DYNA CYLINDERS

Ultra-reliable, high-function tie-rod cylinder

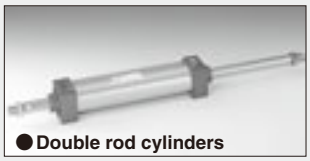
The DYNA cylinders, compact and lightweight mid-sized actuators compatible with ISO standards, offer a wide range of configurations and mounting types to meet various application requirements in a flexible manner. Moreover, the use of a new type of cushion needle and floating seal have made these products user-friendlier.

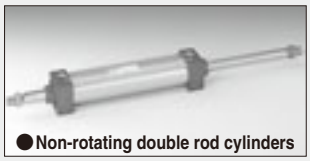
Light & Compact

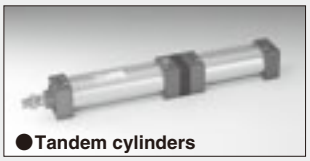
Product Line Up

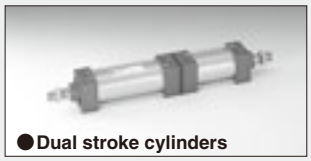

● Standard cylinders


● Non-rotating cylinders


● Double rod cylinders


● Non-rotating double rod cylinders


● Tandem cylinders


● Dual stroke cylinders

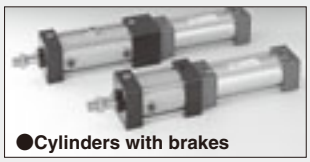

● Push side stroke adjusting cylinders


● Pull side stroke adjusting cylinders

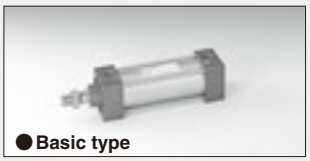

● Low hydraulic cylinders


● Valpack cylinders


● End keep cylinders


● Cylinders with brakes

Mounting type

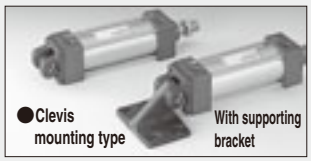

● Basic type


● Foot mounting type


● Axial foot mounting type

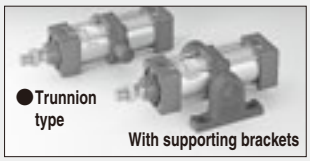

● Rod side flange mounting type


● Head side flange mounting type


● Clevis mounting type

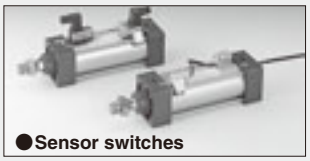
With supporting bracket

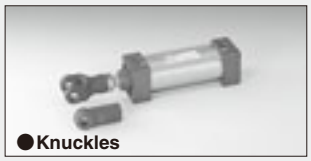

● Pivot mounting type


● Trunnion type

With supporting brackets

Accessory


● Sensor switches


● Knuckles

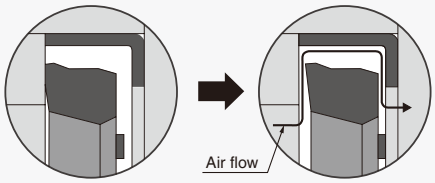

● Cylinders with bellows

1 Extensive variation of functions

■ The series configuration together with its versatile functionality and specifications offers the best match for various mechanical devices.

2 Improved cushioning

■ Improved cushioning is gained by utilizing floating seal in the cushion section.

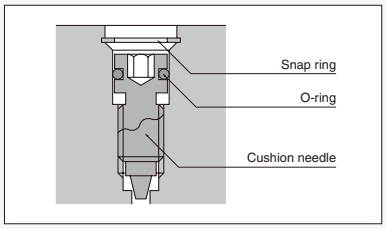


3 Long life

■ Oil impregnated sintered copper alloy in bushings enables stable operation and longer life.

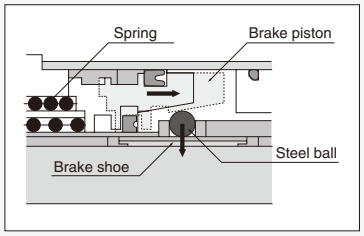
4 New cushion needle

■ Using a new type of cushion needle that is completely embedded in the cylinder body offers fine adjustment for better performance.



5 Safe self-locking mechanism

■ New release of cylinders with brakes. Exhausting compressed air pushes a brake shoe against the piston rod thereby stopping the cylinder.



※Steel balls and a brake shoe are secured in position. Operating the brake piston enables activation or release of the brake.

■Series configurations

	Basic type	Foot mounting type	Axial foot mounting type	Rod side flange mounting type	Head side flange mounting type	Clevis mounting type (with supporting bracket)	Pivot mounting type	Trunnion type (with supporting bracket)
Standard cylinder (ϕ32 [1.260]～ϕ125 [4.921])	●	●	●	●	●	●	●	●
Non-rotating cylinder (ϕ40 [1.575]～ϕ100 [3.940])	○	○	○	○	○	○	○	○
Double rod cylinder (ϕ32 [1.260]～ϕ125 [4.921])	●	●	●	●				●
Non-rotating double rod cylinder (ϕ40 [1.575]～ϕ100 [3.940])	○	○	○	○				○
Tandem cylinder (ϕ40 [1.575]～ϕ100 [3.940])	●	●	●	●	●	●	●	●
Dual stroke cylinder (ϕ40 [1.575]～ϕ100 [3.940])	○	○	○	○				○
Push side stroke adjusting cylinder (ϕ40 [1.575]～ϕ100 [3.940])	●	●	●	●				●
Pull side stroke adjusting cylinder (ϕ40 [1.575]～ϕ100 [3.940])	○	○	○	○				○
Low hydraulic cylinder (ϕ32 [1.260]～ϕ100 [3.940])	●	●	●	●	●	●	●	●
Valpack cylinder (ϕ40 [1.575]～ϕ100 [3.940])	○	○	○	○	○	○	○	○
End keep cylinder (ϕ40 [1.575]～ϕ100 [3.940])	●	●	●	●	●	●	●	●
Cylinder with brake (ϕ40 [1.575]～ϕ100 [3.940])	○	○	○	○	○	○	○	○

mm [in.]

General precautions

Media

1. Use air for the media. For the use of any other media, consult us.
2. Air used for the DYNA cylinder should be clean air that contains no deteriorated compressor oil, water, dust, etc. Install an air filter (filtration of a minimum 40 µm) near the cylinder or valve to remove collected liquid or dust. In addition, drain the air filter periodically.

Piping

Always thoroughly blow off (use compressed air) the tubing before connecting it to the DYNA cylinder. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.

Atmosphere

If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use a cover to protect the unit.

Lubrication

This equipment can be used without lubrication. If lubrication is required, use Turbine Oil Class 1 (ISO VG32) or lithium soap-based grease No.2 or equivalent.

Handling

Assembly of mounting bracket

Use mounting screws which are supplied with the bracket to assemble the mounting bracket. Use an Allen wrench to tighten the mounting screws evenly. When 4 screws are used, tighten diagonally from each corner. The tightening torque is shown below.

Assembly and disassembly

For disassembly, insert an Allen wrench to loosen the tie rod nut, and remove the cover.
For assembly, screw in the tie rod nut with the hexagon socket facing outward. Evenly tighten diagonally from each corner. The tightening torque is shown below.

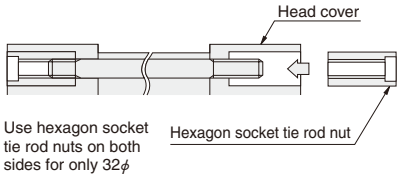
〈**Tightening torque of mounting brackets and tie rod nuts**〉

Bore size mm [in.]	Tightening torque
32, 40, 50 [1.260, 1.575, 1.969]	4.81N·m [3.55ft·lbf]
63 [2.480]	12.0N·m [8.85ft·lbf]
80, 100 [3.150, 3.940]	24.0N·m [17.7ft·lbf]
125 [4.921]	42.2N·m [31.1ft·lbf]

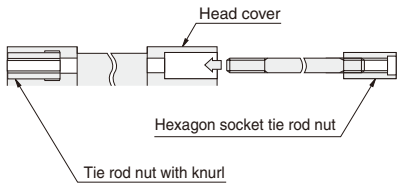
●**Width across flats of hexagon socket** mm [in.]

Bore size	Tie rod nut	Mounting bracket
32 [1.260]	6 [0.236]	4 [0.157]
40, 50 [1.575, 1.969]	6 [0.236]	4 [0.157]
63 [2.480]	8 [0.315]	5 [0.197]
80, 100 [3.150, 3.940]	10 [0.394]	6 [0.236]
125 [4.921]	12 [0.472]	8 [0.315]

● **ϕ 32 [1.260in.]**

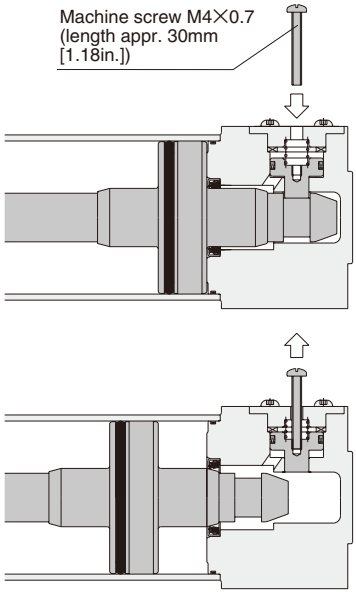


● **ϕ 40 [1.575in.]～ ϕ 125 [4.921in.]**



Manual operation of end keep cylinder locking mechanism

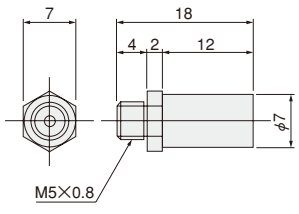
While the locking mechanism is normally released automatically through cylinder operations, it can also be released manually. For manual release, insert an M4×0.7 screw that has 30mm [1.18in.] screw length into the manual override opening, thread it in about 3 turns into the internal lock piston, and then pull up the screw. To maintain the manual override for adjustment, etc., thread the locknut onto the screw and, with the locking mechanism in a released state, tighten the locknut against the cylinder.



Cautions: 1. It is dangerous to release the lock when load (weight) is present on the piston rod, because it may cause the unintended piston rod's extension (or retraction). In this case, always supply air to the connection port opposite the one adjacent to the locking mechanism before releasing the locking mechanism.
2. If the locking mechanism cannot easily be released even with manual override, it could be the result of galling of the lock piston and piston rod. In this case, supply air to the connection port opposite the one adjacent to the locking mechanism before releasing the locking mechanism.
3. Because water, oil, dust, etc., intruding through the manual override opening may be a cause of defective locks or other erratic operation. If using in locations subject to dripping water, dripping oil, etc., or large amounts of dust, use a cover to protect the unit.
4. If the circuit cannot maintain exhaust pressure at 0.03MPa [4.4psi.] or less due to using a manifold valve, use individual valve for operations.

Dedicated muffler

The dedicated muffler can be mounted on the manual override opening.
Dedicated muffler model **SA-5** (mm)



Control circuit for the end keep cylinder

1. For control of the DYNA end keep cylinders, we recommend the use of 2-position, 4-, 5-port valves. Avoid the use of control circuit of ABR connections (exhaust centers) with 3-position valves that exhaust air from 2 ports.
2. Always use meter-out control for speed control. Meter-in control may result in failure of the locking mechanism to release.
3. Always set the air pressure to 0.15MPa [22psi.] or more.

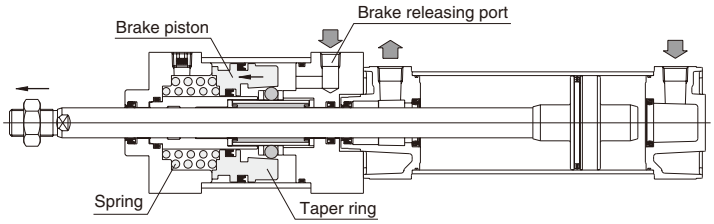
Cautions: 1. It is dangerous to supply air to a connection port on a side with a locking mechanism while the cylinder has already been exhausted, because the piston rod may suddenly extend (or retract). In addition, since the lock piston could also cause galling of the lock piston and piston rod, resulting in defective operation. Always supply air to the connection port on the opposite side of the locking mechanism to ensure applying back pressure.
2. When restarting operations after air has been exhausted from the cylinder due to completion of operations or to an emergency stop, always start by supplying air to a connection port on the opposite side of the locking mechanism.
3. Connect the valve port A (NC) to the connection port on the side with the locking mechanism.

Mounting and piping (for cylinder with brake)

Operating principle

The cylinder with brake uses a mechanism that consists of steel balls contacting a incline and it receives components of a spring force, then it transmits the force via a brake shoe to apply to the piston rod.

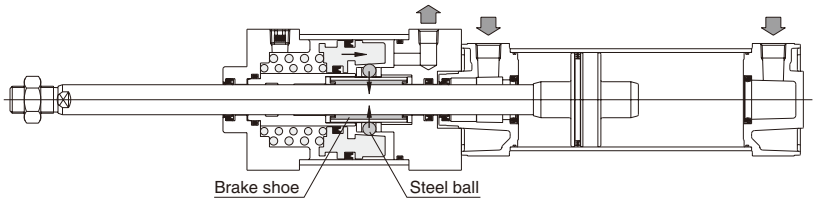
●When the brake is released



When the brake is released

A supply of compressed air from the brake releasing port causes the brake piston including the taper ring, to retract thereby freeing the steel balls from the taper ring, which releases the brake and lets the piston rod freely slide.

●When the brake is applied



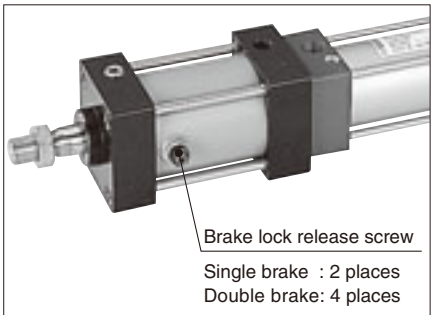
When the brake is applied

Exhausting compressed air from the brake releasing port causes the spring to press against the brake piston, transmitting components of spring force via the taper ring to the steel balls, which then works via the brake shoe to transmit a perpendicular force to the piston rod and to apply friction force to the brake.

Precautions for installation

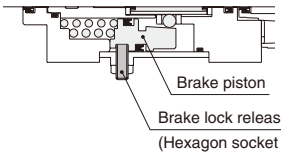
1. In the cylinder with brake, the brake piston in the single brake type is secured in place with 2 hexagon socket screws, and in the double brake type with 4 such screws, with the brake set in a released state at shipping.
When piping and installation is completed, or when performing operation checks, first supply at least 0.35MPa [51psi.] (0.4MPa [58psi.] for bore size of ϕ 50 [1.969in.]) of air to the brake release port, and remove the screws. Then exhausting the compressed air enables the piston rod to be held. While the unit could be operated with the screws removed, it is better for prevention of entering dust to use screws with nuts to secure it in place by inserting 2 or 3 thread ridges into the cylinder.
At this time, do not excessively tighten the screws as they could interfere with the brake piston, by re-locking it in place, or by constricting its movements.

2. Poor centering of the Cylinder with Brake may damage the seal or hasten wear on the brake shoe.
As poor centering could also result in inaccuracy of the stopping position, use of a cylinder joint is recommended.



Single brake : 2 places
Double brake: 4 places

During operation, loosen the brake lock release screw, and set so that it does not bump against the brake piston.



Mounting and piping (for cylinder with brake)

Control circuit

Electric control

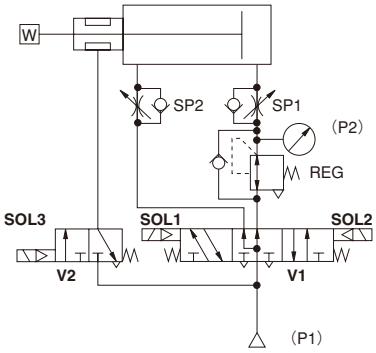
When using a sequencer for control, the scanning time of the sequencer will affect the stopping position error. To improve the stopping position accuracy, use a TTL circuit, etc., to directly control the signal from the cylinder's sensor switch, and operate the valve.

Pneumatic circuit

1. To achieve a balance with the load, and a balance of differences in rod diameter area, always use a regulator with check valve.
2. For the cylinder control solenoid valve (V1), use a PAB connection 3-position solenoid valve, etc.
3. Install the solenoid valve for the brake (V2) as close to the cylinder as possible. Moreover, using a DC current solenoid valve will improve response (stopping position accuracy).

Example of basic circuit (Reference)

●Horizontal mounting
Spring lock



Regulator pressure setting

$$P2 = \frac{D^2 - d^2}{D^2} \cdot P1$$

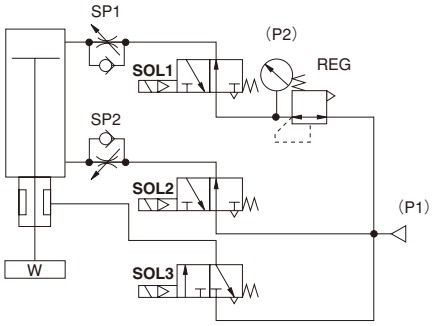
D : Cylinder bore size	(mm)
d : Rod diameter	(mm)
P1 : Supply pressure	(MPa)

Regulator pressure setting

$$P2' = \frac{D'^2 - d'^2}{D'^2} \cdot P1'$$

D' : Cylinder bore size	[in.]
d' : Rod diameter	[in.]
P1' : Supply pressure	[psi.]

●Vertical mounting
Spring lock



Regulator pressure setting

$$P2 = \frac{\pi (D^2 - d^2)\, P1 - 4W}{\pi \cdot D^2}$$

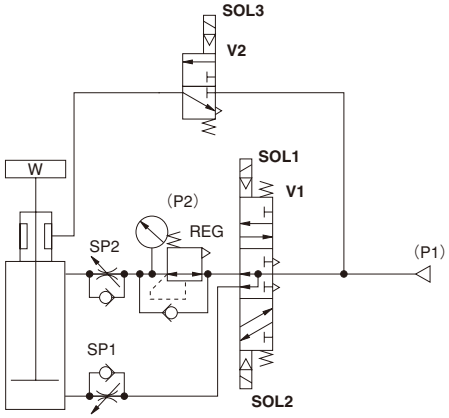
D : Cylinder bore size	(mm)
d : Rod diameter	(mm)
P1 : Supply pressure	(MPa)
W : Load	(N)

Regulator pressure setting

$$P2' = \frac{\pi (D'^2 - d'^2)\, P1' - 4W'}{\pi \cdot D'^2}$$

D' : Cylinder bore size	[in.]
d' : Rod diameter	[in.]
P1' : Supply pressure	[psi.]
W' : Load	[lbf]

●Vertical mounting (push up)



Regulator pressure setting

$$P2 = \frac{\pi \cdot D^2 \cdot P1 - 4W}{\pi (D^2 - d^2)}$$

D : Cylinder bore size	(mm)
d : Rod diameter	(mm)
P1 : Supply pressure	(MPa)
W : Load	(N)

Regulator pressure setting

$$P2' = \frac{\pi \cdot D'^2 \cdot P1' - 4W'}{\pi (D'^2 - d'^2)}$$

D' : Cylinder bore size	[in.]
d' : Rod diameter	[in.]
P1' : Supply pressure	[psi.]
W' : Load	[lbf]

ON, OFF switch sequence for solenoid
(same for all mounting positions)

Valve / Operating state	V1		V2
	SOL1	SOL2	SOL3
Intermediate stop	OFF	OFF	OFF
Forward	OFF	ON	ON
Reverse	ON	OFF	ON

Air Flow Rate and Air Consumption

While the air cylinder's air flow rate and air consumption can be found through the following calculations, the quick reference chart to the right provides the answers more conveniently.

Air flow rate $Q_1=\frac{\pi D^2}{4}\times L\times\frac{60}{t}\times\frac{P+0.1013}{0.1013}\times10^{-6}$

Air consumption $Q_2=\frac{\pi D^2}{4}\times L\times2\times n\times\frac{P+0.1013}{0.1013}\times10^{-6}$

Q_1	: Required air flow rate for cylinder	ℓ/min(ANR)
Q_2	: Air consumption of cylinder	ℓ/min(ANR)
D	: Cylinder tube inner diameter	mm
L	: Cylinder stroke	mm
t	: Time required for cylinder to travel 1 stroke	s
n	: Number of cylinder reciprocations per minute	times/min
P	: Pressure	MPa

Air flow rate $Q_1'=\frac{\pi D'^2}{4}\times L'\times\frac{60}{t}\times\frac{P'+14.696}{14.696}\times\frac{1}{1728}$

Air consumption $Q_2'=\frac{\pi D'^2}{4}\times L'\times2\times n\times\frac{P'+14.696}{14.696}\times\frac{1}{1728}$

Q_1'	: Required air flow rate for cylinder	ft.³/min.(ANR)※
Q_2'	: Air consumption of cylinder	ft.³/min.(ANR)※
D′	: Cylinder tube inner diameter	in.
L′	: Cylinder stroke	in.
t	: Time required for cylinder to travel 1 stroke	sec.
n	: Number of cylinder reciprocations per minute	times/min
P′	: Pressure	psi.

※Refer to p.54 for an explanation of ANR.

Air consumption for each 1mm [0.0394in.] stroke cm³ [in.³]/Reciprocation (ANR)

Bore size mm [in.]	Air pressure MPa [psi.]								
	0.1 [15]	0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	0.6 [87]	0.7 [102]	0.8 [116]	0.9 [131]
32 [1.260]	3.20 [0.1953]	4.78 [0.2917]	6.37 [0.3887]	7.96 [0.4858]	9.55 [0.5828]	11.14 [0.6798]	12.72 [0.7762]	14.31 [0.8733]	15.90 [0.9703]
40 [1.575]	4.99 [0.3045]	7.48 [0.4565]	9.96 [0.6078]	12.44 [0.7591]	14.92 [0.9105]	17.40 [1.0618]	19.88 [1.2132]	22.36 [1.3645]	24.84 [1.5158]
50 [1.969]	7.80 [0.4760]	11.68 [0.7128]	15.56 [0.9495]	19.43 [1.1857]	23.31 [1.4225]	27.19 [1.6592]	31.06 [1.8954]	34.93 [2.1316]	38.78 [2.3665]
63 [2.480]	12.39 [0.7561]	18.54 [1.1314]	24.70 [1.5073]	30.85 [1.8826]	37.01 [2.2585]	43.16 [2.6338]	49.32 [3.0097]	55.46 [3.3844]	61.57 [3.7572]
80 [3.150]	19.98 [1.2193]	29.90 [1.8246]	39.83 [2.4306]	49.75 [3.0359]	59.67 [3.6413]	69.60 [4.2473]	79.52 [4.8526]	89.45 [5.4586]	99.37 [6.0640]
100 [3.940]	31.21 [1.9046]	46.72 [2.8510]	62.23 [3.7975]	77.73 [4.7434]	93.24 [5.6899]	108.75 [6.6364]	124.25 [7.5822]	139.76 [8.5287]	155.27 [9.4752]
125 [4.921]	48.77 [2.9761]	73.00 [4.4548]	97.23 [5.9334]	121.46 [7.4120]	145.69 [8.8906]	169.92 [10.369]	194.14 [11.847]	218.37 [13.326]	242.60 [14.804]

The figures in the table show the air flow rate and air consumption when an air cylinder makes 1 reciprocation with stroke of 1mm [0.0394in.]. The air flow rate and consumption actually required is found by the following calculations.

●Finding the air flow rate (for selecting F.R.L., valves, etc.)

Example: When operating an air cylinder with bore size of 40mm [1.575in.] at speed of 300mm/s [11.8in./sec.], and under air pressure of 0.5MPa [73psi.]

$14.92\times\frac{1}{2}\times300\times10^{-3}\fallingdotseq2.24$ ℓ/s [0.0791ft.³/sec.] (ANR)

(At this time, the air flow rate per minute is $14.92\times\frac{1}{2}\times300\times60\times10^{-3}=$ 134.28 ℓ/min [4.74ft.³/min.] (ANR).)

●Finding the air consumption

Example 1. When operating an air cylinder with bore size of 40mm [1.575in.] and stroke of 100mm [3.94in.], and under air pressure of 0.5MPa [73psi.], for 1 reciprocation

$14.92\times100\times10^{-3}=1.492$ ℓ [0.0527ft.³]/Reciprocation (ANR)

Example 2. When operating an air cylinder with bore size of 40mm [1.575in.] and stroke of 100mm [3.94in.], and under air pressure of 0.5MPa [73psi.], for 10 reciprocations per minute

$14.92\times100\times10\times10^{-3}=14.92$ ℓ/min [0.527ft.³/min.] (ANR)

Cylinder Thrust

Select a suitable cylinder bore size considering the load and air pressure to obtain the required thrust.

Since the figures in the table are calculated values, select a bore size that results in a load ratio (load ratio = $\frac{\text{Load}}{\text{Calculated value}}$) of 70% or less (50% or less for high speed application).

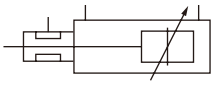
N [lbf.]

Bore size mm [in.]	Rod diameter mm [in.]	Operation	Pressure area mm² [in²]	Air pressure MPa [psi.]								
				0.1 [15]	0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	0.6 [87]	0.7 [102]	0.8 [116]	0.9 [131]	1 [145]
32 [1.260]	**12 [0.472]**	Push side	804 [1.246]	80 [18.0]	161 [36.2]	241 [54.2]	322 [72.4]	402 [90.4]	482 [108]	563 [127]	643 [145]	724 [163]	804 [181]
		Pull side	690 [1.070]	69 [15.5]	138 [31.0]	207 [46.5]	276 [62.0]	345 [77.6]	414 [93.1]	483 [109]	552 [124]	621 [140]	690 [155]
40 [1.575]	**16 [0.630]**	Push side	1256 [1.947]	126 [28.3]	251 [56.4]	377 [84.7]	502 [113]	628 [141]	754 [169]	879 [198]	1005 [226]	1130 [254]	1256 [282]
		Pull side	1055 [1.635]	106 [23.8]	211 [47.4]	317 [71.3]	422 [94.9]	528 [119]	633 [142]	739 [166]	844 [190]	950 [214]	1055 [237]
50 [1.969]	**20 [0.787]**	Push side	1963 [3.043]	196 [44.1]	393 [88.3]	589 [132]	785 [176]	982 [221]	1178 [265]	1374 [309]	1570 [353]	1767 [397]	1963 [441]
		Pull side	1649 [2.556]	165 [37.1]	330 [74.2]	495 [111]	660 [148]	825 [185]	989 [222]	1154 [259]	1319 [297]	1484 [334]	1649 [371]
63 [2.480]	**20 [0.787]**	Push side	3117 [4.831]	312 [70.1]	623 [140]	935 [210]	1247 [280]	1559 [350]	1870 [420]	2182 [491]	2494 [561]	2805 [631]	3117 [701]
		Pull side	2803 [4.345]	280 [62.9]	561 [126]	841 [189]	1121 [252]	1402 [315]	1682 [378]	1962 [380]	2242 [504]	2523 [567]	2803 [630]
80 [3.150]	**25 [0.984]**	Push side	5026 [7.790]	503 [113]	1005 [226]	1508 [339]	2010 [452]	2513 [565]	3016 [678]	3518 [791]	4021 [904]	4523 [1017]	5026 [1130]
		Pull side	4536 [7.031]	454 [102]	907 [204]	1361 [306]	1814 [408]	2268 [510]	2722 [612]	3175 [714]	3629 [816]	4082 [918]	4536 [1020]
100 [3.940]	**30 [1.181]**	Push side	7853 [12.17]	785 [176]	1571 [353]	2356 [530]	3141 [706]	3927 [883]	4712 [1059]	5497 [1236]	6282 [1412]	7068 [1589]	7853 [1765]
		Pull side	7147 [11.08]	715 [161]	1429 [321]	2144 [482]	2859 [643]	3574 [803]	4288 [964]	5003 [1125]	5718 [1285]	6432 [1446]	7147 [1607]
125 [4.921]	**35 [1.378]**	Push side	12271 [19.02]	1227 [276]	2454 [552]	3681 [827]	4908 [1103]	6136 [1379]	7363 [1655]	8590 [1931]	9817 [2207]	11044 [2483]	12271 [2759]
		Pull side	11310 [17.53]	1131 [254]	2262 [508]	3393 [763]	4524 [1017]	5655 [1251]	6786 [1525]	7917 [1780]	9048 [2034]	10179 [2288]	11310 [2542]

DYNA CYLINDERS WITH BRAKES

Single Brake, Double Brake

Symbol



Specifications

Item \ Bore size mm [in.]		40 [1.575]	50 [1.969]	63 [2.480]	80 [3.150]	100 [3.940]
Operation type		Double acting type				
Media		Air				
Mounting type		Basic type, Foot type, Axial foot type, Rod side flange type, Head side flange type, Clevis type, Pivot type				
Operating pressure range MPa [psi.]		0.1～1.0 [15～145]				
Proof pressure MPa [psi.]		1.5 [218]				
Operating temperature range °C [°F]		5～60 [41～140]				
Operating speed range mm/s [in./sec.]		50～300 [2.0～11.8]				
Cushion		Variable cushion at both ends of stroke				
Cushion stroke mm [in.]		16 [0.630]	20 [0.787]		25 [0.984]	
Lubrication		Required (Turbine Oil Class 1 (ISO VG32) or equivalent.)				
Brake release pressure MPa [psi.]		0.35 [51]	0.4 [58]	0.35 [51]		
Brake activating direction		Two directions				
Repeatability mm [in.]		±2 [0.079]				
Maximum load capacity N [lbf.]	Single brake	333 [75]	519 [117]	833 [187]	1352 [304]	2107 [474]
	Double brake	666 [150]	1038 [233]	1666 [375]	2705 [608]	4214 [947]
Port size Rc		1/4	3/8		1/2	
Brake unit connection port Rc		1/4			3/8	

Bore Size and Stroke

mm

Bore size	Standard strokes	Maximum available stroke
40	50, 75, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
50	50, 75, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000	1500
63		
80		
100		

Remarks: 1. Stroke tolerance;
Strokes of 250 or less: $^{+1}_{0}$ [$^{+0.039in.}_{0}$]
Strokes of 251～1000: $^{+1.5}_{0}$ [$^{+0.059in.}_{0}$]
Strokes of 1001 or more: $^{+2.0}_{0}$ [$^{+0.079in.}_{0}$]
2. For non-standard strokes, consult us.
3. Cylinders with magnets are not available for heat resistant specification and steel tube specification.
4. For the maximum available stroke with bellows specification, see p.538.

Order Codes

DDA □ 50×100 – □ – □ – □ – □ – □ □ □

Bore size × Stroke

Types of bellows
JT — Nylon tarpaulin (～80°C [176°F])
JC — Chloroprene (～100°C [212°F])
JK — Conex (～200°C [392°F])
JA — Alumix (～250°C [482°F])
●Conex is a registered trademark of Teijin, Inc.
●The temperatures shown are the bellows' own durable temperatures, and are not temperatures for cylinder use.

Cylinder specification
R — Single brake cylinder
RR — Double brake cylinder
JR — Single brake cylinder with bellows
JRR — Double brake cylinder with bellows

Tube material
Blank — Standard (Aluminum tube)
FT — Steel tube specification

DYNA Cylinder Basic model (Not available for cylinder with magnet.)

Mounting type
Blank — Basic type
1 — Foot mounting type
2 — Axial foot mounting type
3 — Rod side flange mounting type
5 — Head side flange mounting type
7 — Clevis mounting type (with pin)
7-7C — Clevis mounting type (with supporting bracket)
8 — Pivot mounting type
●Mounting brackets are already assembled at shipping.

Sensor switch (For cylinder with magnet)

ZC130	2-lead wire	Solid state type	with indicator lamp	DC10～28V
ZC153	3-lead wire	Solid state type	with indicator lamp	DC4.5～28V
CS5T	2-lead wire	Reed switch type	without indicator lamp	DC5～28V, AC85～115V
CS11T	2-lead wire	Reed switch type	with indicator lamp	DC10～28V
CS2F	DIN type	Reed switch type	with indicator lamp	AC85～230V
CS3F	DIN type	Reed switch type	with indicator lamp	DC10～30V
CS4F	DIN type	Reed switch type	with indicator lamp	DC10～30V
CS5F	DIN type	Reed switch type	without indicator lamp	DC3～30V

●For mounting location of sensor switch, see p.534.
●**CS□F** comes with a DIN connector. All others are grommet type.
●Orders for sensor switches only are also accepted.

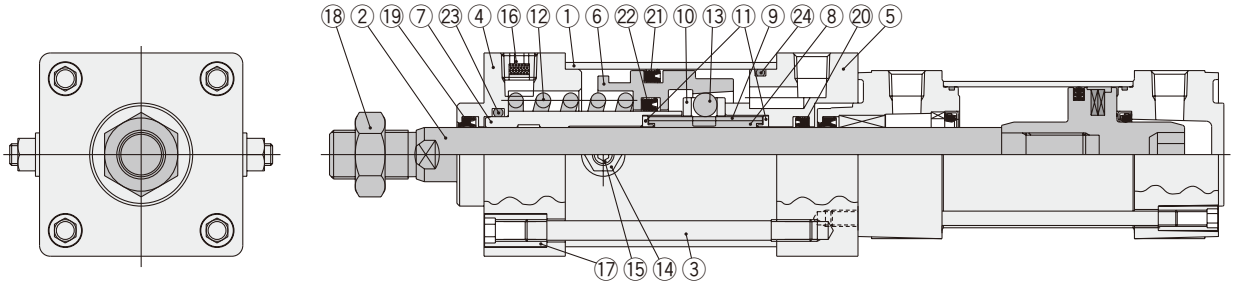
Rod end accessory
Blank — No rod end accessory
Y — With Y type knuckle (with pin)
I — With I type knuckle
●For the cylinder joint and cylinder rod end, see p.1568.
●Orders for rod end accessories only are also accepted.
●For dimensions of rod end accessories, see p.537.

Lead wire length (Applicable only to **ZC,CS□T** types)
A : 1000mm
B : 3000mm

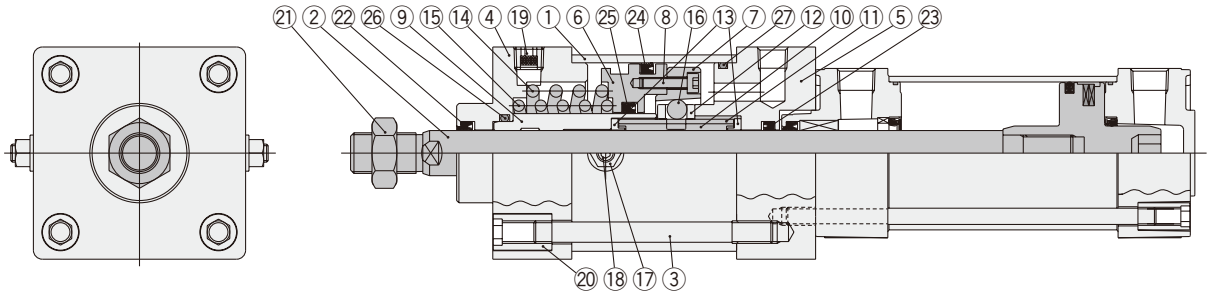
Number of sensor switches
1 — With 1 sensor switch
2 — With 2 sensor switches
⋮ ⋮
n — With n sensor switches

Inner Construction and Major Parts

●Single brake ϕ40 [1.575in.], ϕ50 [1.969in.]



●Single brake ϕ63 [2.480in.]～ ϕ100 [3.940in.]



Major Parts and Materials

Note: For the cylinder body, see the DYNA Standard Cylinders.

●Single brake ϕ40, ϕ50

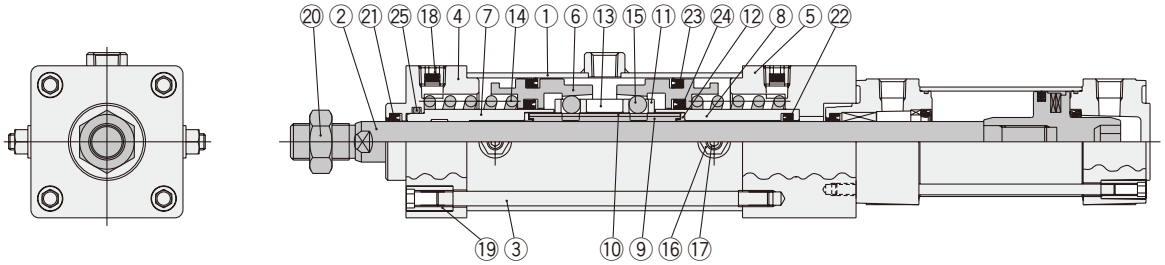
No.	Parts	Materials
①	Brake tube	Carbon steel for machine structural use
②	Piston rod	Carbon steel for machine structural use
③	Brake tie rod	Carbon steel for machine structural use
④	Front cover	Aluminum alloy
⑤	Rear cover	Aluminum alloy
⑥	Brake piston	Cast iron
⑦	Spacer S	Plastic
⑧	Brake shoe	Phosphor bronze
⑨	Ring	High carbon chrome bearing steel
⑩	Retainer A	High carbon chrome bearing steel
⑪	Retainer B	Carbon steel for machine structural use
⑫	Spring	Piano wire
⑬	Steel ball	High carbon chrome bearing steel
⑭	Lock nut	Rolled steel for general structural use
⑮	Brake lock release screw	Chrome-molybdenum steel
⑯	Filter	Chrome-molybdenum steel＋plastic
⑰	Tie rod nut H	Chrome-molybdenum steel
⑱	Rod end nut	Rolled steel for general structural use
⑲	Rod seal A at brake section	Synthetic rubber (NBR)
⑳	Rod seal B at brake section	Synthetic rubber (NBR)
㉑	Brake piston seal A	Synthetic rubber (NBR)
㉒	Brake piston seal B	Synthetic rubber (NBR)
㉓	Spacer gasket	Synthetic rubber (NBR)
㉔	Rear cover gasket	Synthetic rubber (NBR)

●Single brake ϕ63～ϕ100

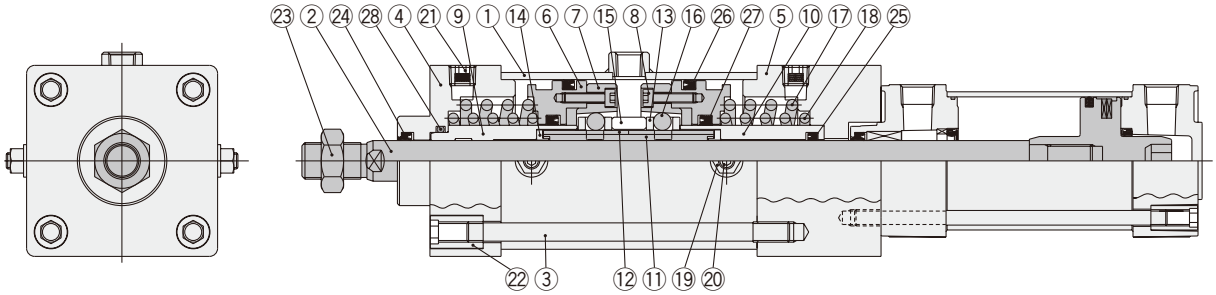
No.	Parts	Materials
①	Brake tube	Carbon steel for machine structural use
②	Piston rod	Carbon steel for machine structural use
③	Brake tie rod	Carbon steel for machine structural use
④	Front cover	Aluminum alloy
⑤	Rear cover	Aluminum alloy
⑥	Brake piston	Cast iron
⑦	Taper ring	High carbon chrome bearing steel
⑧	Hexagon socket bolt	Chrome-molybdenum steel
⑨	Spacer S	Plastic
⑩	Brake shoe	Phosphor bronze
⑪	Ring	High carbon chrome bearing steel
⑫	Retainer A	High carbon chrome bearing steel
⑬	Retainer B	Carbon steel for machine structural use
⑭	Spring A	Piano wire
⑮	Spring B	Piano wire
⑯	Steel ball	High carbon chrome bearing steel
⑰	Lock nut	Rolled steel for general structural use
⑱	Brake lock release screw	Chrome-molybdenum steel
⑲	Filter	Chrome-molybdenum steel＋plastic
⑳	Tie rod nut H	Chrome-molybdenum steel
㉑	Rod end nut	Rolled steel for general structural use
㉒	Rod seal A at brake section	Synthetic rubber (NBR)
㉓	Rod seal B at brake section	Synthetic rubber (NBR)
㉔	Brake piston seal A	Synthetic rubber (NBR)
㉕	Brake piston seal B	Synthetic rubber (NBR)
㉖	Spacer gasket	Synthetic rubber (NBR)
㉗	Rear cover gasket	Synthetic rubber (NBR)

Inner Construction and Major Parts

●Double brake ϕ40 [1.575in.], ϕ50 [1.969in.]



●Double brake ϕ63 [2.480in.]～ϕ100 [3.940in.]



Major Parts and Materials

Note: For the cylinder body, see the DYNA Standard Cylinders.

●Double brake ϕ40, ϕ50

No.	Parts	Materials
①	Brake tube	Carbon steel for machine structural use
②	Piston rod	Carbon steel for machine structural use
③	Brake tie rod	Carbon steel for machine structural use
④	Front cover	Aluminum alloy
⑤	Rear cover	Aluminum alloy
⑥	Brake piston	Cast iron
⑦	Spacer S	Plastic
⑧	Spacer D	Plastic
⑨	Brake shoe	Phosphor bronze
⑩	Ring	High carbon chrome bearing steel
⑪	Retainer A	High carbon chrome bearing steel
⑫	Retainer B	Carbon steel for machine structural use
⑬	Retainer D	Carbon steel for machine structural use
⑭	Spring	Piano wire
⑮	Steel ball	High carbon chrome bearing steel
⑯	Lock nut	Rolled steel for general structural use
⑰	Brake lock release screw	Chrome-molybdenum steel
⑱	Filter	Chrome-molybdenum steel＋plastic
⑲	Tie rod nut H	Chrome-molybdenum steel
⑳	Rod end nut	Rolled steel for general structural use
㉑	Rod seal A at brake section	Synthetic rubber (NBR)
㉒	Rod seal B at brake section	Synthetic rubber (NBR)
㉓	Brake piston seal A	Synthetic rubber (NBR)
㉔	Brake piston seal B	Synthetic rubber (NBR)
㉕	Spacer gasket	Synthetic rubber (NBR)

●Double brake ϕ63～ϕ100

No.	Parts	Materials
①	Brake tube	Carbon steel for machine structural use
②	Piston rod	Carbon steel for machine structural use
③	Brake tie rod	Carbon steel for machine structural use
④	Front cover	Aluminum alloy
⑤	Rear cover	Aluminum alloy
⑥	Brake piston	Cast iron
⑦	Taper ring	High carbon chrome bearing steel
⑧	Hexagon socket bolt	Chrome-molybdenum steel
⑨	Spacer S	Plastic
⑩	Spacer D	Plastic
⑪	Brake shoe	Phosphor bronze
⑫	Ring	High carbon chrome bearing steel
⑬	Retainer A	High carbon chrome bearing steel
⑭	Retainer B	Carbon steel for machine structural use
⑮	Retainer D	Carbon steel for general structural use
⑯	Steel ball	High carbon chrome bearing steel
⑰	Spring A	Piano wire
⑱	Spring B	Piano wire
⑲	Lock nut	Rolled steel for general structural use
⑳	Brake lock release screw	Chrome-molybdenum steel
㉑	Filter	Chrome-molybdenum steel＋Plastic
㉒	Tie rod nut H	Chrome-molybdenum steel
㉓	Rod end nut	Rolled steel for general structural use
㉔	Rod seal A at brake section	Synthetic rubber (NBR)
㉕	Rod seal B at brake section	Synthetic rubber (NBR)
㉖	Brake piston seal A	Synthetic rubber (NBR)
㉗	Brake piston seal B	Synthetic rubber (NBR)
㉘	Spacer gasket	Synthetic rubber (NBR)

Seals

●Single brake

Parts	Rod seal for front cover	Rod seal for rear cover	Piston seal A	Piston seal B	Spacer gasket	Rear cover gasket
Bore size mm / Quantity	1	1	1	1	1	1
40	DRP16	PNU16	PNU40	PNU28	P22	G45
50	DRP20	PNU20	PNU53	PNU32	P28	G58
63	DRP20	PNU20	PNU70	GLY35	P28	G75
80	DRP25	PNU25A	PNU85	PNU45	P32	G95
100	DRP30	PNU30	PNU115	PNU50	P40	G120

●Double brake

Parts	Rod seal for front cover	Rod seal for rear cover	Piston seal A	Piston seal B	Spacer gasket
Bore size mm / Quantity	1	1	2	2	1
40	DRP16	PNU16	PNU40	PNU28	P22
50	DRP20	PNU20	PNU53	PNU32	P28
63	DRP20	PNU20	PNU70	GLY35	P28
80	DRP25	PNU25A	PNU85	PNU45	P32
100	DRP30	PNU30	PNU115	PNU50	P40

Mass

●Single brake

kg [lb.]

Bore size mm [in.]	Zero stroke mass								Additional mass for each 1mm [0.0394in.] stroke	Mass of 1 sensor switch [with holder]		Mass of knuckle	
	Basic type	Foot mounting type	Axial foot mounting type	Rod side flange mounting type	Head side flange mounting type	Clevis mounting type (with pin)	Clevis mtg. type (w. supporting bkt.)	Pivot mtg. type		ZC□□□ CS□T Note	CS□F	Y type knuckle (with pin)	I type knuckle
40 [1.575]	2.21 [4.87] (2.25 [4.96])	2.38 [5.25] (2.42 [5.34])	2.51 [5.53] (2.55 [5.62])	2.60 [5.73] (2.64 [5.82])	2.58 [5.69] (2.62 [5.78])	2.48 [5.47] (2.52 [5.56])	3.18 [7.01] (3.22 [7.10])	2.39 [5.27] (2.43 [5.36])	0.00300 [0.00662] (0.00431 [0.00950])	0.04 [0.09]	0.05 [0.11]	0.27 [0.60]	0.16 [0.35]
50 [1.969]	3.62 [7.98] (3.68 [8.11])	3.85 [8.49] (3.91 [8.62])	4.14 [9.13] (4.20 [9.26])	4.15 [9.15] (4.21 [9.28])	4.01 [8.84] (4.07 [8.97])	4.01 [8.84] (4.07 [8.97])	4.71 [10.39] (4.77 [10.52])	3.88 [8.56] (3.94 [8.69])	0.00428 [0.00944] (0.00635 [0.01400])			0.34 [0.75]	0.21 [0.46]
63 [2.480]	5.68 [12.52] (5.76 [12.70])	6.06 [13.36] (6.14 [13.54])	6.53 [14.40] (6.61 [14.58])	7.28 [16.05] (7.36 [16.23])	6.21 [13.69] (6.29 [13.87])	6.16 [13.58] (6.24 [13.76])	6.86 [15.13] (6.94 [15.30])	6.10 [13.45] (6.18 [13.63])	0.00515 [0.01136] (0.00773 [0.01704])	0.04 [0.09]	0.06 [0.13]	0.34 [0.75]	0.21 [0.46]
80 [3.150]	8.97 [19.78] (9.14 [20.15])	9.44 [20.82] (9.61 [21.19])	10.25 [22.60] (10.42 [22.98])	11.19 [24.67] (11.36 [25.05])	10.57 [23.31] (10.74 [23.68])	9.89 [21.81] (10.06 [22.18])	10.61 [23.40] (10.78 [23.77])	10.05 [22.16] (10.22 [22.54])	0.00834 [0.01839] (0.01302 [0.02871])			0.87 [1.92]	0.62 [1.37]
100 [3.940]	14.69 [32.39] (14.90 [32.85])	15.25 [33.63] (15.46 [34.09])	16.36 [36.07] (16.57 [36.54])	17.56 [38.72] (17.77 [39.18])	16.91 [37.29] (17.12 [37.75])	15.93 [35.13] (16.14 [35.59])	16.65 [36.71] (16.86 [37.18])	16.08 [35.46] (16.29 [35.92])	0.01061 [0.02340] (0.01642 [0.03621])			1.47 [3.24]	1.24 [2.73]

Note: For lead wire length A (1000mm [39in.]).
Remark: Figures in parentheses ( ) are for steel tube specification.

Calculation example: For basic type with bore size of 50mm, and stroke of 100mm,
3.62＋(0.00428×100)＝4.048kg [8.924lb.]

●Double brake

kg [lb.]

Bore size mm [in.]	Zero stroke mass								Additional mass for each 1mm [0.0394in.] stroke	Mass of 1 sensor switch [with holder]		Mass of knuckle	
	Basic type	Foot mounting type	Axial foot mounting type	Rod side flange mounting type	Head side flange mounting type	Clevis mounting type (with pin)	Clevis mtg. type (w. supporting bkt.)	Pivot mtg. type		ZC□□□ CS□T Note	CS□F	Y type knuckle (with pin)	I type knuckle
40 [1.575]	3.32 [7.32] (3.36 [7.41])	3.49 [7.70] (3.53 [7.78])	3.62 [7.98] (3.66 [8.07])	3.71 [8.18] (3.75 [8.27])	3.69 [8.14] (3.73 [8.22])	3.59 [7.92] (3.63 [8.00])	4.29 [9.46] (4.33 [9.55])	3.50 [7.72] (3.54 [7.81])	0.00300 [0.00662] (0.00431 [0.00950])	0.04 [0.09]	0.05 [0.11]	0.27 [0.60]	0.16 [0.35]
50 [1.969]	4.44 [9.79] (4.50 [9.92])	4.67 [10.30] (4.73 [10.43])	4.96 [10.94] (5.02 [11.07])	4.97 [10.96] (5.03 [11.09])	4.83 [10.65] (4.89 [10.78])	4.83 [10.65] (4.89 [10.78])	5.53 [12.19] (5.59 [12.33])	4.70 [10.36] (4.76 [10.50])	0.00428 [0.00944] (0.00635 [0.01400])			0.34 [0.75]	0.21 [0.46]
63 [2.480]	6.93 [15.28] (7.01 [15.46])	7.31 [16.12] (7.39 [16.29])	7.78 [17.15] (7.86 [17.33])	8.53 [18.81] (8.61 [18.99])	7.46 [16.45] (7.54 [16.63])	7.41 [16.34] (7.49 [16.52])	8.11 [17.88] (8.19 [18.06])	7.35 [16.21] (7.43 [16.38])	0.00515 [0.01136] (0.00773 [0.01704])	0.04 [0.09]	0.06 [0.13]	0.34 [0.75]	0.21 [0.46]
80 [3.150]	11.15 [24.59] (11.32 [24.96])	11.62 [25.62] (11.79 [26.00])	12.43 [27.41] (12.60 [27.78])	13.37 [29.48] (13.54 [29.86])	12.75 [28.11] (12.92 [28.49])	12.07 [26.61] (12.24 [26.99])	12.79 [28.20] (12.96 [28.58])	12.23 [26.97] (12.40 [27.34])	0.00834 [0.01839] (0.01302 [0.02871])			0.87 [1.92]	0.62 [1.37]
100 [3.940]	19.32 [42.60] (19.53 [43.06])	19.88 [43.84] (20.09 [44.30])	20.99 [46.28] (21.20 [46.74])	22.19 [48.93] (22.40 [49.39])	21.54 [47.49] (21.75 [47.96])	20.56 [45.33] (20.79 [45.84])	21.28 [46.92] (21.49 [47.38])	20.71 [45.66] (20.92 [46.13])	0.01061 [0.02340] (0.01642 [0.03621])			1.47 [3.24]	1.24 [2.73]

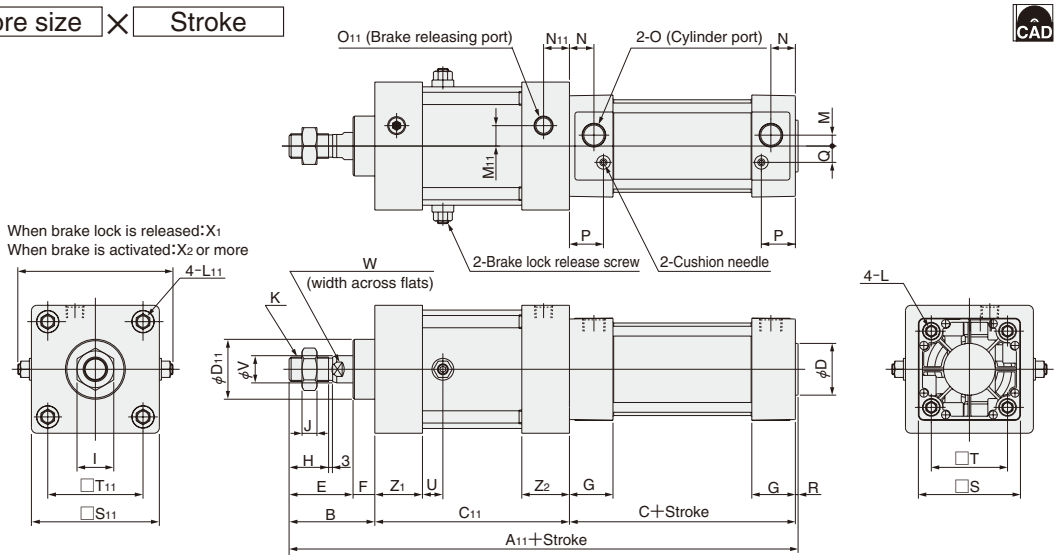
Note: For lead wire length A (1000mm [39in.]).
Remark: Figures in parentheses ( ) are for steel tube specification.

Calculation example: For basic type with bore size of 50mm, and stroke of 100mm,
4.44＋(0.00428×100)＝4.868kg [10.732lb.]

Dimensions of Single Brake, Basic Type (mm)

DDAR Bore size × Stroke

CAD DDAR Bore size

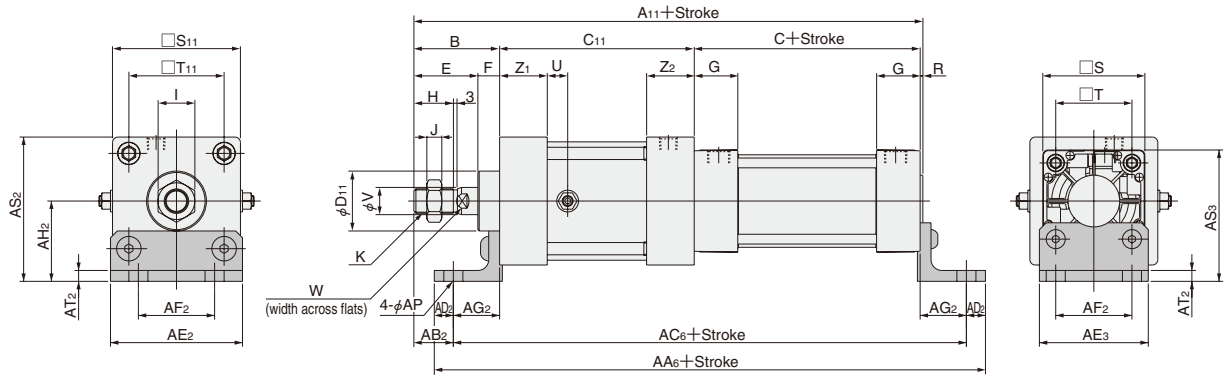


Bore mm [in.] \ Code	A11	B	C	C11	D	D11	E	F	G	H	I	J	K	L	L11
40 [1.575]	272	49	93	128	32	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth14	M6×1 Depth14
50 [1.969]	290	57	93	138	38	38	47	10	31	29	27	11	M18×1.5	M6×1 Depth14	M8×1.25 Depth14
63 [2.480]	304	63	96	143	38	44	47	16	32	29	27	11	M18×1.5	M8×1.25 Depth14	M10×1.5 Depth15
80 [3.150]	347	75	108	162	44	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth15	M10×1.5 Depth15
100 [3.940]	361	75	108	176	50	60	59	16	36	37	36	14	M26×1.5	M10×1.5 Depth15	M12×1.75 Depth15

Bore mm [in.] \ Code	M	M11	N	N11	O	O11	P	Q	R	S	S11	T	T11	U	V	W	X1	X2	Z1	Z2
40 [1.575]	4	6	18	17	Rc1/4	Rc1/4	25.5	10	2	50	62	37	47	12	16	14	88	94	27	28
50 [1.969]	7	11	18	17	Rc3/8	Rc1/4	24	12	2	62	75	47	56	14	20	17	97	104	30	30
63 [2.480]	8	15	18	22	Rc3/8	Rc1/4	25	12	2	75	94	56	70	15	20	17	114	122	35	35
80 [3.150]	11	15	20	24	Rc1/2	Rc3/8	29	16	2	94	112	70	84	18	25	21	134	142	35	39
100 [3.940]	12	15	20	24	Rc1/2	Rc3/8	29	18	2	112	138	84	104	17	30	26	159	166	36	39

Dimensions of Single Brake, Foot Mounting Type (mm)

DDAR Bore size × Stroke **-1**

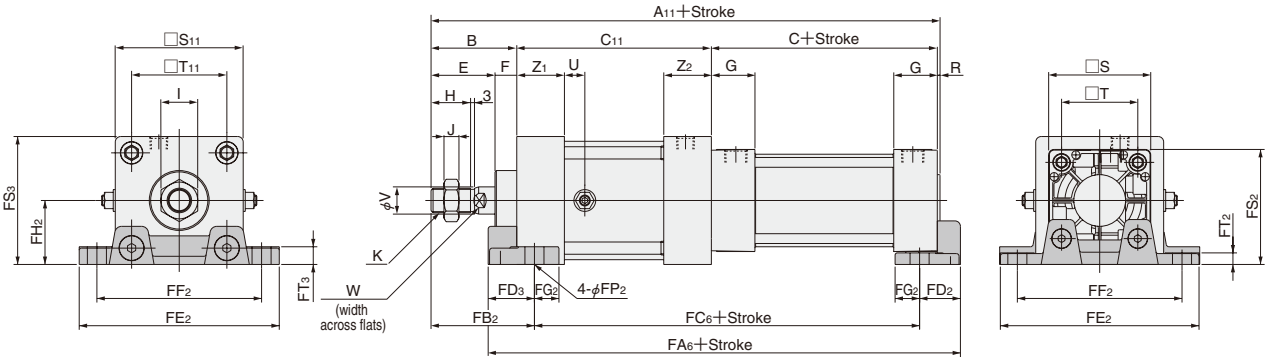


Bore mm [in.] \ Code	A11	B	C	C11	D11	E	F	G	H	I	J	K
40 [1.575]	272	49	93	128	38	39	10	31	21	22	8	M14×1.5
50 [1.969]	290	57	93	138	38	47	10	31	29	27	11	M18×1.5
63 [2.480]	304	63	96	143	44	47	16	32	29	27	11	M18×1.5
80 [3.150]	347	75	108	162	50	59	16	36	37	32	13	M22×1.5
100 [3.940]	361	75	108	176	60	59	16	36	37	36	14	M26×1.5

Bore mm [in.] \ Code	R	S	S11	T	T11	U	V	W	Z1	Z2	AA6	AB2	AC6	AD2	AE2	AE3	AF2	AG2	AH2	AP	AS2	AS3	AT2
40 [1.575]	2	50	62	37	47	12	16	14	27	28	297	23	273	12	70	60	37	26	41	12	72	66	6
50 [1.969]	2	62	75	47	56	14	20	17	30	30	311	29	287	12	80	70	47	28	48	12	85.5	79	6
63 [2.480]	2	75	94	56	70	15	20	17	35	35	335	29	307	14	97	80	56	34	59	14	106	96.5	8
80 [3.150]	2	94	112	70	84	18	25	21	35	39	366	41	338	14	114	97	70	34	66	14	122	113	8
100 [3.940]	2	112	138	84	104	17	30	26	36	39	406	32	370	18	138	114	84	43	79	14	148	135	10

Dimensions of Single Brake, Axial Foot Mounting Type (mm)

DDAR Bore size × Stroke **-2**

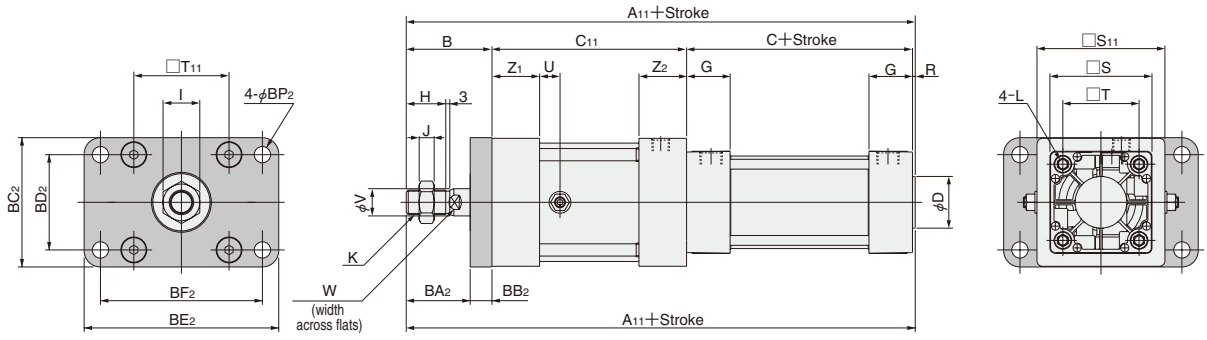


Bore mm [in.] \ Code	A11	B	C	C11	E	F	G	H	I	J	K	R
40 [1.575]	272	49	93	128	39	10	31	21	22	8	M14×1.5	2
50 [1.969]	290	57	93	138	47	10	31	29	27	11	M18×1.5	2
63 [2.480]	304	63	96	143	47	16	32	29	27	11	M18×1.5	2
80 [3.150]	347	75	108	162	59	16	36	37	32	13	M22×1.5	2
100 [3.940]	361	75	108	176	59	16	36	37	36	14	M26×1.5	2

Bore mm [in.] \ Code	S	S11	T	T11	U	V	W	Z1	Z2	FA6	FB2	FC6	FD2	FD3	FE2	FF2	FG2	FH2	FP2	FS2	FS3	FT2	FT3
40 [1.575]	50	62	37	47	12	16	14	27	28	248	59	201	22	25	105	83	14	31	12	56	62	5.5	9
50 [1.969]	62	75	47	56	14	20	17	30	30	262	67	211	24	27	117	95	14	38	12	69	75.5	6.5	9
63 [2.480]	75	94	56	70	15	20	17	35	35	276	76	213	29	34	147	121	18	47	14	84.5	94	8.5	13
80 [3.150]	94	112	70	84	18	25	21	35	39	315	88	244	33	38	168	140	18	57	14	104	113	9.5	14
100 [3.940]	112	138	84	104	17	30	26	36	39	336	89	257	37	42	195	167	18	69	14	125	138	11.5	16

Dimensions of Single Brake, Rod Side Flange Mounting Type (mm)

DDAR Bore size × Stroke **-3**

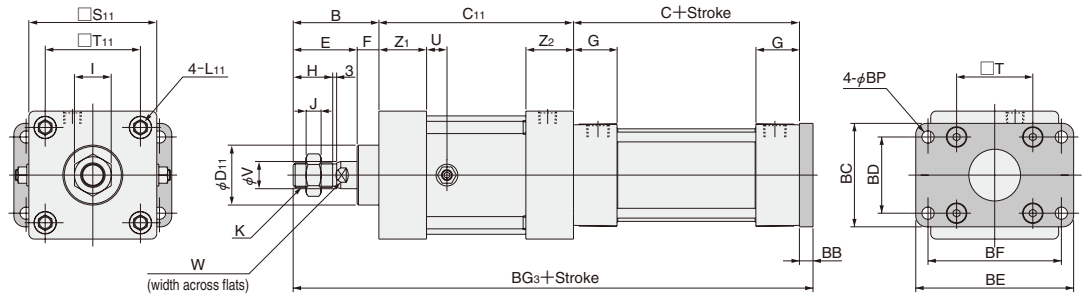


Bore mm [in.] \ Code	A_{11}	B	C	C_{11}	D	G	H	I	J	K	L
40 [1.575]	272	49	93	128	32	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	290	57	93	138	38	31	29	27	11	M18×1.5	M6×1 Depth 14
63 [2.480]	304	63	96	143	38	32	29	27	11	M18×1.5	M8×1.25 Depth 14
80 [3.150]	347	75	108	162	44	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	361	75	108	176	50	36	37	36	14	M26×1.5	M10×1.5 Depth 15

Bore mm [in.] \ Code	R	S	S_{11}	T	T_{11}	U	V	W	Z_1	Z_2	BA_2	BB_2	BC_2	BD_2	BE_2	BF_2	BP_2
40 [1.575]	2	50	62	37	47	12	16	14	27	28	39	10	65	47	104	86	9
50 [1.969]	2	62	75	47	56	14	20	17	30	30	47	10	76	56	116	98	9
63 [2.480]	2	75	94	56	70	15	20	17	35	35	47	16	95	70	143	119	12
80 [3.150]	2	94	112	70	84	18	25	21	35	39	59	16	115	84	162	138	12
100 [3.940]	2	112	138	84	104	17	30	26	36	39	59	16	138	104	196	168	14

Dimensions of Single Brake, Head Side Flange Mounting Type (mm)

DDAR Bore size × Stroke **-5**

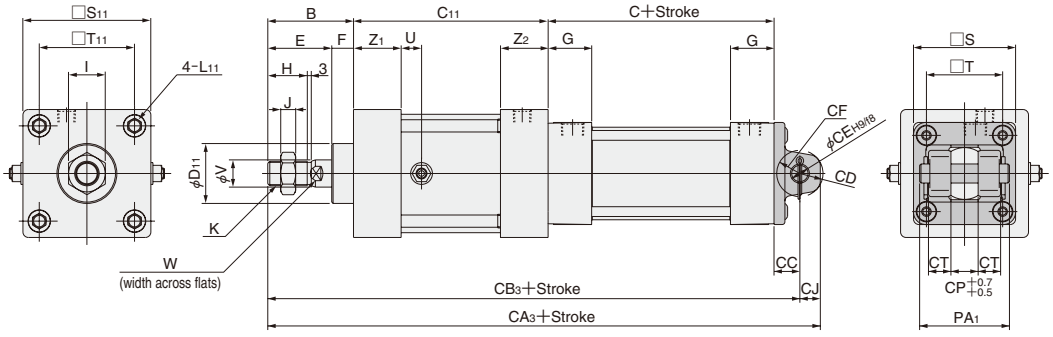


Bore mm [in.] \ Code	B	C	C_{11}	D_{11}	E	F	G	H	I	J	K	L_{11}
40 [1.575]	49	93	128	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	57	93	138	38	47	10	31	29	27	11	M18×1.5	M8×1.25 Depth 14
63 [2.480]	63	96	143	44	47	16	32	29	27	11	M18×1.5	M10×1.5 Depth 15
80 [3.150]	75	108	162	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	75	108	176	60	59	16	36	37	36	14	M26×1.5	M12×1.75 Depth 15

Bore mm [in.] \ Code	S_{11}	T	T_{11}	U	V	W	Z_1	Z_2	BB	BC	BD	BE	BF	BG_3	BP
40 [1.575]	62	37	47	12	16	14	27	28	10	52	36	84	70	280	7
50 [1.969]	75	47	56	14	20	17	30	30	10	65	47	104	86	298	9
63 [2.480]	94	56	70	15	20	17	35	35	10	76	56	116	98	312	9
80 [3.150]	112	70	84	18	25	21	35	39	16	95	70	143	119	361	12
100 [3.940]	138	84	104	17	30	26	36	39	16	115	84	162	138	375	12

Dimensions of Single Brake, Clevis Mounting Type (mm)

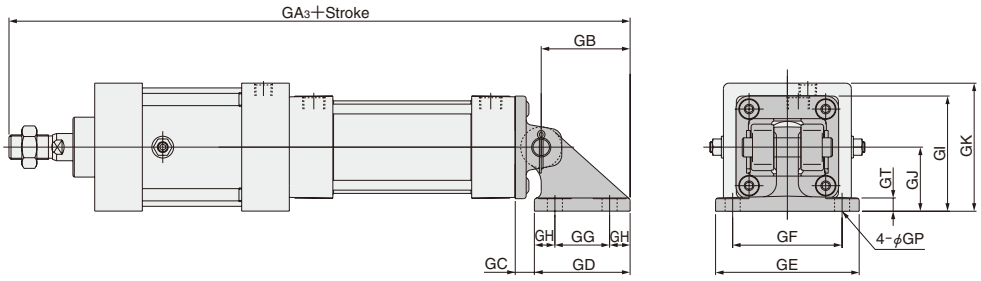
DDAR Bore size × Stroke **-7**



Bore mm [in.] \ Code	B	C	C11	D11	E	F	G	H	I	J	K	L11
40 [1.575]	49	93	128	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	57	93	138	38	47	10	31	29	27	11	M18×1.5	M8×1.25 Depth 14
63 [2.480]	63	96	143	44	47	16	32	29	27	11	M18×1.5	M10×1.5 Depth 15
80 [3.150]	75	108	162	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	75	108	176	60	59	16	36	37	36	14	M26×1.5	M12×1.75 Depth 15

Bore mm [in.] \ Code	S	S11	T	T11	U	V	W	Z1	Z2	CA3	CB3	CC	CD	CE	CF	CJ	CP	CT	PA1
40 [1.575]	50	62	37	47	12	16	14	27	28	302	289	19	R15	14	R17	13	20	12.5	58
50 [1.969]	62	75	47	56	14	20	17	30	30	322	307	19	R17	14	R17	15	20	16.5	66
63 [2.480]	75	94	56	70	15	20	17	35	35	336	321	19	R17	14	R17	15	20	16.5	66
80 [3.150]	94	112	70	84	18	25	21	35	39	398	377	32	R24	20	R30	21	32	17.5	78
100 [3.940]	112	138	84	104	17	30	26	36	39	412	391	32	R24	20	R30	21	32	17.5	78

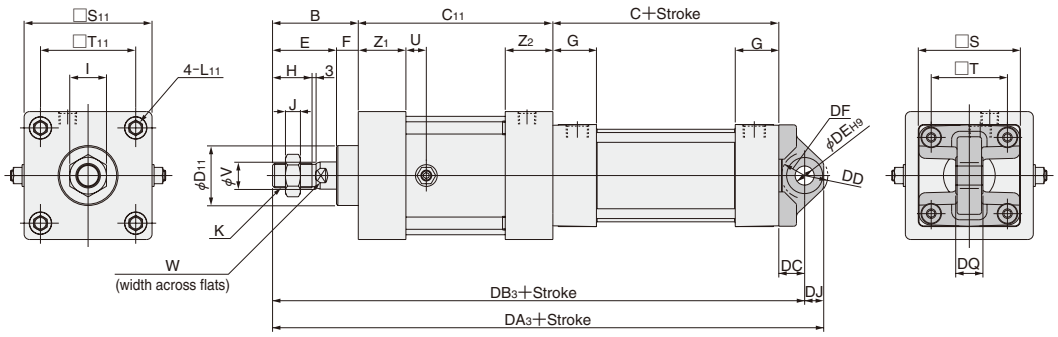
●With Supporting Bracket **DDAR** Bore size × Stroke **-7-7C**



Bore mm [in.] \ Code	GA3	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GP	GT
40 [1.575]	355.5	66.5	12.5	73	105	80	40	16.5	70	45	76	11(Thru hole)	8
50 [1.969]	373.5	66.5	12.5	73	105	80	40	16.5	76	45	82.5	11(Thru hole)	8
63 [2.480]	387.5	66.5	12.5	73	105	80	40	16.5	82.5	45	92	11(Thru hole)	8
80 [3.150]	463.5	86.5	20.5	98	135	105	65	16.5	107	60	116	14(Thru hole)	12
100 [3.940]	477.5	86.5	20.5	98	135	105	65	16.5	116	60	129	14(Thru hole)	12

Dimensions of Single Brake, Pivot Mounting Type (mm)

DDAR Bore size × Stroke **-8**



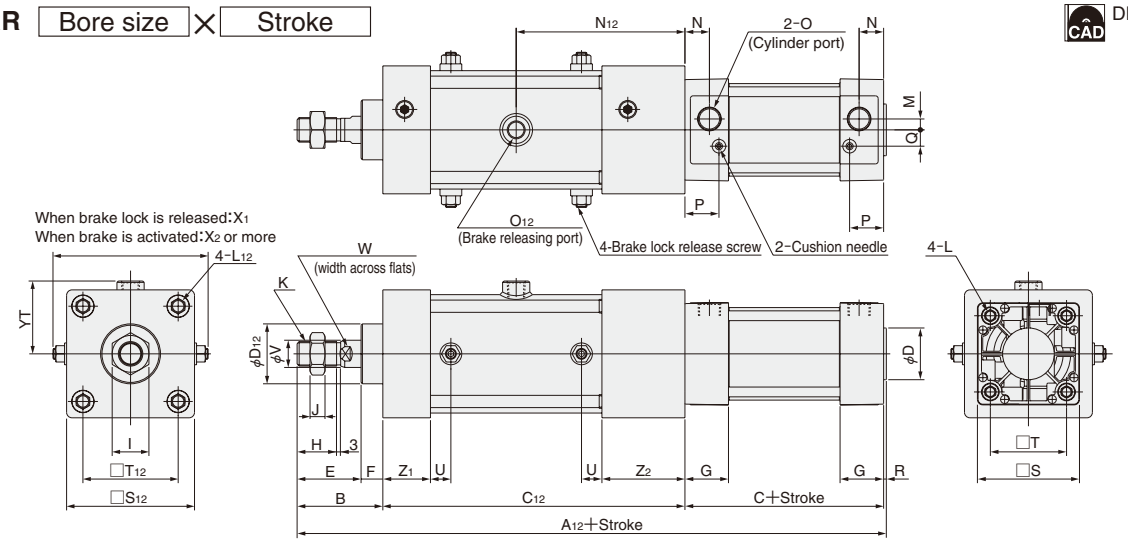
Bore mm [in.] \ Code	B	C	C11	D11	E	F	G	H	I	J	K	L11
40 [1.575]	49	93	128	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	57	93	138	38	47	10	31	29	27	11	M18×1.5	M8×1.25 Depth 14
63 [2.480]	63	96	143	44	47	16	32	29	27	11	M18×1.5	M10×1.5 Depth 15
80 [3.150]	75	108	162	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	75	108	176	60	59	16	36	37	36	14	M26×1.5	M12×1.75 Depth 15

Bore mm [in.] \ Code	S	S11	T	T11	U	V	W	Z1	Z2	DA3	DB3	DC	DD	DE	DF	DJ	DQ
40 [1.575]	50	62	37	47	12	16	14	27	28	303	289	19	R17	14	R17	14	$20^{0}_{-0.084}$
50 [1.969]	62	75	47	56	14	20	17	30	30	321	307	19	R17	14	R17	14	$20^{0}_{-0.084}$
63 [2.480]	75	94	56	70	15	20	17	35	35	335	321	19	R17	14	R17	14	$20^{0}_{-0.084}$
80 [3.150]	94	112	70	84	18	25	21	35	39	398	377	32	R24	20	R25	21	$32^{0}_{-0.100}$
100 [3.940]	112	138	84	104	17	30	26	36	39	411	391	32	R24	20	R26	20	$32^{0}_{-0.100}$

Dimensions of Double Brake, Basic Type (mm)

DDARR Bore size × Stroke

CAD DDARR Bore size

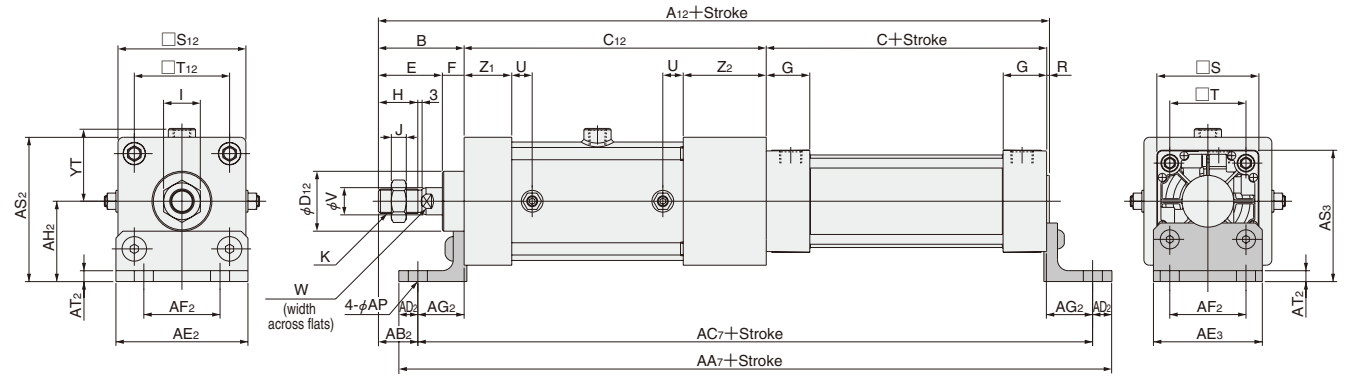


Bore mm [in.] \ Code	A12	B	C	C12	D	D12	E	F	G	H	I	J	K	L	L12
40 [1.575]	350	49	93	206	32	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth14	M6×1 Depth14
50 [1.969]	374	57	93	222	38	38	47	10	31	29	27	11	M18×1.5	M6×1 Depth14	M8×1.25 Depth14
63 [2.480]	383	63	96	222	38	44	47	16	32	29	27	11	M18×1.5	M8×1.25 Depth14	M10×1.5 Depth15
80 [3.150]	439	75	108	254	44	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth15	M10×1.5 Depth15
100 [3.940]	467	75	108	282	50	60	59	16	36	37	36	14	M26×1.5	M10×1.5 Depth15	M12×1.75 Depth15

Bore mm [in.] \ Code	M	N	N12	O	O12	P	Q	R	S	S12	T	T12	U	V	W	X1	X2	YT	Z1	Z2
40 [1.575]	4	18	116	Rc1/4	Rc1/4	25.5	10	2	50	62	37	47	12	16	14	88	94	37.5	27	53
50 [1.969]	7	18	124	Rc3/8	Rc1/4	24	12	2	62	75	47	56	14	20	17	97	104	44	30	56
63 [2.480]	8	18	124	Rc3/8	Rc1/4	25	12	2	75	94	56	70	15	20	17	114	122	53.5	35	61
80 [3.150]	11	20	143	Rc1/2	Rc3/8	29	16	2	94	112	70	84	18	25	21	134	142	68.5	35	67
100 [3.940]	12	20	157	Rc1/2	Rc3/8	29	18	2	112	138	84	104	17	30	26	159	166	82	36	68

Dimensions of Double Brake, Foot Mounting Type (mm)

DDARR Bore size × Stroke **-1**

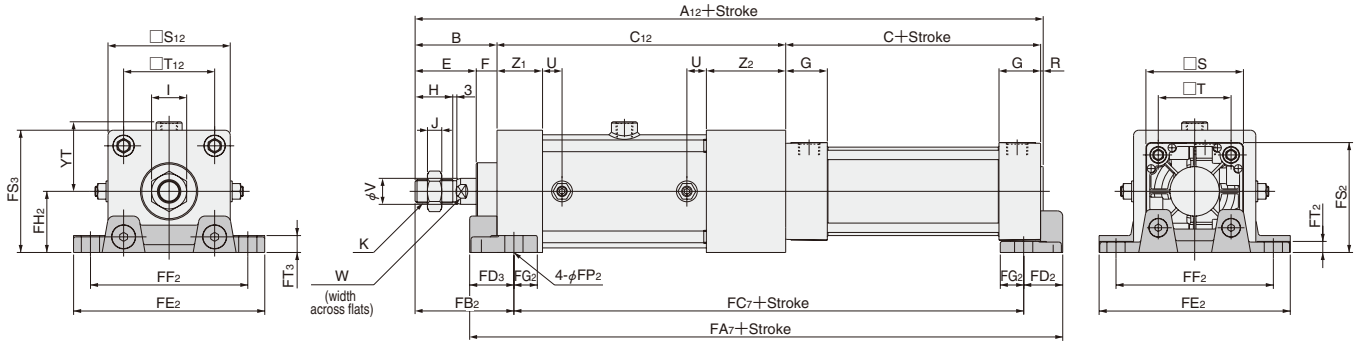


Bore mm [in.] \ Code	A12	B	C	C12	D12	E	F	G	H	I	J	K	R
40 [1.575]	350	49	93	206	38	39	10	31	21	22	8	M14×1.5	2
50 [1.969]	374	57	93	222	38	47	10	31	29	27	11	M18×1.5	2
63 [2.480]	383	63	96	222	44	47	16	32	29	27	11	M18×1.5	2
80 [3.150]	439	75	108	254	50	59	16	36	37	32	13	M22×1.5	2
100 [3.940]	467	75	108	282	60	59	16	36	37	36	14	M26×1.5	2

Bore mm [in.] \ Code	S	S12	T	T12	U	V	W	YT	Z1	Z2	AA7	AB2	AC7	AD2	AE2	AE3	AF2	AG2	AH2	AP	AS2	AS3	AT2
40 [1.575]	50	62	37	47	12	16	14	37.5	27	53	375	23	351	12	70	60	37	26	41	12	72	66	6
50 [1.969]	62	75	47	56	14	20	17	44	30	56	395	29	371	12	80	70	47	28	48	12	85.5	79	6
63 [2.480]	75	94	56	70	15	20	17	53.5	35	61	414	29	386	14	97	80	56	34	59	14	106	96.5	8
80 [3.150]	94	112	70	84	18	25	21	68.5	35	67	458	41	430	14	114	97	70	34	66	14	122	113	8
100 [3.940]	112	138	84	104	17	30	26	82	36	68	512	32	476	18	138	114	84	43	79	14	148	135	10

Dimensions of Double Brake, Axial Foot Mounting Type (mm)

DDARR Bore size × Stroke **-2**

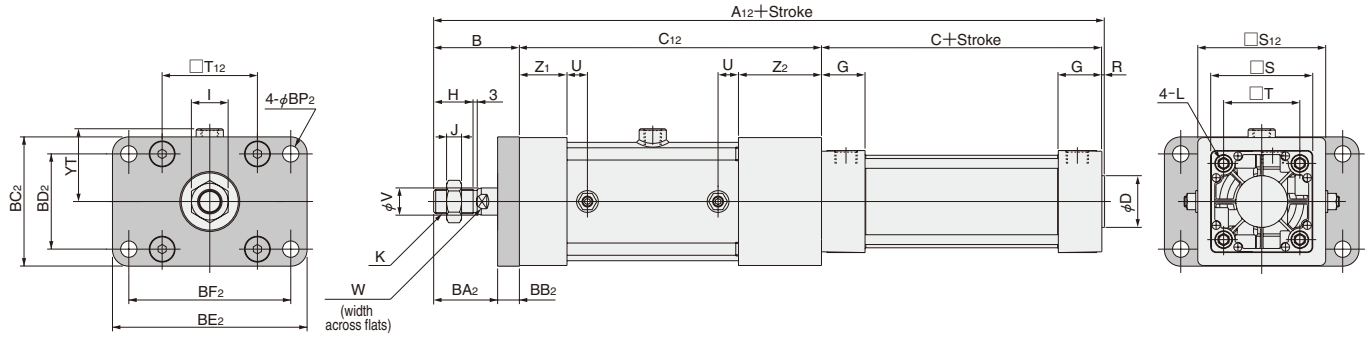


Bore mm [in.] \ Code	A12	B	C	C12	E	F	G	H	I	J	K	R	S
40 [1.575]	350	49	93	206	39	10	31	21	22	8	M14×1.5	2	50
50 [1.969]	374	57	93	222	47	10	31	29	27	11	M18×1.5	2	62
63 [2.480]	383	63	96	222	47	16	32	29	27	11	M18×1.5	2	75
80 [3.150]	439	75	108	254	59	16	36	37	32	13	M22×1.5	2	94
100 [3.940]	467	75	108	282	59	16	36	37	36	14	M26×1.5	2	112

Bore mm [in.] \ Code	S12	T	T12	U	V	W	YT	Z1	Z2	FA7	FB2	FC7	FD2	FD3	FE2	FF2	FG2	FH2	FP2	FS2	FS3	FT2	FT3
40 [1.575]	62	37	47	12	16	14	37.5	27	53	326	59	279	22	25	105	83	14	31	12	56	62	5.5	9
50 [1.969]	75	47	56	14	20	17	44	30	56	346	67	295	24	27	117	95	14	38	12	69	75.5	6.5	9
63 [2.480]	94	56	70	15	20	17	53.5	35	61	355	76	292	29	34	147	121	18	47	14	84.5	94	8.5	13
80 [3.150]	112	70	84	18	25	21	68.5	35	67	407	88	336	33	38	168	140	18	57	14	104	113	9.5	14
100 [3.940]	138	84	104	17	30	26	82	36	68	442	89	363	37	42	195	167	18	69	14	125	138	11.5	16

Dimensions of Double Brake, Rod Side Flange Mounting Type (mm)

DDARR Bore size × Stroke **-3**

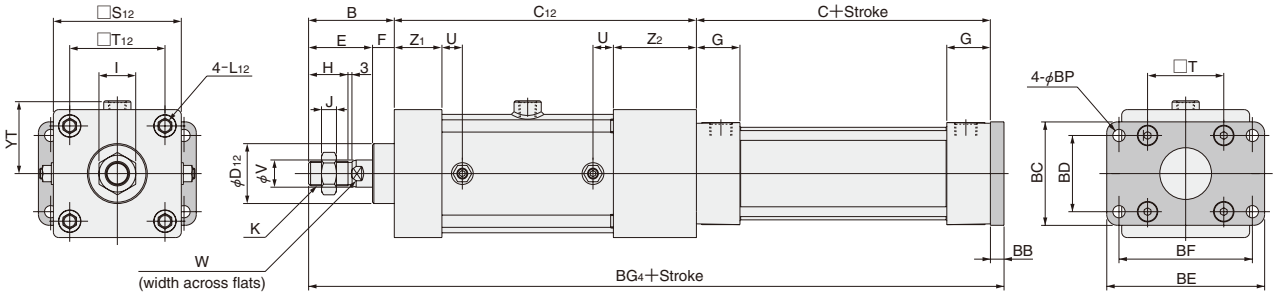


Bore mm [in.] \ Code	A12	B	C	C12	D	G	H	I	J	K	L
40 [1.575]	350	49	93	206	32	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	374	57	93	222	38	31	29	27	11	M18×1.5	M6×1 Depth 14
63 [2.480]	383	63	96	222	38	32	29	27	11	M18×1.5	M8×1.25 Depth 14
80 [3.150]	439	75	108	254	44	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	467	75	108	282	50	36	37	36	14	M26×1.5	M10×1.5 Depth 15

Bore mm [in.] \ Code	R	S	S12	T	T12	U	V	W	YT	Z1	Z2	BA2	BB2	BC2	BD2	BE2	BF2	BP2
40 [1.575]	2	50	62	37	47	12	16	14	37.5	27	53	39	10	65	47	104	86	9
50 [1.969]	2	62	75	47	56	14	20	17	44	30	56	47	10	76	56	116	98	9
63 [2.480]	2	75	94	56	70	15	20	17	53.5	35	61	47	16	95	70	143	119	12
80 [3.150]	2	94	112	70	84	18	25	21	68.5	35	67	59	16	115	84	162	138	12
100 [3.940]	2	112	138	84	104	17	30	26	82	36	68	59	16	138	104	196	168	14

Dimensions of Double Brake, Head Side Flange Mounting Type (mm)

DDARR Bore size × Stroke **-5**

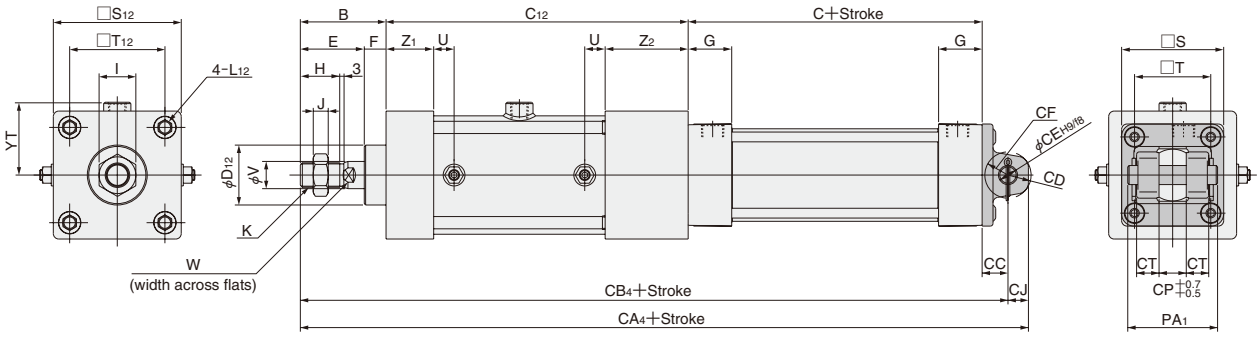


Bore mm [in.] \ Code	B	C	C12	D12	E	F	G	H	I	J	K	L12
40 [1.575]	49	93	206	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	57	93	222	38	47	10	31	29	27	11	M18×1.5	M8×1.25 Depth 14
63 [2.480]	63	96	222	44	47	16	32	29	27	11	M18×1.5	M10×1.5 Depth 15
80 [3.150]	75	108	254	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	75	108	282	60	59	16	36	37	36	14	M26×1.5	M12×1.75 Depth 15

Bore mm [in.] \ Code	S12	T	T12	U	V	W	YT	Z1	Z2	BB	BC	BD	BE	BF	BG4	BP
40 [1.575]	62	37	47	12	16	14	37.5	27	53	10	52	36	84	70	358	7
50 [1.969]	75	47	56	14	20	17	44	30	56	10	65	47	104	86	382	9
63 [2.480]	94	56	70	15	20	17	53.5	35	61	10	76	56	116	98	391	9
80 [3.150]	112	70	84	18	25	21	68.5	35	67	16	95	70	143	119	453	12
100 [3.940]	138	84	104	17	30	26	82	36	68	16	115	84	162	138	481	12

Dimensions of Double Brake, Clevis Mounting Type (mm)

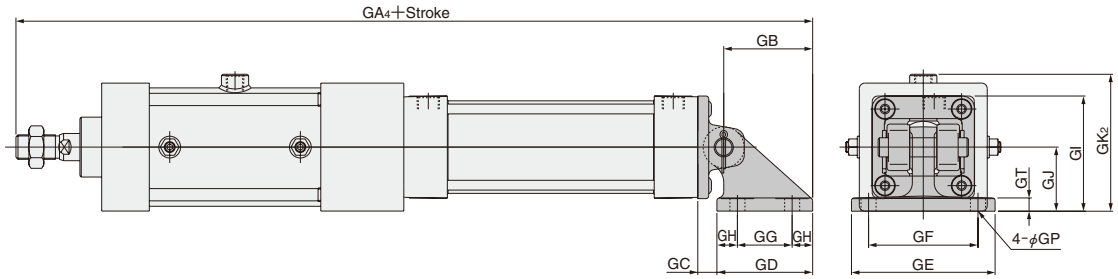
DDARR Bore size × Stroke **-7**



Bore mm [in.] / Code	B	C	C12	D12	E	F	G	H	I	J	K	L12
40 [1.575]	49	93	206	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	57	93	222	38	47	10	31	29	27	11	M18×1.5	M8×1.25 Depth 14
63 [2.480]	63	96	222	44	47	16	32	29	27	11	M18×1.5	M10×1.5 Depth 15
80 [3.150]	75	108	254	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	75	108	282	60	59	16	36	37	36	14	M26×1.5	M12×1.75 Depth 15

Bore mm [in.] / Code	S	S12	T	T12	U	V	W	YT	Z1	Z2	CA4	CB4	CC	CD	CE	CF	CJ	CP	CT	PA1
40 [1.575]	50	62	37	47	12	16	14	37.5	27	53	380	367	19	R15	14	R17	13	20	12.5	58
50 [1.969]	62	75	47	56	14	20	17	44	30	56	406	391	19	R17	14	R17	15	20	16.5	66
63 [2.480]	75	94	56	70	15	20	17	53.5	35	61	415	400	19	R17	14	R17	15	20	16.5	66
80 [3.150]	94	112	70	84	18	25	21	68.5	35	67	490	469	32	R24	20	R30	21	32	17.5	78
100 [3.940]	112	138	84	104	17	30	26	82	36	68	518	497	32	R24	20	R30	21	32	17.5	78

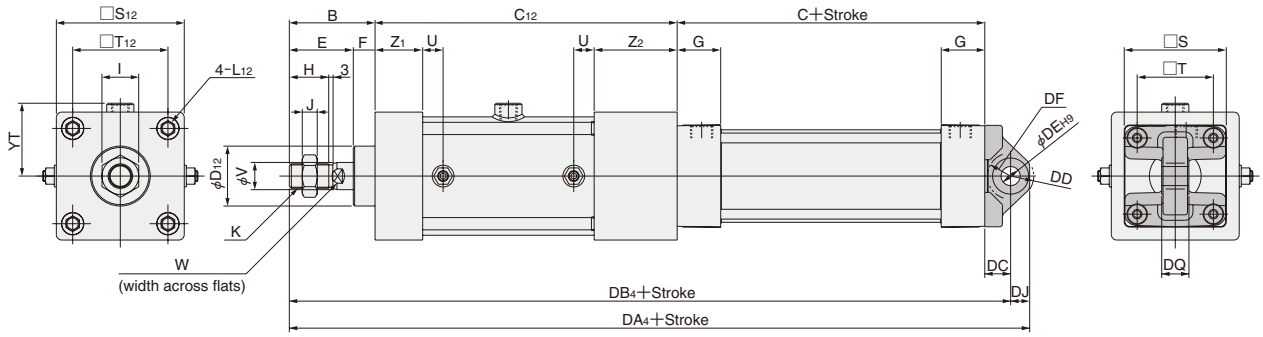
●With Supporting Bracket **DDARR** Bore size × Stroke **-7-7C**



Bore mm [in.] / Code	GA4	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK2	GP	GT
40 [1.575]	433.5	66.5	12.5	73	105	80	40	16.5	70	45	82.5	11(Thru hole)	8
50 [1.969]	457.5	66.5	12.5	73	105	80	40	16.5	76	45	89	11(Thru hole)	8
63 [2.480]	466.5	66.5	12.5	73	105	80	40	16.5	82.5	45	98.5	11(Thru hole)	8
80 [3.150]	555.5	86.5	20.5	98	135	105	65	16.5	107	60	128.5	14(Thru hole)	12
100 [3.940]	583.5	86.5	20.5	98	135	105	65	16.5	116	60	142	14(Thru hole)	12

Dimensions of Double Brake, Pivot Mounting Type (mm)

DDARR Bore size × Stroke **-8**

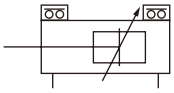


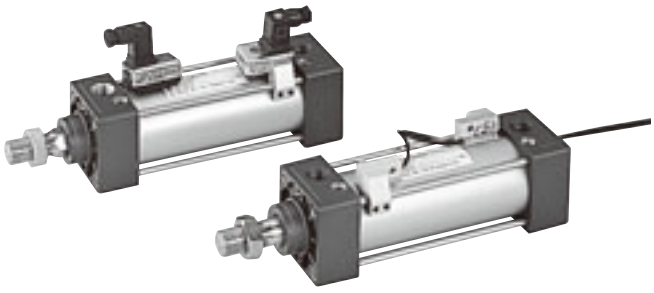
Bore mm [in.] / Code	B	C	C12	D12	E	F	G	H	I	J	K	L12
40 [1.575]	49	93	206	38	39	10	31	21	22	8	M14×1.5	M6×1 Depth 14
50 [1.969]	57	93	222	38	47	10	31	29	27	11	M18×1.5	M8×1.25 Depth 14
63 [2.480]	63	96	222	44	47	16	32	29	27	11	M18×1.5	M10×1.5 Depth 15
80 [3.150]	75	108	254	50	59	16	36	37	32	13	M22×1.5	M10×1.5 Depth 15
100 [3.940]	75	108	282	60	59	16	36	37	36	14	M26×1.5	M12×1.75 Depth 15

Bore mm [in.] / Code	S	S12	T	T12	U	V	W	YT	Z1	Z2	DA4	DB4	DC	DD	DE	DF	DJ	DQ
40 [1.575]	50	62	37	47	12	16	14	37.5	27	53	381	367	19	R17	14	R17	14	$20^{0}_{-0.084}$
50 [1.969]	62	75	47	56	14	20	17	44	30	56	405	391	19	R17	14	R17	14	$20^{0}_{-0.084}$
63 [2.480]	75	94	56	70	15	20	17	53.5	35	61	414	400	19	R17	14	R17	14	$20^{0}_{-0.084}$
80 [3.150]	94	112	70	84	18	25	21	68.5	35	67	490	469	32	R24	20	R25	21	$32^{0}_{-0.100}$
100 [3.940]	112	138	84	104	17	30	26	82	36	68	517	497	32	R24	20	R26	20	$32^{0}_{-0.100}$

SENSOR SWITCHES

Symbol





Order Codes

●Without mounting holder — **ZC130** **A**

●With mounting holder — **ZC130** **A** – **NDDA** **40**

Sensor switch model
ZC130 —— 2-lead wire Solid state type with indicator lamp DC10～28V
ZC153 —— 3-lead wire Solid state type with indicator lamp DC4.5～28V
CS5T —— 2-lead wire Reed switch type without indicator lamp DC5～28V, AC85～115V
CS11T —— 2-lead wire Reed switch type with indicator lamp DC10～28V
CS2F —— DIN connector Reed switch type with indicator lamp AC85～230V
CS3F —— DIN connector Reed switch type with indicator lamp DC10～30V
CS4F —— DIN connector Reed switch type with indicator lamp DC10～30V
CS5F —— DIN connector Reed switch type without indicator lamp DC3～30V

Lead wire length
(Applicable to other than **CS□F** only)
A —— 1000mm [39in.]
B —— 3000mm [118in.]

NDDA: Applicable to other than **CS□F**
NDF : Applicable to **CS□F** only

Bore size

●**Order codes for mounting holders only**

C1 – **NDDA** **40**

Sensor type
C1: Solid state type for **ZC1□□**
Reed switch type for **CS□T**
DF: Reed switch type for **CS□F**

NDDA: Applicable to other than **CS□F**
Blank : For **CS□F**

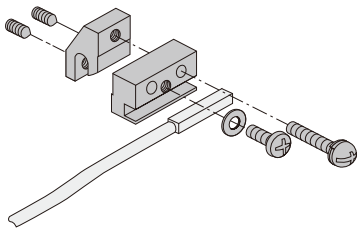
Bore size
32 —— For ϕ 32 [1.260in.]
40 —— For ϕ 40 [1.575in.]
50 —— For ϕ 50 [1.969in.]
63 —— For ϕ 63 [2.480in.]
80 —— For ϕ 80 [3.150in.]
100 —— For ϕ 100 [3.940in.]
125 —— For ϕ 125 [4.921in.]

●For details of sensor switches, see p.1544.

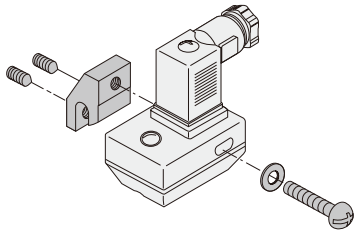
Sensor Switches and Mounting Holders

●DYNA cylinder sensor switches come in 2 types, and 2 corresponding types of mounting holders are available. See the following for details.

Solid state type	**ZC130□□** **ZC153□□**
Reed switch type	**CS5T□** **CS11T□**



DIN connector	**CS2F** **CS3F** **CS4F** **CS5F**



Minimum Cylinder Strokes When Using Sensor Switches

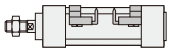
mm

Sensor switch model		Bore size mm [in.]	2pcs. mounting				1pc. mounting	
			Mounting 2 pcs. on a tie rod		Mounting 1 pc. on each tie rod		Rod side	Head side
			In a straight line	In staggered positions	1-plane mounting	2-plane mounting		
Solid state type	ZC130 ZC153	**32 [1.260]**	55 (90)	15 (90)	48 (90)	15 (90)	15 (90)	15 (66)
		40 [1.575]	55 (90)	15 (90)	48 (90)	15 (90)	15 (90)	15 (66)
		50 [1.969]	55 (90)	15 (90)	15 (90)	15 (90)	15 (90)	15 (66)
		63 [2.480]	58 (93)	15 (93)	15 (93)	15 (93)	15 (93)	15 (63)
		80 [3.150]	58 (99)	15 (99)	15 (99)	15 (99)	15 (99)	15 (69)
		100 [3.940]	58 (99)	15 (99)	15 (99)	15 (99)	15 (99)	15 (69)
		125 [4.921]	58 (99)	15 (99)	15 (99)	15 (99)	15 (99)	15 (69)
Reed switch type	CS5T CS11T	**32 [1.260]**	55 (90)	15 (90)	48 (90)	15 (90)	15 (90)	15 (66)
		40 [1.575]	55 (90)	15 (90)	48 (90)	15 (90)	15 (90)	15 (66)
		50 [1.969]	55 (90)	15 (90)	15 (90)	15 (90)	15 (90)	15 (66)
		63 [2.480]	58 (93)	15 (93)	15 (93)	15 (93)	15 (93)	15 (63)
		80 [3.150]	58 (99)	15 (99)	15 (99)	15 (99)	15 (99)	15 (69)
		100 [3.940]	58 (99)	15 (99)	15 (99)	15 (99)	15 (99)	15 (69)
		125 [4.921]	58 (99)	15 (99)	15 (99)	15 (99)	15 (99)	15 (69)
	CS□F	**32 [1.260]**	55 (93)	33 (93)	55 (93)	25 (93)	20 (93)	20 (77)
		40 [1.575]	55 (93)	33 (93)	55 (93)	25 (93)	20 (93)	20 (77)
		50 [1.969]	55 (93)	33 (93)	55 (93)	25 (93)	20 (93)	20 (77)
		63 [2.480]	55 (96)	33 (96)	55 (96)	25 (96)	20 (96)	20 (74)
		80 [3.150]	55 (101)	33 (101)	25 (101)		20 (101)	20 (79)
		100 [3.940]	55 (99)	33 (106)	25 (106)		20 (106)	20 (84)
		125 [4.921]	55 (99)	33 (106)	25 (106)		20 (106)	20 (84)

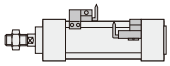
Remark: Figures in parentheses ( ) are for trunnion type.

●When mounting 2 sensors on a tie rod

When mounted in a straight line

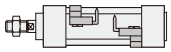


When mounted in staggered positions

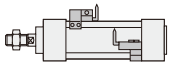


●When mounting 1 sensor on each tie rod

When mounted on 1 plane

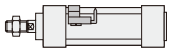


When mounted on 2 planes

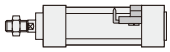


●1pc. mounting

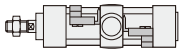
Rod side



Head side



●Mounting on trunnion type



Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

●ZC1□□type, CS□T type, CS□F type

●Operating range: ℓ

The distance the piston travels in one direction, while the switch is in the ON position.

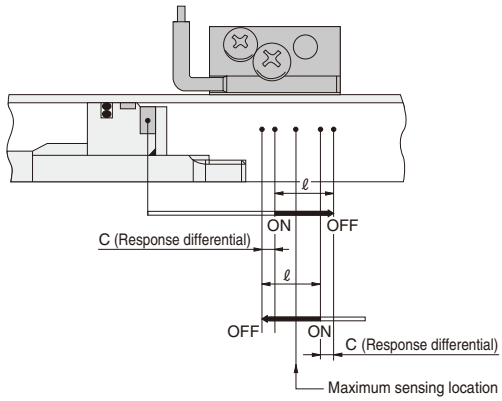
●Response differential: C

The distance between the point where the piston turns the switch ON and the point where the switch is turned OFF as the piston travels in the opposite direction.

mm [in.]

Sensor switches model	Solid state type	Reed switch type		
	ZC130, ZC153	**CS5T**	**CS11T**	**CS□F**
Operating range: ℓ	2～6 [0.079～0.236]	6～15 [0.236～0.591]		
Response differential: C	1.5 [0.059] MAX.	2.5 [0.098] MAX.		
Maximum sensing location	8.5 [0.335]	7 [0.276]	10.5 [0.413]	16 [0.630]

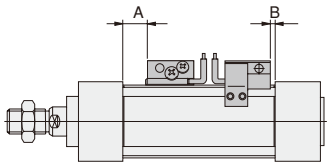
Notes: 1. Figures in the grommet type are lengths measured from the switch's opposite end side to the lead wire, while the figures in connector type are lengths measured from the connector side's end surface.
2. The above table shows reference values.



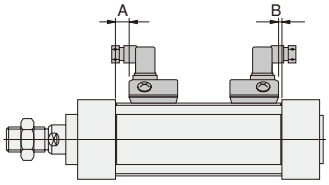
Mounting Location of Sensor Switch

When the sensor switch is mounted in the locations shown in the diagram (figures in the table are reference values), the magnet comes to the sensor switch's maximum sensing location at the end of the stroke.

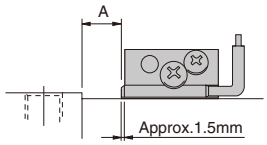
●Grommet type



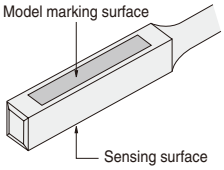
●Connector type



Grommet type enlarged view



●Precaution for mounting



For the ZC type sensor switches, the surface opposite to the model marking surface is the sensing surface side. Mount so that the cylinder magnet comes to the sensing surface side.

●Single rod basic type and non-rotating double rod type

mm [in.]

Sensor switch model		Bore size / Code	32	40	50	63	80	100	125
Solid state type	ZC130 ZC153	A	9 [0.354]	9 [0.354]	9 [0.354]	9.5 [0.374]	12.5 [0.492]	12.5 [0.492]	14.5 [0.571]
		B	5 [0.197]	5 [0.197]	5 [0.197]	5.5 [0.217]	6.5 [0.256]	6.5 [0.256]	10.5 [0.413]
Reed switch type	CS5T	A	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	11 [0.433]	14 [0.551]	14 [0.551]	16 [0.630]
		B	6.5 [0.256]	6.5 [0.256]	6.5 [0.256]	7 [0.276]	8 [0.315]	8 [0.315]	12 [0.472]
	CS11T	A	7 [0.276]	7 [0.276]	7 [0.276]	7.5 [0.295]	10.5 [0.413]	10.5 [0.413]	12.5 [0.492]
		B	3 [0.118]	3 [0.118]	3 [0.118]	3.5 [0.138]	4.5 [0.177]	4.5 [0.177]	8.5 [0.335]
	CS□F	A	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]	4 [0.157]	7 [0.276]	7 [0.276]	9 [0.354]
		B	0	0	0	0	1 [0.039]	1 [0.039]	5 [0.197]

Caution: The reed sensor switch cannot be mounted on the head side in any direction other than that shown in the diagram.

●Standard double rod type

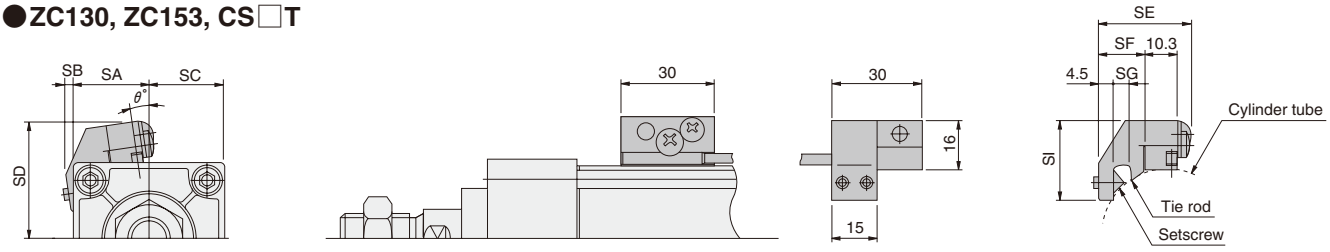
mm [in.]

Sensor switch model		Bore size / Code	32	40	50	63	80	100	125
Solid state type	ZC130 ZC153	A	9.5 [0.374]	9 [0.354]	9.5 [0.374]	9.5 [0.374]	12.5 [0.492]	12.5 [0.492]	14.5 [0.571]
		B	4.5 [0.177]	5 [0.197]	4.5 [0.177]	5.5 [0.217]	6.5 [0.256]	6.5 [0.256]	10.5 [0.413]
Reed switch type	CS5T	A	11 [0.433]	10.5 [0.413]	11 [0.433]	11 [0.433]	14 [0.551]	14 [0.551]	16 [0.630]
		B	6 [0.236]	6.5 [0.256]	6 [0.236]	7 [0.276]	8 [0.315]	8 [0.315]	12 [0.472]
	CS11T	A	7.5 [0.295]	7 [0.276]	7.5 [0.295]	7.5 [0.295]	10.5 [0.413]	10.5 [0.413]	12.5 [0.492]
		B	2.5 [0.098]	3 [0.118]	2.5 [0.098]	3.5 [0.138]	4.5 [0.177]	4.5 [0.177]	8.5 [0.335]
	CS□F	A	4 [0.157]	3.5 [0.138]	4 [0.157]	4 [0.157]	7 [0.276]	7 [0.276]	9 [0.354]
		B	0	0	0	0	1 [0.039]	1 [0.039]	5 [0.197]

Caution: The reed sensor switch cannot be mounted on the head side in any direction other than that shown in the diagram.

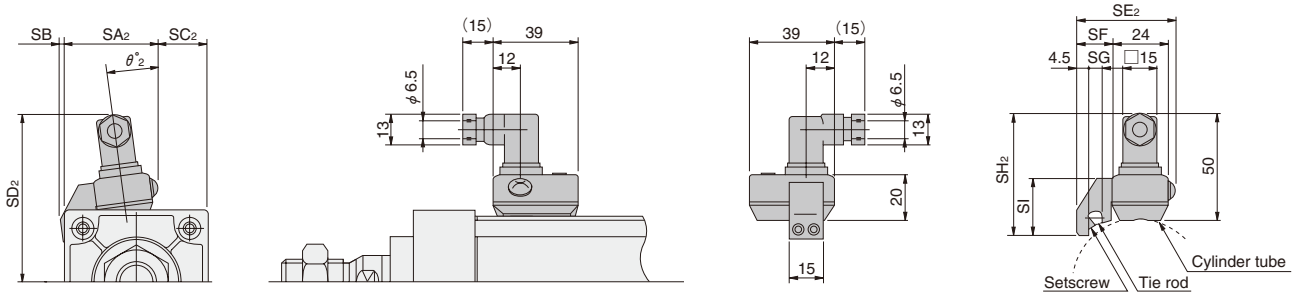
Dimensions of Sensor Switch

●ZC130, ZC153, CS□T



Bore mm [in.] / Code	SA	SB	SC	SD	SE	SF	SG	SI	θ
32 [1.260]	27	5	17	35	29.8	15.5	6	25.5	1
40 [1.575]	26.1	2	23.9	38.4	29.8	15.5	6	25.5	10
50 [1.969]	27.1	0.7	34.9	43.4	29.8	15.5	6	25.5	10
63 [2.480]	28.3	0	46.7	48.6	31.8	17.5	8	24.5	18
80 [3.150]	30.9	0	63.1	55.9	33.3	19	9.5	22.5	22
100 [3.940]	32.2	0	79.8	63.6	33.3	19	9.5	22.5	24.5
125 [4.921]	36.5	—	99.5	75	37.5	24.8	11	15.5	27.5

●CS□F

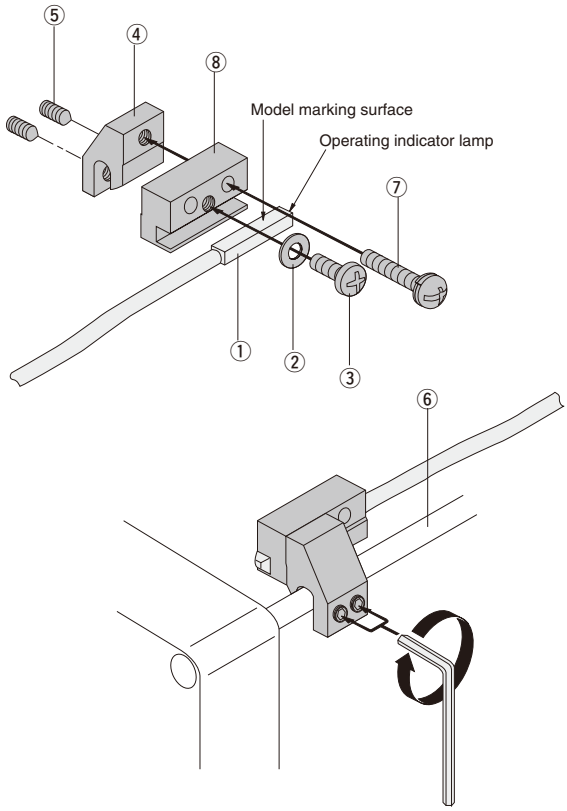


Bore mm [in.] / Code	SA2	SB	SC2	SD2	SE2	SF	SG	SH2	SI	θ 2
32 [1.260]	41.5	5	2.5	66.5	43	15.5	6	56.5	25.5	2.3
40 [1.575]	33.5	1.5	16.5	70	43	15.5	6	56.5	25.5	12
50 [1.969]	40	0.5	22	74.5	43	15.5	6	56.5	25.5	10
63 [2.480]	40.5	0	34.5	79.5	45	17.5	6	55.5	24.5	19
80 [3.150]	42.5	—	51.5	86	46.5	19	9.5	53.5	22.5	23
100 [3.940]	44	—	68	93.5	46.5	19	9.5	53.5	22.5	25
125 [4.921]	49.5	—	86.5	106.5	52.5	25	11	50.5	15.5	23.5

Instructions for Mounting and Moving Sensor Switch

ZC1□□, CS□T types

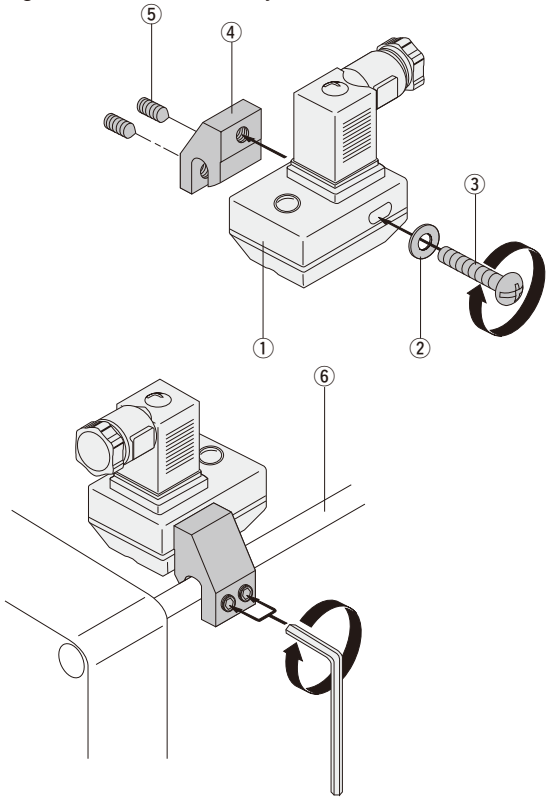
Requiring parts for mounting 1 sensor switch on a cylinder
①Sensor Switch
②Washer×1
③Screw (short)×1
④Sensor holder×1
⑤Setscrew×2
⑥Tie rod
⑦Screw (long)×1
⑧Sub-holder×1



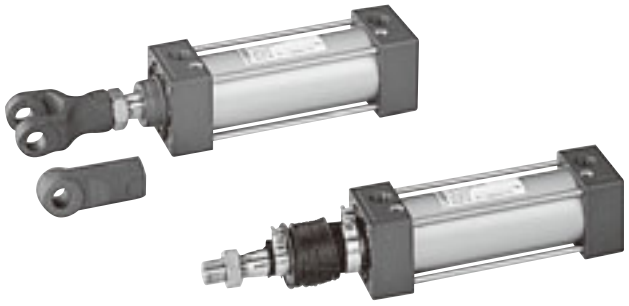
1. ●Align the female thread of sensor holder ④ to the position of the sub-holder ⑧'s thru hole, and use a screw (long) ⑦ to assemble.
●Two thru holes are available for ⑧. Either one can be used.
●The appropriate tightening torque for ⑦ is 70 N·cm [6.2in·lbf].
2. ●Install the sensor switch ① with the model marking surface facing upward, and fit it on the groove of ⑧.
●Align the edges of the body ① and indicator lamp (or the cap) to the end plane of ⑧, and assemble. To protect ①, always assemble so that the body ① does not protrude from the end surface of ⑧.
●The appropriate tightening torque for the screw (short) ③ is 70N·cm [6.2in·lbf].
3. ●Two setscrews ⑤ are temporarily fixed ④ in place.
●Fit ④ that was assembled with ① and ⑧ onto the tie rod ⑥, and align it to the designated position. Then use an Allen wrench (width across flats B = 2) to tighten ⑤ and secure it in place. Always secure it so that the bottom surface of ⑧ is in contact with the cylinder tube.
●The appropriate tightening torque for ⑤ is 70 N·cm [6.2in·lbf].
●There are four ⑥s on the cylinder, and ④ can be installed on any of them. In addition, ④ can be fitted in any direction.
●Loosening the 2 screws ⑤ allows ④ to be moved freely along ⑥.

CS□F type

Requiring parts for mounting 1 sensor switch on a cylinder
①Sensor Switch
②Washer×1
③Screw×1
④Sensor holder×1
⑤Setscrew×2
⑥Tie rod



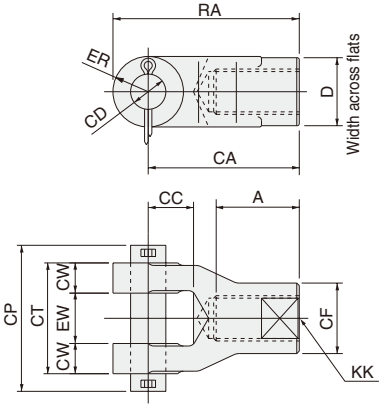
1. ●For the sensor switch ①, align the female thread of sensor holder ④ to any required location of the ①'s thru hole (oval), and assemble.
●The appropriate tightening torque for the screw ③ is 70N·cm [6.2in·lbf].
2. ●Use 2 setscrews ⑤ to temporarily fix ④ in place.
●Fit ④ that was assembled with ① onto the tie rod ⑥, and align it to the designated position. Then use an Allen wrench (width across flats B = 2) to tighten ⑤ and secure it in place. Always secure it so that the bottom surface of ① is in contact with the cylinder tube.
●To detect the head side end of stroke, mount ① so that the connector wiring port faces toward the head cover side, as shown in the diagram to the left.
●The appropriate tightening torque for ⑤ is 70N·cm [6.2in·lbf].
●There are four ⑥s on the cylinder, and ④ can be installed on any of them. In addition, ④ can be fitted in any direction.
●Loosening the 2 screws ⑤ allows ④ to be moved freely along ⑥.



Dimensions of Knuckle (mm)

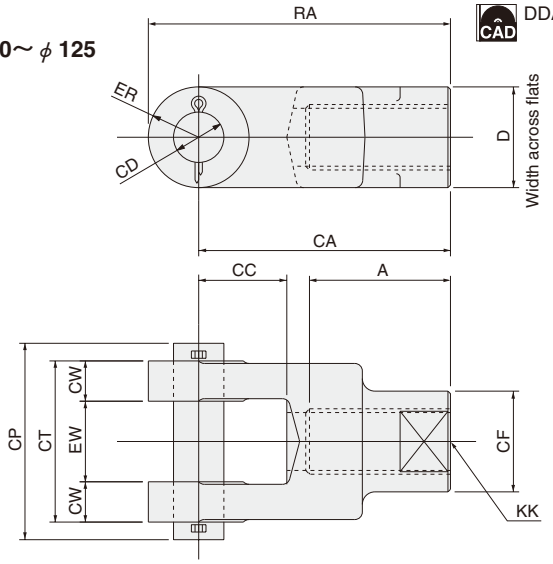
●Y type

ϕ 32



ϕ 40～ ϕ 125

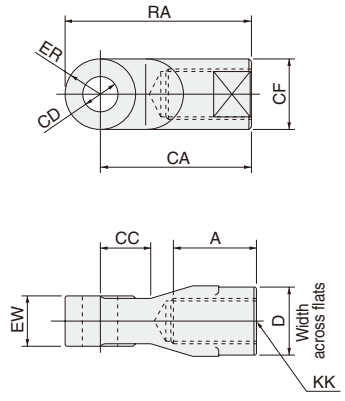
CAD DDA Bore size -Y



Bore mm [in.] \ Code	A	CA	CC	CD	CF	CP	CT	CW	D	ER	EW	KK (other than non-rotating)	KK (non-rotating)	RA
32 [1.260]	23	55	20	ϕ12H9/f8	ϕ 24	46	32	8	24	R12	$16^{+1.5}_{+0.5}$	M10×1.25	—	67
40 [1.575]	18	46	16	ϕ12H9/f8	ϕ 25	48	36	9	—	R12.5	$18^{+0.4}_{+0.1}$	M14×1.5	M12×1.25	58.5
50 [1.969]	22	46	16	ϕ12H9/f8	ϕ 25	48	36	9	—	R12.5	$18^{+0.4}_{+0.1}$	M18×1.5	M18×1.5	58.5
63 [2.480]	22	50	20	ϕ16H9/f8	ϕ 32	56	44	11	—	R16	$22^{+0.4}_{+0.1}$	M18×1.5	M18×1.5	66
80 [3.150]	30	75	25	ϕ20H9/f8	ϕ 40	68	56	14	—	R20	$28^{+0.4}_{+0.1}$	M22×1.5	M22×1.5	95
100 [3.940] (other than non-rotating)	34	75	25	ϕ20H9/f8	ϕ 40	68	56	14	—	R20	$28^{+0.4}_{+0.1}$	M26×1.5	—	95
100 [3.940] (non-rotating)	34	75	25	ϕ20H9/f8	ϕ 40	68	56	14	—	R20	$28^{+0.4}_{+0.1}$	—	M22×1.5	95
125 [4.921]	56	100	35	ϕ20H9/f8	ϕ 40	78	64	16	40	R20	$32^{+1.5}_{+0.5}$	M27×2	—	120

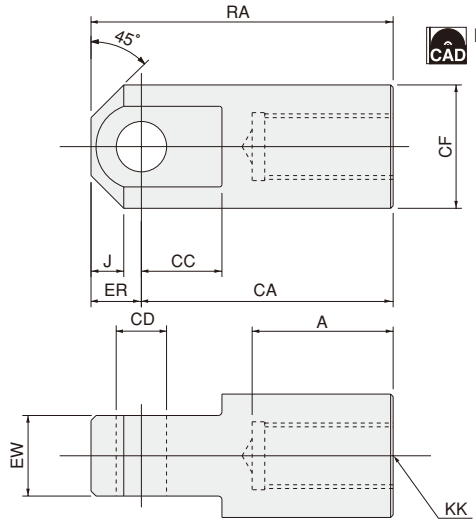
● I type

ϕ 32～ ϕ 100



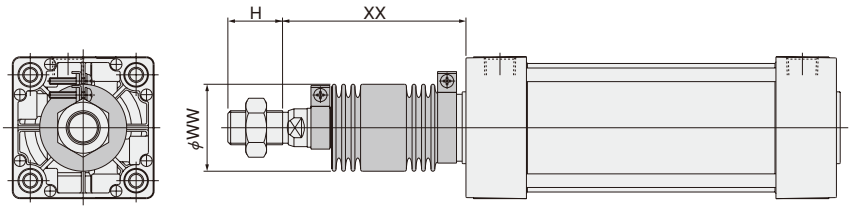
ϕ 125

CAD DDA Bore size -I



Bore mm [in.] \ Code	A	CA	CC	CD	CF	D	ER	EW	J	KK (other than non-rotating)	KK (non-rotating)	RA
32 [1.260]	23	55	20	ϕ 12H9	ϕ 24	24	R12	$16^{0}_{-0.1}$	—	M10×1.25	—	67
40 [1.575]	18	46	16	ϕ 12H9	ϕ 25	—	R12.5	$18^{-0.1}_{-0.4}$	—	M14×1.5	M12×1.25	58.5
50 [1.969]	22	46	16	ϕ 12H9	ϕ 25	—	R12.5	$18^{-0.1}_{-0.4}$	—	M18×1.5	M18×1.5	58.5
63 [2.480]	22	50	20	ϕ 16H9	ϕ 32	—	R16	$22^{-0.1}_{-0.4}$	—	M18×1.5	M18×1.5	66
80 [3.150]	30	75	25	ϕ 20H9	ϕ 40	—	R20	$28^{-0.1}_{-0.4}$	—	M22×1.5	M22×1.5	95
100 [3.940] (other than non-rotating)	34	75	25	ϕ 20H9	ϕ 40	—	R20	$28^{-0.1}_{-0.4}$	—	M26×1.5	—	95
100 [3.940] (non-rotating)	34	75	25	ϕ 20H9	ϕ 40	—	R20	$28^{-0.1}_{-0.4}$	—	—	M22×1.5	95
125 [4.921]	56	100	32	ϕ 20H9	ϕ 49	—	20	$32^{0}_{-0.1}$	13	M27×2	—	120

Dimensions of Bellows (mm [in.])



Code / Bore size mm [in.]	WW				XX				H
	Nylon tarpaulin	Chloroprene	Conex	Alumix	Nylon tarpaulin	Chloroprene	Conex	Alumix	
32 [1.260]	36 [1.42]	36 [1.42]	61 [2.40]	36 [1.42]	1/3 stroke＋48 [1.89]	1/3 stroke＋48 [1.89]	1/2 stroke＋48 [1.89]	1/2 stroke＋48 [1.89]	19 [0.75]
40 [1.575]	41 [1.61]	41 [1.61]	61 [2.40]	41 [1.61]					21 [0.83]
50 [1.969]	47 [1.85]	47 [1.85]	61 [2.40]	47 [1.85]	1/3 stroke＋53 [2.09]	1/3 stroke＋53 [2.09]	1/2 stroke＋53 [2.09]	1/2 stroke＋53 [2.09]	29 [1.14]
63 [2.480]	47 [1.85]	47 [1.85]	61 [2.40]	47 [1.85]					29 [1.14]
80 [3.150]	56 [2.20]	56 [2.20]	61 [2.40]	56 [2.20]	1/4 stroke＋58 [2.28]	1/4 stroke＋58 [2.28]	2/5 stroke＋58 [2.28]	2/5 stroke＋58 [2.28]	37 [1.46]
100 [3.940]	61 [2.40]	61 [2.40]	61 [2.40]	61 [2.40]					37 [1.46]
125 [4.921]	71 [2.80]	71 [2.80]	71 [2.80]	71 [2.80]	1/4 stroke＋59 [2.32]	1/4 stroke＋59 [2.32]	2/5 stroke＋59 [2.32]	2/5 stroke＋59 [2.32]	50 [1.97]

●Bellows Specifications

Type \ Specifications	Contents	Heat resistant temperature °C [°F]
Nylon tarpaulin (standard)	Coating vinyle to nylon cloth	80 [176]
Chloroprene	Coating chloroprene to nylon cloth	100 [212]
Conex	Coating silicone to Conex cloth (no use of asbestos)	200 [392]
Alumix	Coating aluminum foil to asbestos cloth	250 [482]

Note: The temperatures shown are the bellows' own durable temperatures, and are not temperatures for cylinder use.

Order Codes of Mounting Brackets and Knuckles

●Mounting bracket

□ – □ □

Mounting bracket
1 —— Foot mounting type (One set of 2 units)
2 —— Axial foot mounting type (One set of 2 units)
3 —— Rod side flange mounting type[Note]
5 —— Head side flange mounting type
7 —— Clevis mounting type (with pin)
7-7C — Clevis mounting type (with supporting bracket)
8 —— Pivot mounting type
11 —— Trunnion type
11-11T – Trunnion type (with supporting brackets)

Cylinder type
NDDA —— DYNA cylinder
NDDAR — DYNA cylinder with brake
NDDAE — DYNA pull side stroke adjusting cylinder
NDDAP — DYNA push side stroke adjusting cylinder

Bore size
32 —— For ϕ32 [1.260in.]
40 —— For ϕ40 [1.575in.]
50 —— For ϕ50 [1.969in.]
63 —— For ϕ63 [2.480in.]
80 —— For ϕ80 [3.150in.]
100 —— For ϕ100 [3.940in.]
125 —— For ϕ125 [4.921in.]

Note: The rod side flange cannot be retrofitted with the bellows type .

●Y, I type knuckle

□ – □ □

Knuckles
Y —— Y type knuckle
I —— I type knuckle

Cylinder type
NDDA —— DYNA cylinder
NDDAL — DYNA non-rotating cylinder

Bore size
32 —— For ϕ32 [1.260in.]
40 —— For ϕ40 [1.575in.]
50 —— For ϕ50 [1.969in.]
63 —— For ϕ63 [2.480in.]
80 —— For ϕ80 [3.150in.]
100 —— For ϕ100 [3.940in.]
125 —— For ϕ125 [4.921in.]

●For dimensions of knuckle, see p.537.

Maximum Available Stroke of Cylinder with Bellows

mm [in.]

Bellows model / Bore size	ϕ32 [1.260]～ϕ63 [2.480]	ϕ80 [3.150]～ϕ125 [4.921]
JT	Maximum available St×3／4–50	Maximum available St×4／5–50
JC	Maximum available St×3／4–50	Maximum available St×4／5–50
JK	Maximum available St×2／3–50	Maximum available St×2／3–50
JA	Maximum available St×2／3–50	Maximum available St×2／3–50