Cylinder tube	Aluminum alloy	Hard anodized
3	Piston rod A	∅20: Stainless steel ∅32 to ∅100: Carbon steel	Hard chromium electroplated
4	Piston rod B	∅20: Stainless steel ∅32 to ∅100: Carbon steel	Hard chromium electroplated
5	Piston	Aluminum alloy	Chromated
6	Bushing	Copper alloy	
7	Snap ring (∅20 only)	Carbon tool steel	Black zinc chromated
8	Spring pin	Carbon tool steel	
9	Scraper	NBR	
10	Rod seal	NBR	
11	Piston seal	NBR	
12	Piston gasket	NBR	
13	Tube gasket	NBR	
14	Rubber magnet	NBR	
15	Rod end nut	Carbon steel	Nickel plated

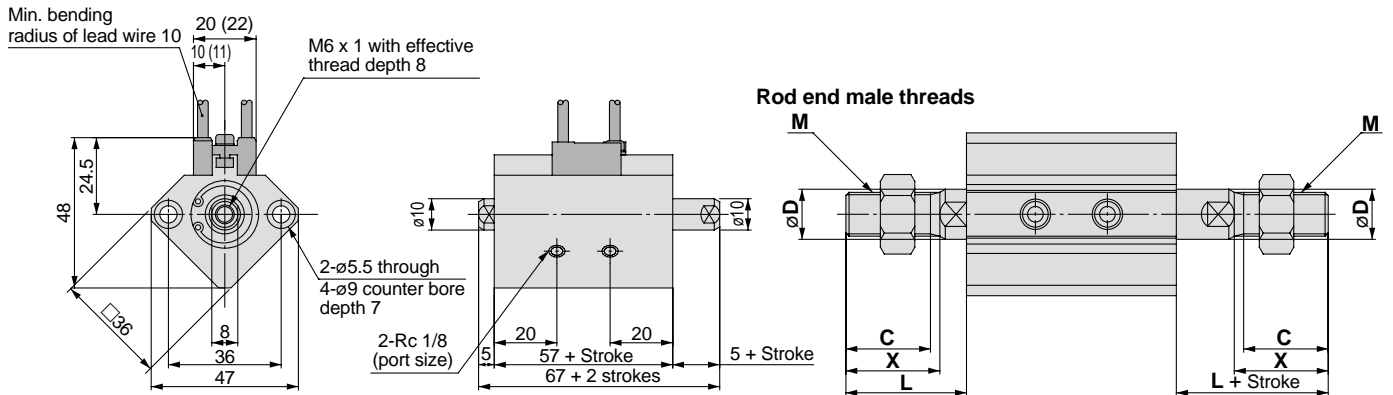
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.	Kit components
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	

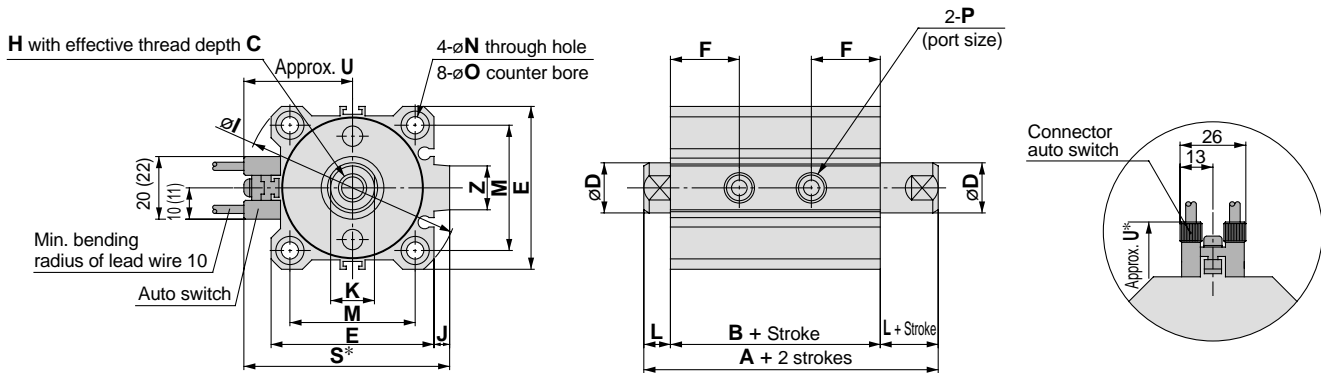
* Seal kits consist of items 9, 10, 11 and 13, which can be ordered by using the seal kit number for each bore size.

Dimensions

∅20



∅32 to ∅100



Note) • The drawings above show type D-A7 and D-A8 reed switches.
 • The values shown inside () are for switches other than types D-A7 and D-A8.
 * S and U dimensions for connector type auto switches (D-A7C, D-A80C, and D-J79C) are 7mm greater.

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	Rc 1/8	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	Rc 1/8	66	35	14
50	98	76	15	20	64	25	M12 x 1.75	86	7	18	11	50	6.6	11 depth 8	Rc 1/4	80	41	19
63	102	80	15	20	77	27	M12 x 1.75	103	7	18	11	60	9	14 depth 10.5	Rc 1/4	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	Rc 3/8	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	Rc 3/8	132.5	67.5	26

Rod end male threads

(mm)

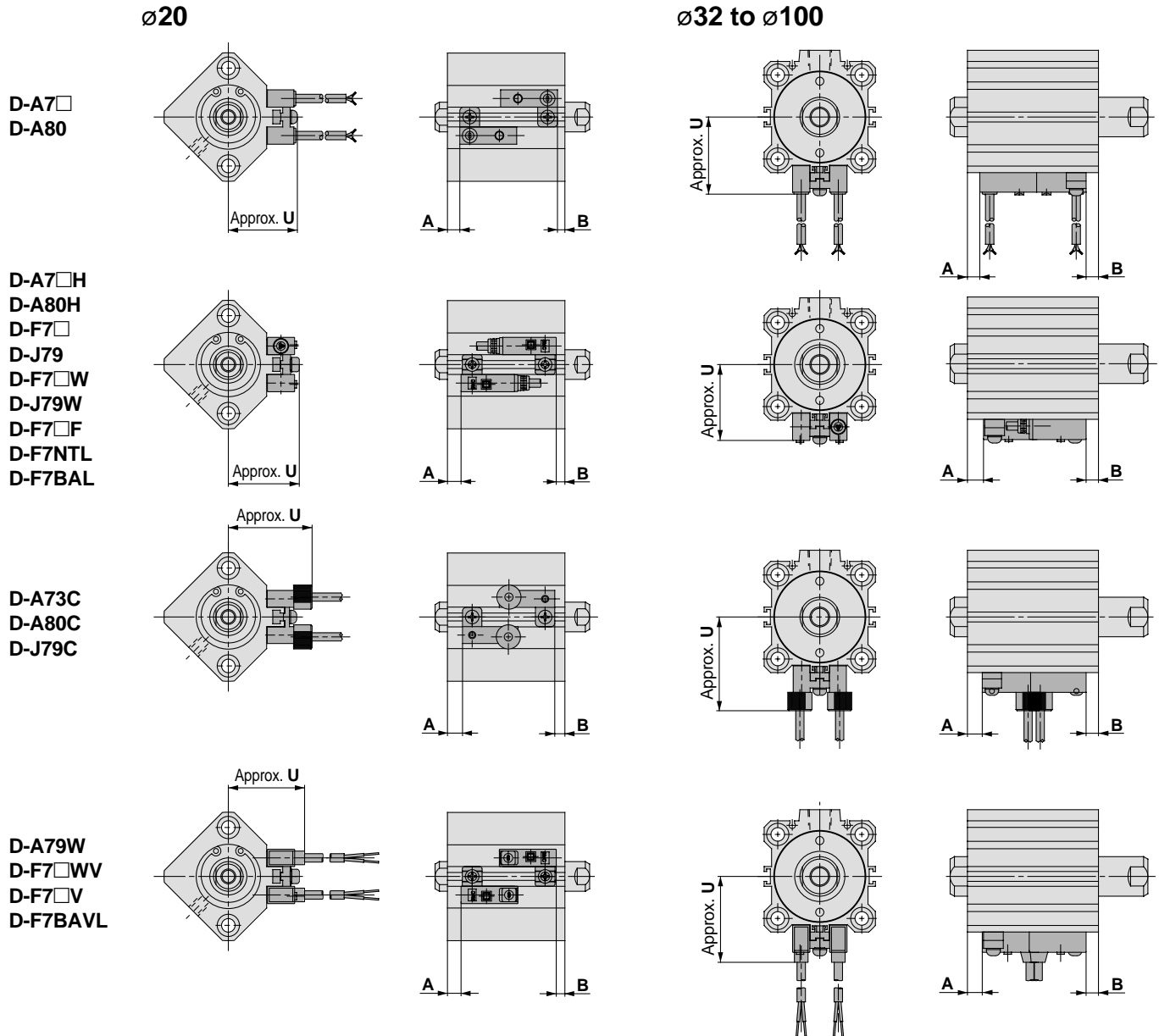
Bore size (mm)	C	X	D	H	L	K
20	15.5	18	10	M8 x 1.25	23	8
32	27	30	16	M14 x 1.5	38.5	14
40	27	30	16	M14 x 1.5	38.5	14
50	32	35	20	M18 x 1.5	46	18
63	32	35	20	M18 x 1.5	46	18
80	37	40	25	M22 x 1.5	51	22
100	37	40	30	M26 x 1.5	52	26

Series CH□QWB Auto Switch Specifications

Refer to "Auto Switch Guide" CAT.E 274-A for detailed specifications.



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



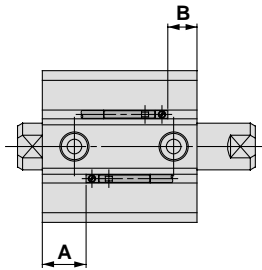
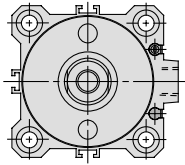
Proper auto switch mounting positions

(mm)

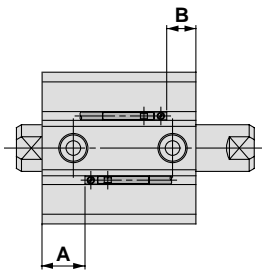
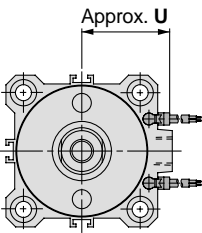
Bore size (mm)	D-A7□ D-A80		D-A7□H, D-A80H D-A73C, D-A80C D-F7□ D-F7□V, D-F7□W D-F7□WV D-J79 D-J79C, D-J79W D-F7BA□		D-A79W		D-F7□F		D-A9□ D-A9□V		D-F9□ D-F9□V D-F9□W D-F9□WV		D-F9BAL		D-F7NTL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	20.5	18.5	21	19	18	16	25	23	—	—	—	—	—	—	26	24
32	25.5	21.5	26	22	23	19	30	26	24.5	20.5	28.5	24.5	27.5	23.5	31	27
40	27.5	21.5	28	22	25	19	32	26	26.5	20.5	30.5	24.5	29.5	23.5	33	27
50	33.5	24.5	34	25	31	22	38	29	32.5	23.5	36.5	27.5	35.5	26.5	39	30
63	35.5	26.5	36	27	33	24	40	31	34.5	25.5	38.5	29.5	37.5	28.5	41	32
80	40.5	30.5	41	31	38	28	45	35	39.5	29.5	43.5	33.5	42.5	32.5	46	36
100	44.5	32.5	45	33	42	30	49	37	43.5	31.5	47.5	35.5	46.5	34.5	50	38

ø32 to ø100

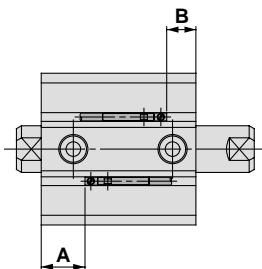
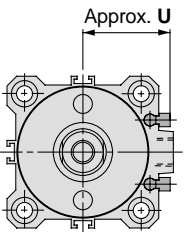
D-A9□
 D-F9□
 D-F9□W



D-A9□V
 D-F9□V
 D-F9□WV



D-F9BAL



Auto switch mounting heights

(mm)

Bore size (mm)	D-A7□ D-A80	D-A7□H D-A80H D-J79 D-J79W D-F7□ D-F7□F D-F7NTL D-F7BAL D-F7□W	D-A73C D-A80C D-F7□WV	D-F7□V D-F7BAVL	D-J79C	D-A79W	D-A9□V	D-F9□V D-F9□WV	D-F9BAL
	U	U	U	U	U	U	U	U	U
20	24.5	25.5	31.5	28	31	27	—	—	—
32	31.5	32.5	38.5	35	38	34	27	29	26.5
40	35	36	42	38.5	41.5	37.5	30.5	32.5	30
50	41	42	48	44.5	47.5	43.5	36.5	38.5	36
63	47.5	48.5	54.5	51	54	50	40	42	39.5
80	57.5	58.5	64.5	61	64	60	50	52	49.5
100	67.5	68.5	74.5	71	74	70	60	62	59.5

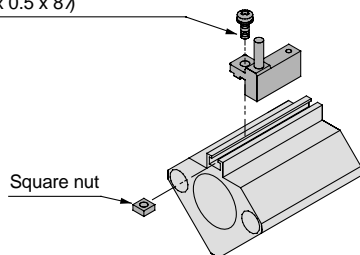
Series CH□QWB

Auto Switch Mounting

Mount auto switches in accordance with the procedures shown in the figures below.

∅20

Auto switch mounting screw
(M3 x 0.5 x 8)

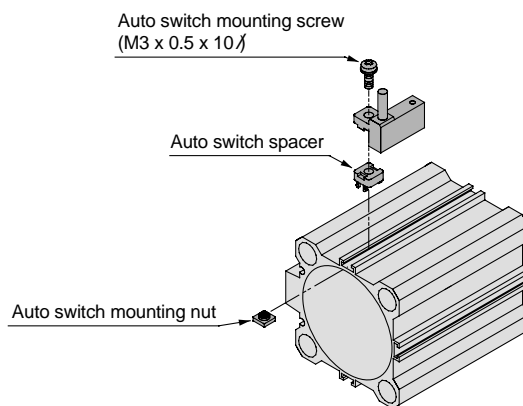


∅32 to ∅100

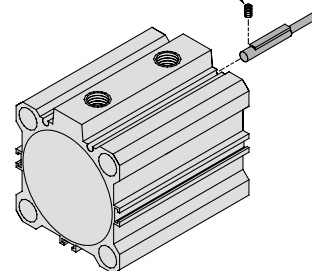
Auto switch mounting screw
(M3 x 0.5 x 10)

Auto switch spacer

Auto switch mounting nut



Set screw



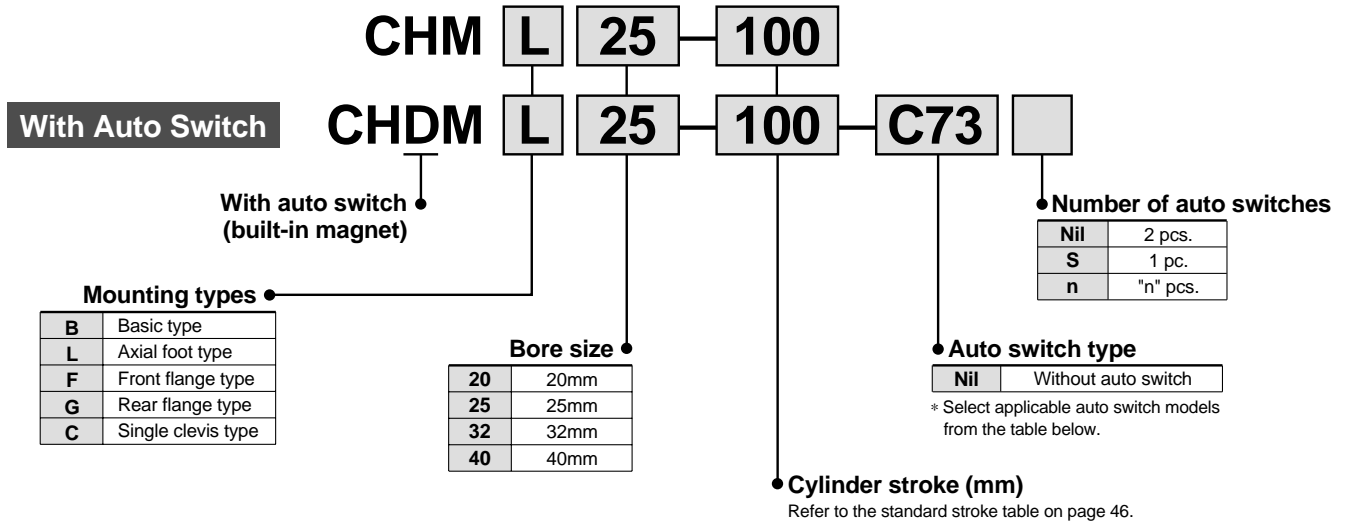
Round Type Low Pressure Hydraulic Cylinder

Series CH□M

3.5MPa

∅20, ∅25, ∅32, ∅40

How to Order



Applicable Auto Switches:

Refer to "Auto Switch Guide" CAT. E274-A for further details on each auto switch.
Refer to pages 117 and 118 for auto switch circuit diagrams.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type	Lead wire length (m)*				Applicable load				
					DC	AC		0.5 (Nil)	3 (L)	5 (Z)	None (N)					
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5V	—	C76	●	●	—	—	IC circuit	—		
				2-wire	24V	12V	200V or less	—	B53	●	●	●	—	—	PLC	
								100V	B64	●	●	●	—	—	Relay PLC	
				2-wire	24V	12V	100V or less	—	C73	●	●	●	—	—	IC circuit	
		12V	—					C73C	●	●	●	●	—	PLC		
		Connector	No	2-wire	24V	5V, 12V	24V or less	—	C80C	●	●	●	●	IC circuit		
								12V	—	A33	—	—	—	●	—	PLC
		Terminal conduit	Yes	2-wire	24V	12V	100V, 200V	—	A34	—	—	—	●	—		
								—	A44	—	—	—	—	●	—	Relay PLC
		DIN terminal	Yes	2-wire	24V	12V	100V, 200V	—	A44	—	—	—	●	—		
—	B59W							●	●	—	—	—	—	Relay PLC		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	5V, 12V	—	—	H7A1	●	●	○	—	IC circuit			
				3-wire (PNP)				H7A2	●	●	○	—	—			
				2-wire				H7B	●	●	○	—	—			
		Connector	No	2-wire	24V	12V	—	—	—	H7C	●	●	●	●	—	
										3-wire (NPN)	G39	—	—	—	●	IC circuit
										2-wire	K39	—	—	—	●	—
		Terminal conduit	Yes	2-wire	24V	5V, 12V	—	—	—	H7NW	●	●	○	—	IC circuit	
										3-wire (NPN)	H7PW	●	●	○	—	—
										3-wire (PNP)	H7BW	●	●	○	—	—
		Grommet	No	2-wire	24V	12V	—	—	—	H7BA	—	●	○	—	—	
										3-wire (NPN)	G5NT	—	●	○	—	—
										4-wire (NPN)	H7NF	●	●	○	—	IC circuit
		Water resistant (2-color display)	No	2-wire	24V	5V, 12V	—	—	—	H7LF	●	●	○	—	—	
—	—									—	—	—	—	—		
With timer	No	2-wire	24V	12V	—	—	—	—	—	—	—	—				
								—	—	—	—	—	—	—		
With diagnostic output (2-color display)	No	2-wire	24V	5V, 12V	—	—	—	—	—	—	—	—				
								—	—	—	—	—	—	—		
Latch type with diagnostic output (2-color display)	No	2-wire	24V	12V	—	—	—	—	—	—	—	—				
								—	—	—	—	—	—	—		

* Lead wire length symbols: 0.5m Nil (Example) C73C
3m L (Example) C73CL
5m Z (Example) C73CZ
None N (Example) C73CN

Notes • Solid state 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.

Specifications

- Light aluminum body
- Auto switch can be mounted.



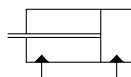
Action	Double acting/Single rod
Fluid	Hydraulic fluid
Nominal pressure	3.5MPa
Proof pressure	5.0MPa
Maximum allowable pressure	3.5MPa
Minimum operating pressure	0.3MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C
	With auto switch: -10° to 60°C
Piston speed	8 to 300mm/s
Cushion	None
Rod end thread	Male thread
Thread tolerance	JIS class 2
Stroke length tolerance	to 250mm $^{+1.0}_0$ mm
	250 to 800mm $^{+1.4}_0$ mm
Mounting type	Basic type, Axial foot type Rear flange type, Front flange type Single clevis type

Note) Refer to page 136 for definitions of terms related to pressure.

Accessories

		Mounting bracket	Basic type	Foot type	Rear flange type	Front flange type	Single clevis type
Standard	Mounting nut		● (2 pcs.)	● (2 pcs.)	● (1 pc.)	● (1 pc.)	—
	Rod end nut		●	●	●	●	●
Optional	Clevis pin		—	—	—	—	—
	Single knuckle joint		●	●	●	●	●
	Double knuckle joint (with pin)		●	●	●	●	●
	Knuckle bracket		●	●	●	●	●

JIS symbol



Refer to page 47 regarding minimum strokes for auto switch mounting.

Standard Strokes

Bore size (mm)	Standard stroke (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.

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

Mounting Bracket 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.

Auto Switch Mounting Bracket Part Nos. (Band & Screw included)

Bore size (mm)	Auto switch models		
	D-C7, D-C8 D-H7	D-B5, D-B6 D-G5, D-K5	D-A3, D-A4
20	BMA2-020	BA-01	BD1-01M
25	BMA2-025	BA-02	BD1-02M
32	BMA2-032	BA-32	BD1-02
40	BMA2-040	BA-04	BD1-04M

[Stainless Steel Mounting Screw Kit]

The following stainless steel mounting screw kit (including nuts) is available to meet special operating environment conditions. (Please note that auto switch mounting bands are not included and must be ordered separately.)

Stainless steel mounting screw kit: BBA3 for D-B5, D-B6, D-G5, and D-K5

Stainless steel mounting screw kit: BBA4 for D-C7, D-C8, and D-H7

When the type D-H7BAL switch is shipped already mounted on a cylinder, the above stainless steel screws are used. When the same switch is ordered separately, BBA4 screw kit is automatically included with the switches.

Minimum Strokes for Auto Switch Mounting

Auto switch model	No. of auto switches				1 pc.
	2 pcs.		"n" pcs.		
	Different sides	Same side	Different sides	Same side	
D-C7 D-C8	15	50	$15 + 45 \left(\frac{n-2}{2} \right)$ (n = 2, 4, 6 ...)	$50 + 45 (n - 2)$	10
D-H7□ D-H7□W D-H7BAL D-H7NF	15	60		$60 + 45 (n - 2)$	10
D-C73C D-C80C D-H7C	15	65	$15 + 50 \left(\frac{n-2}{2} \right)$ (n = 2, 4, 6 ...)	$65 + 50 (n - 2)$	10
D-H7LF	20	65			$20 + 50 \left(\frac{n-2}{2} \right)$ (n = 2, 4, 6 ...)
D-B5 D-B6 D-G5NTL	15	75	$15 + 50 \left(\frac{n-2}{2} \right)$ (n = 2, 4, 6 ...)	$75 + 55 (n - 2)$	10
D-B59W	20	75			$20 + 50 \left(\frac{n-2}{2} \right)$ (n = 2, 4, 6 ...)
D-A3 D-G39 D-K39 D-A44	35	100	$35 + 30 (n - 2)$	$100 + 100 (n - 2)$	10

n: Number of auto switches

Theoretical Output

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 (mm²)

Weights

Bore size (mm)		(kg)			
		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 50mm		0.06	0.08	0.12	0.16

Calculation method

(Example) CHML20-100
(Foot type ø20/100mm stroke)
Basic weight 0.44kg
Additional weight ... 0.06/50mm
Cylinder stroke 100mm
 $0.44 + 0.06 \times 100/50 = 0.56\text{kg}$

⚠ Specific Product Precautions

Be sure to read before handling. Refer to pages 135 through 141 for safety instructions, hydraulic cylinder precautions and auto switch precautions.

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

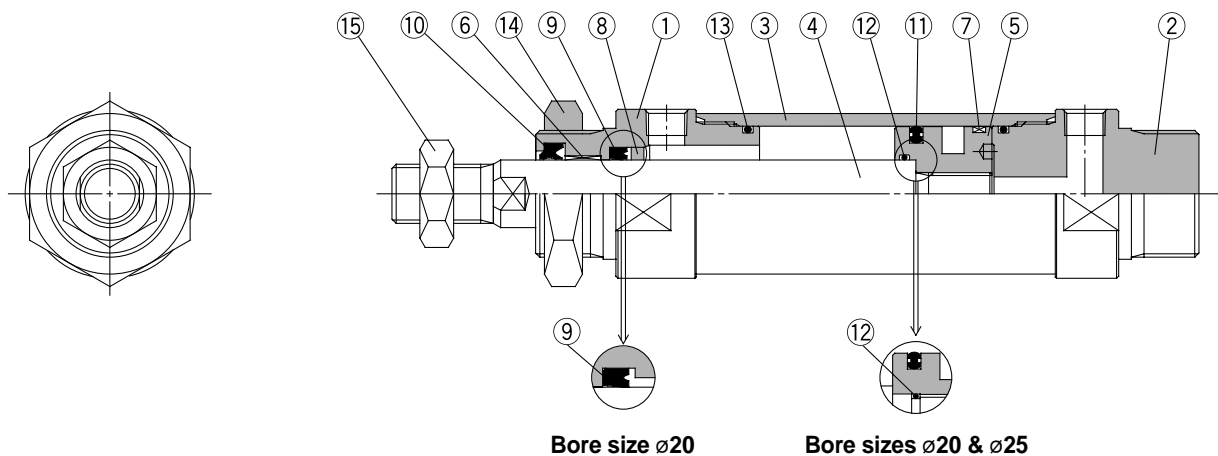
⚠ Caution

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



Parts list

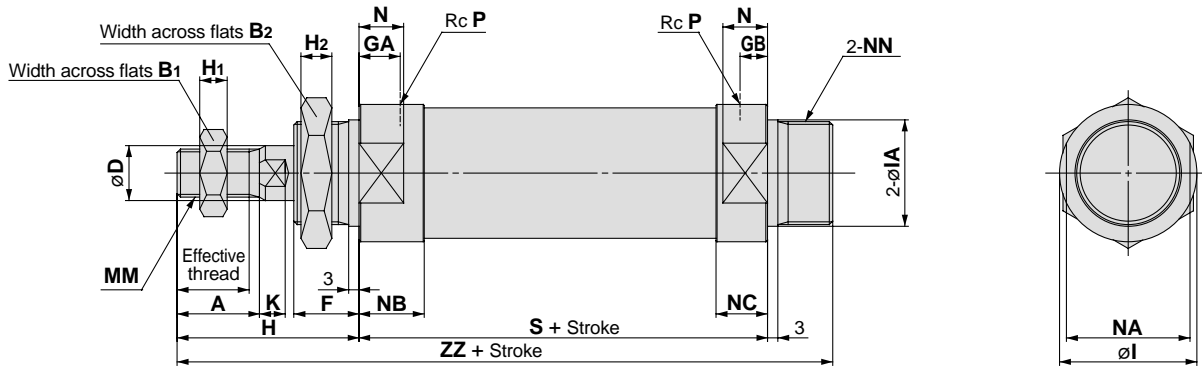
No.	Description	Material	Note
1	Rod cover	Aluminum alloy	Hard black anodized
2	Head cover	Aluminum alloy	Hard black anodized
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Carbon steel	Hard chromium electroplated*
5	Piston	Aluminum alloy	Chromated
6	Bushing	Oil impregnated alloy	
7	Wear ring	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 $\phi 20$ and $\phi 25$, the piston rod material is stainless steel when equipped with auto switches.

Series CH□M

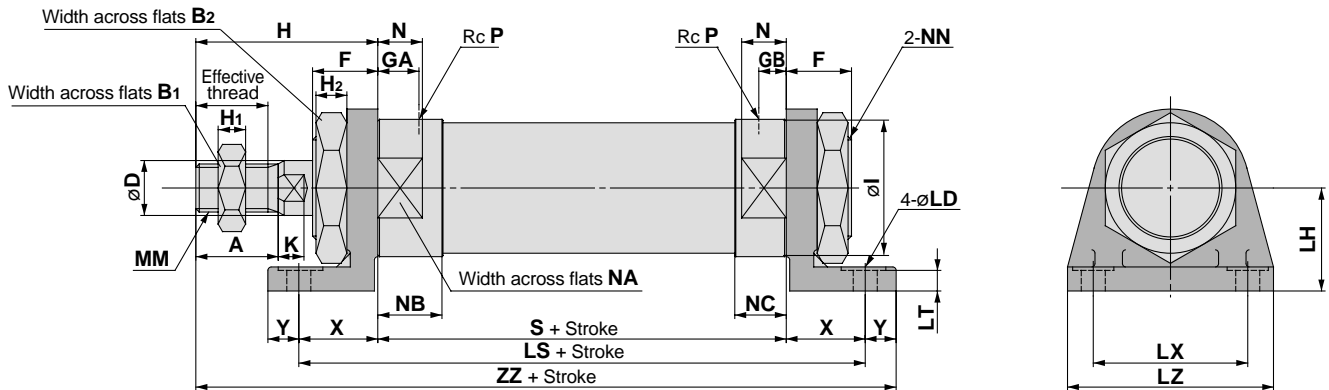
Dimensions

Basic type: CHMB



Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B ₁	B ₂	D	F	GA	GB	H	H ₁	H ₂	I	IA (tolerance)	K	MM	P	S	NN	N	NA	NB	NC	ZZ
20	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	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	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	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 type: CHML

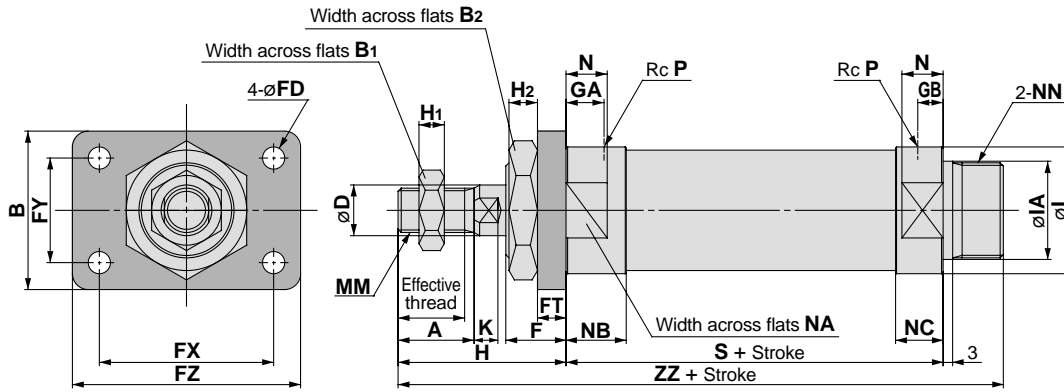


Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B ₁	B ₂	D	F	GA	GB	H	H ₁	H ₂	I	K	LD	LH	LS	LT	LX	LZ	MM	N	NA	NB	NC
20	to 800	15.5	18	13	26	10	16	12	8	41	5	8	30	5	7	25	121	5.5	40	55	M8 x 1.25	13	26	19	15
25	to 800	19.5	22	17	32	12	16	12	8	46	6	8	32	5.5	7	28	121	5.5	40	55	M10 x 1.25	13	28	19	15
32	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	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 + 1mm.

Front flange type: CHMF



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	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	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	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	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

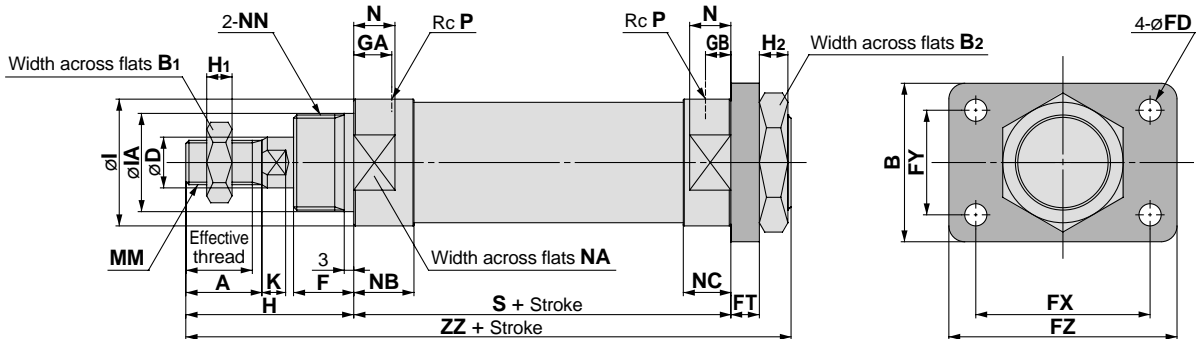
(mm)

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

Series CH□M

Dimensions

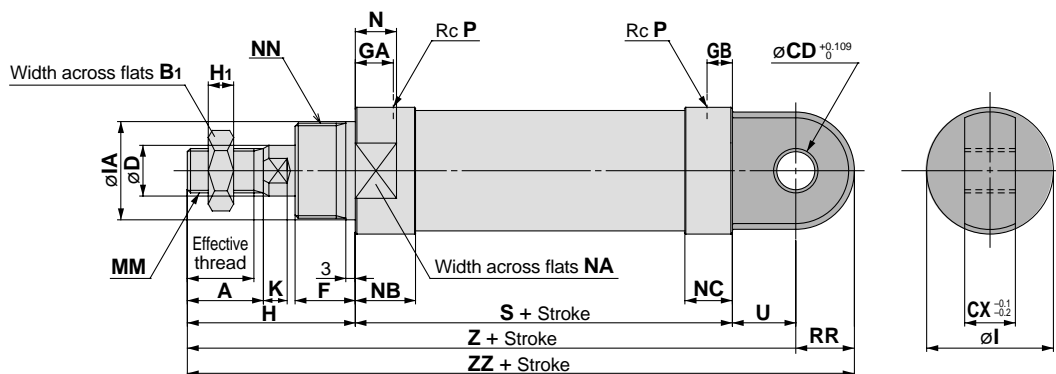
Rear flange type: CHMG



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	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	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	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	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

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

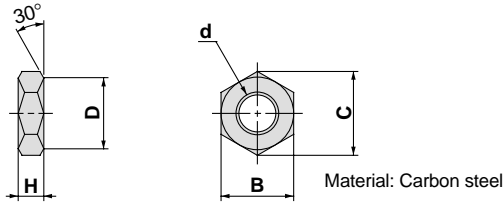
Single clevis type: CHMC



Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	A	B ₁	CD	CX	D	F	GA	GB	H	H ₁	I	IA (tolerance)	K	MM	N	NA	NB	NC	NN	P	RR	S	U	Z	ZZ
20	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	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	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	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

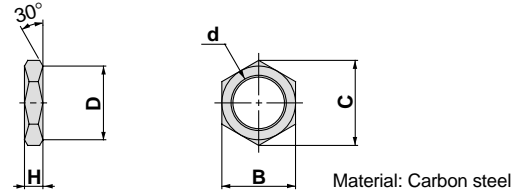
Accessories (Standard)

Rod end nut



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



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

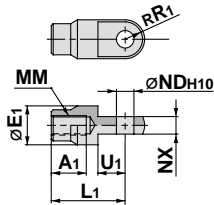
Accessory Brackets (Optional)

I-type single knuckle joint

ø20: I-02

ø25: I-03

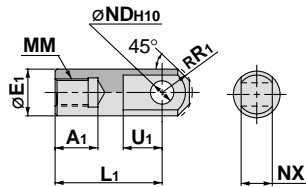
Material: Rolled steel



ø32: I-04

ø40: IA-04

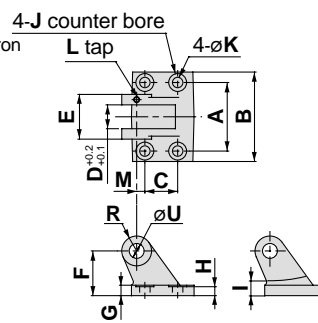
Material: Cast iron



Part no.	Applicable bore size (mm)	A1	E1	L1	MM	R1	U1	NDH10	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}
IA-04	40	22	24	55	M16 x 1.5	15.5	20	12 ^{+0.070} ₀	16 ^{-0.1} _{-0.3}

Bracket

Material: Cast iron



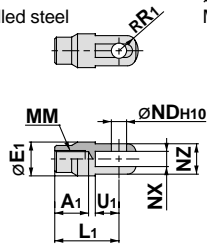
Part no.	Applicable bore size (mm)	A	B	C	D	U(H8)		E	F	G	H	I	J	K	L	M	R
						Size	Tolerance										
AD-FI-20	20	46	60	22	16	10	+0.027	30	28	6.5	5.5	10	12	7	M4	5.5	10
AD-FI-25	25	46	60	22	16	10	+0.027	30	30	6.5	5.5	10	12	7	M4	5.5	10
AD-FI-32	32	56	80	30	16	12	+0.027	36	40	10	9	13	12	7	M5	7	12
AD-FI-40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

Y-type double knuckle joint

ø20: Y-02

ø25: Y-03

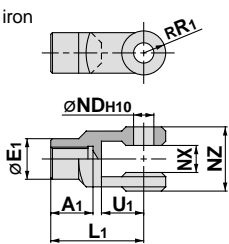
Material: Rolled steel



ø32: Y-04A

ø40: Y-04B

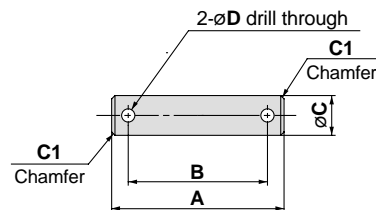
Material: Cast iron



Part no.	Applicable bore size (mm)	A1	E1	L1	MM	R1	U1	NDH10	NX	NZ	Applicable pin no.	Snap ring/ Cotter pin size
Y-02	20	16	20	36	M8 x 1.25	5	14	9 ^{+0.058} ₀	9 ^{+0.2} _{+0.1}	18	CDP-1	C type, ø9 for shaft
Y-03	25	18	20	38	M10 x 1.25	5	14	9 ^{+0.058} ₀	9 ^{+0.2} _{+0.1}	18	CDP-1	C type, ø9 for shaft
Y-04A	32	22	24	55	M14 x 1.5	13	25	12 ^{+0.070} ₀	16 ^{+0.3} _{+0.1}	38	CDP-3	ø3 x 18 /
Y-04B	40	22	24	55	M16 x 1.5	13	25	12 ^{+0.070} ₀	16 ^{+0.3} _{+0.1}	38	CDP-3	ø3 x 18 /

Bracket pin

Material: Carbon steel



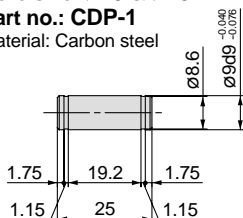
Part no.	Applicable bore size (mm)	A	B	C (f8)		D	Cotter pin
				Size	Tolerance		
AD-EI-20	20	45.5	35.5	10	-0.013 -0.035	3.2	ø3.2 x 16 /
AD-EI-25	25	45.5	35.5	10	-0.013 -0.035	3.2	
AD-EI-32	32	52	42	12	-0.016 -0.043	4	ø4 x 20 /
AD-EI-40	40	60	50	12	-0.016 -0.043	4	

Clevis pin & Knuckle pin

Bore size: ø20 & ø25

Part no.: CDP-1

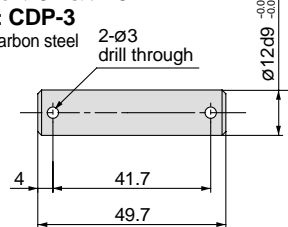
Material: Carbon steel



Bore size: ø32 & ø40

Part no.: CDP-3

Material: Carbon steel



Snap ring: C type, ø9 size for shaft

Cotter pin: ø3 x 18 /

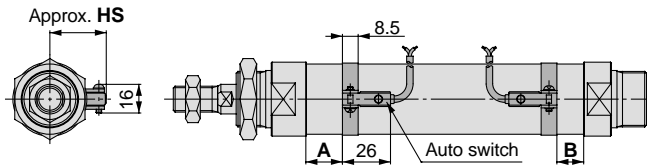
Series CH□M Auto Switch Specifications

Refer to "Auto Switch Guide" CAT.E 274-A for detailed specifications.

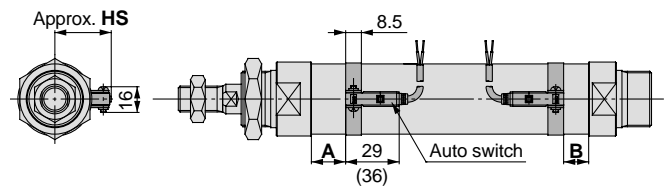


Auto Switches: Proper Mounting Positions and Mounting Heights for Stroke End Detection

D-C7, D-C8

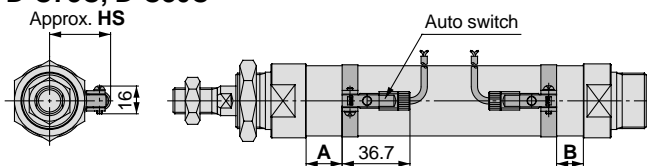


D-H7□, D-H7□W, D-H7□F, D-H7BAL

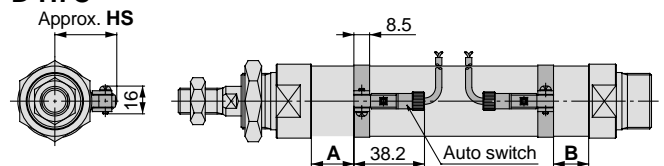


* Values inside () are for D-H7LF.

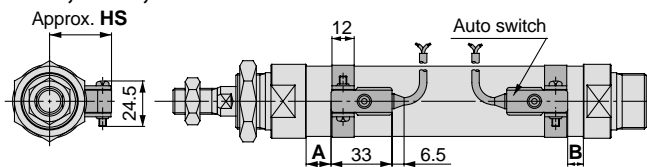
D-C73C, D-C80C



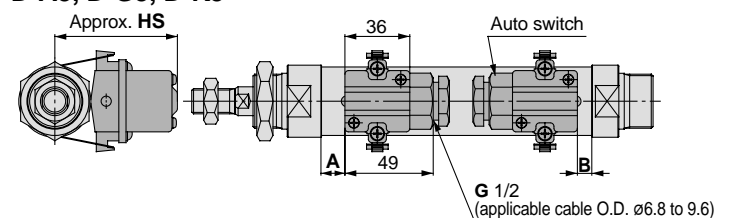
D-H7C



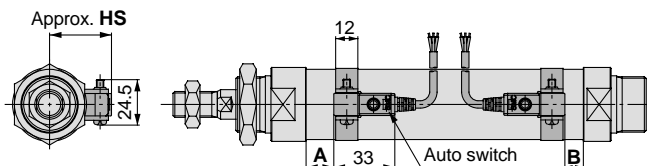
D-B5, D-B6, D-B59W



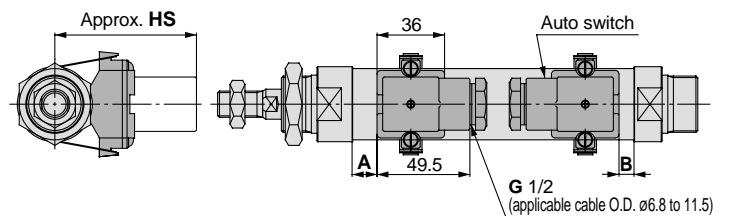
D-A3, D-G3, D-K3



D-G5, D-K5, D-G5□W, D-G5BA, D-K59W, D-G59F, D-G5NT



D-A4



Proper auto switch mounting positions

(mm)

Bore size (mm)	D-C7 D-C8 D-C73C D-C80C		D-B5 D-B6		D-H7□ D-H7C D-H7□W D-H7BAL		D-G5NTL		D-H7□F		D-B59W		D-G39 D-K39 D-A33, D-A34 D-A44	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	15	13	9	7	14	12	10.5	8.5	14	12	12	10	8.5	6.5
25	15.5	12.5	9.5	6.5	14.5	11.5	11	8	14.5	11.5	12.5	9.5	9	6
32	19.5	14.5	13.5	8.5	18.5	13.5	15	10	18.5	13.5	16	11.5	13	8
40	24	20	18	14	23	19	19.5	15.5	23	19	21	17	17.5	13.5

Auto switch mounting heights

(mm)

Bore size (mm)	D-C7 D-C8 D-H7□ D-H7□W D-H7□F D-H7BAL	D-B5/B6 D-B59W D-G5NTL D-H7C	D-C73C D-C80C	D-G39 D-K39 D-A33 D-A34	D-A44
	HS	HS	HS	HS	HS
20	24.5	27.5	27	62	72
25	27	30	29.5	64.5	74.5
32	30.5	33.5	33	68	78
40	35	38	37.5	72.5	82.5

JIS Standard Hydraulic Cylinder Double Acting/Single Rod

Series CH2E/CH2F/CH2G/CH2H

∅32, ∅40, ∅50, ∅63, ∅80, ∅100

3.5MPa
7 MPa
14 MPa

How to Order

Series type

Symbol	Tube material	Nominal pressure
E	Aluminum alloy	3.5MPa
F	Stainless steel	7MPa
G	Steel	14MPa
H	Stainless steel	14MPa

Rod size series

Symbol	Series
B	B-series rod size
C	C-series rod size

* ∅32 is for B-series rod size only.

Cylinder stroke (mm)
Refer to the standard strokes table on page 56.
Refer to page 58 for minimum strokes with auto switch.

With Auto Switch

Series type

Symbol	Tube material	Nominal pressure
E	Aluminum alloy	3.5MPa
F	Stainless steel	7MPa
H	Stainless steel	14MPa

Number of auto switches

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

Auto switch type

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

* Select applicable auto switches from the table below.

Mounting types

B	Basic type	
LA	Transaxial foot type	
LB	Axial foot type	
FA	Front rectangular flange type	For 3.5 & 7 MPa
FB	Rear rectangular flange type	
FY	Front rectangular flange type	For 14 MPa
FZ	Rear rectangular flange type	
FC	Front square flange type	
FD	Rear square flange type	
CA	Single clevis type	
CB	Double clevis type	
TC	Center trunnion type	

Bore size

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

Cylinder options

Rod end nut	Nil	Without rod end nut
	A	With rod end nut
Rod boot	Nil	Without rod boot
	J	Nylon tarpaulin
	K	Neoprene cloth
Cushion	Nil	With double-side cushion
	N	Without cushion
	R	With front cushion
	H	With rear cushion

Port and cushion valve positions
* Refer to page 56.

Part nos. for cylinders with built-in magnets

In the case of cylinders with built-in magnets but no auto switches, do not indicate any auto switch type symbol.
(Example) CHD2HLA50-100□

* Indicate in alphabetical order.

Applicable Auto Switches: Refer to pages 115 through 119 for auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length*			Applicable load		
					DC	AC	Tie-rod mount	Band mount	0.5 (Nil)	3 (L)	5 (Z)	IC circuit	Relay/PLC	
Reed switch	—	Grommet	Yes	3-wire NPN (equiv.)	—	5V	—	A56	—	●	●	—	IC circuit	—
						12V	—	A53	B53	●	●	●		
						12V	100V, 200V	A54	B54	●	●	●	—	Relay, PLC
						5V, 12V	—	A67	—	●	●	—		
						5V, 12V	200V or less	A64	B64	●	●	—	IC circuit	Relay, PLC
						12V	100V, 200V	—	A33**	—	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F59	G59	●	●	○	IC circuit	Relay/PLC
						—	100V, 200V	F51	G51	●	●	○		
						12V	—	J59	K59	●	●	○		
						5V, 12V	—	—	G39**	—	—	—	IC circuit	
						12V	—	—	K39**	—	—	—		
						5V, 12V	—	F59W	G59W	●	●	○	IC circuit	
						5V, 12V	—	F5PW	G5PW	●	●	○		
						12V	—	J59W	K59W	●	●	○		
						12V	—	F5BA	G5BA	—	●	○	—	
						5V, 12V	—	F5NT	G5NT	—	●	○		
						5V, 12V	—	F59F	G59F	●	●	○	IC circuit	

* Lead wire length symbols: 0.5m Nil (Example) A53
3m L A53L
5m Z A53Z

** Not applicable to ∅32.

Notes) • The standard lead wire length is 0.5m. However, the standard length for G5NTL, G5BAL, F5NTL and F5BAL is 3m.
• Solid state switches marked "○" are produced upon receipt of order.

Models

Model	CH2E	CH2F	CH2G	CH2H
Tube material	Aluminum alloy	Stainless steel	Steel	Stainless steel
Nominal pressure	3.5MPa	7MPa	14MPa	14MPa
Bore size	32, 40, 50, 63, 80, 100mm			
Auto switch mounting	Applicable	Applicable	—	Applicable

Specifications

Model	CH2E	CH2F	CH2G	CH2H
Action	Double acting/Single rod			
Fluid	Hydraulic fluid			
Nominal pressure	3.5MPa	7MPa	14MPa	
Maximum allowable pressure	3.5MPa	Rear: 9MPa Front: B-rod 13.5MPa : C-rod 11MPa	Rear: 18MPa Front: B-rod 18MPa : C-rod 14MPa	
Proof pressure	5.0MPa	10.5MPa	21MPa	
Minimum operating pressure	When rear side is pressurized: 0.15MPa When front side is pressurized: 0.2MPa			
Ambient and fluid temperature	Without auto switch: -10° to 80°C With auto switch: -10° to 60°C			
Piston speed	8 to 300mm/s			
Cushion	Cushion seal type			
Thread tolerance	JIS class 2			
Stroke length tolerance	to 100mm $^{+0.8}_0$ mm, 101 to 250mm $^{+1.0}_0$ mm, 251 to 630mm $^{+1.25}_0$ mm 631 to 1000mm $^{+1.4}_0$ mm, 1001 to 1800mm $^{+1.8}_0$ mm			

Note) Refer to page 136 for definitions of terms related to pressure.

Standard Strokes

Cylinder bore size (mm)	Standard strokes (mm)	Long stroke (mm)
32	25 to 800	1800 (1401 or more with tie-rod reinforcing ring) ^{Note 1)}
40	25 to 800	1800 (1401 or more with tie-rod reinforcing ring) ^{Note 1)}
50	25 to 800	1800 (1401 or more with tie-rod reinforcing ring) ^{Note 1)}
63	25 to 800	1800 (1501 or more with tie-rod reinforcing ring) ^{Note 2)}
80	25 to 1000	1800
100	25 to 1000	1800

* Refer to the stroke selection Table in Technical Data 2, starting with page123, to determine stroke limitation depending on the type of mounting brackets that will be used. Then make your selection. Long stroke ranges also differ depending on the type of mounting brackets.

Note 1) The long stroke range for Series CH2E, CH2F, and CH2H with flange and clevis type mounting brackets as well as Series CHG is up to 1400mm.

Note 2) The long stroke range for Series CH2E, CH2F, and CH2H with flange and clevis type mounting brackets as well as Series CHG is up to 1500mm.

Port and Cushion Valve Positions

Symbol Position Mounting type	Nil	A	C	D	E	F	G	H
	Port: Top Cushion valve: Right	Port: Right Cushion valve: Bottom	Port: Left Cushion valve: Top	Port: Top Cushion valve: Left	Port: Top Cushion valve: Bottom	Port: Right Cushion valve: Top	Port: Right Cushion valve: Left	Port: Left Cushion valve: Right
B (Basic Type)								
FA, FB, FC, FD, FY, FZ (Flange type) CA, CB (Single clevis type) TC (Center trunnion type)								
LA, LB (Foot type)								

: Piping port

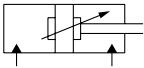
: Cushion valve

* The cylinder's exterior dimensions represented here are as seen from the rod end of the cylinder.



Page 75

JIS symbol



Auto Switch Mounting Bracket Part Nos.

Model	Bore size (mm)	Auto switch model			
		D-A3, D-A4 D-G3, D-K3	D-B5, D-B6 D-G5, D-K5	D-A5, D-A6 D-F5, D-J5	
CH2E	32	—	BA-32	BT-06	
	40	BD1-04M	BA-04	BT-06	
	50	BD1-05M	BA-05	BT-06	
	63	BD1-06M	BA-06	BT-08	
	80	BD1-08M	BA-08	BT-16	
	100	BD1-10M	BA-10	BT-18	
CH2F	32	—	BAF-32	BT-06	
	40	BDS-04M	BAF-04	BT-06	
	50	BDS-05M	BAF-05	BT-06	
	63	BDS-06M	BAF-06	BT-08	
	80	BDS-08M	BAF-08	BT-16	
	100	BDS-10M	BAF-10	BT-18	
CH2H	32	—	BGS1-032	BT-06	
	40	BD1-04M	BH2-040	BT-06	
	50	BD1-05M	BH2-050	BT-06	
	63	BD1-06M	BA-06	BT-08	
	80	BH1-080	BH2-080	BT-16	
	100	BH1-100	BH2-100	BT-18	

Series CH2E/CH2F/CH2G/CH2H

Rod Sizes

		(mm)					
Bore size (mm)		32	40	50	63	80	100
Rod size series*		18	22.4	28	35.5	45	56
B-series		18	22.4	28	35.5	45	56
C-series		—	18	22.4	28	35.5	45

* Based on JIS B8367.

Accessories (Optional)

Single knuckle, Double knuckle, Lock nut, Knuckle pin, Rod boot (Nylon tarpulin, Neoprene cloth) ^{Note)}

Note) Maximum operating temperature: Nylon tarpulin (60°C), Neoprene cloth (110°C)

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.

Cushion Strokes

		(mm)					
Bore size (mm)		32	40	50	63	80	100
Effective cushion stroke		16	16	17	16	20	23

(Front and rear sides)

Weights

		Standard weight (0 stroke)										Unit: kg
Bore size (mm)	Mounting type Model	B	LA	FY, FZ	FC, FD	CA	CB	TC	LB	FA, FB	Additional weight (per 10mm stroke)	
		Basic	Transaxial foot	Rectangular flange	Square flange	Single clevis	Double clevis	Center trunnion type	Axial foot	Rectangular flange (7MPa)		
B-series rod	32	CH2E	2.50	3.49	—	3.35	2.95	3.06	2.99	3.00	2.94	0.04
		CH2F	2.49	3.48	—	3.34	2.94	3.05	2.98	2.99	2.93	0.04
		CH2G	2.59	3.58	3.12	3.44	3.04	3.15	3.08	—	—	0.06
		CH2H	2.60	3.59	3.13	3.45	3.05	3.16	3.09	—	—	0.05
	40	CH2E	3.27	4.57	—	4.36	3.91	4.12	3.86	3.85	3.86	0.08
		CH2F	3.33	4.63	—	4.42	3.97	4.18	3.92	3.91	3.92	0.08
		CH2G	3.66	4.96	4.36	4.75	4.30	4.51	4.25	—	—	0.10
		CH2H	3.55	4.85	4.25	4.64	4.19	4.40	4.14	—	—	0.10
	50	CH2E	4.90	7.50	—	6.86	6.06	6.07	5.74	5.70	5.98	0.09
		CH2F	4.98	7.58	—	6.94	6.14	6.15	5.82	5.78	6.06	0.10
		CH2G	5.49	8.09	6.98	7.45	6.65	6.66	6.33	—	—	0.14
		CH2H	5.32	7.92	6.81	7.28	6.48	6.49	6.16	—	—	0.14
63	CH2E	7.93	11.81	—	10.83	10.67	10.68	9.47	9.55	9.54	0.17	
	CH2F	7.69	11.57	—	10.59	10.43	10.44	9.23	9.31	9.30	0.17	
	CH2G	8.49	12.37	10.64	11.39	11.23	11.24	10.03	—	—	0.20	
	CH2H	8.43	12.31	10.58	11.33	11.17	11.18	9.97	—	—	0.20	
80	CH2E	13.00	18.35	—	17.59	16.40	16.40	15.02	15.36	15.69	0.24	
	CH2F	12.89	18.24	—	17.48	16.29	16.29	14.91	15.25	15.58	0.26	
	CH2G	14.77	20.12	18.34	19.36	18.17	18.17	16.79	—	—	0.34	
	CH2H	14.21	19.56	17.78	18.80	17.61	17.61	16.23	—	—	0.30	
100	CH2E	18.97	29.78	—	26.44	25.15	25.15	22.62	22.39	23.57	0.41	
	CH2F	19.37	30.17	—	26.84	25.55	25.55	23.02	22.79	23.97	0.46	
	CH2G	22.17	32.98	28.62	29.64	28.35	28.35	25.82	—	—	0.49	
	CH2H	21.81	32.62	28.26	29.28	27.99	27.99	25.46	—	—	0.54	

		Standard weight (0 stroke)										Unit: kg
Bore size (mm)	Mounting type Model	B	LA	FY, FZ	FC, FD	CA	CB	TC	LB	FA, FB	Additional weight (per 10mm stroke)	
		Basic	Transaxial foot	Rectangular flange	Square flange	Single clevis	Double clevis	Center trunnion type	Axial foot	Rectangular flange (7MPa)		
C-series rod	40	CH2E	3.19	4.49	—	4.28	3.83	4.04	3.78	3.77	3.78	0.07
		CH2F	3.25	4.55	—	4.34	3.89	4.10	3.84	3.83	3.84	0.07
		CH2G	3.58	4.88	4.28	4.67	4.22	4.43	4.17	—	—	0.09
		CH2H	3.47	4.77	4.17	4.56	4.11	4.32	4.06	—	—	0.09
	50	CH2E	4.74	7.34	—	6.70	5.90	5.91	5.58	5.54	5.82	0.07
		CH2F	4.82	7.42	—	6.78	5.98	5.99	5.66	5.62	5.90	0.08
		CH2G	5.33	7.93	6.82	7.29	6.49	6.50	6.17	—	—	0.12
		CH2H	5.16	7.76	6.65	7.12	6.32	6.33	6.00	—	—	0.12
	63	CH2E	7.62	11.50	—	10.52	10.36	10.37	9.16	9.24	9.23	0.14
		CH2F	7.39	11.27	—	10.29	10.13	10.14	8.93	9.01	9.00	0.14
		CH2G	8.19	12.07	10.34	11.09	10.93	10.94	9.73	—	—	0.17
		CH2H	8.13	12.01	10.28	11.03	10.87	10.88	9.67	—	—	0.17
80	CH2E	12.56	17.91	—	17.15	15.96	15.96	14.58	14.92	15.25	0.18	
	CH2F	12.45	17.80	—	17.04	15.85	15.85	14.47	14.81	15.14	0.21	
	CH2G	14.32	19.67	17.89	18.91	17.72	17.72	16.34	—	—	0.28	
	CH2H	13.77	19.12	17.34	18.36	17.17	17.17	15.79	—	—	0.25	
100	CH2E	17.91	28.72	—	25.38	24.09	24.09	21.56	21.33	22.51	0.29	
	CH2F	18.31	29.12	—	25.78	24.49	24.49	21.96	21.73	22.91	0.30	
	CH2G	21.11	31.92	27.56	28.58	27.29	27.29	24.76	—	—	0.42	
	CH2H	20.75	31.56	27.20	28.22	26.93	26.93	24.40	—	—	0.38	

Water Resistant Hydraulic Cylinder

CHD2F Mounting Bore size Rod series **R** Stroke Cylinders options F5BAL

With auto switch (built-in magnet)

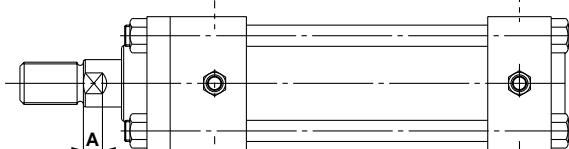
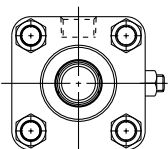
Water resistant cylinder
R NBR Seal (nitrile rubber)
V FKM Seal (fluoro rubber)

* Piston seals are NBR for both types R and V.

Port position

Water resistant solid state switch with 2-color display

* Stainless steel for the piston rod is a special order.



Specifications

Action	Double acting/Single rod
Cylinder bore size (mm)	32, 40, 50, 63, 80, 100
Cushion	Cushion seal
Auto switch mounting	Tie-rod mounting

* Specifications other than those above are the same as double acting/single rod specifications.

Bore size (mm)	B-series rod
	A
32	—
40	—
50	—
63	—
80	13.5
100	14.5

* Other dimensions are the same as those for the double acting/single rod standard type.

Theoretical Output

Unit: N

	Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)					
					1	3.5	5	7	10	14
B-series rod	32	18	OUT	804	804	2813	4019	5627	8038	11254
			IN	550	550	1923	2748	3847	5495	7693
	40	22.4	OUT	1256	1256	4396	6280	8792	12560	17584
			IN	862	862	3017	4311	6035	8621	12070
	50	28	OUT	1963	1963	6869	9813	13738	19625	27475
			IN	1347	1347	4715	6735	9429	13471	18859
	63	35.5	OUT	3116	3116	10905	15578	21810	31157	43619
			IN	2126	2126	7442	10632	14885	21264	29769
	80	45	OUT	5024	5024	17584	25120	35168	50240	70336
			IN	3434	3434	12020	17172	24041	34344	48081
	100	56	OUT	7850	7850	27475	39250	54950	78500	109900
			IN	5388	5388	18859	26941	37718	53882	75435
C-series rod	40	18	OUT	1256	1256	4396	6280	8792	12560	17584
			IN	1002	1002	3506	5008	7012	10017	14023
	50	22.4	OUT	1963	1963	6869	9813	13738	19625	27475
			IN	1569	1569	5490	7843	10980	15686	21961
	63	28	OUT	3116	3116	10905	15578	21810	31157	43619
			IN	2500	2500	8751	12501	17502	25002	35003
	80	35.5	OUT	5024	5024	17584	25120	35168	50240	70336
			IN	4035	4035	14121	20174	28243	40347	56486
	100	45	OUT	7850	7850	27475	39250	54950	78500	109900
			IN	6260	6260	21911	31302	43823	62604	87645

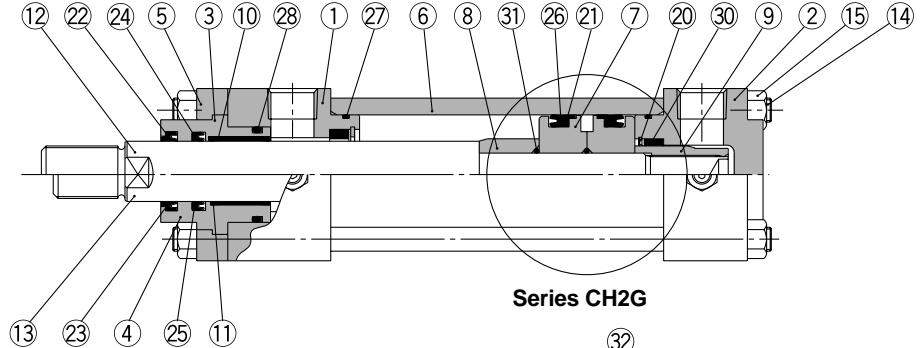
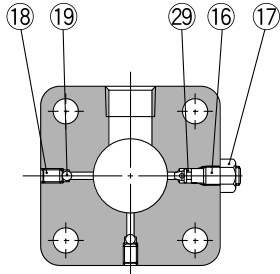
Minimum Strokes for Auto Switch Mounting

Unit: mm

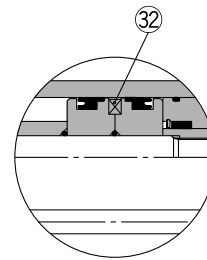
Auto switch type	No. of auto switches		Mounting brackets other than center trunnion		Center trunnion type					
			ø32	ø40 or larger	ø32	ø40	ø50	ø63	ø80	ø100
D-A5□, D-A6□	2 pcs.	Different sides	10	10	110	110	115	125	135	145
		Same side	—							
D-A59W	2 pcs.	Different sides	20	20	115	115	125	130	140	150
		Same side	—							
D-F5□, D-J5□	2 pcs.	Different sides	10	10	115	115	120	130	140	150
		Same side	—							
D-F5□W, D-J5□W D-F5BAL	2 pcs.	Different sides	10	10	120	120	120	135	140	150
		Same side	—							
D-F59F D-F5NTL	2 pcs.	Different sides	10	10	125	125	130	140	150	160
		Same side	—							
D-B5□, D-B6□ D-G5□, D-K59 D-G5□W, D-K59W D-G59F D-G5BAL, D-G5NTL	2 pcs.	Different sides	15	10	110	110	115	125	135	145
		Same side	75							
D-B59W	2 pcs.	Different sides	20	10	115	115	115	130	140	150
		Same side	75							
D-A3□ D-G39□, D-K39□	2 pcs.	Different sides	—	—	—	80	80	95	105	115
		Same side	—							
D-A44	2 pcs.	Different sides	—	—	—	85	85	100	110	120
		Same side	—							

Series CH2E/CH2F/CH2G/CH2H

Construction



Series CH2G



Series CH2E, CH2F, CH2H

Parts list

No.	Description	Material	Note
1	Rod cover	Carbon steel	Metallic painted
2	Head cover	Carbon steel	Metallic painted
3	Seal holder (B-series rod)	Carbon steel	Metallic painted
4	Seal holder (C-series rod)	Carbon steel	Metallic painted
5	Retainer	Carbon steel	Metallic painted
6	Cylinder tube	CH2E Aluminum alloy	Hard anodized
		CH2F Stainless steel	
		CH2G Carbon steel	Metallic painted
		CH2H Stainless steel	
7	Piston	CH2E Aluminum alloy	
		CH2F Aluminum alloy	
		CH2G Stainless steel	
		CH2H Stainless steel	
8	Cushion ring	Rolled steel	
9	Cushion ring nut	Rolled steel	
10	Bushing (B-series rod)	Copper alloy	
11	Bushing (C-series rod)	Copper alloy	
12	Piston rod (B-series rod)	Carbon steel	Hard chromium electroplated
13	Piston rod (C-series rod)	Carbon steel	Hard chromium electroplated
14	Tie-rod	Carbon steel	
15	Tie-rod nut	Carbon steel	
16	Cushion valve	Alloy steel	
17	Lock nut	Carbon steel	
18	Air release valve	Alloy steel	
19	Check ball	Bearing steel	
20	Snap ring	Carbon tool steel	
21	Back-up ring	Resin	
22	Scraper (B-series rod)	NBR	
23	Scraper (C-series rod)	NBR	
24	Rod seal (B-series rod)	NBR	
25	Rod seal (C-series rod)	NBR	
26	Piston seal	NBR	
27	Cylinder tube gasket	NBR	
28	Holder gasket	NBR	
29	Cushion valve seal	NBR	
30	Cushion seal	—	
31	Piston gasket	NBR	
32	Magnet	—	

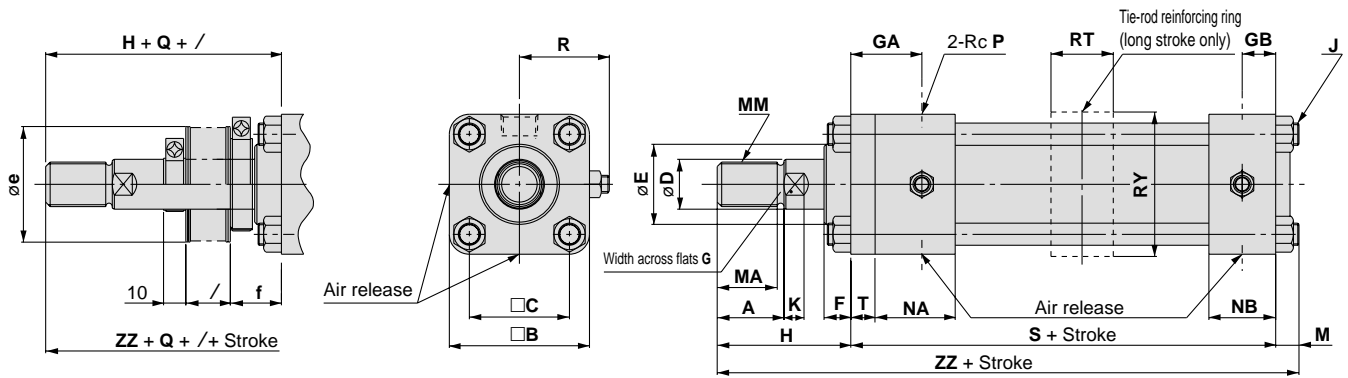
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.		Kit components
	B-series rod	C-series rod	
32	CH2E32B-PS	/	Nos. 21 through 30 from the chart at left
	CH2F32B-PS		
	CH2G32B-PS		
	CH2H32B-PS		
40	CH2E40B-PS	CH2E40C-PS	Nos. 21 through 30 from the chart at left
	CH2F40B-PS	CH2F40C-PS	
	CH2G40B-PS	CH2G40C-PS	
	CH2H40B-PS	CH2H40C-PS	
50	CH2E50B-PS	CH2E50C-PS	Nos. 21 through 30 from the chart at left
	CH2F50B-PS	CH2F50C-PS	
	CH2G50B-PS	CH2G50C-PS	
	CH2H50B-PS	CH2H50C-PS	
63	CH2E63B-PS	CH2E63C-PS	Nos. 21 through 30 from the chart at left
	CH2F63B-PS	CH2F63C-PS	
	CH2G63B-PS	CH2G63C-PS	
	CH2H63B-PS	CH2H63C-PS	
80	CH2E80B-PS	CH2E80C-PS	Nos. 21 through 30 from the chart at left
	CH2F80B-PS	CH2F80C-PS	
	CH2G80B-PS	CH2G80C-PS	
	CH2H80B-PS	CH2H80C-PS	
100	CH2E100B-PS	CH2E100C-PS	Nos. 21 through 30 from the chart at left
	CH2F100B-PS	CH2F100C-PS	
	CH2G100B-PS	CH2G100C-PS	
	CH2H100B-PS	CH2H100C-PS	

* Seal kits consist of items 21 through 30 and can be ordered by using the seal kit number for each bore size.

Dimensions

Basic type: CH2EB, CH2FB, CH2GB, CH2HB



Long stroke (with tie-rod reinforcing ring)

Bore size (mm)	Stroke range* (mm)	RT	RY
32	1401 to 1800	28	58
40	1401 to 1800	28	65
50	1401 to 1800	33	75
63	1501 to 1800	43	90
80	—	—	—
100	—	—	—

* Applicable to Series CH2E, CH2F and CH2H.
 Contact SMC regarding the Series CH2G with the above strokes.

Bore size (mm)	Stroke range (mm)															With rod boot				
		B	C	F	GA	GB	J	M	NA	NB	P	R	S	T	e		f	Q	/	
		B-rod	C-rod															B-rod	C-rod	
32	25 to 1400	58	38	16	32	15	M10 x 1.25	11	37	31	3/8	39	141	11	52	—	21.5	15	—	—
40	25 to 1400	65	45	12	32	15	M10 x 1.25	11	36	30	3/8	42	141	11	52	52	12	15	1/3.5	stroke
50	25 to 1400	76	52	15	40	19	M10 x 1.25	11	43	35	1/2	46	155	13	55	52	15	15	—	—
63	25 to 1500	90	63	15	42	19	M12 x 1.5	14	43	35	1/2	52	163	15	65	55	15	20	—	—
80	25 to 1800	110	80	17	40	22	M16 x 1.5	16	44	44	3/4	65	184	18	80	65	17	20	1/4	stroke
100	25 to 1800	135	102	19	42	22	M18 x 1.5	18	44	44	3/4	75	192	20	100	80	19	15	—	—

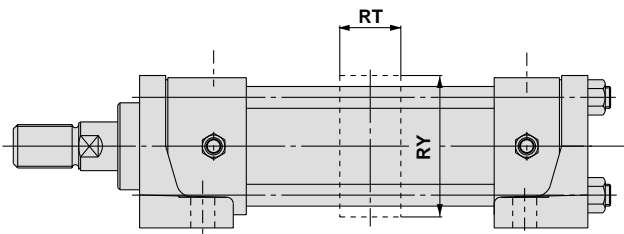
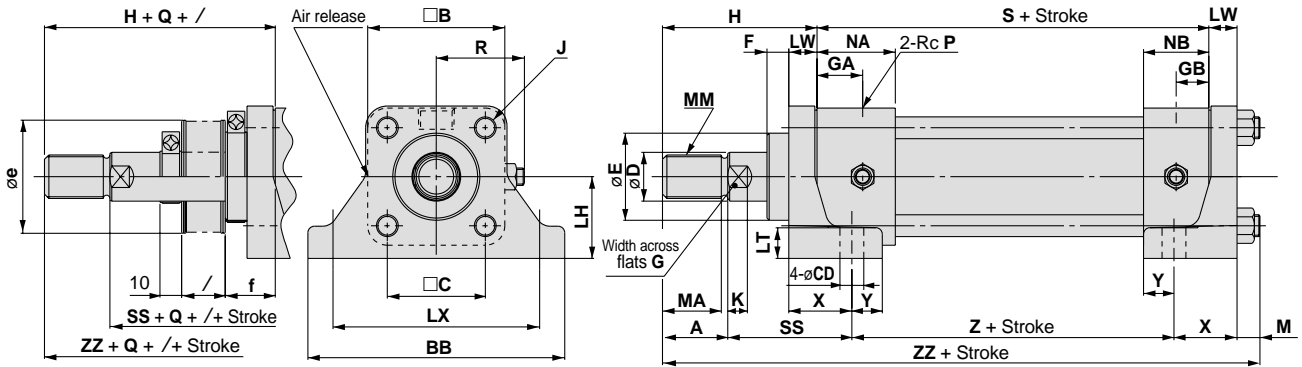
Rod series

Bore size (mm)	B-series rod										C-series rod										
	MM	A	MA	D	E	K	G	H	ZZ		MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	207	—	—	—	—	—	—	—	—	—	—	—	
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	212	M16 x 1.5	25	22	18	36	7	14	55	207	—	
50	M24 x 1.5	35	32	28	46	11	24	65	231	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	226	—	
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	80	257	M24 x 1.5	35	32	28	46	11	24	70	247	—	
80	M39 x 1.5	60	57	45	65	-0.076	15	41	95	295	M30 x 1.5	45	42	35.5	55	-0.030	13	30	80	280	—
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	115	325	M39 x 1.5	60	57	45	65	-0.076	15	41	100	310	—

Series CH2E/CH2F/CH2G/CH2H

Dimensions

Transaxial foot type: CH2ELA, CH2FLA, CH2GLA, CH2HLA



Long stroke (with tie-rod reinforcing ring)

Bore size (mm)	Stroke range* (mm)	RT	RY
32	1401 to 1800	28	58
40	1401 to 1800	28	65
50	1401 to 1800	33	75
63	1501 to 1800	43	90
80	—	—	—
100	—	—	—

* Applicable to Series CH2E, CH2F and CH2H.
Contact SMC regarding Series CH2G with the above strokes.

Bore size (mm)	Stroke range (mm)																					With rod boot							
		B	BB	C	F	GA	GB	J	M	NA	NB	P	R	S	CD	LH	LT	LW	LX	X	Y	Z	SS	e		f	Q		
		B-rod		C-rod		f		Q		B-rod		C-rod																	
32	25 to 1400	58	109	38	14	21	15	M10 x 1.25	11	37	31	3/8	39	130	11	35	14	13	88	29	14	98	57	52	—	21.5	15	—	—
40	25 to 1400	65	118	45	10	21	15	M10 x 1.25	11	36	30	3/8	42	130	11	37.5	14	13	95	29	14	98	57	52	52	12	15	1/3.5	stroke
50	25 to 1400	76	145	52	10	27	19	M10 x 1.25	11	43	35	1/2	46	142	14	45	17	18	115	35	18	108	60	55	52	15	15	—	—
63	25 to 1500	90	165	63	10	27	19	M12 x 1.5	14	43	35	1/2	52	148	18	50	19	20	132	41	19	106	71	65	55	15	20	—	—
80	25 to 1800	110	190	80	11	22	22	M16 x 1.5	16	44	44	3/4	65	166	18	60	24	24	155	45	20	124	74	80	65	17	20	1/4	stroke
100	25 to 1800	135	230	102	11	22	22	M18 x 1.5	18	44	44	3/4	75	172	22	71	27	28	190	53	22	122	85	100	80	19	15	—	—

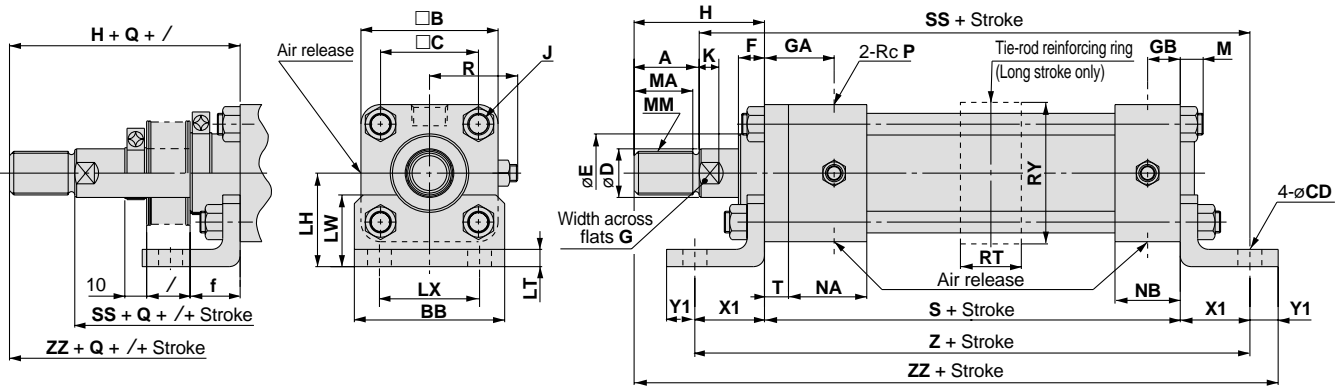
Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	66	220	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	71	225	M16 x 1.5	25	22	18	36	—	—	—		
50	M24 x 1.5	35	32	28	46	11	24	78	249	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	73	244	
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	95	277	M24 x 1.5	35	32	28	46	11	24	85	267	
80	M39 x 1.5	60	57	45	65	-0.076	15	41	113	319	M30 x 1.5	45	42	35.5	55	-0.030	13	30	98	304
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	135	353	M39 x 1.5	60	57	45	65	-0.076	15	41	120	338

Tolerance

Bore size (mm)	LH	LX
32	±0.15	±0.18
40		
50		
63		
80	±0.25	±0.20
100		

Axial foot type: CH2ELB, CH2FLB



**Long stroke
 (with tie-rod reinforcing ring)**

Bore size (mm)	Stroke range* (mm)	RT	RY
32	1401 to 1800	28	58
40	1401 to 1800	28	65
50	1401 to 1800	33	75
63	1501 to 1800	43	90
80	—	—	—
100	—	—	—

* Applicable to Series CH2E and CH2F.

Bore size (mm)	Stroke range (mm)																					With rod boot							
		B	BB	C	F	GA	GB	J	M	NA	NB	P	R	S	T	CD	LH	LT	LX	LW	X1	Y1	SS	Z	e		f	Q	/
		B-rod		C-rod		B-rod		C-rod																					
32	25 to 1400	58	62	38	16	32	15	M10 x 1.25	11	37	31	3/8	39	141	11	11	40	8	40	30	32	13	203	205	52	—	21.5	15	—
40	25 to 1400	65	69	45	12	32	15	M10 x 1.25	11	36	30	3/8	42	141	11	11	43	8	46	33	32	13	203	205	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	85	52	15	40	19	M10 x 1.25	11	43	35	1/2	46	155	13	14	50	8	58	37	35	15	220	225	55	52	15	15	—
63	25 to 1500	90	98	63	15	42	19	M12 x 1.5	14	43	35	1/2	52	163	15	18	60	10	65	45	42	18	240	247	65	55	15	20	—
80	25 to 1800	110	118	80	17	40	22	M16 x 1.5	16	44	44	3/4	65	184	18	18	72	12	87	50	50	20	269	284	80	65	17	20	1/4 stroke
100	25 to 1800	135	150	102	19	42	22	M18 x 1.5	18	44	44	3/4	75	192	20	22	85	12	109	55	55	23	287	302	100	80	19	15	—

Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	241	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	246	M16 x 1.5	25	22	18	36	7	14	55	241	
50	M24 x 1.5	35	32	28	46	-0.025 -0.064	11	24	65	270	M20 x 1.5	30	27	22.4	40	9	19	60	265	
63	M30 x 1.5	45	42	35.5	55	-0.030 -0.076	13	30	80	303	M24 x 1.5	35	32	28	46	11	24	70	293	
80	M39 x 1.5	60	57	45	65	-0.030 -0.076	15	41	95	349	M30 x 1.5	45	42	35.5	55	13	30	80	334	
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	115	385	M39 x 1.5	60	57	45	65	15	41	100	370	

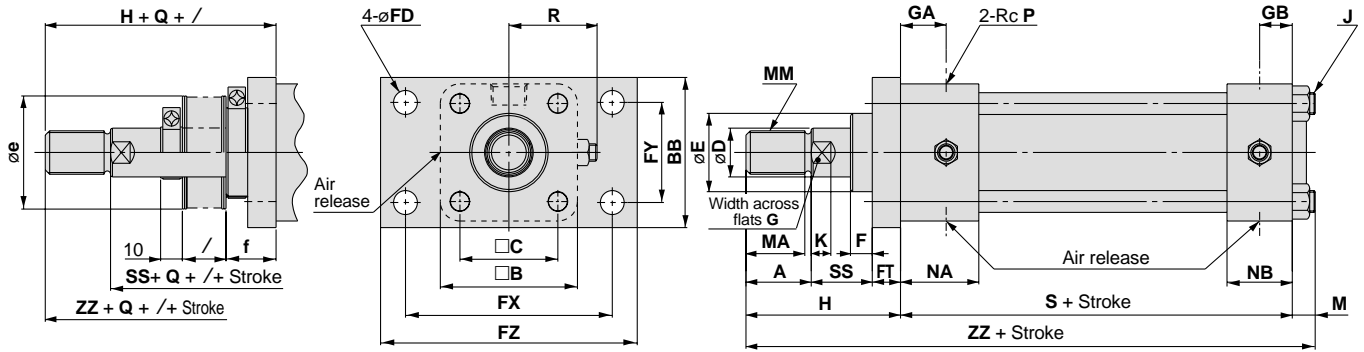
Tolerance

Bore size (mm)	LH	LX
32	±0.15	±0.13
40		±0.15
50		±0.15
63	±0.25	±0.18
80		±0.18
100		±0.18

Series CH2E/CH2F/CH2G/CH2H

Dimensions

Front rectangular flange type: CH2EFA, CH2FFA



Bore size (mm)	Stroke range (mm)																			With rod boot					
		B	BB	C	F	GA	GB	J	M	NA	NB	P	R	S	FD	FT	FX	FY	FZ	SS	e		f	Q	
		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		/			
32	25 to 1400	58	62	38	16	21	15	M10 x 1.25	11	37	31	3/8	39	130	11	11	88	40	109	30	52	—	21.5	15	—
40	25 to 1400	65	69	45	12	21	15	M10 x 1.25	11	36	30	3/8	42	130	11	11	95	46	118	30	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	85	52	15	27	19	M10 x 1.25	11	43	35	1/2	46	142	14	13	115	58	145	30	55	52	15	15	
63	25 to 1500	90	98	63	15	27	19	M12 x 1.5	14	43	35	1/2	52	148	18	15	132	65	165	35	65	55	15	20	1/4 stroke
80	25 to 1800	110	118	80	17	22	22	M16 x 1.5	16	44	44	3/4	65	166	18	18	155	87	190	35	80	65	17	20	
100	25 to 1800	135	150	102	19	22	22	M18 x 1.5	18	44	44	3/4	75	172	22	20	190	109	230	40	100	80	19	15	

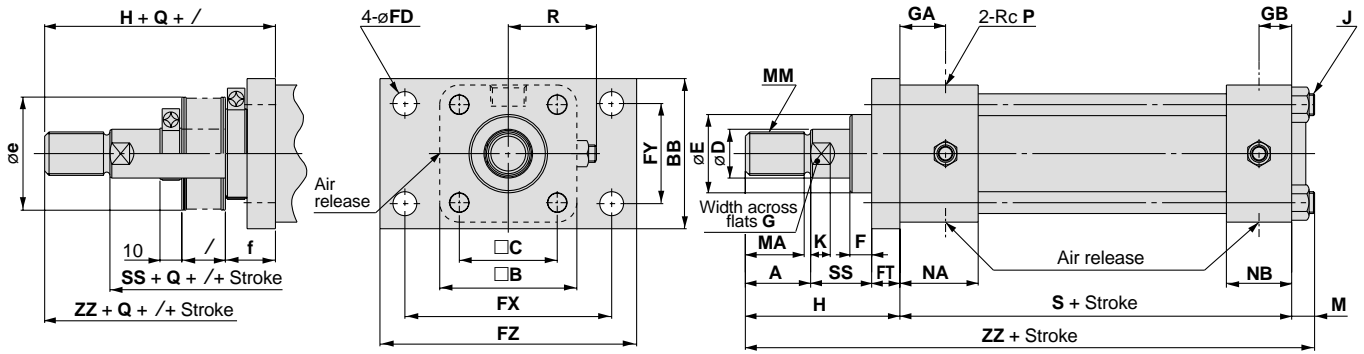
Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	66	207	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	71	212	M16 x 1.5	25	22	18	36	7	14	66	207	
50	M24 x 1.5	35	32	28	46	11	24	78	231	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	73	226	
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	95	257	M24 x 1.5	35	32	28	46	11	24	85	247	
80	M39 x 1.5	60	57	45	65	-0.076	15	41	113	295	M30 x 1.5	45	42	35.5	55	-0.030	13	30	98	280
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	135	325	M39 x 1.5	60	57	45	65	-0.076	15	41	120	310

Tolerance

Bore size (mm)	FT	FY	FX
32			
40	±0.2	±0.13	±0.18
50		±0.15	
63	±0.3		±0.2
80		±0.18	
100			±0.23

Front rectangular flange type: CH2GFY, CH2HFY



Bore size (mm)	Stroke range (mm)																				With rod boot				(mm)	
		B	BB	C	F	GA	GB	J	M	NA	NB	P	R	S	FD	FT	FX	FY	FZ	SS	e		f	Q	/	
		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		
32	25 to 1400	58	62	38	14	21	15	M10 x 1.25	11	37	31	3/8	39	130	11	13	88	40	109	30	52	—	21.5	15	—	
40	25 to 1400	65	69	45	10	21	15	M10 x 1.25	11	36	30	3/8	42	130	11	13	95	46	118	30	52	52	12	15	1/3.5 stroke	
50	25 to 1400	76	85	52	10	27	19	M10 x 1.25	11	43	35	1/2	46	142	14	18	115	58	145	30	55	52	15	15		
63	25 to 1500	90	98	63	10	27	19	M12 x 1.5	14	43	35	1/2	52	148	18	20	132	65	165	35	65	55	15	20	1/4 stroke	
80	25 to 1800	110	118	80	11	22	22	M16 x 1.5	16	44	44	3/4	65	166	18	24	155	87	190	35	80	65	17	20		
100	25 to 1800	135	150	102	11	22	22	M18 x 1.5	18	44	44	3/4	75	172	22	28	190	109	230	40	100	80	19	15		

Rod series

Bore size (mm)	B-series rod										C-series rod										(mm)						
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ
32	M16 x 1.5	25	22	18	34	—	7	14	68	209	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	73	214	M16 x 1.5	25	22	18	36	—	7	14	68	209	—	—	—	—	—	—	—
50	M24 x 1.5	35	32	28	46	—	11	24	83	236	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	78	231	—	—	—	—	—	—	—
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	100	262	M24 x 1.5	35	32	28	46	—	11	24	90	252	—	—	—	—	—	—	—
80	M39 x 1.5	60	57	45	65	-0.076	15	41	119	301	M30 x 1.5	45	42	35.5	55	-0.030	13	30	104	286	—	—	—	—	—	—	—
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	143	333	M39 x 1.5	60	57	45	65	-0.076	15	41	128	318	—	—	—	—	—	—	—

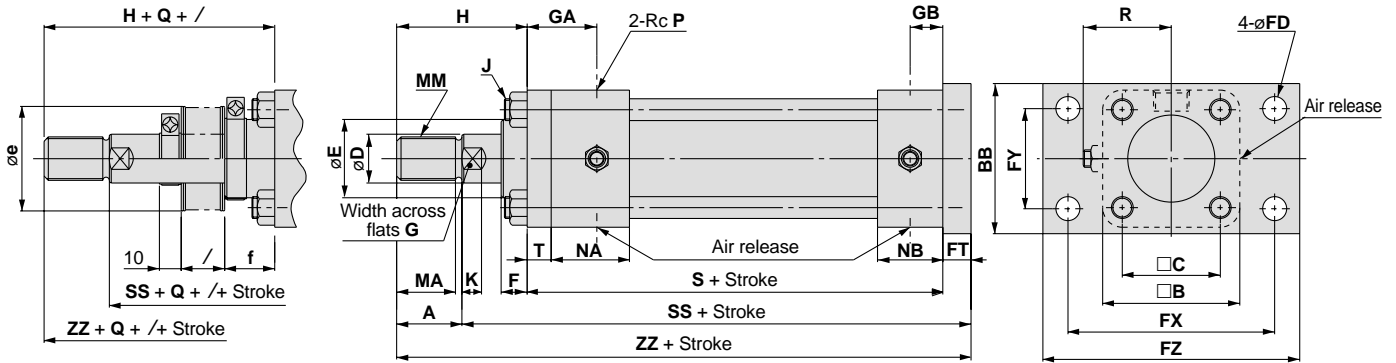
Tolerance

Bore size (mm)	FT	FX	FY
32	±0.2	±0.18	±0.13
40			
50	±0.3	±0.2	±0.15
63			
80			
100	±0.23	±0.18	±0.13

Series CH2E/CH2F/CH2G/CH2H

Dimensions

Rear rectangular flange type: CH2EFB, CH2FFB



Bore size (mm)	Stroke range (mm)																			With rod boot				/	
		B	BB	C	F	GA	GB	J	NA	NB	P	R	S	T	FD	FT	FX	FY	FZ	SS	e		f		Q
		B-rod	C-rod																			B-rod	C-rod		
32	25 to 1400	58	62	38	16	32	15	M10 x 1.25	37	31	3/8	39	141	11	11	11	88	40	109	182	52	—	21.5	15	—
40	25 to 1400	65	69	45	12	32	15	M10 x 1.25	36	30	3/8	42	141	11	11	11	95	46	118	182	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	85	52	15	40	19	M10 x 1.25	43	35	1/2	46	155	13	14	13	115	58	145	198	55	52	15	15	—
63	25 to 1500	90	98	63	15	42	19	M12 x 1.5	43	35	1/2	52	163	15	18	15	132	65	165	213	65	55	15	20	—
80	25 to 1800	110	118	80	17	40	22	M16 x 1.5	44	44	3/4	65	184	18	18	18	155	87	190	237	80	65	17	20	1/4 stroke
100	25 to 1800	135	150	102	19	42	22	M18 x 1.5	44	44	3/4	75	192	20	22	20	190	109	230	252	100	80	19	15	—

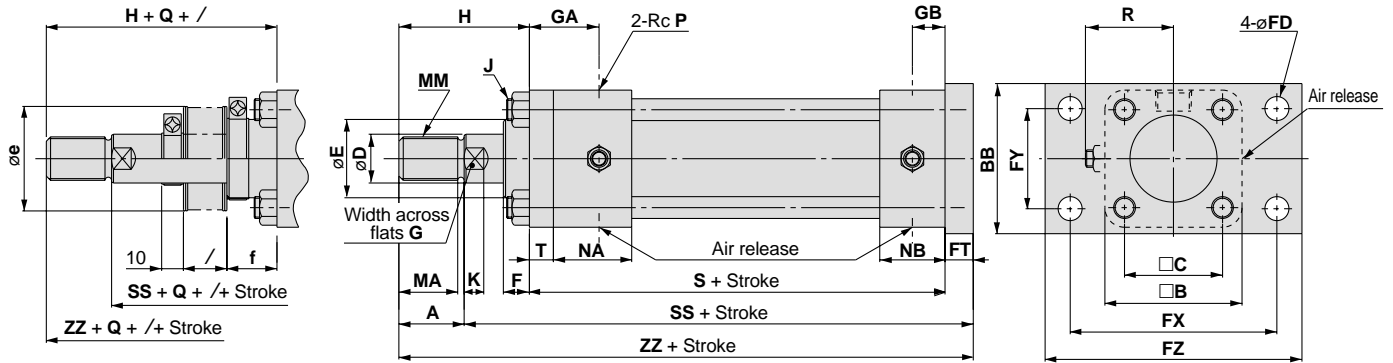
Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	207	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	212	M16 x 1.5	25	22	18	36	7	14	55	207	
50	M24 x 1.5	35	32	28	46	11	24	65	233	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	228	
63	M30 x 1.5	45	42	35.5	55	-0.030 -0.076	13	30	80	258	M24 x 1.5	35	32	28	46	11	24	70	248	
80	M39 x 1.5	60	57	45	65	15	41	95	297	M30 x 1.5	45	42	35.5	55	-0.030 -0.076	13	30	80	282	
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	115	327	M39 x 1.5	60	57	45	65	15	41	100	312	

Tolerance

Bore size (mm)	FT	FY	FX
32			
40	±0.2	±0.13	±0.18
50		±0.15	
63			±0.2
80	±0.3	±0.18	
100			±0.23

Rear rectangular flange type: CH2GFZ, CH2HFZ



Bore size (mm)	Stroke range (mm)																			With rod boot					
		B	BB	C	F	GA	GB	J	NA	NB	P	R	S	T	FD	FT	FX	FY	FZ	SS	e		f	Q	
		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod	
32	25 to 1400	58	62	38	16	32	15	M10 x 1.25	37	31	3/8	39	141	11	11	13	88	40	109	184	52	—	21.5	15	—
40	25 to 1400	65	69	45	12	32	15	M10 x 1.25	36	30	3/8	42	141	11	11	13	95	46	118	184	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	85	52	15	40	19	M10 x 1.25	43	35	1/2	46	155	13	14	18	115	58	145	203	55	52	15	15	
63	25 to 1500	90	98	63	15	42	19	M12 x 1.5	43	35	1/2	52	163	15	18	20	132	65	165	218	65	55	15	20	1/4 stroke
80	25 to 1800	110	118	80	17	40	22	M16 x 1.5	44	44	3/4	65	184	18	18	24	155	87	190	243	80	65	17	20	
100	25 to 1800	135	150	102	19	42	22	M18 x 1.5	44	44	3/4	75	192	20	22	28	190	109	230	260	100	80	19	15	

Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	209	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	9	19	60	214	M16 x 1.5	25	22	18	36	7	14	55	209		
50	M24 x 1.5	35	32	28	46	11	24	65	238	M20 x 1.5	30	27	22.4	40	9	19	60	233		
63	M30 x 1.5	45	42	35.5	55	13	30	80	263	M24 x 1.5	35	32	28	46	11	24	70	253		
80	M39 x 1.5	60	57	45	65	15	41	95	303	M30 x 1.5	45	42	35.5	55	13	30	80	288		
100	M48 x 1.5	75	72	56	80	16	50	115	335	M39 x 1.5	60	57	45	65	15	41	100	320		

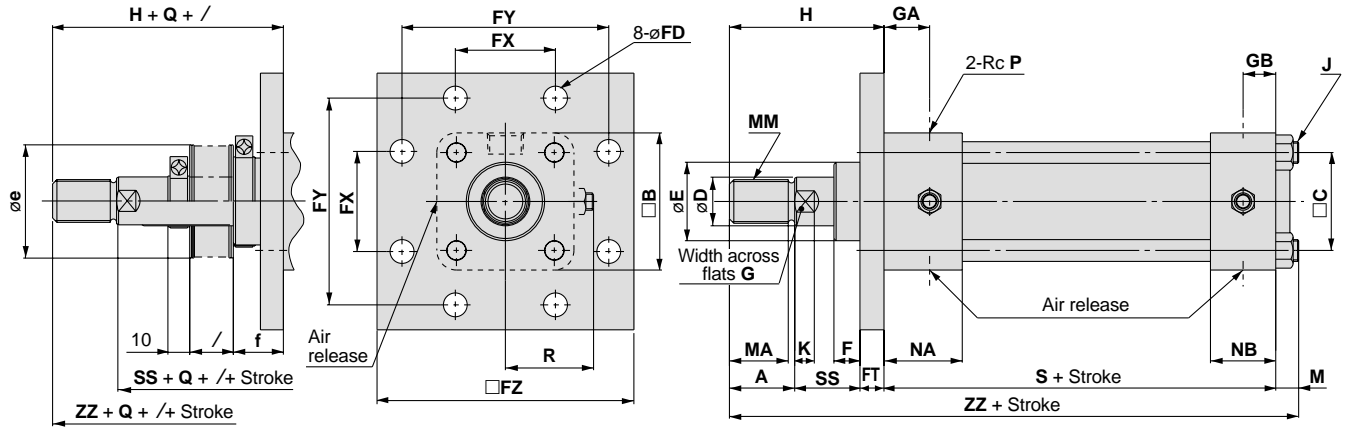
Tolerance

Bore size (mm)	FT	FX	FY
32	±0.2	±0.18	±0.13
40			
50	±0.3	±0.2	±0.15
63			
80			
100	±0.23	±0.18	±0.18

Series CH2E/CH2F/CH2G/CH2H

Dimensions

Front square flange type: CH2EFC, CH2FFC, CH2GFC, CH2HFC



Bore size (mm)	Stroke range (mm)																		With rod boot				(mm)		
		B	C	F	GA	GB	J	M	NA	NB	P	R	S	FD	FT	FX	FY	FZ	SS	e		f	Q	/	
		B-rod	C-rod																						B-rod
32	25 to 1400	58	38	16	21	15	M10 x 1.25	11	37	31	3/8	39	130	11	11	40	88	109	30	52	—	21.5	15	—	—
40	25 to 1400	65	45	12	21	15	M10 x 1.25	11	36	30	3/8	42	130	11	11	46	95	118	30	52	52	12	15	1/3.5	stroke
50	25 to 1400	76	52	15	27	19	M10 x 1.25	11	43	35	1/2	46	142	14	13	58	115	145	30	55	52	15	15	—	—
63	25 to 1500	90	63	15	27	19	M12 x 1.5	14	43	35	1/2	52	148	18	15	65	132	165	35	65	55	15	20	—	—
80	25 to 1800	110	80	17	22	22	M16 x 1.5	16	44	44	3/4	65	166	18	18	87	155	190	35	80	65	17	20	1/4	stroke
100	25 to 1800	135	102	19	22	22	M18 x 1.5	18	44	44	3/4	75	172	22	20	109	190	230	40	100	80	19	15	—	—

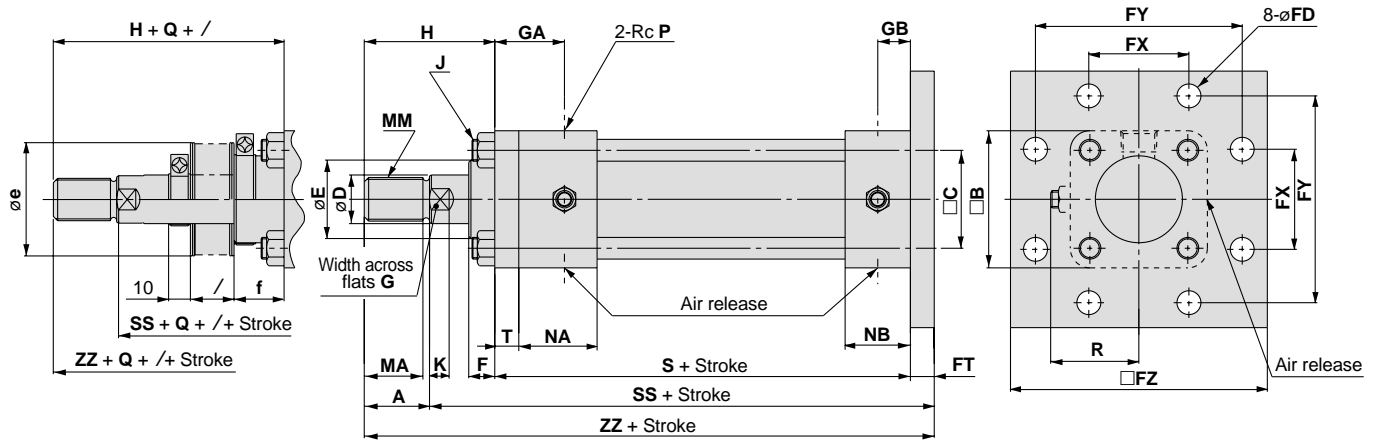
Rod series

Bore size (mm)	B-series rod										C-series rod										(mm)				
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ							
32	M16 x 1.5	25	22	18	34	7	14	66	207	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	71	212	M16 x 1.5	25	22	18	36	7	14	66	207	—	—	—	—	—	—
50	M24 x 1.5	35	32	28	46	11	24	78	231	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	73	226	—	—	—	—	—	—
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	95	257	M24 x 1.5	35	32	28	46	11	24	85	247	—	—	—	—	—	—
80	M39 x 1.5	60	57	45	65	-0.076	15	41	113	295	M30 x 1.5	45	42	35.5	55	-0.030	13	30	98	280	—	—	—	—	—
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	135	325	M39 x 1.5	60	57	45	65	-0.036 -0.090	15	41	120	310	—	—	—	—	—

Tolerance

Bore size (mm)	FT	FX	FY
32			
40	±0.2	±0.13	±0.18
50		±0.15	
63			±0.2
80	±0.3	±0.18	±0.23
100			

Rear square flange type: CH2EFD, CH2FFD, CH2GFD, CH2HFD



Bore size (mm)	Stroke range (mm)																		With rod boot					
		B	C	F	GA	GB	J	NA	NB	P	R	S	T	FD	FT	FX	FY	FZ	SS	e		f	Q	
		B-rod		C-rod		/		B-rod		C-rod														
32	25 to 1400	58	38	16	32	15	M10 x 1.25	37	31	3/8	39	141	11	11	11	40	88	109	182	52	—	21.5	15	—
40	25 to 1400	65	45	12	32	15	M10 x 1.25	36	30	3/8	42	141	11	11	11	46	95	118	182	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	52	15	40	19	M10 x 1.25	43	35	1/2	46	155	13	14	13	58	115	145	198	55	52	15	15	—
63	25 to 1500	90	63	15	42	19	M12 x 1.5	43	35	1/2	52	163	15	18	15	65	132	165	213	65	55	15	20	—
80	25 to 1800	110	80	17	40	22	M16 x 1.5	44	44	3/4	65	184	18	18	18	87	155	190	237	80	65	17	20	1/4 stroke
100	25 to 1800	135	102	19	42	22	M18 x 1.5	44	44	3/4	75	192	20	22	20	109	190	230	252	100	80	19	15	—

Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	207	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	212	M16 x 1.5	25	22	18	36	7	14	55	207	
50	M24 x 1.5	35	32	28	46	11	24	65	233	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	228	
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	80	258	M24 x 1.5	35	32	28	46	11	24	70	248	
80	M39 x 1.5	60	57	45	65	-0.076	15	41	95	297	M30 x 1.5	45	42	35.5	55	-0.030	13	30	80	282
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	115	327	M39 x 1.5	60	57	45	65	-0.076	15	41	100	312

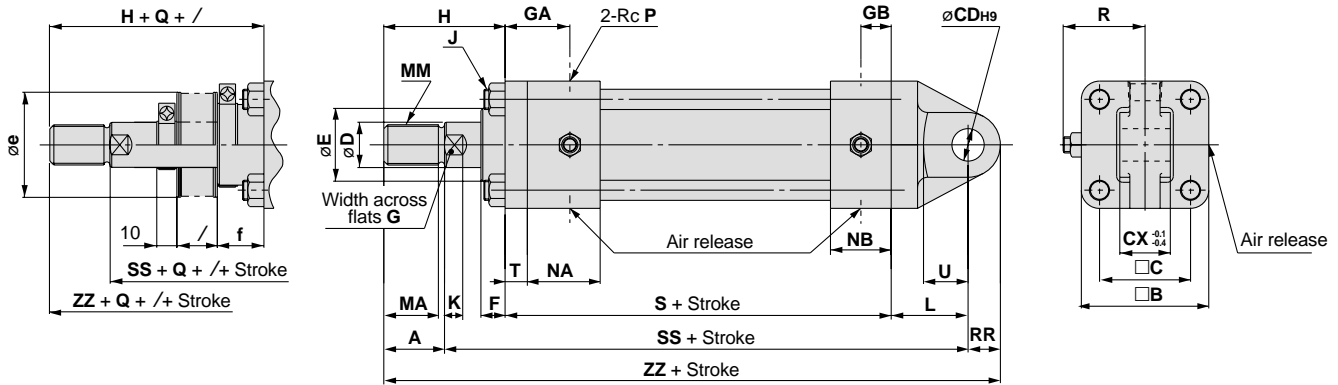
Tolerance

Bore size (mm)	FT	FX	FY
32	±0.2	±0.13	±0.18
40			
50			
63	±0.3	±0.18	±0.23
80			
100			

Series CH2E/CH2F/CH2G/CH2H

Dimensions

Single clevis type: CH2ECA, CH2FCA, CH2GCA, CH2HCA



Bore size (mm)	Stroke range (mm)																		With rod boot					
		B	C	F	GA	GB	J	NA	NB	P	R	S	T	CX	CD	RR	SS	U	L	e		f	Q	
		B-rod	C-rod																					
32	25 to 1400	58	38	16	32	15	M10 x 1.25	37	31	3/8	39	141	11	25	16	16	209	22	38	52	—	21.5	15	—
40	25 to 1400	65	45	12	32	15	M10 x 1.25	36	30	3/8	42	141	11	25	16	16	209	22	38	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	52	15	40	19	M10 x 1.25	43	35	1/2	46	155	13	31.5	20	20	230	25	45	55	52	15	15	—
63	25 to 1500	90	63	15	42	19	M12 x 1.5	43	35	1/2	52	163	15	40	31.5	31.5	261	40	63	65	55	15	20	—
80	25 to 1800	110	80	17	40	22	M16 x 1.5	44	44	3/4	65	184	18	40	31.5	31.5	291	40	72	80	65	17	20	1/4 stroke
100	25 to 1800	135	102	19	42	22	M18 x 1.5	44	44	3/4	75	192	20	50	40	40	316	50	84	100	80	19	15	—

Rod series

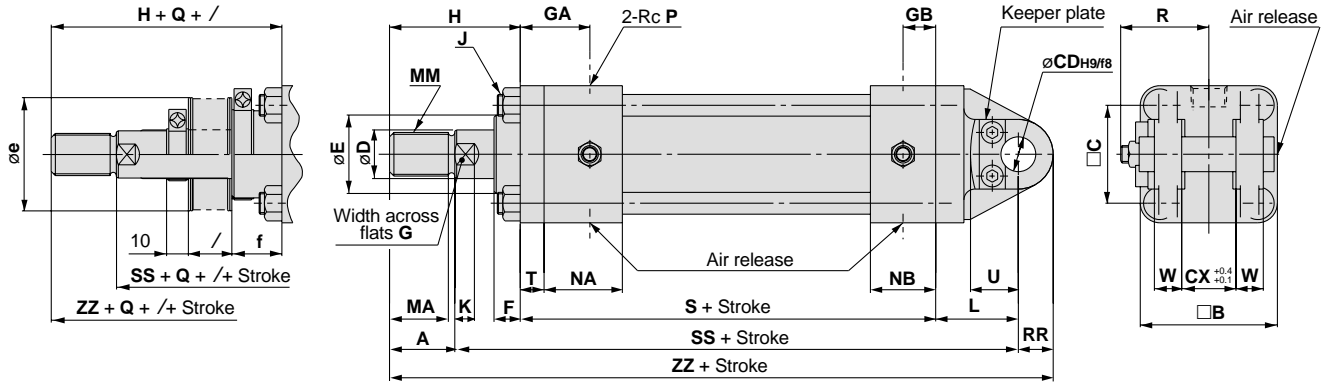
Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	250	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	9	19	60	255	M16 x 1.5	25	22	18	36	7	14	55	250		
50	M24 x 1.5	35	32	28	46	11	24	65	285	M20 x 1.5	30	27	22.4	40	9	19	60	280		
63	M30 x 1.5	45	42	35.5	55	13	30	80	337.5	M24 x 1.5	35	32	28	46	11	24	70	327.5		
80	M39 x 1.5	60	57	45	65	15	41	95	382.5	M30 x 1.5	45	42	35.5	55	13	30	80	367.5		
100	M48 x 1.5	75	72	56	80	16	50	115	431	M39 x 1.5	60	57	45	65	15	41	100	416		

Tolerance

Bore size (mm)	CDH9
32	+0.043
40	0
50	+0.052
63	0
80	+0.062
100	0

JIS Standard Hydraulic Cylinder
 Double Acting/Single Rod **Series CH2E/CH2F/CH2G/CH2H**

Double clevis type: CH2ECB, CH2FCB, CH2GCB, CH2HCB



Bore size (mm)	Stroke range (mm)																				With rod boot				
		B	C	F	GA	GB	J	NA	NB	P	R	S	T	CX	CD	RR	SS	L	U	W	e		f	Q	
		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		B-rod		C-rod		/			
32	25 to 1400	58	38	16	32	15	M10 x 1.25	37	31	3/8	39	141	11	25	16	16	209	38	22	12.5	52	—	21.5	15	—
40	25 to 1400	65	45	12	32	15	M10 x 1.25	36	30	3/8	42	141	11	25	16	16	209	38	22	12.5	52	52	12	15	1/3.5 stroke
50	25 to 1400	76	52	15	40	19	M10 x 1.25	43	35	1/2	46	155	13	31.5	20	20	230	45	25	16	55	52	15	15	
63	25 to 1500	90	63	15	42	19	M12 x 1.5	43	35	1/2	52	163	15	40	31.5	31.5	261	63	40	20	65	55	15	20	1/4 stroke
80	25 to 1800	110	80	17	40	22	M16 x 1.5	44	44	3/4	65	184	18	40	31.5	31.5	291	72	40	20	80	65	17	20	
100	25 to 1800	135	102	19	42	22	M18 x 1.5	44	44	3/4	75	192	20	50	40	40	316	84	50	25	100	80	19	15	

Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	250	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	9	19	60	255	M16 x 1.5	25	22	18	36	7	14	55	250		
50	M24 x 1.5	35	32	28	46	11	24	65	285	M20 x 1.5	30	27	22.4	40	9	19	60	280		
63	M30 x 1.5	45	42	35.5	55	13	30	80	337.5	M24 x 1.5	35	32	28	46	11	24	70	327.5		
80	M39 x 1.5	60	57	45	65	15	41	95	382.5	M30 x 1.5	45	42	35.5	55	13	30	80	367.5		
100	M48 x 1.5	75	72	56	80	16	50	115	431	M39 x 1.5	60	57	45	65	15	41	100	416		

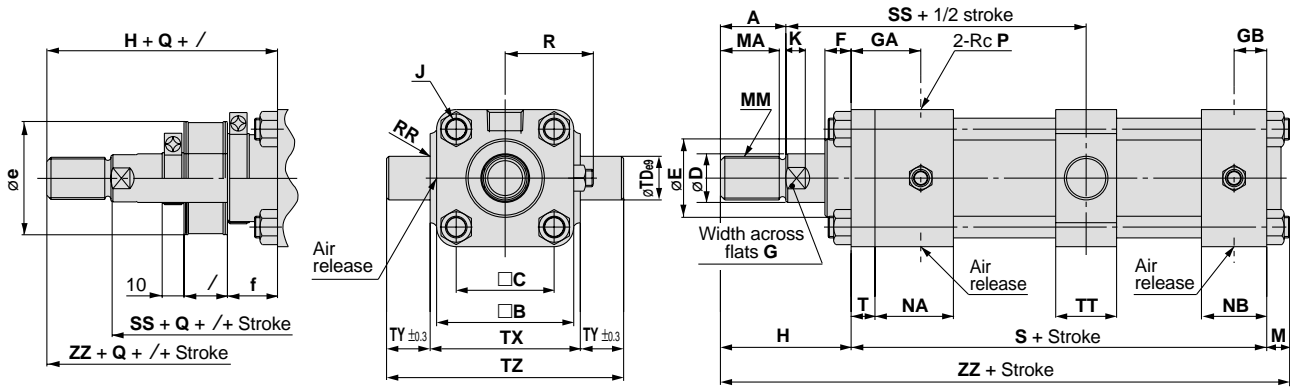
Tolerance

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

Series CH2E/CH2F/CH2G/CH2H

Dimensions

Center trunnion type: CH2ETC, CH2FTC, CH2GTC, CH2HTC



Bore size (mm)	Stroke range (mm)																				With rod boot				(mm)	
		B	C	F	GA	GB	J	M	NA	NB	P	R	S	T	RR	SS	TD	TT	TX	TY	TZ	e		f	Q	/
		B-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod		C-rod
32 ^{*1}	25 to 1800	58	38	16	32	15	M10 x 1.25	11	37	31	3/8	39	141	11	2	113	20	28	58	20	98	52	—	21.5	15	—
40 ^{*1}	25 to 1800	65	45	12	32	15	M10 x 1.25	11	36	30	3/8	42	141	11	2	113	20	28	69	20	109	52	52	12	15	1/3.5 stroke
50 ^{*1}	25 to 1800	76	52	15	40	19	M10 x 1.25	11	43	35	1/2	46	155	13	2.5	121	25	33	85	25	135	55	52	15	15	1/3.5 stroke
63 ^{*2}	25 to 1800	90	63	15	42	19	M12 x 1.5	14	43	35	1/2	52	163	15	2.5	132	31.5	43	98	31.5	161	65	55	15	20	1/4 stroke
80	25 to 1800	110	80	17	40	22	M16 x 1.5	16	44	44	3/4	65	184	18	2.5	146	31.5	43	118	31.5	181	80	65	17	20	1/4 stroke
100	25 to 1800	135	102	19	42	22	M18 x 1.5	18	44	44	3/4	75	192	20	3	156	40	53	145	40	225	100	80	19	15	1/4 stroke

*1: CH2GTC is limited to 1400mm. *2: CH2GTC is limited to 1500mm.

Rod series

Bore size (mm)	B-series rod										C-series rod										(mm)						
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ
32	M16 x 1.5	25	22	18	34	7	14	55	207	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	212	M16 x 1.5	25	22	18	36	7	14	55	207	—	—	—	—	—	—	—	—
50	M24 x 1.5	35	32	28	46	11	24	65	231	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	60	226	—	—	—	—	—	—	—	—
63	M30 x 1.5	45	42	35.5	55	-0.030 -0.076	13	30	80	257	M24 x 1.5	35	32	28	46	11	24	70	247	—	—	—	—	—	—	—	—
80	M39 x 1.5	60	57	45	65	15	41	95	295	M30 x 1.5	45	42	35.5	55	-0.030 -0.076	13	30	80	280	—	—	—	—	—	—	—	—
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	115	325	M39 x 1.5	60	57	45	65	15	41	100	310	—	—	—	—	—	—	—	—

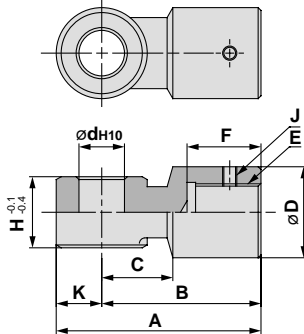
Tolerance

Bore size (mm)	TD _{e9}	TX
32	0	0
40	-0.040 -0.092	-0.3
50	0	0
63	-0.050 -0.112	-0.35
80	0	0
100	0	-0.4

Accessories (optional)

Single knuckle joint

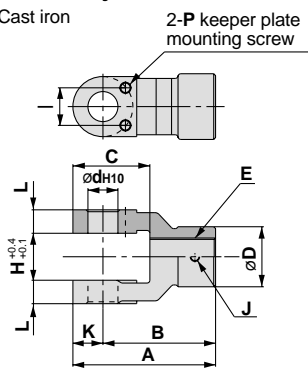
Material: Cast iron



Rod series	Part no.	Bore size (mm)	Dimensions (mm)									
			A	B	C	D	d	E	F	H	J	K
B-series	IH2-03B	32	76	60	25	32	16 ^{+0.07/0}	M16 x 1.5	26	25	M5 x 0.8	16
	IH2-04B	40	76	60	25	32	16 ^{+0.07/0}	M20 x 1.5	31	25	M5 x 0.8	16
	IH2-05B	50	90	70	30	40	20 ^{+0.084/0}	M24 x 1.5	36	31.5	M5 x 0.8	20
	IH2-06B	63	145	115	45	60	31.5 ^{+0.1/0}	M30 x 1.5	50	40	M6 x 1.0	30
	IH2-08B	80	145	115	45	60	31.5 ^{+0.1/0}	M39 x 1.5	61	40	M6 x 1.0	30
C-series	IH2-10B	100	185	145	57	79	40 ^{+0.1/0}	M48 x 1.5	76	50	M8 x 1.25	40
	IH2-03B	40	76	60	25	32	16 ^{+0.07/0}	M16 x 1.5	26	25	M5 x 0.8	16
	IH2-05C	50	90	70	30	40	20 ^{+0.084/0}	M20 x 1.5	31	31.5	M5 x 0.8	20
	IH2-06C	63	145	115	45	60	31.5 ^{+0.1/0}	M24 x 1.5	40	40	M6 x 1.0	30
	IH2-06B	80	145	115	45	60	31.5 ^{+0.1/0}	M30 x 1.5	50	40	M6 x 1.0	30
IH2-10C	100	185	145	57	79	40 ^{+0.1/0}	M39 x 1.5	63	50	M8 x 1.25	40	

Double knuckle joint

Material: Cast iron

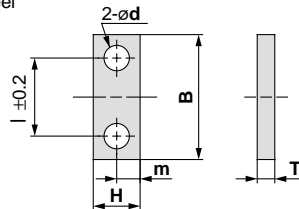


Rod series	Part no.	Bore size (mm)	Dimensions (mm)												
			A	B	C	D	d	E	H	J	K	L	/	P	
B-series	YH2-03B	32	76	60	41	32	16 ^{+0.07/0}	M16 x 1.5	25	M5 x 0.8	16	12.5	20	M6 x 1.0	
	YH2-04B	40	76	60	41	32	16 ^{+0.07/0}	M20 x 1.5	25	M5 x 0.8	16	12.5	20	M6 x 1.0	
	YH2-05B	50	90	70	50	40	20 ^{+0.084/0}	M24 x 1.5	31.5	M5 x 0.8	20	16	20	M6 x 1.0	
	YH2-06B	63	145	115	75	60	31.5 ^{+0.1/0}	M30 x 1.5	40	M6 x 1.0	30	20	24	M8 x 1.25	
	YH2-08B	80	145	115	75	60	31.5 ^{+0.1/0}	M39 x 1.5	40	M6 x 1.0	30	20	24	M8 x 1.25	
C-series	YH2-10B	100	185	145	95	80	40 ^{+0.1/0}	M48 x 1.5	50	M8 x 1.25	40	25	26	M10 x 1.5	
	YH2-03B	40	76	60	41	32	16 ^{+0.07/0}	M16 x 1.5	25	M5 x 0.8	16	12.5	20	M6 x 1.0	
	YH2-05C	50	90	70	50	40	20 ^{+0.084/0}	M20 x 1.5	31.5	M5 x 0.8	20	16	20	M6 x 1.0	
	YH2-06C	63	145	115	75	60	31.5 ^{+0.1/0}	M24 x 1.5	40	M6 x 1.0	30	20	24	M8 x 1.25	
	YH2-06B	80	145	115	75	60	31.5 ^{+0.1/0}	M30 x 1.5	40	M6 x 1.0	30	20	24	M8 x 1.25	
YH2-10C	100	185	145	95	80	40 ^{+0.1/0}	M39 x 1.5	50	M8 x 1.25	40	25	26	M10 x 1.5		

Note) The pin, keeper plate and cap bolt are included with a double knuckle joint.

Keeper plate

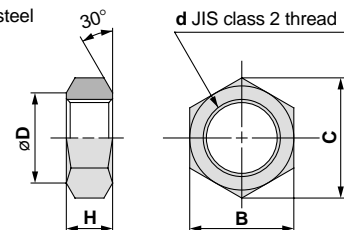
Material: Rolled steel



Part no.	Bore size (mm)	Dimensions (mm)							Cap bolt
		B	H	/	m	T	d		
KP-05	32, 40, 50	32	12	20 ^{±0.2}	6	4.5	6.5	M6 x 10/	
KP-08	63, 80	44	18	24 ^{±0.2}	9	4.5	9	M8 x 12/	
KP-10	100	44	22	26 ^{±0.2}	11	6	11.5	M10 x 14/	

Rod end nut

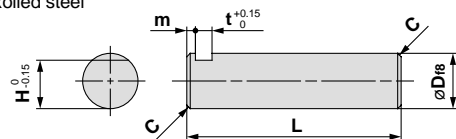
Material: Carbon steel



Rod series	Part no.	Bore size (mm)	Dimensions (mm)				
			B	C	D	H	d
B-series	NTH-040	32	22	25.4	21	10	M16 x 1.5
	NTH-050	40	27	31.2	26	12	M20 x 1.5
	NTH-060	50	32	37	31	14	M24 x 1.5
	NTH-080	63	41	47.3	40	17	M30 x 1.5
	NTH-100	80	55	63.5	54	20	M39 x 1.5
C-series	NTH-125	100	70	80.8	69	26	M48 x 1.5
	NTH-040	40	22	25.4	21	10	M16 x 1.5
	NTH-050	50	27	31.2	26	12	M20 x 1.5
	NTH-060	63	32	37	31	14	M24 x 1.5
	NTH-080	80	41	47.3	40	17	M30 x 1.5
NTH-100	100	55	63.5	54	20	M39 x 1.5	

Double clevis/Double knuckle pin

Material: Rolled steel



Part no.	Bore size (mm)	Dimensions (mm)						
		D ₁₈	C	L	m	T	d	
CDH-04	32, 40	16 ^{-0.016/-0.043}	1	62	2.5	4.8	14	
CDH-05	50	20 ^{-0.016/-0.043}	1	76.5	3.5	4.8	18	
CDH-08	63, 80	31.5 ^{-0.016/-0.043}	1.5	93	3.5	4.8	29	
CDH-10	100	40 ^{-0.016/-0.043}	2	117	6	6.3	35	

Series CH2E/CH2F/CH2G/CH2H Auto Switch Specifications

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

<Tie-rod mount type>

Reed switches

D-A5, D-A6

D-A59W

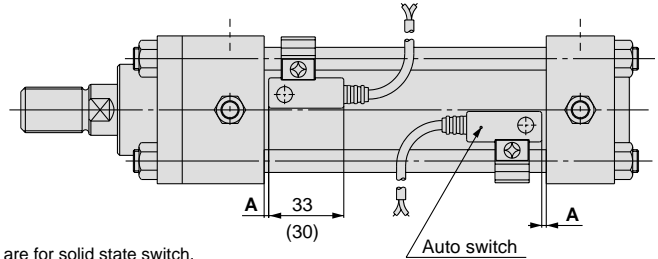
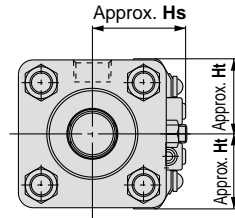
Solid state switches

D-F5□, D-J5□

D-F5NTL

D-F5□W, D-J59W

D-F5BAL, D-F59F



Dimensions inside () are for solid state switch.

<Band mount type>

Reed switches

D-B5, D-B6, D-B59W

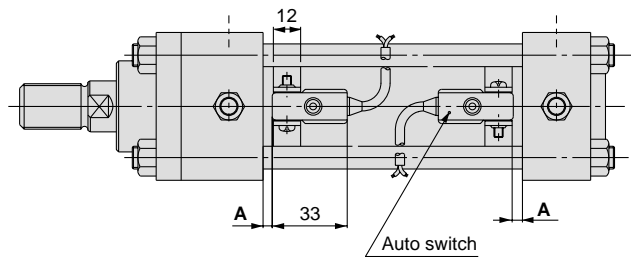
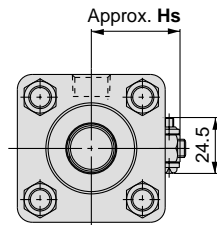
Solid state switches

D-G5□, D-K59

D-G5□W, D-K59W

D-G5BAL

D-G59F, D-G5NTL

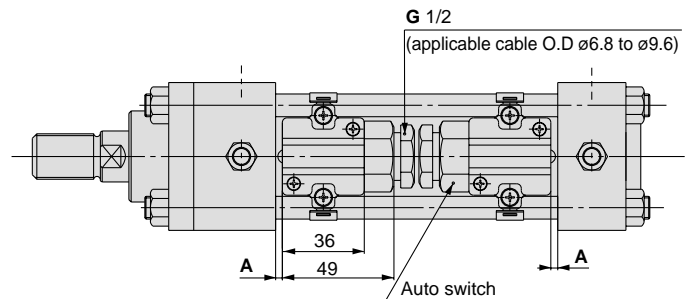
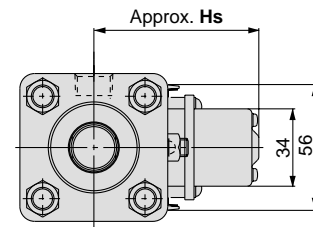


Reed switch

D-A3

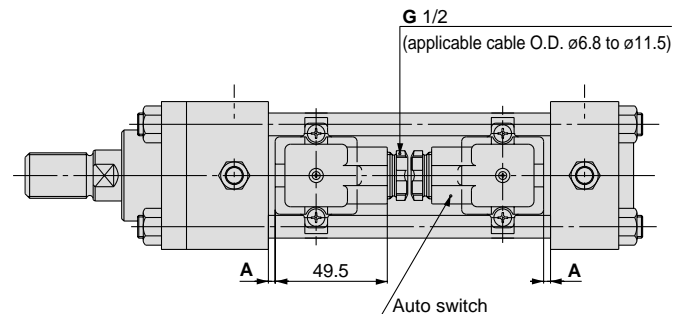
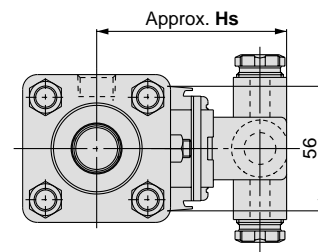
Solid state switches

D-G39, D-K39



Reed switch

D-A44



Auto switch mounting heights

Unit: mm

Bore size (mm)		D-A5, D-A6 D-A59W		D-F5□, D-J5□ D-F5□W, D-J59W D-F5BAL, D-F59F D-F5NTL		D-B5□, D-B6□ D-B59W D-G5□, D-K59 D-G5□W, D-K59W D-G5BAL D-G59F, D-G5NTL	D-A3 D-G39, D-K39	D-A44
		Hs	Ht	Hs	Ht	Hs	Hs	Hs
32	CH2E	35	29.5	35	29.5	33.5	—	—
	CH2F	34.5	30	34.5	30	32	—	—
	CH2H	34.5	29.5	34.5	29.5	32.5	—	—
40	CH2E	38.5	32.5	38.5	32.5	38	72.5	82.5
	CH2F	38	33.5	38	33.5	36.5	71	81
	CH2H	38	33	38	33	37	71.5	81.5
50	CH2E	43	36.5	42	36.5	43.5	78	88
	CH2F	41.5	36.5	41.5	36.5	41.5	76	86
	CH2H	42	36	42	36	42.5	77	87
63	CH2E	48.5	43	47	43	50.5	85	95
	CH2F	46.5	43	46.5	43	48.5	83	93
	CH2H	48.5	43	47	43	50.5	85	95
80	CH2E	58.5	55.5	57	55.5	59	93.5	103.5
	CH2F	56.5	55.5	56.5	55.5	57.5	92	102
	CH2H	59	55.5	57.5	55.5	59.5	94	104
100	CH2E	66.5	67	66.5	67	69.5	104	114
	CH2F	65.5	67	65.5	67	68	102.5	112.5
	CH2H	67.5	67	67.5	67	71	105.5	115.5

Proper auto switch mounting positions

Auto switch type Bore size (mm)	D-A5□, D-A6□ D-A3□, D-A44 D-G39□, D-K39□	D-A59W	D-F5□, D-J5□ D-F5□W, D-J59W D-F5BAL	D-F59F	D-F5NTL	D-G5□, D-K59 D-G5□W, D-K59W D-G5BAL, D-G5NTL	D-B5□, D-B64 D-G59F	D-B59W
	A	A	A	A	A	A	A	A
32	15 (Note)	19	21.5	25.5	26.5	17	15.5	18.5
40	16	20	22.5	26.5	27.5	18	16.5	19.5
50	16	20	22.5	26.5	27.5	18	16.5	19.5
63	19	23	25.5	29.5	30.5	21	19.5	22.5
80	23	27	29.5	33.5	34.5	25	23.5	26.5
100	26	30	32.5	36.5	37.5	28	26.5	29.5

Note) Auto switch models D-A3□, D-A44, D-G39□ and D-K39□ cannot be mounted on ø32 bore size cylinders.

Series CH2E/CH2F/CH2G/CH2H Made to Order Specifications

Contact SMC for detailed specifications, lead times, and prices.



1 Modification of Rod End Configuration

CH2 Series Mounting type Bore size Rod size series Stroke Cylinder options — X **A0**

Indicate the rod end configuration pattern symbol

<p>A1</p>	<p>A2</p>	<p>A3</p>								
<p>A4</p> <p>Note) Female thread effective depth should be no more than twice the thread diameter.</p>	<p>A5</p> <p>Note) Male thread effective length should be no more than 100mm.</p>	<p>A6</p> <p>Note) Male thread effective length should be no more than 100mm.</p>								
<p>A7</p> <p>Note) Male thread effective length should be no more than 100mm.</p>	<p>A0</p> <p>When the rod end configuration is the same as the standard type, and only the H dimension or MM dimension is changed, indicate the H dimension or MM dimension.</p>	<p>Note) Dimensions indicated with an asterisk (*) in the patterns A1, A3, A4 and A5 are provided in the table below.</p> <table border="1"> <thead> <tr> <th>Pattern</th> <th>Dimension for *</th> </tr> </thead> <tbody> <tr> <td>A1</td> <td rowspan="2">$\phi d - 2$</td> </tr> <tr> <td>A3</td> </tr> <tr> <td>A4</td> <td rowspan="2">$\phi D - 2$</td> </tr> <tr> <td>A5</td> </tr> </tbody> </table> <p>If dimensions other than the above are necessary, please indicate as such.</p> <p>* Please indicate the desired dimensions on the bold lines provided in the drawings.</p>	Pattern	Dimension for *	A1	$\phi d - 2$	A3	A4	$\phi D - 2$	A5
Pattern	Dimension for *									
A1	$\phi d - 2$									
A3										
A4	$\phi D - 2$									
A5										

JIS Standard Hydraulic Cylinder Double Acting/Double Rod

Series CH2EW/CH2FW

∅32, ∅40, ∅50, ∅63, ∅80, ∅100

3.5MPa
7 MPa

How to Order

Type: Double acting/Double Rod

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.

CH2 F W LA 50 B 100

With Auto Switch CHD2 F W LA 50 B 100 A53

With auto switch (built-in magnet)

Series type

Symbol	Tube material	Nominal pressure
E	Aluminum alloy	3.5MPa
F	Stainless steel	7MPa

Mounting types

B	Basic type
LA	Transaxial foot type
LB	Axial foot type
FA	Front rectangular flange type
FC	Front square flange type
TC	Center trunnion type

Cylinder options

Rod end nut	Nil	Without rod end nut
	A	With rod end nut
Cushion	Nil	With double side cushion
	N	Without cushion
	R	With front cushion
	H	With rear cushion

 * Indicate in alphabetical order.

Cylinder stroke (mm)
 Refer to the standard stroke table on page 78.
 Refer to page 79 for minimum strokes with auto switch.

Rod size series

B	B-series rod size
C	C-series rod size

Bore size

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

Port and cushion valve positions
 * Refer to page 78.

Part nos. for cylinders with built-in magnets
 In the case of cylinders with built-in magnets but no auto switches, do not indicate any auto switch type symbol.
 (Example) CHD2FWLA50-100□

Applicable Auto Switches: Refer to pages 115 to 119 for auto switch switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length (m)*			Applicable load									
					DC	AC	Tie-rod mount	Band mount	0.5 (Nil)	3 (L)	5 (Z)										
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5V	—	A56	—	●	●	—	IC circuit	—							
								A53	B53	●	●	●	—	PLC							
								A54	B54	●	●	●	—	Relay, PLC							
								A67	—	●	●	—	IC circuit	PLC							
								A64	B64	●	●	—	Relay, PLC								
								A33**	—	—	—	—	PLC								
Solid state switch	—	Grommet	Yes	2-wire	24V	5V, 12V	—	A59W	B59W	●	●	—	Relay PLC								
								F59	G59	●	●	○									
								F5P	G5P	●	●	○									
								J51	—	●	●	○									
								J59	K59	●	●	○									
								—	G39**	—	—	—		IC circuit							
								—	K39**	—	—	—		—							
								Diagnostic indication (2-color display)	Grommet	Yes	3-wire (NPN)	24V		5V, 12V	—	F59W	G59W	●	●	○	IC circuit
																F5PW	G5PW	●	●	○	
																J59W	K59W	●	●	○	
																F5BA	G5BA	—	●	○	
																F5NT	G5NT	—	●	○	
F59F	G59F	●	●	○	IC circuit																
Water resistant (2-color display)	Grommet	Yes	2-wire	24V	12V	—	—	—	—	—	—										
							—	—	—	—	—										
With timer	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	—	—	—	—	—										
							—	—	—	—	—										
With diagnostic output (2-color display)	Grommet	Yes	4-wire (NPN)	24V	5V, 12V	—	—	—	—	—	—										
							—	—	—	—	—										

* Lead wire length symbols: 0.5m Nil (Example) A53
 3m L A53L
 5m Z A53Z

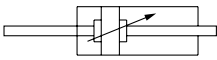
** Cannot be mounted on ∅32 bore size cylinders.
 Note) • The standard lead wire length is 0.5m. However, the standard length for G5NLT, G5BAL, F5NLT and F5BAL is 3m.
 • Solid state switches marked "○" are produced upon receipt of order.

JIS Standard Hydraulic Cylinder
Double Acting/Double Rod **Series CH2EW/CH2FW**



Pages 75 to 76

JIS symbol



Models

Model	CH2EW	CH2FW
Tube material	Aluminum alloy	Stainless steel
Nominal pressure	3.5MPa	7
Bore size	32, 40, 50, 63, 80, 100mm	
Auto switch mounting	Applicable	Applicable

Specifications

Model	CH2EW	CH2FW
Action	Double acting/Double rod	
Fluid	Hydraulic fluid	
Nominal pressure	3.5MPa	7MPa
Maximum allowable pressure	3.5MPa	B-rod: 13.5MPa C-rod: 11MPa
Proof pressure	5.0MPa	10.5MPa
Minimum operating pressure	0.3MPa	
Ambient and fluid temperature	Without auto switch: -10° to 80°C	
	With auto switch: -10° to 60°C	
Piston speed	8 to 300mm/s	
Cushion	Cushion seal type	
Rod end threads	Male threads	
Thread tolerance	JIS class 2	
Stroke length tolerance	to 100mm ^{+0.8} ₀ mm, 101 to 250mm ^{+1.0} ₀ mm, 251 to 630mm ^{+1.25} ₀ mm, 631 to 1000mm ^{+1.4} ₀ mm	

Note) Refer to page 136 for definitions of terms related to pressure.

Auto Switch mounting Bracket Part Nos.

Model	Bore size (mm)	Auto switch type			
		D-A3, D-A4 D-G3, D-K3	D-B5, D-B6 D-G5, D-K5	D-A5, D-A6 D-F5, D-J5	
CH2E	32	—	BA-32	BT-06	
	40	BD1-04M	BA-04	BT-06	
	50	BD1-05M	BA-05	BT-06	
	63	BD1-06M	BA-06	BT-08	
	80	BD1-08M	BA-08	BT-16	
	100	BD1-10M	BA-10	BT-18	
CH2F	32	—	BAF-32	BT-06	
	40	BDS-04M	BAF-04	BT-06	
	50	BDS-05M	BAF-05	BT-06	
	63	BDS-06M	BAF-06	BT-08	
	80	BDS-08M	BAF-08	BT-16	
	100	BDS-10M	BAF-10	BT-18	

Standard Strokes

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

Note) Refer to the stroke selection Table in Technical Data 2, starting with page 123 to determine stroke limitation depending on the type of mounting brackets that will be used. Then make your selection.

Port and Cushion Valve Positions

Symbol Position	Nil	A	C	D	E	F	G	H
Mounting type	Port: Top Cushion valve: Right	Port: Right Cushion valve: Bottom	Port: Left Cushion valve: Top	Port: Top Cushion valve: Left	Port: Top Cushion valve: Bottom	Port: Right Cushion valve: Top	Port: Right Cushion valve: Left	Port: Left Cushion valve: Right
B (Basic Type)								
FA, FB, FC, FD, FY, FZ (Flange type) CA, CB (Single clevis type) TC (Center trunnion type)								
LA, LB (Foot type)								

: Piping port : Cushion valve

* The cylinder's exterior dimensions represented here are as seen from the end rod of the cylinder.

Series CH2EW/CH2FW

Rod Sizes

(mm)

Bore size (mm) \ Rod size series*	32	40	50	63	80	100
B-series	18	22.4	28	35.5	45	56
C-series	—	18	22.4	28	35.5	45

* Based on JIS B8367.

Accessories (optional)

Refer to page 72.

Single knuckle, Double Knuckle
Lock nut, Knuckle pin

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.

Cushion Stroke

(mm)

Bore size (mm)	32	40	50	63	80	100
Effective cushion stroke	16	16	17	16	20	23

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

Same as double acting/single rod: Refer to page 74.

Weights

Unit: kg

Bore size (mm)	Mounting type \ Model	B	LA	FC	TC	LB	FA	Additional weight (per 10mm stroke)	
		Basic	Transaxial foot	Square flange	Center trunnion	Axial foot	Rectangular flange (7MPa)		
B-series rod	32	CH2E	2.94	3.93	3.79	3.43	3.44	3.38	0.04
		CH2F	2.93	3.92	3.78	3.42	3.43	3.37	0.04
	40	CH2E	3.82	5.12	4.91	4.41	4.40	4.41	0.08
		CH2F	3.79	5.09	4.88	4.38	4.37	4.38	0.08
	50	CH2E	6.37	8.97	8.33	7.21	7.17	7.45	0.09
		CH2F	6.27	8.87	8.23	7.11	7.07	7.35	0.10
	63	CH2E	9.75	13.63	12.65	11.29	11.37	11.36	0.17
		CH2F	9.16	13.04	12.06	10.70	10.78	10.77	0.17
	80	CH2E	15.00	20.35	19.59	17.02	17.36	17.69	0.24
		CH2F	14.36	19.71	18.95	16.38	16.72	17.05	0.26
	100	CH2E	21.82	32.63	29.29	25.47	25.24	26.42	0.41
		CH2F	21.26	32.06	28.73	24.91	24.68	25.86	0.46

Bore size (mm)	Mounting type \ Model	B	LA	FC	TC	LB	FA	Additional weight (per 10mm stroke)	
		Basic	Transaxial foot	Square flange	Center trunnion	Axial foot	Rectangular flange (7MPa)		
C-series rod	40	CH2E	3.74	5.04	4.83	4.33	4.32	4.33	0.07
		CH2F	3.71	5.01	4.80	4.30	4.29	4.30	0.07
	50	CH2E	6.21	8.81	8.17	7.05	7.01	7.29	0.07
		CH2F	6.11	8.71	8.07	6.95	6.91	7.19	0.08
	63	CH2E	9.44	13.32	12.34	10.98	11.06	11.05	0.14
		CH2F	8.86	12.74	11.76	10.40	10.48	10.47	0.14
	80	CH2E	14.56	19.91	19.15	16.58	16.92	17.25	0.18
		CH2F	13.92	19.27	18.51	15.94	16.28	16.61	0.21
	100	CH2E	20.76	31.57	28.23	24.41	24.18	25.36	0.29
		CH2F	20.20	31.01	27.67	23.85	23.62	24.80	0.30

Theoretical Output

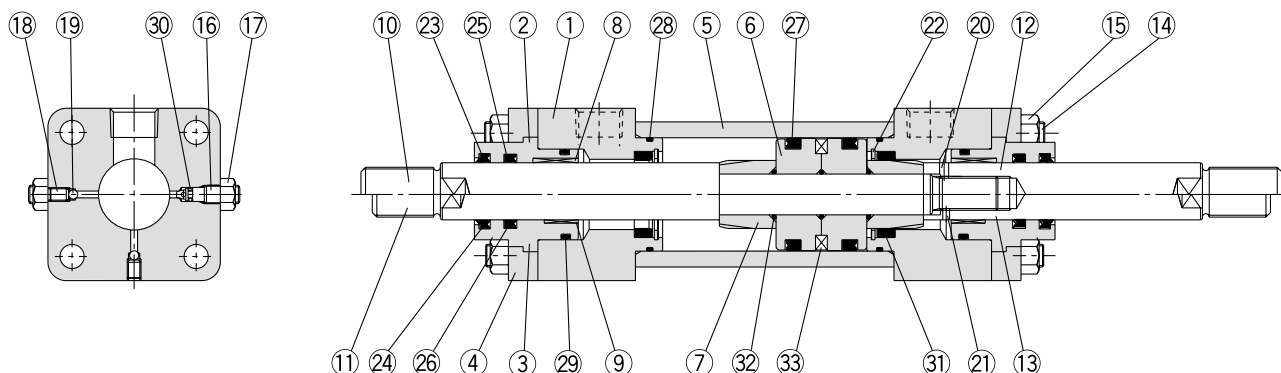
Unit: N

	Bore size (mm)	Rod size (mm)	Piston area (mm ²)	Nominal pressure (MPa)			
				1	3.5	5	7
B-series rod	32	18	550	550	1923	2748	3847
	40	22.4	862	862	3017	4311	6035
	50	28	1347	1347	4715	6735	9429
	63	35.5	2126	2126	7442	10632	14885
	80	45	3434	3434	12020	17172	24041
	100	56	5388	5388	18859	26941	37718
C-series rod	40	18	1002	1002	3506	5008	7012
	50	22.4	1569	1569	5490	7843	10980
	63	28	2500	2500	8751	12501	17502
	80	35.5	4035	4035	14121	20174	28243
	100	45	6260	6260	21911	31302	43823

Minimum Strokes for Auto Switch Mounting

Refer to the table for double acting/single rod on page 58.

Construction



Parts list

No.	Description	Material	Note
1	Rod cover	Carbon steel	
2	Seal holder (B-series rod)	Carbon steel	
3	Seal holder (C-series rod)	Carbon steel	
4	Retainer	Carbon steel	
5	Cylinder tube	CH2E Aluminum alloy	Hard anodized
		CH2F Stainless steel	
6	Piston	Aluminum alloy	
7	Cushion ring	Rolled steel	
8	Bushing (B-series rod)	Copper alloy	
9	Bushing (C-series rod)	Copper alloy	
10	Piston rod A (B-series rod)	Carbon steel	Hard chromium electroplated
11	Piston rod A (C-series rod)	Carbon steel	Hard chromium electroplated
12	Piston rod B (B-series rod)	Carbon steel	Hard chromium electroplated
13	Piston rod B (C-series rod)	Carbon steel	Hard chromium electroplated
14	Tie-rod	Carbon steel	
15	Tie-rod nut	Carbon steel	
16	Cushion valve	Alloy steel	
17	Lock nut	Carbon steel	
18	Air release valve	Alloy steel	
19	Check ball	Bearing steel	
20	Spring pin (B-series rod)	Carbon tool steel	
21	Spring pin (C-series rod)	Carbon tool steel	
22	Snap ring	Carbon tool steel	
23	Scraper (B-series rod)	NBR	
24	Scraper (C-series rod)	NBR	
25	Rod seal (B-series rod)	NBR	
26	Rod seal (C-series rod)	NBR	
27	Piston seal	NBR	
28	Cylinder tube gasket	NBR	
29	Holder gasket	NBR	
30	Cushion valve seal	NBR	
31	Cushion seal	-	
32	Gasket	NBR	
33	Magnet	-	

Replacement parts: Seal kits

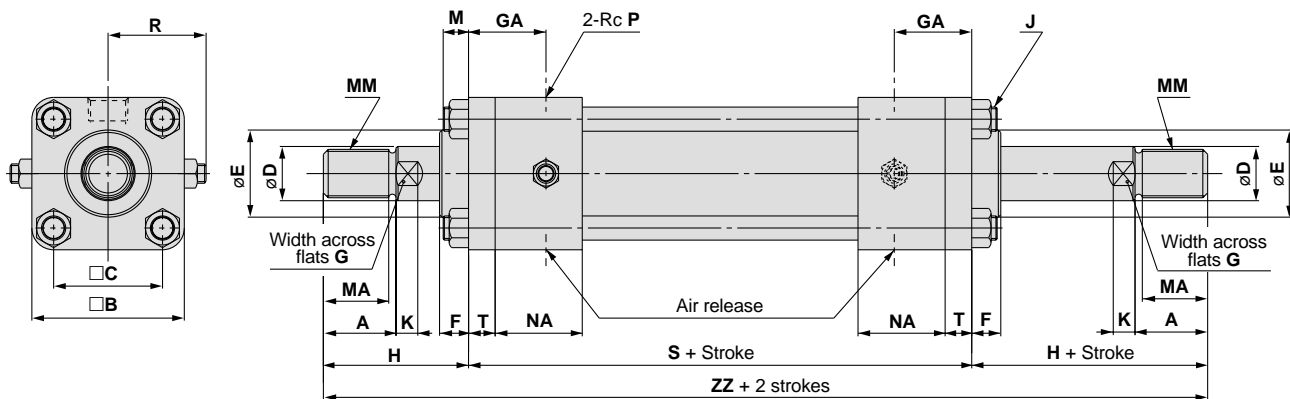
Bore size (mm)	Seal kit no.		Kit components
	B-series rod	C-series rod	
32	CH2EW32B-PS CH2FW32B-PS	CH2EW32C-PS CH2FW32C-PS	Nos. 23 through 32 from the chart at left
40	CH2EW40B-PS CH2FW40B-PS	CH2EW40C-PS CH2FW40C-PS	
50	CH2EW50B-PS CH2FW50B-PS	CH2EW50C-PS CH2FW50C-PS	
63	CH2EW63B-PS CH2FW63B-PS	CH2EW63C-PS CH2FW63C-PS	
80	CH2EW80B-PS CH2FW80B-PS	CH2EW80C-PS CH2FW80C-PS	
100	CH2EW100B-PS CH2FW100B-PS	CH2EW100C-PS CH2FW100C-PS	

* Seal kits consist of items 23 through 32 and can be ordered using the seal kit number for each bore size.

Series CH2EW/CH2FW

Dimensions

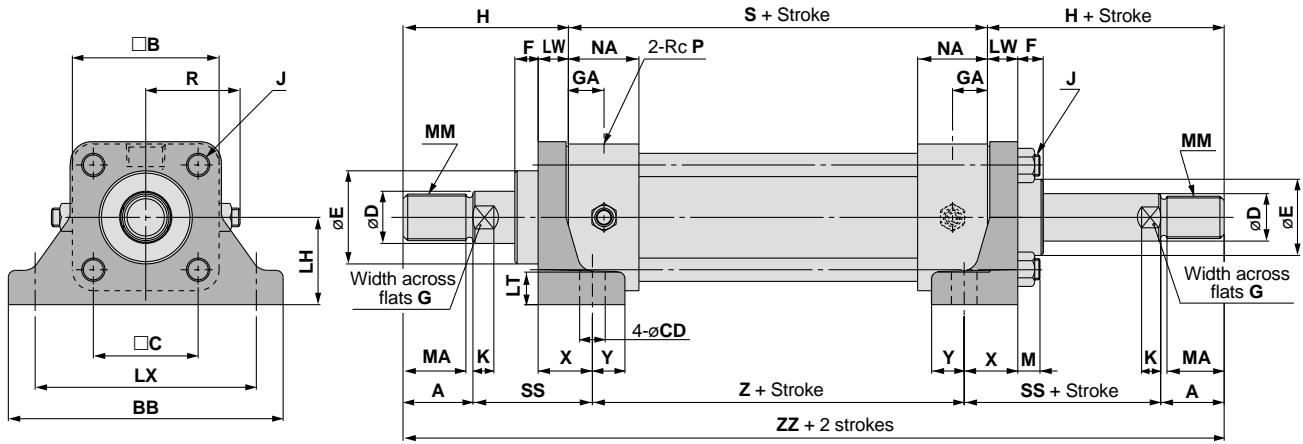
Basic type: CH2EWB, CH2FWB



Bore size (mm)	Stroke range (mm)	B	C	F	GA	J	M	NA	P	R	S	T
32	25 to 800	58	38	16	32	M10 x 1.25	11	37	3/8	39	158	11
40	25 to 800	65	45	12	32	M10 x 1.25	11	36	3/8	42	158	11
50	25 to 800	76	52	15	40	M10 x 1.25	11	43	1/2	46	176	13
63	25 to 800	90	63	15	42	M12 x 1.5	14	43	1/2	52	186	15
80	25 to 1000	110	80	17	40	M16 x 1.5	16	44	3/4	65	202	18
100	25 to 1000	135	102	19	42	M18 x 1.5	18	44	3/4	75	212	20

Bore size (mm)	B-series rod									C-series rod								
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ
32	M16 x 1.5	25	22	18	34	7	14	55	268	—	—	—	—	—	—	—	—	—
40	M20 x 1.5	30	27	22.4	40	9	19	60	278	M16 x 1.5	25	22	18	36	7	14	55	268
50	M24 x 1.5	35	32	28	46	11	24	65	306	M20 x 1.5	30	27	22.4	40	9	19	60	296
63	M30 x 1.5	45	42	35.5	55	13	30	80	346	M24 x 1.5	35	32	28	46	11	24	70	326
80	M39 x 1.5	60	57	45	65	15	41	95	392	M30 x 1.5	45	42	35.5	55	13	30	80	362
100	M48 x 1.5	75	72	56	80	16	50	115	442	M39 x 1.5	60	57	45	65	15	41	100	412

Transaxial foot type: CH2EWLA, CH2FWLA



(mm)

Bore size (mm)	Stroke range (mm)	BB	B	C	CD	F	GA	J	LH	LT	LW	LX	M	NA	P	R	S	SS	X	Y	Z		
32	25 to 800	109	58	38	11	14	21	M10 x 1.25	35	±0.15	14	13	88	11	37	3/8	39	136	57	29	14	104	
40	25 to 800	118	65	45	11	10	21	M10 x 1.25	37.5		14	13	95	±0.18	11	36	3/8	42	136	57	29	14	104
50	25 to 800	145	76	52	14	10	27	M10 x 1.25	45		17	18	115	11	43	1/2	46	150	60	35	18	116	
63	25 to 800	165	90	63	18	10	27	M12 x 1.5	50	±0.20	19	20	132	14	43	1/2	52	156	71	41	19	114	
80	25 to 1000	190	110	80	18	11	22	M16 x 1.5	60		24	24	155	±0.23	16	44	3/4	65	166	74	45	20	124
100	25 to 1000	230	135	102	22	11	22	M18 x 1.5	71		27	28	190	18	44	3/4	75	172	85	53	22	122	

Rod series

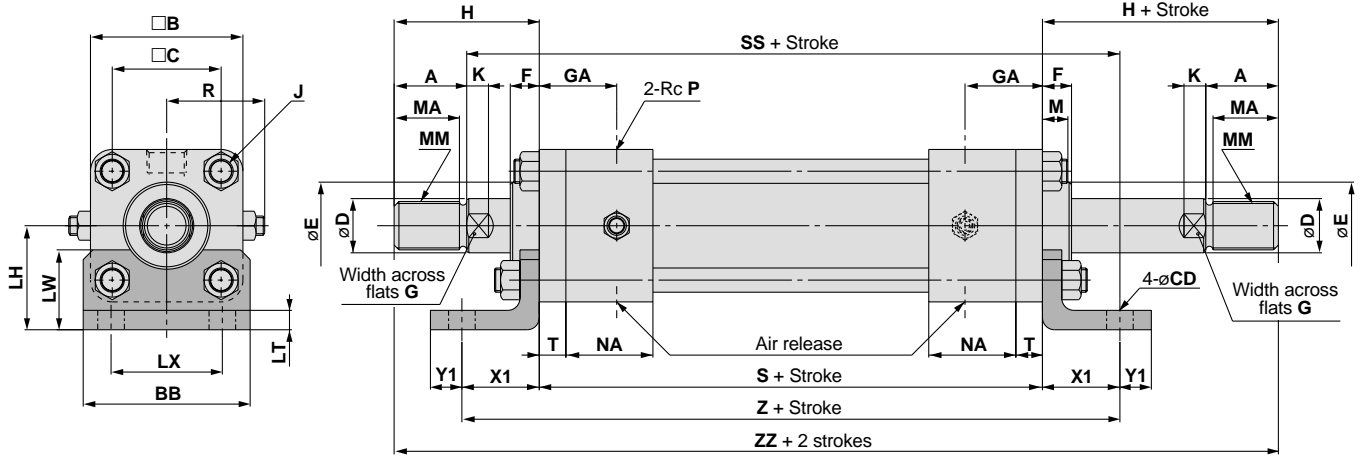
(mm)

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	66	268	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	-0.025 -0.064	9	19	71	278	M16 x 1.5	25	22	18	36	-0.025 -0.064	7	14	66	268
50	M24 x 1.5	35	32	28	46		11	24	78	306	M20 x 1.5	30	27	22.4	40		9	19	73	296
63	M30 x 1.5	45	42	35.5	55	-0.030 -0.076	13	30	95	346	M24 x 1.5	35	32	28	46	-0.030 -0.076	11	24	85	326
80	M39 x 1.5	60	57	45	65		15	41	113	392	M30 x 1.5	45	42	35.5	55		13	30	98	362
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	135	442	M39 x 1.5	60	57	45	65	-0.036 -0.090	15	41	120	412

Series CH2EW/CH2FW

Dimensions

Axial foot type: CH2EWLB, CH2FWLB



(mm)

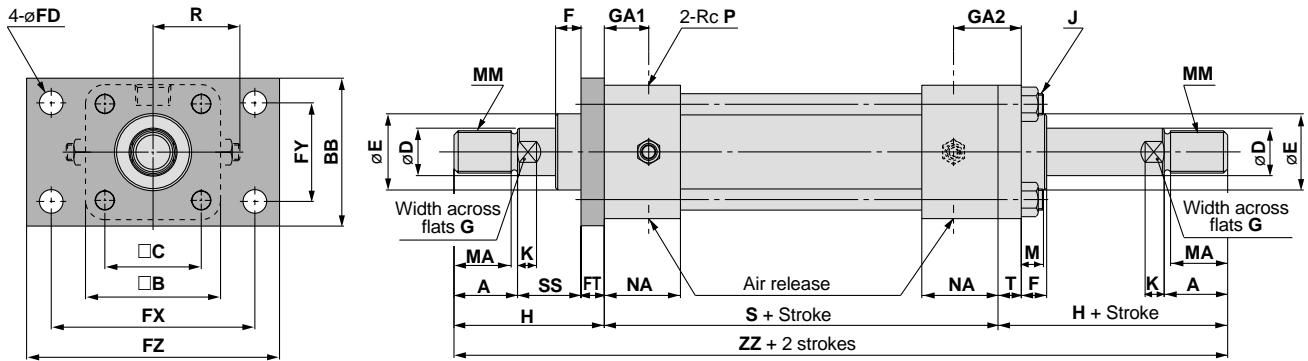
Bore size (mm)	Stroke range (mm)	BB	B	C	CD	F	GA	J	LH	LT	LW	LX	M	NA	P	R	S	SS	T	X1	Y1	Z		
32	25 to 800	62	58	38	11	16	32	M10 x 1.25	40	±0.15	8	30	40	±0.13	11	37	3/8	39	158	220	11	32	13	222
40	25 to 800	69	65	45	11	12	32	M10 x 1.25	43		8	33	46		11	36	3/8	42	158	220	11	32	13	222
50	25 to 800	85	76	52	14	15	40	M10 x 1.25	50		8	37	58		11	43	1/2	46	176	241	13	35	15	246
63	25 to 800	98	90	63	18	15	42	M12 x 1.5	60	±0.15	10	45	65	±0.15	14	43	1/2	52	186	263	15	42	18	270
80	25 to 1000	118	110	80	18	17	40	M16 x 1.5	72		12	50	87		16	44	3/4	65	202	287	18	50	20	302
100	25 to 1000	150	135	102	22	19	42	M18 x 1.5	85		±0.25	12	55		109	±0.18	18	44	3/4	75	212	307	20	55

Rod series

(mm)

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	268	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40					-0.025	9	19	60	278	M16 x 1.5	25	22	18	36	7
50	M24 x 1.5	35	32	28	46	-0.064	11	24	65	306	M20 x 1.5	30	27	22.4	40	9	19	60	296	
63	M30 x 1.5	45	42	35.5	55	-0.030	13	30	80	346	M24 x 1.5	35	32	28	46	11	24	70	326	
80	M39 x 1.5	60	57	45	65	-0.076	15	41	95	392	M30 x 1.5	45	42	35.5	55	13	30	80	362	
100	M48 x 1.5	75	72	56	80	-0.036 -0.090	16	50	115	442	M39 x 1.5	60	57	45	65	-0.076	15	41	100	412

Front rectangular flange type: CH2EWFA, CH2FWFA



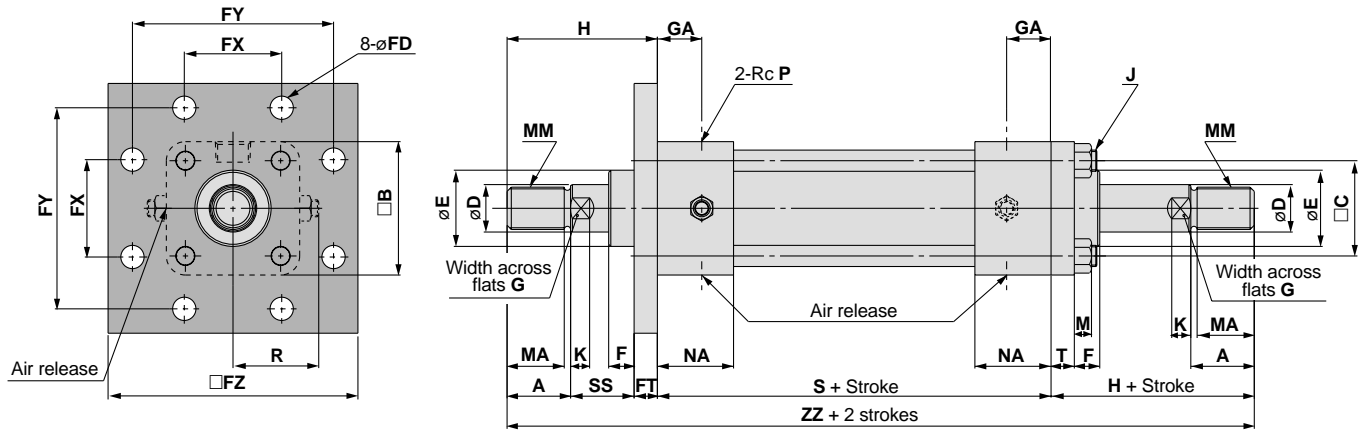
Bore size (mm)	Stroke range (mm)	BB	B	C	F	FD	FT	FX		FY		FZ	GA1	GA2	J	M	NA	P	R	S	SS	T
								88	±0.18	40	±0.13											
32	25 to 800	62	58	38	16	11	11	88	±0.18	40	±0.13	109	21	32	M10 x 1.25	11	37	3/8	39	136	30	11
40	25 to 800	69	65	45	12	11	11	95	±0.18	46	±0.13	118	21	32	M10 x 1.25	11	36	3/8	42	136	30	11
50	25 to 800	85	76	52	15	14	13	115	±0.2	58	±0.15	145	27	40	M10 x 1.25	11	43	1/2	46	150	30	13
63	25 to 800	98	90	63	15	18	15	132	±0.2	65	±0.15	165	27	42	M12 x 1.5	14	43	1/2	52	156	35	15
80	25 to 1000	118	110	80	17	18	18	155	±0.3	87	±0.18	190	22	40	M16 x 1.5	16	44	3/4	65	166	35	18
100	25 to 1000	150	135	102	19	22	20	190	±0.23	109	±0.18	230	22	42	M18 x 1.5	18	44	3/4	75	172	40	20

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	66	268	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	9	19	71	278	M16 x 1.5	25	22	18	36	7	14	66	268		
50	M24 x 1.5	35	32	28	46	11	24	78	306	M20 x 1.5	30	27	22.4	40	9	19	73	296		
63	M30 x 1.5	45	42	35.5	55	13	30	95	346	M24 x 1.5	35	32	28	46	11	24	85	326		
80	M39 x 1.5	60	57	45	65	15	41	113	392	M30 x 1.5	45	42	35.5	55	13	30	98	362		
100	M48 x 1.5	75	72	56	80	16	50	135	442	M39 x 1.5	60	57	45	65	15	41	120	412		

Series CH2EW/CH2FW

Dimensions

Square flange type: CH2EWFC, CH2FWFC

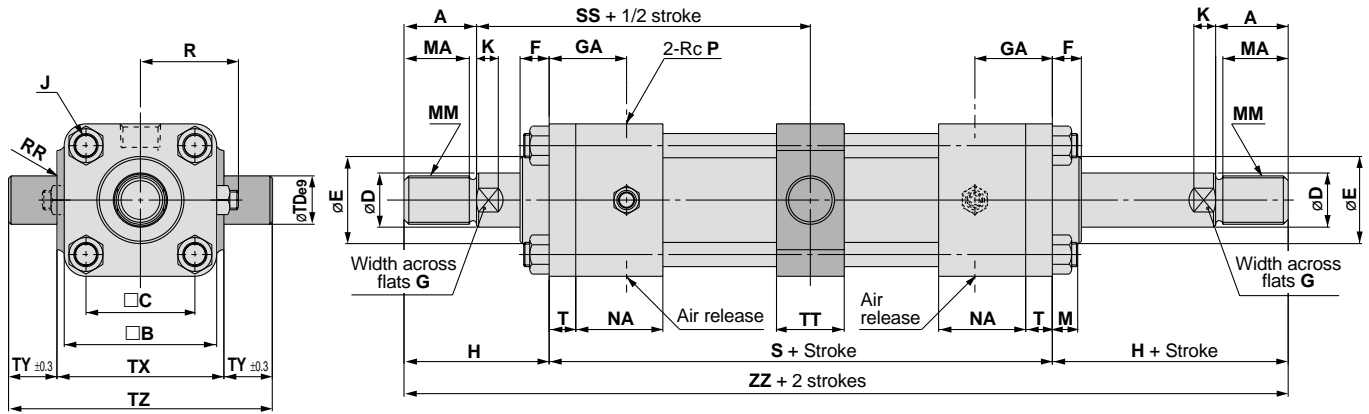


Bore size (mm)	Stroke range (mm)	B	C	F	FD	FT	FX		FY		FZ	GA	J	M	NA	P	R	S	SS	T
							±0.2	±0.13	±0.18	±0.2										
32	25 to 800	58	38	16	11	11	40	88	88	109	21	M10 x 1.25	11	37	3/8	39	136	30	11	
40	25 to 800	65	45	12	11	11	46	95	95	118	21	M10 x 1.25	11	36	3/8	42	136	30	11	
50	25 to 800	76	52	15	14	13	58	115	115	145	27	M10 x 1.25	11	43	1/2	46	150	30	13	
63	25 to 800	90	63	15	18	15	65	132	132	165	27	M12 x 1.5	14	43	1/2	52	156	35	15	
80	25 to 1000	110	80	17	18	18	87	155	155	190	22	M16 x 1.5	16	44	3/4	65	166	35	18	
100	25 to 1000	135	102	19	22	20	109	190	190	230	22	M18 x 1.5	18	44	3/4	75	172	40	20	

Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	66	268	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	9	19	71	278	M16 x 1.5	25	22	18	36	7	14	66	268		
50	M24 x 1.5	35	32	28	46	11	24	78	306	M20 x 1.5	30	27	22.4	40	9	19	73	296		
63	M30 x 1.5	45	42	35.5	55	13	30	95	346	M24 x 1.5	35	32	28	46	11	24	85	326		
80	M39 x 1.5	60	57	45	65	15	41	113	392	M30 x 1.5	45	42	35.5	55	13	30	98	362		
100	M48 x 1.5	75	72	56	80	16	50	135	442	M39 x 1.5	60	57	45	65	15	41	120	412		

Center trunnion type: CH2EWTC, CH2FWTC



Bore size (mm)	Stroke range (mm)	B	C	F	GA	J	M	NA	P	R	RR	S	SS	T	TD _{e9}	TT	TX	TY	TZ		
																				TD _{e9}	TX
32	25 to 800	58	38	16	32	M10 x 1.25	11	37	3/8	39	2	158	113	11	20	-0.040	28	58	0	20	98
40	25 to 800	65	45	12	32	M10 x 1.25	11	36	3/8	42	2	158	113	11	20	-0.092	28	69	-0.3	20	109
50	25 to 800	76	52	15	40	M10 x 1.25	11	43	1/2	46	2.5	176	121	13	25	-0.050	33	85	0	25	135
63	25 to 800	90	63	15	42	M12 x 1.5	14	43	1/2	52	2.5	186	132	15	31.5	-0.112	43	98	-0.35	31.5	161
80	25 to 1000	110	80	17	40	M16 x 1.5	16	44	3/4	65	2.5	202	146	18	31.5	-0.112	43	118	-0.35	31.5	181
100	25 to 1000	135	102	19	42	M18 x 1.5	18	44	3/4	75	3	212	156	20	40	-0.112	53	145	0	40	225

Rod series

Bore size (mm)	B-series rod										C-series rod									
	MM	A	MA	D	E	K	G	H	ZZ	MM	A	MA	D	E	K	G	H	ZZ		
32	M16 x 1.5	25	22	18	34	7	14	55	268	—	—	—	—	—	—	—	—	—		
40	M20 x 1.5	30	27	22.4	40	9	19	60	278	M16 x 1.5	25	22	18	36	7	14	55	268		
50	M24 x 1.5	35	32	28	46	11	24	65	306	M20 x 1.5	30	27	22.4	40	9	19	60	296		
63	M30 x 1.5	45	42	35.5	55	13	30	80	346	M24 x 1.5	35	32	28	46	11	24	70	326		
80	M39 x 1.5	60	57	45	65	15	41	95	392	M30 x 1.5	45	42	35.5	55	13	30	80	362		
100	M48 x 1.5	75	72	56	80	16	50	115	442	M39 x 1.5	60	57	45	65	15	41	100	412		

• **Light aluminum body**

• **Easy position detection with auto switches**

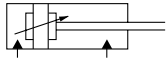
Aluminum cylinder sizes ø40 to ø100 are auto switch capable for easy stroke position detection.

• **Smooth cushioning**

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



JIS symbol



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	3.5MPa
Proof pressure	5.0MPa
Maximum allowable pressure ^{Note 2)}	3.5MPa
Minimum operating pressure	0.25MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C
	With auto switch: -10° to 60°C
Piston speed	8 to 300mm/s
Cushion	Cushion seal ^{Note 1)}
Thread tolerance	JIS class 2
Stroke length tolerance	to 100mm $^{+0.8}_0$ mm, 100 to 250mm $^{+1.0}_0$ mm, 250 to 630mm $^{+1.25}_0$ mm 630 to 1000mm $^{+1.4}_0$ mm, 1000 to 1500mm $^{+1.8}_0$ mm
Mounting	Basic type (B), Axial foot type (L), Front flange type (F) Rear flange type (G), Single clevis type (C), Double clevis type (D), Center trunnion type (T), Front trunnion type (U)

Note 1) Insert type with the check mechanism.

Note 2) Refer to page 136 for definitions of terms related to pressure.

Auto Switch Mounting Bracket Part Nos.

Bore size (mm)	Auto switch model		
	D-A3, D-A44 D-G39, D-K39	D-B5, D-B6	D-A5, D-A6, D-A59W, D-F5□, D-J5□ D-F5□W, D-J59W, D-F5NT, D-F5BA, D-F5□F
40	BD1-04M	BA-04	BT-04
50	BD1-05M	BA-05	BT-06
63	BD1-06M	—	BT-06
80	BD1-08M	BA-08	BT-08
100	BD1-10M	BA-10	BT-08

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 the stroke selection Table in Technical Data 2, starting with page 123 to determine stroke limitation depending on the type of mounting brackets that will be used. Then make your selection.

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

Cushion Strokes (for Front & Rear)

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

Accessories (Optional)

Knuckle bracket, Single knuckle Double knuckle, Bracket pin Knuckle pin Rod boot* (Nylon tarpaulin) (Neoprene cloth)

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

Series CHA

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 and ø50	ø63	ø80	ø100
D-A5, D-A6 D-F5□, D-J5□	1 or 2 pcs. (different sides/same side)	10	100	100	110	120
	"n" pcs. (same side)	$10 + 55 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$110 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
D-A59W	2 pcs. (different sides/same side)	20	100	100	110	120
	"n" pcs. (same side)	$20 + 55 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$110 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
	1 pc.	15	100	100	110	120
D-F5□W, D-J59W D-F5BA D-F5□F D-F5NT	1 or 2 pcs. (different sides/same side)	15	120	120	130	140
	"n" pcs. (same side)	$15 + 55 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$130 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$140 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
D-B5, D-B6	2 pcs.	Different sides	15	90	—	120
		Same side	75	90	—	120
	"n" pcs.	Different sides	$15 + 50 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$90 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	—	$120 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
		Same side	$75 + 50 (n-2)$ n = 2, 3, 4 ...	$90 + 50 (n-2)$ n = 2, 4, 6, 8 ...	—	$120 + 5 (n-2)$ n = 2, 4, 6, 8 ...
	1 pc.	10	90	—	120	
D-B59W	2 pcs.	Different sides	20	90	—	120
		Same side	75	90	—	120
	"n" pcs.	Different sides	$20 + 50 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$90 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	—	$120 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
		Same side	$75 + 50 (n-2)$ n = 2, 3, 4 ...	$90 + 50 (n-2)$ n = 2, 4, 6 ...	—	$120 + 5 (n-2)$ n = 2, 4, 6, 8 ...
	1 pc.	15	90	—	120	
D-A3 D-G39 D-K39	2 pcs.	Different sides	35	75	80	90
		Same side	100			
	"n" pcs.	Different sides	$35 + 30 (n-2)$ 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 side	$100 + 100 (n-2)$ n = 2, 3, 4 ...	$100 + 100 (n-2)$ n = 4, 6, 8 ...		
	1 pc.	10	75	80	90	
D-A44	2 pcs.	Different sides	35	75	80	90
		Same side	55	75	80	90
	"n" pcs.	Different sides	$35 + 30 (n-2)$ 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 side	$55 + 50 (n-2)$ n = 2, 3, 4 ...	$75 + 50 (n-2)$ n = 2, 4, 6, 8 ...	$80 + 50 (n-2)$ n = 4, 6, 8 ...	$90 + 50 (n-2)$ n = 2, 4, 6, 8 ...
	1 pc.	10	75	80	90	

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

Weights

Series CHA (built-in magnet)

Unit: kg

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

Calculation (Example) CHAL50-100

- Basic weight 2.9 (foot type, ø50)
- Additional weight 0.07/10mm stroke
- Cylinder stroke 100mm

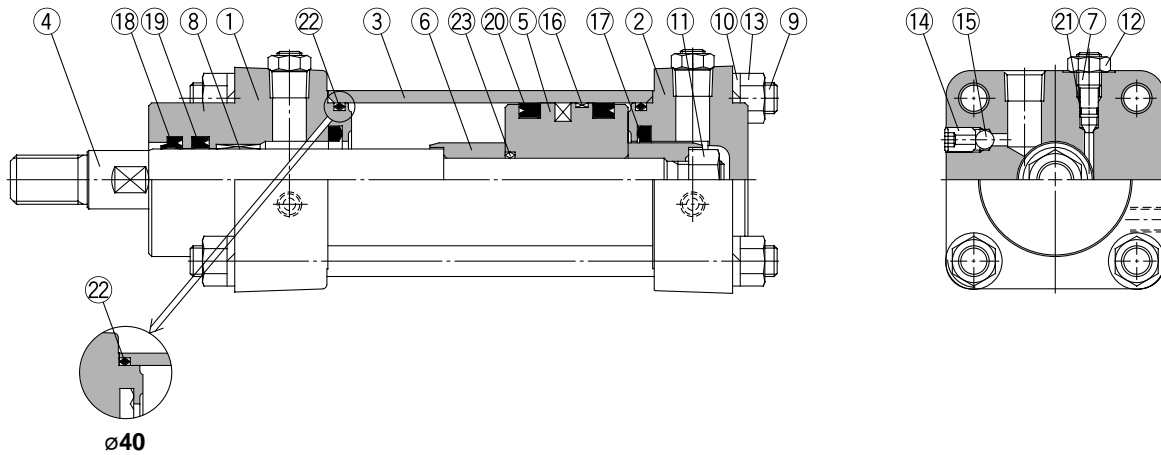
$$2.9 + 0.07 \times 100/10 = 3.6\text{kg}$$

Series CHA□F (steel tube)

Unit: kg

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

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	

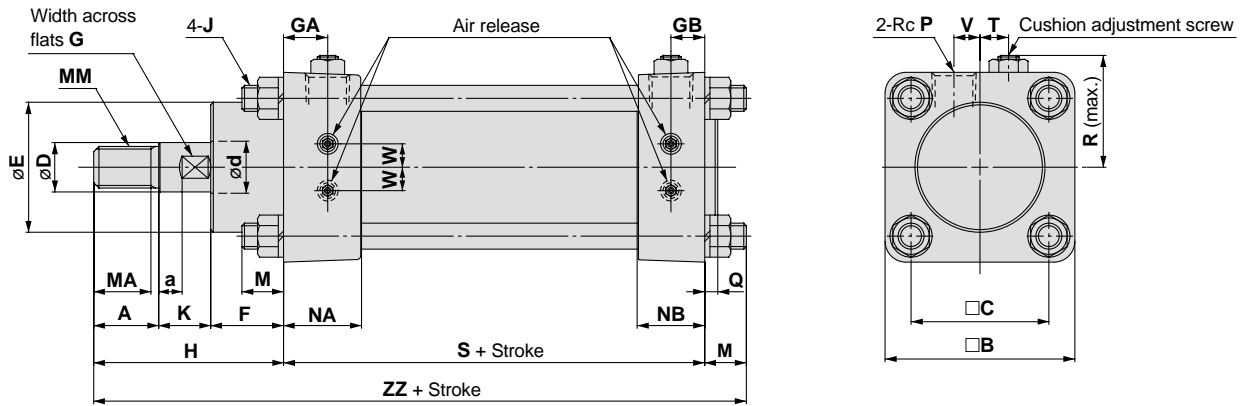
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.	Kit components
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	

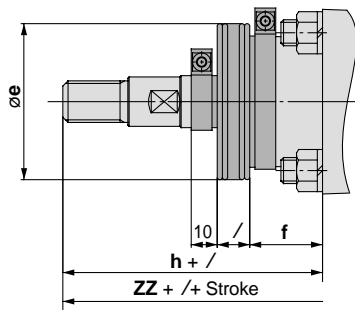
* Seal kits consist of items 17 through 22 and can be ordered using the seal kit number for each bore size.

Dimensions

Basic type: CHAB



With rod boot



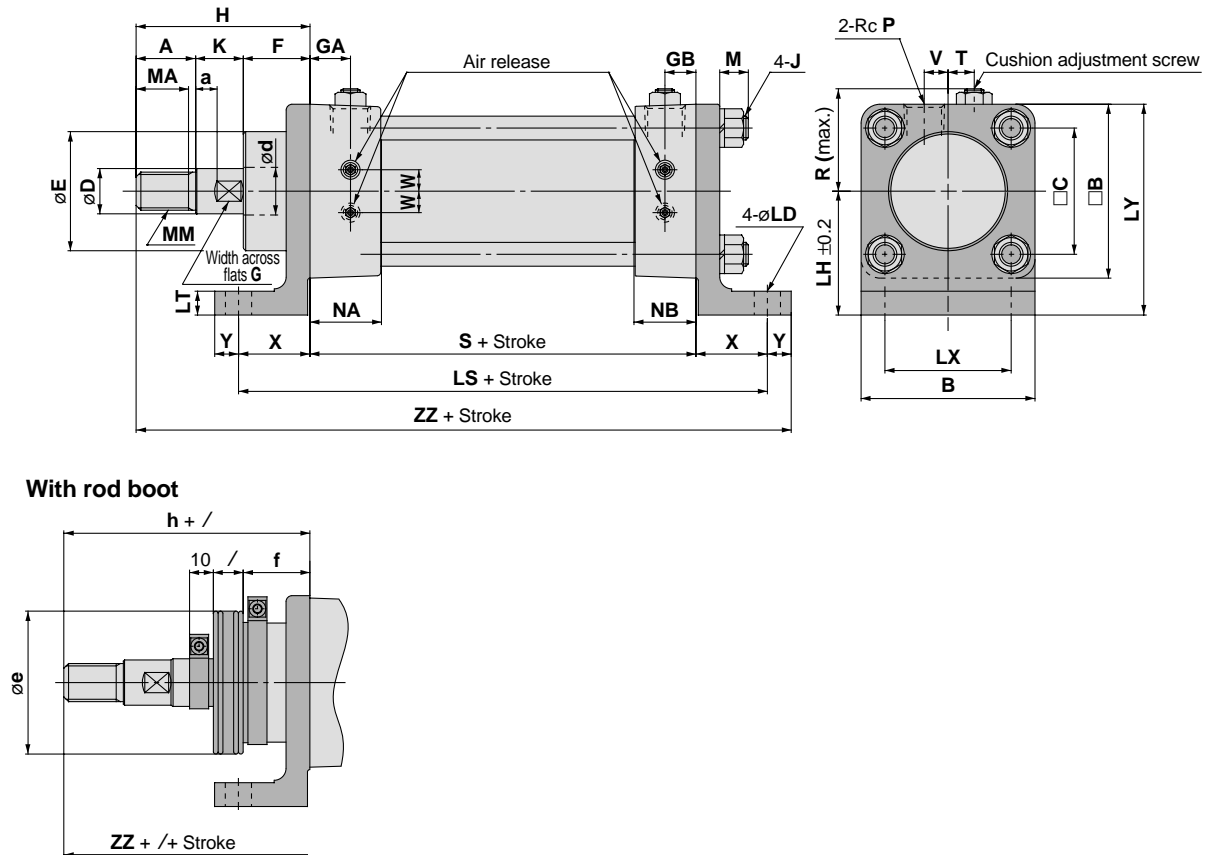
Bore size (mm)	(mm)																								
	A	a	B	C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	Q	R	S	T	V	W
40	23	10	60	44	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	14	17.5	9.5	M8 x 1.25	18	13	20	M14 x 1.5	30	22	1/4	5	37	106	11	7.5	8
50	25	9	73	53	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	28	17	17	13	M10 x 1.5	20	16	22	M16 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

Bore size (mm)	(mm)						
	Without rod boot		With rod boot				
	H	ZZ	e	f	h	/	Z
40	66	185	55	25	92		211
50	73	201	60	28	99	1/4 stroke	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

Series CHA

Dimensions

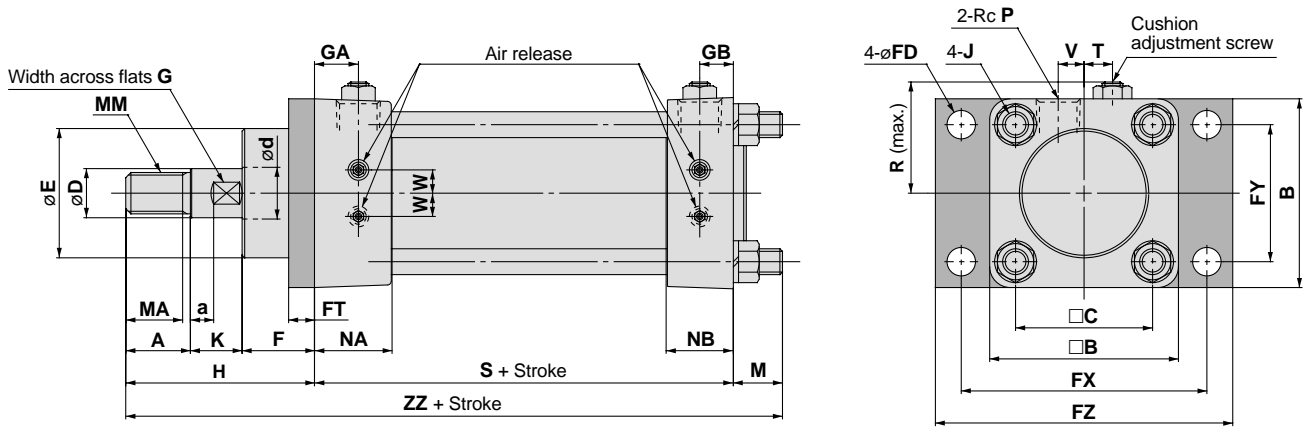
Foot type: CHAL



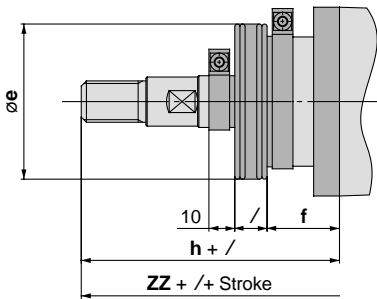
Bore size (mm)	(mm)																								
	A	a	B	□B	C	D	d	E	F	G	GA	GB	J	K	LD	LH	LS	LT	LX	LY	M	MA	MM	NA	NB
40	23	10	60	60	44	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	14	17.5	9.5	M8 x 1.25	18	9	47	160	8	44	77	10	20	M14 x 1.5	30	22
50	25	9	73	73	53	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	28	17	17	13	M10 x 1.5	20	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

Bore size (mm)	(mm)														
	P	R	S	T	V	W	X	Y	H	ZZ	e	f	h	/	ZZ
40	1/4	37	106	11	7.5	8	27	8	66	207	55	25	92	1/4 stroke	233
50	3/8	43	112	11	10	9	30	10	73	225	60	28	99		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	299	100	35	123	1/5 stroke	322
125	1/2	77	137	12	20	16	55	15	100	305	100	35	123		328
160	3/4	94	155	12	24	20	60	20	108	343	120	38	131		366

Front flange type: CHAF



With rod boot



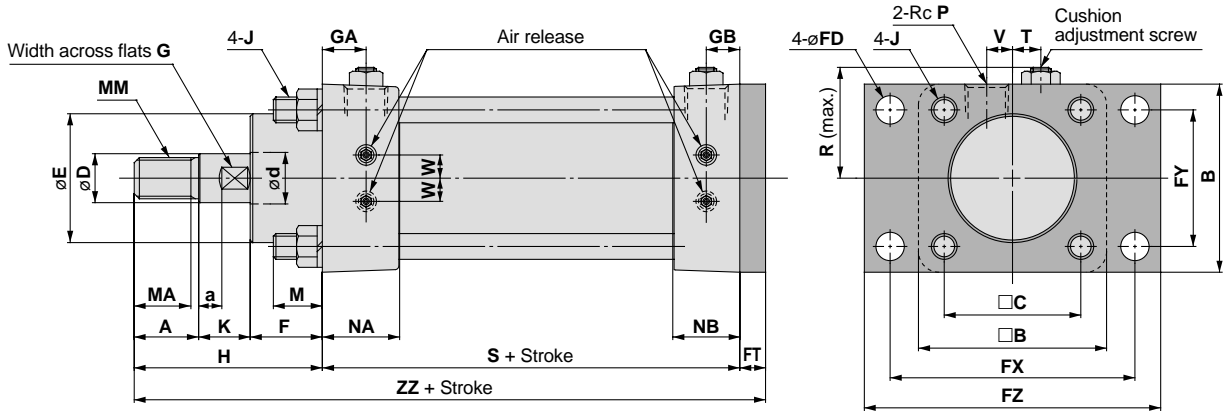
Bore size (mm)	A	a	B	□B	C	D	d	E	F	FD	FT	FX	FY	FZ	G	GA	GB	J	K	M	MA	MM	NA	NB	P
	40	23	10	60	60	44	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	9	10	77	44	95	14	17.5	9.5	M8 x 1.25	18	16	20	M14 x 1.5	30	22
50	25	9	73	73	53	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	28	11	10	95	53	115	17	17	13	M10 x 1.5	20	22	22	M16 x 1.5	30	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

Bore size (mm)						Without rod boot		With rod boot						
	R	S	T	V	W	H	ZZ	e	f	h	/	Z		
40	37	106	11	7.5	8	66	188	55	25	92		214		
50	43	112	11	10	9	73	207	60	28	99	1/4 stroke	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		

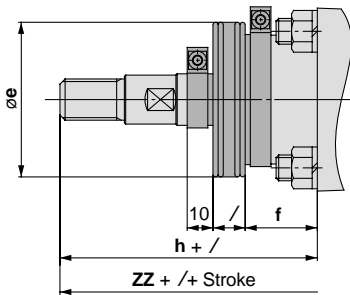
Series CHA

Dimensions

Rear flange type: CHAG



With rod boot

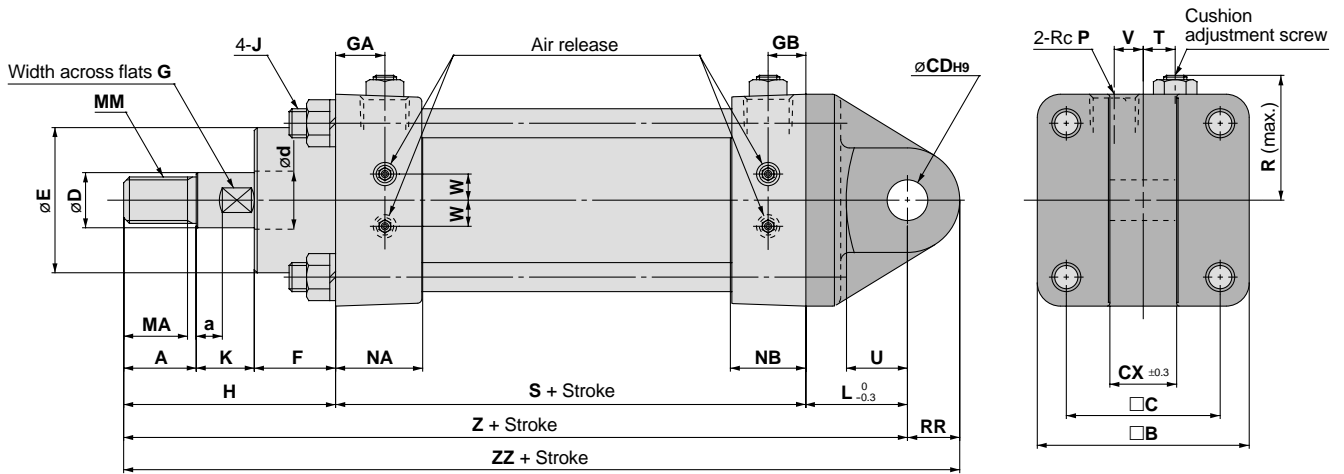


Bore size (mm)	(mm)																								
	A	a	B	C	D	d	E	F	FD	FT	FX	FY	FZ	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R
40	23	10	60	44	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	9	10	77	44	95	14	17.5	9.5	M8 x 1.25	18	16	20	M14 x 1.5	30	22	1/4	37
50	25	9	73	53	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	28	11	10	95	53	115	17	17	13	M10 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

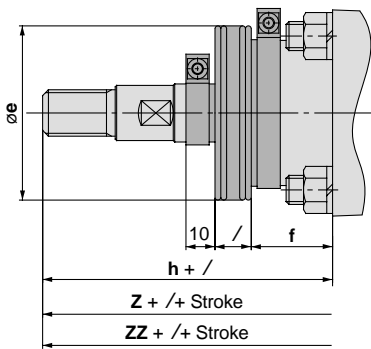
(mm)

Bore size (mm)	Without rod boot										With rod boot	
	S	T	V	W	H	ZZ	e	f	h	/	Z	
40	106	11	7.5	8	66	182	55	25	92		208	
50	112	11	10	9	73	195	60	28	99	1/4 stroke	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	

Single clevis type: CHAC



With rod boot



Bore size (mm)	(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

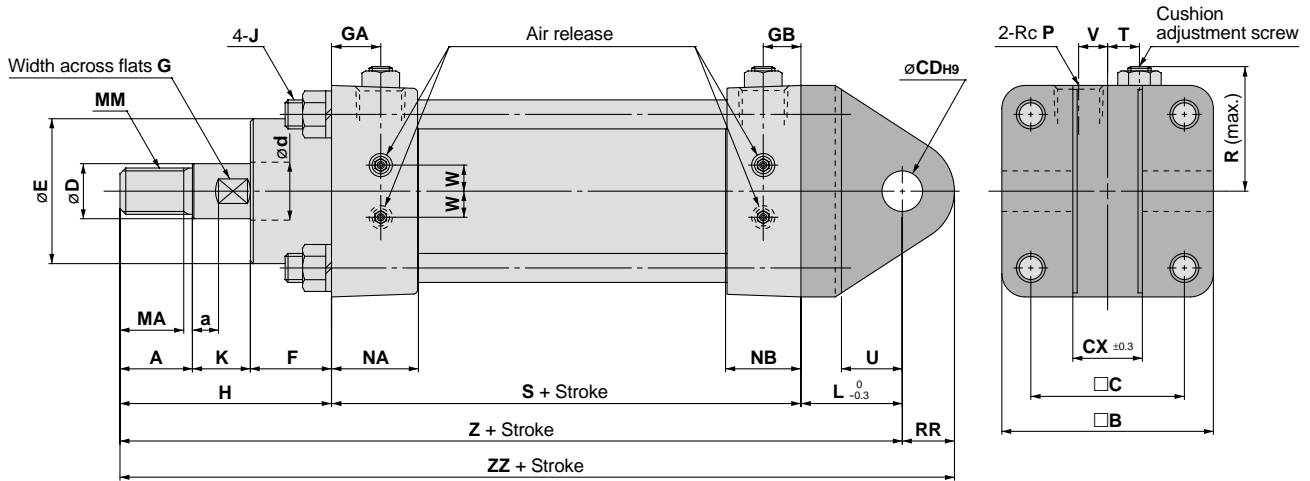
(mm)

Bore size (mm)	Without rod boot											With rod boot			
	T	U	V	W	H	Z	ZZ	e	f	h	/	Z	ZZ		
40	11	18	7.5	8	66	204	219	55	25	92		230	245		
50	11	21	10	9	73	220	238	60	28	99	1/4 stroke	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		

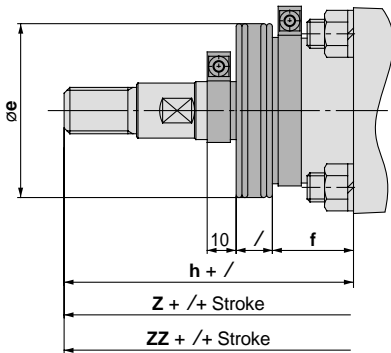
Series CHA

Dimensions

Double clevis type: CHAD



With rod boot

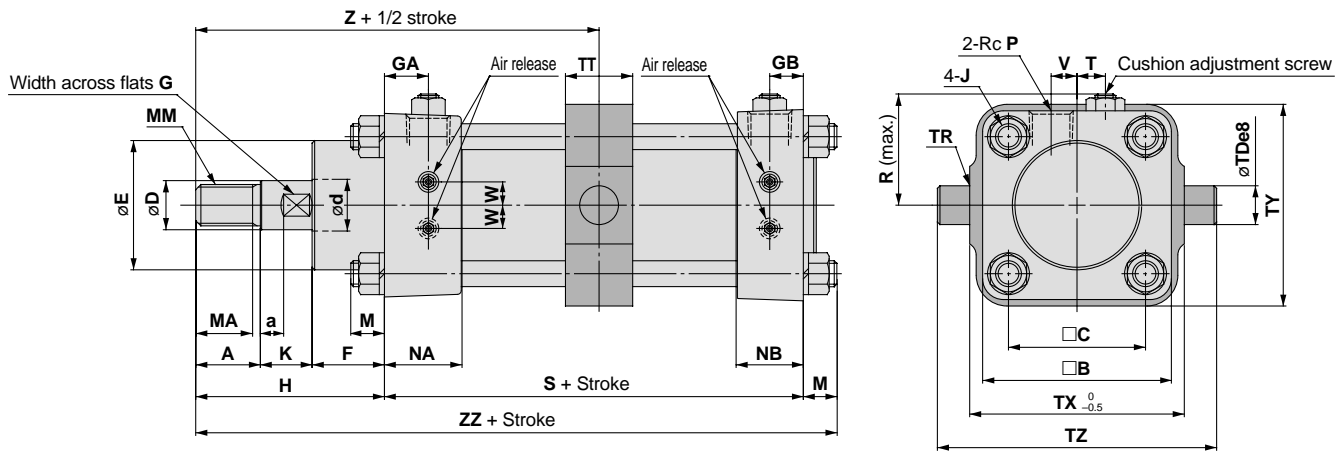


Bore size (mm)	(mm)																							
	A	a	B	C	CDH9	CX	D	d	E	F	G	GA	GB	J	K	L	MA	MM	NA	NB	P	R	RR	S
40	23	10	60	44	ø12H9 ^{+0.043} ₀	22	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	14	17.5	11	M8 x 1.25	18	32	20	M14 x 1.5	30	22	1/4	37	15	106
50	25	9	73	53	ø14H9 ^{+0.043} ₀	24	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	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

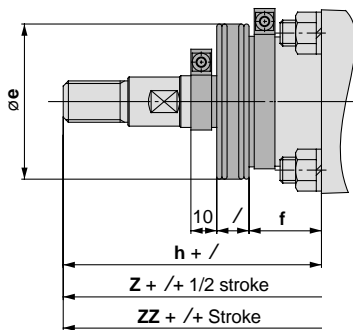
(mm)

Bore size (mm)	Without rod boot											With rod boot	
	T	U	V	W	H	Z	ZZ	e	f	h	/	Z	ZZ
40	11	18	7.5	8	66	204	219	55	25	92		230	245
50	11	21	10	9	73	220	238	60	28	99	1/4 stroke	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

Center trunnion type: CHAT



With rod boot



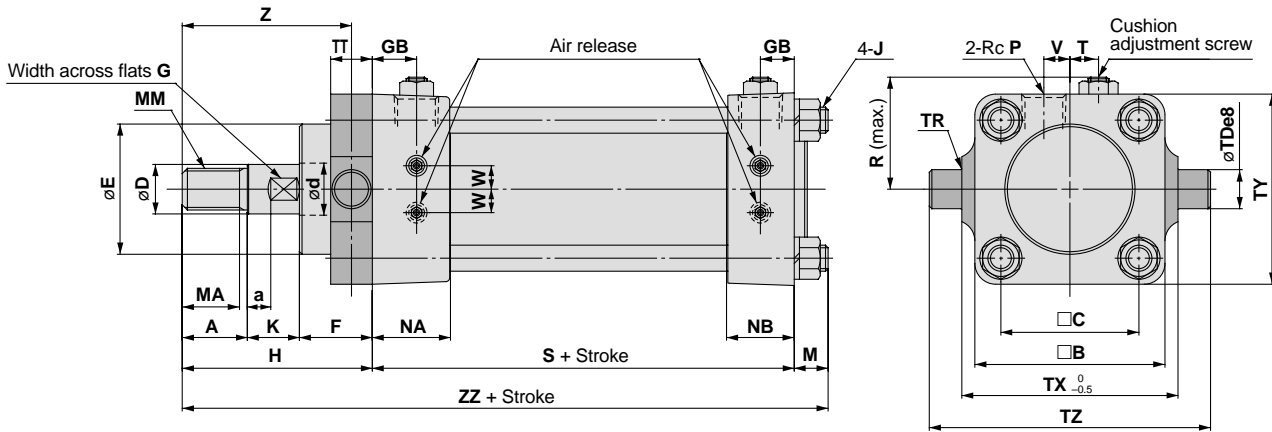
Bore size (mm)	(mm)																						
	A	a	B	C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R	S	T	Tde8
40	23	10	60	44	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	14	17.5	9.5	M8 x 1.25	18	10	20	M14 x 1.5	30	22	1/4	37	106	11	15 ^{-0.032} _{-0.059}
50	25	9	73	53	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	28	17	17	13	M10 x 1.5	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}

Bore size (mm)	(mm)															
	TR	TT	TX	TY	TZ	V	W	H	Z	ZZ	e	f	h	/	Z	ZZ
40	R0.5	24	70	65	95	7.5	8	66	123	182	55	25	92		149	208
50	R0.5	26	83	78	108	10	9	73	131	195	60	28	99	1/4 stroke	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		193	273
125	R2.5	42	170	162	234	20	16	100	170	252	100	35	123	1/5 stroke	193	275
160	R2.5	52	212	200	284	24	20	108	187.5	280	120	38	131		210.5	303

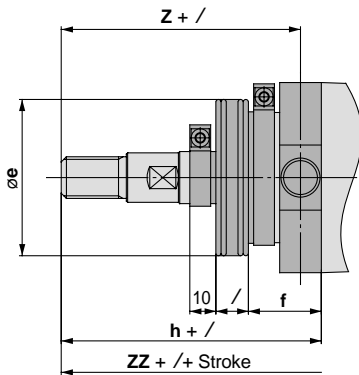
Series CHA

Dimensions

Front trunnion type: CHAU



With rod boot



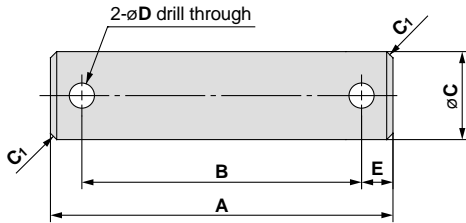
Bore size (mm)	(mm)																						
	A	a	B	C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R	S	T	Tde8
40	23	10	60	44	17 ⁰ _{-0.018}	18	45 ⁰ _{-0.062}	25	14	17.5	9.5	M8 x 1.25	18	10	20	M14 x 1.5	30	22	1/4	37	106	11	15 ^{-0.032} _{-0.059}
50	25	9	73	53	19 ⁰ _{-0.021}	20	50 ⁰ _{-0.062}	28	17	17	13	M10 x 1.5	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}

Bore size (mm)	(mm)																
	TR	TT	TX	TY	TZ	V	W	H	Z	ZZ	e	f	h	/	Z	ZZ	
40	R0.5	16	70	60	95	7.5	8	66	58	182	55	25	92		84	208	
50	R0.5	16	83	73	108	10	9	73	65	201	60	28	99	1/4 stroke	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		106	273	
125	R2.5	34	170	140	234	20	16	100	83	252	100	35	123	1/5 stroke	106	275	
160	R2.5	38	212	174	284	24	20	108	89	280	120	38	131		112	303	

Accessories (optional)

Bracket pin

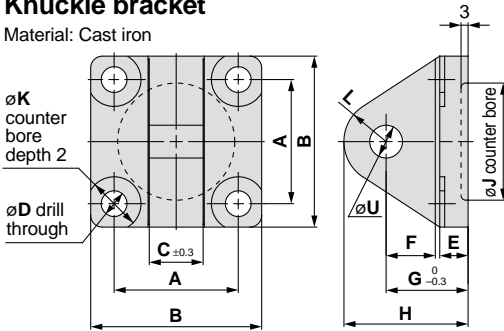
Material: Carbon steel



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

Knuckle bracket

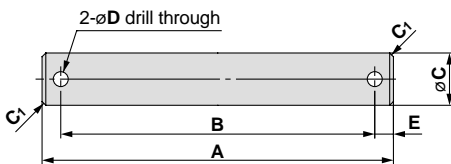
Material: Cast iron



Bore size (mm)	C (f8)											U (H8)		Hexagon mounting bolt	Applicable cylinder type	Order no.
	A	B	C	D	E	F	G	H	J	K	L	Size	Tolerance			
40	44	60	21	9	12	18	32	47	45	19	R 15	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	R 18	14	$+0.027$ 0	M10 x 22	ø50 double clevis type	
63	60	80	27	11	15	23	40	60	55	23	R 20	16	$+0.027$ 0	M10 x 25	ø63 double clevis type	
80	75	100	31	13	16	26	45	67	65	28	R 22	18	$+0.027$ 0	M12 x 28	ø80 double clevis type	
100	90	118	35	13	17	30	50	74	80	28	R 24	20	$+0.033$ 0	M12 x 32	ø100 double clevis type	
125	112	140	41	15	20	30	55	81	90	31	R 26	22	$+0.033$ 0	M14 x 36	ø125 double clevis type	
160	140	174	54	17	22	40	65	95	100	34	R 30	25	$+0.033$ 0	M16 x 40	ø160 double clevis type	

Knuckle pin

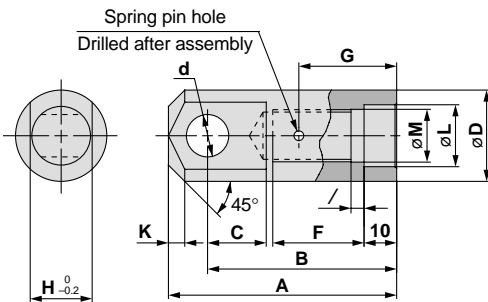
Material: Carbon steel



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

Knuckle

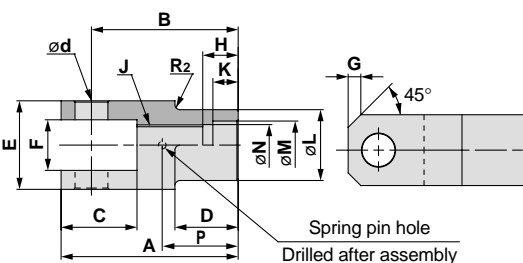
Material: Carbon steel



Bore size (mm)	C (f8)				d (H8)				L (F8)				Spring pin	Applicable cylinder type	Order no.		
	A	B	C	D	Size	Tolerance	E	F	Reference G	H	K	Size				Tolerance	M
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
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)	C (f8)				d (H8)				F				M				Spring pin	Applicable cylinder type	Order no.
	A	B	C	D	Size	Tolerance	E	Size	Tolerance	G	H	J	K	L	Tolerance	N			
40	67	55	27	29	13	$+0.027$ 0	32	18	$+0.2$ 0	4	14	M14 x 1.5	10	25	$+0.043$ $+0.016$	14.2	28	3 x 25AW	ø40 all types
50	70	58	30	25	13	$+0.027$ 0	35	20	$+0.2$ 0	5	14	M16 x 1.5	10	28	$+0.053$ $+0.020$	16.2	30	3 x 28AW	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	$+0.053$ $+0.020$	18.3	32	4 x 28AW	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	$+0.053$ $+0.020$	22.3	36	4 x 36AW	ø80 all types
100	110	90	46	43	20	$+0.033$ 0	59	33	$+0.2$ 0	8	15	M27 x 2	10	42	$+0.064$ $+0.025$	27.5	40	5 x 40AW	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	$+0.064$ $+0.025$	34	44	5 x 50AW	ø160 all types

Auto Switch Specifications

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

<Tie-rod mount type>

Reed switches

D-A5, D-A6

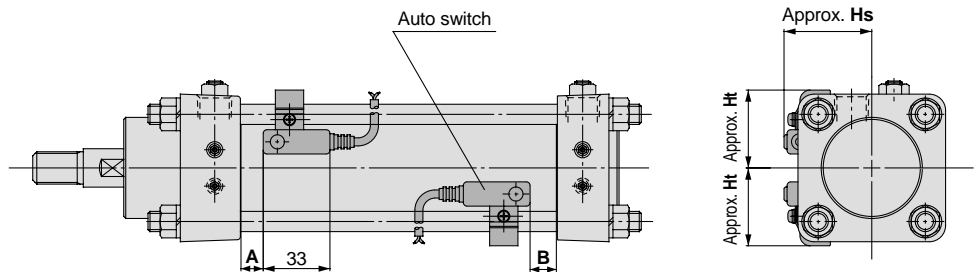
D-A59W

Solid state switches

D-F5□, D-J5□, D-F5NTL

D-F5□W, D-J59W

D-F5BAL, D-F5□F



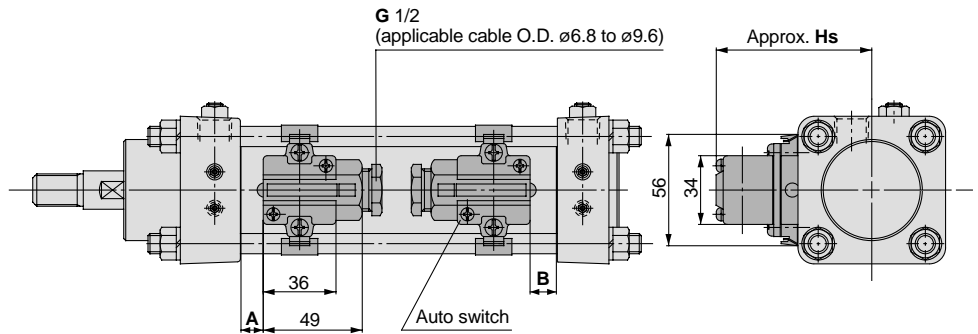
<Band mount type>

Reed switch

D-A3

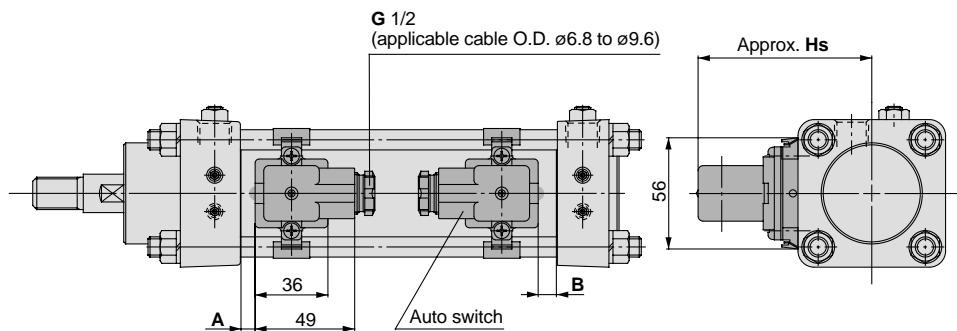
Solid state switches

D-G39, D-K39



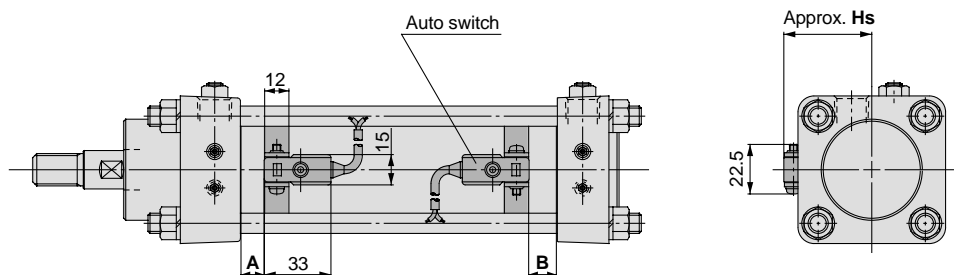
Reed switch

D-A44



Reed switches

D-B5, D-B6



Proper auto switch mounting positions

(mm)

Auto switch type Bore size (mm)	D-A5□, D-A6□ D-A3□, D-A44 D-G39□, D-K39□		D-A59W		D-F5□, D-J5□ D-F5□W, D-J5□W D-F5BAL		D-F5□F		D-F5NTL		D-B5□, D-B64		D-B59W	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
40	10.5	11.5	14.5	15.5	17	18	21	22	22	23	11	12	14	15
50	11	13	15	17	17.5	19.5	21.5	23.5	22.5	24.5	11.5	13.5	14.5	16.5
63	13.5	14.5	17.5	18.5	20	21	24	25	25	26	—	—	—	—
80	13.5	16.5	17.5	20.5	20	23	24	27	25	28	14	17	17	20
100	17	21	21	25	23.5	27.5	27.5	31.5	28.5	32.5	17.5	21.5	20.5	24.5

Auto switch mounting heights

(mm)

Auto switch type Bore size (mm)	D-A5, D-A6 D-A59W		D-F5□, D-J5□ D-F5□W, D-J59W D-F5BA, D-F5□F D-F5NT		D-B5 D-B6	D-A3 D-G39 D-K39	D-A44
	Hs	Ht	Hs	Ht	Hs	Hs	Hs
40	39.5	33.5	38	33.5	38	72.5	82.5
50	44	39	43	39	43.5	78	88
63	50	43	48.5	43	—	85	95
80	57	51	56	51	59	93.5	104
100	65	58.5	63.5	58.5	70	104	114

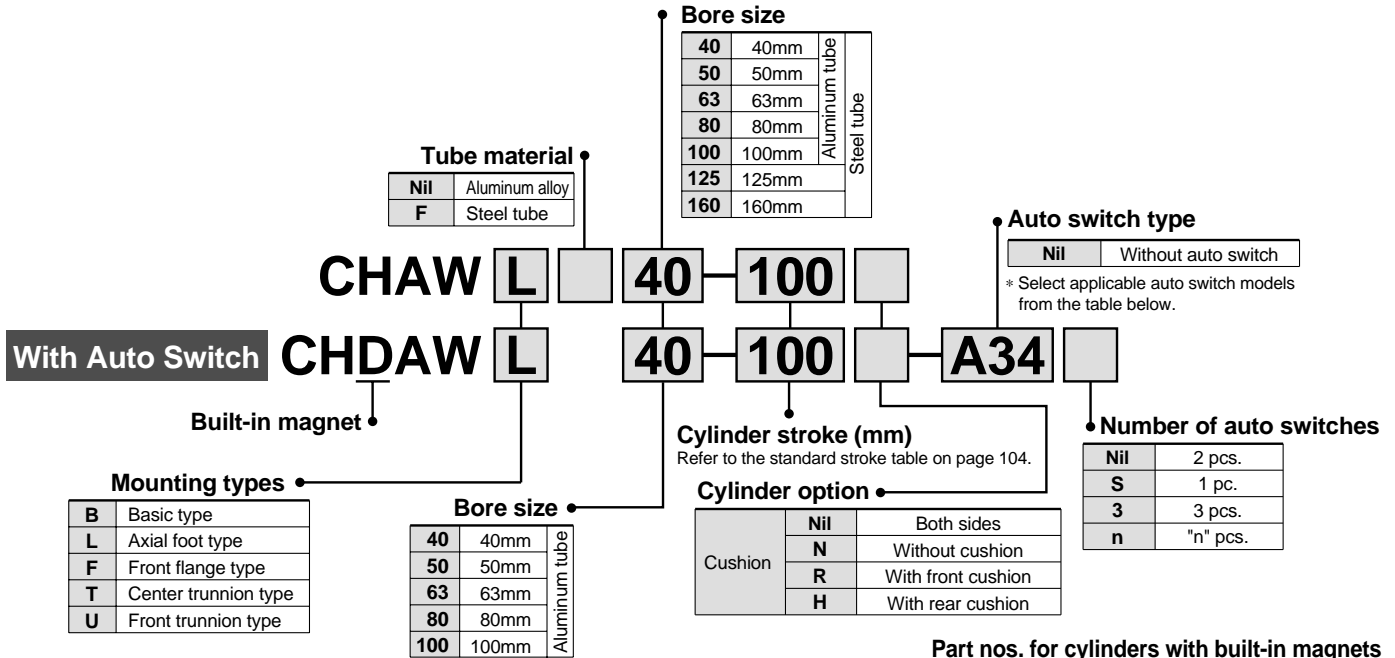
Tie-rod Type Low Pressure Hydraulic Cylinder Double Acting/Double Rod

Series CHAW

3.5MPa

∅40, ∅50, ∅63, ∅80, ∅100, ∅125, ∅160

How to Order



Part nos. for cylinders with built-in magnets

In the case of cylinders with built-in magnets but no auto switches, do not indicate any auto switch type symbol.
(Example) CHDAWB50-100□

Applicable Auto Switches:

Refer to "Auto Switch Guide" CAT.E274-A for further details on each auto switch.
Refer to pages 117 and 118 for auto switch circuit diagrams.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch type		Lead wire length (m)*			Applicable load				
					DC	AC	Tie-rod mount	Band mount	0.5 (Nil)	3 (L)	5 (Z)					
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5V	—	A56	—	●	●	—	IC circuit	—		
								A53	B53	●	●	●			—	PLC
								A54	B54	●	●	●				
		Terminal conduit	No	2-wire	24V	5V, 12V	—	100V 200V	A67	—	●	●	—	IC circuit	PLC	
									A64	B64	●	●	—			Relay, PLC
									—	A33	—	—	—			
DIN terminal	Yes	—	—	12V	100V 200V	—	—	A34	—	—	—	—	Relay, PLC			
							—	A44	—	—	—					
Diagnostic indication (2-color display)	Grommet	—	—	—	—	—	A59W	B59W	●	●	—	—	—			
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F59	—	●	●			○	IC circuit	Relay, PLC
								F5P	—	●	●	○				
				2-wire	—	100V 200V	J51	—	●	●	○	—				
							J59	—	●	●	○					
		Terminal conduit	Yes	3-wire (NPN)	24V	5V, 12V	—	100V 200V	—	G39	—	—	—	IC circuit	—	
									—	K39	—	—	—			
		Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	100V 200V	F59W	—	●	●	○	IC circuit	Relay, PLC	
									F5PW	—	●	●	○			
				2-wire	—	100V 200V	J59W	—	●	●	○	—				
							F5BA	—	—	●	○					
Diagnostic indication (2-color display)	Grommet	Yes	2-wire	24V	12V	—	F5NT	—	—	●	○	IC circuit	—			
							F59F	—	●	●	○					
Water resistant (2-color display)	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F5LF	—	●	●	○	—	—			
With timer							4-wire (NPN)	—	—	—	—			—	—	●
With diagnostic output (2-color display)	Grommet	Yes	4-wire (NPN)	24V	5V, 12V	—						F59F	—			
Latch type with diagnostic output (2-color display)							Grommet	Yes	4-wire (NPN)	24V	5V, 12V	—	F5LF	—	●	●

* Lead wire length symbols: 0.5m Nil (Example) A53
3m L (Example) A53L
5m Z (Example) A53Z

Note) • Solid state auto switches marked "○" are produced upon receipt of order.
• Types D-B53, D-B54, D-B64 and D-B59W cannot be mounted on bore size ∅63 cylinders.

• **Light**

Principle parts are light weight aluminum alloy.

• **Easy position detection with auto switches**

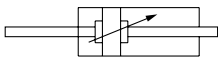
Aluminum cylinder sizes ø40 to ø100 are auto switch capable for easy stroke position detection.

• **Smooth cushioning**

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



JIS symbol



Models

Model	Tube material	Bore sizes (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	3.5MPa
Proof pressure	5.0MPa
Maximum allowable pressure	3.5MPa
Minimum operating pressure	0.25MPa
Ambient and fluid temperature	Without auto switch: -10° to 80°C With auto switch: -10° to 60°C
Piston speed	8 to 300mm/s
Cushion	Cushion seal ^{Note 1)}
Thread tolerance	JIS class 2
Stroke length tolerance	to 100mm ^{+0.8} ₀ mm, 100 to 250mm ^{+1.0} ₀ mm, 250 to 630mm ^{+1.25} ₀ mm 630 to 1000mm ^{+1.4} ₀ mm, 1000 to 1200mm ^{+1.8} ₀ mm
Mounting type	Basic type (B), Axial foot type (L), Front flange type (F), Rear flange type (G), Single clevis type (C), Double clevis type (D), Center trunnion type (T), Front trunnion type (U)

Note 1) Insert type with check mechanism.

* Refer to page 136 for definitions of terms related to pressure.

Auto Switch Mounting Bracket Part Nos.

Bore size (mm)	Auto switch types		
	D-A3, D-A44 D-G39, D-K39	D-B5, D-B6	D-A5, D-A6, D-A59W, D-F5□, D-J5□ D-F5□W, D-J59W, D-F5NT, D-F5BA, D-F5□F
40	BD1-04M	BA-04	BT-04
50	BD1-05M	BA-05	BT-06
63	BD1-06M	—	BT-06
80	BD1-08M	BA-08	BT-08
100	BD1-10M	BA-10	BT-08

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	25 to 1000
160	50 to 1200

Note) Refer to the stroke selection Table in Technical Data 2, starting with page 123 to determine stroke limitation depending on the type of mounting brackets that will be used. Then make sure your selection.

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

Cushion Strokes (for Front & Rear)

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

Accessories (Optional)

Refer to page 100.

- Knuckle bracket, Single knuckle
- Double knuckle, Bracket pin
- Knuckle pin
- Rod boot *
- (Nylon tarpaulin)
- (Neoprene cloth)

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

Series CHAW

Minimum Strokes for Auto Switch Mounting

n: Numbers of auto switched

Auto switch types	Number of auto switches	Mounting brackets other than center trunnion	Center trunnion type			
			ø40 and ø50	ø63	ø80	ø100
D-A5, D-A6 D-F5□, D-J5□	1 or 2 pcs. (different sides/same side)	10	100	100	110	120
	"n" pcs. (same side)	$10 + 55 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$110 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
D-A59W	2 pcs. (different sides/same side)	20	100	100	110	120
	"n" pcs. (same side)	$20 + 55 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$100 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$110 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
	1 pc.	15	100	100	110	120
D-F5□W, D-J59W D-F5BA D-F5□F D-F5NT	1 or 2 pcs. (different sides/same side)	15	120	120	130	140
	"n" pcs. (same side)	$15 + 55 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$120 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$130 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	$140 + 55 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
D-B5, D-B6	2 pcs.	Different sides	15	90	—	120
		Same side	75	90	—	120
	"n" pcs.	Different sides	$15 + 50 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$90 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	—	$120 + 50 \frac{(n-4)}{2}$ n = 4, 6, 8 ...
		Same side	$75 + 50 (n-2)$ n = 2, 3, 4 ...	$90 + 50 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	—	$120 + 50 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...
	1 pc.	10	90	—	120	
D-B59W	2 pcs.	Different sides	20	90	—	120
		Same side	75	90	—	120
	"n" pcs.	Different sides	$20 + 50 \frac{(n-2)}{2}$ n = 2, 4, 6, 8 ...	$90 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...	—	$120 + 50 \frac{(n-4)}{2}$ n = 4, 8, 12, 16 ...
		Same side	$75 + 50 (n-2)$ n = 2, 3, 4 ...	$90 + 50 (n-2)$ n = 2, 4, 6 ...	—	$120 + 50 (n-2)$ n = 2, 4, 6, 8 ...
	1 pc.	15	90	—	120	
D-A3 D-G39 D-K39	2 pcs.	Different sides	35	75	80	90
		Same side	100			
	"n" pcs.	Different sides	$35 + 30 (n-2)$ 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 side	$100 + 100 \frac{(n-2)}{2}$ n = 2, 3, 4 ...	$100 + 100 (n-2)$ n = 4, 6, 8 ...		
	1 pc.	10	75	80	90	
D-A44	2 pcs.	Different sides	35	75	80	90
		Same side	55	75	80	90
	"n" pcs.	Different sides	$35 + 30 (n-2)$ 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 side	$55 + 50 (n-2)$ n = 2, 3, 4 ...	$75 + 50 (n-2)$ n = 2, 4, 6, 8 ...	$80 + 50 (n-2)$ n = 2, 4, 6, 8 ...	$90 + 50 (n-2)$ n = 2, 4, 6, 8 ...
	1 pc.	10	75	80	90	

Weights

Aluminum tube

Unit: kg

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

Calculation (example) CHAWL50-100

- Basic weight 3.08 (foot type, ø50)
 - Additional weight 0.14/10mm stroke
 - Cylinder stroke ... 100mm
- $3.08 + 0.14 \times 100/10 = 4.48\text{kg}$

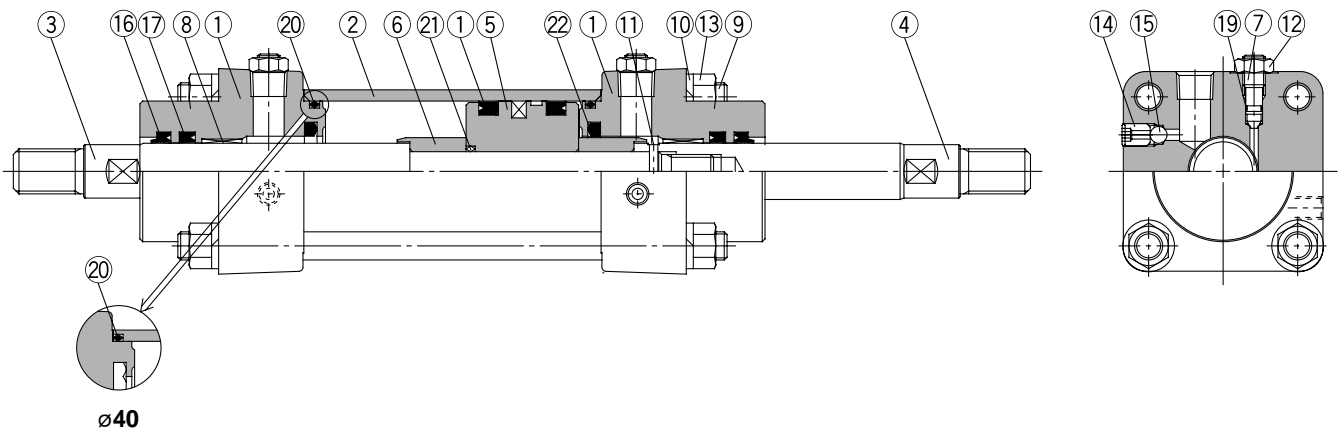
Steel tube

Unit: kg

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

Series CHAW

Construction



Parts list

No.	Description	Material	Note
1	Rod cover	Aluminum alloy	70% flat black
2	Cylinder tube	Aluminum alloy Carbon steel	Hard anodized
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	—	

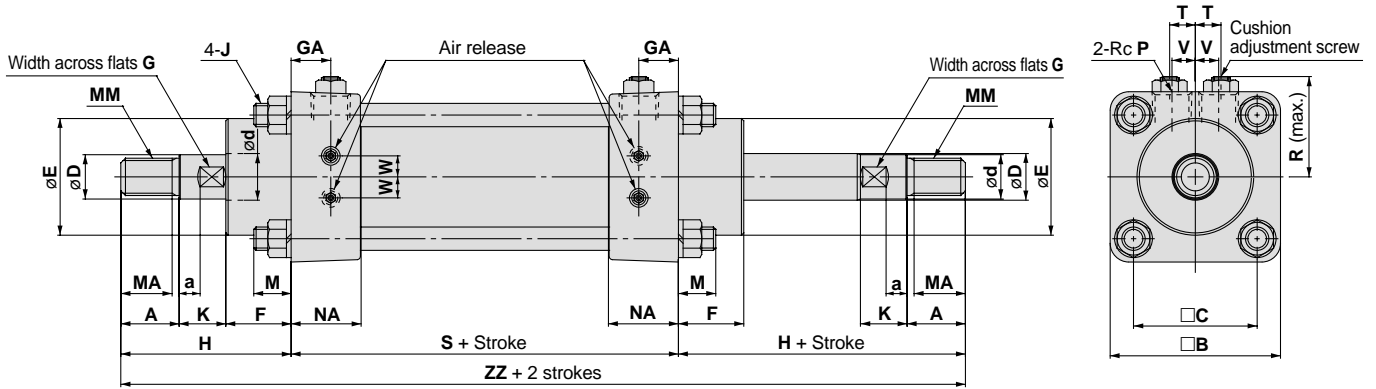
Replacement parts: Seal kits

Bore size (mm)	Seal kit no.	Kit components
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 kits consist of items of 16 through 20 and 22, and can be ordered by using the seal kit number for each bore size.

Dimensions

Basic type: CHAWB



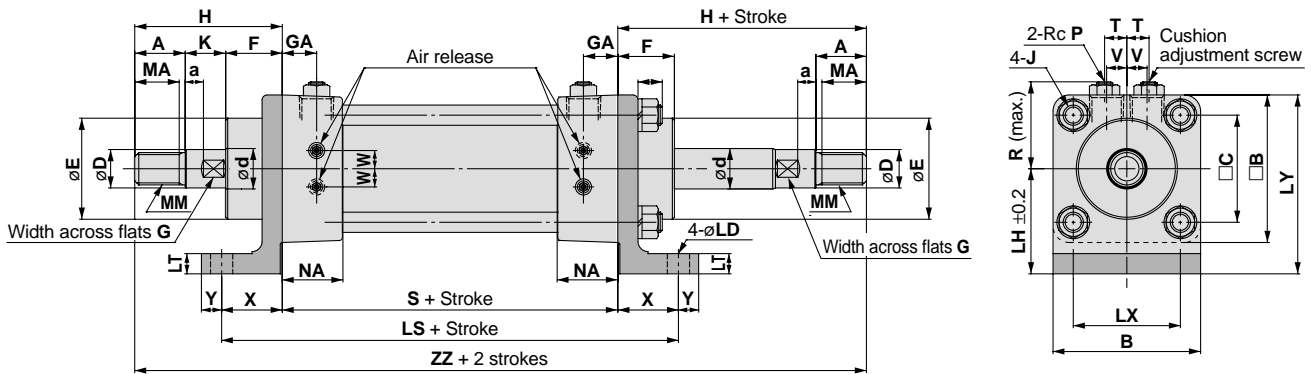
(mm)

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

Series CHAW

Dimensions

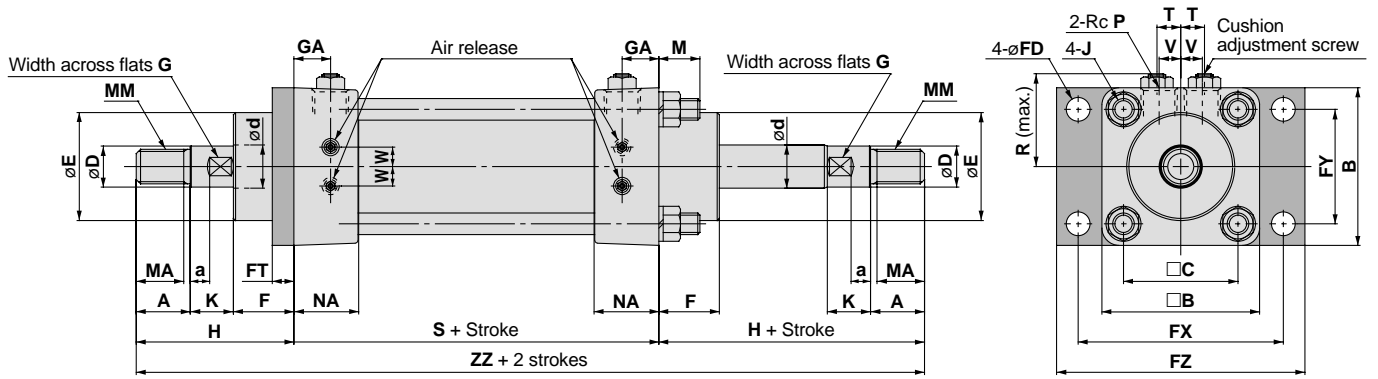
Foot type: CHAWL



Bore size (mm)	(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

Bore size (mm)	(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	

Front flange type: 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

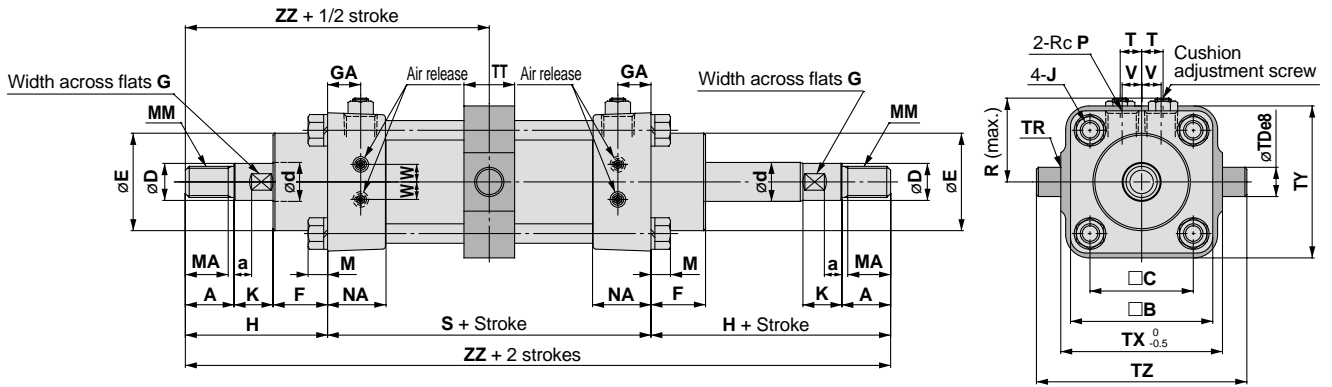
(mm)

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

Series CHAW

Dimensions

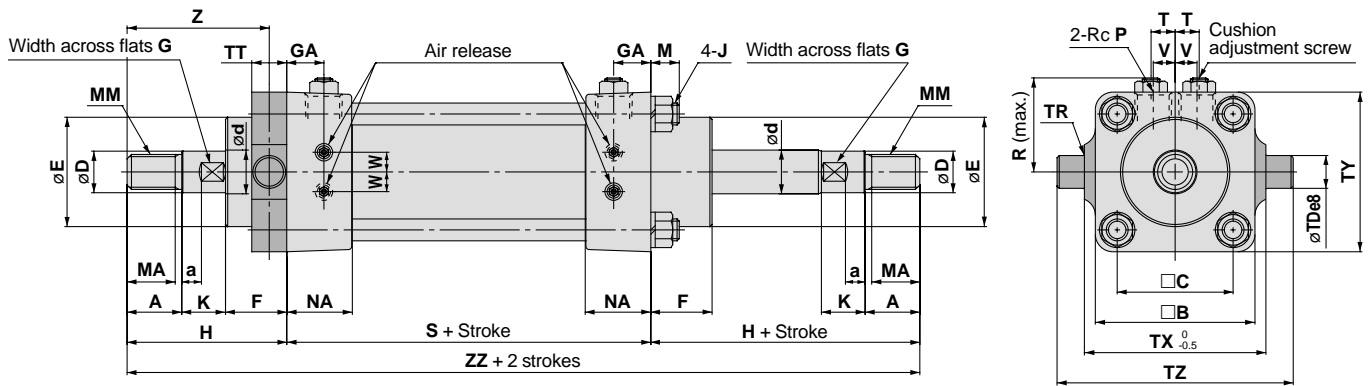
Center trunnion type: CHAWT



Bore size (mm)	(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} _{-0.073}	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

Bore size (mm)	(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

Front trunnion type: CHAWU



Bore size (mm)	(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

Bore size (mm)	(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 CHAW

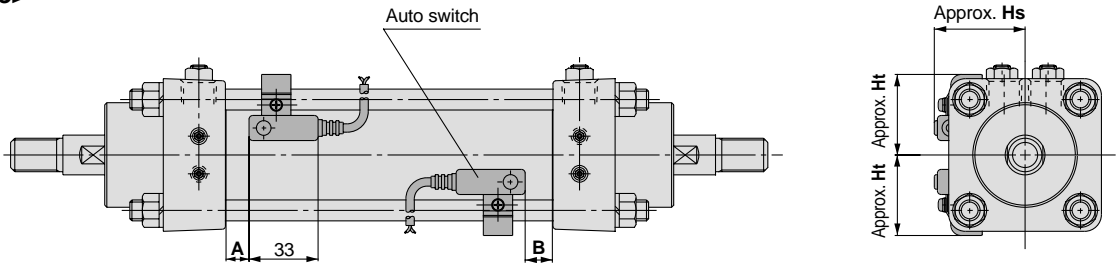
Auto Switch Specifications

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

<Tie-rod mount type>

Reed switches
D-A5, D-A6
D-A59W

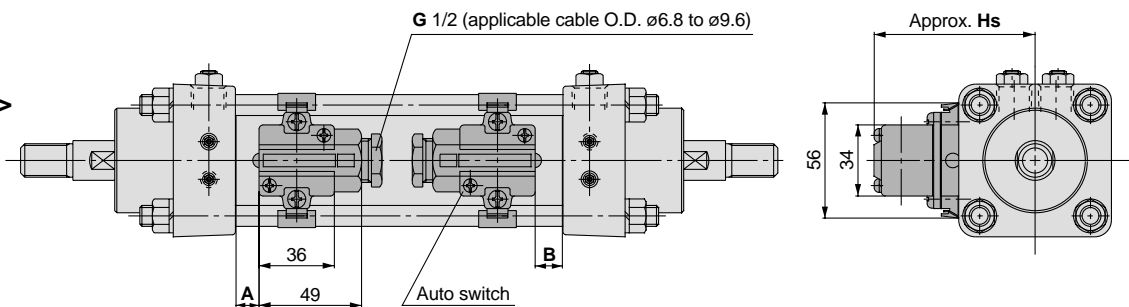
Solid state switches
D-F5□, D-J5□
D-F5NTL
D-F5□W, D-J59W
D-F5BAL, D-F5□F



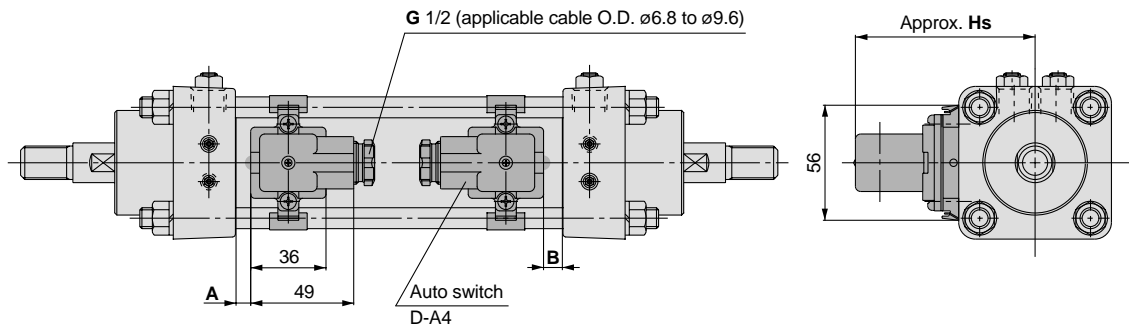
<Band mount type>

Reed switch
D-A3

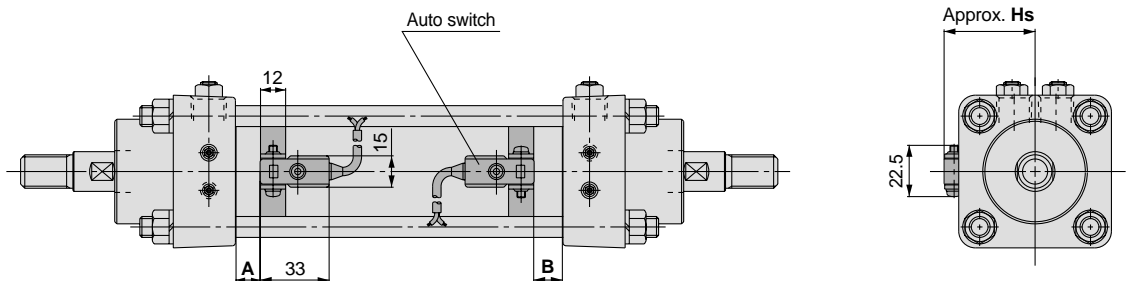
Solid state switches
D-G39, D-K39



Reed switch
D-A44



Reed switches
D-B5, D-B6



Proper auto switch mounting positions

(mm)

Auto switch types Bore size (mm)	D-A5□, D-A6□ D-A3□, D-A44 D-G39□, D-K39□		D-A59W		D-F5□, D-J5□ D-F5□W, D-J5□W D-F5BAL		D-F5□F		D-F5NTL		D-B5□, D-B64		D-B59W	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
40	10.5	11.5	14.5	15.5	17	18	21	22	22	23	11	12	14	15
50	11	13	15	17	17.5	19.5	21.5	23.5	22.5	24.5	11.5	13.5	14.5	16.5
63	13.5	14.5	17.5	18.5	20	21	24	25	25	26	—	—	—	—
80	13.5	16.5	17.5	20.5	20	23	24	27	25	28	14	17	17	20
100	17	21	21	25	23.5	27.5	27.5	31.5	28.5	32.5	17.5	21.5	20.5	24.5

Auto switch mounting heights

(mm)

Auto switch types Bore size (mm)	D-A5, D-A6 D-A59W		D-F5□, D-J5□ D-F5□W, D-J59W D-F5BA, D-F5□F D-F5NT		D-B5 D-B6	D-A3 D-G39□ D-K39□	D-A44
	Hs	Ht	Hs	Ht	Hs	Hs	Hs
40	39.5	33.5	38	33.5	38	72.5	82.5
50	44	39	43	39	43.5	78	88
63	50	43	48.5	43	—	85	95
80	57	51	56	51	59	93.5	104
100	65	58.5	63.5	58.5	70	104	114

Hydraulic Cylinders

Auto Switch Specifications

⚠ Specific Product Precautions

Be sure to read auto switch precautions on pages 139 through 141 before handling auto switches.

Auto Switch Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100μA or less 2-wire: 0.8mA or less
Operating time	1.2ms	1ms or less ^{*2)}
Impact resistance	300m/s ²	1000m/s ²
Insulation resistance	50MΩ or more at 500VDC (between lead wire and case)	
Withstand voltage	1500VAC for 1min. ^{*1)} (between lead wire and case)	1000VAC for 1min. (between lead wire and case)
Ambient temperature	-10° to 60°C	

* 1) Electrical entry: Connector type (A73C, A80C, C73C, and C80C) and type A9 are 1000VAC for 1 minute (between lead wire and case).

* 2) Except solid state switches with timer (F5NTL, F7NTL, and G5NTL)

Lead Wire Lengths

Lead wire length indication (example)

D-A73 **L**

• Lead wire length

Nil	0.5m
L	3m
Z	5m
N*	None

* Applicable only to connector type switches D-□□C.

Note 1) Lead wire length: Z (5m) applicable auto switches
Reed: D-B53, D-B54, D-C73(C), D-C80C, D-A53, D-A54, D-A73(C)(H), D-A80C, D-Z73
Solid state: All types are produced upon receipt of order.

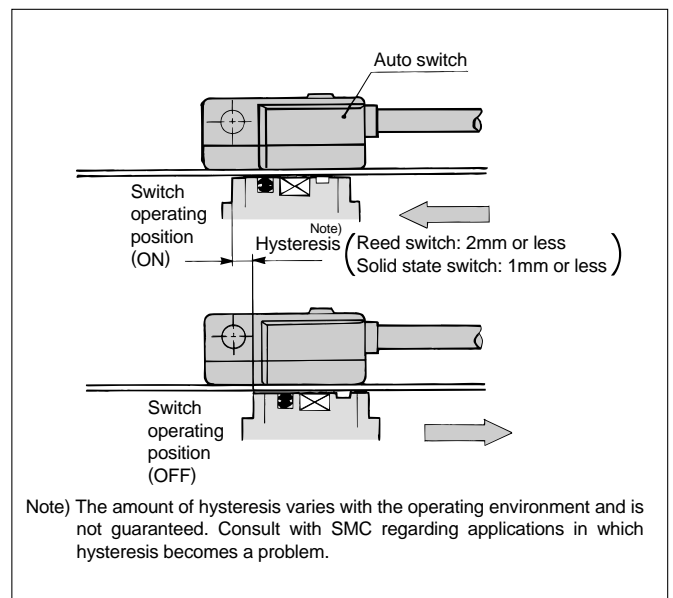
Note 2) The standard lead wire length is 3 meters for solid state switches with timer and water resistant 2-color display solid state switches. (0.5m is not available)

Part numbers for lead wires with connector (applicable only to connector type)

Type	Lead wire length
D-LC05	0.5m
D-LC30	3m
D-LC50	5m

Auto Switch Hysteresis

Hysteresis is the distance between the position at which piston movement operates an auto switch and the position at which movement in the opposite direction turns the switch OFF. This hysteresis is included in part (one side) of the operating range.



Contact Protection Boxes: CD-P11, CD-P12

1

<Applicable switch models>

D-A7, D-A8, D-A7□H, D-A80H, D-A73C, D-A80C, D-C7, D-C8, D-C73C, D-C80C, D-Z7, D-Z8, D-A9, D-A9□V, D-A79W

The above auto switches do not have built-in contact protection circuits.

1. The operating load is an induction load.
2. The length of wiring to the load is 5m or more.
3. The load voltage is 100VAC or 200VAC.

A contact protection box should be used in any of the above conditions, otherwise, the life of the contacts may be reduced. (They may stay on continuously.)

Since this effect is especially great in the case of type D-A72 (H), be sure to use a contact protection box regardless of the type of load or length of wiring.

2

Further, even in the case of a type of auto switch with built-in contact protection circuit (D-A34, D-A44, D-A54, D-A64, D-B54, D-B64, D-A59W, D-B59W), if the length of the wiring to the load is extremely long (30m or more) and a PLC having a large rush current is used, consult with SMC as a contact protection box may be necessary.

Contact protection box specifications

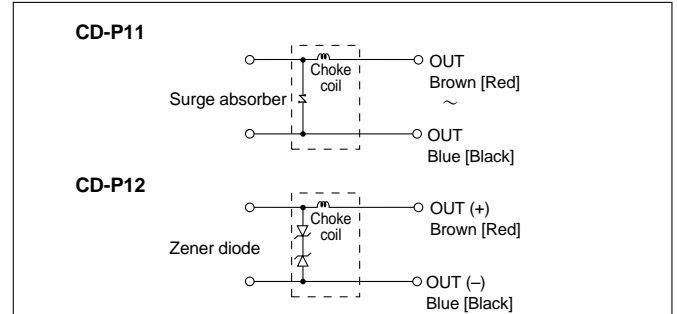
Part no.	CD-P11		CD-P12
Load voltage	100VAC	200VAC	24VDC
Maximum load current	25mA	12.5mA	50mA

* Lead wire length: Switch connection side 0.5m
Load connection side 0.5m

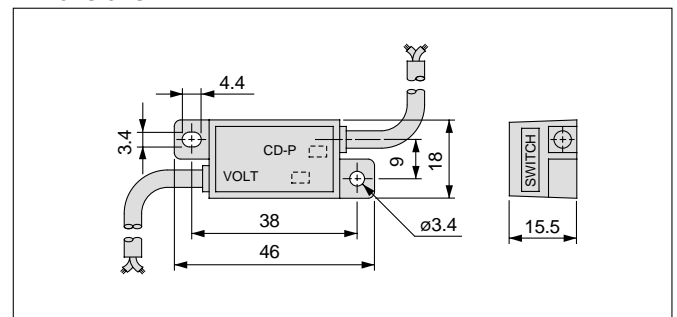


Internal circuits

Lead wire colors inside [] are those prior to conformity with IEC standards.



Dimensions



Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit.

Moreover, the switch unit should be kept as close as possible to the contact protection box, with a lead wire that is no more than 1 meter in length.

Hydraulic Cylinders

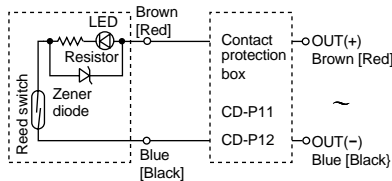
Auto Switch Specifications

Auto Switch Internal Circuits

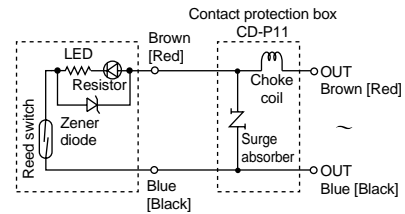
Reed switches

Lead wire colors inside [] are those prior to conformity with IEC standards.

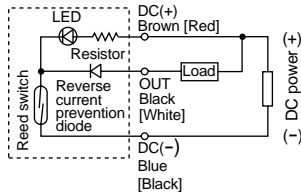
D-A73, D-A73H, D-C73, D-Z73, D-A93, D-A93V



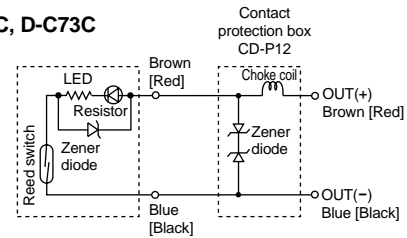
D-A72, D-A72H



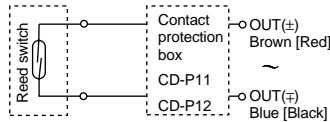
**D-A56, D-A76H, D-A96(V)
D-C76, D-Z76**



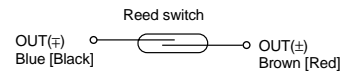
D-A73C, D-C73C



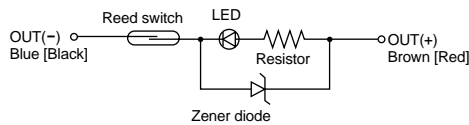
**D-A80, D-A80H, D-A80C, D-A90
D-A90V, D-C80, D-C80C, D-Z80**



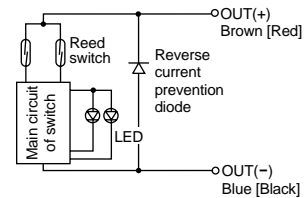
D-A67



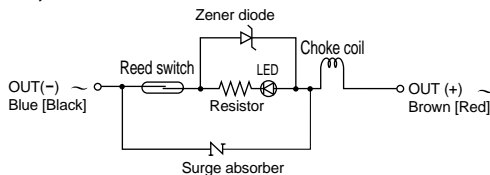
D-A53, D-B53



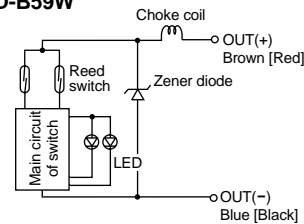
D-A79W



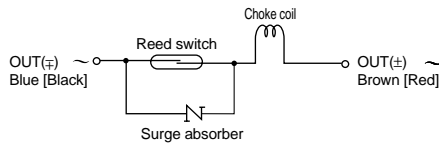
D-A54, D-B54



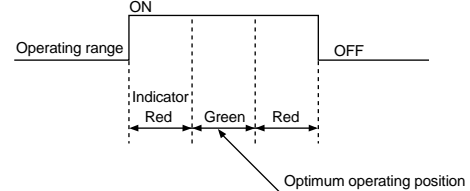
D-A59W, D-B59W



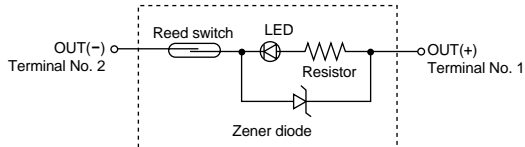
D-A64, D-B64



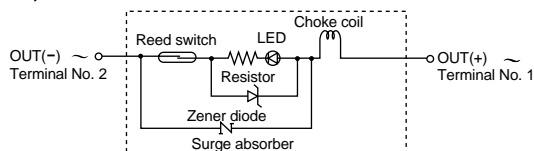
Indicator light/Display method



D-A33



D-A34, D-A44



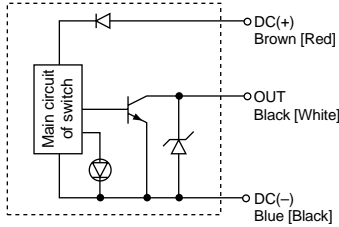
Auto Switch Specifications

Auto Switch Internal Circuits

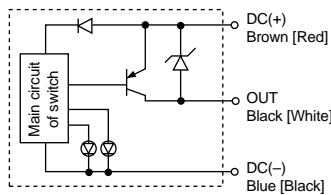
Solid state switches

Lead wire colors inside [] are those prior to conformity with IEC standards.

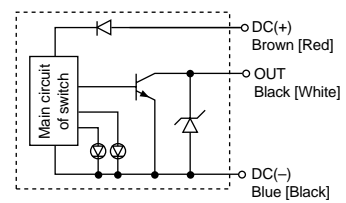
**D-F59, D-F79, D-F7NV, D-G59
D-H7A1, D-Y59A, D-Y69A, D-F9N(V)**



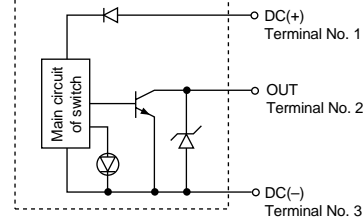
**D-F5PW, D-G5PW, D-H7PW
D-F7PW, D-Y7PW(V), D-F9PW(V)**



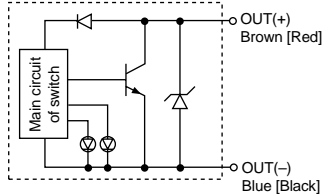
**D-G59W, D-F59W, D-H7NW
D-F7NWV, D-F79W, D-F9NW(V)
D-Y7NW(V)**



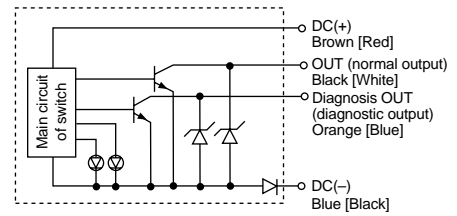
D-G39, D-G39C



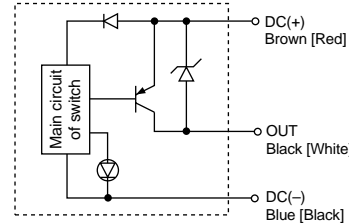
**D-F5BAL, D-F7BAL
D-F7BAVL, D-F7BWV
D-F9BAL, D-F9BW(V), D-G5BAL
D-H7BAL, D-H7BW, D-J59W, D-J79W
D-K59W, D-Y7BW(V), D-Y7BAL**



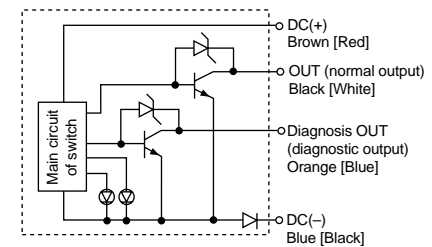
D-F5LF, D-F7LF, D-H7LF



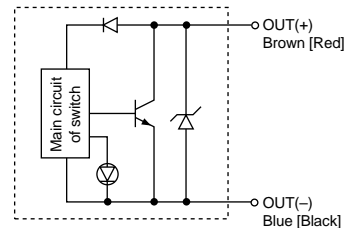
**D-G5P, D-H7A2, D-F5P, D-F7P
D-F7PV, D-Y7P(V), D-F9P(V)**



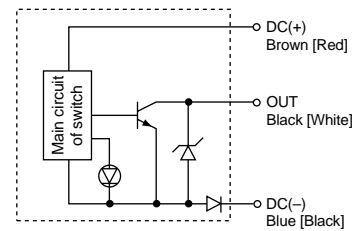
D-F59F, D-F79F, D-G59F, D-H7NF



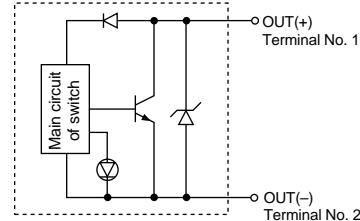
**D-F7BV, D-H7B, D-H7C, D-J59, D-J79
D-J79C, D-K59, D-Y59B, D-Y69B, D-F9B(V)**



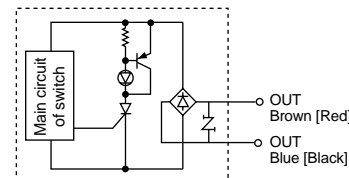
**D-G5NTL, D-F5NTL
D-F7NTL**



D-K39, D-K39C



D-J51

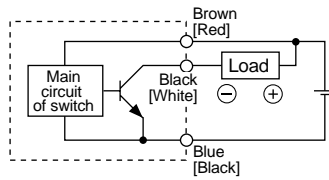


Hydraulic Cylinders

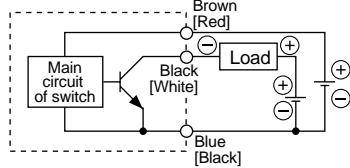
Auto Switch Connections and Examples

Basic Wiring

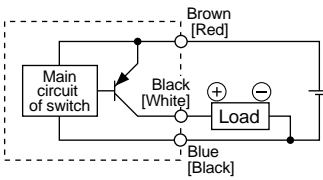
Solid state 3-wire, NPN



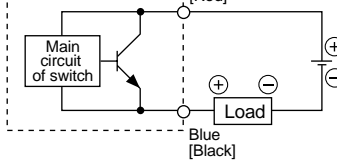
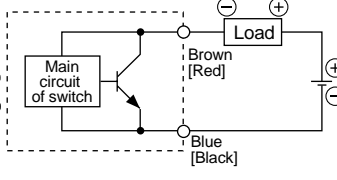
(Power supplies for switch and load are separate.)



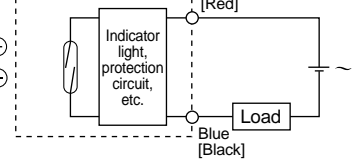
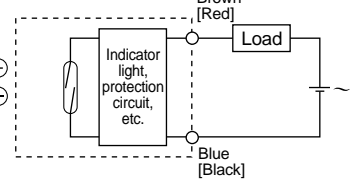
Solid state 3-wire, PNP



2-wire <Solid state>



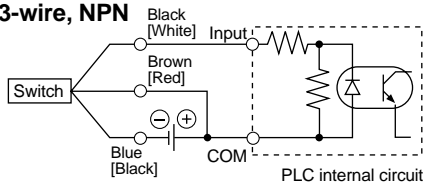
2-wire <Reed switch>



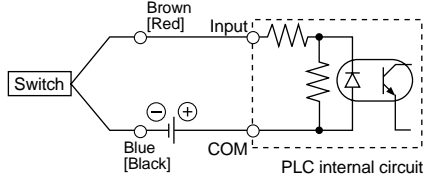
Examples of Connection to PLC

Sink input specifications

3-wire, NPN

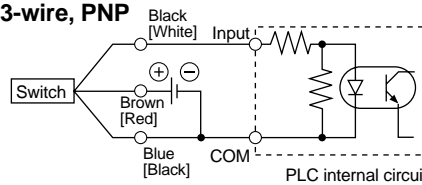


2-wire

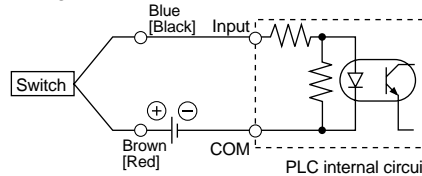


Source input specifications

3-wire, PNP



2-wire

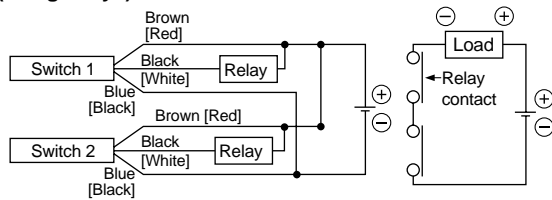


The connection method will vary depending on the PLC input specifications. Connect accordingly.

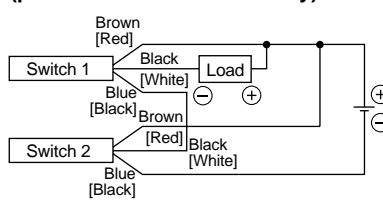
Connection Examples for AND (Series) and OR (Parallel)

3-wire

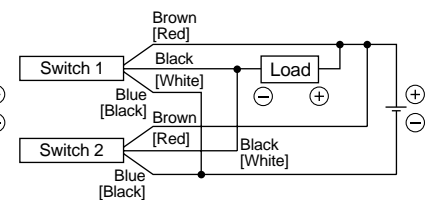
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)



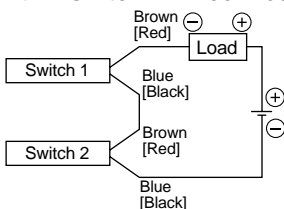
OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

2-wire

with 2-switch AND connection



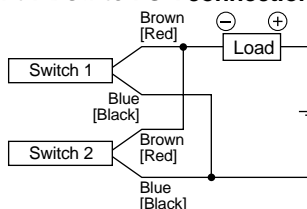
When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Residual voltage} \times 2 \text{ pcs.} \\ &= 24\text{V} - 4\text{V} \times 2 \text{ pcs.} \\ &= 16\text{V} \end{aligned}$$

Example: Power supply is 24VDC.
Voltage decline in switch is 4V.

2-wire

with 2-switch OR connection



<Solid state>

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

<Reed switch>

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

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \times \text{Load impedance} \\ &= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}\Omega \\ &= 6\text{V} \end{aligned}$$

Example: Load impedance is 3kΩ.
Leakage current from switch is 1mA.

Hydraulic Cylinders

Technical Data 1

Bore Size Selection

Series and bore sizes

Series	Nominal pressure (MPa)	Bore size (mm)									
		20	25	32	40	50	63	80	100	125	160
CHKDB	10	●	●	●	●	●	●	●	●		
CHKGB	16	●	●	●	●	●	●	●	●		
CHQB	3.5	●		●	●	●	●	●	●		
CHM	3.5	●	●	●	●						
CH2E	3.5			●	●	●	●	●	●		
CH2F	7			●	●	●	●	●	●		
CH2G	14			●	●	●	●	●	●		
CH2H	14			●	●	●	●	●	●		
CHA	3.5				●	●	●	●	●	●	●

Relationship among generated force, bore size and pressure

When a cylinder is nearly at rest, the relationship among generated force, bore size and pressure can be expressed with the following formulas.

$$F_{p1} = \mu_1 \times F_{f1} \text{ Formula (1)}$$

$$F_{p2} = \mu_2 \times F_{f2} \text{ Formula (2)}$$

$$F_{f1} = \frac{\pi}{4} D^2 \times P \text{ Formula (3)}$$

$$F_{f2} = \frac{\pi}{4} (D^2 - d^2) \times P \text{ Formula (4)}$$

F_{p1}: Generated extension force of cylinder (N)

F_{p2}: Generated retraction force of cylinder (N)

F_{f1}: Theoretical extension output (N)

F_{f2}: Theoretical retraction output (N)

P: Operating pressure (MPa)

D: Bore size (mm)

d: Piston rod diameter (mm)

μ₁: Cylinder extension load pressure coefficient

μ₂: Cylinder retraction load pressure coefficient

Selection standards

A cylinder's generated force will be lower than the theoretical output due to the following factors.

(1) Sliding resistance on the cylinder bearings and seals, etc.

(2) Pressure loss in hydraulic equipment and piping

(3) Frictional resistance in moving parts of machinery

It is necessary to select bore sizes considering these factors.

The ratio of the load to the theoretical output is the load factor. Select bore sizes using the values below as reference for the load factor.

Load type	Load factor
Low-speed operation (100mm/sec or less)	60 to 80%
High-speed operation	25 to 35%

Series CHKDB 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	2010	
25	14	OUT	490	1715	3430	4900
		IN	336	1176	3360	
32	18	OUT	804	2814	5628	8040
		IN	549	1922	5490	
40	22.4	OUT	1256	4396	8792	12560
		IN	862	3017	8620	
50	28	OUT	1963	6871	13741	19630
		IN	1347	4715	13470	
63	35.5	OUT	3117	10910	21819	31170
		IN	2127	7445	21270	
80	45	OUT	5026	17591	35182	50260
		IN	3436	12026	34360	
100	56	OUT	7853	27486	54971	78530
		IN	5390	18865	53900	

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

Technical Data 1

Series CHKGB 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

Series CHQB 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

Series CHM 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

Series CH2E/CH2F/CH2G/CH2H Theoretical Output

Unit: N

	Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	Operating pressure (MPa)					
					1	3.5	5	7	10	14
B-series rod	32	18	OUT	804	804	2813	4019	5627	8038	11254
			IN	550	550	1923	2748	3847	5495	7693
	40	22.4	OUT	1256	1256	4396	6280	8792	12560	17584
			IN	862	862	3017	4311	6035	8621	12070
	50	28	OUT	1963	1963	6869	9813	13738	19625	27475
			IN	1347	1347	4715	6735	9429	13471	18859
	63	35.5	OUT	3116	3116	10905	15578	21810	31157	43619
			IN	2126	2126	7442	10632	14885	21264	29769
	80	45	OUT	5024	5024	17584	25120	35168	50240	70336
			IN	3434	3434	12020	17172	24041	34344	48081
	100	56	OUT	7850	7850	27475	39250	54950	78500	109900
			IN	5388	5388	18859	26941	37718	53882	75435
C-series rod	40	18	OUT	1256	1256	4396	6280	8792	12560	17584
			IN	1002	1002	3506	5008	7012	10017	14023
	50	22.4	OUT	1963	1963	6869	9813	13738	19625	27475
			IN	1569	1569	5490	7843	10980	15686	21961
	63	28	OUT	3116	3116	10905	15578	21810	31157	43619
			IN	2500	2500	8751	12501	17502	25002	35003
	80	35.5	OUT	5024	5024	17584	25120	35168	50240	70336
			IN	4035	4035	14121	20174	28243	40347	56486
	100	45	OUT	7850	7850	27475	39250	54950	78500	109900
			IN	6260	6260	21911	31302	43823	62604	87645

Series CHA 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

Hydraulic Cylinders

Technical Data 2

Stroke Selection (maximum stroke based on buckling strength)

Refer to the stroke range limit charts regarding rod buckling due to load weight.

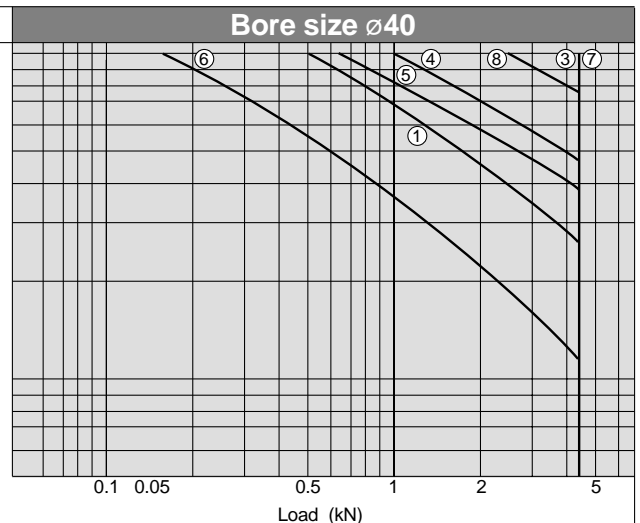
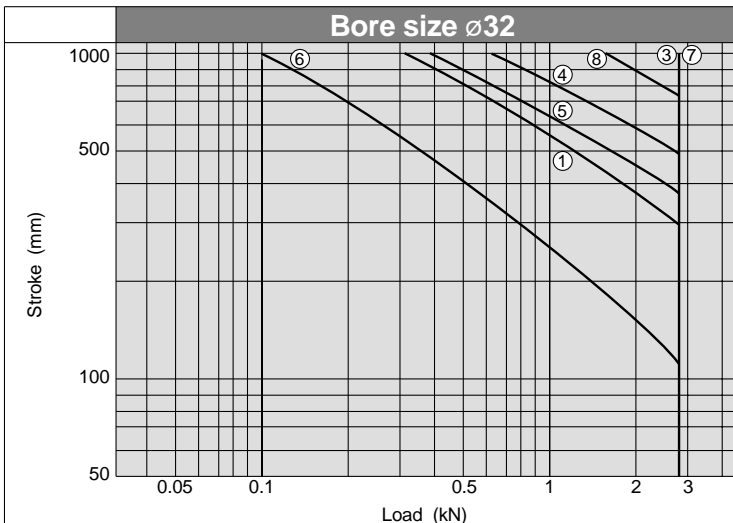
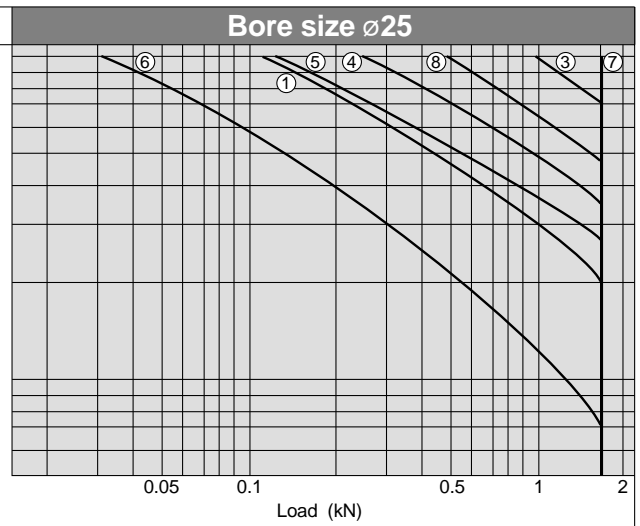
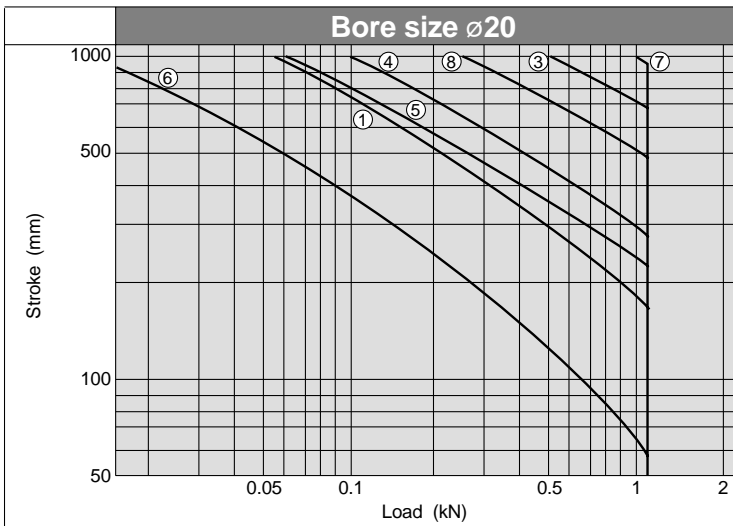
The values in these tables indicate the maximum stroke that can be used in a situation when air is being supplied while the cylinder is stopped in an intermediate position by a) an external force acting on the piston rod and/or by b) an external stopper.

Since the maximum usable stroke varies depending on the diameter of the piston rod and operating conditions, verify the applicability using the stroke range limit charts.

ton rod and/or by b) an external stopper. Since the maximum usable stroke varies depending on the diameter of the piston rod and operating conditions, verify the applicability using the stroke range limit charts.

Series CHM Stroke range limit charts: Bore sizes $\varnothing 20$, $\varnothing 25$, $\varnothing 32$, $\varnothing 40$

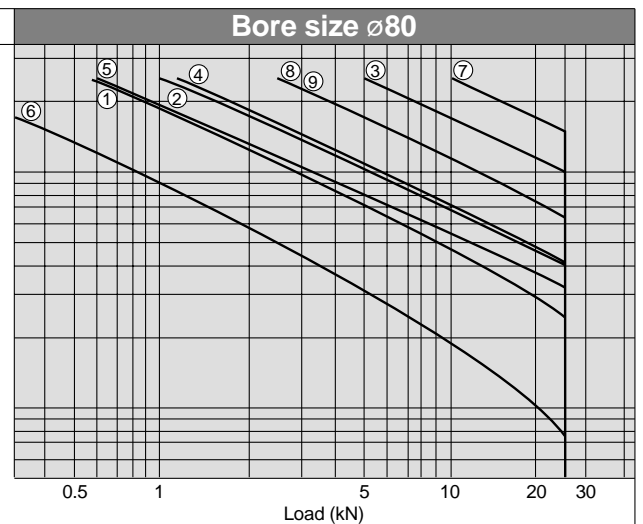
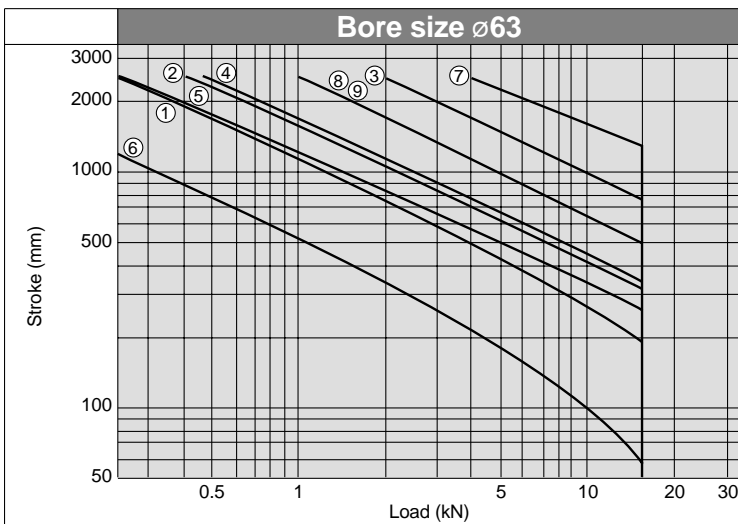
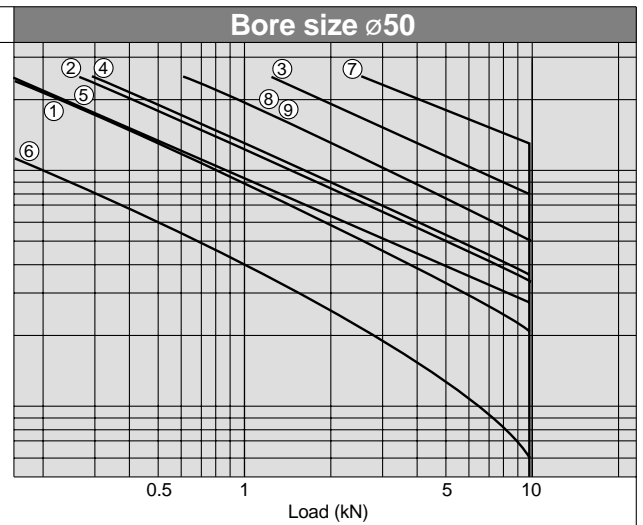
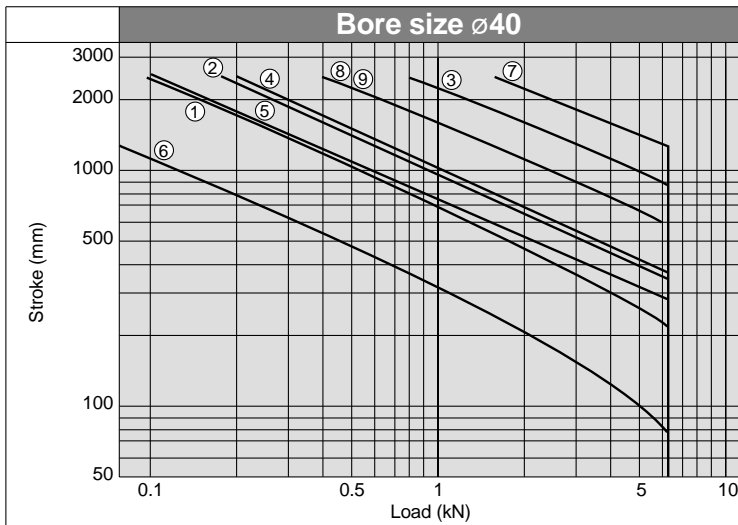
Symbol	Mounting orientation	Symbol	Mounting orientation	Symbol	Mounting orientation	Symbol	Mounting orientation
①				③		③	
④		⑤		⑤		⑥	
⑦		⑦		⑧			



Hydraulic Cylinders: Technical Data 2

Series CHA Stroke range limit charts: Bore sizes $\varnothing 40$, $\varnothing 50$, $\varnothing 63$, $\varnothing 80$

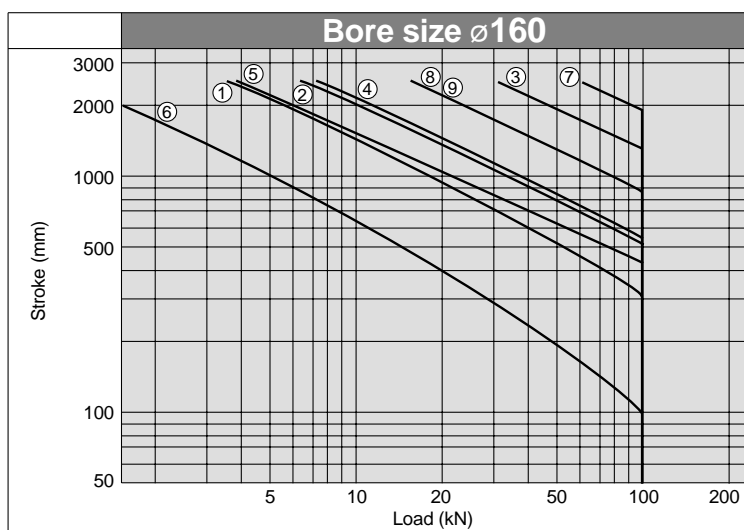
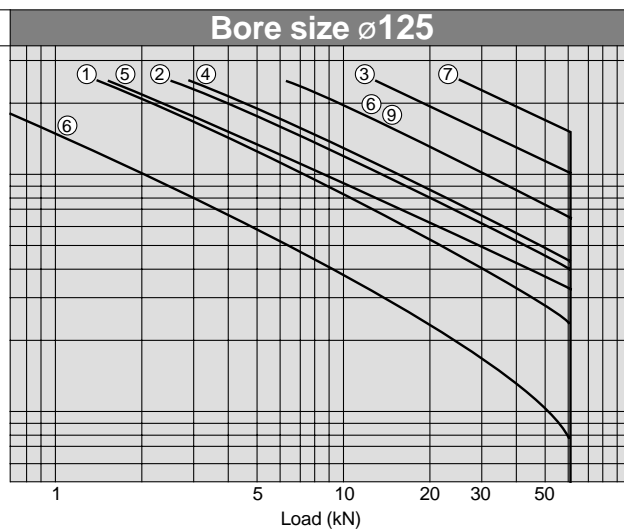
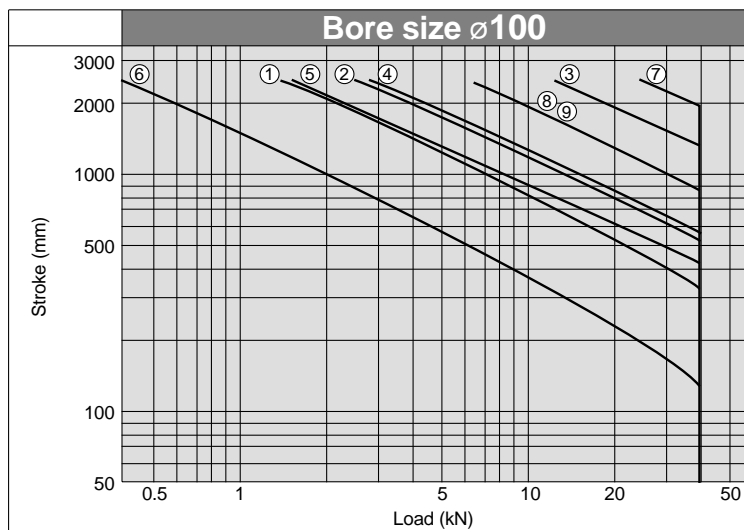
Symbol	Mounting orientation	Symbol	Mounting orientation	Symbol	Mounting orientation	Symbol	Mounting orientation
①		②		③		④	
④		⑤		⑤		⑥	
⑦		⑦		⑧		⑨	



Technical Data 2

Series CHA Stroke range limit charts: Bore sizes $\varnothing 100$, $\varnothing 125$, $\varnothing 160$

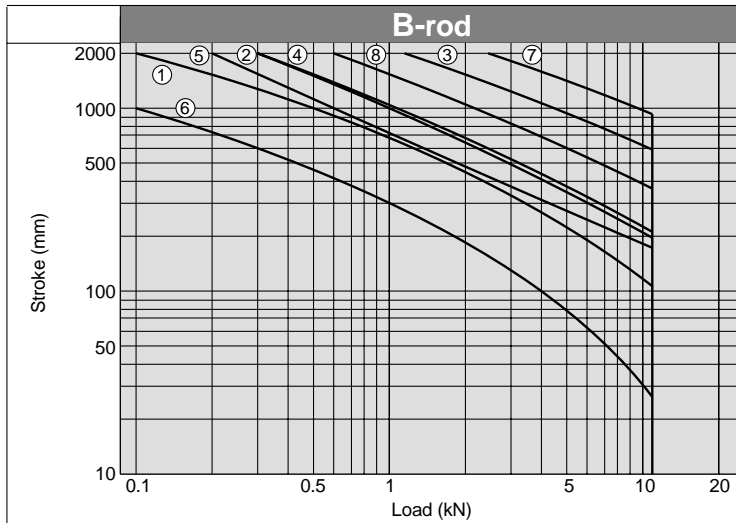
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⑦		⑦		⑧		⑨	



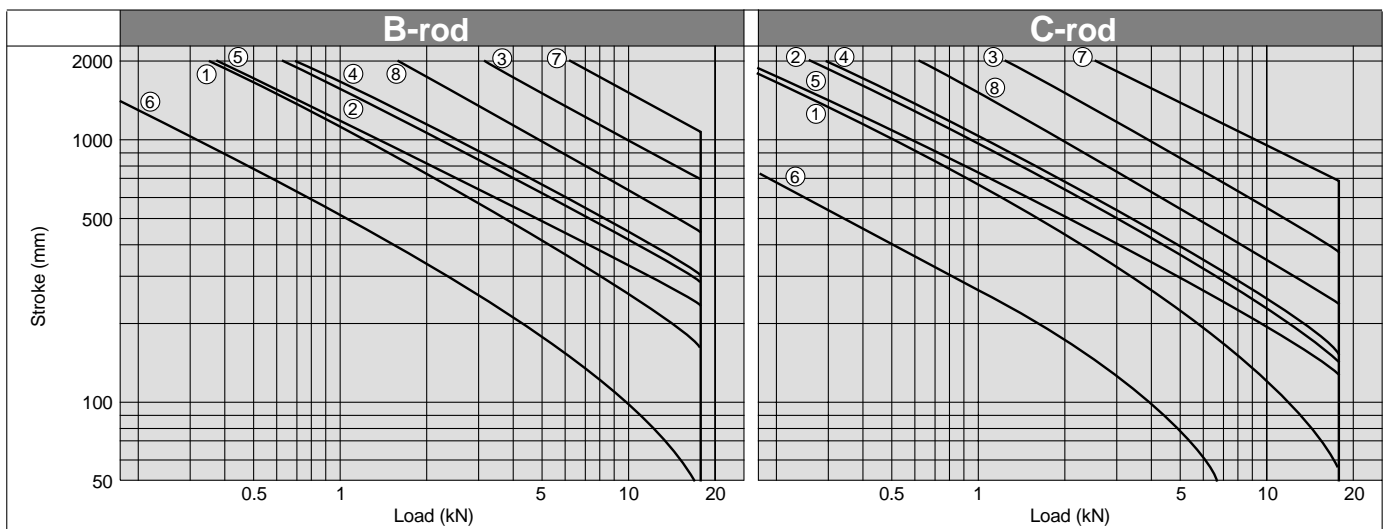
Series CH2E, CH2F, CH2G, CH2H Stroke range limit chart: Bore sizes $\varnothing 32$ & $\varnothing 40$

Symbol	Mounting orientation	Symbol	Mounting orientation	Symbol	Mounting orientation	Symbol	Mounting orientation
①		②		③		③	
④		⑤		⑤		⑥	
⑦		⑦		⑧			

Bore size $\varnothing 32$



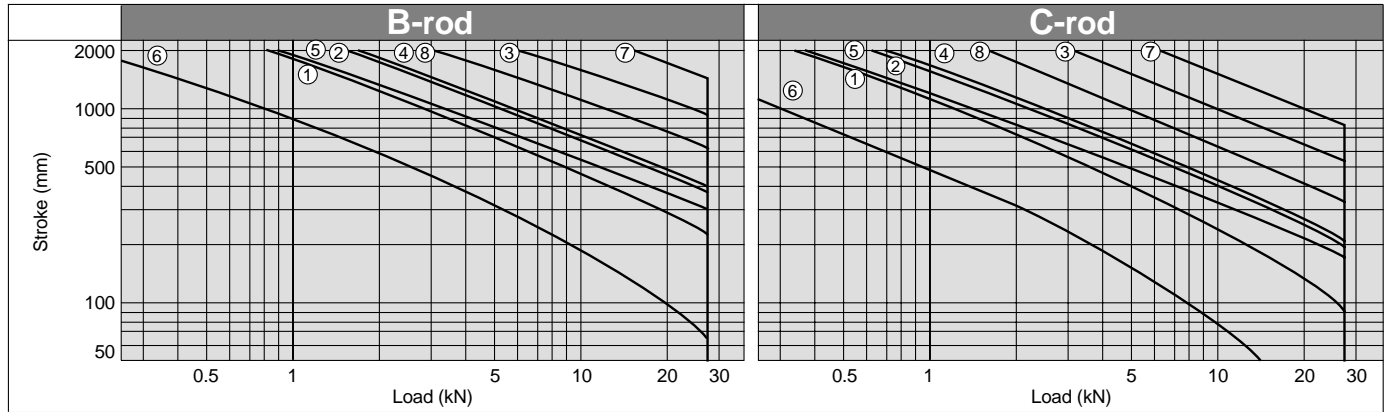
Bore size $\varnothing 40$



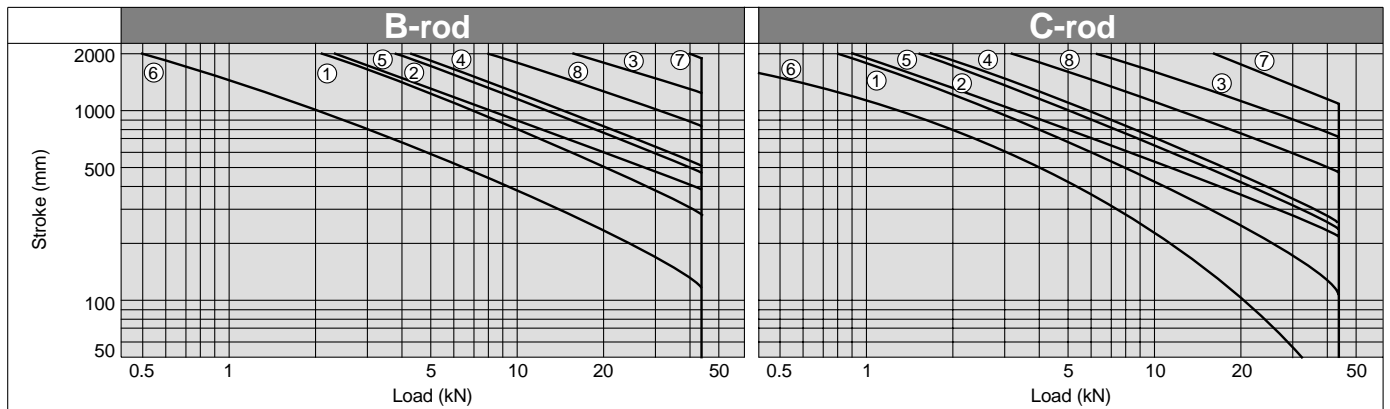
Technical Data 2

Series CH2E, CH2F, CH2G, CH2H Stroke range limit charts: Bore sizes $\phi 50$, $\phi 63$, $\phi 80$, $\phi 100$

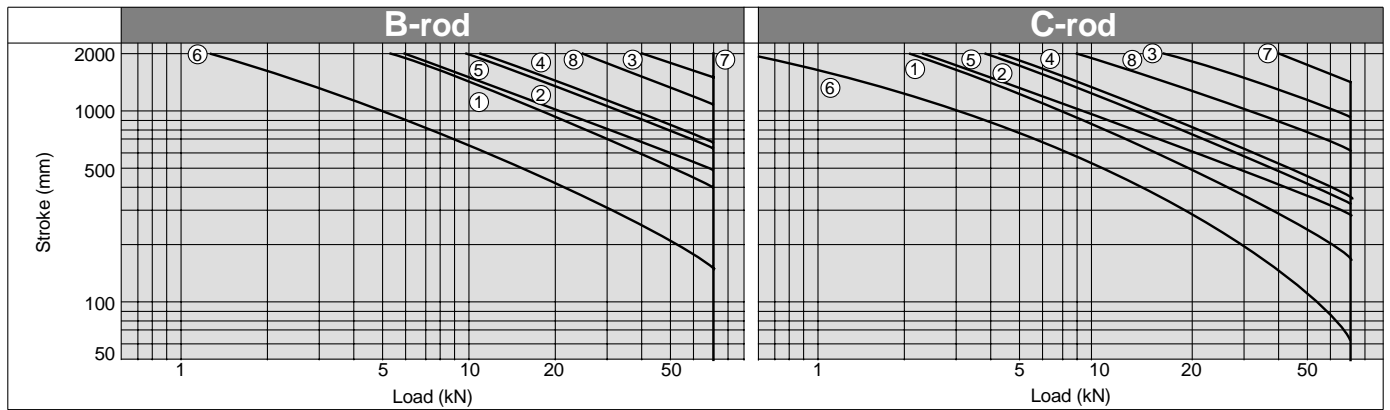
Bore size $\phi 50$



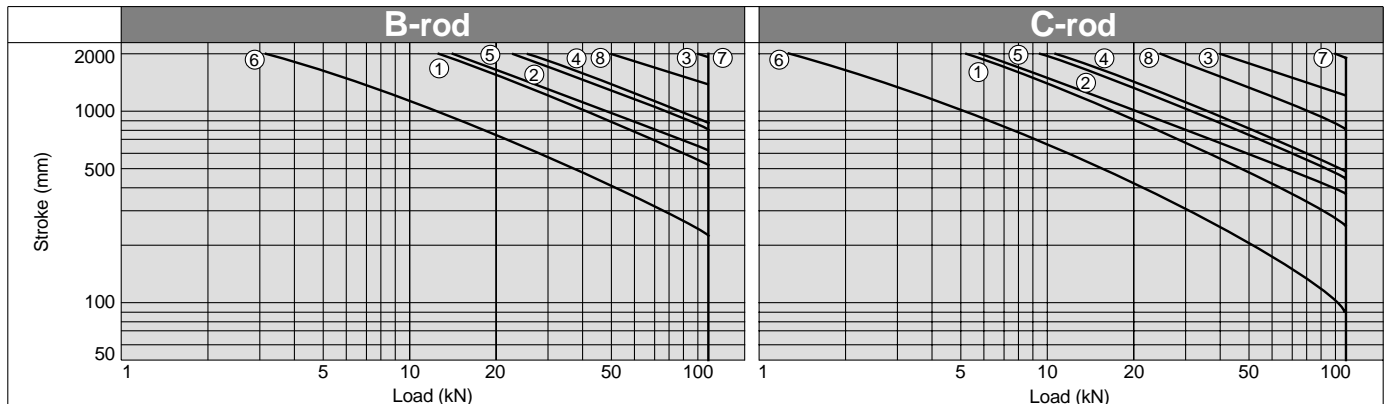
Bore size $\phi 63$



Bore size $\phi 80$



Bore size $\phi 100$



Hydraulic Cylinders

Technical Data 3

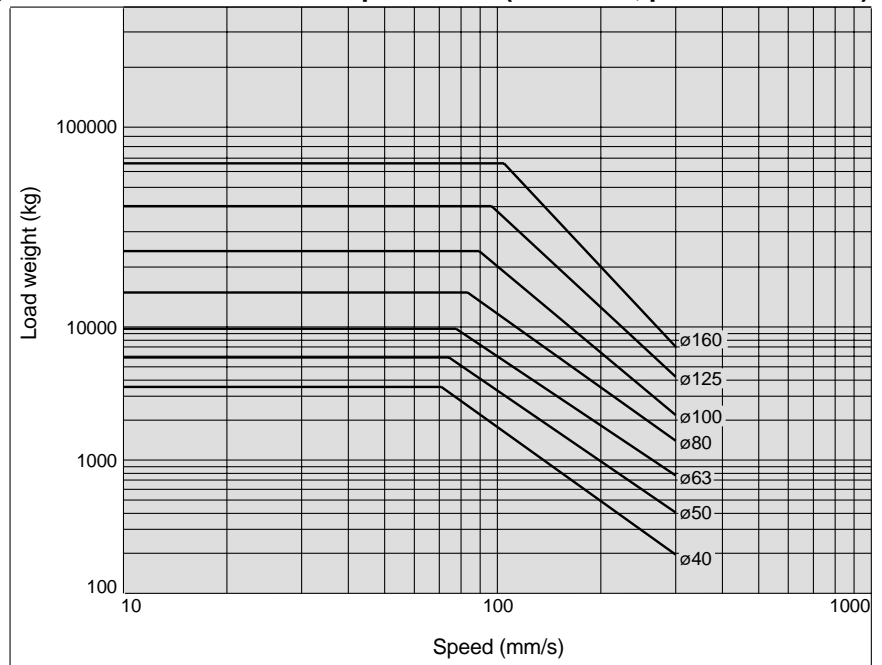
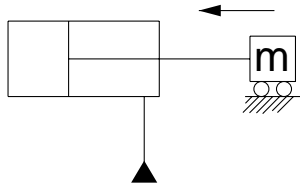
Relationship Between Load Weight and Speed

Load weight in light of cushion performance characteristics — Speed charts

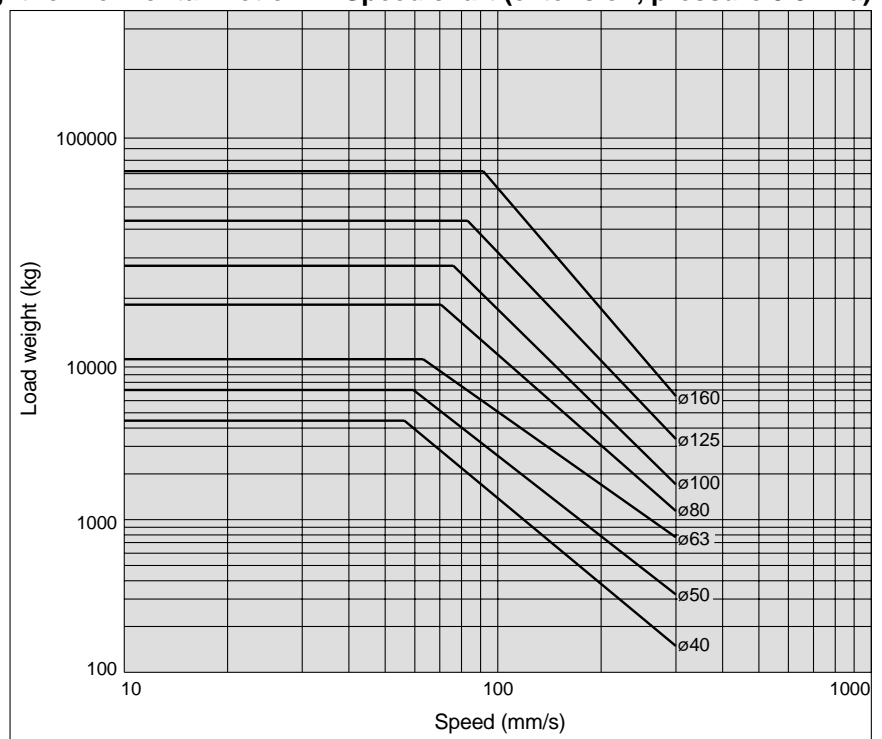
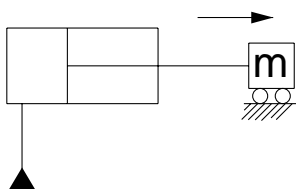
Set up the inertial force that can be absorbed by the cylinder cushion within the values shown in the graphs.

* In case of vertical motion, since surge pressure is generated by the gravitational force, adjust the load weight and speed below the maximum allowable pressure.

Series CHA (aluminum tube): Load weight for horizontal motion — Speed chart (retraction, pressure 3.5MPa)

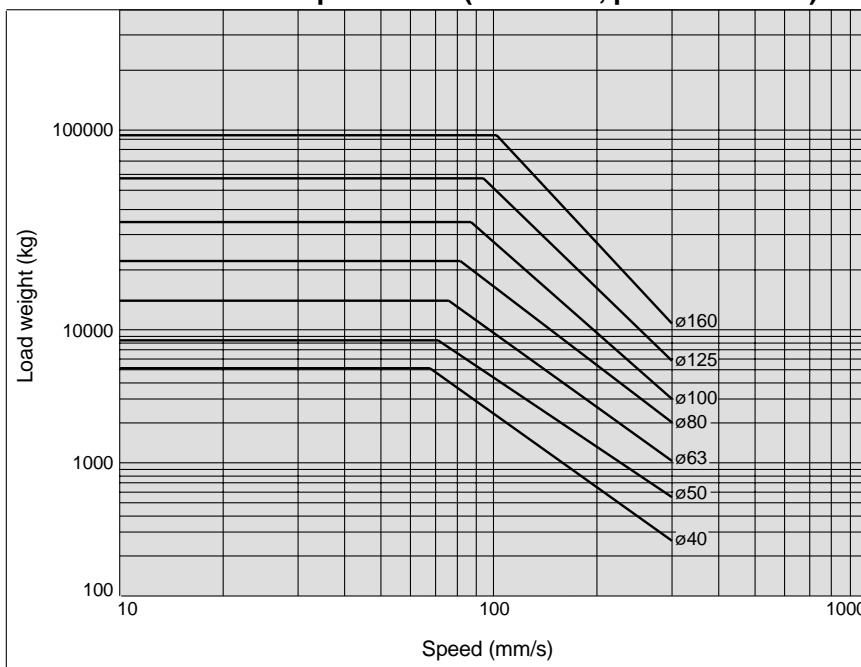
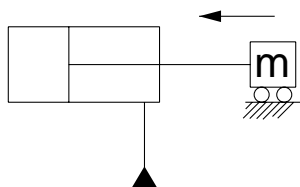


Series CHA (aluminum tube): Load weight for horizontal motion — Speed chart (extension, pressure 3.5MPa)

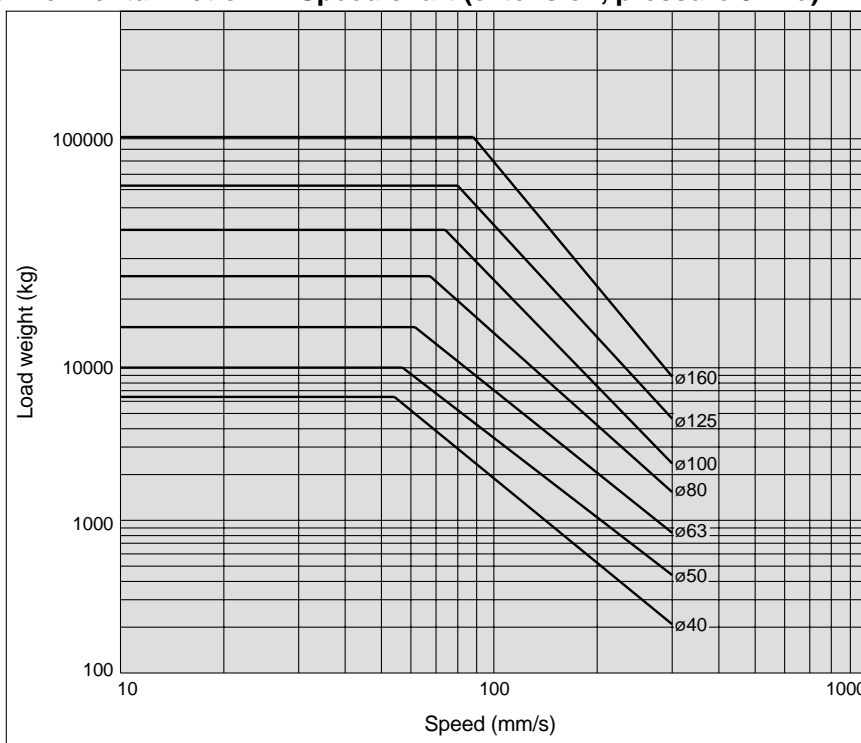
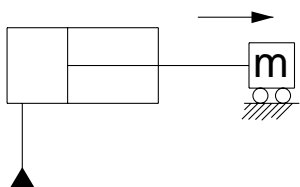


Technical Data 3

Series CHA (steel tube): Load weight for horizontal motion — Speed chart (retraction, pressure 5MPa)

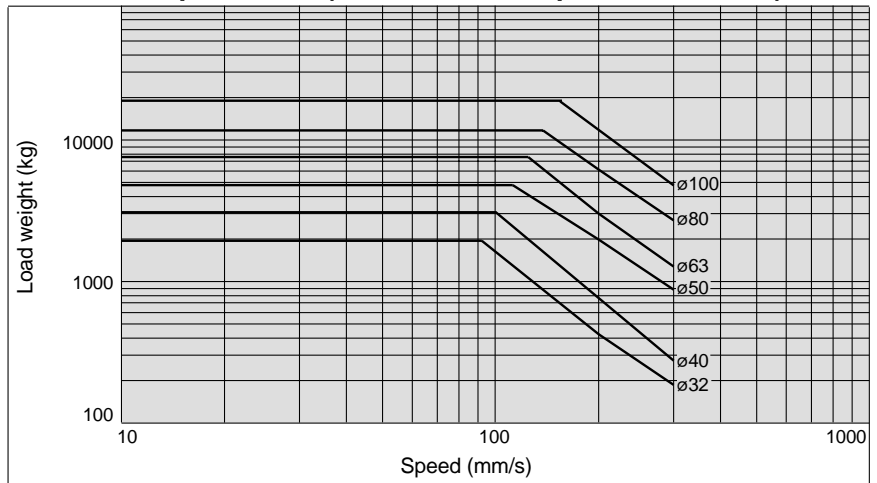
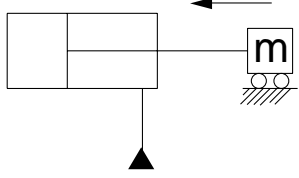


Series CHA (steel tube): Load weight for horizontal motion — Speed chart (extension, pressure 5MPa)

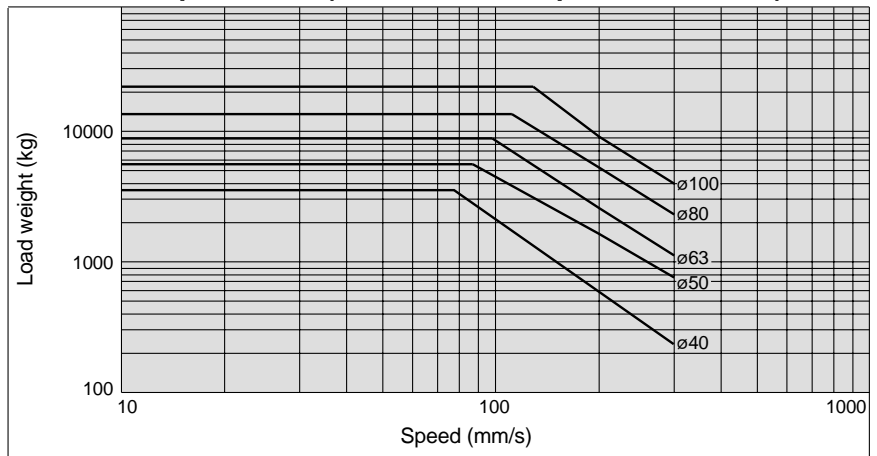
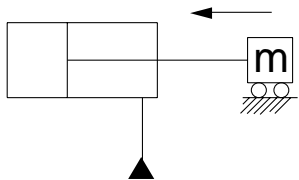


Hydraulic Cylinders: Technical Data 3

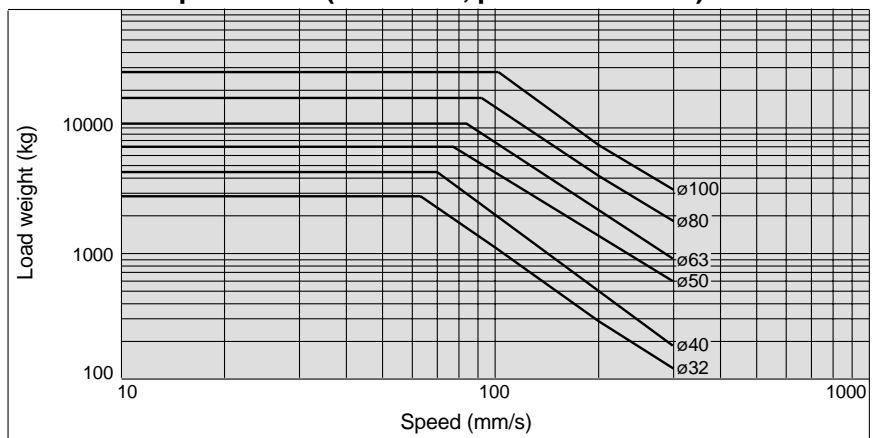
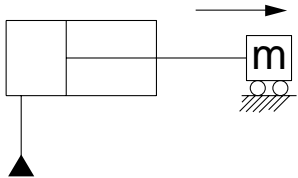
Series CH2E: Load weight for horizontal motion — Speed chart (B-rod retraction, pressure 3.5MPa)



Series CH2E: Load weight for horizontal motion — Speed chart (C-rod retraction, pressure 3.5MPa)

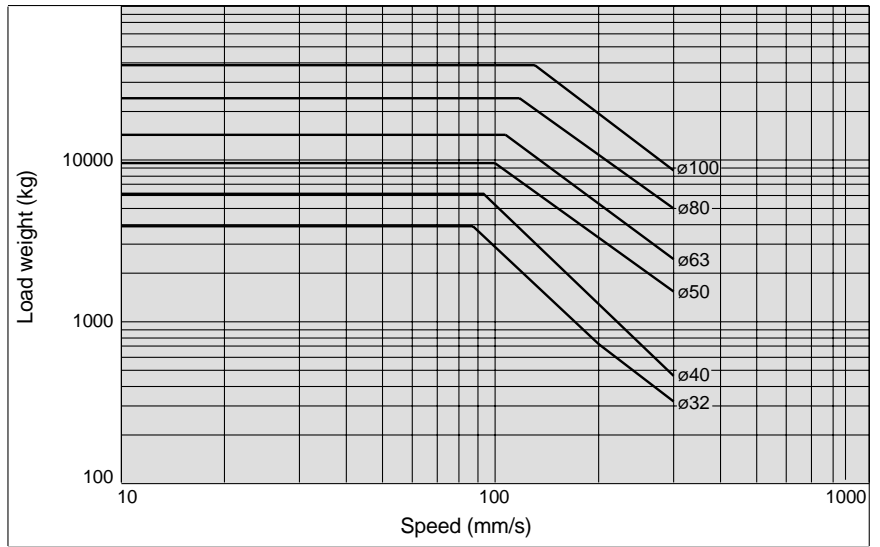
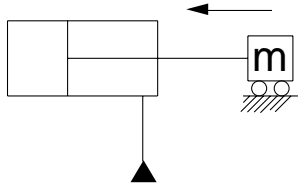


Series CH2E: Load weight for horizontal motion — Speed chart (extension, pressure 3.5MPa)

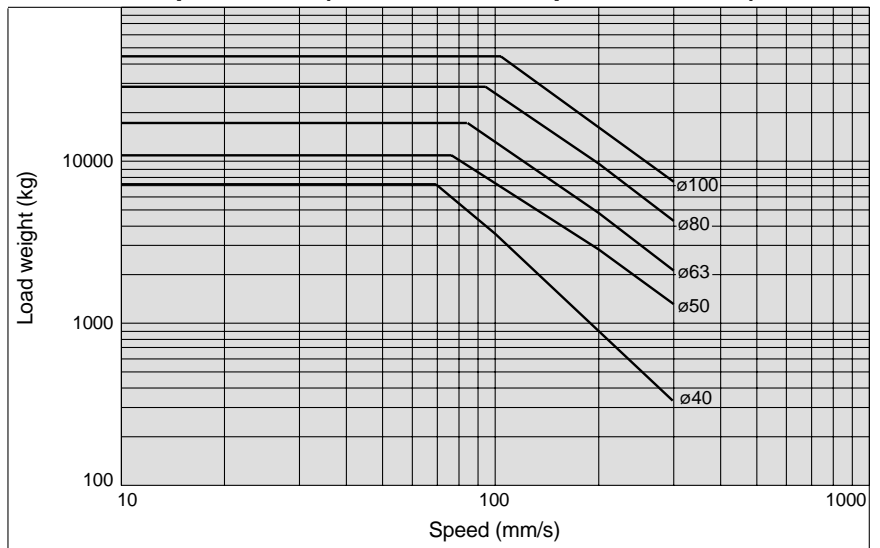
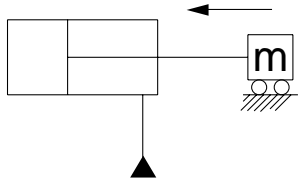


Technical Data 3

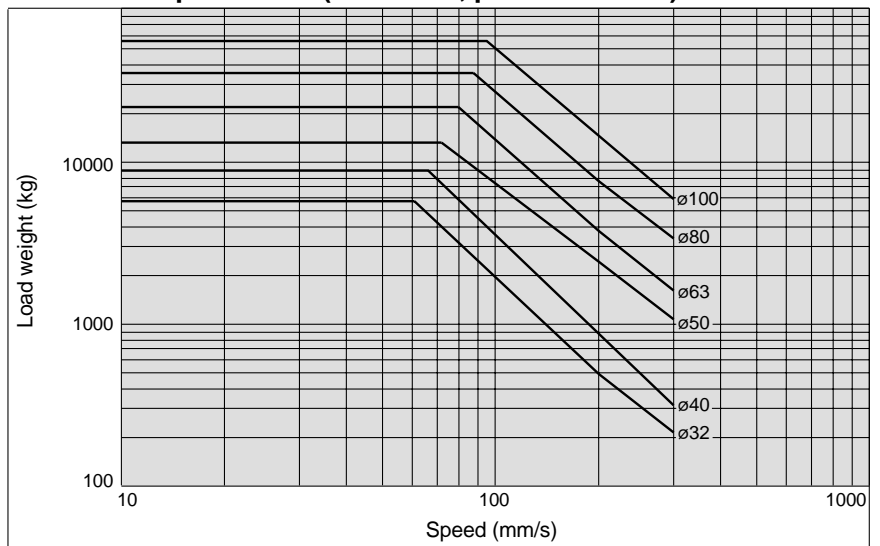
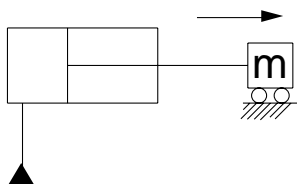
Series CH2F: Load weight for horizontal motion — Speed chart (B-rod retraction, pressure 7MPa)



Series CH2F: Load weight for horizontal motion — Speed chart (C-rod retraction, pressure 7MPa)

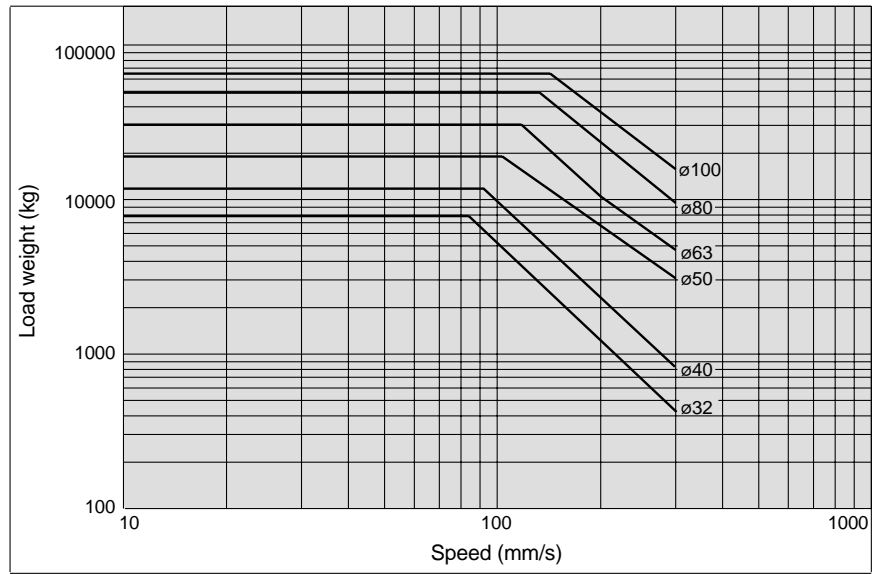
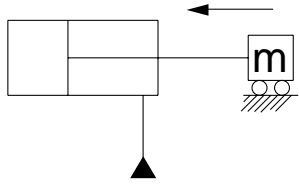


Series CH2F: Load weight for horizontal motion — Speed chart (extension, pressure 7MPa)

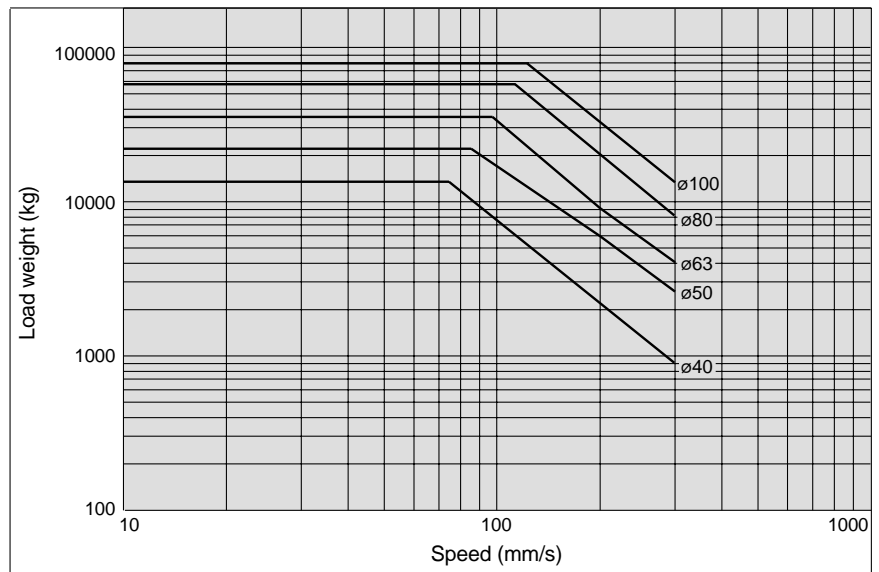
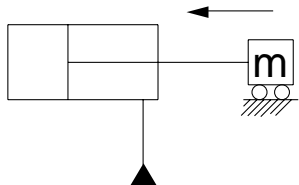


Hydraulic Cylinders: Technical Data 3

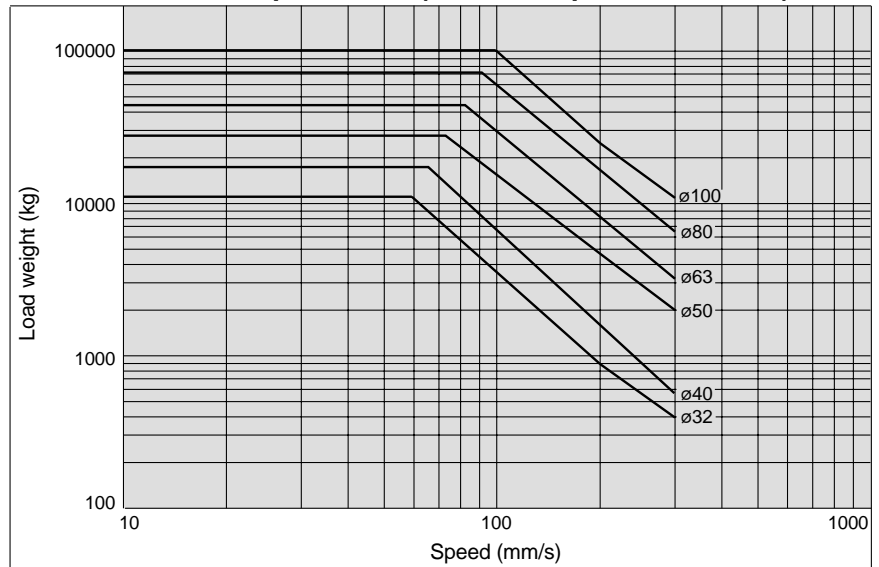
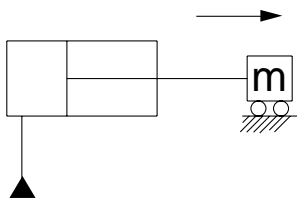
Series CH2G, CH2H: Load weight for horizontal motion — Speed chart (B-rod retraction, pressure 14MPa)



Series CH2G, CH2H: Load weight for horizontal motion — Speed chart (C-rod retraction, pressure 14MPa)



Series CH2G, CH2H: Load weight for horizontal motion — Speed chart (extension, pressure 14MPa)



Hydraulic Cylinders Technical Data 4

Piston Speed, Required Fluid Volume and Piping Size Selection

This information is intended to help you find the required fluid volume and piping size to operate a cylinder at a specified speed.

Relationship between piston speed and fluid volume

$$Q_1 = \frac{\pi}{4} D^2 \cdot v \cdot \frac{6}{1000} \dots\dots\dots \text{Formula (1)}$$

$$Q_2 = \frac{\pi}{4} (D^2 - d^2) \cdot v \cdot \frac{6}{1000} \dots\dots \text{Formula (2)}$$

- Q₁: Required fluid volume for extension (l/min)
- Q₂: Required fluid volume for retraction (l/min)
- D: Bore size (cm)
- d: Piston rod diameter (cm)
- v: Piston speed (mm/s)

It is generally necessary to select a piping diameter that will not allow the fluid flow velocity to exceed the values shown in the chart below.
If the fluid flow velocity exceeds this value, turbulent flow and overheating may occur in conjunction with pressure loss.

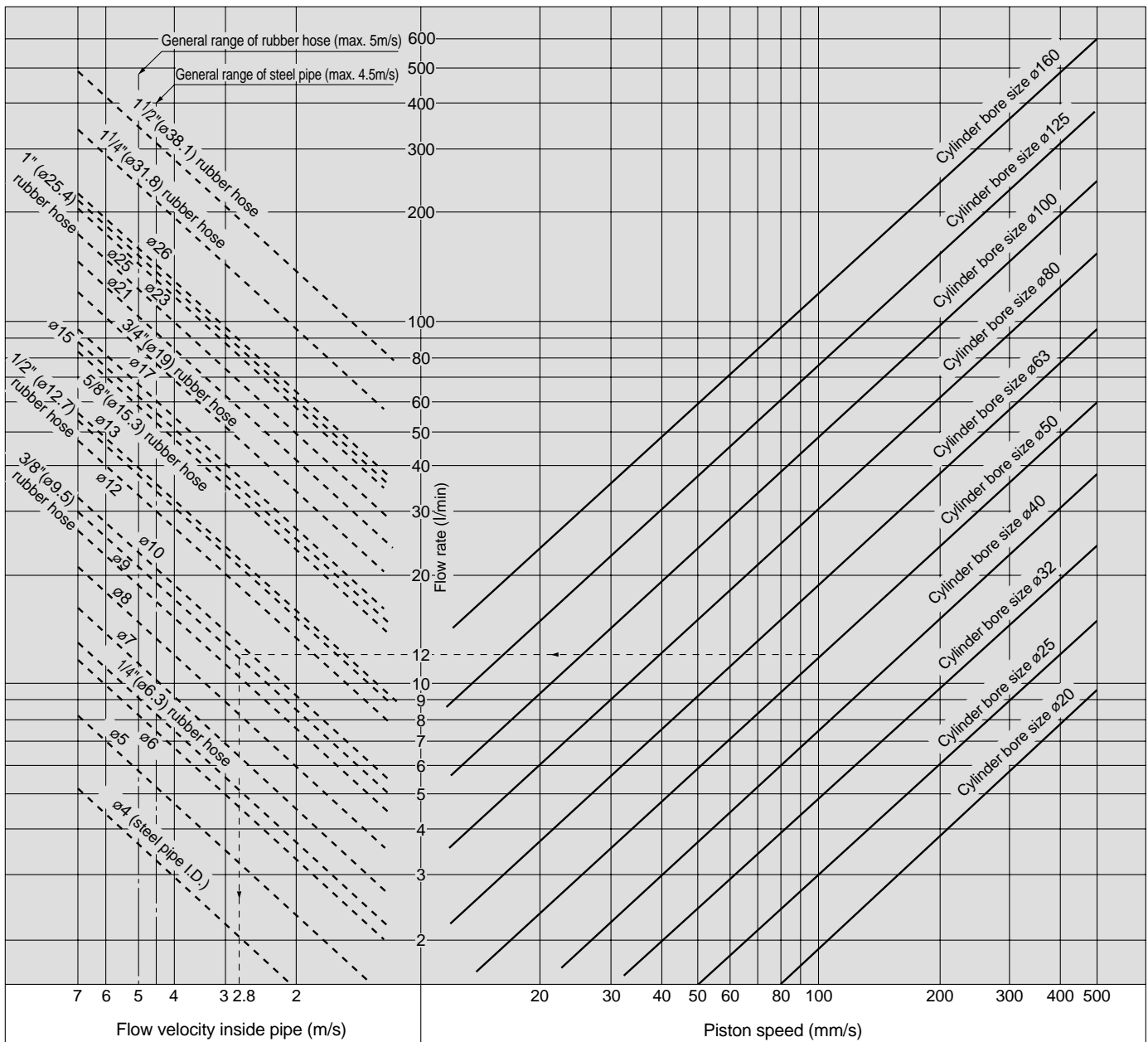
Effective inside diameter of piping

$$V = \frac{Q}{\frac{\pi}{4} \text{din}^2 \times 10^{-3}} \cdot \frac{1}{60} \dots\dots\dots \text{Formula (3)}$$

- V: Fluid flow velocity (m/s)
- Q: Fluid volume (l/min)
- din: Effective inside diameter of piping (mm)

Fluid flow velocity

Rubber hose	5m/s
Steel piping	4.5m/s



How to read the chart: Example) The required flow rate necessary to operate a ø50 cylinder at a speed of 100mm/s is 12 l/min.
When the 3/8" (ø9.5) rubber hose is used for piping, the flow velocity in the piping will be about 2.8m/s.



Hydraulic Cylinders

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "**Caution**", "**Warning**", or "**Danger**". To ensure safety, be sure to observe ISO 4413 Note 1), JIS B 8361 Note 2) and other safety practices.

⚠ Caution : Operator error could result in injury or equipment damage.

⚠ Warning : Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4413: Hydraulic fluid power — General rules for the application of equipment to transmission and control systems

Note 2) JIS B 8361: General Rules for Hydraulic Equipment

⚠ Warning

1. The compatibility of hydraulic cylinders is the responsibility of the person who designs the hydraulic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility with the specific hydraulic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. Only trained personnel should operate hydraulic machinery and equipment.

Oil hydraulics can be dangerous if an operator is unfamiliar with it. Assembly, handling, or repair of hydraulic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the oil supply pressure and electric power for this equipment and confirm that there is no pressure in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc., and proceed with caution.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, press applications, or safety equipment.
3. An application that has the possibility of having negative effects on people, property, or animals, and therefore requires special safety analysis.



Hydraulic Cylinder Precautions 1

Be sure to read before handling.

Design

Warning

1. **There is a danger of sudden or erratic action by cylinders if sliding parts of machinery are twisted, causing changes in forces to occur.**

In such cases, human injury may occur, e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machinery should be adjusted to operate smoothly and designed to prevent such dangers.

2. **A protective cover is recommended to minimize the risk of personal injury.**

If driven objects and moving parts of a cylinder pose a serious danger of human injury, design the structure to avoid direct contact with the human body.

3. **Securely tighten all stationary parts and connected parts so that they will not become loose.**

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

4. **A deceleration circuit or shock absorber may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact. In this case, the rigidity of the machinery should also be examined.

5. **Take into account a possible drop in operating pressure due to a power outage.**

When a cylinder is used as a clamping mechanism, there is a danger of a work piece dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage. Therefore, safety equipment should be installed to prevent damage to machinery and human injury. Suspension mechanisms and lifting devices also be considered as drop prevention equipment.

6. **Take into account a possible loss of power source.**

Measures should be taken to protect against human injury and equipment damage in the event that there is a loss of power to equipment controlled by air pressure, electricity, or hydraulics.

7. **Design circuitry to prevent sudden lurching of driven objects.**

When hydraulic pressure in a cylinder is zero, the driven object will lurch at high speed if pressure is applied to one side of the piston. Therefore, equipment should be selected and circuits designed to prevent sudden lurching because there is a danger of human injury and/or damage to equipment when this occurs.

8. **Take into account emergency stops.**

Design the system so that human injury and/or damage to machinery and equipment will not occur when machinery is stopped by a manual emergency stop or a safety device triggered by abnormal conditions such as a power outage.

Design

Warning

9. **Consider the action of the system when operation is restarted after an emergency stop or abnormal stop.**

Design machinery so that human injury or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the starting position, install safe manual control equipment.

Selection

Warning

1. **Confirm the specifications.**

The products featured in this catalog are designed for use in industrial hydraulic system applications only. If the products are used in conditions where pressure and/or temperature are out of specification, damage and/or malfunction may occur. Do not use in these conditions. (Refer to specifications.)

Consult with SMC if a fluid other than hydraulic fluid is to be used.

2. **Intermediate stops**

Since hydraulic cylinders are not guaranteed for zero fluid leakage, it may not be possible to hold a stopped position for an extended period of time.

3. **Consider surge pressure.**

Use cylinders that can withstand the surge pressures (maximum allowable pressure) generated in hydraulic systems. (Refer to specifications.)

Inside cylinders, pressure that is higher than the set pressure for the relief valve may be generated, e.g., internal pressure due to load inertia or surge pressure when switching valves.

Consider these factors and determine the operating pressure so that the pressure generated inside cylinders will be within the maximum allowable pressure.

Pressure terminology used in this catalog is defined as follows:

Nominal pressure: Pressure assigned to a cylinder for convenient identification. It is not necessarily the same as the operating pressure which guarantees performance under specified conditions.

Maximum allowable pressure: The maximum allowable value for the pressure that is generated inside cylinders (such as surge pressure).

Proof pressure: Test pressure that the cylinder must be able to withstand without lowering system performance when returning to the nominal pressure.

Minimum operating pressure: Minimum pressure at which a horizontally installed cylinder operates with no-load.

4. **Take into account compatibility with hydraulic fluids.**

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 regarding fluids marked "*".



Hydraulic Cylinder Precautions 2

Be sure to read before handling.

Selection

⚠ Caution

1. Operate within the limits of the maximum stroke.

The piston rod will be damaged if operated beyond the maximum stroke. Refer to the hydraulic cylinder stroke selection procedures (pages 123 to 127) for maximum strokes.

2. Operate the piston within a range that will prevent impact damage from occurring at the stroke end.

Ensure a safety margin so that damage will not occur when the piston, having inertial force, stops by striking the cover at the stroke end.

1. Take load factors and piston speed on page 120 into consideration and determine the operability by referring to "Relationship between load weight speed" charts on pages 128 through 132.
2. When using cylinders without a cushion, either slow the speed down so that it is 50mm/s or less (i.e., a speed where no metal sounds are heard) when the piston hits the cover, or install a stopper on the outside of the cylinder.

3. Use a flow control valve to adjust the hydraulic cylinder drive speed, gradually increasing from a low speed to the desired speed setting.

4. Provide intermediate supports for long stroke cylinders.

Provide intermediate supports for cylinders with long strokes to prevent piston rod damage due to sagging of the piston rod, deflection of the tube, vibration and external loads.

Mounting

⚠ Caution

1. Be certain to align the axis center of the piston with the load and direction of movement when connecting.

When not properly aligned, twisting of the piston rod and tubing may occur, and damage may be caused due to wear on areas such as the inner tube surface, bushings, piston rod surface and seals.

2. When an external guide is used, connect the piston rod end and the load in such a way that there is no interference at any point within the stroke.

3. Do not scratch or gouge the sliding parts of the cylinder tube by striking or grasping it with other objects.

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation.

4. Do not use until you can verify that equipment can operate properly.

Verify correct mounting by performing suitable function and leakage inspections after piping and power is connected, following mounting, repairs, or conversions.

Mounting

⚠ Caution

5. Instruction manual

The product should be mounted and operated after thoroughly reading the manual and understanding its contents.

Keep the instruction manual where it can be referred to easily.

Piping

⚠ Caution

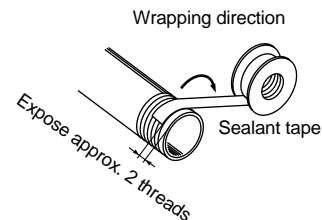
1. Preparation before piping

Before piping is connected, it should be thoroughly flushed out with air or water to remove chips, cutting oil and other debris.

2. Wrapping of sealant tape

When screwing together pipes and fittings, be certain that chips from the pipe threads and sealing material do not get inside the piping.

Also, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



3. Set up so that air cannot accumulate inside piping.

Cushion

⚠ Caution

1. Readjust using the cushion needle.

Cushions are adjusted at the time of shipment. However, the cushion needle on the cover should be readjusted when the product is put into service, based on factors such as the size of the load and the operating speed. When the cushion needle is turned clockwise, the restriction becomes smaller and the cushion's effectiveness is increased.

2. Do not operate with the cushion needle fully closed.

This will contribute to the generation of surge pressure, and the cylinder or equipment can be damaged.

3. Do not loosen the cushion needle too much.

This can cause fluid to be blown out.



Hydraulic Cylinder Precautions 3

Be sure to read before handling.

Air Release

⚠ Caution

- 1. Operate after opening the air release valve and completely releasing any internal air.**
Residual air can cause a malfunction.
- 2. When adjusting the air release, do not loosen the plug too much.**
Use caution, since loosening the plug too much may cause it to fly out or fluid to blow out, posing a danger of human injury.

Hydraulic Fluid

⚠ Warning

1. Use clean fluid.

Do not use deteriorated fluid or fluid containing foreign matter, moisture or corrosive additives, as this can cause the malfunction and damage or corrosion of parts.

⚠ Caution

1. Install hydraulic fluid filters.

Provide your hydraulic system with hydraulic fluid filters with a filtration degree of 10mm or finer.

Refer to SMC's hydraulic filter specifications.

2. Use the product within the specified range of fluid and ambient temperature.

Take measures to prevent freezing, since moisture in hydraulic fluid will freeze at 0°C or below and this may cause damage to seals and lead to a malfunction.

3. Use hydraulic fluid with a viscosity grade equivalent to ISO VG32 or VG46.

Operating Environment

⚠ Warning

- 1. Do not use in environments where there is a danger of corrosion.**
Refer to the construction drawings for cylinder materials.
- 2. In dusty locations, or where there is exposure to chips and spatter, install a protective cover.**
When there is splashing or spraying of water or coolant, use water resistant hydraulic cylinders.

Maintenance

⚠ Warning

1. Perform maintenance inspection and services according to the procedures indicated in the instruction manual.

Improper handling and maintenance services may cause malfunctioning and damage of machinery or equipment to occur.

2. Removal of equipment

When machinery is removed, first ensure that the appropriate measures are in place to prevent the fall or sudden erratic movement of driven objects and equipments. Then cut off the electric power and reduce the pressure in the system to zero.

When machinery is restarted, proceed with caution after confirming measures to prevent cylinder lurching.

⚠ Caution

1. Perform periodic maintenance procedures on filters installed in a hydraulic system in order to keep the fluid clean.

If the fluid used in hydraulic cylinders contains foreign matter, parts such as the piston seals and rod seals will be damaged.



Auto Switch Precautions 1

Be sure to read before handling.

Design and Selection

Warning

1. Confirm the specifications.

Read the specifications carefully and use the product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications for load current, voltage, temperature or impact.

2. Take precautions when multiple cylinders are used close together.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

3. Monitor the length of time that a switch is ON at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V(\text{mm/s}) = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

In case of a high piston speed, it is possible to extend the operating time of the load by using an auto switch (D-F5NT, D-F7NT, and D-G5NT) with a built-in off delay timer (approx. 200ms).

4. Keep wiring as short as possible.

<Reed switches>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

- 1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5m or longer.
- 2) Even when an auto switch has a built-in contact protection circuit, if the lead wire length is 30m or more, the rush current cannot be adequately absorbed and the life of the switch may be shortened. Contact SMC, as it may be necessary in this case to connect a contact protection box to extend the switch life.

<Solid state switches>

- 3) Although wire length should not affect switch function, use a wire 100m or shorter.

5. Monitor the internal voltage drop of the switch.

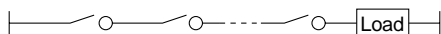
<Reed switches>

- 1) Switches with an indicator light (except D-A56, D-A76H, D-A96, D-A96V, D-C76, D-Z76)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



- Similarly, when operating below a specified voltage, it is possible that the load may be inoperable even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (D-A6□, D-A80, D-A80H, D-A90, D-A90V, D-B64, D-C80, or D-Z80).

<Solid state switches>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also, note that a 12VDC relay is not applicable.

6. Be careful of leakage current.

<Solid state switches>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

$$\text{Operating current of load (OFF condition)} > \text{Leakage current}$$

If the condition given in the above formula is not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Reed switches>

If driving a load such as a relay that generates surge voltage, use a switch with a built-in contact protection circuit or a contact protection box.

<Solid state switches>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid valve, that generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also, perform periodic maintenance inspection and confirm proper operation.

9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance inspections.



Auto Switch Precautions 2

Be sure to read before handling.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to the lead wires.

2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (such as contact with other circuits, ground fault, or improper insulation between terminals). Damage may occur due to excess current flow into a switch.

4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise from these other lines.

5. Do not allow short circuit of loads.

<Reed switches>

If the power is turned ON with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switches>

D-F9BAL, D-J51 and all models of PNP output type switches do not have built-in short circuit protection circuits. If loads are short circuited, the switches will be instantly damaged, as in the case of reed switches.

* Take special care to avoid reverse wiring with the brown [red] power supply line and the black [white] output line on 3-wire type switches.

6. Avoid incorrect wiring.

<Reed switches>

* A 24VDC switch with indicator light has polarity. The brown [red] lead wire or terminal no. 1 is (+), and the blue [black] lead wire or terminal no. 2 is (-).

1) If connections are reversed, the switch will still operate, but the light emitting diode will not light up.

Also note that a current greater than specified will damage a light emitting diode and make it inoperable.

Applicable models: D-A73, D-A73H, D-A73C, D-C73,

D-C73C, D-Z73,

D-A93, D-A93V,

D-A33, D-A34, D-A44,

D-A53, D-A54, D-B53, D-B54

2) Note however, in the case of 2-color display type auto switches (D-A79W, D-A59W, and D-B59W), if the wiring is reversed, the switch will be in a normally ON condition.

Wiring

Warning

<Solid state switches>

1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will be in a normally ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

*2) Even if (+) and (-) power supply line connections are reversed on a 3-wire type switch, the switch will still be protected by a protection circuit. However, if the (+) power supply line is connected to the blue [black] wire and the (-) power supply line is connected to the black [white] wire, the switch will be damaged.

* Lead wire color changes

Lead wire colors of SMC switches have been changed in order to meet NECA Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided.

Special care should be taken regarding wire polarity during the time that the old colors still coexist with the new colors.

2-wire

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

3-wire

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

Solid state with diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

Solid state with latch type diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange



Auto Switch Precautions 3

Be sure to read before handling.

Mounting and Adjustment

⚠ Warning

1. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (300m/s² or more for reed switches and 1000m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of tightening torque, the mounting screws, mounting bracket, or switch may be damaged.

On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position. (Refer to the switch mounting procedure for each series regarding switch mounting, movement and tightening torque, etc.)

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalog indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), operation will be unstable.

Operating Environment

⚠ Warning

1. Never use in an atmosphere of explosive gases.

The construction of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Consult with SMC regarding the availability of magnetic field resistant auto switches.)

3. Do not use in an environment where the auto switch will be continually exposed to water.

With the exception of some models (D-A3□, D-A44, D-G39□, D-K39□), switches satisfy IEC standard IP67 construction (JIS C 0920: watertight construction). Nevertheless, they should not be used in applications where they are continually exposed to water splash or spray. This may cause deterioration of the insulation or swelling of the potting resin inside switches and may cause a malfunction.

Operating Environment

⚠ Warning

4. Do not use in an environment with oil or chemicals.

Consult with SMC if auto switches will be used in an environment laden with coolants, cleaning solvents, various oils, or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by a deterioration of the insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

6. Do not use in an environment where there is excessive impact shock.

<Reed switches>

When excessive impact (300m/s² or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1ms or less). Consult with SMC regarding the need to use a solid state switch depending on the environment.

7. Do not use in an area where surges are generated.

<Solid state switch>

When there are units (such as solenoid type lifters, high frequency induction furnaces, motors) that generate a large amount of surge in the area around cylinders with solid state auto switches, their proximity or pressure may cause deterioration or damage to the internal circuit elements of the switches. Avoid sources of surge generation and crossed lines.

8. Avoid accumulation of iron waste or close contact with magnetic substances.

When a large accumulated amount of ferrous waste, such as machining chips or welding spatter, or a magnetic substance (something attracted by a magnet) is brought into close proximity to a cylinder with auto switches, this may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.



Auto Switch Precautions 4

Be sure to read before handling.

Maintenance

Warning

1. Perform the following maintenance inspection and services periodically in order to prevent possible danger due to unexpected auto switch malfunction.

- 1) Securely tighten switch mounting screws.
If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.
- 2) Confirm that there is no damage to lead wires.
To prevent faulty insulation, replace switches or repair lead wires if damage is discovered.
- 3) Confirm that the green light on the 2-color indicator type switch lights up.
Confirm that the green LED is on when stopped at the set position. If the red LED is on, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

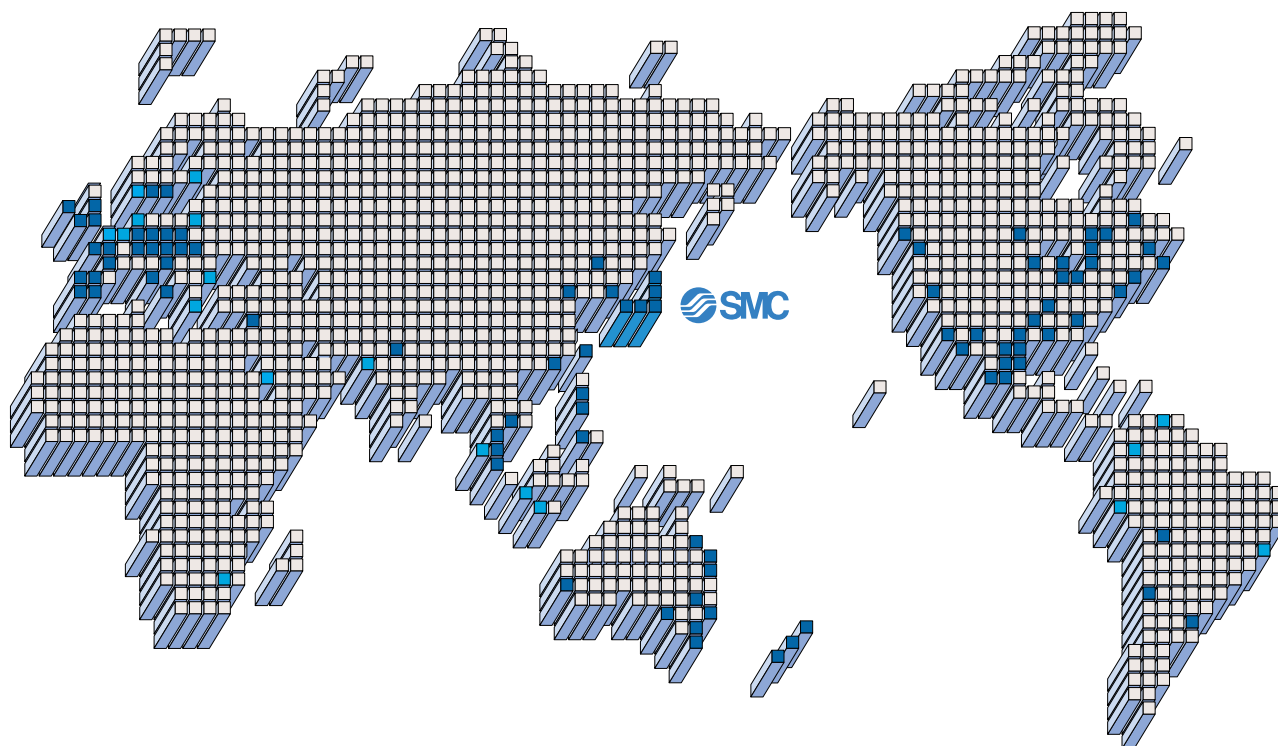
Other

Warning

1. Consult with SMC concerning water resistance, elasticity of lead wires and usage at welding sites.



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