

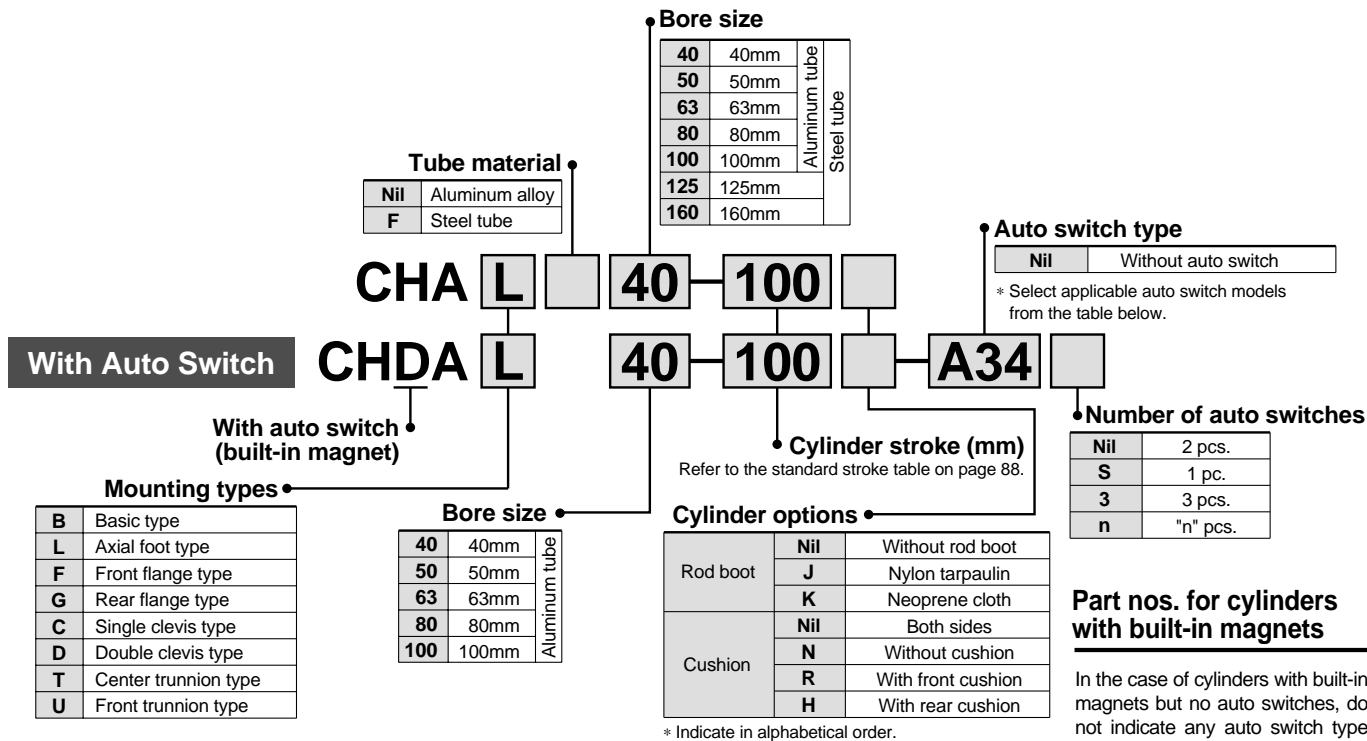
# Tie-rod Type Low Pressure Hydraulic Cylinder Double Acting/Single Rod

## Series *CHA*

3.5MPa

∅40, ∅50, ∅63, ∅80, ∅100, ∅125, ∅160

### 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.

(Example) CHDAB50-100□

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	—	
						12V	—	A53	B53	●	●	●	—	PLC	
				12V	100V 200V	A54	B54	●	●	●	—	Relay PLC			
				5V, 12V	—	A67	—	●	●	—	IC circuit	PLC			
		Terminal conduit DIN terminal	Yes	2-wire	24V	5V, 12V	200V or less	A64	B64	●	●	—	Relay, PLC		
						—	—	A33	—	—	—	—	PLC		
				12V	100V 200V	—	A34	—	—	—	—	Relay PLC			
Diagnostic indication (2-color display)	Grommet	—	—	—	—	A59W	B59W	●	●	—	—				
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F59	—	●	●	○	IC circuit	Relay PLC	
				3-wire (PNP)	—	—	100V 200V	F5P	—	●	●	○	—		
				2-wire	—	—	100V 200V	J51	—	●	●	○	—		
				Terminal conduit	12V	—	J59	—	●	●	○	—			
					5V, 12V	—	G39	—	—	—	—	—	IC circuit		
					12V	—	K39	—	—	—	—	—	—		
		Grommet	Yes	3-wire (NPN)	24V	3-wire (NPN)	5V, 12V	—	F59W	—	●	●	○		IC circuit
				3-wire (PNP)					F5PW	—	●	●	○		—
				2-wire		5V, 12V	—	J59W	—	●	●	○	—		
						12V	—	F5BA	—	—	●	○	—		
		Grommet	Yes	3-wire (NPN)	24V	3-wire (NPN)	5V, 12V	—	F5NT	—	—	●	○		IC circuit
				3-wire (PNP)					F59F	—	●	●	○		—
				4-wire (NPN)					—	—	F5LF	—	●		●
Water resistant (2-color display)	Grommet	Yes	2-wire	24V	12V	—	F5BA	—	—	●	○	—			
With timer							F5NT	—	—	●	○	—			
With diagnostic output (2-color display)	Grommet	Yes	3-wire (NPN)	24V	5V, 12V	—	F59F	—	●	●	○	IC circuit			
Latch type with diagnostic output (2-color display)							4-wire (NPN)	—	—	F5LF	—	●	●	○	—

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

Note • Solid state auto switches marked "O" are produced upon receipt of order.

• Types D-B53, D-B54, D-B64, and D-B59W cannot be mounted on ∅63 bore size cylinders.

• **Light aluminum body**

• **Easy position detection with auto switches**

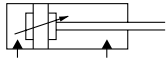
Aluminum cylinder sizes ø40 to ø100 are auto switch capable for easy stroke position detection.

• **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 <sup>Note 2)</sup>	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 <sup>Note 1)</sup>
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)
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\* 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 <sup>2</sup> )	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

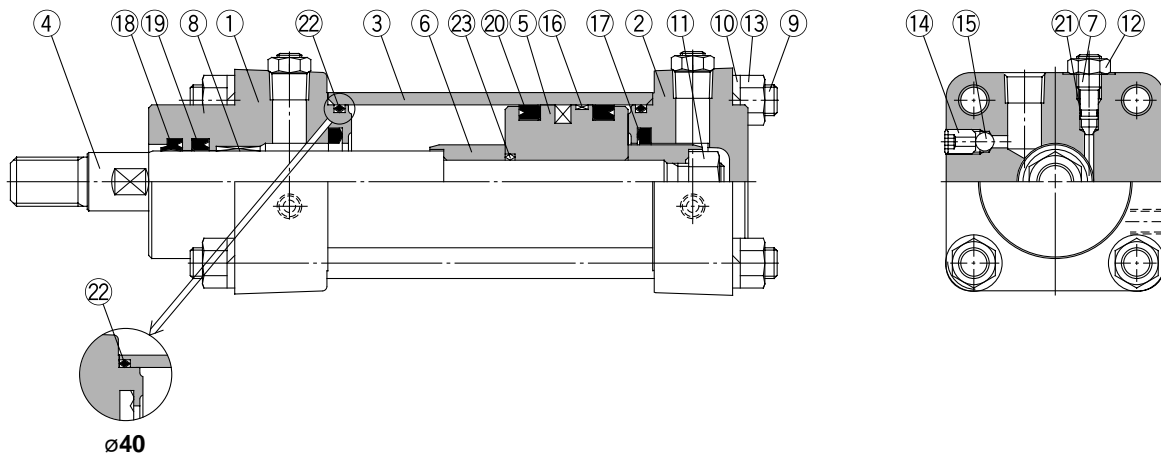
$$2.9 + 0.07 \times 100/10 = 3.6\text{kg}$$

### 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	

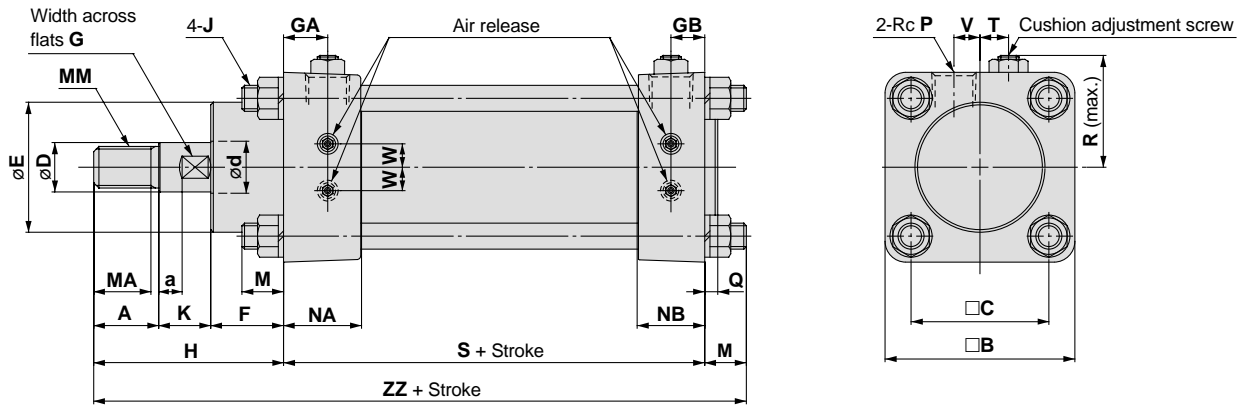
### Replacement parts: Seal kits

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	

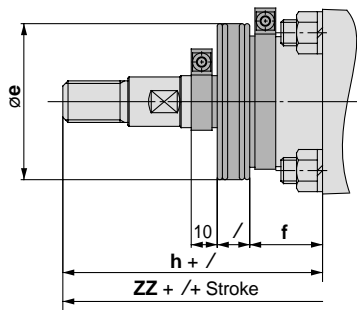
\* Seal kits consist of items 17 through 22 and can be ordered using the seal kit number for each bore size.

## Dimensions

### Basic type: CHAB



#### With rod boot



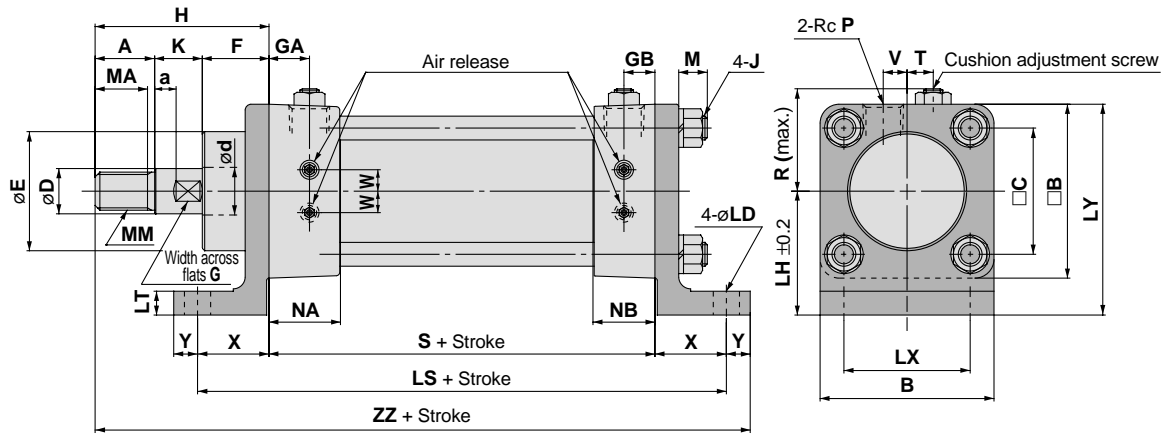
Bore size (mm)	(mm)																								
	A	a	B	C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	Q	R	S	T	V	W
40	23	10	60	44	17 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	25	14	17.5	9.5	M8 x 1.25	18	13	20	M14 x 1.5	30	22	1/4	5	37	106	11	7.5	8
50	25	9	73	53	19 <sup>0</sup> <sub>-0.021</sub>	20	50 <sup>0</sup> <sub>-0.062</sub>	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 <sup>0</sup> <sub>-0.021</sub>	22.4	55 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.021</sub>	28	65 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	45	100 <sup>0</sup> <sub>-0.087</sub>	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

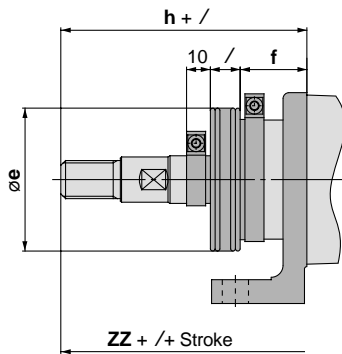
# Series CHA

## Dimensions

### Foot type: CHAL



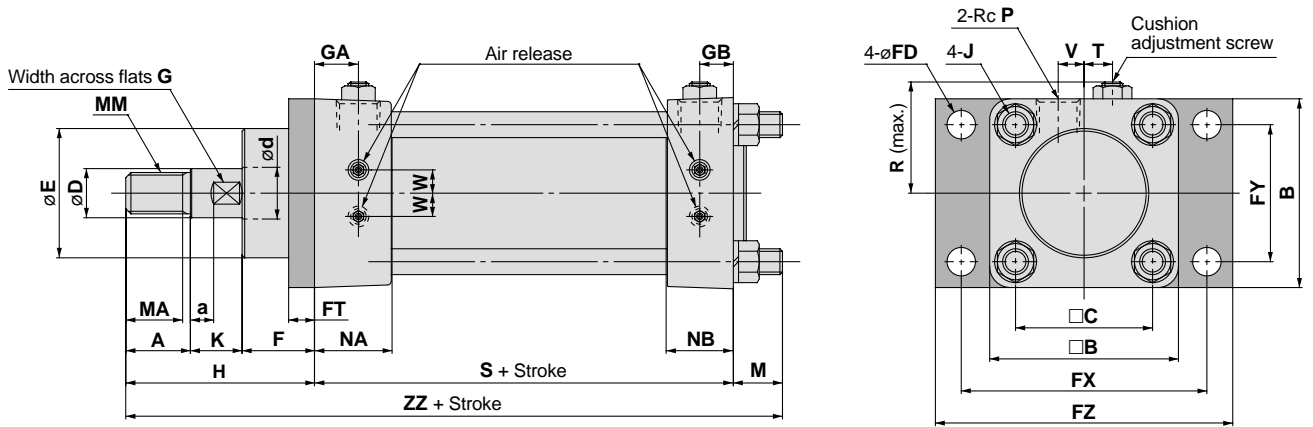
#### With rod boot



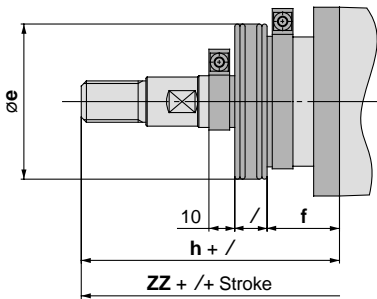
Bore size (mm)	(mm)																								
	A	a	B	$\square B$	C	D	d	E	F	G	GA	GB	J	K	LD	LH	LS	LT	LX	LY	M	MA	MM	NA	NB
40	23	10	60	60	44	17 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	25	14	17.5	9.5	M8 x 1.25	18	9	47	160	8	44	77	10	20	M14 x 1.5	30	22
50	25	9	73	73	53	19 <sup>0</sup> <sub>-0.021</sub>	20	50 <sup>0</sup> <sub>-0.062</sub>	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 <sup>0</sup> <sub>-0.021</sub>	22.4	55 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.021</sub>	28	65 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	45	100 <sup>0</sup> <sub>-0.087</sub>	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 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	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 <sup>0</sup> <sub>-0.021</sub>	20	50 <sup>0</sup> <sub>-0.062</sub>	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 <sup>0</sup> <sub>-0.021</sub>	22.4	55 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.021</sub>	28	65 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	45	100 <sup>0</sup> <sub>-0.087</sub>	38	17	20	205	140	240	36	22	18	M16 x 2	28	34	38	M33 x 2	40	36	3/4

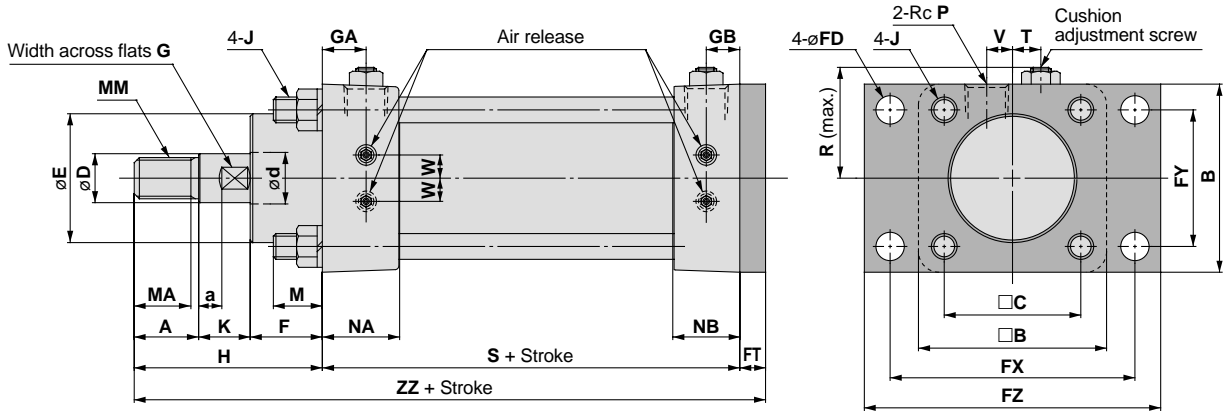
Bore size (mm)						Without rod boot		With rod boot					Z
	R	S	T	V	W	H	ZZ	e	f	h	/		
40	37	106	11	7.5	8	66	188	55	25	92		214	
50	43	112	11	10	9	73	207	60	28	99	1/4 stroke	233	
63	47	116	11	12	10	80	216	65	30	106		242	
80	57	127	11	16	13	90	243	80	32	116		269	
100	66	137	12	20	16	100	263	100	35	123	1/5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



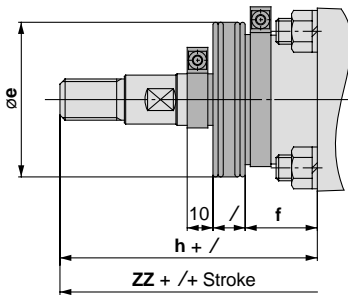
# Series CHA

## Dimensions

### Rear flange type: CHAG



#### With rod boot

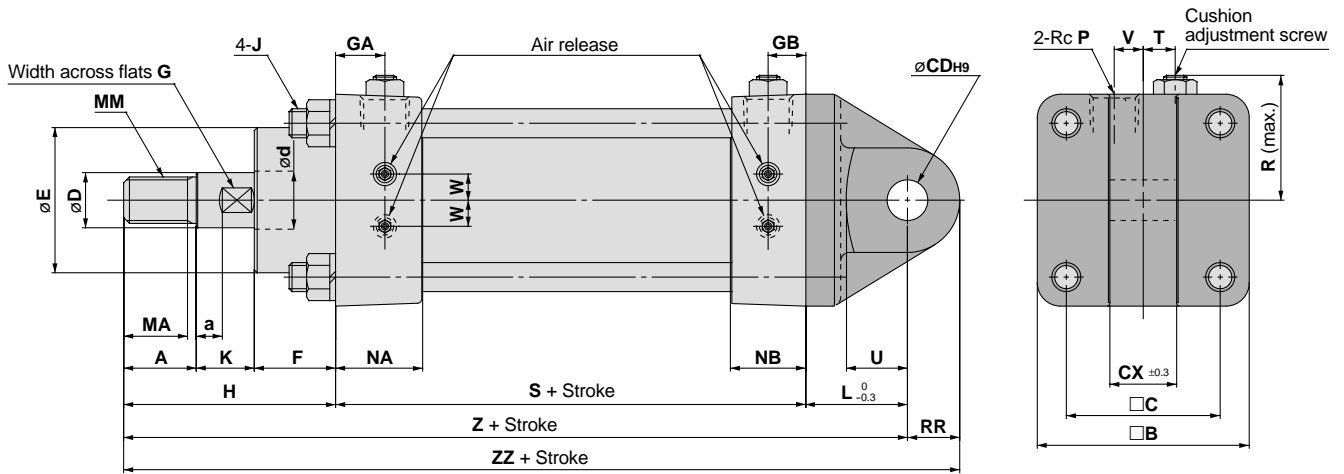


Bore size (mm)	(mm)																								
	A	a	B	C	D	d	E	F	FD	FT	FX	FY	FZ	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R
40	23	10	60	44	17 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	25	9	10	77	44	95	14	17.5	9.5	M8 x 1.25	18	16	20	M14 x 1.5	30	22	1/4	37
50	25	9	73	53	19 <sup>0</sup> <sub>-0.021</sub>	20	50 <sup>0</sup> <sub>-0.062</sub>	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 <sup>0</sup> <sub>-0.021</sub>	22.4	55 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.021</sub>	28	65 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>0</sup> <sub>-0.025</sub>	45	100 <sup>0</sup> <sub>-0.087</sub>	38	17	20	205	140	240	36	22	18	M16 x 2	28	34	38	M33 x 2	40	36	3/4	94

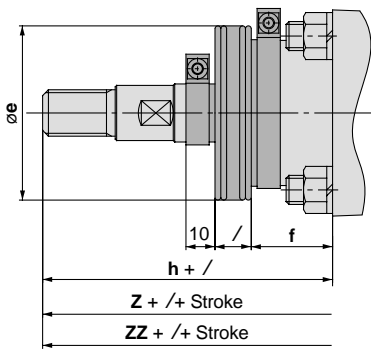
(mm)

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		276	
125	137	12	20	16	100	255	100	35	123	1/5 stroke	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 <sup>+0.043</sup> <sub>0</sub>	21	17 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	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 <sup>+0.043</sup> <sub>0</sub>	23	19 <sup>0</sup> <sub>-0.021</sub>	20	50 <sup>0</sup> <sub>-0.062</sub>	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 <sup>+0.043</sup> <sub>0</sub>	27	21 <sup>0</sup> <sub>-0.021</sub>	22.4	55 <sup>0</sup> <sub>-0.074</sub>	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 <sup>+0.043</sup> <sub>0</sub>	31	26 <sup>0</sup> <sub>-0.021</sub>	28	65 <sup>0</sup> <sub>-0.074</sub>	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 <sup>+0.052</sup> <sub>0</sub>	35	34 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>+0.052</sup> <sub>0</sub>	41	34 <sup>0</sup> <sub>-0.025</sub>	35.5	80 <sup>0</sup> <sub>-0.074</sub>	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 <sup>+0.052</sup> <sub>0</sub>	54	43 <sup>0</sup> <sub>-0.025</sub>	45	100 <sup>0</sup> <sub>-0.087</sub>	38	36	22	18	M16 x 2	28	65	38	M33 x 2	40	36	3/4	94	30	155

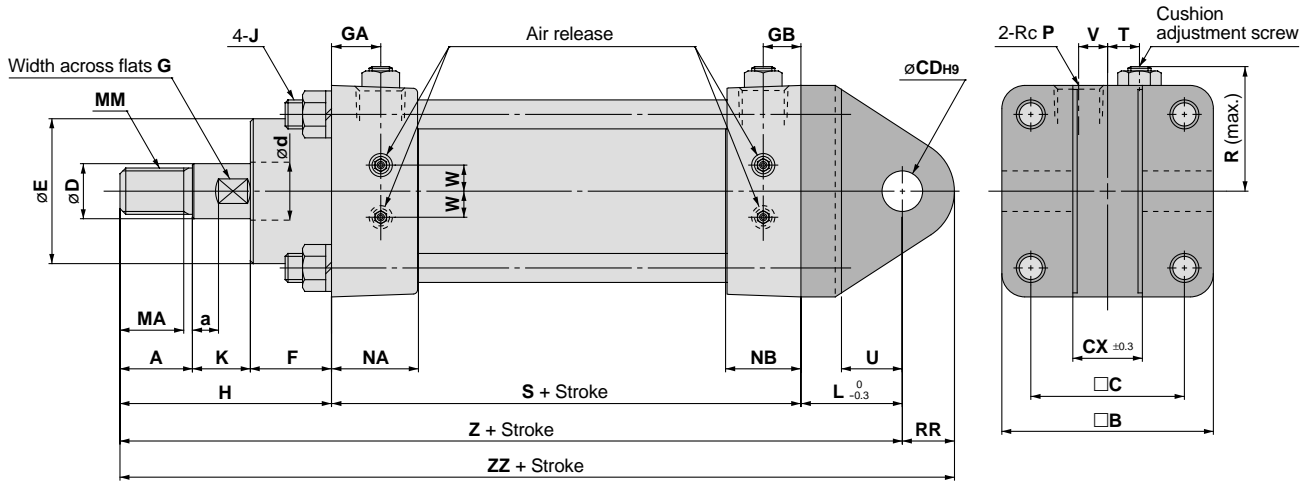
(mm)

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	

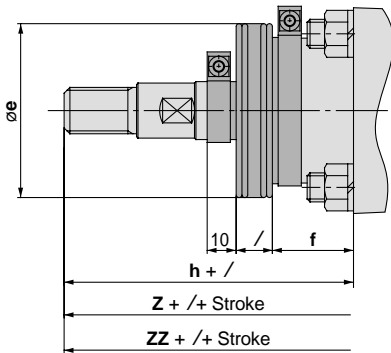
# Series CHA

## Dimensions

### Double clevis type: CHAD



#### With rod boot

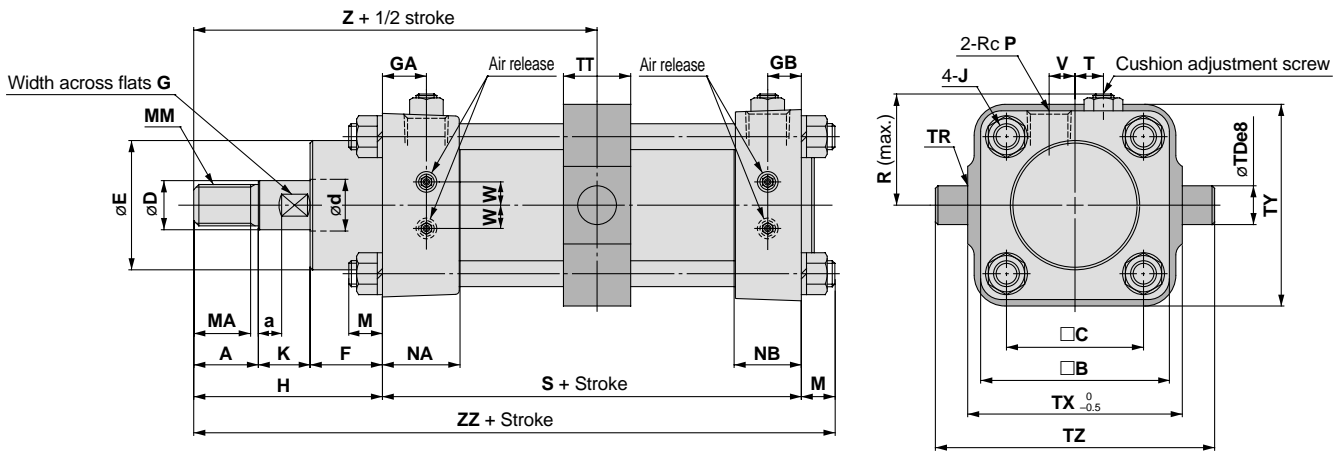


Bore size (mm)	(mm)																							
	A	a	B	C	CDH9	CX	D	d	E	F	G	GA	GB	J	K	L	MA	MM	NA	NB	P	R	RR	S
40	23	10	60	44	$\phi 12H9^{+0.043}_0$	22	$17^{0}_{-0.018}$	18	$45^{0}_{-0.062}$	25	14	17.5	11	M8 x 1.25	18	32	20	M14 x 1.5	30	22	1/4	37	15	106
50	25	9	73	53	$\phi 14H9^{+0.043}_0$	24	$19^{0}_{-0.021}$	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	$\phi 16H9^{+0.043}_0$	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	$\phi 18H9^{+0.043}_0$	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	$\phi 20H9^{+0.052}_0$	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	$\phi 22H9^{+0.052}_0$	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	$\phi 25H9^{+0.052}_0$	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

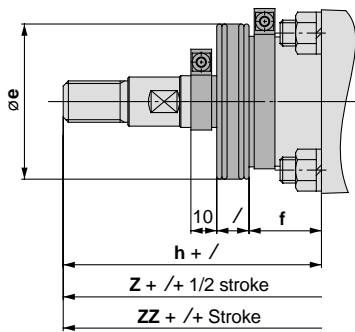
(mm)

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**



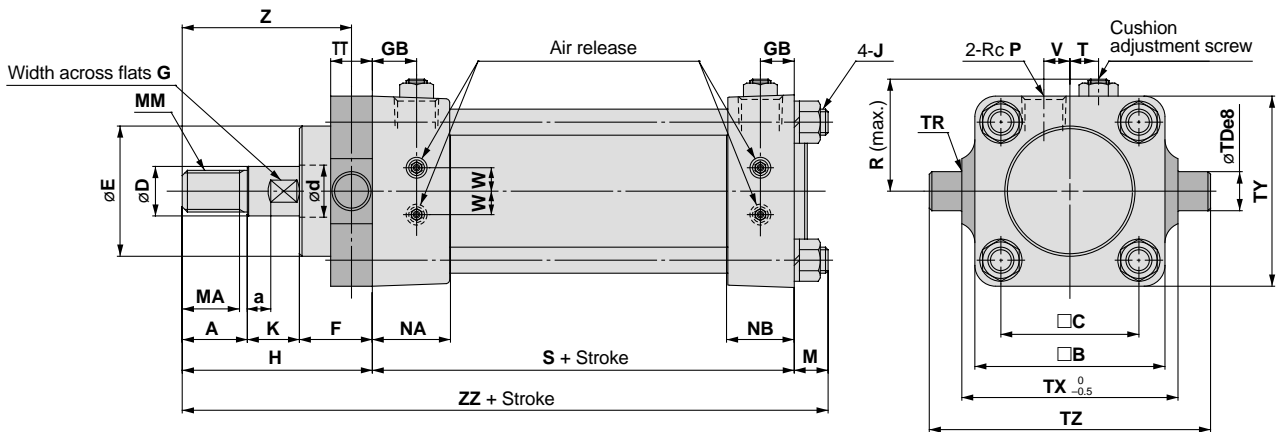
Bore size (mm)	(mm)																						
	A	a	B	C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R	S	T	Tde8
40	23	10	60	44	17 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	25	14	17.5	9.5	M8 x 1.25	18	10	20	M14 x 1.5	30	22	1/4	37	106	11	15 <sup>-0.032</sup> <sub>-0.059</sub>
50	25	9	73	53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

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	

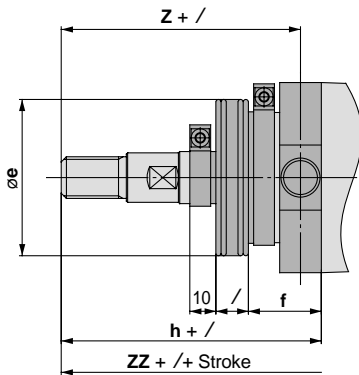
# Series CHA

## Dimensions

### Front trunnion type: CHAU



### With rod boot



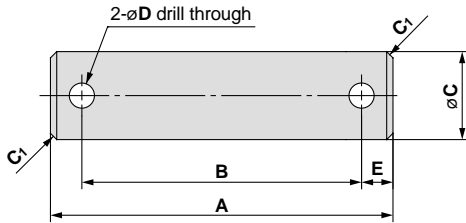
Bore size (mm)	(mm)																						
	A	a	B	C	D	d	E	F	G	GA	GB	J	K	M	MA	MM	NA	NB	P	R	S	T	Tde8
40	23	10	60	44	17 <sup>0</sup> <sub>-0.018</sub>	18	45 <sup>0</sup> <sub>-0.062</sub>	25	14	17.5	9.5	M8 x 1.25	18	10	20	M14 x 1.5	30	22	1/4	37	106	11	15 <sup>-0.032</sup> <sub>-0.059</sub>
50	25	9	73	53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

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

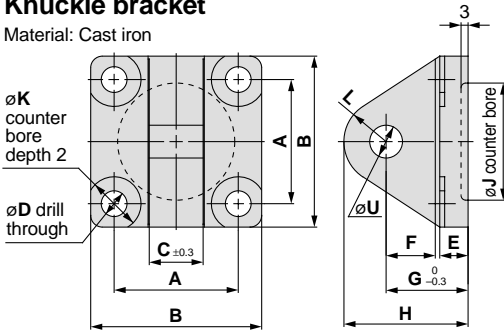
Material: Carbon steel



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

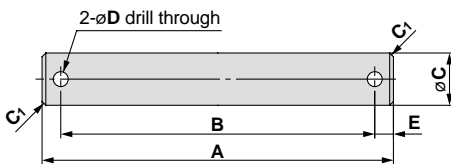
Material: Cast iron



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

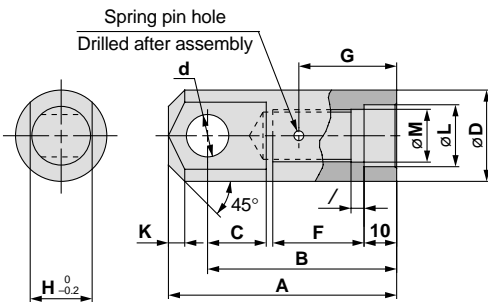
Material: Carbon steel



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

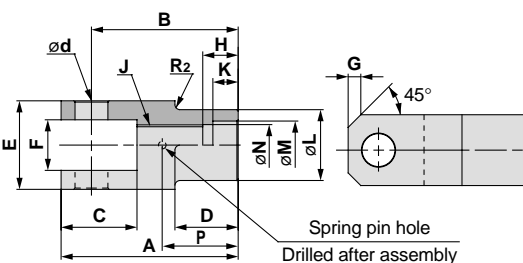
Material: Carbon steel



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

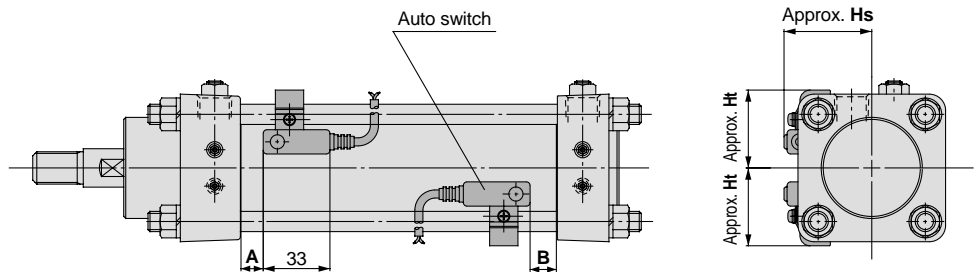
D-A59W

Solid state switches

D-F5□, D-J5□, D-F5NTL

D-F5□W, D-J59W

D-F5BAL, D-F5□F



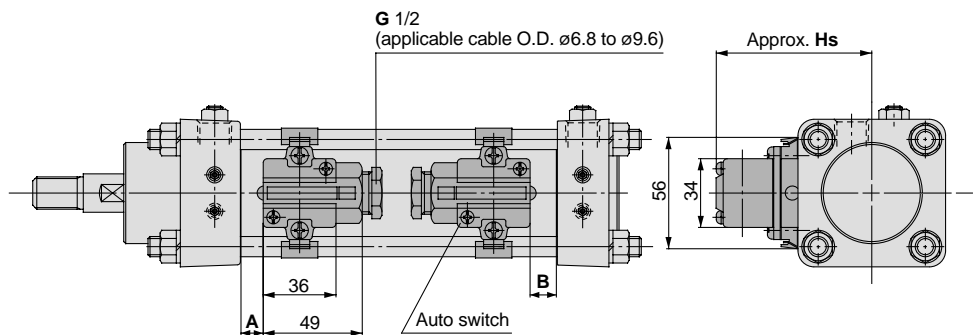
### <Band mount type>

Reed switch

D-A3

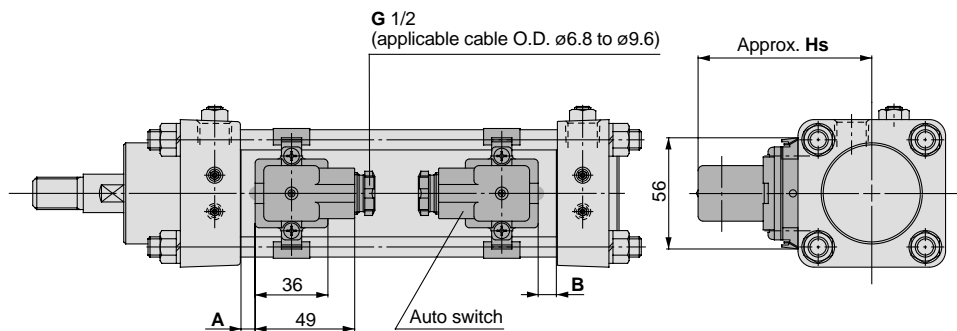
Solid state switches

D-G39, D-K39



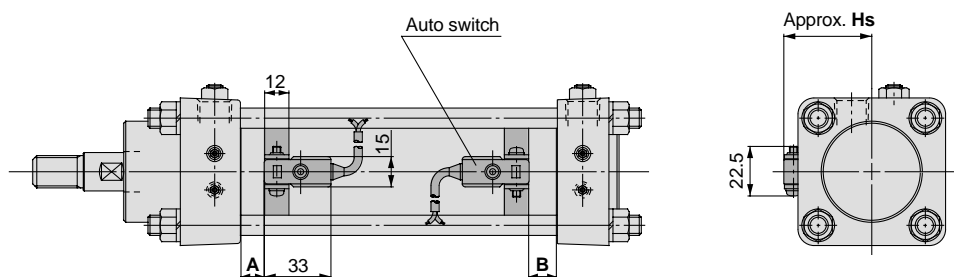
Reed switch

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