ISO Cylinder ISO Standard (15552) New

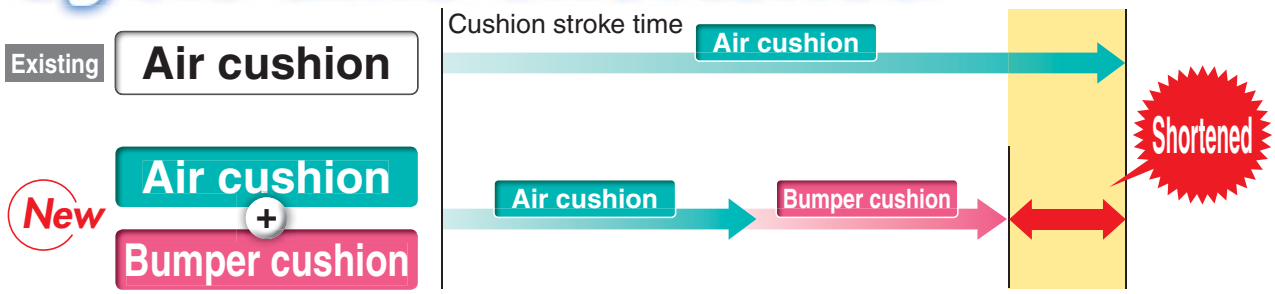
ø32, ø40, ø50, ø63, ø80, ø100

Lightweight Up to 15% Weight reduced

* Compared with the existing CP96 series (ø40, 100 stroke)

By adopting a new cushion method (Air cushion + Bumper cushion),

Cycle time shortened



Bumper cushion reduces the impact noise that occurs when piston stops

Series CP96

SMC

CAT.EUS20-241A-UK

Weight reduced

Achieved weight reduction by changing rod cover shape and piston structure

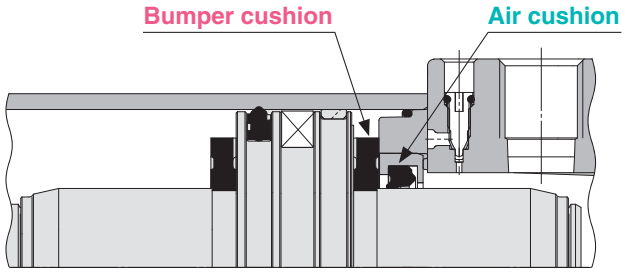
[kg]

Bore size [mm]	New CP96	Reduction rate
32	0.74	11%
40	1.02	15%
50	1.74	11%
63	2.12	12%
80	3.40	11%
100	4.33	11%

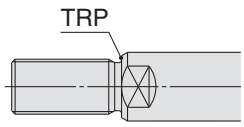
∗ Compared with the existing CP96 series (ø40, 100 stroke)

Air cushion + Bumper cushion Combined structure

- The cushion stroke time can now be reduced with the double cushioning, which improves the cycle time.
- The bumper cushion reduces the impact noise that occurs when the piston stops at the end of the stroke.



Rod end nut can be screwed up to TRP.

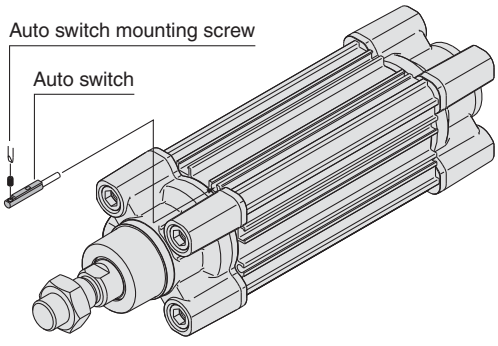


Auto switch mounting

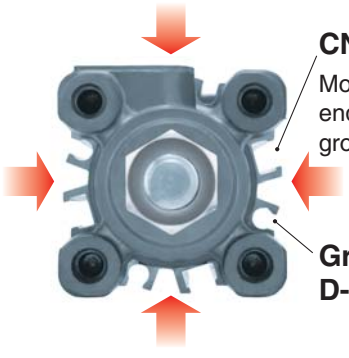
- Switch can be slid in for mounting.
- Groove for M9, A9 switches and CNOMO groove are on all four sides. Max. four sides, slide-in mountable

Auto switch can be slid in.

Mountable from both the head end and the rod end.



Auto switch mounting surface



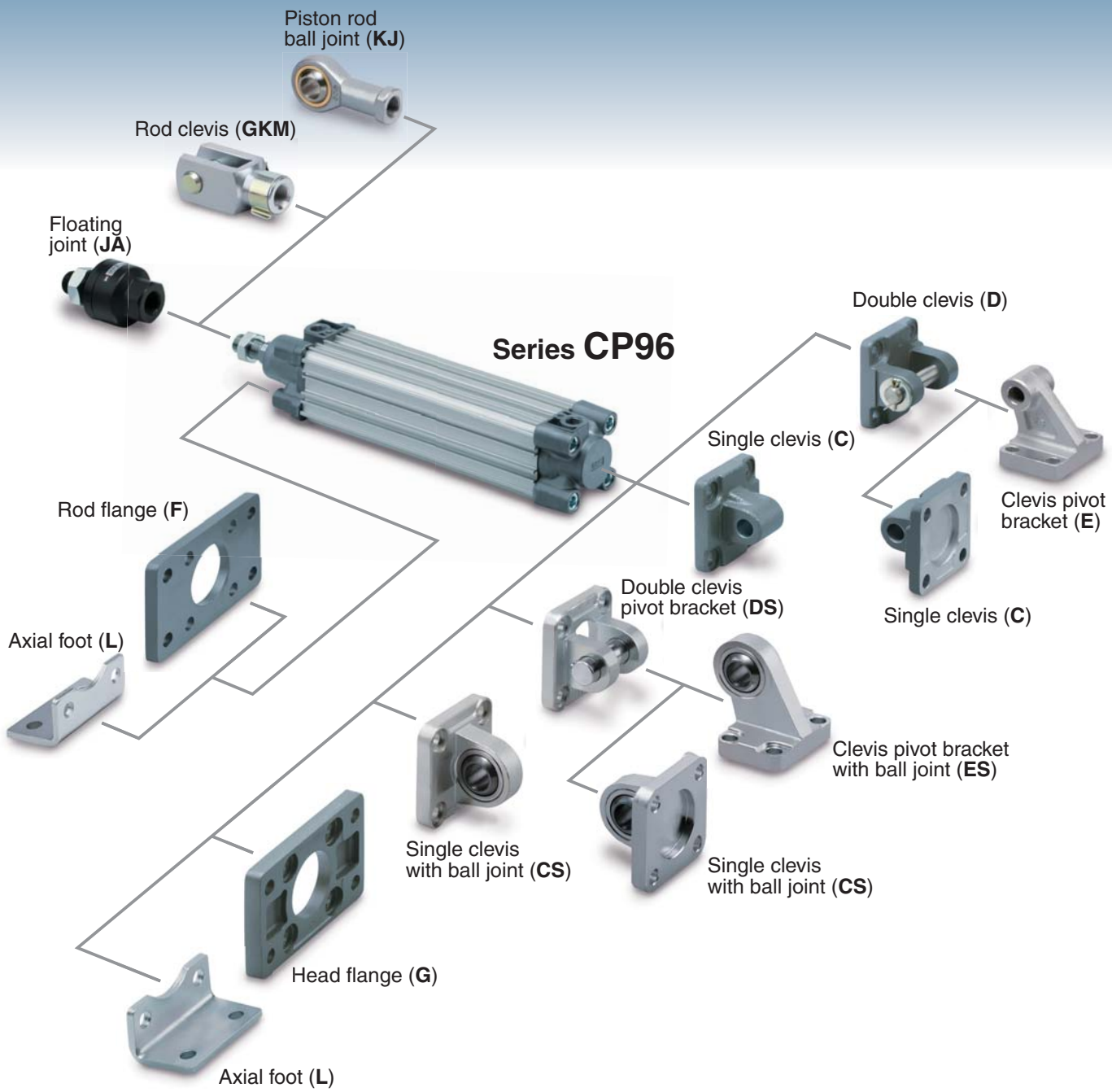
CNOMO grooves

Mount a switch from the head end for attaching to the CNOMO groove on the port surfaces.

Groove for the D-M9□, A9□ type

Various mounting bracket options

Mounting brackets can be combined according to the operating conditions.



ISO Standard (15552)

Air Cylinder: Standard Type
Double Acting, Single Rod

Series CP96

ø32, ø40, ø50, ø63, ø80, ø100

How to order

With auto switch **CP96SD B 32 – 100 C – M9BW S**

With auto switch
(Built-in magnet)

Mounting

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

∗ Mounting brackets are shipped together, (but not assembled).

Bore size

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

Cylinder stroke [mm]
Refer to "Standard Strokes" on page 4.

Air cushion on both ends + Bumper cushion

Auto switch

—	Without auto switch

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

Number of auto switches

—	2 pcs.
S	1 pc.
3	3 pcs.
n	"n" pcs.

Applicable Auto Switches/Refer to **the Auto Switch Guide** for further information on auto switches.

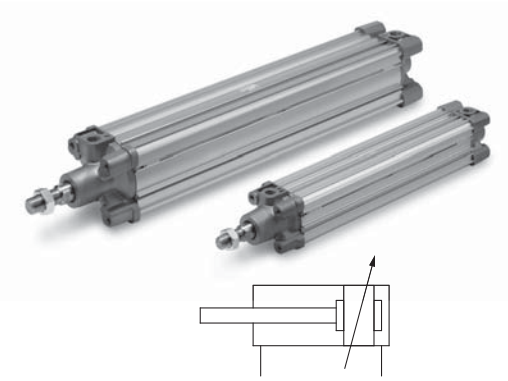
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model	Lead wire length [m] 0.5 (—)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9N**	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9P**	●	●	●	○	○		
				2-wire		12 V		**M9B**	●	●	●	○	○	—	
	Diagnostic indication (2-colour indication)	Grommet		3-wire (NPN)		5 V, 12 V		**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BW**	●	●	●	○	○	—	
	Water resistant (2-colour indication)			3-wire (NPN)		5 V, 12 V		**M9NA**∗∗	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PA**∗∗	○	○	●	○	○		
				2-wire		12 V		**M9BA**∗∗	○	○	●	○	○	—	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96**	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93**	●	—	●	●	—	—	Relay, PLC
							100 V or less	**A90**	●	—	●	—	—	IC circuit	

∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.

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

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

∗ Since there are other applicable auto switches than listed above, refer to **the Auto Switch Guide** for details.
∗ For details about auto switches with pre-wired connector, refer to **the Auto Switch Guide**.
∗ The D-A9□/M9□/M9□W/M9□A auto switches are shipped together, (but not assembled).
(However, only the auto switch mounting brackets are assembled before shipment.)
Note) The D-Y59A, Y69A, Y7P, Y7□W, Z7□, Z80 cannot be mounted on the CP96 series.
Moreover, the D-M9□□ and A9□ auto switches cannot be mounted on square groove of the CP96 series.



Specifications

Bore size [mm]	32	40	50	63	80	100
Action	Double acting					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.05 MPa					
Ambient and fluid temperature	Without auto switch: –20 to 70°C (No freezing) With auto switch : –10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Operating piston speed	50 to 1000 mm/s					
Allowable stroke tolerance	Up to 500 stroke: $^{+2}_{0}$, 501 to 1000 stroke: $^{+2.4}_{0}$, 1001 to 1500 stroke: $^{+2.8}_{0}$, 1501 to 2000 stroke: $^{+3.2}_{0}$					
Cushion	Air cushion on both ends + Bumper cushion					
Port size	G1/8	G1/4	G1/4	G3/8	G3/8	G1/2
Mounting	Basic, Axial foot, Rod flange, Head flange, Single clevis, Double clevis					

Minimum Stroke for Auto Switch Mounting

Refer to “Minimum Stroke for Auto Switch Mounting” on page 13.

Standard Strokes

Bore size [mm]	Standard stroke [mm]	Max. stroke Note)
32	25, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500	2000
40	25, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500	2000
50	25, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500, 600	2000
63	25, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500, 600	2000
80	25, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500, 600, 700, 800	2000
100	25, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500, 600, 700, 800	2000

Intermediate strokes are available.
Note) Please consult with SMC for longer strokes.

Accessories

Mounting		Basic	Foot	Rod flange	Head flange	Single clevis	Double clevis
Standard	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●
Option	Piston rod ball joint	●	●	●	●	●	●
	Rod clevis	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●

∗ Do not use a piston rod ball joint (or floating joint) together with a single clevis with a ball joint (or clevis pivot bracket with a ball joint).

Theoretical Output

[N]

Bore size [mm]	Rod size [mm]	Operating direction	Piston area [mm²]	Operating pressure [MPa]								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	OUT	804	161	241	322	402	482	563	643	724	804
		IN	691	138	207	276	346	415	484	553	622	691
40	16	OUT	1257	251	377	503	629	754	880	1006	1131	1257
		IN	1056	211	317	422	528	634	739	845	950	1056
50	20	OUT	1963	393	589	785	982	1178	1374	1570	1767	1963
		IN	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	OUT	3117	623	935	1247	1559	1870	2182	2494	2805	3117
		IN	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	OUT	5027	1005	1508	2011	2514	3016	3519	4022	4524	5027
		IN	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	25	OUT	7854	1571	2356	3142	3927	4712	5498	6283	7068	7854
		IN	7363	1473	2209	2945	3682	4418	5154	5890	6627	7363

Note) Theoretical output [N] = Pressure [MPa] x Piston area [mm²]

Weights

[kg]

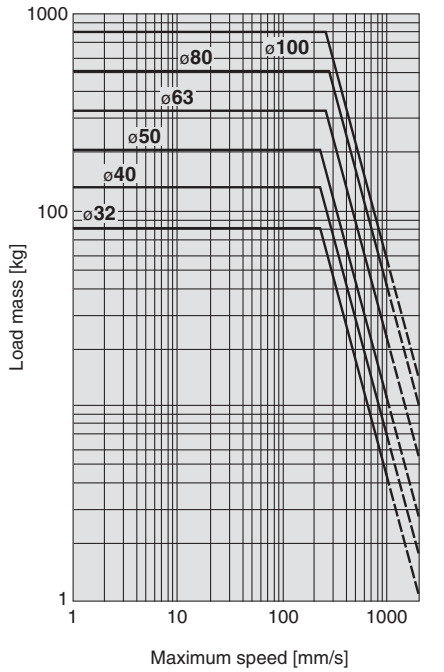
Bore size [mm]		**32**	**40**	**50**	**63**	**80**	**100**
Basic weight	Basic	0.46	0.66	1.14	1.48	2.42	3.25
	Foot	0.16	0.20	0.38	0.46	0.89	1.09
	Flange	0.20	0.23	0.47	0.58	1.30	1.81
	Single clevis	0.16	0.23	0.37	0.60	1.07	1.73
	Double clevis	0.20	0.32	0.45	0.71	1.28	2.11
Additional weight per 50 mm of stroke	All mounting brackets	0.14	0.18	0.30	0.32	0.49	0.54
Accessories	Piston rod ball joint	0.07	0.11	0.22		0.40	
	Rod clevis	0.09	0.15	0.34		0.69	

Calculation: Example) **CP96SD40-100C**

- Basic weight ····· 0.66 [kg] (Basic, ø40)
- Additional weight ····· 0.18 (kg/50 st)
- Cylinder stroke ····· 100 (st)
- Mounting bracket weight ····· 0.32 [kg] (Double clevis)

0.66 + 0.18 x 100 ÷ 50 + 0.32 = 1.32 kg

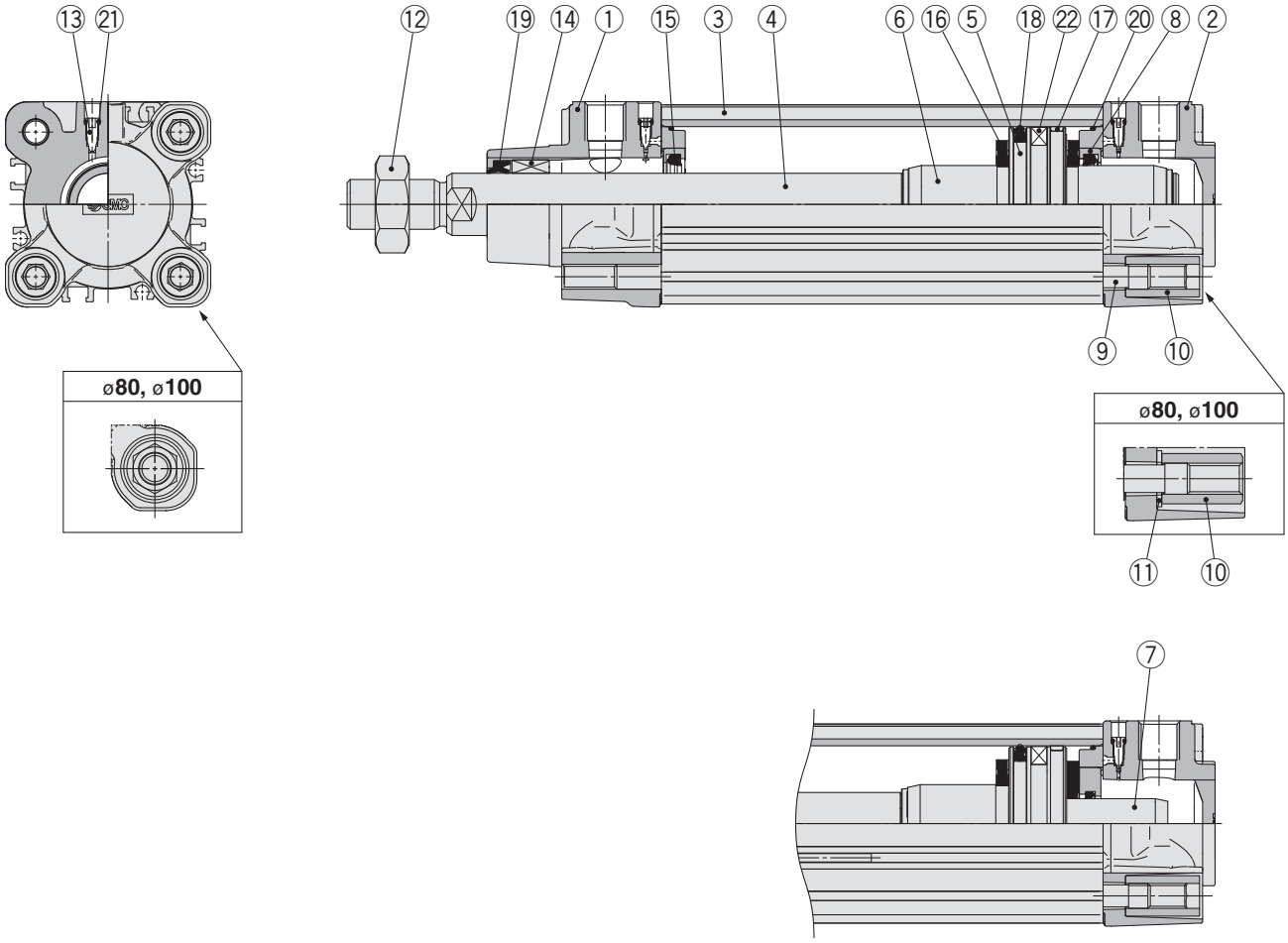
Allowable Kinetic Energy



(Example) Find the upper limit of rod end load when an air cylinder of ø63 is operated at 500 mm/s. From a point indicating 500 mm/s on the axis of abscissas, extend a line upward and find a point where it intersects with a line for the 63 mm bore size. Extend a line from the intersection to the left and find a load mass 80 kg.

Construction

[First angle projection]



Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminium die-cast	
2	**Head cover**	Aluminium die-cast	
3	**Cylinder tube**	Aluminium alloy	
4	**Piston rod**	Carbon steel	
5	**Piston**	Aluminium alloy	ø32 to ø63
		Aluminium die-cast	ø80, ø100
6	**Cushion ring A**	Aluminium alloy	
7	**Cushion ring B**	Aluminium alloy	
8	**Cushion seal holder**	Aluminium alloy	
9	**Tie-rod**	Carbon steel	
10	**Tie-rod nut**	Steel	
11	**Flat washer**	Steel	ø80, ø100
12	**Rod end nut**	Steel	
13	**Cushion valve**	Resin	
14	**Bushing**	Bearing alloy	
15	**Cushion seal**	Urethane	
16	**Bumper**	Urethane	
17	**Wear ring**	Resin	
18	**Piston seal**	NBR	
19	**Rod seal**	NBR	
20	**Cylinder tube gasket**	NBR	
21	**Cushion valve seal**	NBR	
22	**Magnet**		

Replacement Parts/Seal Kit (Single rod)

Bore size [mm]	Kit no.	Contents
32	CS95-32	Kits include items ⑮, ⑰, ⑱, ⑲, ⑳.
40	CS95-40	
50	CS95-50	
63	CS95-63	
80	CS95-80	
100	CS96-100	

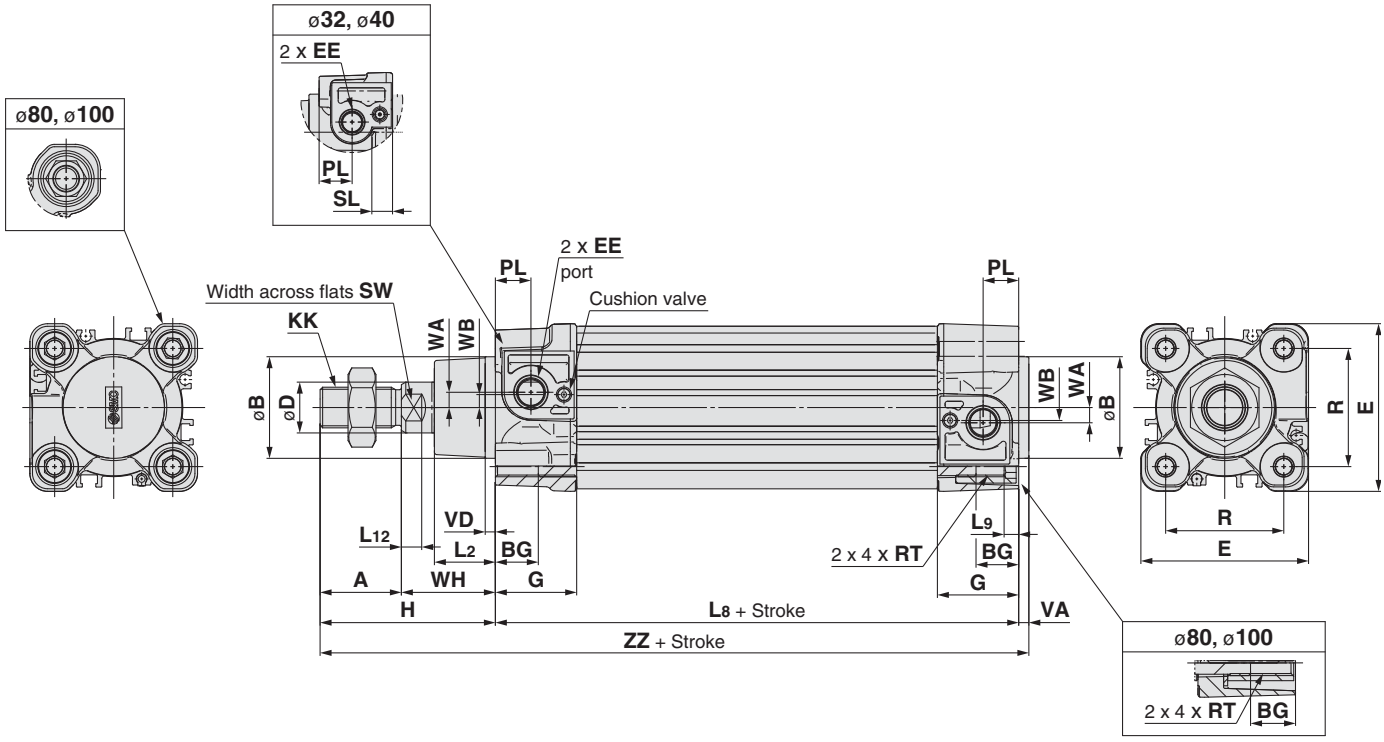
∗ Seal kits consist of items ⑮, ⑰, ⑱, ⑲, ⑳ and can be ordered by using the seal kit number corresponding to each bore size.

∗ The seal kit includes a grease pack (10 g for ø32 to ø50, 20 g for ø63 and ø80, 30 g for ø100).
Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Dimensions

[First angle projection]

Basic: CP96S (D) B Bore size – Stroke C



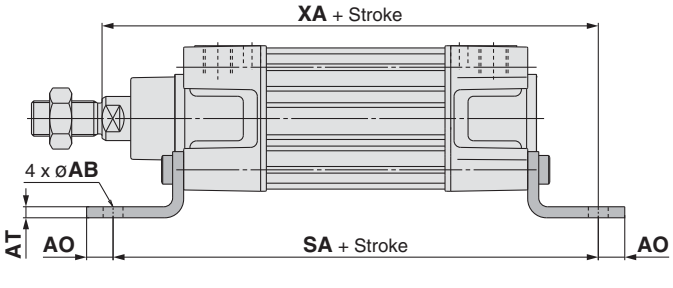
[mm]

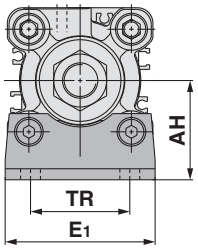
Bore size [mm]	Stroke range [mm]	A	øB d11	BG	øD	E	EE	G	H	KK	L2	L8	L9	L12	PL	R	RT	SL	SW	VA	VD	WA	WB	WH	ZZ
32	Up to 2000	22	30	16	12	47	G 1/8	28.9	48	M10 x 1.25	15	94	4	6	13	32.5	M6 x 1	8	10	4	4	4	7	26	146
40	Up to 2000	24	35	16	16	54	G 1/4	32.6	54	M12 x 1.25	17	105	4	6.5	14	38	M6 x 1	8	13	4	4	5	8.9	30	163
50	Up to 2000	32	40	16	20	66	G 1/4	32	69	M16 x 1.5	24	106	5	8	14	46.5	M8 x 1.25	—	17	4	4	6	5.1	37	179
63	Up to 2000	32	45	16	20	77	G 3/8	38.6	69	M16 x 1.5	24	121	5	8	16	56.5	M8 x 1.25	—	17	4	4	9	6.3	37	194
80	Up to 2000	40	45	17	25	99	G 3/8	38.4	86	M20 x 1.5	30	128	—	10	16	72	M10 x 1.5	—	22	4	4	11.5	6	46	218
100	Up to 2000	40	55	17	25	118	G 1/2	42.9	91	M20 x 1.5	32	138	—	10	18	89	M10 x 1.5	—	22	4	4	17	10	51	233

Dimensions: With Mounting Bracket

[First angle projection]

Axial foot (L)

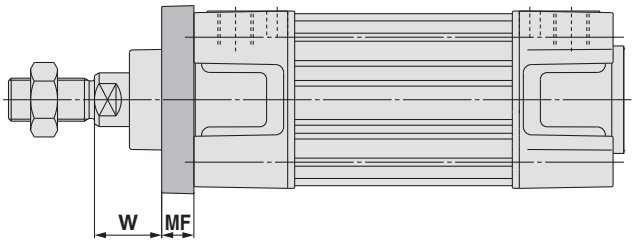


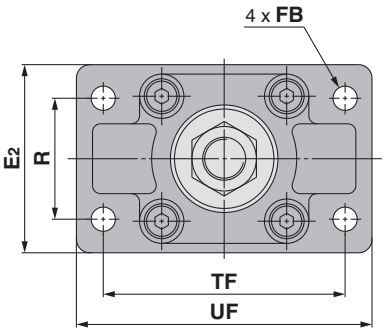


[mm]

Bore size [mm]	E1	TR	AH	AO	AT	AB	SA	XA
32	48	32	32	10	4.5	7	142	144
40	55	36	36	11	4.5	10	161	163
50	68	45	45	12	5.5	10	170	175
63	80	50	50	12	5.5	10	185	190
80	100	63	63	14	6.5	12	210	215
100	120	75	71	16	6.5	14.5	220	230

Rod flange (F)

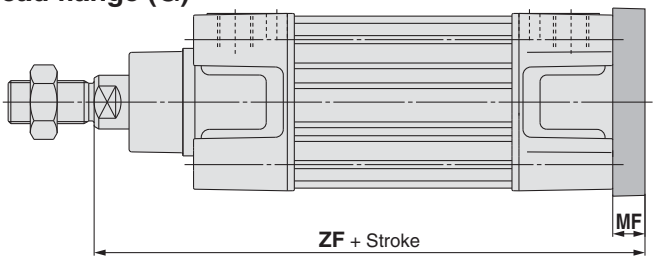




[mm]

Bore size [mm]	R	TF	FB	E2	UF	W	MF
32	32	64	7	50	79	16	10
40	36	72	9	55	90	20	10
50	45	90	9	70	110	25	12
63	50	100	9	80	120	25	12
80	63	126	12	100	153	30	16
100	75	150	14	120	178	35	16

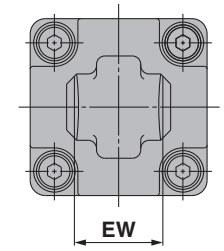
Head flange (G)



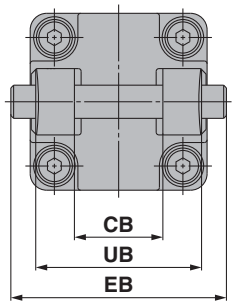
[mm]

Bore size [mm]	MF	ZF
32	10	130
40	10	145
50	12	155
63	12	170
80	16	190
100	16	205

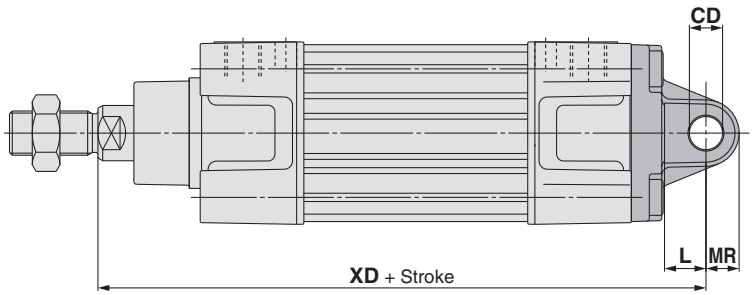
Single clevis (C)
Double clevis (D)



Single clevis (C)



Double clevis (D)



[mm]

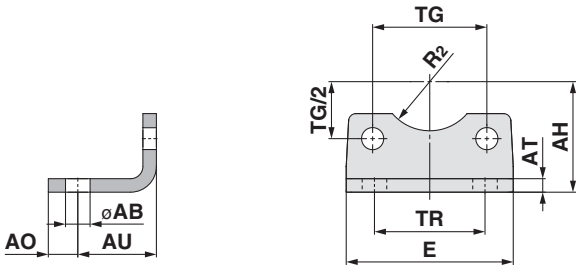
Bore size [mm]	EW	CD H9	L	MR	XD	UB h14	CB H14	EB
32	$26^{-0.2}_{-0.6}$	10	12	9.5	142	45	26	65
40	$28^{-0.2}_{-0.6}$	12	15	12	160	52	28	75
50	$32^{-0.2}_{-0.6}$	12	15	12	170	60	32	80
63	$40^{-0.2}_{-0.6}$	16	20	16	190	70	40	90
80	$50^{-0.2}_{-0.6}$	16	20	16	210	90	50	110
100	$60^{-0.2}_{-0.6}$	20	25	20	230	110	60	140

Accessories

Dimensions: Mounting Brackets

[First angle projection]

Axial foot (L)

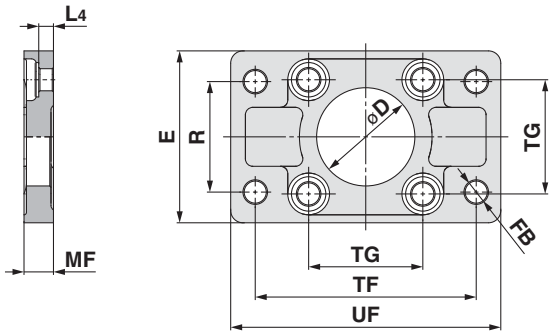


[mm]

Bore size [mm]	Part no.	AB	TG ±0.2	E	TR	AO	AU	AH	AT	R2	Screw size
32	**L5032**	7	32.5	48	32	10	24	32	4.5	15	M6 x 16L
40	**L5040**	10	38	55	36	11	28	36	4.5	17.5	M6 x 16L
50	**L5050**	10	46.5	68	45	12	32	45	5.5	20	M8 x 20L
63	**L5063**	10	56.5	80	50	12	32	50	5.5	22.5	M8 x 20L
80	**L5080**	12	72	100	63	14	41	63	6.5	22.5	M10 x 20L
100	**L5100**	14.5	89	120	75	16	41	71	6.5	27.5	M10 x 20L

∗ Supplied with 4 mounting screws.

Flange (F, G)

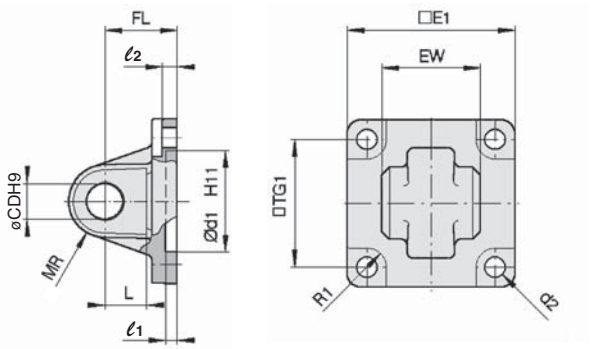


[mm]

Bore size [mm]	Part no.	D H11	øFB	TG ±0.2	E	R	MF	TF	UF	L4	Screw size
32	**F5032**	30	7	32.5	50	32	10	64	79	5	M6 x 20L
40	**F5040**	35	9	38	55	36	10	72	90	5	M6 x 20L
50	**F5050**	40	9	46.5	70	45	12	90	110	6.5	M8 x 20L
63	**F5063**	45	9	56.5	80	50	12	100	120	6.5	M8 x 20L
80	**F5080**	45	12	72	100	63	16	126	153	9	M10 x 25L
100	**F5100**	55	14	89	120	75	16	150	178	9	M10 x 25L

∗ Supplied with 4 mounting screws.

Single clevis (C)



[mm]

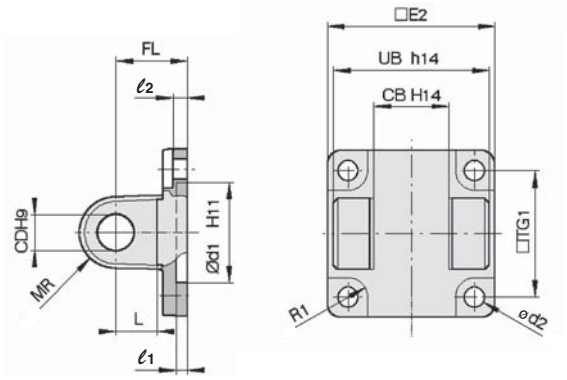
Bore size [mm]	Part no.	E1	EW	TG1	FL	ℓ1	L	ℓ2	ød1	øCD	MR	ød2	R1
32	**C5032**	45	$26^{-0.2}_{-0.6}$	32.5	22	5	12	5.5	30	10	9.5	6.6	6.5
40	**C5040**	51	$28^{-0.2}_{-0.6}$	38	25	5	15	5.5	35	12	12	6.6	6.5
50	**C5050**	64	$32^{-0.2}_{-0.6}$	46.5	27	5	15	6.5	40	12	12	9	8.5
63	**C5063**	74	$40^{-0.2}_{-0.6}$	56.5	32	5	20	6.5	45	16	16	9	8.5
80	**C5080**	94	$50^{-0.2}_{-0.6}$	72	36	5	20	10	45	16	16	11	11
100	**C5100**	113	$60^{-0.2}_{-0.6}$	89	41	5	25	10	55	20	20	11	12

∗ Supplied with 4 mounting screws.

Dimensions: Mounting Brackets, Pivot Brackets for Cylinder Mounting

[First angle projection]

Double clevis (D)

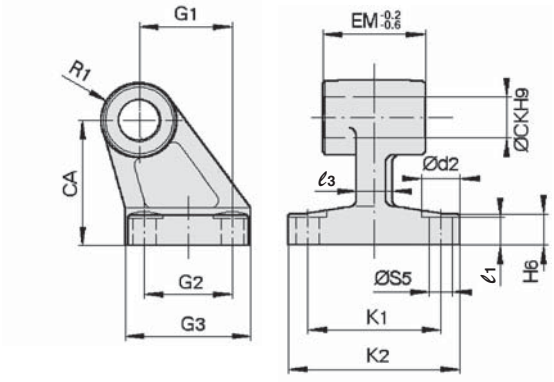


[mm]

Bore size [mm]	Part no.	TG1	FL	ℓ1	L	ℓ2	ød1	øCD	MR	ød2	R1	E2	UB	CB
32	**D5032**	32.5	22	5	12	5.5	30	10	9.5	6.6	6.5	48	45	26
40	**D5040**	38	25	5	15	5.5	35	12	12	6.6	6.5	56	52	28
50	**D5050**	46.5	27	5	15	6.5	40	12	12	9	8.5	64	60	32
63	**D5063**	56.5	32	5	20	6.5	45	16	16	9	8.5	75	70	40
80	**D5080**	72	36	5	20	10	45	16	16	11	11	95	90	50
100	**D5100**	89	41	5	25	10	55	20	20	11	12	115	110	60

∗ Supplied with 4 mounting screws, clevis pin, and clevis pin bracket.

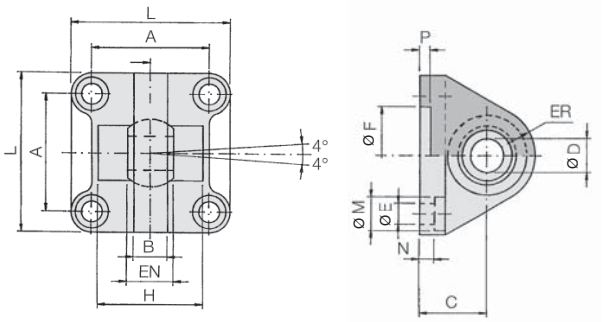
Clevis pivot bracket (E)



[mm]

Bore size [mm]	Part no.	ød2	øCK	øS5	K1	K2 (Max.)	ℓ3 (Max.)	G1	ℓ1	G2	EM	G3 (Max.)	CA	H6	R1
32	**E5032**	11	10	6.6	38	51	10	21	7	18	$26^{-0.2}_{-0.6}$	31	32	8	10
40	**E5040**	11	12	6.6	41	54	10	24	9	22	$28^{-0.2}_{-0.6}$	35	36	10	11
50	**E5050**	15	12	9	50	65	12	33	11	30	$32^{-0.2}_{-0.6}$	45	45	12	12
63	**E5063**	15	16	9	52	67	14	37	11	35	$40^{-0.2}_{-0.6}$	50	50	12	15
80	**E5080**	18	16	11	66	86	18	47	12.5	40	$50^{-0.2}_{-0.6}$	60	63	14	15
100	**E5100**	18	20	11	76	96	20	55	13.5	50	$60^{-0.2}_{-0.6}$	70	71	15	19

Single clevis with ball joint (CS)



[mm]

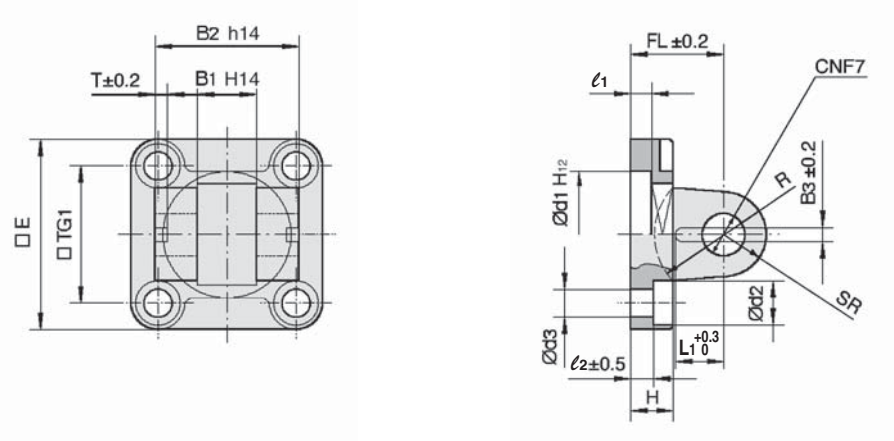
Bore size [mm]	Part no.	A	B (Max.)	C	øDH7	EN 0 −0.1	ER (Max.)	øFH11	øE	L	øM	N	P	H ±0.5
32	**CS5032**	32.5	10.5	22	10	14	15	30	6.6	45	10.5	5.5	5	—
40	**CS5040**	38	12	25	12	16	18	35	6.6	55	11	5.5	5	—
50	**CS5050**	46.5	15	27	16	21	20	40	9	65	15	6.5	5	51
63	**CS5063**	56.5	15	32	16	21	23	45	9	75	15	6.5	5	—
80	**CS5080**	72	18	36	20	25	27	45	11	95	18	10	5	70
100	**CS5100**	89	18	41	20	25	30	55	11	115	18	10	5	—

∗ Supplied with 4 mounting screws.

Dimensions: Pivot Brackets for Cylinder Mounting

[First angle projection]

Double clevis pivot bracket (DS)/for ES accessory

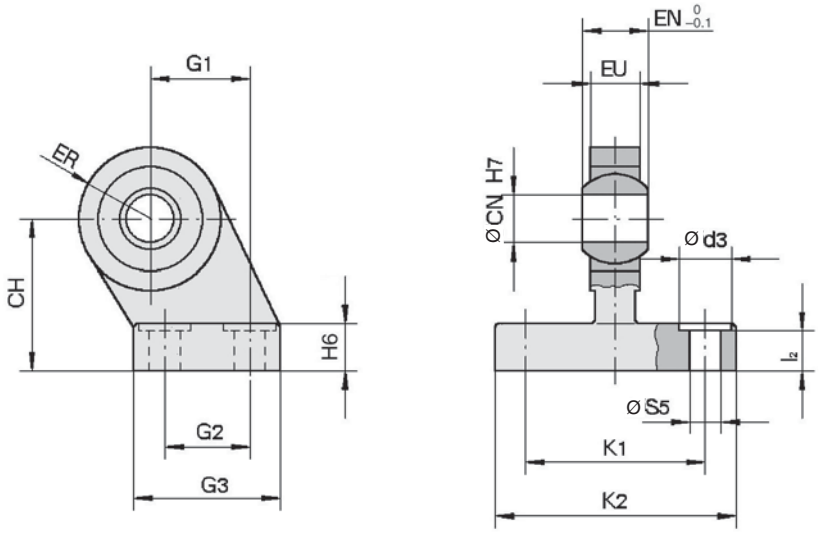


[mm]

Bore size [mm]	Part no.	E	B_1	B_2	B_3	L_1	TG_1	T	ℓ_1 (Min.)	ℓ_2	FL	H (Max.)	ød_1	ød_2	ød_3	øCN	SR (Max.)	R
32	**DS5032**	45	14	34	3.3	11.5	32.5	3	5	5.5	22	10	30	10.5	6.6	10	11	17
40	**DS5040**	55	16	40	4.3	12	38	4	5	5.5	25	10	35	11	6.6	12	13	20
50	**DS5050**	65	21	45	4.3	14	46.5	4	5	6.5	27	12	40	15	9	16	18	22
63	**DS5063**	75	21	51	4.3	14	56.5	4	5	6.5	32	12	45	15	9	16	18	25
80	**DS5080**	95	25	65	4.3	16	72	4	5	10	36	16	45	18	11	20	22	30
100	**DS5100**	115	25	75	6.3	16	89	4	5	10	41	16	55	18	11	20	22	32

∗ Supplied with 4 mounting screws, clevis pin, and clevis pin bracket.

Clevis pivot bracket with ball joint (ES)



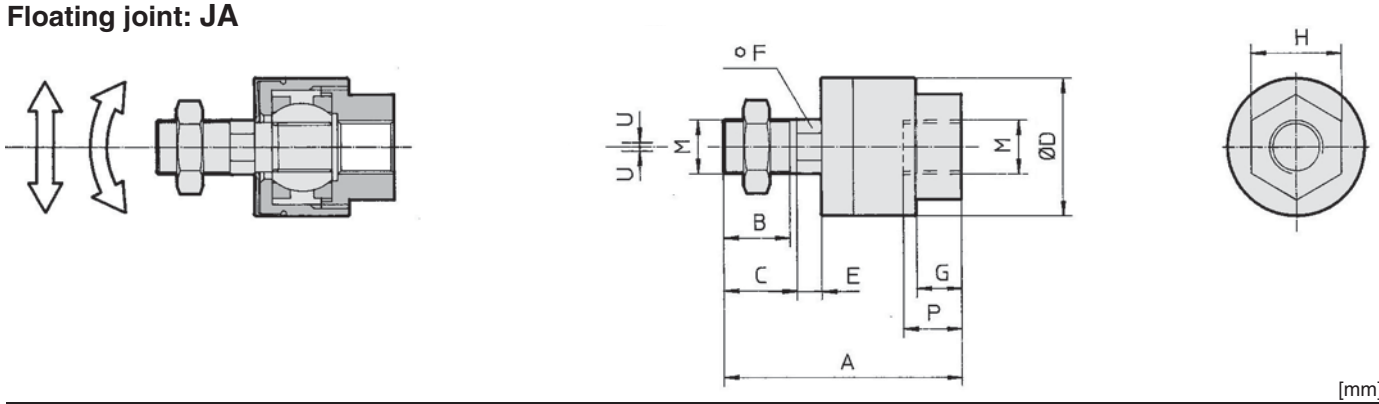
[mm]

Bore size [mm]	Part no.	ød_3	øCN	øS_5	K_1	K_2 (Max.)	ℓ_2	G_1	G_2	G_3 (Max.)	EN	EU	CH	H_6	ER (Max.)
32	**ES5032**	11	10	6.6	38	51	8.5	21	18	31	14	10.5	32	10	15
40	**ES5040**	11	12	6.6	41	54	8.5	24	22	35	16	12	36	10	18
50	**ES5050**	15	16	9	50	65	10.5	33	30	45	21	15	45	12	20
63	**ES5063**	15	16	9	52	67	10.5	37	35	50	21	15	50	12	23
80	**ES5080**	18	20	11	66	86	11.5	47	40	60	25	18	63	14	27
100	**ES5100**	18	20	11	76	96	12.5	55	50	70	25	18	71	15	30

Dimensions: Piston Rod Accessories

[First angle projection]

Floating joint: JA

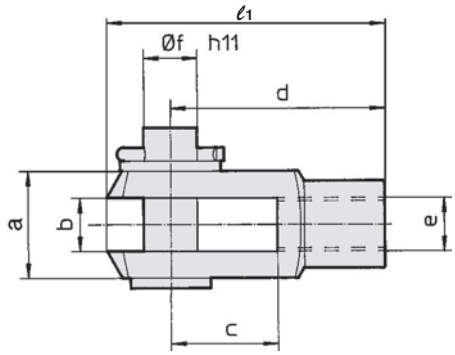


[mm]

Bore size [mm]	Part no.	M	A	B	C	øD	E	F	G	H	P	U	Load (kN)	Weight (g)	Angle
32	**JA30-10-125**	M10 x 1.25	49.5	19.5	—	24	5	8	8	17	9	0.5	2.5	70	±0.5°
40	**JA40-12-125**	M12 x 1.25	60	20	—	31	6	11	11	22	13	0.75	4.4	160	
50, 63	**JA50-16-150**	M16 x 1.5	71.5	22	—	41	7.5	14	13.5	27	15	1	11	300	
80, 100	**JAH50-20-150**	M20 x 1.5	101	28	31	59.5	11.5	24	16	32	18	2	18	1080	

∗ Black colour

Rod clevis: GKM (ISO 8140)

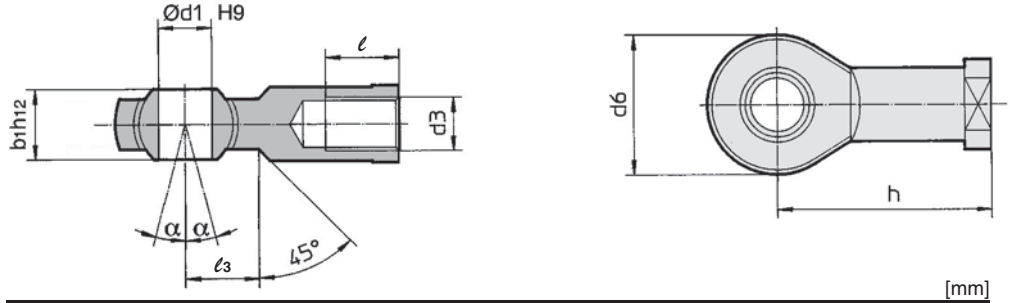


[mm]

Bore size [mm]	Part no.	e	b	d	øf h11 (Shaft)	øf H9 (Hole)	ℓ1	c (Min.)	a (Max.)
32	**GKM10-20**	M10 x 1.25	$10^{+0.5}_{+0.15}$	40	10	10	52	20	20
40	**GKM12-24**	M12 x 1.25	$12^{+0.5}_{+0.15}$	48	12	12	62	24	24
50, 63	**GKM16-32**	M16 x 1.5	$16^{+0.5}_{+0.15}$	64	16	16	83	32	32
80, 100	**GKM20-40**	M20 x 1.5	$20^{+0.5}_{+0.15}$	80	20	20	105	40	40

∗ Supplied with clevis pin and clevis pin bracket.

Piston rod ball joint: KJ (ISO 8139)



[mm]

Bore size [mm]	Part no.	d3	ød1 H9	h	d6 (Max.)	b1 h12	ℓ (Min.)	α	ℓ3
32	**KJ10D**	M10 x 1.25	10	43	28	14	20	4°	15
40	**KJ12D**	M12 x 1.25	12	50	32	16	22	4°	17
50, 63	**KJ16D**	M16 x 1.5	16	64	42	21	28	4°	23
80, 100	**KJ20D**	M20 x 1.5	20	77	50	25	33	4°	27

Series CP96
Auto Switch Mounting

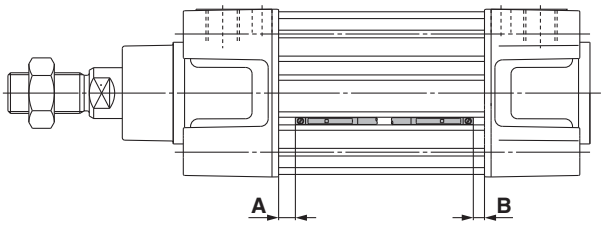
Minimum Stroke for Auto Switch Mounting

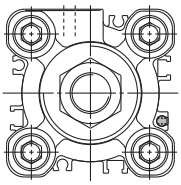
[mm]

Auto switch model	Number of auto switches	32	40	50	63	80	100
D-M9□ **D-M9□W**	With 2 pcs. (Same surface)	50					
	With 1 pc./2 pcs. (Different surfaces)	10					
	With n pcs.	10 + 40 (n – 2)					
D-M9□V **D-M9□WV**	With 2 pcs. (Same surface)	40					
	With 1 pc./2 pcs. (Different surfaces)	10					
	With n pcs.	10 + 30 (n – 2)					
D-M9□A	With 2 pcs. (Same surface)	55	50				
	With 1 pc./2 pcs. (Different surfaces)	15	10				
	With n pcs.	15 + 40 (n – 2)	10 + 40 (n – 2)				
D-M9□AV	With 2 pcs. (Same surface)	40					
	With 1 pc./2 pcs. (Different surfaces)	10					
	With n pcs.	10 + 30 (n – 2)					
D-A9□	With 2 pcs. (Same surface)	50					
	With 1 pc./2 pcs. (Different surfaces)	10					
	With n pcs.	10 + 40 (n – 2)					
D-A9□V	With 2 pcs. (Same surface)	40					
	With 1 pc./2 pcs. (Different surfaces)	10					
	With n pcs.	10 + 30 (n – 2)					

Note 1) n = 3, 4, 5…
Note 2) The D-M9□V/M9□WV/M9□AV/A9□V are mountable on ø32 to ø63.

Auto Switch Proper Mounting Position (Detection at stroke end)





Auto Switch Proper Mounting Position [mm]

Auto switch model / Bore size	D-M9□(V) D-M9□W(V) D-M9□A(V)		D-A9□(V)	
	A	B	A	B
32	14	10.5	10	6.5
40	14	14	10	10
50	15.5	14.5	11.5	10.5
63	16.5	15.5	12.5	11.5
80	21.5	18	17.5	14
100	21.5	19	17.5	15

Note 1) Adjust the auto switch after confirming the operating conditions in the actual setting.
Note 2) The D-M9□V/M9□WV/M9□AV/A9□V are mountable on ø32 to ø63.

Operating Range

[mm]

Auto switch model	Bore size					
	32	40	50	63	80	100
D-M9□(V) **D-M9□W(V)** **D-M9□A(V)**	4	4	5	6	5.5	6
D-A9□(V)	7	8	8.5	9.5	9.5	10.5

∗ Values which include hysteresis are for guideline purposes only, they are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.
Note) The D-M9□V/M9□WV/M9□AV/A9□V are mountable on ø32 to ø63.

Other than the applicable auto switches listed in "How to Order", the following auto switches are mountable.
Refer to **the Auto Switch Guide** for the detailed specifications.

Type	Model	Electrical entry	Features	Applicable bore size
Solid state	**D-M9NV, M9PV, M9BV**	Grommet (Perpendicular)	—	ø32 to ø63
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-colour indication)	
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-colour indication)	
Reed	**D-A93V, A96V**		—	
	D-A90V		Without indicator light	

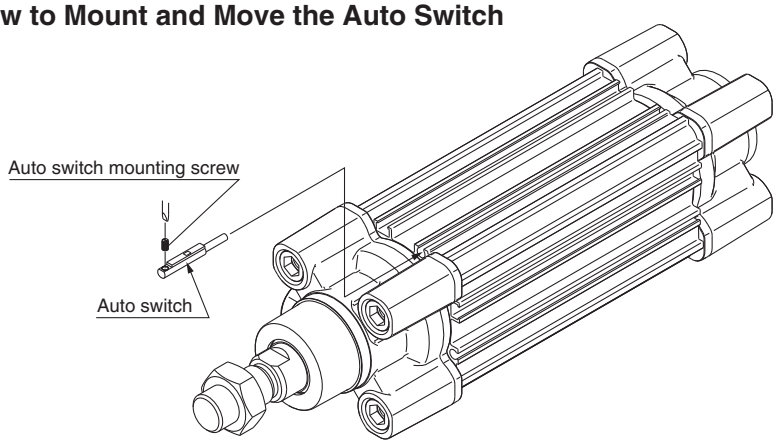
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H) are also available.
For details, refer to **the Auto Switch Guide**.
∗ With pre-wired connector is also available for solid state auto switches. For details, refer to **the Auto Switch Guide**.

How to Mount and Move the Auto Switch

<Applicable Auto Switch>

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

How to Mount and Move the Auto Switch



•Use a watchmaker's screwdriver with a handle diameter of 5 to 6 mm when tightening the auto switch mounting screw.

Auto switch mounting screw tightening torque (N·m)

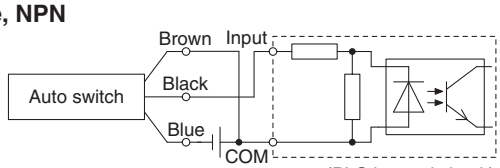
Auto switch model	Tightening torque
D-M9□(V) **D-M9□W(V)** **D-M9□A(V)**	0.05 to 0.15
D-A9□(V)	0.10 to 0.20

∗ As a guide, turn 90° from the position where it comes to feel tight.
Note 1) The D-M9□ and A9□ cannot be mounted on square groove of the CP96 series.
Note 2) The D-M9□V/M9□WV/M9□AV/A9□V are mountable on ø32 to ø63.

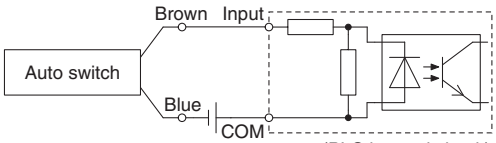
Prior to Use
Auto Switch Connection and Example

Sink Input Specifications

3-wire, NPN

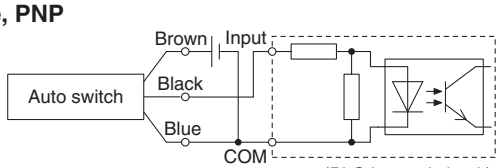


2-wire

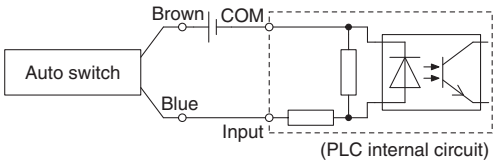


Source Input Specifications

3-wire, PNP



2-wire



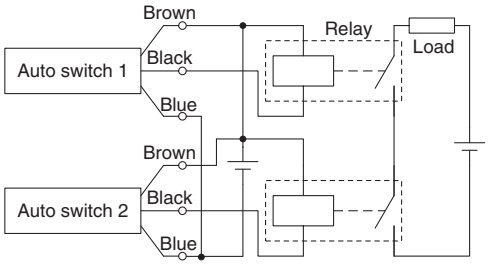
Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

Example of AND (Series) and OR (Parallel) Connection

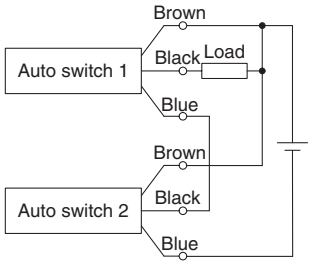
∗ When using solid state auto switches, ensure the application is set up so the signals for the first 50 ms are invalid.

3-wire AND connection for NPN output

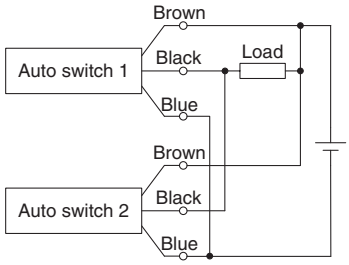
(Using relays)



(Performed with auto switches only)

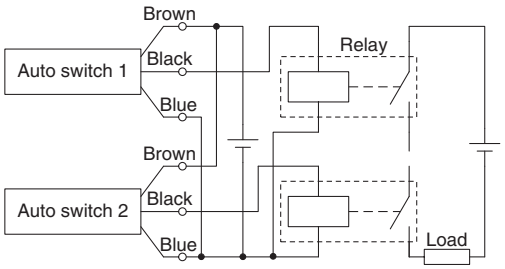


3-wire OR connection for NPN output

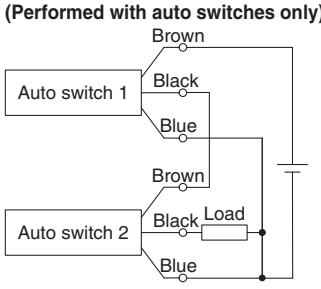


3-wire AND connection for PNP output

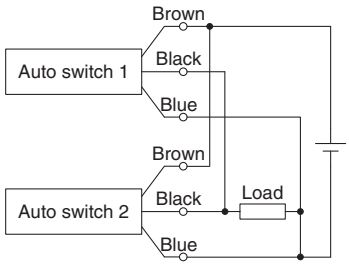
(Using relays)



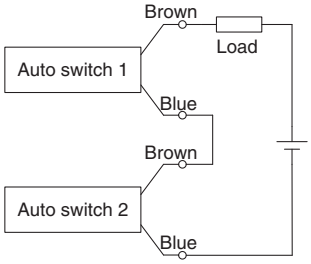
(Performed with auto switches only)



3-wire OR connection for PNP output



2-wire AND connection

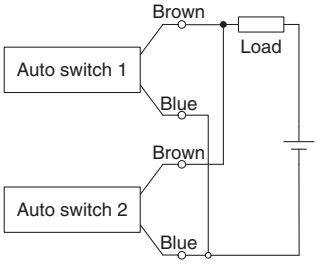


When two auto switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state.
The indicator lights will light up when both of the auto switches are in the ON state.
Auto switches with load voltage less than 20 V cannot be used.

Load voltage at ON = Power supply voltage – Residual voltage x 2 pcs.
= 24 V – 4 V x 2 pcs.
= 16 V

Example: Power supply is 24 VDC
Internal voltage drop in auto switch is 4 V.

2-wire OR connection



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

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

Load voltage at OFF = Leakage current x 2 pcs. x Load impedance
= 1 mA x 2 pcs. x 3 kΩ
= 6 V

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

Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions. For Actuator and Auto Switch Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smc.eu

Adjustment

⚠Warning

1. Do not open the cushion valve more than the allowable number of rotations (following table).

Although the cushion valve is caulked as a retaining mechanism, do not open the cushion valve more than the allowable number of rotations. If air is supplied and operation started without confirming the above condition, the cushion valve may be ejected from the cover.

The allowable number of rotations refers to the number of rotations until the restrictor of the cushion valve is completely opened from the completely closed state.

2. Keep the screwing torque and the unscrewing torque of the cushion valve to the allowable torque or below (following table).

If a screwing torque or unscrewing torque beyond the allowable torque is applied, the valve will be damaged when the valve is closed completely or exceeds the retaining mechanism when the valve is opened completely, which will dislocate the engagement of the screw and eject the valve.

Bore size [mm]	Cushion valve width across flats	Hexagon wrench	Allowable number of rotations	Allowable torque (N·m)
32, 40	2	JIS 4648 Hexagon wrench key 2	4	0.02
50, 63	2	JIS 4648 Hexagon wrench key 2	4.5	0.02
80, 100	3	JIS 4648 Hexagon wrench key 3	5.5	0.06

3. Be certain to activate the air cushion at the stroke end.

When the air cushion is inactivated, if the allowable kinetic energy exceeds the value on page 5, the piston rod assembly or the tie-rod may be damaged. Set the air cushion to valid when operating the cylinder.

⚠Caution

1. When replacing brackets, use the hexagon wrenches shown below.

Bore size [mm]	Width across flats	Tightening torque (N·m)
32, 40	4	4.8
50, 63	5	10.4
80, 100	6	18.2