PEN CYLINDERS

Consistently our best-selling products, pen cylinders are essential basic components for all types of small actuators. We have further developed pen cylinders, taking the lead in air cylinder miniaturization with superior individual design.

Lighter Body Weight

Using a thin-walled stainless steel tube we have reduced pen cylinder body weight

Decrease in Rod Bearing Clearance Gap

We have improved cylinder durability by decreasing the rod bearing clearance gap.

Smooth Restart

To ensure low operating pressure, low speed and long service life, we have adopted two lip packings.

High-Speed Actuation

Our bumper of highly durable urethane rubber can withstand operation at the maximum speed of 750 mm/s.

Option Data : Allowable Kinetic Energy for Pen Cylinder

A cushion mechanism is incorporated into all pen cylinders (excluding heat resistant type). This mechanism minimizes the impact of a piston with high kinetic energy stopping at its stroke end. The following two kinds of cushions are available:

● Rubber cushion (provided with standard models)

Rubber bumpers mounted on both ends of a piston lessen the impact at the piston's stroke end. The bumper also absorbs impact noise during high-frequency and high-speed operation. This cushion is provided with all standard cylinders except heat resistant type.
Please note that slight bound will occur at the stroke end of cylinders equipped with a rubber cushion.

● Variable cushion

The variable cushion should be used for large loads which cannot be absorbed by the rubber cushion, and for high-speed operation. Using air compression, the variable cushion acts as a shock absorber when the piston stops at its stroke end.
As cushion stroke is within the cylinder stroke, avoid excessive cushioning on strokes of less than 25. Excessive cushioning results in added time for each stroke and poor efficiency. If kinetic energy of the load is less than the absorbable kinetic energy values shown in the chart below, service life of the cushion packing reaches one million strokes or more.

The kinetic energy of a load can be found with the following formula:

$$Ex = \frac{W}{2g} \nu^2$$

Ex: Kinetic energy (N·cm)
W: Weight of load (kg)
g : Gravitational acceleration 980 (cm/s²)
ν : Piston Speed (cm/s)

Impact Absorbtion

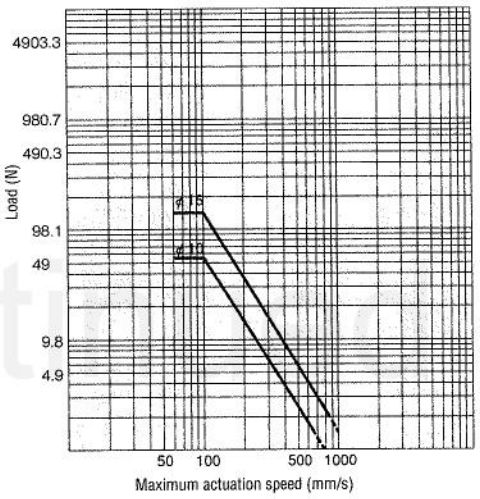
● Rubber cushion · · · · · · · · · · · 30~800mm/s

● Variable cushion· · · · · · · · · · · 30~1000mm/s

N · cm

Cylinder bore size mm	Allowable kinetic energy	
	With rubber cushion	With variable cushion
10	2.9	6.9
16	6.9	17.7

● Rubber cushion



● Adjustable Cushion

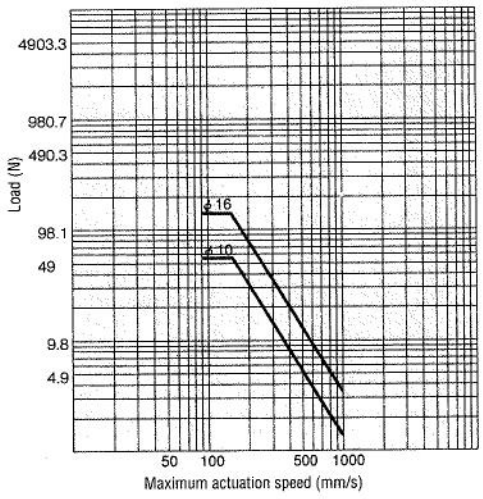
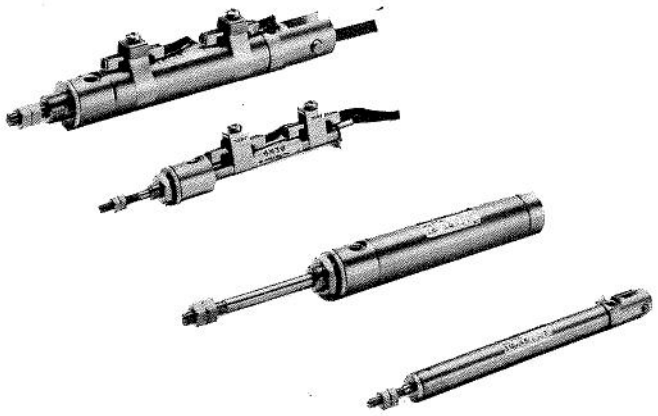


Chart Figures
For a load of 39.2N and the maximum driving speed of 200 mm/s, select a ϕ16 cylinder with rubber cushion.
For a load of 19.6N and maximum driving speed of 400 mm/s, select a ϕ16 cylinder with adjustable cushion.

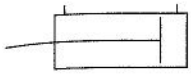
PEN CYLINDERS

DOUBLE ACTING TYPE, SINGLE ACTING PUSH TYPE, SINGLE ACTING PULL TYPE

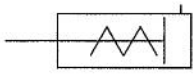


Symbols

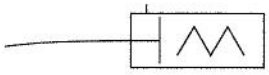
Double acting type



Single acting push type



Single acting pull type



Specifications

Items \ Cylinder bore size (mm)	6	10	16
Operation	Double acting type, Single acting push type, and Single acting pull type		
Fluid	Air		
Mounting type	Basic type, foot type, flange type clevis type (available on ϕ 10 and ϕ 16 only)		
Fluid	Air		
Pressure range[note] MPa{kgf/cm²}	0.12~0.7{1.2~7.1}	0.08~0.7{0.8~7.1}	0.06~0.7{0.6~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}		
Temperature range ℃	0~70		
Speed range mm/s	50~500	50~750	
Cushion	Not available	Rubber Bumper	
Lubrication	Not required		
Port size	M5 x 0.8(M3 x 0.5 is also available only for the cylinder bore size ϕ 6)		

Note: See Minimum Working Pressure chart for details on each cylinder operation.

Bore Size and Stroke

Double acting type

mm

Bore size	Stroke	Available stroke	Stroke tolerance
6	5 10 15 30 45 60	100	$^{+1.2}_{-0.2}$
10	5 10 15 30 45 60 75 100 125 150	150	$^{+1.8}_{-0.2}$
16	5 10 15 30 45 60 75 100 125 150 175 200	200	$^{+1.5}_{-0.2}$

Single acting type

mm

Operation	Cylinder bore size	Stroke	Available stroke	Stroke tolerance
Single acting push type	6	5 10 15 30 45 60	75	$^{+1.2}_{-0.2}$
	10		105	$^{+1.5}_{-0.2}$
	16		120	$^{+1.2}_{-0.2}$
Single acting pull type	6	5 10 15 30	30	$^{+1.2}_{-0.2}$
	10			$^{+1.5}_{-0.2}$
	16			$^{+1.2}_{-0.2}$

Remark : Consult us on non-standard strokes.

Order Example

P □ □ 10×30 – □ – □ – □ – □ – □ □ □

- P: Pen cylinder series
- Type of action (□): DA — Double acting type; SA — Single acting push type; TA — Single acting pull type
- Cylinder specifications (□): Blank — Standard cylinder; S — Sensor cylinder
- Cylinder bore size × stroke: 10×30
- Head cover piping specifications (□): Blank — Axial piping; A — Lateral piping; M — Lateral piping, with mounting screw (Only ø10 and ø16 double acting type and single acting push type are available. Not available for clevis mounting type.)
- Port size (□): Blank — M5 x 0.8 (ϕ 6, ϕ 10, ϕ 16); M3 — M3 x 0.5 (for ϕ 6 only)
- Mounting type (included in delivery, except for clevis mounting type) (□): Blank — Basic type; 1 — Double foot type (Available for double acting with head cover M specification type and ϕ 10, ϕ 16 single acting push type only.); 1A — Single foot type; 3 — Flange type; 7 — Clevis type (With pin, for bore size ϕ 10 and ϕ 16 only); 7-7C — Clevis type with supporting bracket (with pin)(for ϕ 10 and ϕ 16 only)
- Rod clevis (□): Blank — Without rod end bracket; I — With I-shaped Rod clevis; Y — With Y-shaped Rod clevis (with pin). For bore size ϕ 10 and ϕ 16 only. Please order the cylinder joint separately
- Type of Sensor switch (□): Blank — Without sensor switch; ZC153 — Three-wire, solid state type; ZC130 — Two-wire, solid state type; CS5T — Two-wire, reed switch type; CS11T — Two-wire, reed switch type. See page 616 for further details
- Lead wire length (□): A — 1000mm; B — 3000mm
- Number of sensor switches (□): 1 — With one switch; 2 — With two switches; 3 — With three switches

Minimum Operating Pressure

Operation	Cylinder bore size mm	Minimum operating pressure MPa{kgf/cm²}
Double acting type	6	0.12 {1.2}
	10	0.08 {0.8}
	16	0.06 {0.6}
Single acting push type	6	0.3 {3.1}
	10	0.15 {1.5}
	16	
Single acting pull type	6	0.4 {4.1}
	10	0.3 {3.1}
	16	0.25 {2.5}

Mounting Type

Mounting type	Item	Remarks
1	Double foot type	Included delivery[note]
1A	Single foot type	Included in delivery
3	Flange type	Included in delivery
7	Clevis type (with pin)	Delivered assembled
7-7C	Clevis type with supporting bracket	Supporting bracket included in delivery

Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Weight

g

Operation	Mounting type	Cylinder bore size mm		Stroke mm						Added weight								Added weight of lateral piping
										Added weight for each mounting type			Sensor cylinder	Added weight of one sensor switch				
				5	10	15	30	45	60	Single foot type	Flange	Clevis type (with supporting bracket and pin)		ZC153□	ZC130□	CS5T□	CS11T□	
Double acting type	Basic type	6	M3 port	19	19	20	22	24	26	7	5	—	2	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	2
			M5 port	30	30	31	33	35	37	7	5	—	2					4
		10		43	44	45	48	52	55	7	5	—	5					4
		16		82	84	86	91	97	102	18	12	—	12					6
	Clevis type (with pin)	10		54	55	56	59	63	66	—	—	32	5					—
		16		110	112	114	119	125	130	—	—	45	12					—
Single acting push type	Basic type	6	M3 port	13	13	14	18	23	27	7	5	—	3					2
			M5 port	14	14	15	19	24	28	7	5	—	3					4
		10		29	30	31	40	50	59	7	5	—	5					4
		16		66	68	70	90	110	130	18	12	—	12					6
	Clevis type (with pin)	10		39	40	41	50	69	69	—	—	32	5					—
		16		90	92	94	114	134	154	—	—	45	12					—
Single acting pull type	Basic type	6	M3 port	22	22	23	27	—	—	7	5	—	4					—
			M5 port	32	32	33	37	—	—	7	5	—	4					—
		10		44	45	46	55	—	—	7	5	—	5					—
		16		86	88	90	110	—	—	18	12	—	12					—
	Clevis type (with pin)	10		60	61	62	71	—	—	—	—	32	5					—
		16		116	118	120	116	—	—	—	—	45	12					—

Remark : Mounting nut and rod end nut are included.
Calculation Example : The weight of a double acting cylinder with magnets with a foot bracket of 10mm bore, 45mm stroke and two CS5TA installed is calculated as follows:
57+7+40=104g

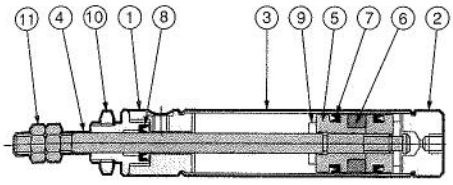
Spring Return Force Single Acting Type

N

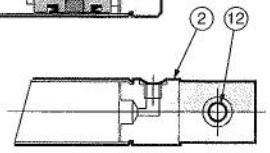
Cylinder bore size mm	Spring return force						Stroke end
	5St	10St	15St	30St	45St	60St	
2.5	0.6	0.6	—	—	—	—	1.2
4	1.5	1.5	0.15	20St 1.5	—	—	2.8
6	3.9	2.9	2.0	2.0	2.0	2.0	5.9
10	5.9	4.9	2.9	2.9	2.9	2.9	6.9
16	9.8	6.9	4.9	2.9	4.9	4.9	11.8

Construction DiagramConstruction Diagram

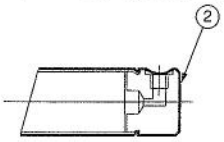
●Double acting type



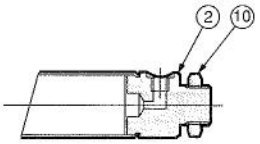
●Clevis type (-7)



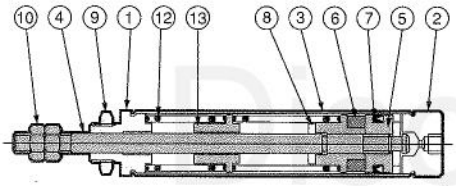
●Lateral piping (-A)



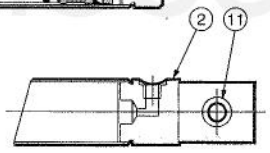
●Lateral piping with mounting screw (-M)



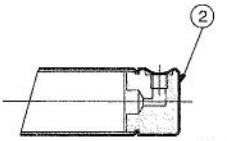
●Single acting push type



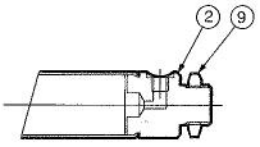
●Clevis type (-7)



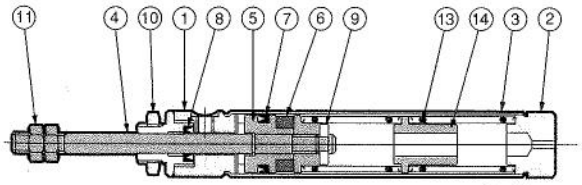
●Lateral piping (-A)



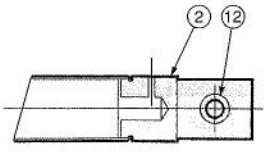
●Lateral piping with mounting screw (-M)



●Single acting pull type



●Clevis type (-7)



The figure shown here is a cylinder with magnets. Sensor switch magnet is not built into standard cylinders.

Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	Resin
⑦	Piston seal	Synthetic rubber(NBR)
⑧	Rod seal	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Clevis-shaped bushing	Oil permeated bronze

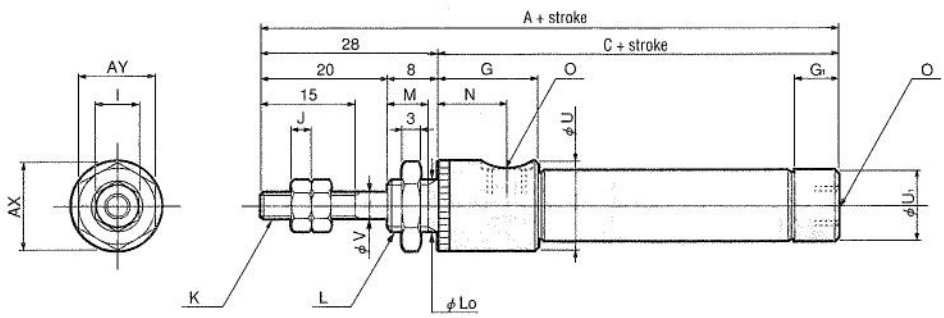
No.	Items	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	Resin
⑦	Piston seal	Synthetic rubber(NBR)
⑧	Bumper	Urethane rubber
⑨	Mounting nut	Brass (nickel plated)
⑩	Rod end nut	Mild steel (nickel plated)
⑪	Clevis-shaped bushing	Oil permeated bronze
⑫	Spring	Hard steel
⑬	Collar	Brass

No.	Items	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	Resin
⑦	Piston seal	Synthetic rubber(NBR)
⑧	Rod seal	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Clevis-shaped bushing	Oil permeated bronze
⑬	Spring	Hard steel
⑭	Collar	Brass

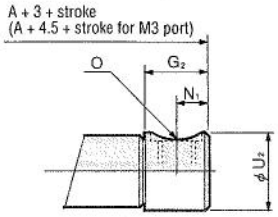
Dimentions of Double Acting Type

(unit : mm)

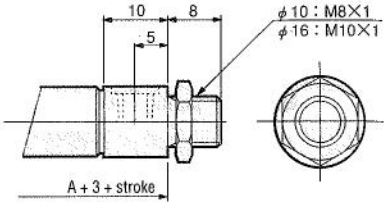
●Basic type



●Lateral piping (-A)



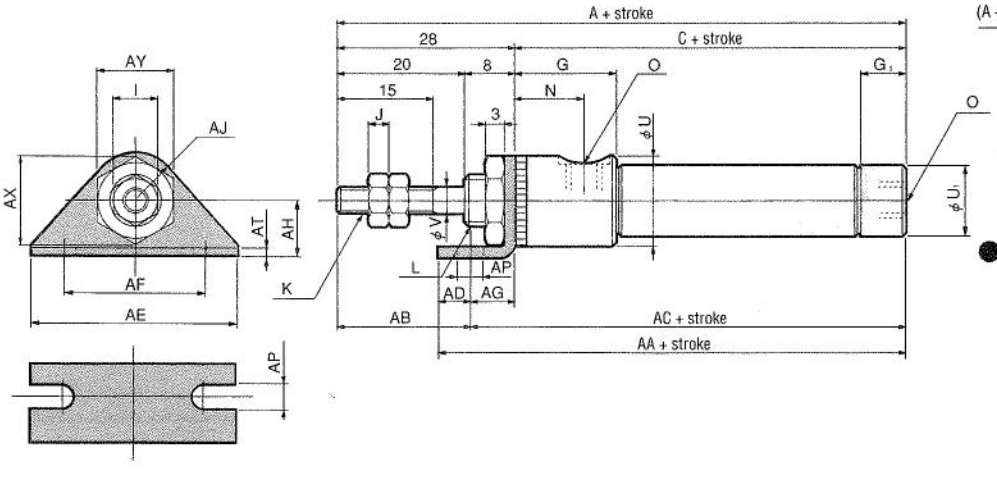
●Lateral piping, with mounting screw (-M)



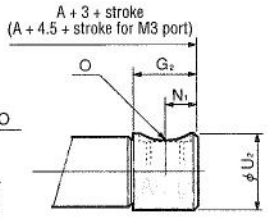
Type / Bore size / Symbol		Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G1	G2	I	J	K	L
6	M3 port	62.5	34.5	72.5	44.5	13.5	3.5	8	5.5	2.4	M3×0.5	M6×1
	M5 port	69	41	79	51	16.5	7	10				
10		73	45	83	55	16	7	10	7	3.2	M4×0.7	M8×1
16		74.5	46.5	84.5	56.5	15.5	7	10	8	4	M5×0.8	M10×1

Bore size / Symbol		Lo	M	N	N1	O	U	U1	U2	V	AX	AY
6	M3 port	6 $^{-0.05}_{-0.10}$	6.5	10	4	M3×0.5	11	7	8	3	11.5	10
	M5 port			11.5	5	M5×0.8	14	8	10			
10		8 $^{-0.05}_{-0.10}$	6.5	11	5	M5×0.8	14	11	12	4	13.9	12
16		10 $^{-0.05}_{-0.10}$	6	10.5	5	M5×0.8	17	17	17	5	16.2	14

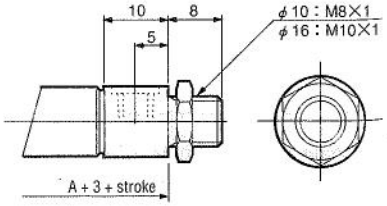
●Single foot type



●Lateral piping (-A)



●Lateral piping, with mounting screw(-M)



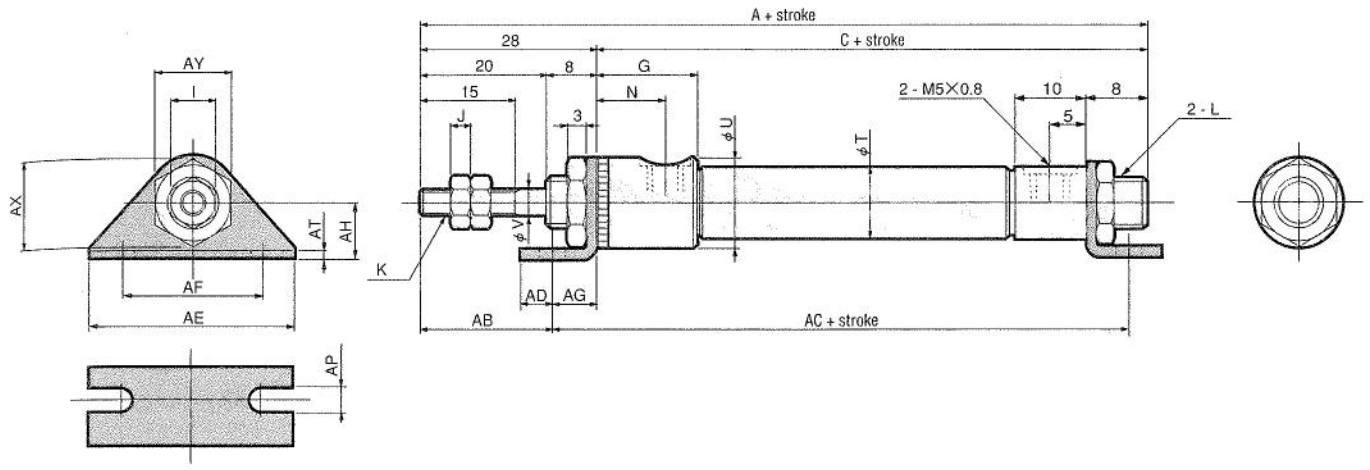
Type / Bore size / Symbol		Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G1	G2	I	J	K	L	N	N1	O
6	M3 port	62.5	34.5	72.5	44.5	13.5	3.5	8	5.5	2.4	M3×0.5	M6×1	10	4	M3×0.5
	M5 port	69	41	79	51	16.5	7	10					11.5	5	M5×0.8
10		73	45	83	55	16	7	10	7	3.2	M4×0.7	M8×1	11	5	M5×0.8
16		74.5	46.5	84.5	56.5	15.5	7	10	8	4	M5×0.8	M10×1	10.5	5	M5×0.8

Type / Bore size / Symbol		U	U1	U2	V	Standard cylinder AA	Standard cylinder AB	Standard cylinder AC	Sensor cylinder AA	Sensor cylinder AB	Sensor cylinder AC	AD	AE	AF	AG	AH	AJ	AP	AT	AX	AY
6	M3 port	11	7	8	3	46.5	21	41.5	56.5	21	51.5	5	32	22.2	7	9	7	4.2	1.6	11.5	10
	M5 port	14	8	10		53		48	63		58										
10		14	11	12	4	57	21	52	67	21	62	5	32	22.2	7	9	7	4.2	1.6	13.9	12
16		17	17	17	5	61.5	19	55.5	71.5	19	65.5	6	42	29.2	9	14	10	5.2	2.3	16.2	14

Dimensions of Double Acting Type

(unit : mm)

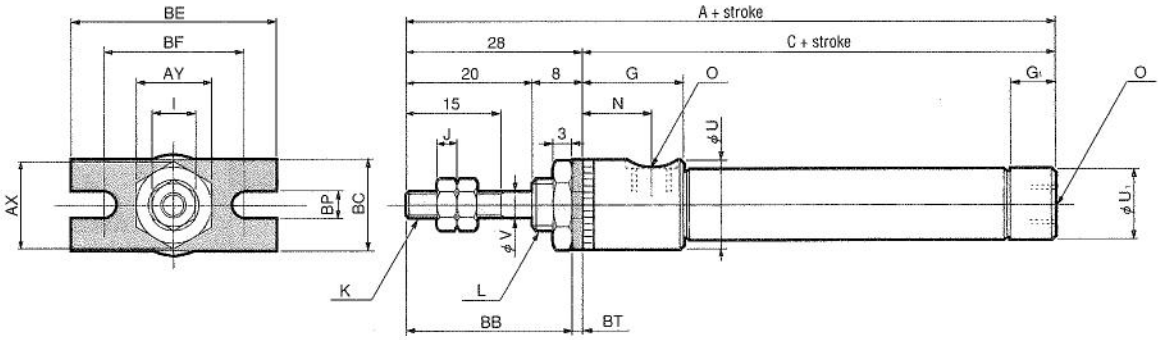
●Double foot type



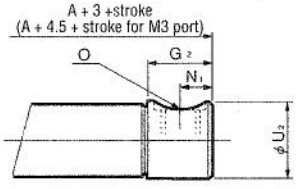
Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	I	J	K	L	U	V
10	84	56	94	66	16	7	3.2	M4×0.7	M8×1	14	4
16	85.5	57.5	95.5	67.5	16	8	4	M5×0.8	M10×1	17	5

Type / Bore size / Symbol	Standard cylinder AC	Standard cylinder AB	Sensor cylinder AC	Sensor cylinder AB	AD	AE	AF	AG	AH	AJ	AP	AT	AX	AY
10	62	21	72	21	5	32	22.2	7	9	7	4.2	1.6	14	12
16	67.5	19	87.5	19	6	42	29.2	9	14	10	5.2	2.3	16	14

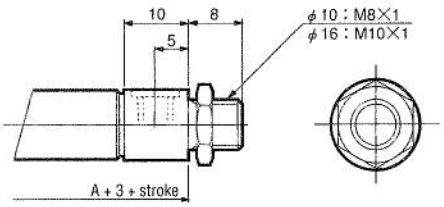
●Flange type



●Lateral piping (-A)



●Lateral piping with mounting screw (-M)



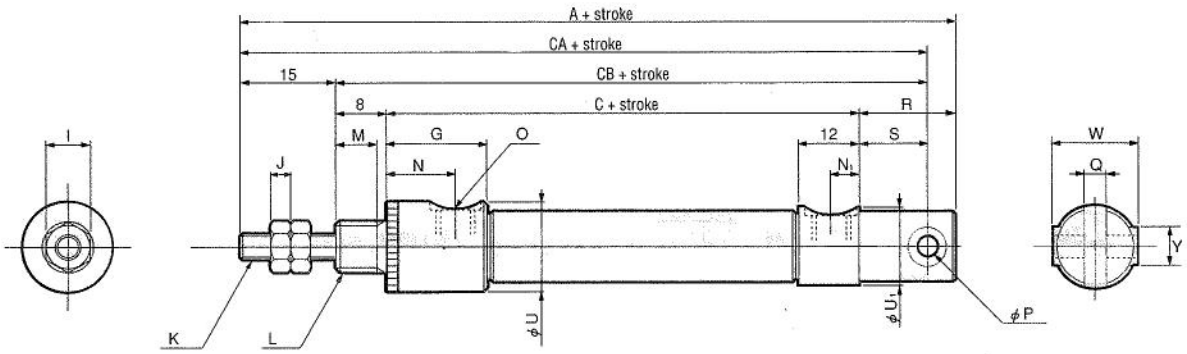
Type / Bore size / Symbol		Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G1	G2	I	J	K	L	N	N1
6	M3 port	62.5	34.5	72.5	44.5	13.5	3.5	8	5.5	2.4	M3×0.5	M6×1	10	4
	M5 port	69	41	79	51	16.5	7	10					11.5	5
10		73	45	83	55	16	7	10	7	3.2	M4×0.7	M8×1	11	5
16		74.5	46.5	84.5	56.5	15.5	7	10	8	4	M5×0.8	M10×1	10.5	5

Bore size / Symbol		O	U	U1	U2	V	AX	AY	BB	BC	BE	BF	BP	BT
6	M3 port	M3×0.5	11	7	8	3	11.5	10	26.4	14	32	22.2	4.2	1.6
	M5 port	M5×0.8	14	8	10									
10		M5×0.8	14	11	12	4	13.9	12	26.4	14	32	22.2	4.2	1.6
16		M5×0.8	17	17	17	5	16.2	14	25.7	20	42	29.2	5.2	2.3

Dimensions of Double Acting Type

(unit : mm)

●Clevis type



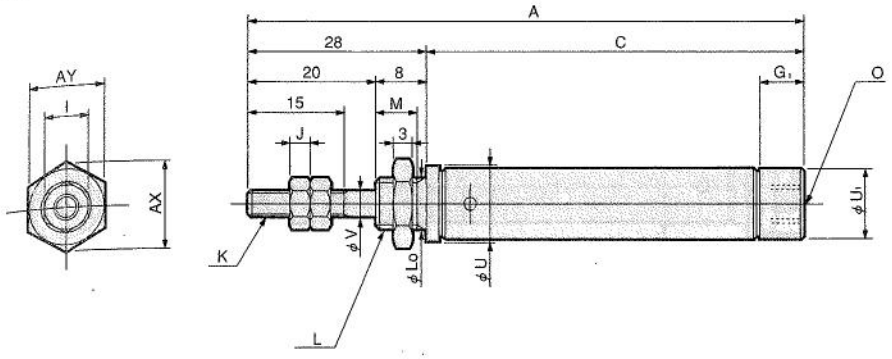
Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	I	J	K	L	M	N	N_1
10	86	50	96	60	16	7	3.2	M4×0.7	M8 ×1	6.5	11	7
16	94.5	51.5	104.5	61.5	15.5	8	4	M5×0.8	M10×1	6	10.5	7

Type / Bore size / Symbol	O	P	Q	R	S	U	U_1	W	Y	Standard cylinder CA	Standard cylinder CB	Sensor cylinder CA	Sensor cylinder CB
10	M5×0.8	3.3±0.05	$3.2^{+0.2}_{+0.1}$	13	8	14	12	12	φ6	81	66	91	76
16	M5×0.8	5.1±0.05	$6.5^{+0.2}_{+0.1}$	20	10	17	17	17	φ8	84.5	69.5	94.5	79.5

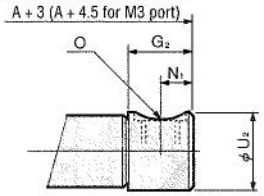
Dimensions of Single Acting Push Type

(unit : mm)

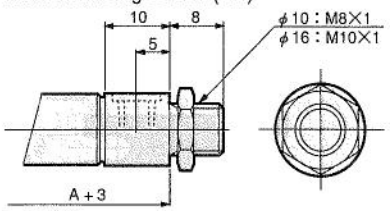
●Basic type



●Lateral piping (-A)



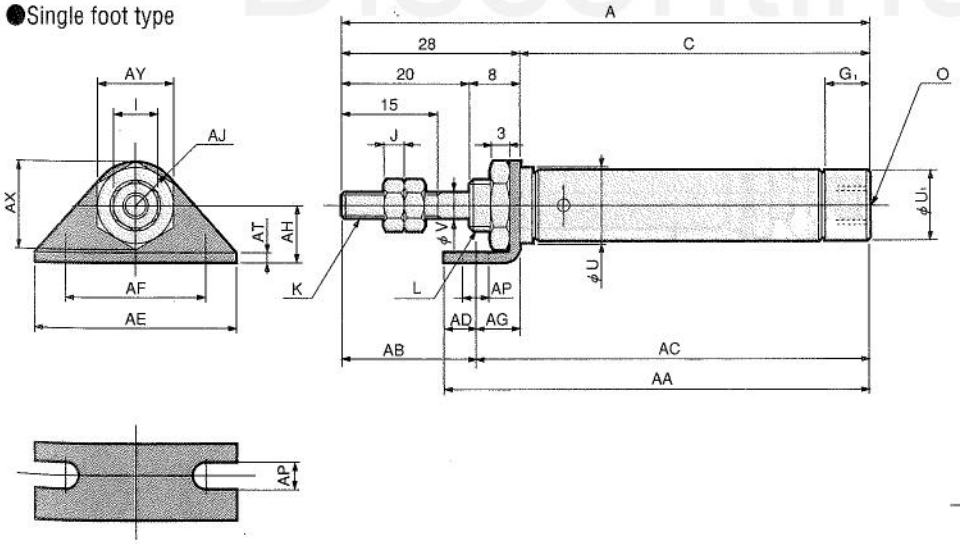
●Lateral piping
With mounting screw (-M)



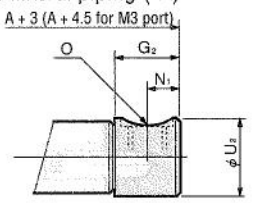
Type	Standard cylinder												Sensor cylinder											
Symbol	A						C						A						C					
Stroke / Bore size	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60
6 M3 port	61.5	66.5	71.5	98.5	125.5	152.5	33.5	38.5	43.5	70.5	97.5	124.5	71.5	76.5	81.5	108.5	135.5	162.5	43.5	48.5	53.5	80.5	107.5	134.5
6 M5 port	65	70	75	102	129	156	37	42	47	74	101	128	75	80	85	112	139	166	47	52	57	84	111	138
10	69	74	79	106	133	160	41	46	51	78	105	132	79	84	89	116	143	170	51	56	61	88	115	142
16	70	75	80	107	134	161	42	47	52	79	106	133	80	85	90	117	144	171	52	57	62	89	116	143

Bore size / Symbol	G1	G2	I	J	K	L	Lo	M	N1	O	U	U1	U2	V	AX	AY
6 M3 port	3.5	8	5.5	2.4	M3×0.5	M6×1	$6^{-0.05}_{-0.10}$	6.5	4	M3×0.5	8	7	8	3	11.5	10
6 M5 port	7	10							5	M5×0.8		8	10			
10	7	10	7	3.2	M4×0.7	M8×1	$8^{-0.05}_{-0.10}$	6.5	5	M5×0.8	11	11	12	4	13.9	12
16	7	10	8	4	M5×0.8	M10×1	$10^{-0.05}_{-0.10}$	6	5	M5×0.8	17	17	17	5	16.2	14

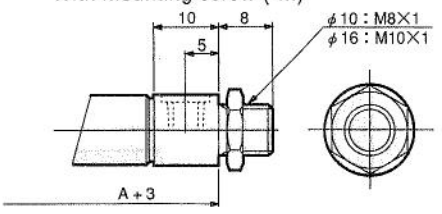
●Single foot type



●Lateral piping (-A)



●Lateral piping
With mounting screw (-M)



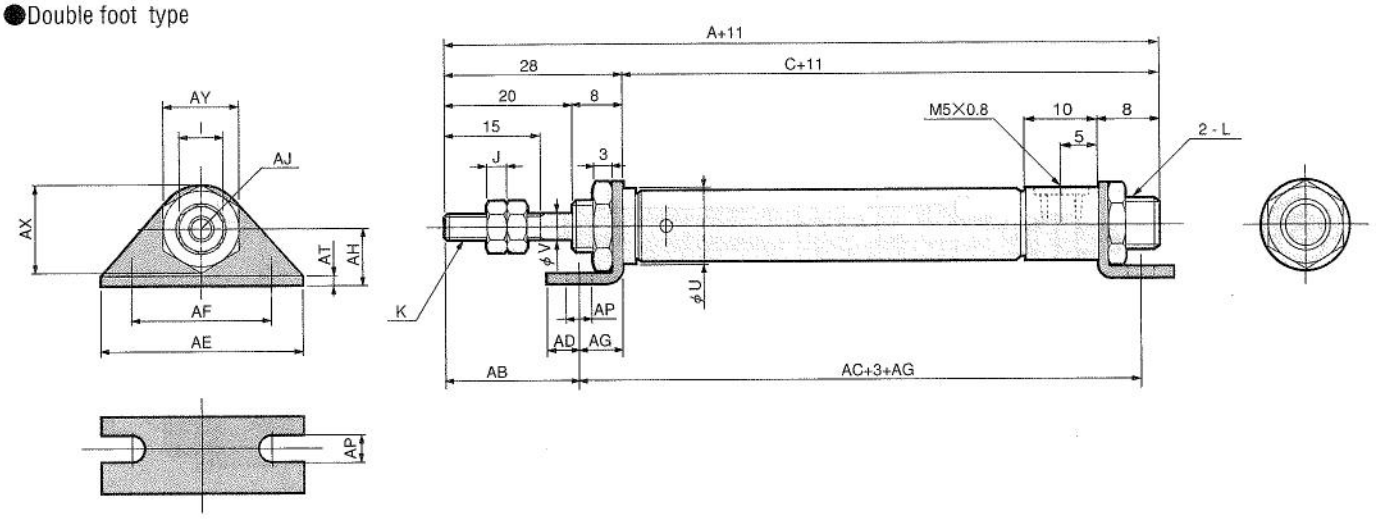
Type	Standard cylinder												Sensor cylinder												G1	G2	I	J	K	L	N1	O	U	U1	U2	V
Symbol	A						C						A						C																	
Stroke / Bore size	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60												
6 M3 port	61.5	66.5	71.5	98.5	125.5	152.5	33.5	38.5	43.5	70.5	97.5	124.5	71.5	76.5	81.5	108.5	135.5	162.5	43.5	48.5	53.5	80.5	107.5	134.5	3.5	8	5.5	2.4	M3×0.5	M6×1	4	M3×0.5	8	7	8	3
6 M5 port	65	70	75	102	129	156	37	42	47	74	101	128	75	80	85	112	139	166	47	52	57	84	111	138	7	10					5	M5×0.8		8	10	
10	69	74	79	106	133	160	41	46	51	78	105	132	79	84	89	116	143	170	51	56	61	88	115	142	7	10	7	3.2	M4×0.7	M8×1	5	M5×0.8	11	11	12	4
16	70	75	80	107	134	161	42	47	52	79	106	133	80	85	90	117	144	171	52	57	62	89	116	143	7	10	8	4	M5×0.8	M10×1	5	M5×0.8	17	17	17	5

Type	Standard cylinder													Sensor cylinder												AD	AE	AF	AG	AH	AJ	AP	AT	AX	AY
Symbol	AA						AB	AC						AA						AB	AC															
Stroke / Bore size	5	10	15	30	45	60		5	10	15	30	45	60	5	10	15	30	45	60		5	10	15	30	45	60										
6 M3 port	45.5	50.5	55.5	82.5	109.5	136.5	21	40.5	45.5	50.5	77.5	104.5	131.5	55.5	60.5	65.5	92.5	119.5	146.5	21	50.5	55.5	60.5	87.5	114.5	141.5	5	32	22.2	7	9	7	4.2	1.6	11.5	10
6 M5 port	49	54	59	86	113	140		44	49	54	81	108	135	59	64	69	96	123	150		54	59	64	91	118	145										
10	53	58	63	90	117	144	21	48	53	58	85	112	139	63	68	73	100	127	154	21	58	63	68	95	122	149	5	32	22.2	7	9	7	4.2	1.6	13.9	12
16	57	62	67	94	121	148	19	51	56	61	88	115	142	67	72	77	104	131	158	19	61	66	71	98	125	152	6	42	29.2	9	14	10	5.2	2.3	16.2	14

Dimensions of Single Acting Push Type

(unit : mm)

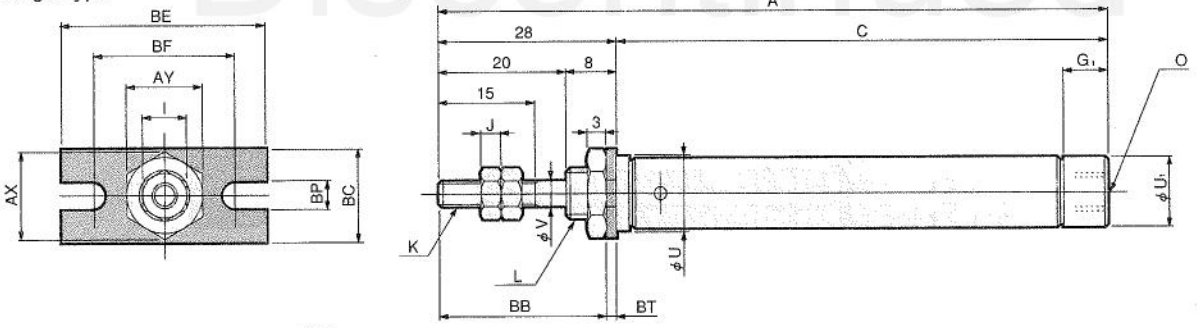
●Double foot type



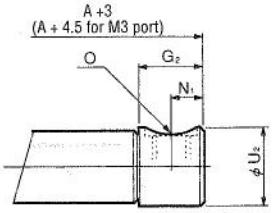
Type / Symbol / Stroke / Bore size	Standard cylinder A 5	10	15	30	45	60	Standard cylinder C 5	10	15	30	45	60	Sensor cylinder A 5	10	15	30	45	60	Sensor cylinder C 5	10	15	30	45	60	I	J	K	L	U	V
10	69	74	79	106	133	160	41	46	51	78	105	132	79	84	89	116	143	170	51	56	61	88	115	142	7	3.2	M4X0.7	M8X1	11	4
16	70	75	80	107	134	161	42	47	52	79	106	133	80	85	90	117	144	171	52	57	62	89	116	143	8	4	M5X0.8	M10X1	17	5

Type / Symbol / Stroke / Bore size	Standard cylinder AB	AC 5	10	15	30	45	60	Sensor cylinder AB	AC 5	10	15	30	45	60	AD	AE	AF	AG	AH	AJ	AP	AT	AX	AY
10	21	48	53	58	85	112	139	21	58	63	68	95	122	149	5	32	22.2	7	9	7	4.2	1.6	13.9	12
16	19	51	56	61	88	115	142	19	61	66	71	98	125	152	6	42	29.2	9	14	10	5.2	2.3	16.2	14

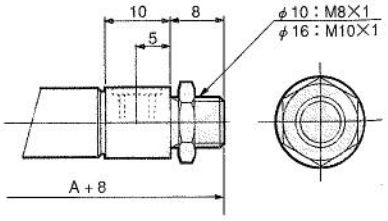
●Flange type



●Lateral piping(-A)



●Lateral piping
With mounting screw (-M)



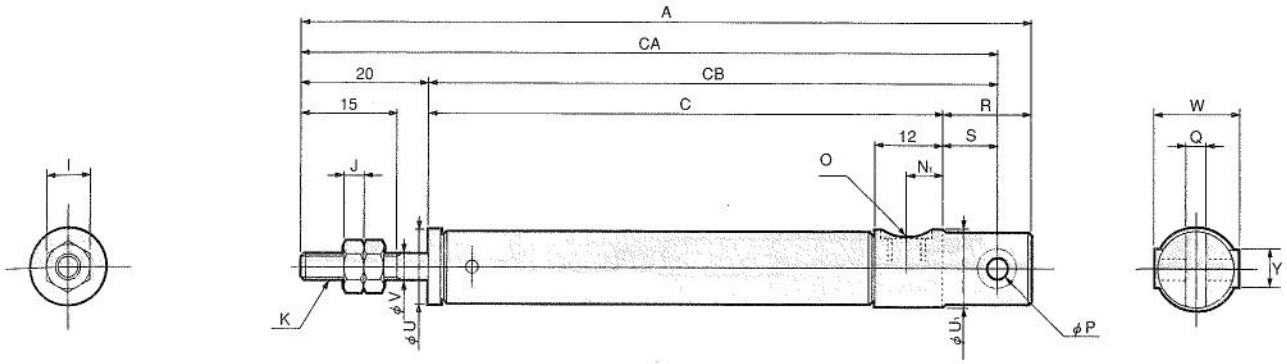
Type / Symbol / Stroke / Bore size		Standard cylinder A 5	10	15	30	45	60	Standard cylinder C 5	10	15	30	45	60	Sensor cylinder A 5	10	15	30	45	60	Sensor cylinder C 5	10	15	30	45	60
6	M3 port	61.5	66.5	71.5	98.5	125.5	152.5	33.5	38.5	43.5	70.5	97.5	124.5	71.5	76.5	81.5	108.5	135.5	162.5	43.5	48.5	53.5	80.5	107.5	134.5
	M5 port	65	70	75	102	129	156	37	42	47	74	101	128	75	80	85	112	139	166	47	52	57	84	111	138
10		69	74	79	106	133	160	41	46	51	78	105	132	79	84	89	116	143	170	51	56	61	88	115	142
16		70	75	80	107	134	161	42	47	52	79	106	133	80	85	90	117	144	171	52	57	62	89	116	143

Bore size / Symbol		G1	G2	I	J	K	L	N1	O	U	U1	U2	V	AX	AY	BB	BC	BE	BF	BP	BT
6	M3 port	3.5	8	5.5	2.4	M3×0.5	M6×1	4	M3×0.5	8	7	8	3	11.5	10	26.4	14	32	22.2	4.2	1.6
	M5 port	7	10					5	M5×0.8		8	10									
10		7	10	7	3.2	M4×0.7	M8×1	5	M5×0.8	11	11	12	4	13.9	12	26.4	14	32	22.2	4.2	1.6
16		7	10	8	4	M5×0.8	M10×1	5	M5×0.8	17	17	17	5	16.2	14	25.7	20	42	29.2	5.2	2.3

Dimensions of Single Acting Push Type

(unit : mm)

●Clevis type



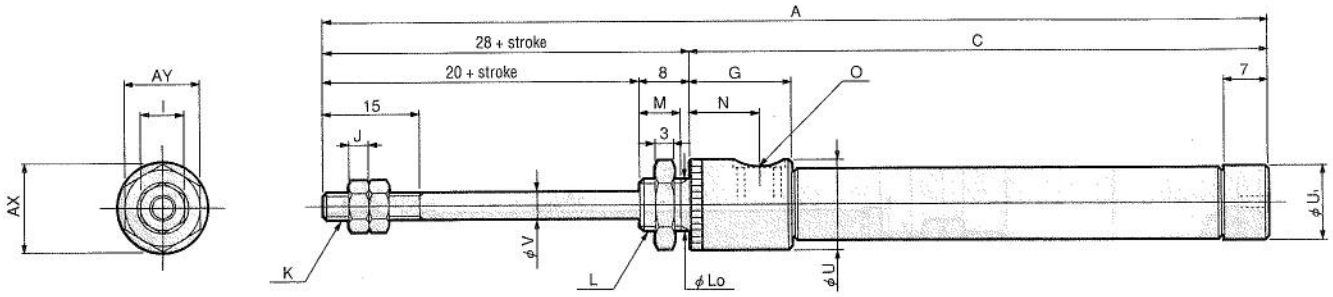
Type / Symbol / Stroke / Bore size	Standard cylinder A						Standard cylinder C						Sensor cylinder A						Sensor cylinder C						I	J	K	N1	O	P
	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60						
10	79	84	89	116	143	170	46	51	56	83	110	137	89	94	99	126	153	180	56	61	66	93	120	147	7	3.4	M4×0.7	7	M5×0.8	3.3±0.05
16	87	92	97	124	151	178	47	52	57	84	111	138	97	102	107	134	161	188	57	62	67	94	121	148	8	4	M5×0.8	7	M5×0.8	5.1±0.05

Type / Symbol / Stroke / Bore size	Q	R	S	U	U1	V	W	Y	Standard cylinder CA						Standard cylinder CB						Sensor cylinder CA						Sensor cylinder CB					
									5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60	5	10	15	30	45	60
10	$3.2^{+0.2}_{+0.1}$	13	8	11	12	4	12	φ6	74	79	84	111	138	165	54	59	64	91	118	145	84	89	94	121	148	175	64	69	74	101	128	155
16	$6.5^{+0.2}_{-0.1}$	20	10	17	17	5	17	φ8	77	82	87	114	141	168	57	62	67	94	121	148	87	92	97	124	151	178	67	72	77	104	131	158

Dimensions of Single Acting Pull Type

(unit : mm)

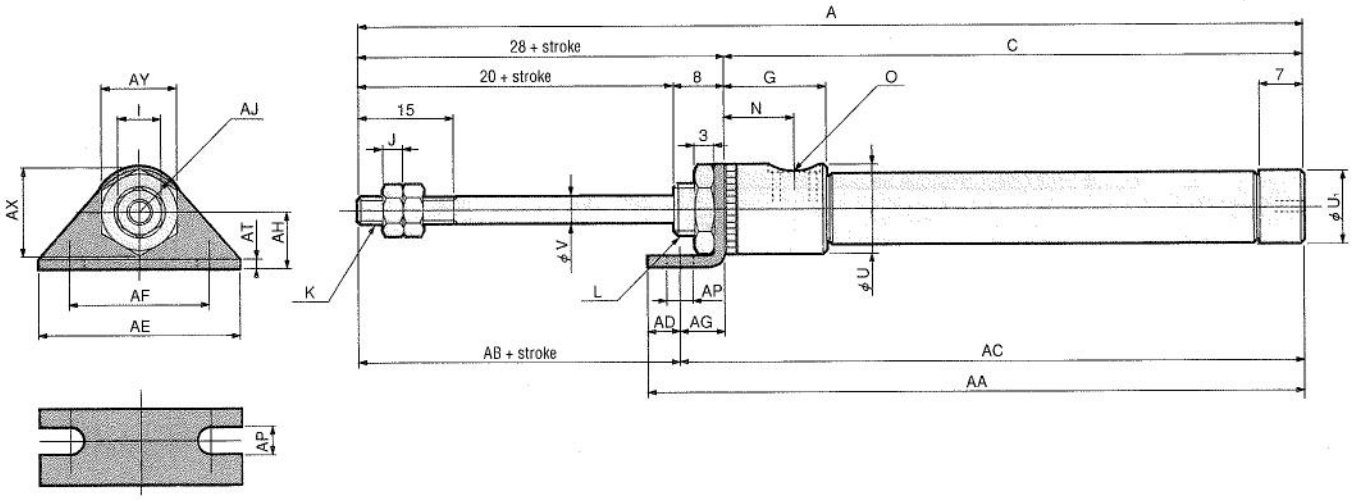
●Basic type



Type		Standard cylinder								Sensor cylinder							
Symbol / Stroke / Bore size		A				C				A				C			
		5	10	15	30	5	10	15	30	5	10	15	30	5	10	15	30
6	M3 port	81.5	91.5	101.5	143.5	48.5	53.5	58.5	85.5	91.5	101.5	111.5	153.5	58.5	63.5	68.5	95.5
	M5 port	84.5	94.5	104.5	146.5	51.5	56.5	61.5	88.5	94.5	104.5	114.5	156.5	61.5	66.5	71.5	98.5
10		88	98	108	150	55	60	65	92	98	108	118	160	65	70	75	102
16		88	98	108	150	55	60	65	92	98	108	118	160	65	70	75	102

Bore size / Symbol		G	I	J	K	L	Lo	M	N	O	U	U1	V	AX	AY
6	M3 port	13.5	5.5	2.4	M3×0.5	M6×1	$6^{-0.05}_{-0.10}$	6.5	10	M3×0.5	11	8	3	11.5	10
	M5 port	16.5							11.5	M5×0.8	14				
10		16	7	3.2	M4×0.7	M8×1	$8^{-0.05}_{-0.10}$	6.5	11	M5×0.8	14	11	4	13.9	12
16		15.5	8	4	M5×0.8	M10×1	$10^{-0.05}_{-0.10}$	6	10.5	M5×0.8	17	17	5	16.2	14

●Single foot type



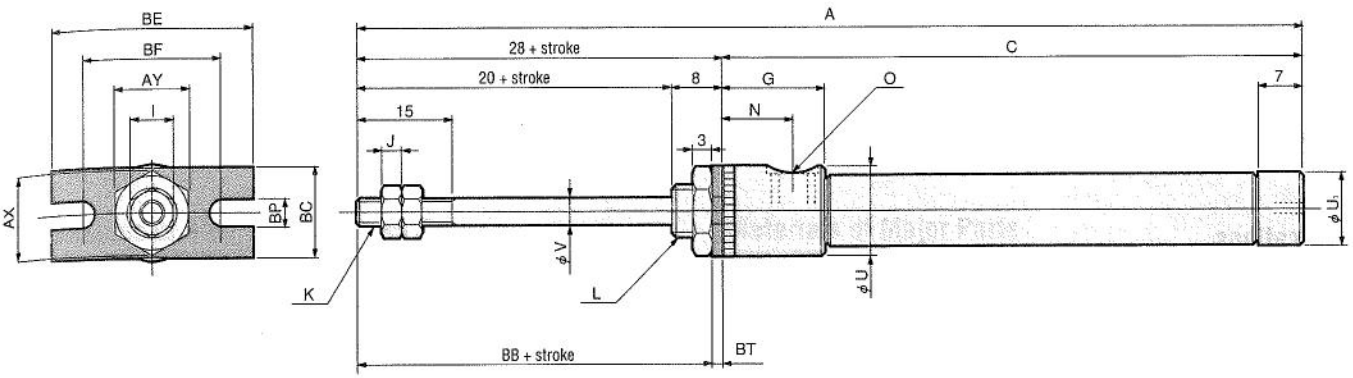
Type		Standard cylinder								Sensor cylinder								G	I	J	K	L	N	O	U	U1	V
Symbol / Stroke / Bore size		A				C				A				C													
		5	10	15	30	5	10	15	30	5	10	15	30	5	10	15	30										
6	M3 port	81.5	91.5	101.5	143.5	48.5	53.5	58.5	85.5	91.5	101.5	111.5	153.5	58.5	63.5	68.5	95.5	13.5	5.5	2.4	M3×0.5	M6×1	10	M3×0.5	11	8	3
	M5 port	84.5	94.5	104.5	146.5	51.5	56.5	61.5	88.5	94.5	104.5	114.5	156.5	61.5	66.5	71.5	98.5	16.5					11.5	M5×0.8	14		
10		88	98	108	150	55	60	65	92	98	108	118	160	65	70	75	102	16	7	3.2	M4×0.7	M8×1	11	M5×0.8	14	11	4
16		88	98	108	150	55	60	65	92	98	108	118	160	65	70	75	102	15.5	8	4	M5×0.8	M10×1	10.5	M5×0.8	17	17	5

Type		Standard cylinder										Sensor cylinder										AD	AE	AF	AG	AH	AJ	AP	AT	AX	AY
Symbol / Stroke / Bore size		AA				AB	AC					AA				AB	AC														
		5	10	15	30		5	10	15	30		5	10	15	30		5	10	15	30												
6	M3 port	60.5	65.5	70.5	97.5	21	55.5	60.5	65.5	92.5		70.5	75.5	80.5	107.5	21	65.5	70.5	75.5	102.5		5	32	22.2	7	9	7	4.2	1.6	11.5	10
	M5 port	63.5	68.5	73.5	100.5		58.5	63.5	68.5	95.5		73.5	78.5	83.5	110.5		68.5	73.5	78.5	105.5											
10		67	72	77	104	21	62	67	72	99		77	82	87	114	21	72	77	82	109		5	32	22.2	7	9	7	4.2	1.6	13.9	12
16		70	75	80	107	19	64	69	74	101		80	85	90	117	19	74	79	84	111		6	42	29.2	9	14	10	5.2	2.3	16.2	14

Dimensions of Single Acting Pull Type

(unit : mm)

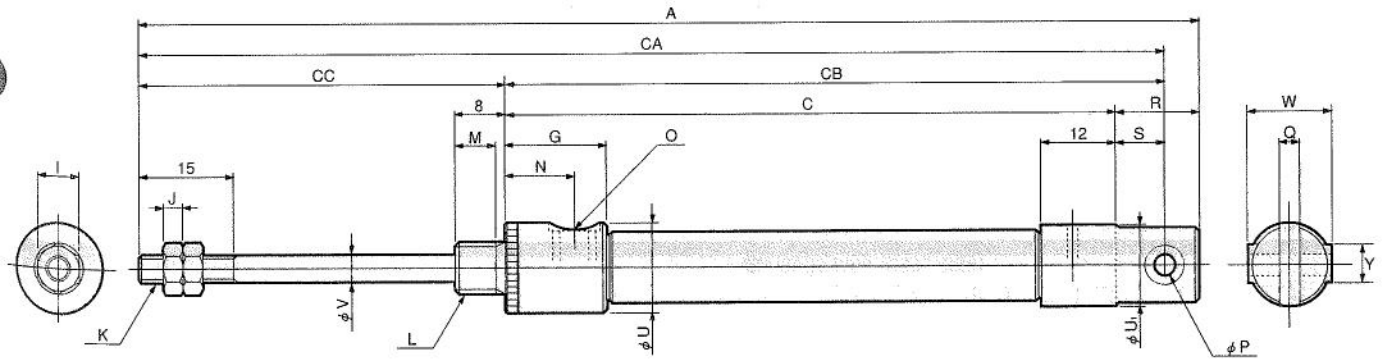
●Flange type



Type / Symbol / Stroke / Bore size	Standard cylinder A 5	A 10	A 15	A 30	C 5	C 10	C 15	C 30	Sensor cylinder A 5	A 10	A 15	A 30	C 5	C 10	C 15	C 30
6 M3 port	81.5	91.5	101.5	143.5	48.5	53.5	58.5	85.5	91.5	101.5	111.5	153.5	58.5	63.5	68.5	95.5
6 M5 port	84.5	94.5	104.5	146.5	51.5	56.5	61.5	88.5	94.5	104.5	114.5	156.5	61.5	66.5	71.5	98.5
10	88	98	108	150	55	60	65	92	98	108	118	160	65	70	75	102
16	88	98	108	150	55	60	65	92	98	108	118	160	65	70	75	102

Bore size / Symbol	G	I	J	K	L	N	O	U	U_1	V	AX	AY	BB	BC	BE	BF	BP	BT
6 M3 port	13.5	5.5	2.4	M3×0.5	M6×1	10	M3×0.5	11	8	3	11.5	10	26.4	14	32	22.2	4.2	1.6
6 M5 port	16.5					11.5	M5×0.8	14										
10	16	7	3.2	M4×0.7	M8×1	11	M5×0.8	14	11	4	13.9	12	26.4	14	32	22.2	4.2	1.6
16	15.5	8	4	M5×0.8	M10×1	10.5	M5×0.8	17	17	5	16.2	14	25.7	20	42	29.2	5.2	2.3

●Clevis type

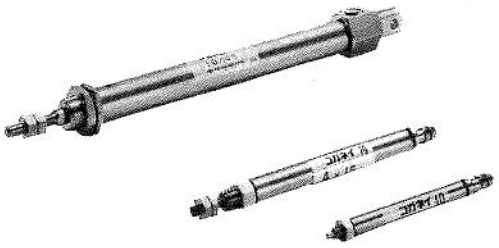


Type / Symbol / Stroke / Bore size	Standard cylinder A 5	A 10	A 15	A 30	C 5	C 10	C 15	C 30	Sensor cylinder A 5	A 10	A 15	A 30	C 5	C 10	C 15	C 30	G	I	J	K	L	M	N	O	P	Q
10	101	111	121	163	60	65	70	97	111	121	131	173	70	75	80	107	16	7	3.2	M4×0.7	M8×1	6.5	11	M5×0.8	3.3±0.05	$3.2^{+0.2}_{+0.1}$
16	113	123	133	175	60	65	70	97	123	133	143	185	70	75	80	107	15.5	8	4	M5×0.8	M10×1	6	10.5	M5×0.8	5.1±0.05	$6.5^{+0.2}_{+0.1}$

Type / Symbol / Stroke / Bore size	R	S	U	U_1	V	W	Y	Standard cylinder CA 5	CA 10	CA 15	CA 30	CB 5	CB 10	CB 15	CB 30	CC 5	CC 10	CC 15	CC 30	Sensor cylinder CA 5	CA 10	CA 15	CA 30	CB 5	CB 10	CB 15	CB 30	CC 5	CC 10	CC 15	CC 30
10	13	8	14	12	4	12	φ6	96	106	116	158	68	73	78	105	28	33	38	53	106	116	126	168	78	83	88	115	28	33	38	53
16	20	10	17	17	5	17	φ8	103	113	123	165	70	75	80	107	33	38	43	58	113	123	133	175	80	85	90	117	33	38	43	58

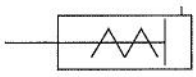
PEN CYLINDERS

Single Acting Push Cylinders ø2.5, ø4
Non-RotatingSingle Acting Push Cylinders

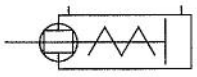


Symbols

●Single acting push type



●Non-RotatingSingle Acting Push Cylinders



Specifications

Item \ Bore size mm	2.5・4	10・16
Operation	Single acting push type	Non-RotatingSingle Acting Push Cylinders
Fluid	Air	
Mounting type	Basic type	Basic type, Foot type Flange type, Pivot type
Pressure range[Note] MPa{kgf/cm²}	0.34~0.7{3.5~7.1}	0.15~0.7{1.5~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~60	
Piston speed range mm/s	50~300 (External stopper is required for operation over the specified speed or workload.)	
Cushion	None	Fixed type (rubber bumper)
Lubrication	Not required	
Maximum rod rotation	—	±2°
Port connection	ø2.5 and ø4 are equipped with barb filtings for nylon tube.	M5×0.8

Note: See minimum operating pressure chart for further details on each operation.

Bore Size and Stroke

mm

Operation	Bore size	Stroke	available stroke	Stroke tolerance
Single acting push type	2.5	5 10	10	$^{+1.2}_{-0.2}$
	4	5 10 15 20	20	
Non-rotating Single acting push type	10	15 30 45 60	60	$^{+1.5}_{-0.5}$
	16			$^{+1.2}_{-0.2}$

Minimum Operating Pressure

Operation	Bore size mm	Minimum operating pressure MPa{kgf/cm²}
Single acting push type	2.5, 4	0.34{3.5}
Non-rotating Single acting push type	10, 16	0.15{1.5}

Spring Returning Force

See page 119.

Weight

g

Operation	Mounting type	Cylinder bore size mm	Stroke mm							Additional weight of bracket	
			5	10	15	20	30	45	60	Foot type	Flange type
Single acting push type	Basic type	2.5	1.5	1.9	—	—	—	—	—	—	—
		4	3.4	4.4	5.2	6.1	—	—	—	—	—
Non-rotating Single acting push type	Basic type (same for pivot type)	10	—	—	59	—	70	81	92	36	12
		16	—	—	108	—	128	148	168	34	11

Remark: Includes mounting nut and rod end nut.

Order Example

P SA □ □ – □ – □

Pen cylinder series

Single acting push type

Operation
Blank —— Single acting push type
L —— Non-rotating Single acting push type

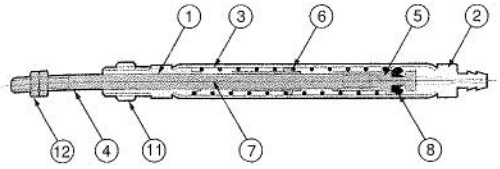
Bore size x stroke

Mounting type
Blank —— Basic type (clevis mounting type for non-rotating cylinder)
1 —— Double foot type (for non-rotating cylinder only)
3 —— Flange type (same for both rod side and head side; for non-rotating cylinder only)
8E —— pivot type (with pin and pivot supporting bracket for non-rotating cylinder only)
Note: Basic type cylinder and supporting brackets are delivered together

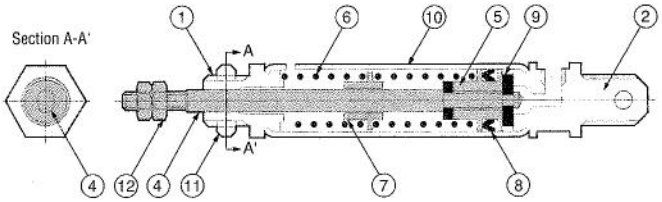
Rod knuckle
Blank —— Without rod knuckle
I —— With I-shaped rod knuckle
Y —— With Y-shaped rod knuckle (with pin)
For bore size ø10 and ø16 only
Please order cylinder joint separately.

Construction Diagrams

●Single acting push type
● ϕ2.5 · ϕ4



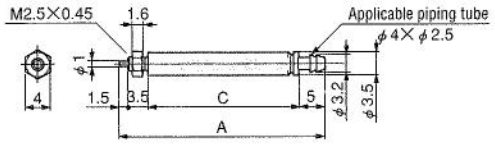
●Non-rotating (single acting-push type)
● ϕ10 · ϕ16



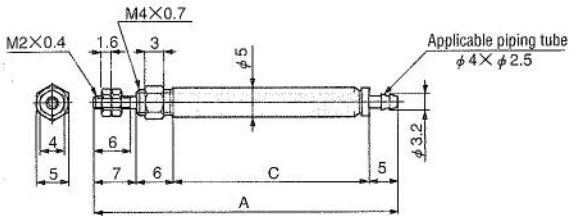
Dimensions of Single Acting Push Type

(unit : mm)

●Basic type
● ϕ2.5



● ϕ4



Symbol / Bore size	A note				C note			
	5	10	15	20	5	10	15	20
2.5	26.5	35.5	—	—	16.5	25.5	—	—
4	37	46	55	64	19	28	37	46

Note: See longer figures for non-standard strokes because distance collars are used.

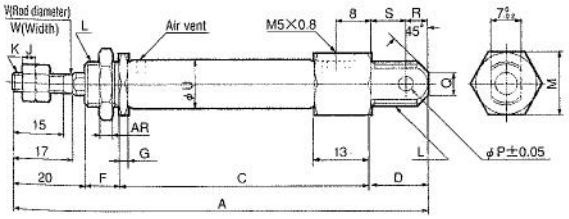
Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel electroplated)
②	Head cover	
③	Cylinder tube	
④	Piston rod	Stainless steel
⑤	Piston	Brass
⑥	Spring	Hard steel
⑦	Collar	Brass
⑧	Piston packing	Synthetic rubber(NBR)
⑨	Bumper	
⑩	Cylinder tube	Stainless steel
⑪	Mounting nut	Brass (nickel electroplated)
⑫	Rod end nut	ϕ4 —Brass (nickel electroplated) Non-rotating type—Hard steel (nickel electroplated)

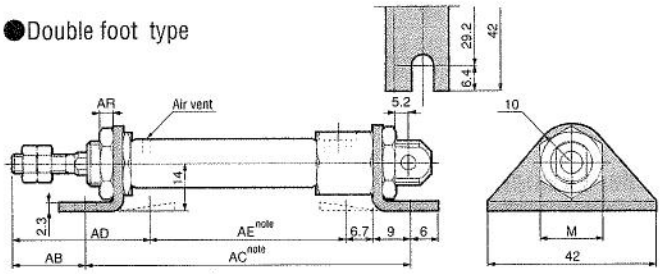
Dimensions of Non-Rotating Single Acting Push Type

(unit : mm)

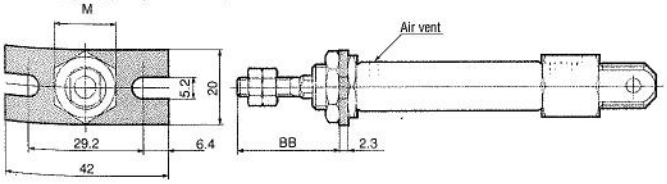
●Basic type (also Pivot type)



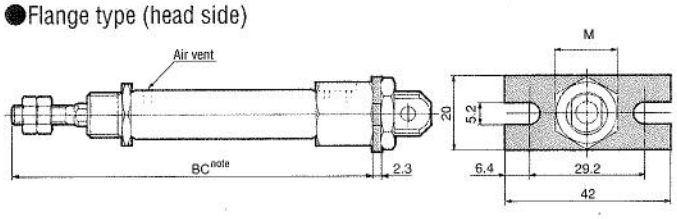
●Double foot type



●Flange type (rod side)



●Flange type (head side)



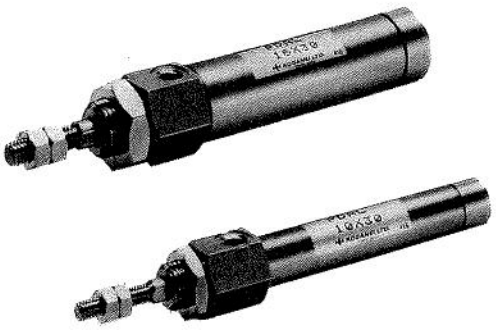
Symbol / Stroke / Bore size	A				C				D	F	G	J	K	L	M	P	Q
	15	30	45	60	15	30	45	60									
10	98	125	152	179	57	84	111	138	13	8	2	3.2	M4×0.7	M10×1	14	3.3	5
16	106.5	133.5	160.5	187.5	59.5	86.5	113.5	140.5	17	10	4	4	M5×0.8	M12×1	17	5.1	6

Symbol / Stroke / Bore size	R	S	U	V	W	AB	AC				AD	AE				AR	BB	BC			
							15	30	45	60		15	30	45	60			15	30	45	60
10	5	8	11	5	4.2	19	75	102	129	156	34.7	43.6	70.6	97.6	124.6	3	25.7	85	112	139	166
16	7	10	17	6	5.2	21	77.5	104.5	131.5	158.5	36.7	46.1	73.1	100.1	127.1	5	27.7	89.5	116.5	143.5	170.5

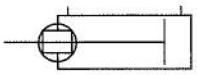
Note: See longer figures for non-standard strokes because distance collars are used.

PEN CYLINDERS

Non-Rotating Double Acting Cylinders



Symbol



Specifications

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	Basic type, Foot type, Flange type, Clevis type	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.1～0.7{1.0～7.1}	
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0～70	
Speed range mm/s	50～500	
Cushion	Fixed type (rubber bumper)	
Lubrication	Not required	
Port size	M5×0.8	
Maximum rod rotation	±2°	

Bore Size and Stroke

mm

Bore size	Standard stroke	available stroke
10	5 10 15 30 45 60	60
16	5 10 15 30 45 60	60

Mounting type

Mounting type	Item	Notes
1A	Single foot type	included in delivery
3	Flange type	included in delivery
7	Clevis type (with pin)	Clevis type (with pin)
7-7C	Clevis type with supporting bracket (with pin)	supporting bracket included in delivery.

Weight

g

Cylinder bore size mm	Mounting type	Stroke mm						Additional weight of bracket			Sensor cylinder	Additional weight of sensor switch			
		5	10	15	30	45	60	-1A	-3	-7C		ZC153□	ZC130□	CS5T□	CS11T□
10	Basic type	51.1	52.2	53.3	56.6	59.9	63.2	18	12	32	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		86.8	88.6	90.5	96	101.5	107	18	12	45	12				
10	Clevis type	62.1	63.2	64.3	67.6	70.9	74.2	—	—	32	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		113.8	115.6	117.4	122.9	128.4	133.9	—	—	45	12				

Remark: Includes mounting nut and rod-end nut

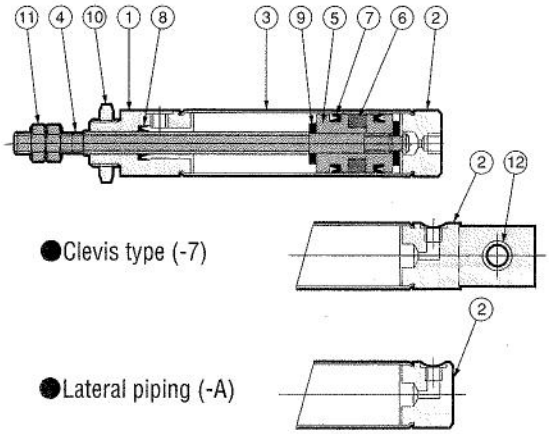
Order Example

P DAL □ □ – □ – □ – □ – □ □ □

- P: Pen cylinder series
- DAL: single rod non-rotating Double acting type
- Bore size x stroke
- Cylinder specifications: Blank — Standard cylinder; S — sensor cylinder
- position of port on head cover (not applicable on clevis type): Blank — Axial piping; A — Lateral piping
- Mounting (mounting brackets are included in delivery, except clevis type.): Blank — Basic type; 1A — Single foot type; 3 — Flange type; 7 — Clevis type (with pin); 7-7C — Clevis type with supporting bracket (with pin)
- Rod knuckle (included in delivery): Blank — Without bracket; I — I-shaped rod knuckle; Y — Y-shaped rod knuckle (with pin); Please order cylinder joint separately
- Type of Sensor switch: Blank — Without sensor switch; ZC153 — Three wire, solid state type; ZC130 — Two wire, solid state type; CS5T — Two wire, reed switch type; CS11T — Two wire, reed switch type; See page 616 for further details.
- Lead wire length: A — 1000mm; B — 3000mm
- Number of sensor switches: 1 — With one switch; 2 — With two switches; 3 — With three switches

Construction Diagrams

●Double acting type



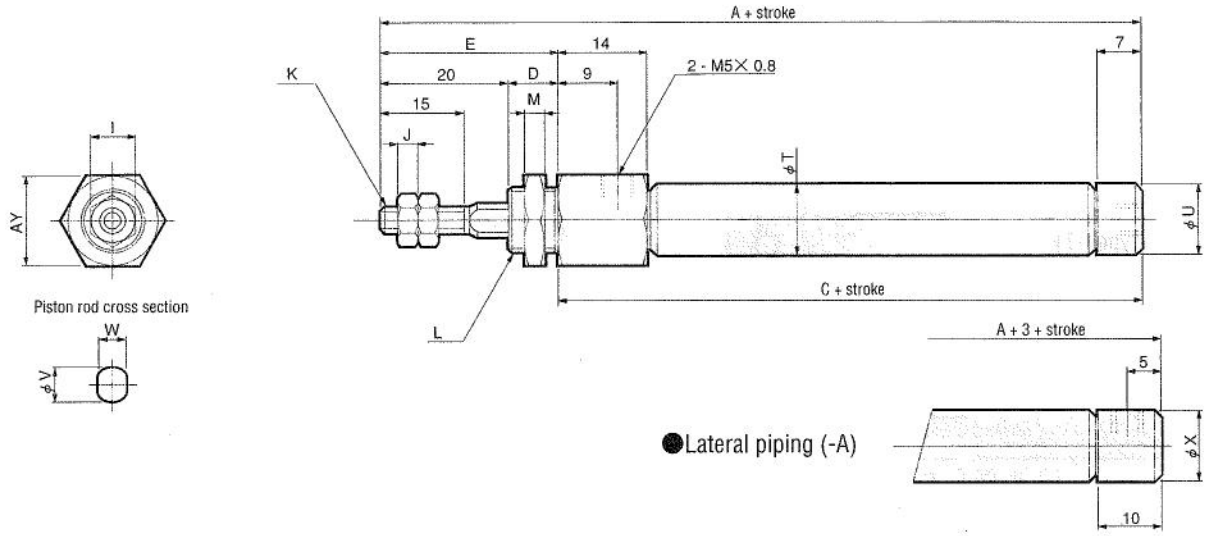
Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder tube	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	—
⑦	Piston packing	Synthetic rubber(NBR)
⑧	Rod packing	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Clevis shaped bushing	Oil permeated bronze

Dimensions of Non-Rotating Double Acting Type

(unit : mm)

●Basic type

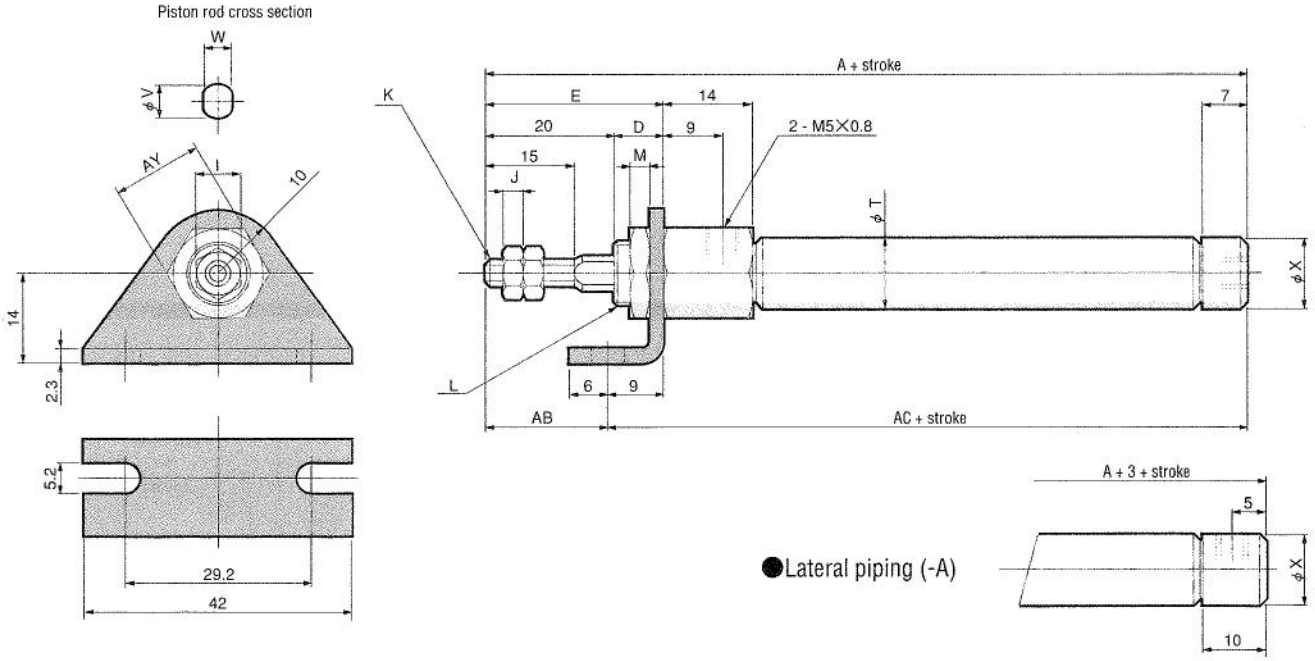


●Lateral piping (-A)

Type	Standard cylinder		Cylinder with magnets							
Bore size \ Symbol	A	C	A	C	D	E	I	J	K	L
10	71	43	81	53	8	28	7	3.2	M4×0.7	M10×1
16	75	45	85	55	10	30	8	4.0	M5×0.8	M12×1

Bore size \ Symbol	AY	M	φT	φU	φV	W	φX
10	14	3	11	11	5	4.2	12
16	17	5	17	17	6	5.2	17

●Single foot type



●Lateral piping (-A)

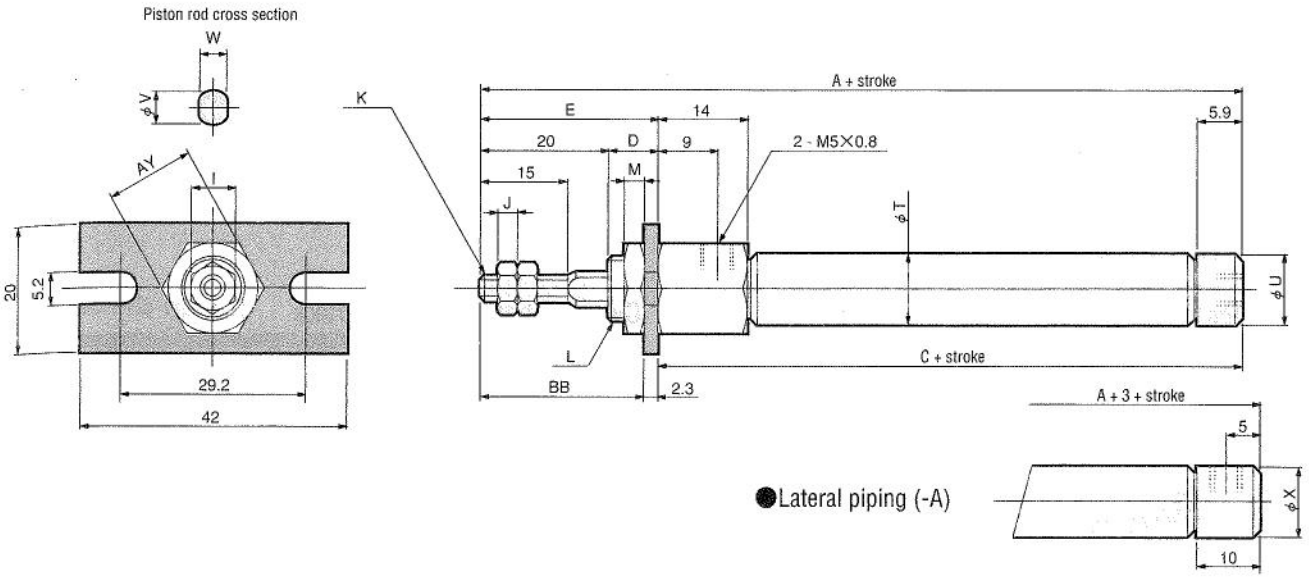
Type	Standard cylinder			Cylinder with magnets							
Bore size \ Symbol	A	AB	AC	A	AB	AC	D	E	I	J	K
10	71	19	52	81	19	62	8	28	7	3.2	M4×0.7
16	75	21	54	85	21	64	10	30	8	4.0	M5×0.8

Bore size \ Symbol	AY	L	M	φT	φU	φV	W	φX
10	14	M10×1	3	11	11	5	4.2	12
16	17	M12×1	5	17	17	6	5.2	17

Dimensions of Non-Rotating Double Acting Type

(unit : mm)

●Flange type

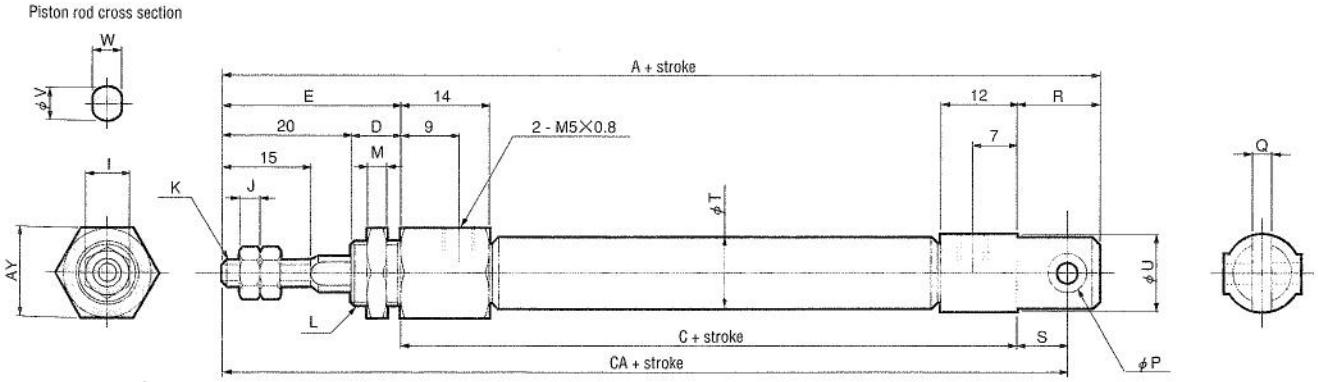


●Lateral piping (-A)

Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	D	E	I	J	K
10	71	43	81	53	8	28	7	3.2	M4×0.7
16	75	45	85	55	10	30	8	4.0	M5×0.8

Bore size / Symbol	L	M	AY	φT	φU	φV	W	BB	φX
10	M10×1	3	14	11	11	5	4.2	25.7	12
16	M12×1	5	17	17	17	6	5.2	27.7	17

●Clevis type

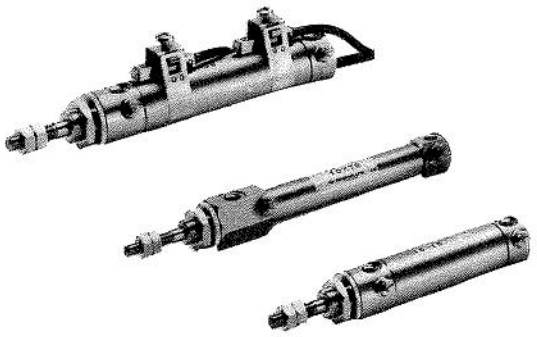


Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Standard cylinder CA	Sensor cylinder A	Sensor cylinder C	Sensor cylinder CA	D	E	I	J	K	L	M
10	89	48	84	99	58	94	8	28	7	3.2	M4×0.7	M10×1	3
16	100	50	90	110	60	100	10	30	8	4.0	M5×0.8	M12×1	5

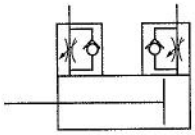
Bore size / Symbol	AY	φP	Q	R	S	φT	φU	φV	W
10	14	3.3±0.05	$3.2^{+0.2}_{-0.1}$	13	8	11	12	5	4.2
16	17	5.1±0.05	$6.5^{+0.2}_{-0.1}$	20	10	17	17	6	5.2

PEN CYLINDERS

Pen Cylinders with Speed Controller



Symbol



Specifications

Item \ Bore Size mm	10	16
Operation	Double acting type	
Mounting type	Basic type, Foot type, Flange type, Clevis type	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.1~0.7{1.0~7.1}	
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Piston speed range mm/s	50~300	
Cushion	Fixed type (rubber bumper)	
Lubrication	Not required	
Port size	M5×0.8	

Cylinder bore size and stroke

mm

Bore size	Standard stroke	available stroke
10	5 10 15 30 45 60 75 100 125 150	150
16	5 10 15 30 45 60 75 100 125 150 175 200	200

Mounting type

Mounting type	Name	Remarks
1	Double foot type	included in delivery
1A	Single foot type	included in delivery note
3	Flange type	included in delivery
7	Clevis type (with pin)	delivered assembled
7-7C	Clevis type with supporting bracket (with pin)	supporting bracket is included in delivery.

Note: Use double foot type for foot brackets with strokes longer than 60mm.

Order Example

P DAU □ □ – □ – □ – □ – □ □ □

Number of sensor switches
1 ——— With one switch
2 ——— With two switches
3 ——— With three switches
⋮ ⋮

Lead wire length
A ——— 1000mm
B ——— 3000mm

Type of sensor switch
Blank ——— Without sensor switch
ZC153 ——— Three wire , solid state type
ZC130 ——— Two wire , solid state type
CS5T ——— Two wire , reed switch type
CS11T ——— Two wire , reed switch type
See page 616 for further details

Bore size
x
Stroke

Cylinder specification
Blank ——— Standard cylinder
S ——— Sensor cylinder

Knuckle (included in delivery)
Blank ——— Without knuckle
I ——— pivot knuckle
Y ——— Y-shaped knuckle (with pin)
Please order the cylinder joint separately.

DAU — Double acting single rod type with speed controller

Mounting (Mounting brackets are included in delivery, except for clevis type).
Blank ——— Basic type
1 ——— Double foot type (for head cover M specification only)
1A ——— Single foot type
3 ——— Flange type
7 ——— Clevis type (with pin)
7-7C ——— Clevis type with supporting bracket (with pin)

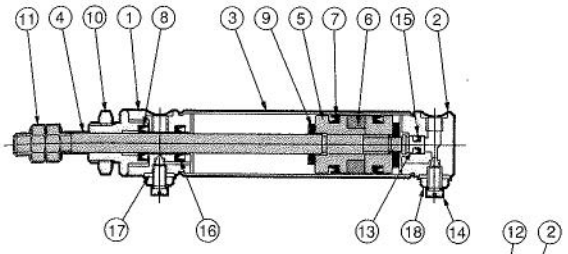
Pen cylinder series

Head cover piping specification (not applicable to clevis type)
A ——— Axial piping
M ——— Lateral piping, with mounting screw

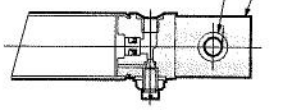
Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Construction

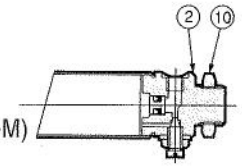
●Double acting type



●**Clevis type (-7)**



●Lateral piping
With mounting screw(-M)



Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder tube	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	—
⑦	Piston packing	Synthetic rubber(NBR)
⑧	Rod packing	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Clevis shaped bushing	Oil permeated bronze
⑬	Housing	Brass
⑭	Needle	Stainless steel
⑮	Check packing	Synthetic rubber(NBR)
⑯	Check packing	
⑰	Gasket	
⑱	Locking nut	Brass (nickel plated)

Weight

g

Cylinder bore size mm	Mounting type	Stroke mm											
		5	10	15	30	45	60	75	100	125	150	175	200
10	Basic type	59.1	60.2	61.3	64.6	67.9	71.2	74.5	80	85.5	91	—	—
16		87.8	89.6	91.4	96.9	102.4	107.9	113.4	122.4	131.4	140.5	149.4	158.4
10	Clevis type	70.1	71.2	72.3	75.6	78.9	82.2	85.5	91	96.5	102	—	—
16		114.8	116.6	118.5	124	129.5	135	140.5	149.5	158.5	167.5	176.5	185.5

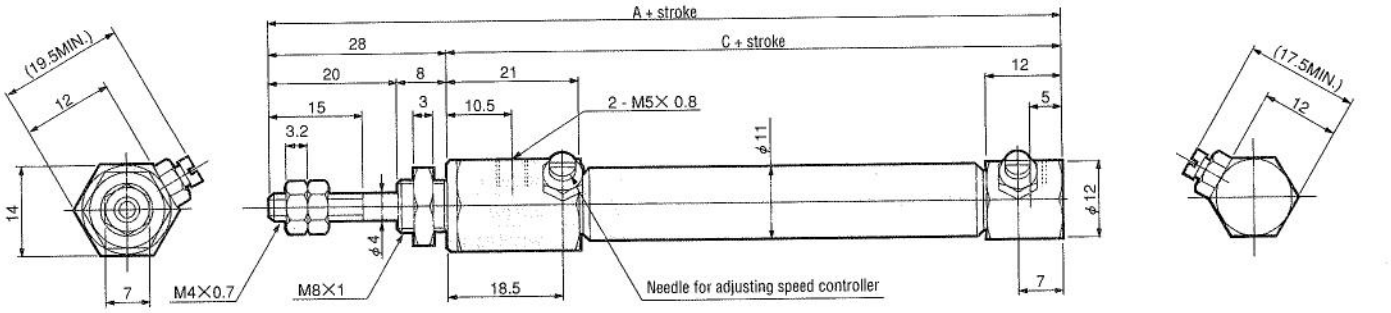
Cylinder bore size mm	Mounting type	Added weight of mounting bracket				Sensor cylinder	Added weight of sensor switch			
		-1	-1A	-3	-7C		ZC153□	ZC130□	CS5T□	CS11T□
10	Basic type	14	7	5	32	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		36	18	12	45	12				
10	Clevis type	14	7	5	32	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		36	18	12	45	12				

Dimensions of Cylinder with Speed Controller

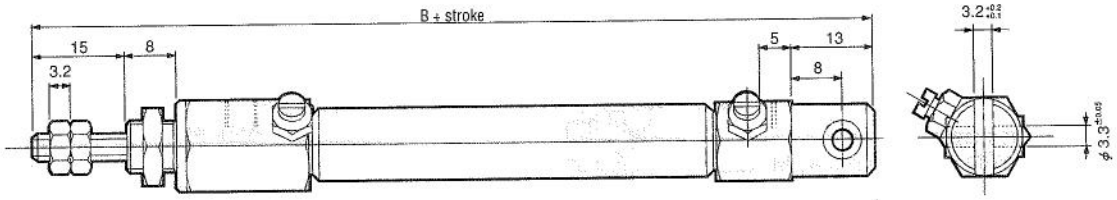
(unit : mm)

● ϕ 10

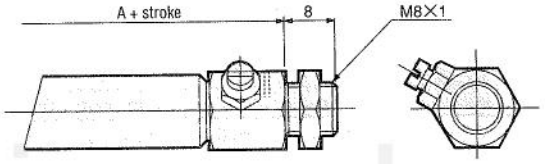
●Lateral piping (-A)



●Clevis type(-7)



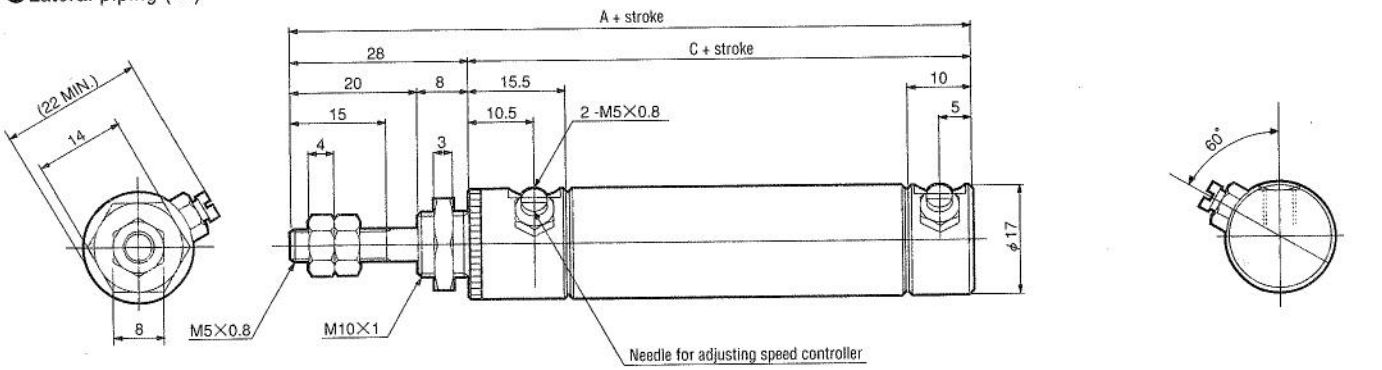
●Lateral piping, with mounting screw (-M)



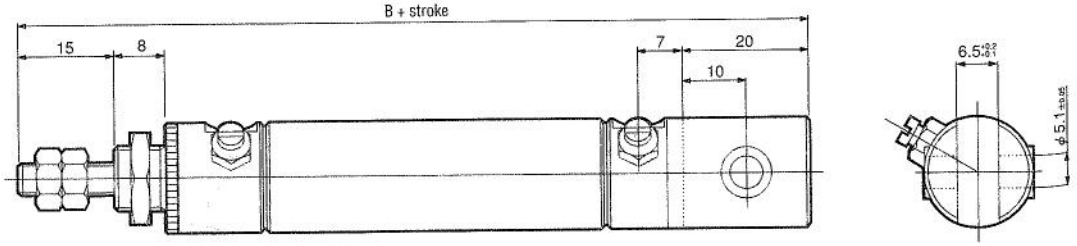
Type \ Symbol	A	B	C
Standard cylinder	83	91	55
Sensor cylinder	93	101	65

● ϕ 16

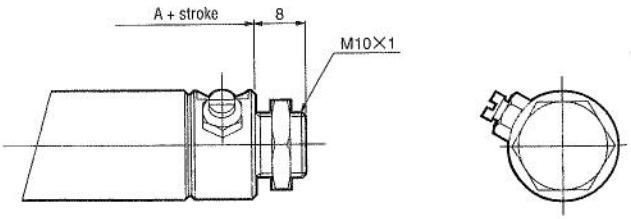
●Lateral piping (-A)



●Clevis type (-7)



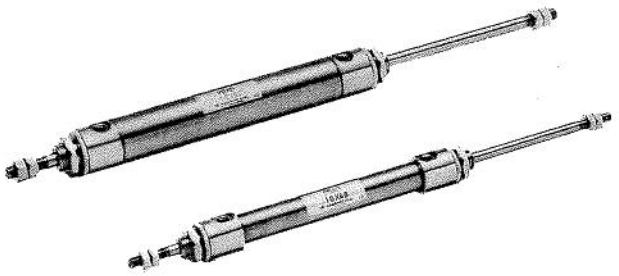
●Lateral piping with mounting screw (-M)



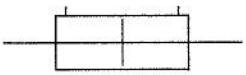
Type \ Symbol	A	B	C
Standard cylinder	77.5	94.5	49.5
Sensor cylinder	87.5	104.5	59.5

PEN CYLINDERS

Double-End Rod Cylinders



Symbol



Specifications

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	Basic type, Foot type, Flange type	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.12~0.7{1.2~7.0}	0.1~0.7{0.1~7.1}
Proof pressure range MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Operating speed range mm/s	50~750	
Cushion	Fixed type (rubber bumper)	
Lubrication	Not required	
Port size	M5×0.8	

Cylinder bore size and Stroke

mm

Bore size	Standard stroke	available stroke
10	15 30 45 60	60
16	15 30 45 60	100

Mounting type

Mounting type	Name	Remarks
1	Double foot type	included in delivery
1A	Single foot type	included in delivery[note]
3	Flange type	included in delivery

Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Weight

g

Cylinder bore size mm	Stroke mm				Added weight of bracket			Sensor cylinder	Added weight of sensor switch			
	15	30	45	60	-1	-1A	-3		ZC153□	ZC130□	CS5T□	CS11T□
10	76.8	81.6	86.4	91.2	14	7	5	—	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16	138.8	146.6	154.4	162.2	36	18	12	12				

Order Example

P DAD □ □ – □ – □ – □ □ □

Pen cylinder series

DAD — Double acting double-end rod type

Cylinder specification
Blank — Standard cylinder
S — Sensor cylinder (for ø16 only)

Bore size x Stroke

Mounting type (included in delivery except for clevis type).
Blank — Basic type
1 — Double foot type
1A — Single foot type
3 — Flange type

Knuckle (included in delivery)
Blank — Without knuckle
I — I-shaped knuckle
Y — Y-shaped knuckle (with pin)
Please order cylinder joint separately.

Lead wire length
A — 1000mm
B — 3000mm

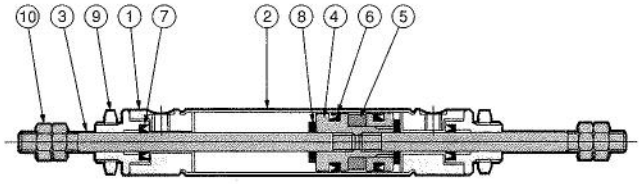
Type of sensor switch(for ø16 only)
Blank — Without sensor switch
ZC153 — Three wire , solid state type
ZC130 — Two wire , solid state type
CS5T — Two wire , reed switch type
CS11T — Two wire , reed switch type
See page 616 for further details.

Number of sensor switches
1 — With one switch
2 — With two switches
3 — With three switches

Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Construction

●Double acting type



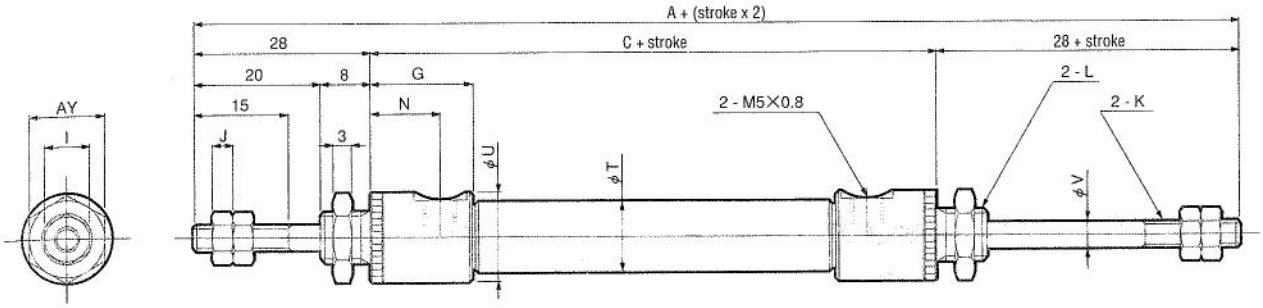
Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Cylinder tube	Stainless steel
③	Piston rod	
④	Piston	Brass
⑤	Magnet	—
⑥	Piston packing	Synthetic rubber(NBR)
⑦	Rod packing	
⑧	Bumper	Urethane rubber
⑨	Mounting nut	Brass (nickel plated)
⑩	Rod end nut	Mild steel (nickel plated)

Dimensions of Double-End Rod Cylinder

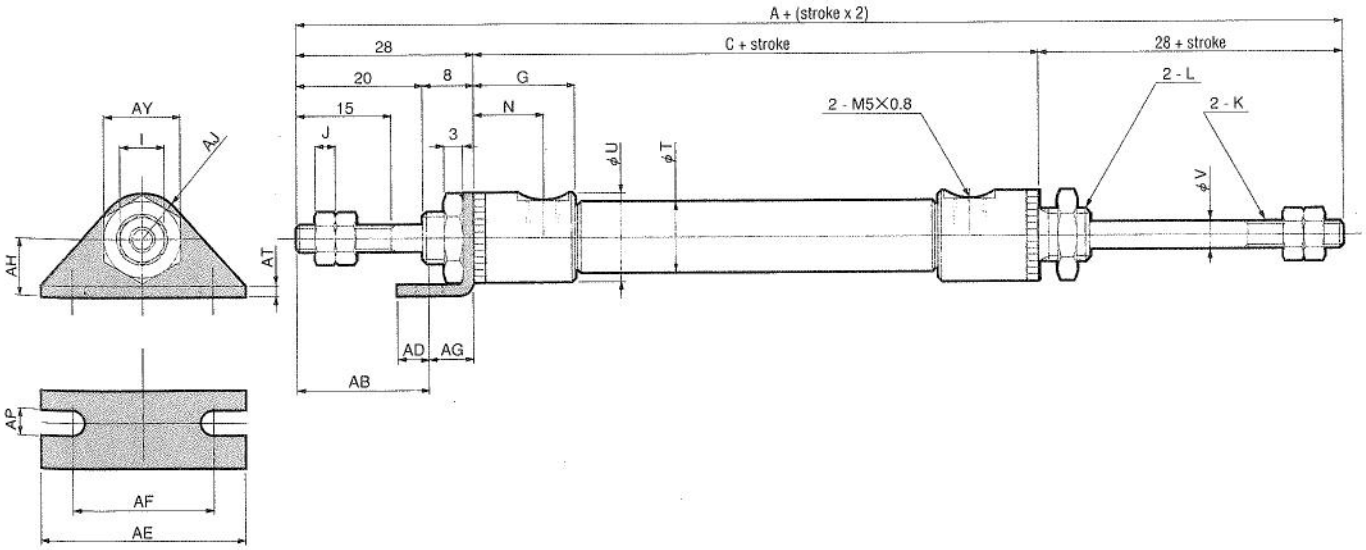
(unit : mm)

●Basic type



Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	I	J	K	L	N	φT	φU	φV	AY
10	120	64	—	—	16.0	7	3.2	M4×0.7	M8×1	11.0	11	14	4	12
16	121	65	121	65	15.5	8	4.0	M5×0.8	M10×1	10.5	17	17	5	14

●Single foot type



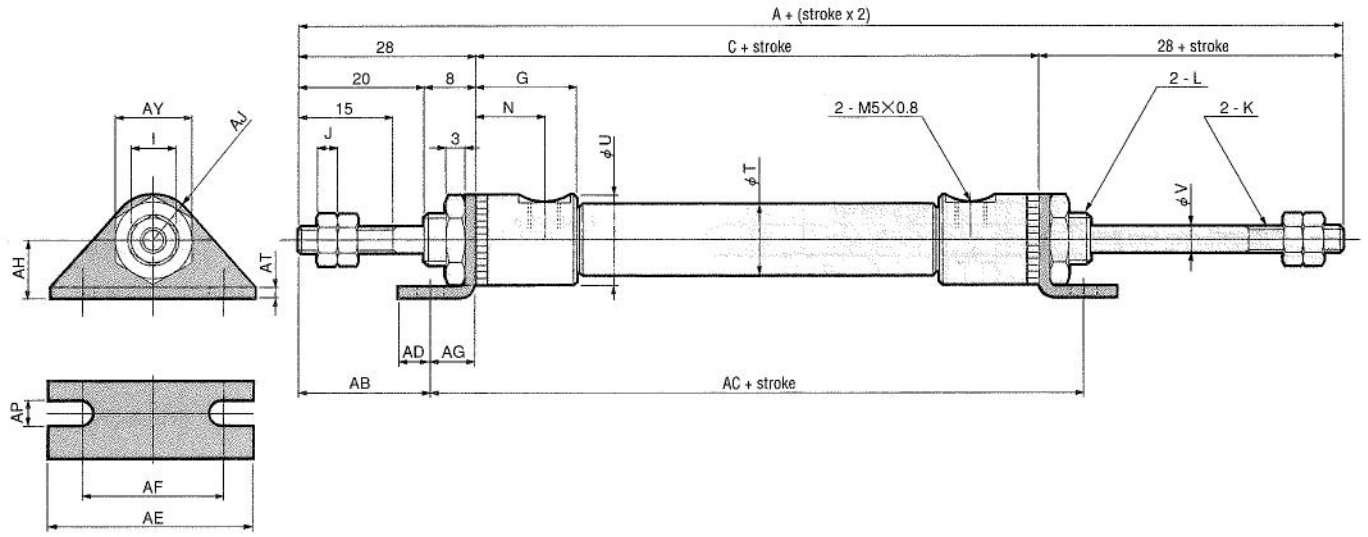
Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	I	J	K	L	N	φT	φU	φV	AY
10	120	64	—	—	16.0	7	3.2	M4×0.7	M8 ×1	11.0	11	14	4	12
16	121	65	121	65	15.5	8	4.0	M5×0.8	M10×1	10.5	17	17	5	14

Bore size / Symbol	AB	AD	AE	AF	AG	AH	AJ	AP	AT
10	21	5	32	22.2	7	9	7	4.2	1.6
16	19	6	42	29.2	9	14	10	5.2	2.3

Dimensions of Double-End Rod Cylinder

(unit : mm)

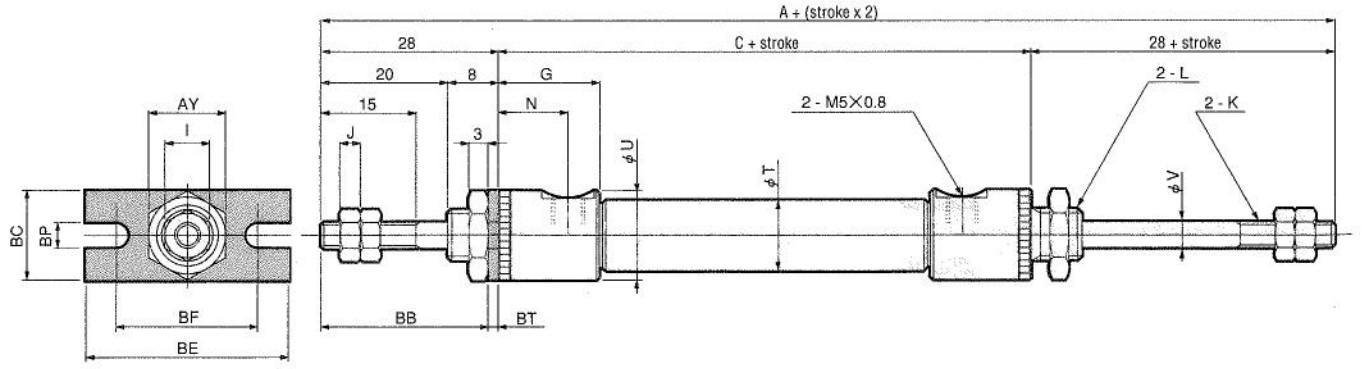
●Double foot type



Type	Standard cylinder			Sensor cylinder												
Bore size \ Symbol	A	C	AC	A	C	AC	G	I	J	K	L	N	φT	φU	φV	AY
10	120	64	78	—	—	—	16.0	7	3.2	M4×0.7	M8×1	11.0	11	14	4	12
16	121	65	83	121	65	83	15.5	8	4.0	M5×0.8	M10×1	10.5	17	17	5	14

Bore size \ Symbol	AB	AD	AE	AF	AG	AH	AJ	AP	AT
10	21	5	32	22.2	7	9	7	4.2	1.6
16	19	6	42	29.2	9	14	10	5.2	2.3

●Flange type

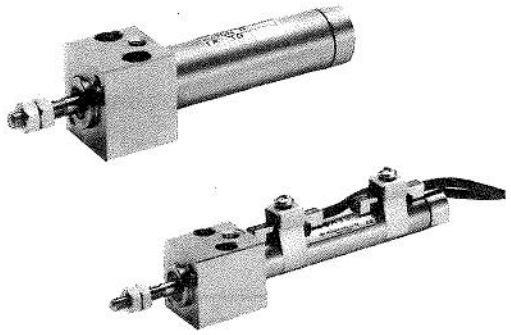


Type	Standard cylinder		Sensor cylinder											
Bore size \ Symbol	A	C	A	C	G	I	J	K	L	N	φT	φU	φV	AY
10	120	64	—	—	16.0	7	3.2	M4×0.7	M8×1	11.0	11	14	4	12
16	121	65	121	65	15.5	8	4.0	M5×0.8	M10×1	10.5	17	17	5	14

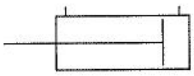
Bore size \ Symbol	BB	BC	BE	BF	BP	BT
10	26.4	14	32	22.2	4.2	1.6
16	25.7	20	42	29.2	5.2	2.3

PEN CYLINDER

Block Cylinder



Symbol



Specification

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	Side mounting type and front mounting type	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.08~0.7{0.8~7.1}	0.06~0.7{0.6~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Operation speed range mm/s	50~750	
Cushion	Rubber bumper	
Lubrication	Not required	
Post size	M5×0.8	

Bore Size and Stroke

mm

bore size	Stroke	available stroke note
10	5 10 15 30 45 60 75 100	100
16	5 10 15 30 45 60 75 100	100

Remark: Not applicable for more than 100mm stroke due to side mounting.

Weight

g

Cylinder bore size mm	Stroke mm								Sensor cylinder	Added weight of sensor switch			
	5	10	15	30	45	60	75	100		ZC153□	ZC130□	CS5T□	CS11T□
10	89.1	90.2	91.3	94.6	97.9	101.2	104.5	110	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16	152.8	154.6	156.4	161.9	167.4	172.9	178.4	187.4	12				

Remark: Including rod end nut.

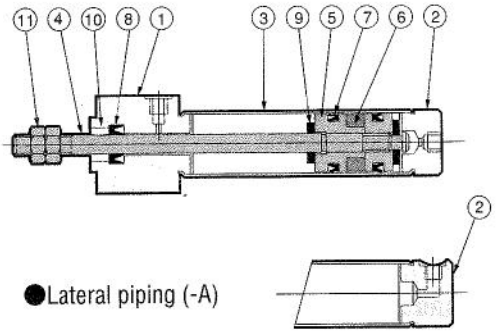
Order Example

P DAB □ □ – □ – □ – □ □ □

- P: Pen cylinder series
- DAB: Double acting single rod block cylinder
- □ (Cylinder specification): Blank — Standard cylinder; S — Sensor cylinder
- □ (Bore size × Stroke)
- □ (Head cover piping specification): Blank — Axial piping; A — Lateral piping
- □ (Rod knuckle (included in delivery)): Blank — Without rod knuckle; I — I-shaped rod knuckle; Y — Y-shaped rod knuckle. Please order cylinder joint separately.
- □ (Type of sensor switch): Blank — Without sensor switch; ZC153 — Three wire type, solid state type; ZC130 — Two wire type, solid state type; CS5T — Two wire type, reed switch type; CS11T — Two wire type, reed switch type. See page 616 for further details.
- □ (Lead wire length): A — 1000mm; B — 3000mm
- □ (Number of sensor switches): 1 — With one switch; 2 — With two switches; 3 — With three switches; ⋮ ⋮

Construction Diagram

●Double acting type



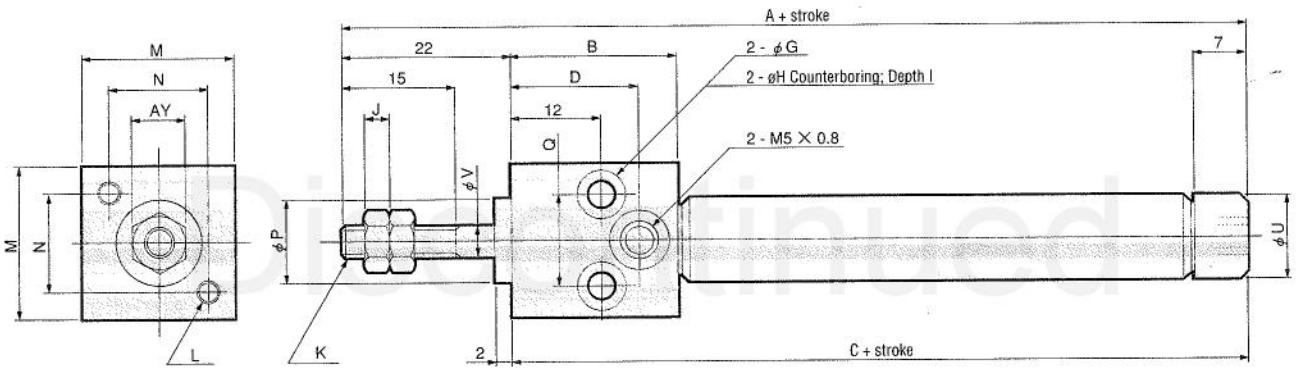
●Lateral piping (-A)

Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder tube	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	—
⑦	Piston packing	Synthetic rubber (NBR)
⑧	Rod packing	
⑨	Bumper	Urethane rubber
⑩	Rod bushing	Oil permeated bronze
⑪	Rod end nut	Mild steel (nickel plated)

Dimensions of Block Cylinders

(unit : mm)

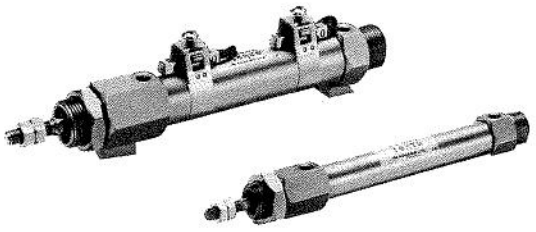


Type	Standard cylinder		Sensor cylinder								
Bore size \ Symbol	A	C	A	C	B	D	ϕG	ϕH	I	J	K
10	73.0	51.0	83.0	61.0	22.0	17.0	3.5	6.5	3.5	3.2	M4×0.7
16	74.5	52.5	84.5	62.5	21.5	16.5	4.5	8.0	4.5	4.0	M5×0.8

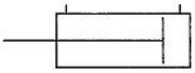
Bore size \ Symbol	L	M	N	ϕP	Q	ϕU	ϕV	AY
10	M3×0.5 Depth 6	20	13	12	12	11	4	7
16	M4×0.7 Depth 7	25	16	14	16	17	5	8

PEN CYLINDER

Linear bearing cylinder



Symbol



Specification

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	See the following chart.	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.12~0.7{1.2~7.1}	0.1~0.7{1.0~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Speed range mm/s	50~750	
Cushion	Rubber bumper	
Lubrication	Not required	
Port size	M5×0.8	

Bore size and stroke

mm

Bore size	Standard cylinder	available stroke
10	25 50 75 100	300
16	25 50 75 100	500

Note: Please inquire about delivery times, except for standard stroke.

Mounting type

Mounting type	Name	Remarks
1	Double foot type	included in delivery
1A	Single foot type	included in delivery note1
3	Flange type	included in delivery
8	pivot type (with pin)	delivered assembled note2
8-8E	pivot type with supporting bracket	with pin,supporting bracket is included in delivery.

Note 1: Pliase use double foot type for foot bracket with strokes longer than 60mm.
2: Oil permeated bushing is standard in the pivot pin hole.

Order Example

P DAA S □ – M – □ – □ – □ □ □

P — Pen cylinder series

DAA — Double acting single rod linear bearing type

S — Sensor Cylinder (Installation of magnet is standard)

□ — Bore size x Stroke

M — Head cover piping specification
M — Lateral piping with mounting screw (not applicable to pivot type)

□ — Mounting type (not applicable to pivot type, supporting brackets are included in delivery)
Blank — Basic type
1 — Double foot type (not applicable to pivot type)
1A — Single foot type
3 — Flange type
8 — pivot type
8-8E — pivot type with supporting bracket (with pin)

□ — Rod knuckle (included in delivery)
Blank — Without rod knuckle
I — I-shaped rod knuckle
Y — Y-shaped rod knuckle (with pin)
Please order the cylinder joint separately

□ — Type of sensor switch
Blank — Without sensor switch
ZC153 — Three wire type; solid state type
ZC130 — Two wire type; solid state type
CS5T — Two wire type; reed switch type
CS11T — Two wire type; reed switch type
See page 616 for further details

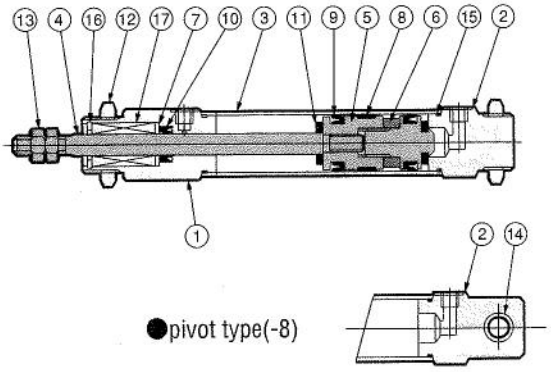
□ — Lead wire length
A — 1000mm
B — 3000mm

□ — Number of sensor switches
1 — With one switch
2 — With two switches
3 — With three switches
⋮ ⋮

Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Construction Diagram

●Double acting type



●pivot type(-8)

Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	Resin
⑦	Washer	Mild steel
⑧	Wearing	Fluorocarbon resin
⑨	Piston packing	Synthetic rubber (NBR)
⑩	Rod seal	Synthetic rubber (NBR)
⑪	Bumper	Urethane rubber
⑫	Mounting nut	Brass (nickel plated)
⑬	Rod end nut	Mild steel (nickel plated)
⑭	I-shaped bushing	Oil permeated bronze
⑮	Tube gasket	Synthetic rubber (NBR)
⑯	Snap ring	Mild steel
⑰	Linear bearing	—

Weight

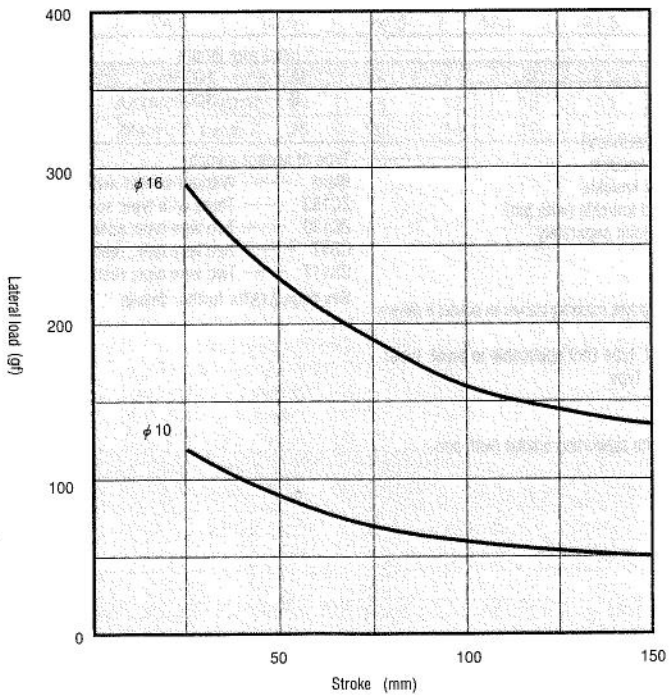
g

Cylinder bore size mm	Mounting type	Stroke mm				Added weight of mounting bracket				Sensor Cylinder	Added weight of sensor switch			
		25	50	75	100	-1A	-1	-3	-8E		ZC153□	ZC130□	CS5T□	CS11T□
10	Basic type	102.4	110.8	119.2	127.6	19	38	10	8	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		221.7	238.4	255.1	271.8	38	76	25	23	12				
10	pivot type	98.4	106.8	115.2	123.6	19	38	10	8	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		223.7	240.4	257.1	273.8	38	76	25	23	12				

Note: Including mounting nut and rod end nut

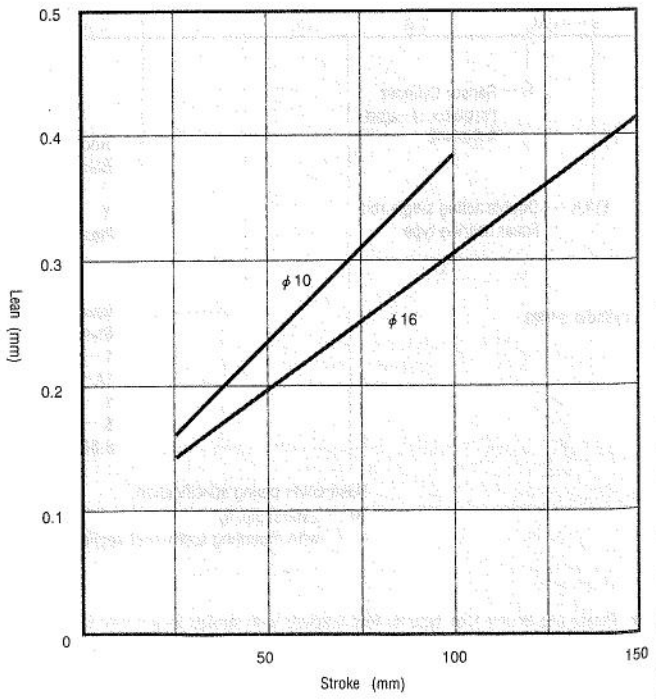
Allowable lateral load

Lateral load on the piston rod end should be less than that shown in the accompanying chart.



Piston rod end lean

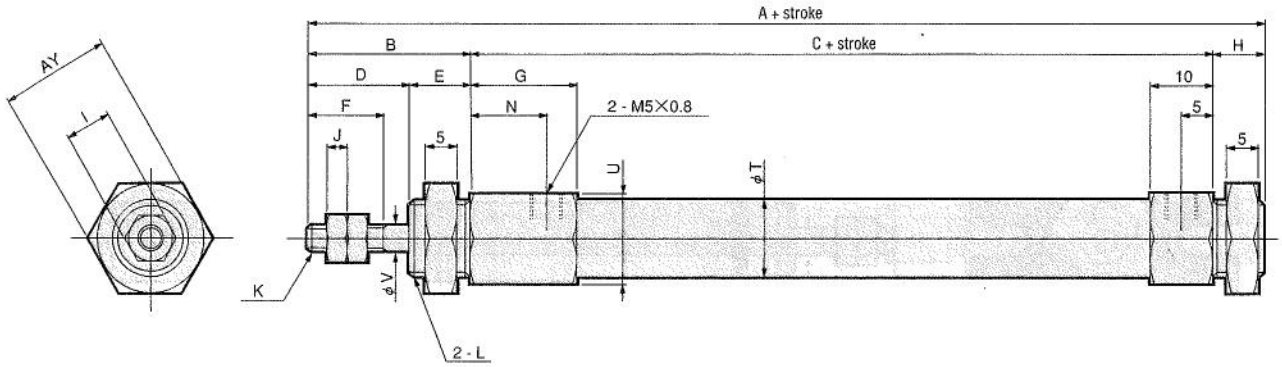
Piston rod end lean without load is within the range shown on the graph below.



Dimensions of linear bearing type

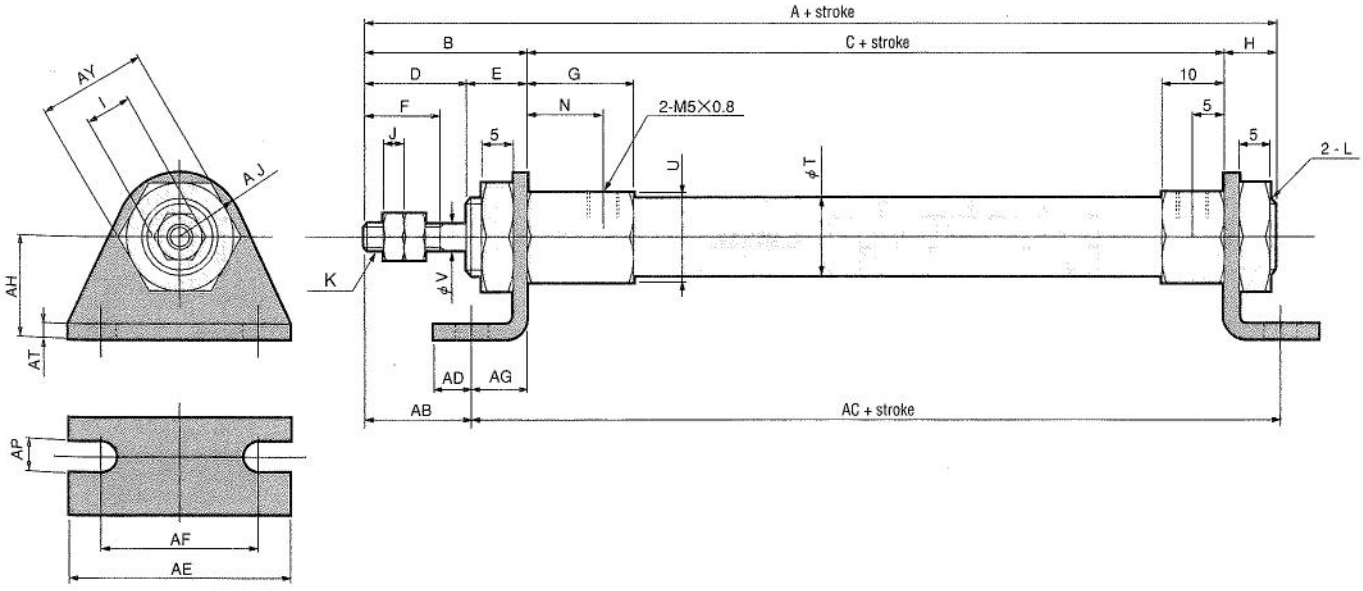
(unit : mm)

●Basic type



Symbol / Base size	A	B	C	D	E	F	G	H	I	J	K	L	N	φT	U	φV	AY
10	101	26	67	16	10	12	17	8	7	3.2	M4×0.7	M12×1	12	12	14	4	17
16	115	32	73	20	12	15	23	10	8	4.0	M5×0.8	M16×1	18	18	20	6	20

●Double foot type



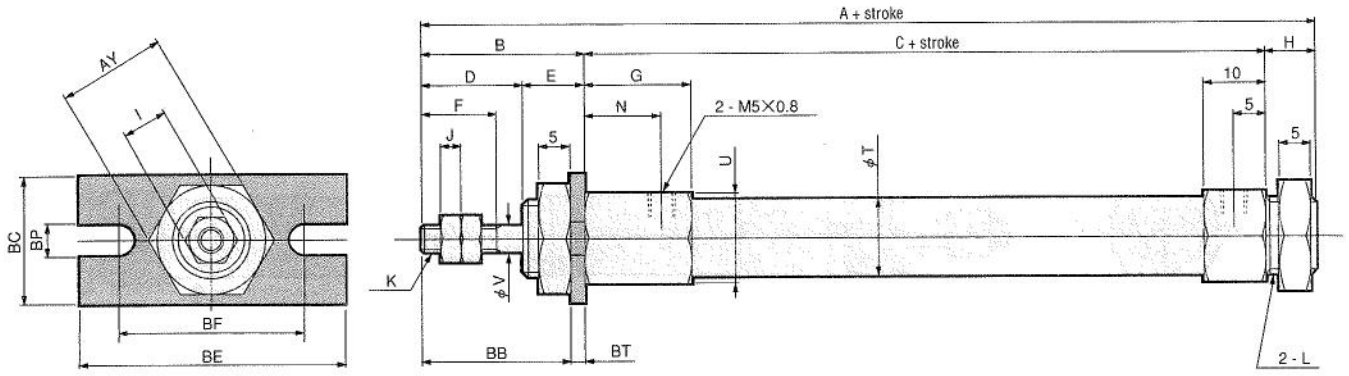
Symbol / Base size	A	B	C	D	E	F	G	H	I	J	K	L	N	φT	U	φV	AY
10	101	26	67	16	10	12	17	8	7	3.2	M4×0.7	M12×1	12	12	14	4	17
16	115	32	73	20	12	15	23	10	8	4.0	M5×0.8	M16×1	18	18	20	6	20

Base size / Symbol	AB	AC	AD	AE	AF	AG	AH	AJ	AP	AT
10	13	93	5	35	25	13	16	10	4.5	2.3
16	19	99	6	44	32	13	20	13	5.5	3.2

Dimensions of linear bearing type

(unit : mm)

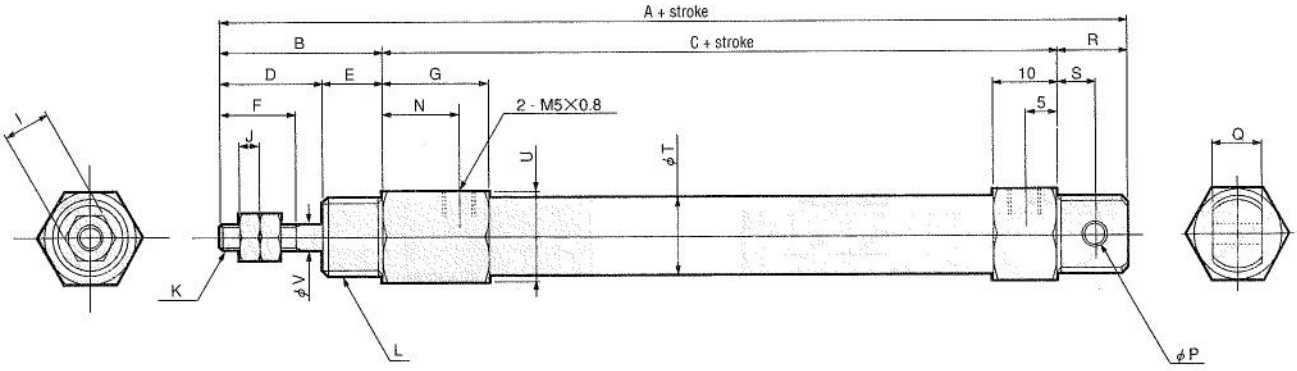
●Flange type



Bore size \ Symbol	A	B	C	D	E	F	G	H	I	J	K	L	N	φT	U	φV	AY
10	101	26	67	16	10	12	17	8	7	3.2	M4×0.7	M12×1	12	12	14	4	17
16	115	32	73	20	12	15	23	10	8	4.0	M5×0.8	M16×1	18	18	20	6	20

Bore size \ Symbol	BB	BC	BE	BF	BP	BT
10	23.7	20	40	30	4.5	2.3
16	28.8	26	52	40	5.5	3.2

●pivot type



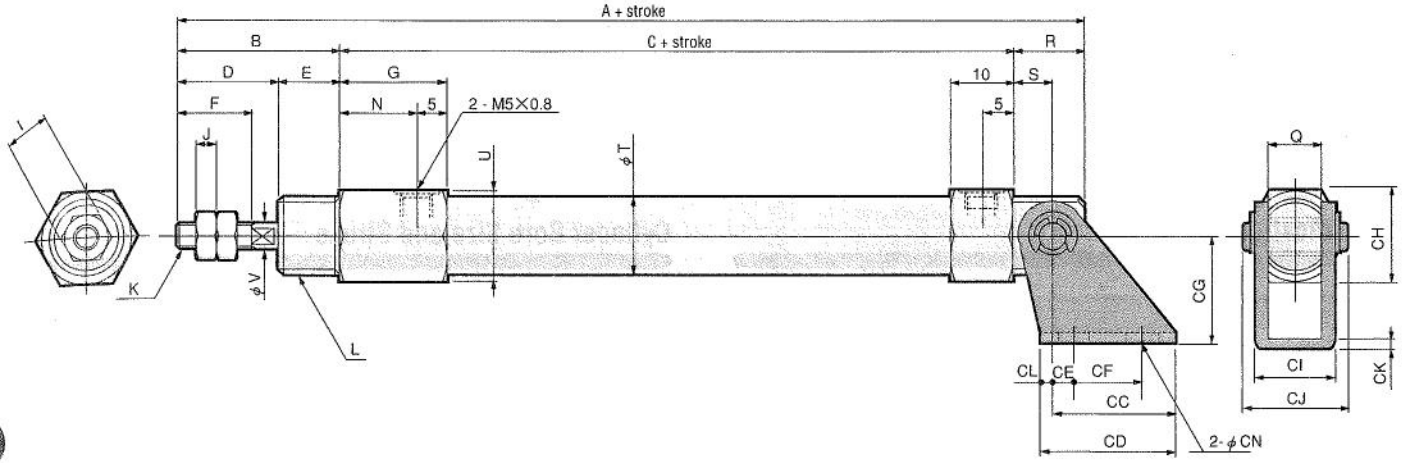
Bore size \ Symbol	A	B	C	D	E	F	G	I	J	K	L	N
10	104	26	67	16	10	12	17	7	3.2	M4×0.7	M12×1	12
16	121	32	73	20	12	15	23	8	4.0	M5×0.8	M16×1	18

Bore size \ Symbol	φP	Q	R	S	φT	U	φV
10	$4^{+0.08}_{0}$	$8^{-0.04}_{-0.26}$	11	6	12	14	4
16	$6^{+0.08}_{0}$	$12^{-0.05}_{-0.23}$	16	9	18	20	6

Dimensions of linear bearing type

(unit : mm)

●Pivot type with supporting bracket

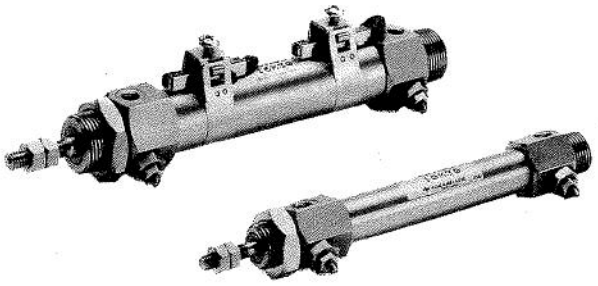


Bore size / Symbol	A	B	C	D	E	F	G	I	J	K	L	N	φP	Q
10	104	26	67	16	10	12	17	7	3.2	M4×0.7	M12×1	12	$4^{+0.08}_{0}$	$8^{-0.04}_{-0.26}$
16	121	32	73	20	12	15	23	8	4.0	M5×0.8	M16×1	18	$6^{+0.08}_{0}$	$12^{-0.05}_{-0.23}$

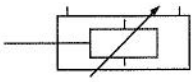
Bore size / Symbol	R	S	φT	U	φV	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CN
10	11	6	12	14	4	18	20	3	10	16	14	11.3	15	1.6	2	4.5
16	16	9	18	20	6	20	23	3	12	20	20	16.7	20.8	2.3	3	5.5

PEN CYLINDERS

Variable Cushioned Cylinders



Symbol



Specifications

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	Basic type, Foot type, Flange type, Pivot type	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.2~0.7{2.0~7.1}	0.1~0.7{1.0~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Speed range mm/s mm/s	100~1000	
Cushion	Variable cushioned type	
Cushion stroke mm	8	10
Allowable kinetic energy Kgf•cm	0.7	1.8
Lubrication	Unnecessary	
Port size	M5×0.8	

Cylinder Bore Size and Stroke

mm

Bore size	Standard stroke	Available stroke
10	25 50 75 100	150
16	25 50 75 100	300

Mounting Type

Mounting type	Item	Remarks
1	Double foot type	included in delivery
1A	Single foot type	included in delivery note
3	Flange type	included in delivery
8	Pivot type with pin	delivered assembled
8-8E	Pivot type c/w supporting bracket	and pin, included in delivery

Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Order Example

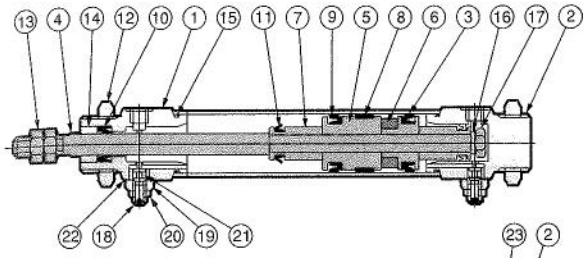
P DAC S □ – M – □ – □ – □ □ □

- P — Pen cylinder series
- DAC — Double acting, single rod variable cushioned type
- S □ — Sensor Cylinder (Installation of magnet is standard) / Cylinder bore size × stroke
- M — Port head cover piping specifications (not applicable to Pivot type)
  - M — Lateral piping with screw
- □ — Mounting type (included in delivery, except for Pivot type)
  - Blank — Basic type
  - 1 — Double foot type (available for M specification head cover type only)
  - 1A — Single foot type
  - 3 — Flange type
  - 8 — Pivot type
  - 8-8E — Pivot type c/w supporting bracket and pin
- □ — Rod Clevis (Included in delivery)
  - Blank — Without knuckle
  - I — I - Pivot rod knuckle
  - Y — Y - Y-shaped rod knuckle with pin
- □ — Type of sensor switch
  - Blank — Without sensor switch
  - ZC153 — Three wire, solid state type
  - ZC130 — Two wire, solid state type
  - CS5T — Two wire, reed switch type
  - CS11T — Two wire, reed switch type
  - See page 616 for further details.
- □ — Lead wire length
  - A — 1000mm
  - B — 3000mm
- □ — Number of sensor switches
  - 1 — with one switch
  - 2 — with two switches
  - 3 — with three switches
  - ⋮ ⋮

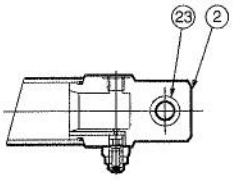
Note : Please use double foot type for foot brackets with strokes longer than 60mm.

Construction (Diagram)

●Double acting type



●Pivot mounting type (-8)



Materials of Major Parts

No.	Name	Material
①	Rod cover	Brass (Nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	Resin
⑦	Cushion collar	Mild steel
⑧	Wearing	Fluorocarbon resin
⑨	Piston packing	Synthetic rubber (NBR)
⑩	Rod seal	
⑪	Cushion packing	
⑫	Mounting nut	Brass (Nickel plated)
⑬	Rod-end nut	Mild steel (Nickel plated)
⑭	Rod bushing	Oil permeated bronze
⑮	Tube gasket	Synthetic rubber (NBR)
⑯	Washer	Mild steel
⑰	Hexagon nut	
⑱	Needle	Stainless steel
⑲	Needle guide	Brass (Nickel plated)
⑳	Lock nut	
㉑	Gasket	Synthetic rubber (NBR)
㉒	Gasket	
㉓	Pivot bushing	Oil permeated bronze

Weight

g

Cylinder bore size mm	Mounting type	Stroke mm										
		5	10	15	25	50	75	100	125	150	175	200
10	Basic type	106.7	108.4	110.1	113.4	121.8	130.2	138.6	147.3	155.7	—	—
16		213.3	216.6	219.9	226.7	243.4	260.1	276.8	292.9	309.6	326.3	343
10	Pivot type	102.7	104.4	106.1	109.4	117.8	126.2	134.6	143.3	151.7	—	—
16		215.3	218.6	221.9	228.7	245.4	262.1	278.8	294.9	311.6	328.3	345

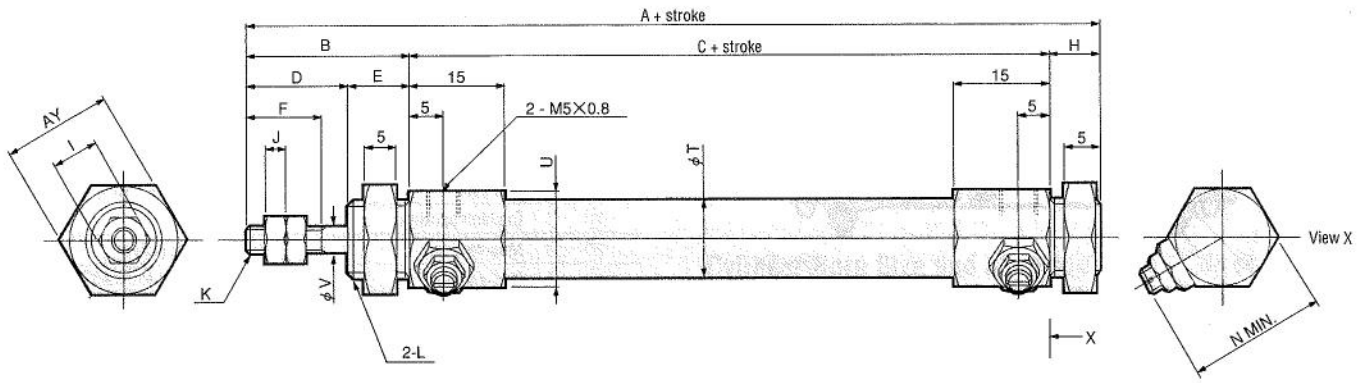
Cylinder bore size mm	Mounting type	Added weight of mounting brackets				Sensor cylinder	Added weight of sensor switch			
		-1	-1A	-3	-8C		ZC153□	ZC130□	CS5T□	CS11T□
10	Basic type	38	19	10	8	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		76	38	25	23	12				
10	Pivot type	—	—	—	8	5	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50	A : 20 B : 50
16		—	—	—	23	12				

Remark: includes mounting nut and rod-end nut

Dimensions of Variable Cushioned Cylinder

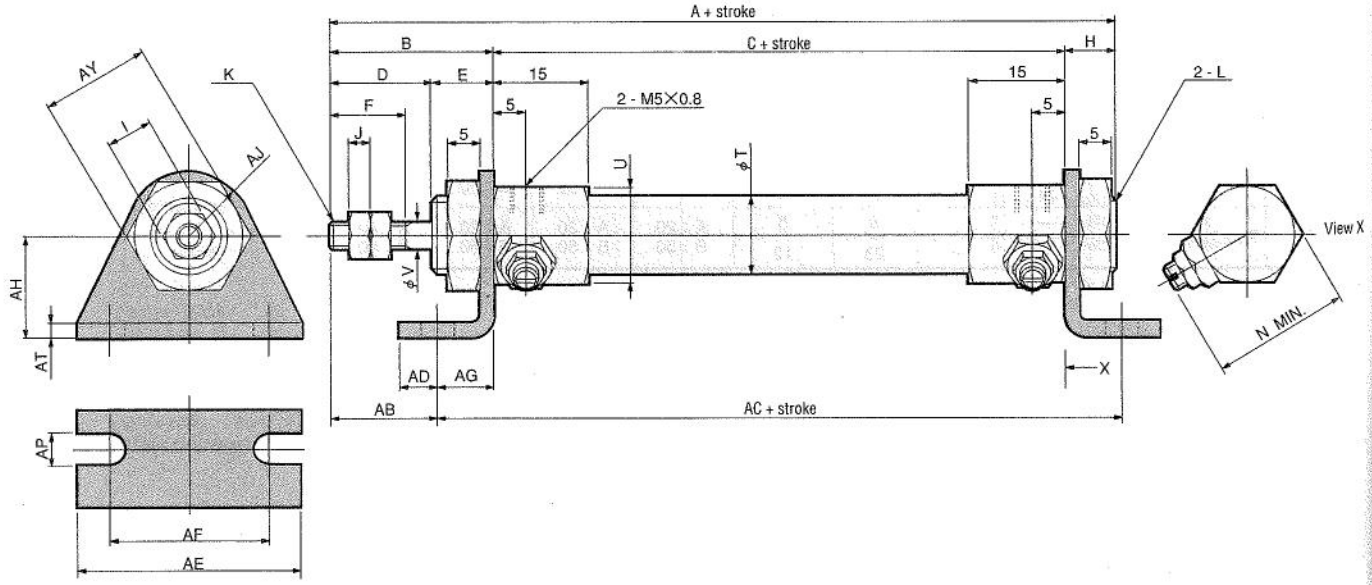
(unit : mm)

●Basic type



Bore size \ Symbol	A	B	C	D	E	F	H	I	J	K	L	N	φT	U	φV	AY
10	94	26	60	16	10	12	8	7	3.2	M4×0.7	M12×1	22	12	15	4	17
16	112	32	70	20	12	15	10	8	4.0	M5×0.8	M16×1	27	18	20	6	20

●Double foot type



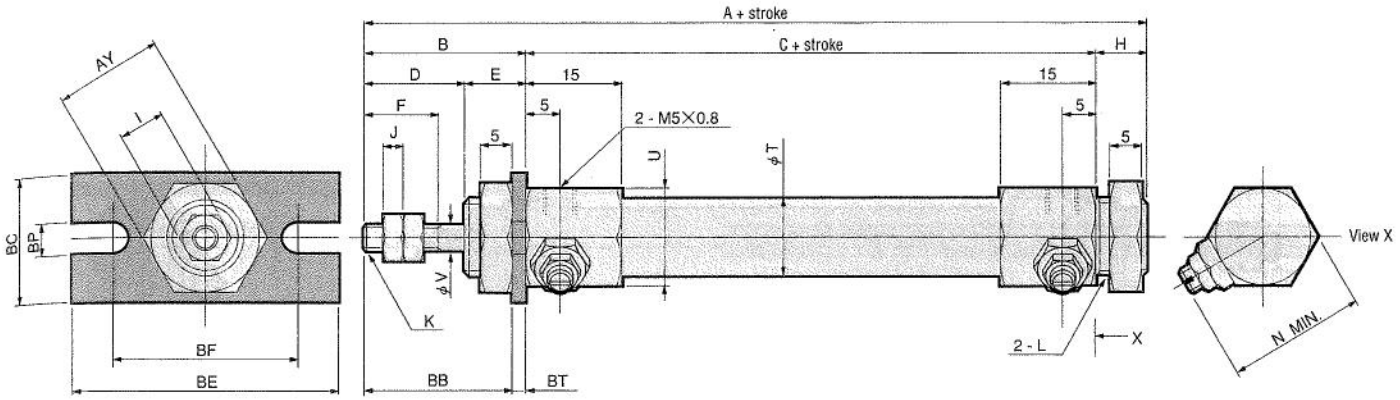
Bore size \ Symbol	A	B	C	D	E	F	H	I	J	K	L	N	φT	U	φV	AY
10	94	26	60	16	10	12	8	7	3.2	M4×0.7	M12×1	22	12	15	4	17
16	112	32	70	20	12	15	10	8	4.0	M5×0.8	M16×1	27	18	20	6	20

Bore size \ Symbol	AB	AC	AD	AE	AF	AG	AH	AJ	AP	AT
10	13	86	5	35	25	13	16	10	4.5	2.3
16	19	96	6	44	32	13	20	13	5.5	3.2

Dimensions of Variable Cushioned Cylinder

(unit : mm)

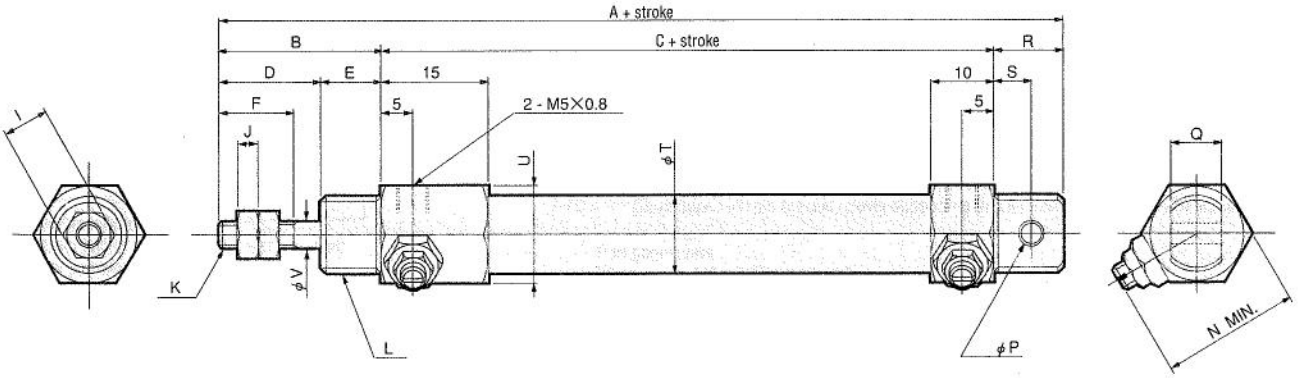
●Flange type



Bore size \ Symbol	A	B	C	D	E	F	H	I	J	K	L	N	φT	U	φV	AY
10	94	26	60	16	10	12	8	7	3.2	M4×0.7	M12×1	22	12	15	4	17
16	112	32	70	20	12	15	10	8	4.0	M5×0.8	M16×1	27	18	20	6	20

Bore size \ Symbol	BB	BC	BE	BF	BP	BT
10	23.7	20	40	30	4.5	2.3
16	28.8	26	52	40	5.5	3.2

●Pivot type



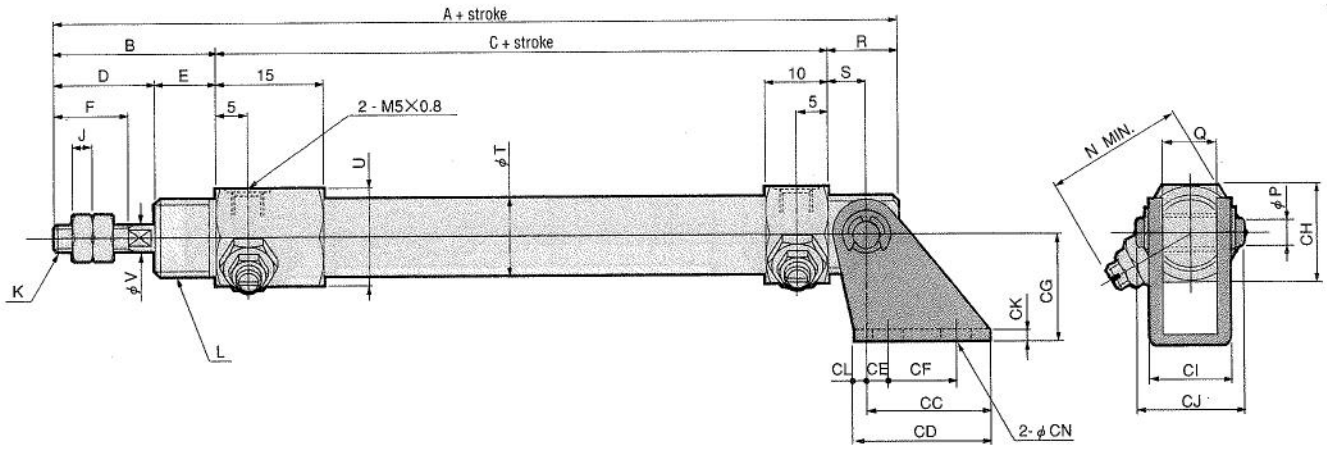
Bore size \ Symbol	A	B	C	D	E	F	I	J	K	L	N
10	97	26	60	16	10	12	7	3.2	M4×0.7	M12×1	22
16	118	32	70	20	12	15	8	4.0	M5×0.8	M16×1	27

Bore size \ Symbol	φP	Q	R	S	φT	U	φV
10	$4^{+0.08}_{0}$	$8^{-0.04}_{-0.26}$	11	6	12	15	4
16	$6^{+0.08}_{0}$	$12^{-0.05}_{-0.23}$	16	9	18	20	6

Dimensions of Variable Cushioned Cylinder

(unit : mm)

●Pivot type with supporting brackets



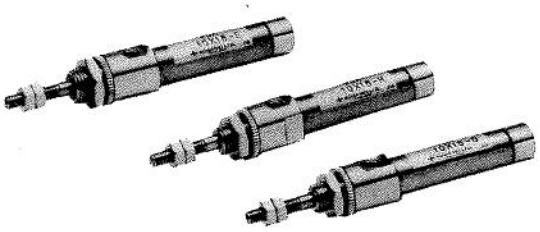
Bore size \ Symbol	A	B	C	D	E	F	I	J	K	L	N	φP	Q
10	97	26	60	16	10	12	7	3.2	M4×0.7	M12×1	22	$4^{+0.08}_{0}$	$8^{-0.04}_{-0.26}$
16	118	32	70	20	12	15	8	4.0	M5×0.8	M16×1	27	$6^{+0.08}_{0}$	$12^{-0.05}_{-0.23}$

Bore size \ Symbol	R	S	φT	U	φV	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CN
10	11	6	12	14	4	18	20	3	10	16	15	11.3	15	1.6	2	4.5
16	16	9	18	20	6	20	23	3	12	20	20	16.7	20.8	2.3	3	5.5

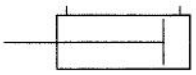
CUSTOM-MADE
PEN CYLINDER SPECIFICATION

Oil Permeated Metal Rod Bushing Specification
With Spanner Hanger Specification
Spot Facing of Port Specification

Contact our nearest business office for delivery time.



Symbol



Specifications

Same as standard double acting type. See page 118.

Cylinder Bore Size & Stroke

Same as standard double acting type. See page 118.

Mounting Type

Symbol	Name	Remarks
1	Double foot type	included in delivery
1A	Single foot type	ncluded in delivery[note]
3	Flange type	included in delivery
7	Clevis type (with pin)	delivered assembled
7-7C	Clevis type with supporting bracket (with pin)	supporting bracket included in delivery.

Note:Please use double foot type for foot bracket with strokes longer than 60mm.

Order Example

P DA □ □ – □ – □ – □ – □ – □ – □ □ □

Pen cylinder series

DA — Double acting type

Cylinder bore size × stroke

Cylinder specification
Blank — Standard cylinder
S — Sensor cylinder

Head cover piping specification
Blank — Axial piping
A — Lateral piping

Rod cover specification
D — Spot facing of port (head cover included)
E — Oil permeated metal rod bushing
H — With spanner hanger specification

Port connection
Blank — M5×0.8(ø6,ø10,ø16)
M3 — M3×0.5(only available forø6)

Mounting type (all mounts, except clevis type, included in delivery)
Blank — Standard type
1 — Double foot type
(head cover double acting M type and single acting push type only available in ø10 and ø16)
1A — Single foot type
3 — Flange type
7 — Clevis type (pin included, only available in ø10 and ø16)
7-7C — Clevis type with pin bracket, clevis supporting bracket (only available in ø10 and ø16)

Rod end bracket
Blank — Without rod end bracket
I — I-shaped rod knuckle
Y — Y-shaped rod knuckle (with pin)
Only available in ø10 and ø16.
Please order cylinder joint separately.

Type of Sensor switch
Blank — Without sensor switch
ZC153 — Three wire, solid state type
ZC130 — Two wire, solid state type
CS5T — Two wire, reed switch type
CS11T — Two wire, reed switch type
See page 616 for further details.

Lead wire length
A — 1000mm
B — 3000mm

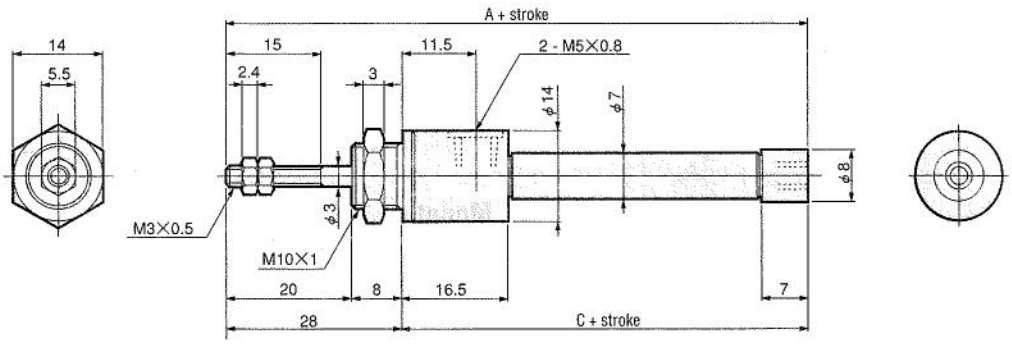
Number of sensor switches
1 — with one switch
2 — with two switches
3 — with three switches
⋮ ⋮

Note : Please use double foot type for foot bracket with strokes longer than 60mm.

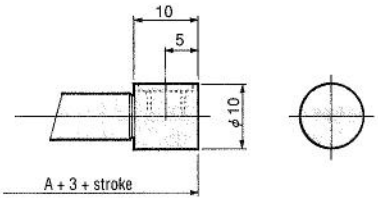
Dimensions of Oil Permeated Rod Bushing Specification

(unit : mm)

● ϕ6

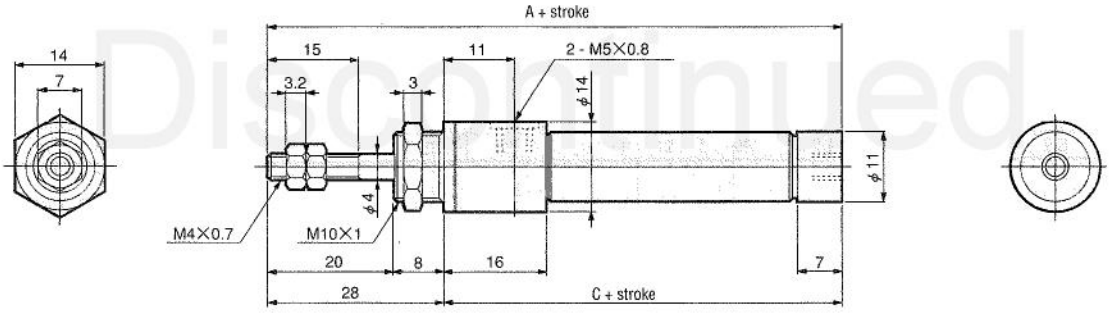


●Lateral piping (-A)

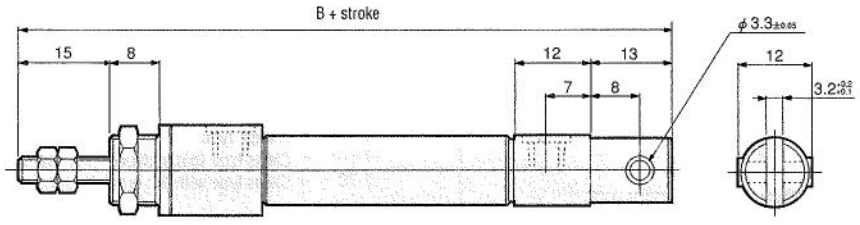


Bore size \ Symbol	A	C
Standard cylinder	69	41
Sensor cylinder	79	51

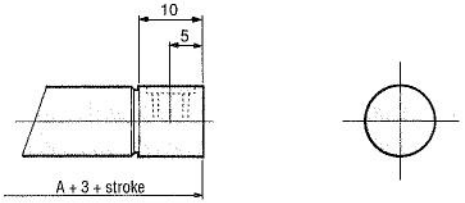
● ϕ10



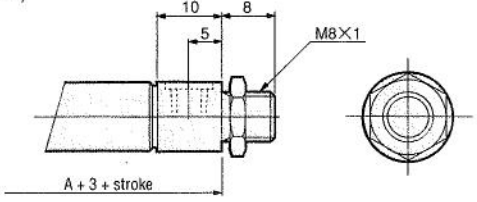
●Clevis type (-7)



●Lateral piping (-A)



●Lateral piping, with mounting nut (-M)

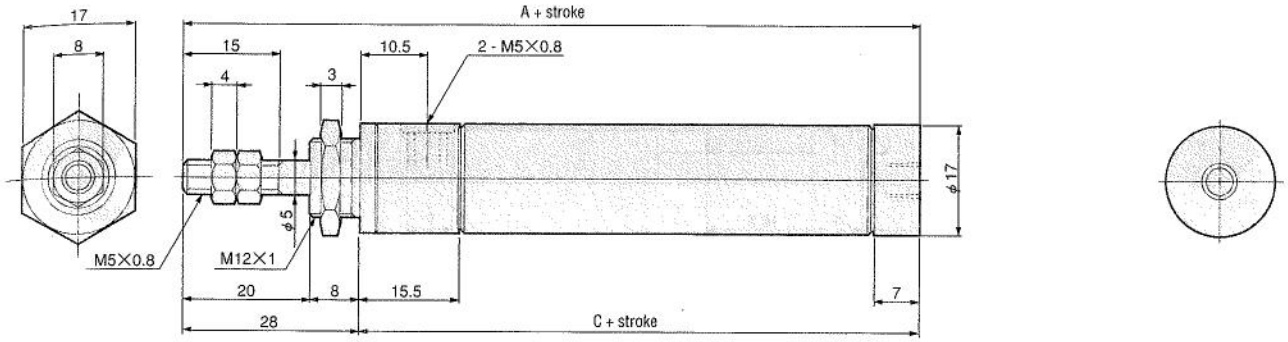


Bore size \ Symbol	A	B	C
Standard cylinder	73	86	45
Sensor cylinder	83	96	55

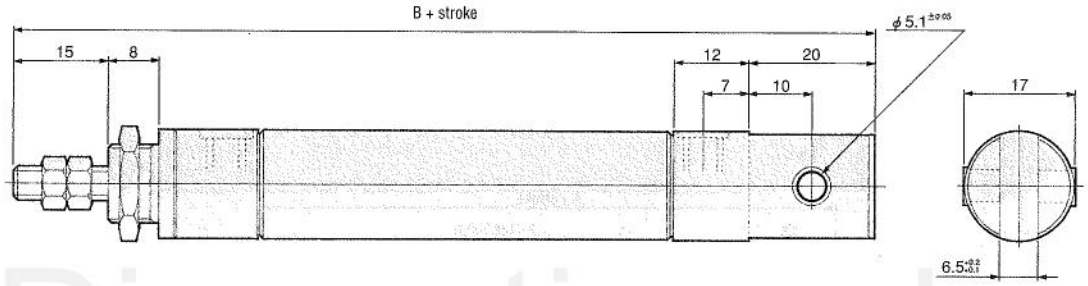
Dimensions of Oil Permeated Metal Rod Bushing Specification

(unit : mm)

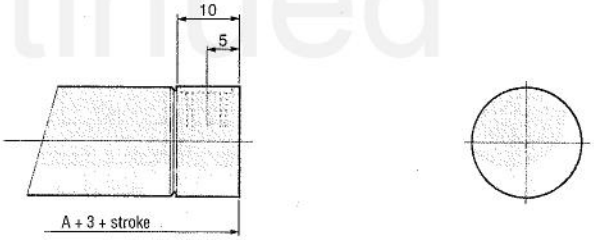
● ϕ16



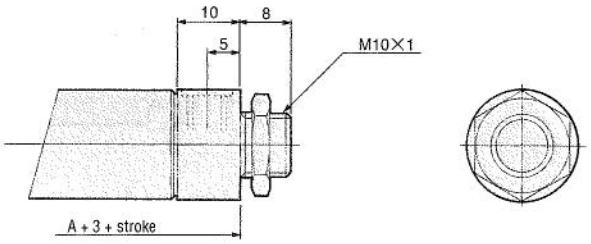
●Clevis type (-7)



●Latcral piping (-A)



●Lateral piping, with mounting screw (-M)

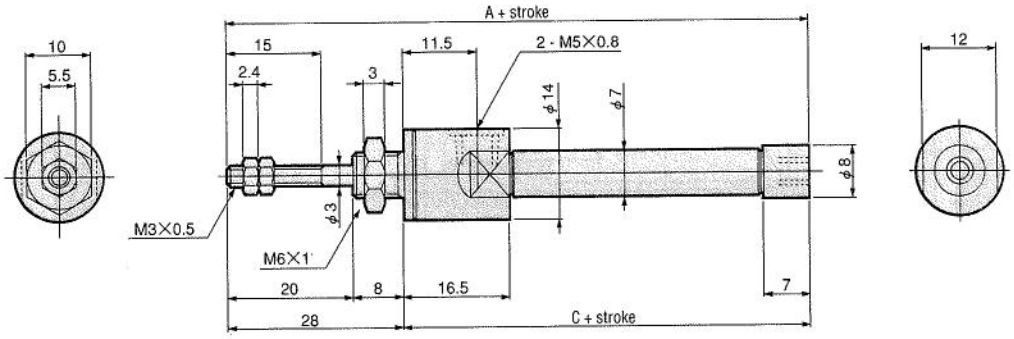


Bore size / Symbol	A	B	C
Standard cylinder	74.5	94.5	46.5
Sensor cylinder	84.5	104.5	56.5

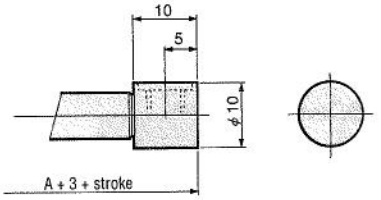
Dimensions of Spanner Hanger Specification

(unit : mm)

● ϕ6

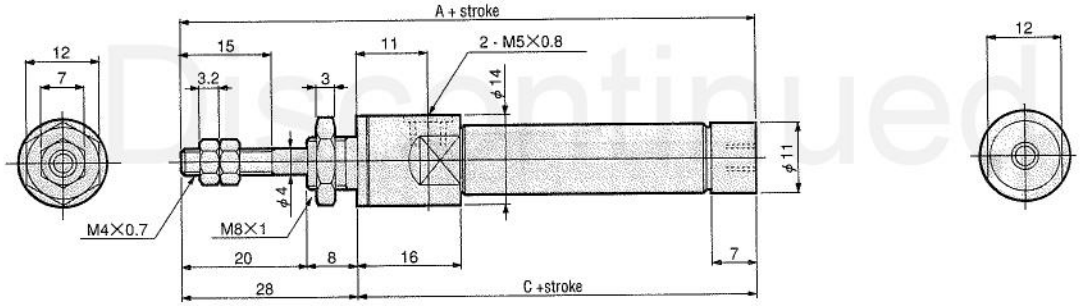


●Lateral piping (-A)

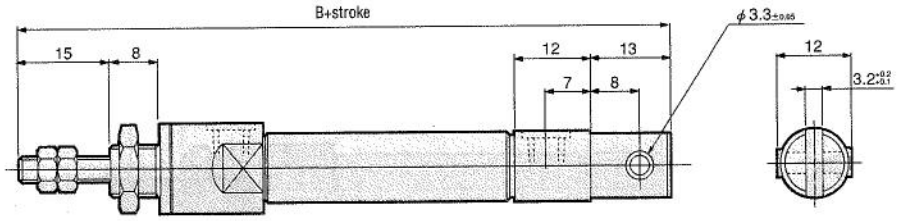


Bore size \ Symbol	A	C
Standard cylinder	69	41
Sensor cylinder	79	51

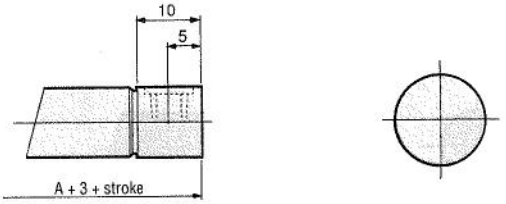
● ϕ10



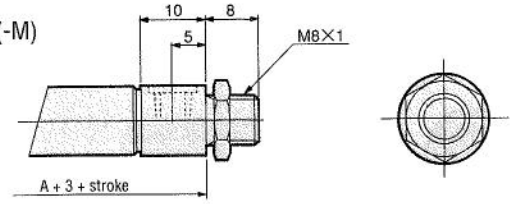
●Clevis type (-7)



●Lateral piping (-A)



●Lateral piping, with mounting screw (-M)

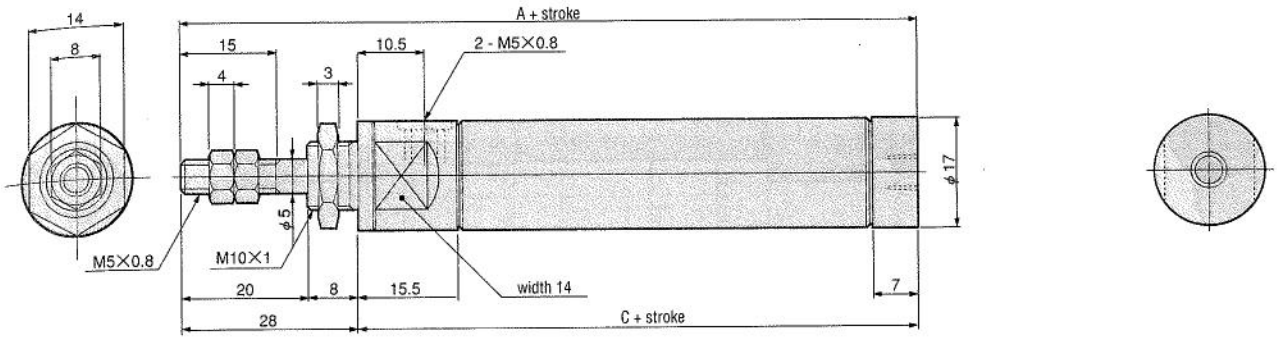


Bore size \ Symbol	A	B	C
Standard cylinder	73	86	45
Sensor cylinder	83	96	55

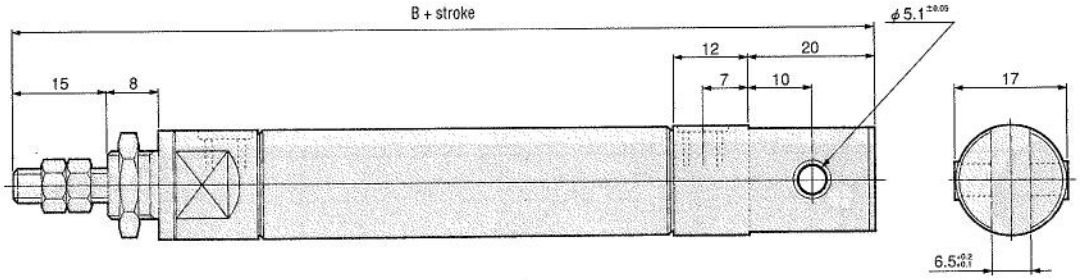
Dimensions of Spanner Hanger Specification

(unit:mm)

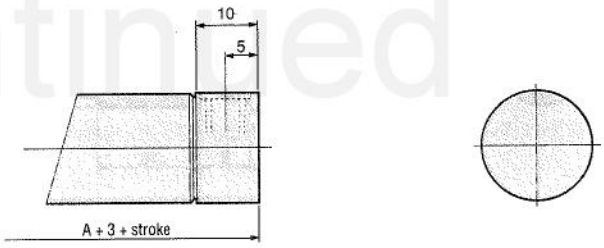
● ϕ16



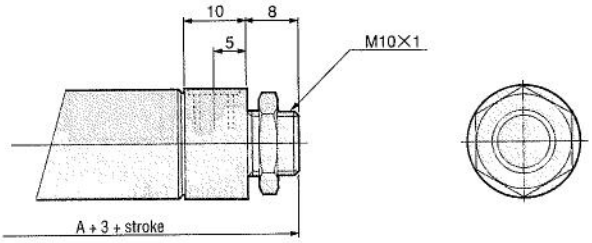
●Clevis type (-7)



●Lateral piping (-A)



●Lateral piping, with mounting screw (-M)

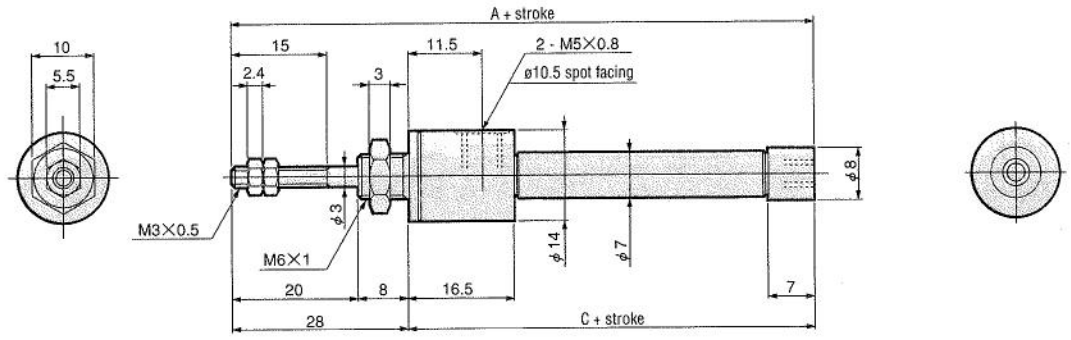


Bore size / Symbol	A	B	C
Standard cylinder	74.5	94.5	46.5
Sensor cylinder	84.5	104.5	56.5

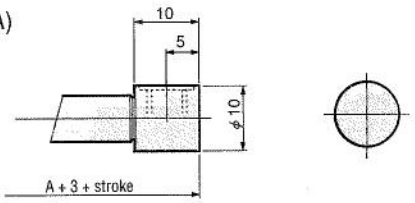
Dimensions of Spot Facing of Port Specification

(unit:mm)

● ϕ 6

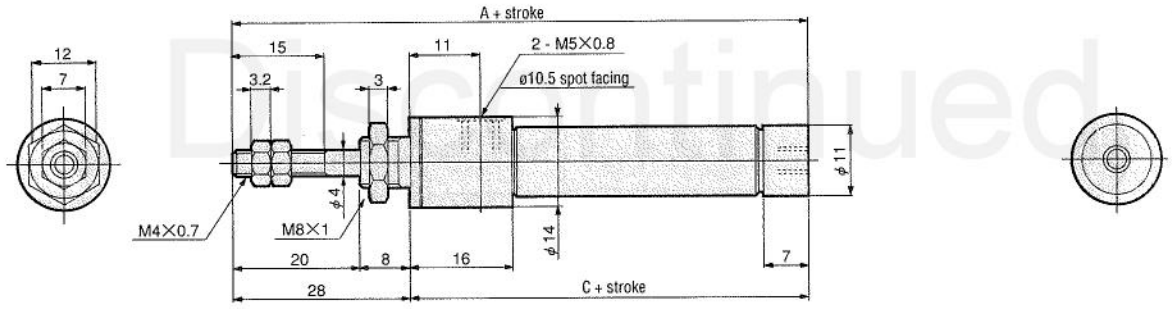


●Lateral piping (-A)

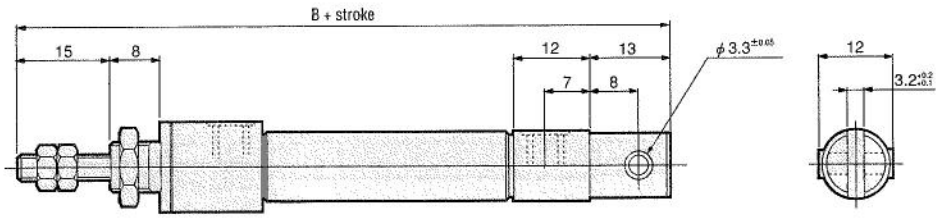


Bore size \ Symbol	A	C
Standard cylinder	69	41
Sensor cylinder	79	51

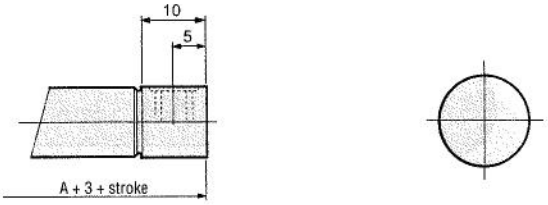
● ϕ 10



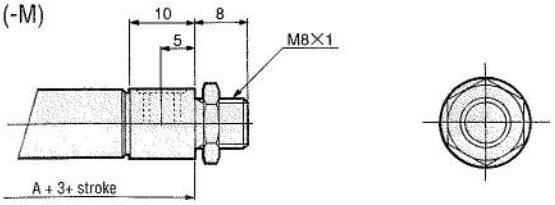
●Clevis type (-7)



●Lateral piping (-A)



●Lateral piping, with mounting screw (-M)

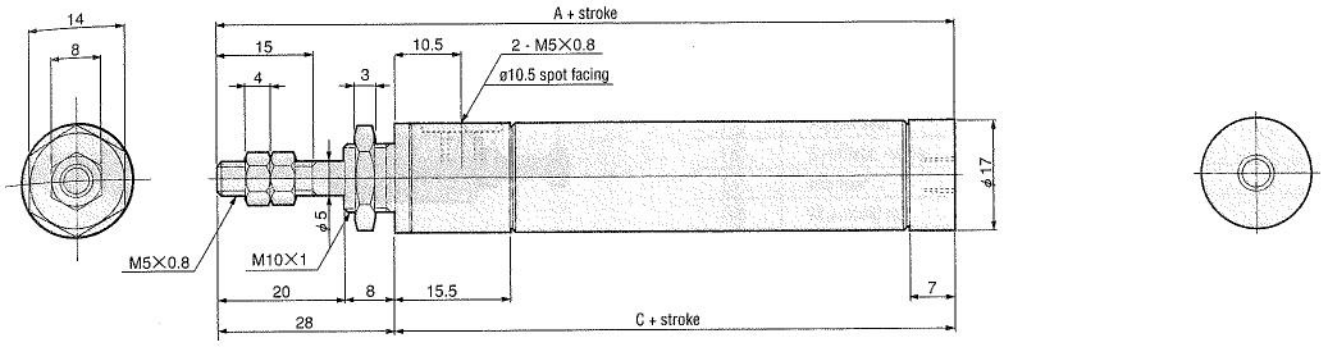


Bore size \ Symbol	A	B	C
Standard cylinder	73	86	45
Sensor cylinder	83	96	55

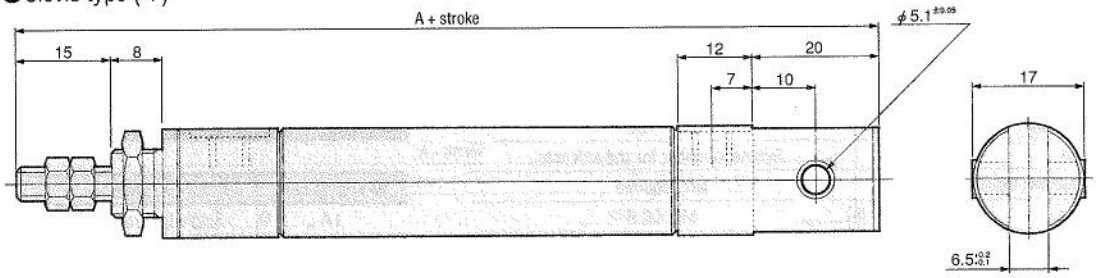
Dimensions of Spot Facing of Port Specification

(unit:mm)

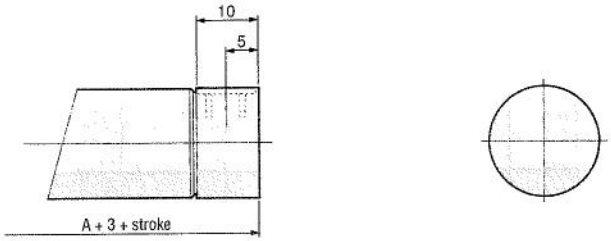
● ϕ16



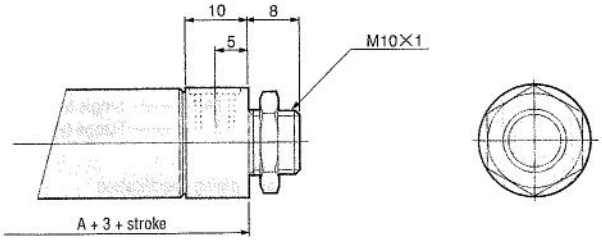
●Clevis type (-7)



●Lateral piping (-A)



●Lateral piping, with mounting screw (-M)

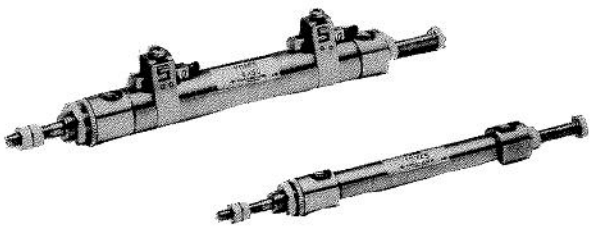


Bore size / Symbol	A	B	C
Standard cylinder	74.5	94.5	46.5
Sensor cylinder	84.5	104.5	56.5

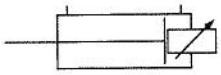
CUSTOM-MADE PEN CYLINDER SPECIFICATION

Pull Side Adjustable Stroke Cylinder

● Contact us for detailed dimensions and delivery time.



Symbol



Specifications

Item \ Cylinder Bore Size (mm)		10	16
Operation		Double acting type	
Mounting type		Basic type, Foot type, Flange type	
Fluid		Air	
Pressure range	MPa{kgf/cm²}	0.08~0.7{0.8~7.1}	
Proof pressure	MPa{kgf/cm²}	1.03{10.5}	
Temperature range	℃	0~70	
Speed range	mm/s	50~750	
Cushion		Synthetic rubber for rod sidenote	
LubricationNot required		Not required	
Port size		M5×0.8	
Stroke adjustment range	mm	0~−15	

Note: Cushion is not provided for head side.

Cylinder Bore Size and Stroke

mm

Bore size (mm)	Standard stroke	Available Stroke
10	15 30 45 60 75 100 125 150	150
16	15 30 45 60 75 100 125 150 175 200	200

Mounting type

Mounting type	Item	Remark
1A	Single foot mounting type	included in delivery
	Flange mounting type	included in delivery

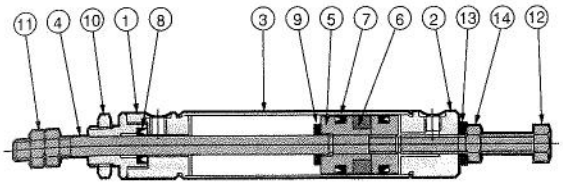
Order Example

P DAE □ □ – A – □ – □ – □ □ □

- P: Pen cylinder series
- DAE: Double acting single rod type, pull side stroke adjustable cylinder
- Cylinder specification: Blank — Standard cylinder; S — Sensor cylinder
- Cylinder bore size × Stroke
- Head cover piping specification: A — Lateral piping
- Mounting type (included in delivery): Blank — Basic type; 1A — Single foot type; 3 — Flange type
- knuckle: Blank — Without rod end bracket; I — With I-shaped rod clevis; Y — With Y-shaped rod clevis (with pin). Please order cylinder joint separately
- Type of Sensor switch: Blank — Without sensor switch; ZC153 — Three-wire solid state type; ZC130 — Two-wire solid state type; CS5T — Two-wire reed switch type; CS11T — Two-wire reed switch type. See page 616 for further details.
- Lead wire length: A — 1,000 mm; B — 3,000 mm
- Number of sensor switches: 1 — With one switch; 2 — With two switches; 3 — With three switches ⋮ ⋮

Construction Diagram

● Double acting type

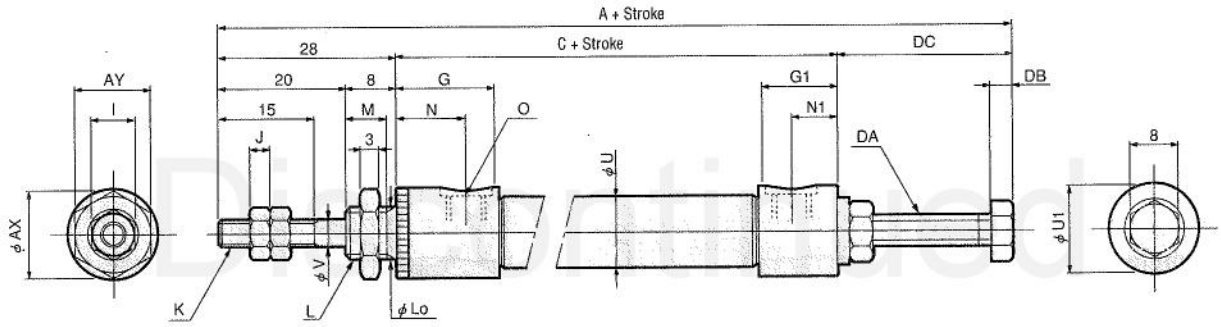


Materials of Major Parts

No.	Item	Material
①	Rod covera	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	Resin
⑦	Piston seal	Rod seal(NBR)
⑧	Synthetic rubber	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Stroke adjusting bolt	Mild steel
⑬	Die thread	Mild steel and synthetic rubber(NBR)
⑭	Locking nut	Mild steel (nickel plated)

Dimensions of Pull Side Adjustable Stroke Cylinder

(Unit : mm)



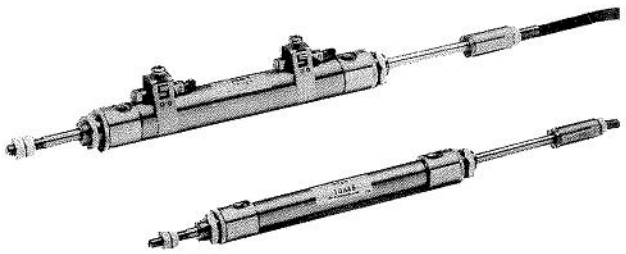
Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G1	G2	I	J	K	L	Lo
10	76	48	86	58	16	12	—	7	3.2	M4×0.7	M8×1	8 $^{-0.05}_{-0.10}$
16	77.5	49.5	87.5	59.5	15.5	12	—	8	4	M5×0.8	M10×1	10 $^{-0.05}_{-0.10}$

Bore size / Symbol	M	N	N1	O	U	U1	U2	V	AX	AY	DA	DB	DC
10	6.5	11	7.5	2-M5×0.8	11	17	—	4	14	12	M5×0.8	3.5	(28max)
16	6	10.5	7.5	—	17	17	—	5	17	14	M5×0.8	3.5	(28max)

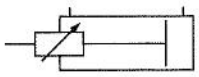
CUSTOM-MADE PEN CYLINDER SPECIFICATION

Push Side Adjustable Stroke Cylinder

● Contact us for detailed dimensions and delivery time.



Symbol



Specifications

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting	typeSee separate chart	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.12~0.7{1.2~7.1}	0.1~0.7{1.0~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Speed range mm/s	50~750	
Cushion	Synthetic rubber	
Lubrication	Not required	
Port size	M5×0.8	
Stroke adjustment range mm	0~−15	

Cylinder Bore Size and Stroke

mm

Bore size	Standard stroke	Available Stroke
10	15 30 45 60	60
16	15 30 45 60	100

Mounting type

Mounting type	Item	Remark
1	Double foot type	included in delivery
1A	Single foot type	included in delivery Note
3	Flange type	included in delivery

Note : Please use double foot type for foot brackets with strokes longer than 60 mm.

Order Example

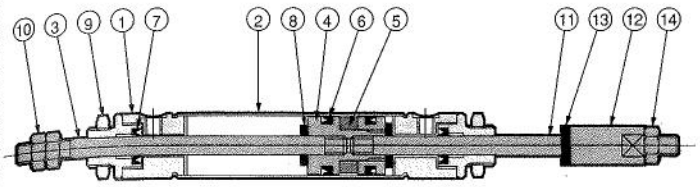
P DAP □ □ − M − □ − □ − □ □ □

- P — Pen cylinder series
- DAP — Double acting single rod type push side adjustable cylinder.
- Cylinder bore size × Stroke
- Cylinder specification: Blank — Standard cylinder; S — Sensor cylinder (φ16 oniy)
- Head cover piping specification: M — Lateral piping, with mounting screw
- Mounting type (included in delivery): Blank — Basic type; 1 — Double foot type (mounted on M specification head cover type only.); 1A — Single foot type; 3 — Flange type
- Rod clevis (included in delivery): Blank — Without rod end bracket; I — I-shaped rod clevis; Y — Y-shaped rod clevis (with pin). Please order cylinder joints separately
- Type of Sensor switch.: Blank — Without sensor switch; ZC153 — Three-wire, solid state type; ZC130 — Two-wire, solid state type; CS5T — Two-wire, reed switch type; CS11T — Two-wire, reed switch type. See page 616 for further details.
- Lead wire length: A — 1000mm; B — 3000mm
- Number of Sensor Switches: 1 — With one switch; 2 — With two switches; 3 — With three switches

Note:Please use double foot type for foot brackets with strokes longer than 60mm.

Construction Diagram

● Double acting type

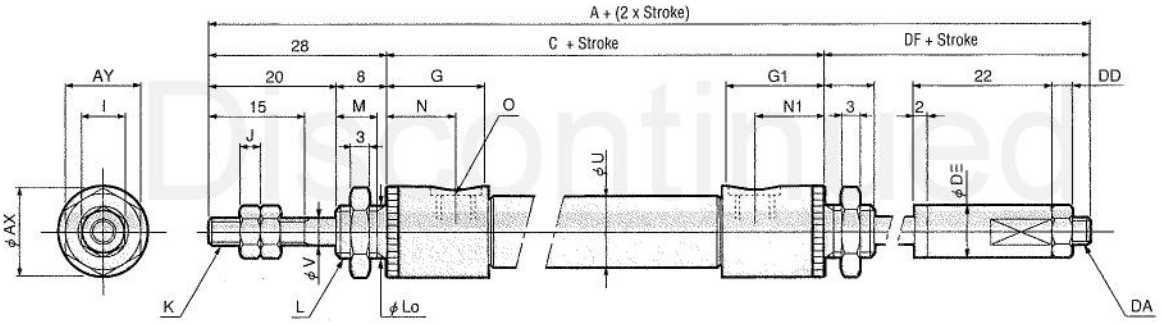


Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (Nickel electroplated)
②	Cylinder barrel	Stainless steel
③	Piston rod	
④	Piston	Brass
⑤	Magnet	—
⑥	Piston ceal	Synthetic rubber(NBR)
⑦	Rod ceal	
⑧	Bumper	Urethane rubber
⑨	Mounting nut	Brass (nickel plated)
⑩	Rod end nut	Mild steel (nickel plated)
⑪	Stroke adjusting rod	Stainless steel
⑫	Stroke adjusting knob	Brass (nickel plated)
⑬	Bumper	Urethane rubber
⑭	Locking nut	Mild steel (nickel plated)

Dimensions of Push Side Adjustable Stroke Cylinder

(Unit : mm)



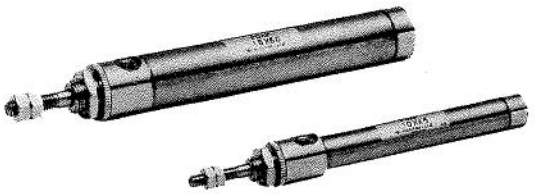
Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G_1	G_2	I	J	K	L	Lo
10	127	64	—	—	16	16	—	7	3.2	M4×0.7	2- M8×1	$8^{-0.05}_{-0.10}$
16	128	65	128	65	15.5	15.5	—	8	4	M5×0.8	M10×1	$10^{-0.05}_{-0.10}$

Bore size / Symbol	M	N	N_1	O	U	V	AX	AY	DA	DD	DE	DF
10	6.5	11	11	2-M5×0.8	11	4	14	12	M4×0.7	3.2	8	35
16	6	10.5	10.5	M5×0.8	17	5	17	14	M5×0.8	4	10	35

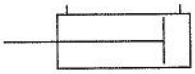
CUSTOM-MADE PEN CYLINDER SPECIFICATION

Heat Resistant Cylinder

● Contact us for detailed dimensions and delivery time.



Symbol



Specifications

Item \ Cylinder bore size mm	6	10	16
Operation	Double acting type		
Mounting type	Basic type,Foot type,Flange type,Clevis type		
Fluid	Air		
Pressure range MPa{kgf/cm²}	0.5~0.7{5.0~7.1}	0.25~0.7{2.5~7.1}	0.2~0.7{2.0~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}		
Temperature range ℃	0~150		
Speed range mm/s	—		
Cushion	Not available		
Lubrication	Not required		
Port size	M5×0.8		

Note: Fluororubber is used for packing. Contact us for further details.

Cylinder Bore Size and Stroke

mm

Bore size	Standard stroke	Available Stroke
6	5 10 15 30 45 60	100
10	5 10 15 30 45 60 75 100 125 150	150
16	5 10 15 30 45 60 75 100 125 150 175 200	200

Mounting Type

Mounting type	Item	Remark
1	Double foot type	Included in delivery
1A	Single foot type	Included in delivery
3	Flange type	Included in delivery
7	Clevis type	Assembled at factory prior to delivery
7-7C	Clevis type with supporting bracket (with pin)	Supporting brackets included in shipment.

Note : Please use double foot type for foot brackets with strokes longer than 60 mm.

Order Example

P DAF □ – □ – □ – □

Cantion : Not available heat resistant cylinder with sensor switch.

Cylinder bore size × Stroke

Rod clevis (included in delivery)
Blank — Without rod end bracket
I — With I-shaped rod clevis
Y — With Y-Shaped rod clevis (with pin)

Mounting type (All mounting types except clevis mounting type included in delivery)
Blank — Basic type
1 — Double foot type (available for M specification head cover type only.)
1A — Single foot type
3 — Flange type
7 — Clevis type (with pin)(ϕ 10 and ϕ 16 only).
7-7C — Clevis type with supporting bracket (with pin) (ϕ 10 and ϕ 16 only).

Head cover piping specification (Not applicable to clevis mounting type)
Blank — Axial piping
A — Lateral piping
M — Lateral piping, with mounting screw (Available on ø10 and ø16 only).

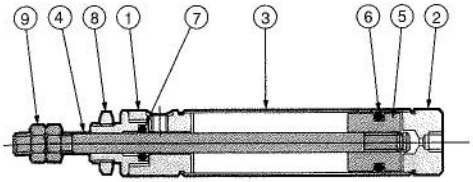
DAF — Double acting single rod heat-resistant type

Pen cylinder series

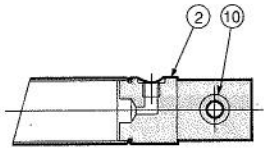
Note : Please use double foot type for foot brackets with strokes longer than 60 mm.

Construction Diagram

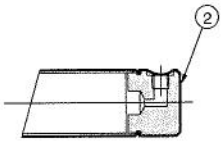
● Double acting type



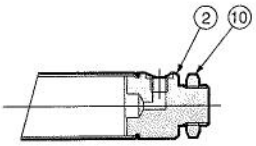
● Clevis type (-7)



● Lateral piping (-A)



● Lateral piping
with mounting screw (-M)



Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Piston seal	Fluororubber
⑦	Rod seal	
⑧	Mounting nut	Brass (nickel plated)
⑨	Rod end nut	Mild steel (nickel plated)
⑩	Clevis-shaped bushing	Oil permeated bronze

Dimensions

(Unit : mm)

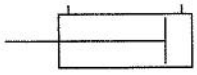
● Same as standard double acting type. See pages 121 to 123.

CUSTOM-MADE PEN CYLINDER SPECIFICATION

Low Hydraulic Cylinder

● Contact us for detailed dimensions and delivery time.

Symbol



Specifications

Item \ Cylinder bore size mm	6	10	16
Operation	Double acting type		
Mounting type	See separate chart		
Fluid	Turbine oil containing a defoaming agent (ISO VG 22~100 equivalent)		
Pressure range MPa{kgf/cm²}	0.5~0.7{5.0~7.1}	0.25~0.7{2.0~7.1}	0.2~0.7{2.0~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}		
Temperature range ℃	0~70		
Speed range mm/s	5~500(30~100 for sensor specification)		
Cushion	Fixed type (synthetic rubber)		
Port size	M5×0.8		

Note 1: Application of oil to both ends of low hydraulic cylinder is advised. If oil is applied to one end, and air to the other end, precise speed control may not be achieved or hydraulic oil may force its way into the air pressurized end. Please control speed via a meter to output control.
2: When using a cylinder with a reed switch, maintain a minimum speed of 30mm/s.
3: Nonflammable hydraulic fluid, machine oil, and spindle oil cannot be used for this type.
4: Operating speed varies with oil temperature

Bore Size and Stroke

mm

Bore size	Standard stroke	Available Stroke
6	5 10 15 30 45 60	100
10	5 10 15 30 45 60 75 100 125 150	150
16	5 10 15 30 45 60 75 100 125 150 175 200	200

Mounting Type

Mounting type	Item	Remark
1	Double foot type	Included in delivery.
1A	Single foot type	Included in delivery. Note 1
3	Flange type	Included in delivery.
7	Clevis type	Delivered assembled Note 2
7-7C	Clevis type with supporting bracket (with pin)	Supporting bracket included in delivery.

Note 1 : Please use double foot type for foot brackets with strokes longer than 60mm.
Note 2 : Oil permeated bushing is the standard part used for the clevis shaped pin hole.

Order Example

P DAH □ □ – □ – □ – □ – □ □ □

Pen cylinder series

DAH — Double acting single rod type low hydraulic cylinder

Cylinder specification
Blank — Standard cylinder
S — Sensor cylinder

Cylinder bore size × Stroke

Head cover piping specification (Not applicable to clevis mounting type)
Blank — Axial piping
A — Lateral piping
M — Lateral piping, with mounting screws (ø10 and ø16 only)

Mounting brackets (all mounts, except clevis mounting type, included in delivery)
Blank — Basic type
1 — Double foot type (mounted on M specification head cover type only)
1A — Single foot type
3 — Flange type
7 — Clevis type (with pin) (ϕ 10 and ϕ 16 only)
7-7C — Clevis type with supporting bracket (with pin) (ϕ 10 and ϕ 16 only)

Rod Clevis (included in delivery; ø10 and ø16 only).
Blank — Without knuckle
I — With I-shaped rod Clevis
Y — With Y-shaped rod Clevis

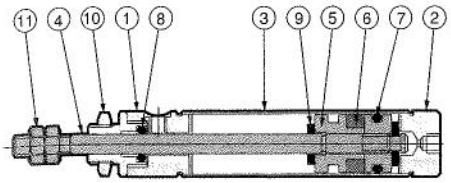
Lead wire length
A — 1000mm
B — 3000mm

Type of Sensor switch.
Blank — Without sensor switch
ZC153 — Three wire, solid state type
ZC130 — Two wire, solid state type
CS5T — Two wire, reed switch type
CS11T — Two wire, reed switch type
See page 616 for futher details.

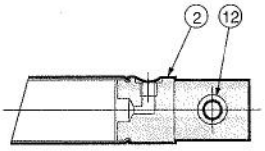
Number of sensor switches
1 — With one switch
2 — With two switches
3 — With three switches

Note : Please use double foot mounting type for foot bracket with strokes longer than 60mm.

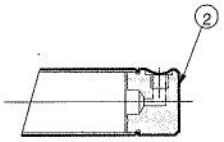
Construction Diagram



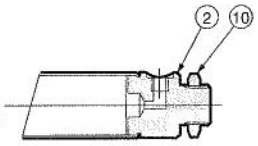
● Clevis type(-7)



● Lateral piping (-A)



● Lateral piping
with mounting screw (-M)



Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	—
⑦	Piston seal	Fluororubber(NBR)
⑧	Rod seal	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Pivot shaped bushing	Oil permeated bronze

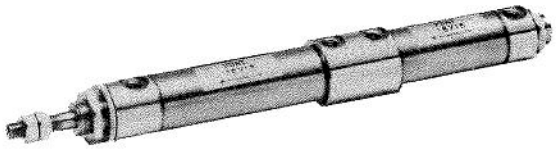
Dimensions

● Same as standard double acting type. See pages 121 to 123.

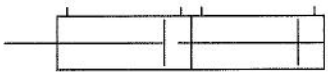
CUSTOM-MADE PEN CYLINDER SPECIFICATION

Tandem Cylinders

● Contact us for detailed dimensions and delivery time.



Symbol



Specifications

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	Basic type	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.2~0.7{2.0~7.1}	
Proof Pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Speed range mm/s	50~300	
Cushion	Fixed type (synthetic rubber)	
Lubrication	Not required	
Port size	M5×0.8	

Cylinder Bore Size and Stroke

mm

Bore size \ Stroke 1 (standard)	5	10	15	30	45	60	Available stroke (St1 x 2) + St2
10	0	5	10	15	30		150
16	0	5	10	15	30		150

Note : The figures in the above chart are combinations of stroke 2 (standard), corresponding to stroke 1 (standard)

Mounting Type

Mounting type	Item	Remark
1	Double foot type	Included in delivery.
1A	Single foot type	Included in delivery Note
3	Flange type	Included in delivery.
7	Clevis type (with pin)	Delivered assembled
7-7C	Clevis type with supporting bracket (with pin)	Supporting bracket included in delivery.

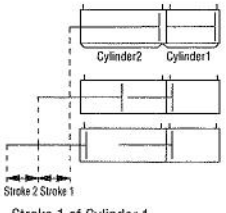
Note : Please use double foot type for foot brackets with total stroke (St1 x 2 + St2) longer than 60 mm.

Order Example

P DAT □ □ – □ – □ – □ – □ □ □

- P: Pen cylinder series
- DAT: Double acting single rod type tandem cylinder
- Cylinder specification: Blank — Standard cylinder; S — Sensor cylinder
- Bore size × Stroke 1 × Stroke 2
- Head cover piping specification (Not applicable to clevis mounting type): Blank — Axial piping; A — Lateral piping; M — Lateral piping, with mounting screw
- Mounting type (All mounts, except clevis mounting type, included in delivery): Blank — Basic type; 1 — Double foot type (mounted on M specification head cover type only); 1A — Single foot type; 3 — Flange type; 7 — Clevis type (with pin); 7-7C — Clevis type with supporting bracket (with pin)
- Rod Clevis (included in delivery): Blank — Without rod end bracket; I — With I-shaped rod Clevis; Y — With Y-shaped rod Clevis (with pin). Please order cylinder joint separately.
- Lead wire length: A — 1000mm; B — 3000mm
- Type of Sensor switch: Blank — Without sensor switch; ZC153 — Three-wire, solid state type; ZC130 — Two-wire, solid state type; CS5T — Two-wire, reed switch type; CS11T — Two-wire, reed switch type. See page 616 for further details
- Number of sensor switches: 1 — With one switch; 2 — With two switches; 3 — With three switches; ⋮ ⋮

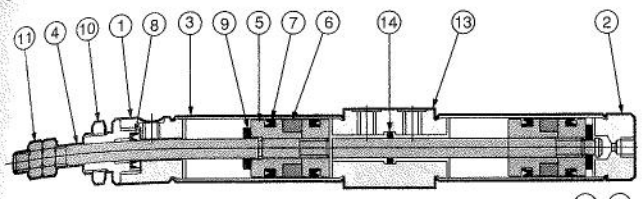
● for stroke 1 and stroke 2



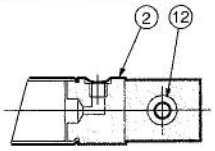
Stroke 1 of Cylinder 1.
Stroke 2 equals Stroke 1 subtracted from the stroke of cylinder 2.

Note : Please use double foot mounting type for foot bracket with total stroke (St1 x 2 + St2) longer than 60mm

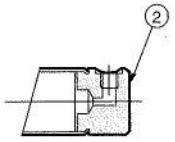
Construction Diagram



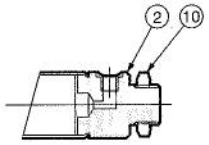
- Clevis type(-7)



- Lateral piping(-A)



- Lateral piping with mounting screw (-M)

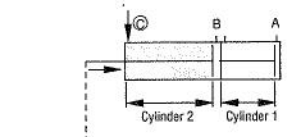


Materials of Major Parts

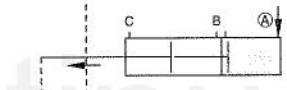
No.	Item	Material
①	Rod cover	Brass (nickel plated)
②	Head cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	—
⑦	Piston seal	Synthetic rubber(NBR)
⑧	Rod seal	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (nickel plated)
⑪	Rod end nut	Mild steel (nickel plated)
⑫	Clevis shaped bushing	Oil permeated bronze
⑬	Intermediate cover	Brass (nickel plated)
⑭	Rod packing	Synthetic rubber(NBR)

Tandem Cylinder Operation

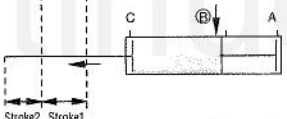
Tandem cylinders are constructed of two cylinders connected end to end.
A tandem cylinder can be used as a two stage stroke cylinder by supplying the A or B port with air, and also doubles the cylinder thrust of other cylinders within one stroke range.



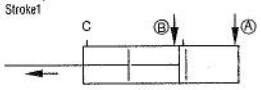
Apply air to port Ⓒ, both strokes 1 and 2 are pulled.



Apply air to port Ⓐ, rod operates stroke 1.



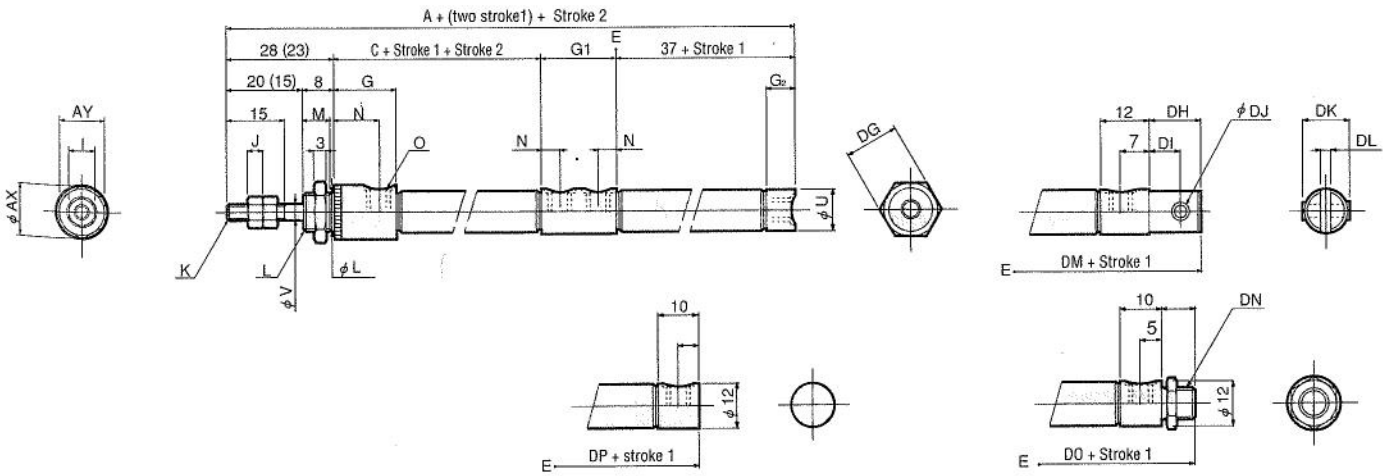
Apply air to port Ⓑ, rod operates stroke 2.



Apply air to ports Ⓐ and Ⓑ, output will be doubled with less than one stroke.

Dimensions of Tandem Cylinder

(Unit : mm)



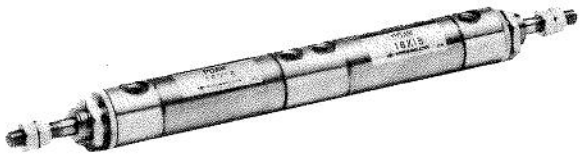
Type / Bore size / Symbol	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G1	G2	I	J	K	L	Lo	M	N	N1	O
10	113	36	133	46	16	22	7	7	4	M4×0.7	M8×1	8 $^{-0.05}_{-0.10}$	6.5	11	5	4-M5×0.8
16	120.5	38.5	140.5	48.5	15.5	24	7	8	4	M5×0.8	M10×1	10 $^{-0.05}_{-0.10}$	6	10.5	5	4-M5×0.8

Bore size / Symbol	U	V	AX	AY	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP
10	11	4	14	12	14	13	8	3.3 $^{-0.05}_{-0.10}$	12	3.2 $^{-0.05}_{-0.10}$	55	M8×1	48	40
16	17	5	20	14	20	20	10	5.1 $^{-0.05}_{-0.10}$	17	6.5 $^{-0.05}_{-0.10}$	65	M8×1	51	43

CUSTOM-MADE PEN CYLINDER SPECIFICATION

Dual Stroke Cylinders

● Contact us for detailed dimensions and delivery time.



Symbol

Specifications

Item \ Cylinder bore size mm	10	16
Operation	Double acting type	
Mounting type	See separate chart	
Fluid	Air	
Pressure range MPa{kgf/cm²}	0.08~0.7{0.8~7.1}	0.06~0.7{0.6~7.1}
Proof pressure MPa{kgf/cm²}	1.03{10.5}	
Temperature range ℃	0~70	
Speed range mm/s	50~750	
Cushion	Fixed type (synthetic rubber)	
Lubrication	Not required	
Port size	M5×0.8	

Bore Size and Stroke

mm

Bore size	Standard stroke		Available stroke St1+St2
	Stroke 1	Stroke 2	
10	5 10 15 30 45 60	5 10 15 30 45 60	120
16	5 10 15 30 45 60	5 10 15 30 45 60	120

Mounting Type

Mounting type	Item	Remark
1	Double foot type	Included in delivery.
1A	Single foot type	Included in delivery (Note).
3	Flange type	Included in delivery.

Note : Please use double foot type for foot bracket with a total stroke (St1 + St2) longer than 60 mm.

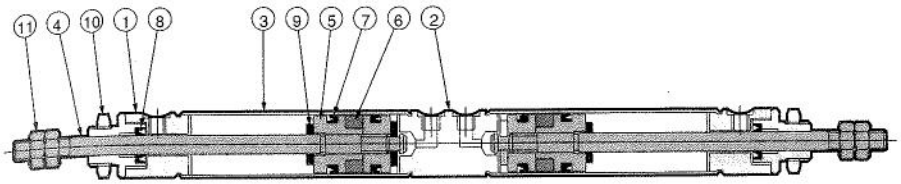
Order Example

P DAW □ □ – □ – □ – □ □ □

- P — Pen cylinder series
- DAW — Double acting single rod type, dual stroke cylinder.
- □ Cylinder specification: Blank — Standard cylinder; S — Sensor cylinder
- □ Cylinder bore size x Stroke 1 x Stroke 2
- □ Mounting type (included in delivery): Blank — Basic type; 1 — Double foot type; 1A — Single foot type; 3 — Flange type
- □ Rod Clevis: Blank — Without rod end bracket; I — With I-shaped rod Clevis; Y — With Y-shaped rod Clevis (with pin). ϕ10 and ϕ16 only. Please order cylinder joints separately.
- □ Type of Sensor switch: Blank — Without sensor switch; ZC153 — Three-wire, solid state type; ZC130 — Two-wire, solid state type; CS5T — Two-wire, reed switch type; CS11T — Two-wire, reed switch type. Please see page 616 for further details
- □ Length of lead wire: A — 1000mm; B — 3000mm
- □ Number of Sensor Switches: 1 — With one switch; 2 — With two switches; 3 — With three switches

Note : Please use double foot mounting type for foot bracket with total stroke (St1 x 2 + St2) longer than 60mm

Construction Diagram

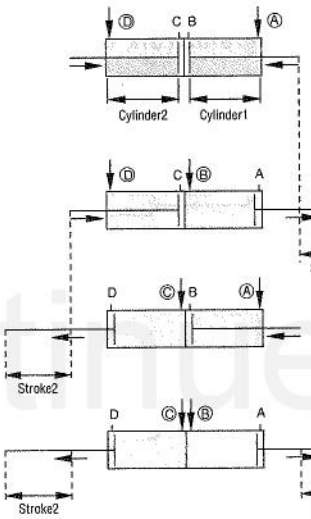


Materials of Major Parts

No.	Item	Material
①	Rod cover	Brass (Nickel plated)
②	Intermediate cover	
③	Cylinder barrel	Stainless steel
④	Piston rod	
⑤	Piston	Brass
⑥	Magnet	—
⑦	Piston seal	Synthetic rubber(NBR)
⑧	Rod seal	
⑨	Bumper	Urethane rubber
⑩	Mounting nut	Brass (Nickel plated)
⑪	Rod end nut	Mild steel (Nickel plated)

Tandem Cylinder Operation

Dual stroke cylinders are constructed of two cylinders connected back to back.
When mounted onto the cylinder body, both strokes can be controlled separately.
When mounted onto one rod end, a two-step or a three-step stroke can be achieved.



Apply air to ports Ⓐ and Ⓓ, both strokes 1 and 2 are pulled.

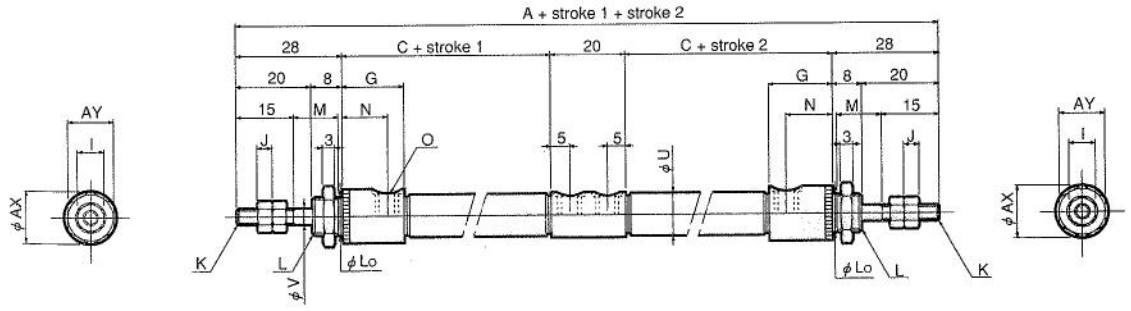
Apply air to ports Ⓑ and Ⓒ, rod operates stroke 1 .

Apply air to ports Ⓐ and Ⓒ, rod operates stroke 2 .

Apply air to ports Ⓒ and Ⓑ, rod operates strokes 1 and 2.

Dimensions of Dual Stroke

(Unit : mm)



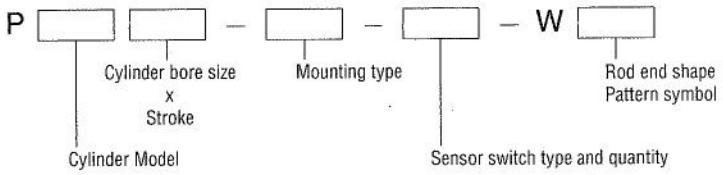
Type / Symbol / Bore size	Standard cylinder A	Standard cylinder C	Sensor cylinder A	Sensor cylinder C	G	G1	G2	I	J	K
10	152	38	172	48	16	—	—	7	3.2	M4×0.7
16	155	39.5	175	49.5	15.5	—	—	8	4	M5×0.8

Bore size / Symbol	L	Lo	M	N	N1	O	U	V	AX	AY
10	M8×1	$8^{-0.05}_{-0.10}$	6.5	11	—	4- M5×0.8	12	4	14	12
16	M10×1	$10^{-0.05}_{-0.10}$	6	10.5	—	4- M5×0.8	17	5	17	14

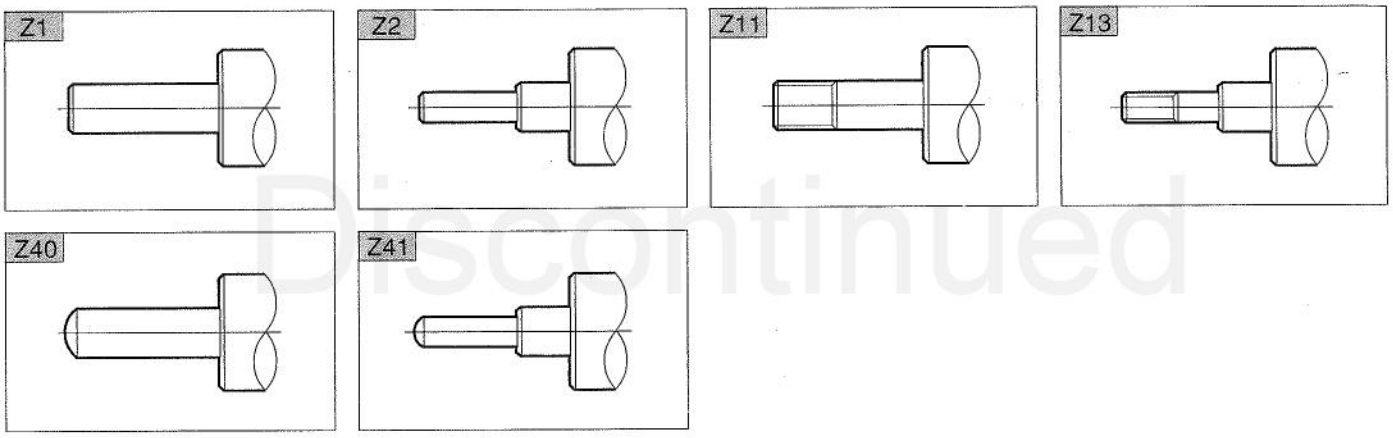
PATTERN DIAGRAM OF ROD END SHAPES

Simply choose the pattern you desire from the six shapes and fill in the required spaces on the order form where the pattern appears. You can also order a custom made cylinder with a rod end shape other than the standard models offered. Any rod end shape can be used with the entire Pen Cylinder series excluding PDAAS, PDAL, PDALS, PSAL, PSA/2.5, and PSA/4.
Please contact any of our business offices for the order forms with rod end patterns.

Order Example

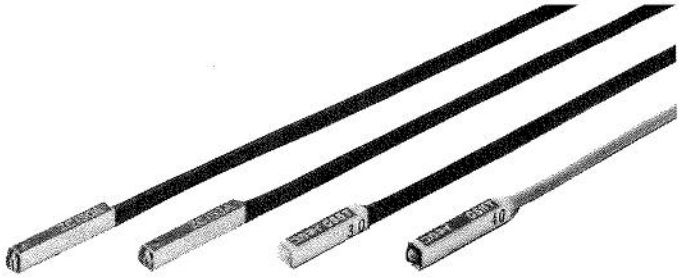


Piston Rod End Shape Pattern Diagrams (Six Types)



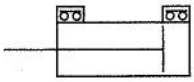
SENSOR SWITCH

Solid State Type; Reed Switch Type



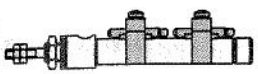
ZC130□ ZC153□ CS5T□ CS11T□

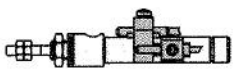
Symbol

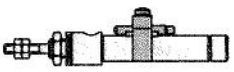


Minimum Strokes for Sensor Switch Installation

- With two switches installed
- With two switches mounted linearly on the cylinder
- With two switches mounted non-linearly on the cylinder
- With one switch installed







Sensor switch model	With two switches installed		With one switch installed
	Linear installation	Non-linear installation	
ZC130□·ZC135□	30	5	5
CS5T□·CS11T□		10	

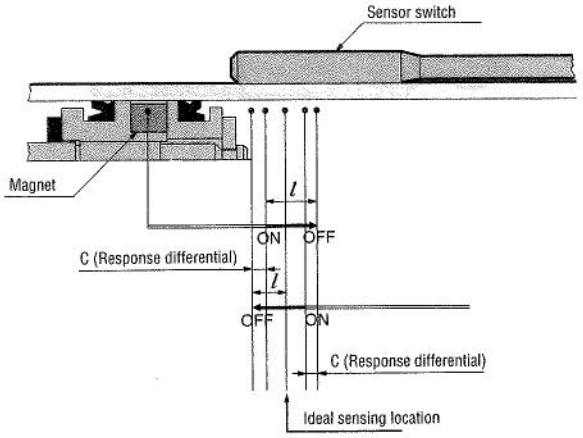
Operating Range, Response Differential, Ideal Sensing Location

- Operating range: *l*

The range between the point where the reed switch turns ON and the point where it turns OFF after the piston moves further along in the same direction.

- Response differential: C

The distance between the point where the piston turns the reed switch ON and the point where it turns OFF after the piston moves further along in the same direction.



mm

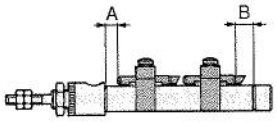
Cylinder bore size	ZC130□ · ZC135□		CS5T□ · CS11T□	
	Operating range	Response differential	Operating range	Response differential
6	1.3~2.2	less than 0.1	3.1~6.2	less than 1.6
10	1.4~2.6	less than 0.1	4.0~6.9	less than 1.6
16	1.7~3.3	less than 0.1	4.7~8.2	less than 1.6

Note:The operating ranges and response differential shown in the chart are reference values.

Sensor Switch Mounting Location

By mounting sensor switches as shown below (figures in chart are reference values), the piston magnet will achieve maximum sensing at the cylinder stroke end.

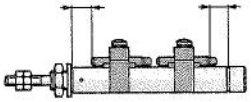
● Double acting type



mm

Sensor switch type \ Cylinder bore size	Symbol	6	10	16
ZC130□ ZC153□ CS5T□	A	3	9.5	9.5
	B	-0.5	-0.5	-0.5
CS11T□	A	1	7.5	7.5
	B	0.5	-1.5	0.5

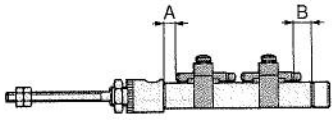
● Double acting type



mm

Sensor switch type	Symbol	Stroke \ Cylinder bore size	6	10	16
ZC130□ ZC153□ CS5T□	A	5・10・15	8.5	14.5	13
		30	20.5	26.5	25
		45	32.5	38.5	37
		60	44.5	50.5	49
	B	—	1	-1	1
CS11T□	A	5・10・15	6.5	12.5	11
		30	18.5	24.5	23
		45	30.5	36.5	35
		60	42.5	48.5	47
	B	—	0.5	-1.5	0.5

● Single acting pull type

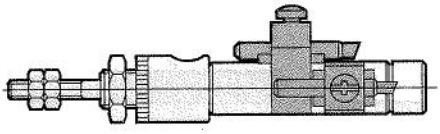


mm

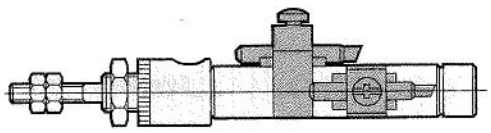
Sensor switch type	Symbol	Stroke \ Cylinder bore size	6	10	16
ZC130□ ZC153□ CS5T□	A	—	3	8.5	9.5
	B	5・10・15	5	3.5	3
		30	17	15.5	15
CS11T□	A	—	1	6.5	7.5
	B	5・10・15	6	4.5	4
		30	18	16.5	16

Installation of Sensor Switch by Stroke

● For five strokes



● For ten strokes or more



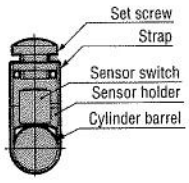
Sensor holder position and movement

- If two sensor switches are mounted on a cylinder with five strokes, sensor holder cannot be mounted in the center of each switch.
- If two sensor switches are mounted on a cylinder with five strokes, loosen the set screw, reposition the sensor switches so that the sensor holder can be mounted as shown in the figure, and mount.
- For a cylinder with ten strokes or more, the sensor holder can be mounted near the center of the sensor switch.

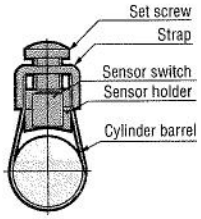
Sensor Switch Movement

- Loosen the set screw, allowing the sensor switch to move along its axis or circumference.
- For fine adjusting in the axial direction, loosen the set screw slightly (about 180°) to permit movement of the sensor switch only.
- The tightening torque of the set screw should not exceed 0.3N/cm (3kgf/cm).

● ϕ6

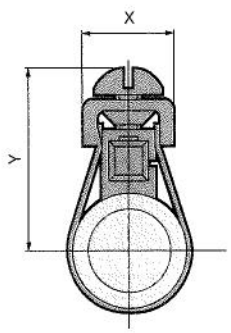


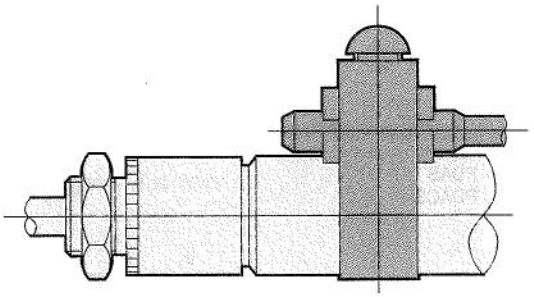
● ϕ10・ϕ16



Mounting Dimensions for Sensor Switch

● PDAS type

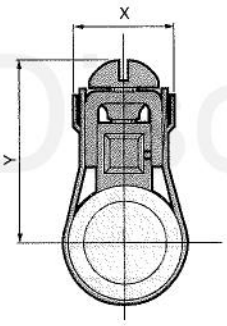


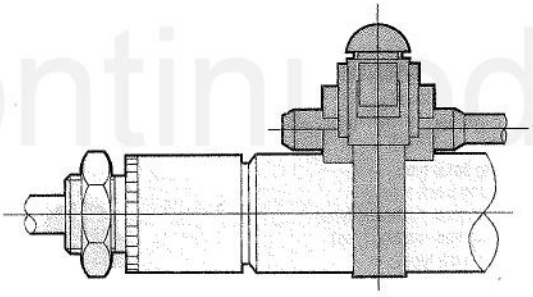


mm

Bore size \ Symbol	X	Y
6	6.5	15.5
10	9.5	17.5
16	9.5	20.5

● PDACS type





mm

Bore size \ Symbol	Y	X
10	12.4	(14)
16	12.4	(21)

Sensor Switch Order Example

● For sensor switch (with mounting bracket)

□ □ — □ □

Cylinder bore size
6 — ϕ 6
10 — ϕ 10
16 — ϕ 16

Typical cylinder type [Note]
PDAS
PDACS

Lead wire length
A — 1000mm
B — 3000mm

Sensor switch type

ZC130	Solid state type with indicator lamp	DC10~28V
ZC153	Solid state type with indicator lamp	DC4.5~28V
CS5T	Reed switch type without indicator lamp	DC5~28V AC85~115V
CS11T	Reed switch type with indicator lamp	DC10~28V

●For mounting bracket only

C1 — □ □

Cylinder bore size
6 — ϕ 6
10 — ϕ 10
16 — ϕ 16

Standard cylinder type [Note]
PDAS
PDACS

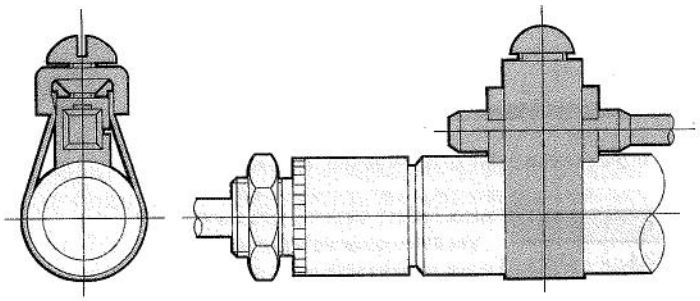
Mounting bracket type

Note: Mounting brackets are categorized into two types in accordance with cylinder types.
PDAS is applicable to PDAS (double acting basic type), PDABS (double acting block type), PDAHS (double acting low-hydraulic type), PDALS (double acting non-rotating type), PSAS (single acting push type) and PTAS (single acting pull type).
PDACS is applicable to PDAAS (double acting linear bearing type), PDACS (double acting with bumper type), PDADS (double acting double rods type), PDAES (double acting pull-side stroke adjustable type), PDAPS (double acting push-side stroke adjustable type), PDATS (double acting tandem type), PDAWS (double acting dual type) and PDAUS (double acting with speed controller type)

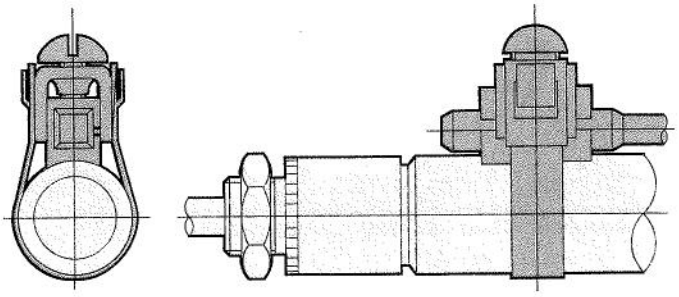
SENSOR BAND

Note: Two types of sensor bands are available depending on cylinder type. Refer to the following when placing your order.

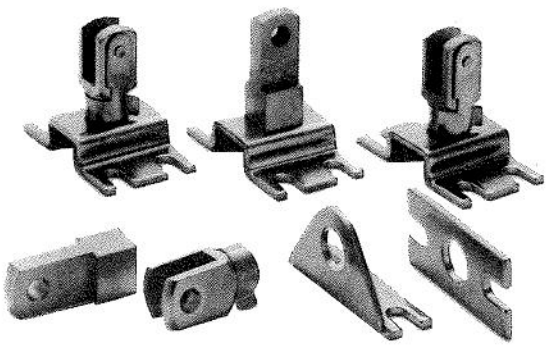
PDAS
- PDAS(double acting basic type)
- PDABS (double acting block type)
- PDAHS (double acting low hydraulic type)
- PDALS (single acting non-rotating type)
- PSAS (single acting push type)
- PTAS (single acting pull type)



PDACS
- PDAAS (double acting linear bearing type)
- PDACS (double acting with bumper type)
- PDADS (double acting double rods type)
- PDAES (double acting pull-side stroke adjustable type)
- PDAPS (double acting push-side stroke adjustable type)
- PDATS (double acting tandem type)
- PDAWS (double acting dual type)
- PDAUS (double acting with speed controller)



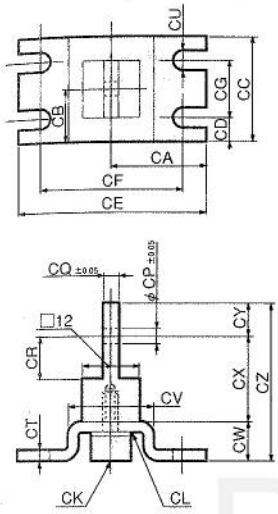
MOUNTING BRACKET AND ROD CLEVIS



Dimensions of Mounting Brackets

(Unit : mm)

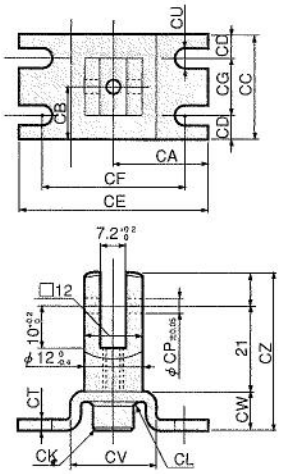
● Clevis mounting bracket



Symbol / Bore size	CA	CB	CC	CD	CE	CF	CG	CK (Hexagon socket head cap screw)
10	20	11	22	5	40	30.2	12	M4×0.7×10
16	24	14	28	6	48	35.2	16	M5×0.8×10

Symbol / Bore size	CL (Spring washer)	CP	CQ	CR	CT	CU	CV	CW	CX	CY	CZ
10	Cylinder diameter4	3.3	3.1	9	2	4.2	18	8	21	7	36
16	Cylinder diameter5	5.1	6.4	14	2.3	5.2	20	10	25	7	42

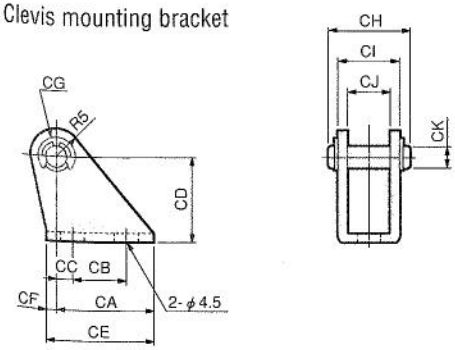
● I-shaped Rod clevis



Symbol / Bore size	CA	CB	CC	CD	CE	CF	CG	CK (Hexagon socket head cap screw)
10	20	11	22	5	40	30.2	12	M4×0.7×10
16	24	14	28	6	48	35.2	16	M5×0.8×10

Symbol / Bore size	CL (Spring washer)	CP	CT	CU	CV	CW	CZ
10	Cylinder diameter4	3.3	2	4.2	18	8	36
16	Cylinder diameter5	5.1	2.3	5.2	20	10	38

● Clevis mounting bracket

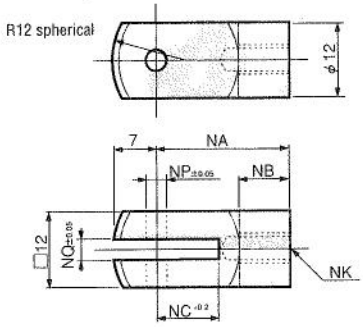


Symbol / Bore size	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK
10	18	10	3	16	20	2	Cylinder diameter3	15	11.3	8.1	φ4
16	20	12	3	20	23	3	Cylinder diameter5	20.8	16.7	12.1	φ6

Dimensions of Rod cievis

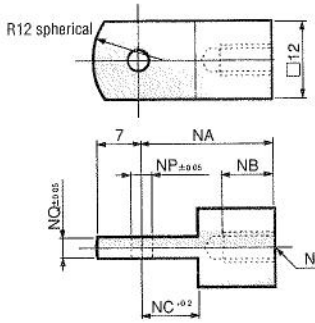
(Unit : mm)

● Y-shaped Rod cievis



Bore size \ Symbol	NA	NB	NC	NK	NP	NQ	Weight (with pin) (Unit: g)
10	21	8	10	M4×0.7	3.3	3.2	21
16	21	11	10	M5×0.8	5.1	6.5	15

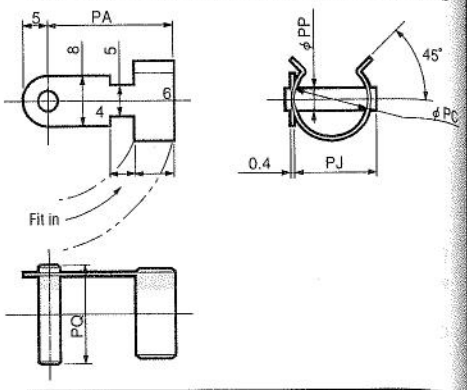
● I-shaped Rod cievis



Bore size \ Symbol	NA	NB	NC	NK	NP	NQ	Weight (Unit : g)
10	21	8	9	M4×0.7	3.3	3.1	16
16	25	8	14	M5×0.8	5.1	6.4	22

Dimensions of Pins

(Unit : mm)



Bore size \ Symbol	PA	PC	PJ	PP	PQ	Weight (Unit : g)
10	20	12	13.5	3.2	15	2
16	20	12	13.5	5	15	3
16 *	22	17	19			

Note : The bore size marked with * applies to clevis head.

Order Example for Brackets and Rod cievis

(1)Single foot bracket

P — □ — Type (See the following chart)

P: Single foot bracket

Type	Applicable cylinder types
PDA6	PDA6 PSA6 PTA6 PDAF6 PDAH6
PDA10	PDA10 PDAU10 PDAP10 PDAT10 PSA10 PDAD10 PDAF10 PDAW10 PTA10
PDA10	PDA16 PDAU16 PDAH16 PSAT16 PDAD16 PDAT16 PTA16 PDAE16 PDAW16 PDAF16 PDAP16
PDA10	PDAL10 (Same part as PDA16)
PDA10	PDAL16
PDA10	PDAA10 PDAC10
PDA10	PDAA16 PDAC16

(2)Double foot bracket

1 — □ — Type (See the following chart)

1: Double foot bracket

Type	Applicable cylinder types
PDA10	PDA10 PDAU10 PDAP10 PDAT10 PSA10 PDAD10 PDAF10 PDAW10 PDAH10
PDA16	PDA16 PDAD16 PDAH16 PSA16 PDAP16 PDAT16 PDAU16 PDAF16 PDAW16
PSAL10	PSAL10
PSAL16	PSAL16
PDAC10	PDAA10 PDAC10
PDAC16	PDAA16 PDAC16

Note : One set consists of two foot mounting brackets.

(3) Flange bracket

3 — □ — Type (See the following chart)

3: Flange bracket

Type	Applicable cylinder types
PDA6	PDA6 PSA6 PTA6 PDAF6 PDAH6
PDA10	PDA10 PDAU10 PDAP10 PDAT10 PSA10 PDAD10 PDAF10 PDAF10 PDAW10 PTA10 PDAE10 PDAH10
PDA16	PDA16 PDAU16 PDAH16 PSA16 PDAD16 PDAT16 PTA16 PDAE16 PDAW16 PDAF16 PDAP16
PDAL10	PDAL10 PSAL10
PDAL16	PDAL16 PSAL16
PDAC10	PDAA10 PDAC10
PDAC16	PDAA16 PDAC16

(4) Clevis bracket

7C — □ — Type (See the following chart)

7C: Clevis bracket

Type	Applicable cylinder types
PDA10	PDA10 PDAU10 PDAT10 PSA10 PDAF10 PDAL10 PTA10 PDAH10
PDA16	PDA16 PDAU16 PDAT16 PSA16 PDAF16 PDAL16 PTA16 PDAH16

(5) I-shaped bracket

8E — □ □

- 8E: I-shaped bracket
- Type: PDAC (also includes PDAA), PSAL
- Cylinder bore size: 10 — φ10, 16 — φ16

(6) Y-shaped rod cievis

Y — PDA □

- Y: Y-shaped rod cievis
- PDA: Pen cylinder
- Cylinder bore size: 10 — φ10, 16 — φ16

(7) I-shaped rod cievis

I — PDA □

- I: I-shaped rod cievise
- PDA: Pen cylinder
- Cylinder bore size: 10 — φ10, 16 — φ16

(8) Pins

PK □ — PDA

- PK: Pin
- □: Types of Pins
  - 3 — Y-shaped rod clevis for φ10; use with clevis bracket
  - 5 — Y-shaped rod clevis for φ16
  - 6 — Clevis for φ16
- PDA: Pen cylinder