CAD drawing data catalog is available.

KOGANEI

ACTUATORS GENERAL CATALOG

LOW-PRESSURE CYLINDERS

INDEX

BF diaphragm

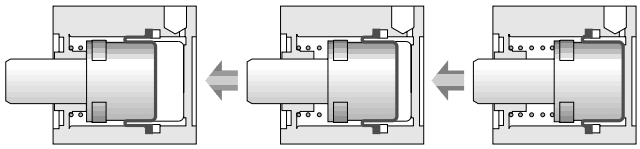
DJ Cylinders

■ **Double acting type: φ20 [0.787in.], φ32 [1.260in.], φ40 [1.575in.], φ50 [1.969in.]**
■ **Single acting push type: φ20 [0.787in.], φ32 [1.260in.], φ40 [1.575in.]**

- A precision control cylinder that uses a BF diaphragm.
- Air leaks almost never occur with the BF diaphragm seal.
- Excellent follow-up performance for pressure fluctuations.
  Can operate even under micro-pressures (0.02MPa [3psi.]Note).

Note: For sizes other than φ20 [0.787in.], the pressure is 0.015MPa [2psi.].

●Operating principles (DJ cylinder, single acting type)



Diaphragm

DF Cylinders

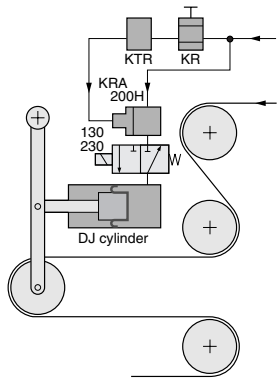
■ **Non-rotating single acting push type: φ12 [0.472in.], φ20 [0.787in.], φ30 [1.181in.], φ40 [1.575in.]**

- A thin and lightweight cylinder for precision control.
- Air leaks almost never occur with the diaphragm seal.
- With no sliding portion open to the air, solid particles are eliminated.

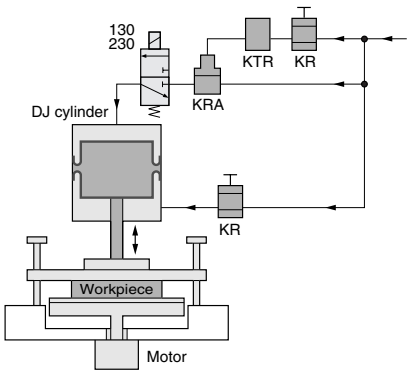
■Application example

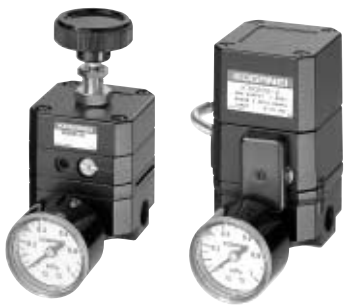
Equipment applications: Printing equipment, paper plant equipment, plastic film processors, textile machines, grinders, etc.

❶Tension control



❷Pressure control (grinders)





Remark: Optimum precision regulators KR series and electro-pneumatic transducing regulators KTR series are available for control the DJ cylinders and DF cylinders. For details, see the General Catalog of Air Treatment, Auxiliary, Vacuum.

Safety Precautions

⚠ Warning

Listed below are safety precautions specifically for the DJ Cylinders and DF Cylinders. For general safety precautions, be sure to read p.45.

- Do not apply lateral loads to the rod. It could cause increase of sliding friction, deterioration in bearing operating life, and early rupture of the diaphragm.
- Install an external stopper to ensure that the piston does not impact against the body.
- Use within the recommended load and specified speed ranges. Use in excess of the recommended load and specified speed could cause the piston rod or plate to pop up, damaging equipment or causing personal injury.

Handling Instructions and Precautions

General precautions

1. Always thoroughly blow off (use compressed air) the tubing before piping. Entering metal chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. Use air for the media. For the use of any other media, consult us.
3. Air used for the cylinder should be clean air that contains no deteriorated compressor oil, etc. Install an air filter (filtration of 40μm or less) near the cylinder or valve to remove collected liquid or dust. In addition, drain the air filter periodically. Collected liquid or dust entering the cylinder may cause in improper operation.

Mounting and piping

1. For the DJ cylinder, do not attempt to move the piston rod when air is not being applied. The BF diaphragm inside the cylinder will be slack and become snagged.
2. If using the double acting type DJ cylinder in a vertical position, take the following measures.
   When the piston rod is facing upward, always design the equipment that allows air to be supplied such that the piston rod retracted when completed the operation. When, on the other hand, the piston rod is facing downward, always design the equipment that allows air to be supplied such that the piston rod extended when completed the operation.
   Attempting to move the piston rod when air pressure is not being applied will cause the BF diaphragm inside the cylinder to be slack and become snagged.
3. When mounting the DJ cylinder or DF cylinder, or when doing piping work, tighten mounting bolts at the tightening torques shown below.

●DJ cylinder mounting bolt tightening torque

Thread size	Tightening torque N·m {kgf·m} [ft·lbf]
M5×0.8	2.9 {0.3} [2.1]
M6×1	4.4 {0.45} [3.2]
M8×1.25	10.8 {1.1} [8.0]

Caution: Do not attempt to rotate the rods or tighten threads while air is supplied to the cylinder. The internal BF diaphragm could become twisted and break. When tightening the threads, always use wrench flats (width across flats) to hold the rod in place, at no applying air pressure.

●DF cylinder mounting bolt tightening torque

Thread size	Tightening torque N·m {kgf·m} [ft·lbf]
M3×0.5	0.6～0.8 {0.06～0.08} [0.4～0.6]
M4×0.7	1.2～1.4 {0.12～0.14} [0.9～1.0]
M5×0.8	2.5～2.7 {0.25～0.28} [1.8～2.0]

Caution: Although the DF cylinder employs a non-rotating construction, use wrench flats (width across flats) to ensure that no load is applied to the piston rod. If not, the non-rotating portion could be damaged, obstructing normal operations.

●DJ cylinder, DF cylinder piping tightening torque

Port size	Tightening torque N·m {kgf·m} [ft·lbf]
M5×0.8	1.6 {0.16} [1.2]
Rc 1/8	6.8～ 8.6 {0.69～0.88} [5.0～6.3]
Rc 1/4	11.6～13.4 {1.18～1.37} [8.6～9.9]

DJ CYLINDERS

Double Acting Type, Single Acting Push Type

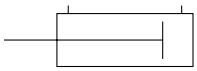
Features

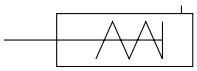
- A precision control cylinder that uses a BF diaphragm.
- Air leaks almost never occur with the BF diaphragm's perfect seal.
- Excellent follow-up performance for pressure fluctuations. Can operate even under micro-pressures (0.015MPa [2psi.][Note]).

Note: ϕ20 [7.87in.]:0.02MPa [3psi.]

Symbols

●Double acting type **●Single acting push type**





Specifications

Item \ Bore size mm [in.]		20 [0.787]	32 [1.260]	40 [1.575]	50 [1.969]
Operating type		Double acting type, single acting push type			Double acting type
Media		Air			
Mounting type		Basic type	Basic type, Foot mounting type, Axial foot mounting type, Rod/head side flange mounting type		
Operating pressure range	MPa {kgf/cm²} [psi.]	0.02～0.7 {0.20～7.1} [3～102]	0.015～0.7 {0.15～7.1} [2～102]		
Proof pressure	MPa {kgf/cm²} [psi.]	1.05 {10.7} [152]			
Operating temperature range	°C [°F]	0～60 [32～140]			
Maximum operating speed	mm/s [in./sec.]	200 [7.87] (MAX.)			
Lubrication		Prohibited			
Port size		M5×0.8	Rc1/8		Rc1/4
Stroke tolerance	mm [in.]	$^{+1}_{0}\left[^{+0.039}_{0}\right]$			

Bore Size and Stroke

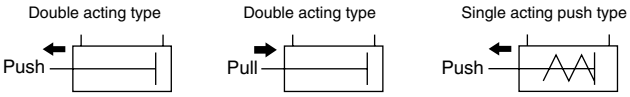
mm

Operating type	Bore size	Standard strokes
Double acting type	**20**	10, 20
	32	10, 20, 30
	40	10, 20, 30, 40
	50	20, 30, 40, 50
Single acting push type	**20**	10
	32	
	40	

Remark: Non-standard strokes are collar-packed.
For delivery, consult us.

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.

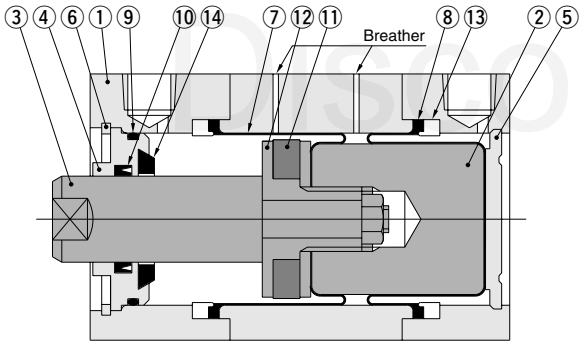


N [lbf.]

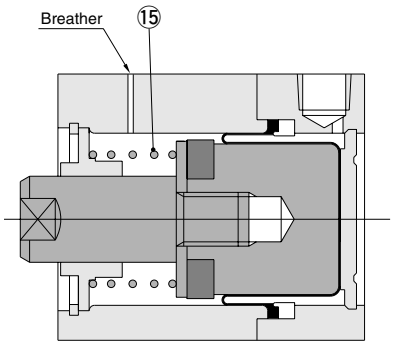
Bore size mm [in.]	Piston rod diameter mm [in.]	Operation		Pressure area mm^2 [$in.^2$]	Air pressure MPa [psi.]							Spring return force	
					0.1 [15]	0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	0.6 [87]	0.7 [102]	Zero stroke	Stroke end
20 [0.787]	10 [0.394]	Double acting type	Push side	269 [0.417]	26.9 [6.05]	53.8 [12.09]	80.7 [18.14]	107.6 [24.19]	134.5 [30.24]	161.4 [36.28]	188.3 [42.33]	—	—
			Pull side	190 [0.295]	19.0 [4.27]	38.0 [8.54]	57.0 [12.81]	76.0 [17.08]	95.0 [21.36]	114.0 [25.63]	133.0 [29.90]	—	—
		Single acting push type		269 [0.417]	22.0 [4.95]	48.9 [10.99]	75.8 [17.04]	102.7 [23.09]	129.6 [29.13]	156.5 [35.18]	183.4 [41.23]	2.9 [0.65]	4.9 [1.10]
32 [1.260]	16 [0.630]	Double acting type	Push side	684 [1.060]	68.4 [15.38]	136.8 [30.75]	205.2 [46.13]	273.6 [61.51]	342.0 [76.88]	410.4 [92.26]	478.8 [107.64]	—	—
			Pull side	483 [0.749]	48.3 [10.86]	96.6 [21.72]	144.9 [32.57]	193.2 [43.43]	241.5 [54.29]	289.8 [65.15]	338.1 [76.01]	—	—
		Single acting push type		684 [1.060]	60.5 [13.60]	128.9 [28.98]	197.3 [44.35]	265.7 [59.73]	334.1 [75.11]	402.5 [90.48]	470.9 [105.86]	4.9 [1.10]	7.9 [1.78]
40 [1.575]	16 [0.630]	Double acting type	Push side	1100 [1.705]	110.0 [24.73]	220.0 [49.46]	330.0 [74.18]	440.0 [98.91]	550.0 [123.64]	660.0 [148.37]	770.0 [173.11]	—	—
			Pull side	903 [1.400]	90.3 [20.30]	180.6 [40.60]	270.9 [60.90]	361.2 [81.20]	451.5 [101.50]	541.8 [121.80]	632.1 [142.10]	—	—
		Single acting push type		1100 [1.705]	98.2 [22.08]	208.2 [46.80]	318.2 [71.53]	428.2 [96.26]	538.2 [120.99]	648.2 [145.72]	758.2 [170.45]	7.9 [1.78]	11.8 [2.65]
50 [1.969]	20 [0.787]	Double acting type	Push side	1770 [2.744]	177.0 [39.79]	354.0 [79.58]	531.0 [119.37]	708.0 [159.17]	885.0 [198.96]	1062.0 [238.75]	1239.0 [278.55]	—	—
			Pull side	1450 [2.248]	145.0 [32.60]	290.0 [65.19]	435.0 [97.79]	580.0 [130.39]	725.0 [162.99]	870.0 [195.59]	1015.0 [228.19]	—	—

Inner Construction

●Double acting type ϕ20, ϕ32, ϕ40, ϕ50 (DJDA)



●Single acting push type ϕ20, ϕ32, ϕ40 (DJSA)



Major Parts and Materials

No.	Parts \ Bore size mm [in.]	20 [0.787]	32 [1.260]	40 [1.575]	50 [1.969]
①	Cylinder body	Aluminum alloy (anodized)			
②	Piston	Aluminum alloy (anodized)			
③	Piston rod	Stainless steel	Steel		
④	Rod cover	Aluminum alloy (wear-resistant surface treatment)			
⑤	Head cover	Aluminum alloy (anodized)			
⑥	Snap ring	Steel (black oxide)			
⑦	BF diaphragm F	Synthetic rubber with layer cloth			
⑧	BF diaphragm R	Synthetic rubber with layer cloth			
⑨	Tube gasket	Synthetic rubber (NBR)			
⑩	Rod seal	Synthetic rubber (NBR)			
⑪	Magnet	Plastic magnet			
⑫	Support	Aluminum alloy (anodized)			
⑬	Diaphragm support	Aluminum alloy (anodized)			
⑭	Bumper	Synthetic rubber (urethane rubber)			
⑮	Spring	Piano wire			

Mounting Bracket Materials

Parts	Materials
Foot mounting bracket	Mild steel (black zinc plated)
Axial foot mounting bracket	Mild steel (black zinc plated)
Flange mounting bracket	Mild steel (black oxide)
Bracket mounting bolt	Steel (black oxide)

Air Flow Rate and Air Consumption

While the DJ cylinder double acting type's air flow rate and air consumption can be found through the following calculations, the quick reference table below provides the answers more conveniently.

Air flow rate $Q_1 = A^{Note} \times L \times \frac{60}{t} \times \frac{P+0.1013}{0.1013} \times 10^{-6}$

Air consumption $Q_2 = A^{Note} \times L \times 2 \times n \times \frac{P+0.1013}{0.1013} \times 10^{-6}$

Q_1	: Required air flow rate for cylinder	ℓ /min (ANR)
Q_2	: Air consumption of cylinder	ℓ /min (ANR)
A	: Pressure area	mm^2
L	: Cylinder stroke	mm
t	: Time required for cylinder to travel one stroke	s
n	: Number of cylinder reciprocations per minute	times/min
P	: Operating pressure	MPa

Air flow rate $Q_1' = A'^{Note} \times L' \times \frac{60}{t} \times \frac{P'+14.696}{14.696} \times \frac{1}{1728}$

Air consumption $Q_2' = A'^{Note} \times L' \times 2 \times n \times \frac{P'+14.696}{14.696} \times \frac{1}{1728}$

Q_1'	: Required air flow rate for cylinder	ft^3/min. (ANR)※
Q_2'	: Air consumption of cylinder	ft^3/min. (ANR)※
A′	: Pressure area	in^2
L′	: Cylinder stroke	in.
t	: Time required for cylinder to travel one stroke	sec.
n	: Number of cylinder reciprocations per minute	times/min.
P′	: Operating pressure	psi.

Note: For the pressure area, see the Thrust table on p.1378.

※Refer to p.42 for an explanation of ANR.

Air consumption for each 1mm [0.0394in.] stroke (DJ cylinder)

cm^3 [$in.^3$]/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]
20 [0.787]	1.07 [0.0653]	1.60 [0.0976]	2.13 [0.1300]	2.66 [0.1623]	3.19 [0.1947]	3.72 [0.2270]	4.26 [0.2600]
32 [1.260]	2.72 [0.1660]	4.07 [0.2484]	5.42 [0.3307]	6.77 [0.4131]	8.12 [0.4955]	9.47 [0.5779]	10.82 [0.6603]
40 [1.575]	4.37 [0.2667]	6.54 [0.3991]	8.72 [0.5321]	10.89 [0.6646]	13.06 [0.7970]	15.23 [0.9294]	17.40 [1.0618]
50 [1.969]	7.03 [0.4290]	10.53 [0.6426]	14.02 [0.8556]	17.52 [1.0691]	21.01 [1.2821]	24.51 [1.4957]	28.00 [1.7087]

The figures in the table are to calculate the air flow rate and air consumption when a DJ cylinder (double acting type) makes one reciprocation with stroke of 1mm [0.0394in.].
The air flow rate and air consumption actually required are found by the following calculations.

●Finding the air flow rate (for selecting F.R.L., valves, etc.)
Example: When operating a DJ cylinder (double acting type) with bore size of 40mm [1.575in.] at speed of 200mm/s [7.9in./sec.] under air pressure 0.5MPa [73psi.]

$13.06 \times \frac{1}{2} \times 200 \times 10^{-3} = 1.306$ ℓ /s [0.0461ft^3/sec.] (ANR)

(At this time, the air flow rate per minute is $13.06 \times \frac{1}{2} \times 200 \times 60 \times 10^{-3} = 78.36$ ℓ /min [2.766ft^3/min.] (ANR).)

●Finding the air consumption
Example 1. When operating a DJ cylinder (double acting type) with bore size of 40mm [1.575in.] and stroke of 40mm [1.575in.], under air pressure 0.5MPa [73psi.], for one reciprocation per minute

$13.06 \times 40 \times 10^{-3} = 0.5224$ ℓ [0.0184ft^3]/Reciprocation (ANR)

Example 2. When operating a DJ cylinder (double acting type) with bore size of 40mm [1.575in.] and stroke of 40mm [1.575in.], under air pressure 0.5MPa [73psi.], for 10 reciprocations per minute

$13.06 \times 40 \times 10 \times 10^{-3} = 5.224$ ℓ /min [0.184ft^3/min.] (ANR)

Order Code

DJ □ **20×10** - □ - □ □ □

DJ cylinder

Operating type[Note1]
DA : Double acting type
SA : Single acting push type

Bore size×stroke[Note2]

Mounting type[Note3]
Blank : Basic type
1 : Foot mounting type
2 : Axial foot mounting type
3 : Rod side flange mounting type
5 : Head side flange mounting type

Sensor switch

Blank	: Without sensor switch				
ZE135	: 2-lead wire	Solid state type	With indicator lamp	Horizontal lead wire	DC10～28V
ZE235	: 2-lead wire	Solid state type	With indicator lamp	Vertical lead wire[Note 5]	DC10～28V
ZE155	: 3-lead wire	Solid state type	With indicator lamp	Horizontal lead wire	DC4.5～28V
ZE255	: 3-lead wire	Solid state type	With indicator lamp	Vertical lead wire[Note 5]	DC4.5～28V
ZE101	: 2-lead wire	Reed switch type[Note4]	Without indicator lamp	Horizontal lead wire	DC5～28V, AC85～115V
ZE201	: 2-lead wire	Reed switch type[Note4]	Without indicator lamp	Vertical lead wire[Note 5]	DC5～28V, AC85～115V
ZE102	: 2-lead wire	Reed switch type[Note4]	With indicator lamp	Horizontal lead wire	DC10～28V,AC85～115V
ZE202	: 2-lead wire	Reed switch type[Note4]	With indicator lamp	Vertical lead wire[Note 5]	DC10～28V, AC85～115V

●For details of sensor switches, see p.1398.

Lead wire length
A : 1000mm [39in.]
B : 3000mm [118in.]

Number of sensor switches
1 : With one sensor switch
2 : With two sensor switches
⋮
n : With n sensor switches

Notes: 1. Single acting push type is available in ϕ20 [0.787in.] to ϕ40 [1.575in.] only.
2. For the bore size and stroke, see p.1377.
3. The ϕ20 [0.787in.] is available in the basic type only.
4. When using the reed switch type sensor switch, maintain a minimum speed of 30mm/s [1.2in./sec.] or larger. A speed of less than 30mm/s [1.2in./sec.] could cause the contact reed part to deposit, resulting in erratic operations. For balancer or tension control operations, the solid state type is recommended, instead.
5. In the vertical lead wire type, the lead wire protrudes at right angles to the sensor switch.

●Mounting bracket only

□ - **DJDA** □

Mounting bracket
1 : Foot mounting type
2 : Axial foot mounting type
3 : Flange mounting type (Rod/head side in common)

DJ Cylinder

Bore size
32 : For ϕ32 [1.260in.]
40 : For ϕ40 [1.575in.]
50 : For ϕ50 [1.969in.]

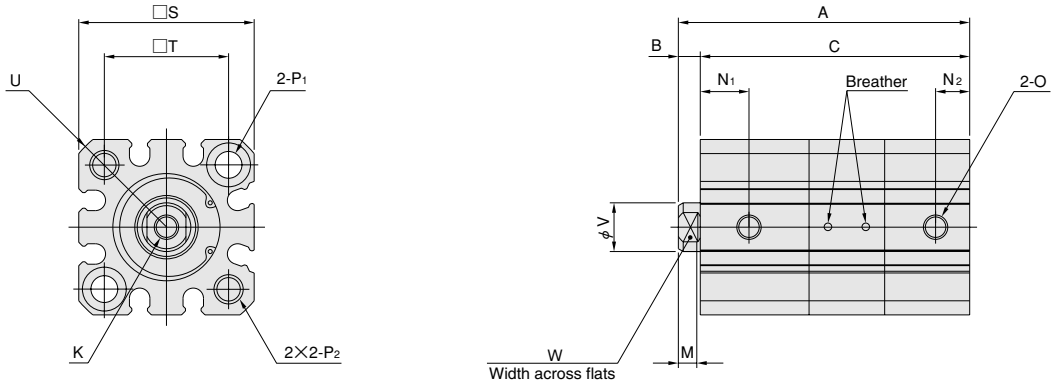
Mounting bracket content pcs.

Model	Contents
1 - DJDA□	Bracket: 2 Mounting bolt: 4
2 - DJDA□	Bracket: 2 Mounting bolt: 4
3 - DJDA□	Bracket: 1 Mounting bolt: 4

Dimensions of Double Acting Type (mm)

●**Basic type** **DJDA** 20× Stroke (φ20)

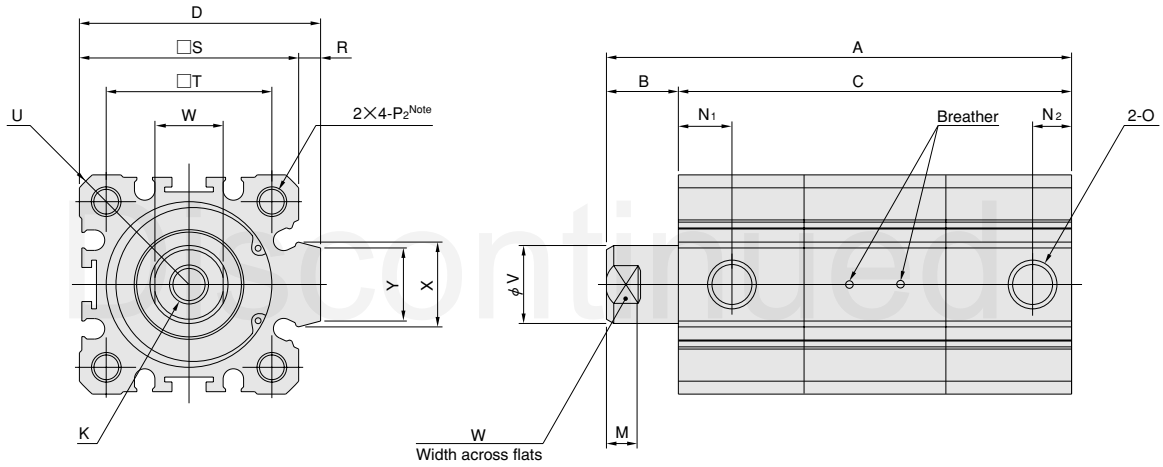
DJDA20



Remark: Basic type only for φ20.

●**Basic type** **DJDA** Bore size × Stroke (φ32～φ50)

DJDA Bore size



Note: Through bolts cannot be used.

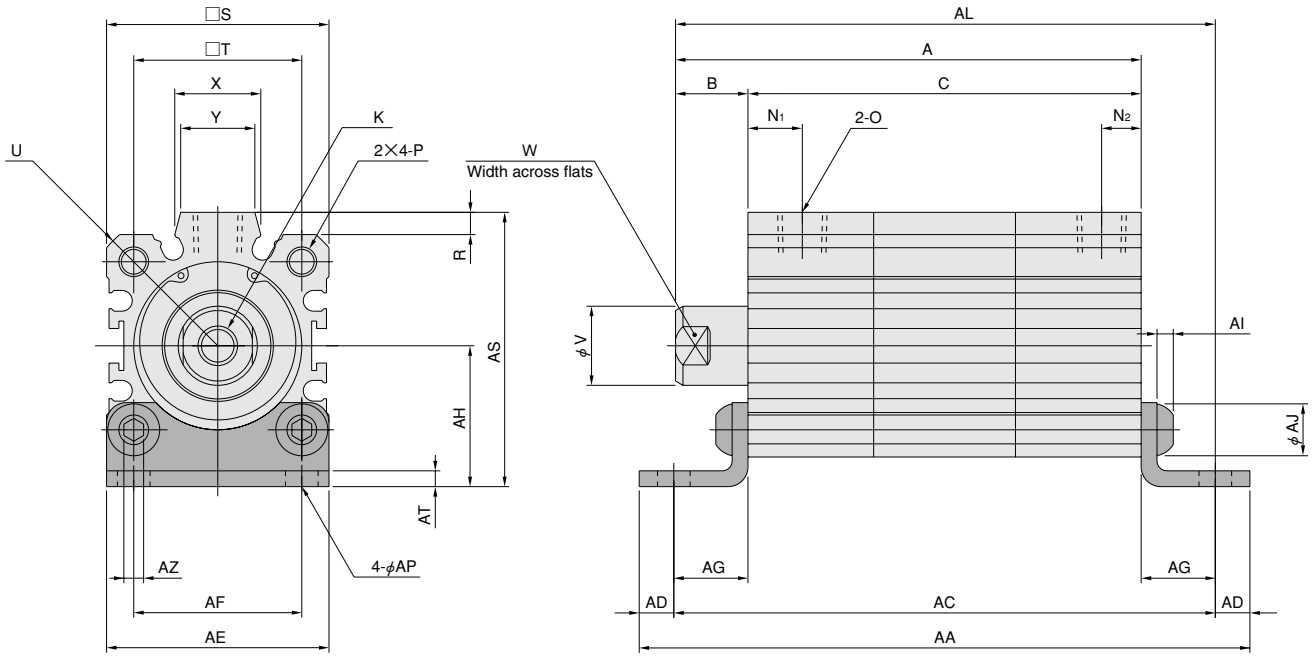
Code / Stroke / Bore mm [in.]	A					B	C					D
	10	20	30	40	50		10	20	30	40	50	
20 [0.787]	58	68	—	—	—	4.5	53.5	63.5	—	—	—	—
32 [1.260]	96	96	106	—	—	15	81	81	91	—	—	49.5
40 [1.575]	114	114	124	134	—	17	97	97	107	117	—	57
50 [1.969]	—	136	136	146	156	18	—	118	118	128	138	71

Code / Bore mm [in.]	K	M	N1	N2	O	P1
20 [0.787]	M5×0.8 Depth 7	4	10	5	M5×0.8	φ5.5 Through hole, φ9 Counterbore Depth 5.4 (Both sides)
32 [1.260]	M8×1.25 Depth 13	6.5	11	7.5	Rc 1/8	—
40 [1.575]	M8×1.25 Depth 13	6.5	11.5	11.5	Rc 1/8	—
50 [1.969]	M10×1.5 Depth 15	7	12	12	Rc 1/4	—

Code / Bore mm [in.]	P2	R	S	T	U	V	W	X	Y
20 [0.787]	M6×1 Depth 12	—	36	25.5	R23.5	10	8	—	—
32 [1.260]	M6×1 Depth 12	4.5	45	34	R30	16	14	17.4	15
40 [1.575]	M6×1 Depth 12	5	52	40	R34.5	16	14	20.5	17.5
50 [1.969]	M8×1.25 Depth 16	7	64	50	R42.5	20	17	21.6	19

Dimensions of Double Acting Type (mm)

●**Foot mounting type** **DJDA** Bore size × Stroke **-1**



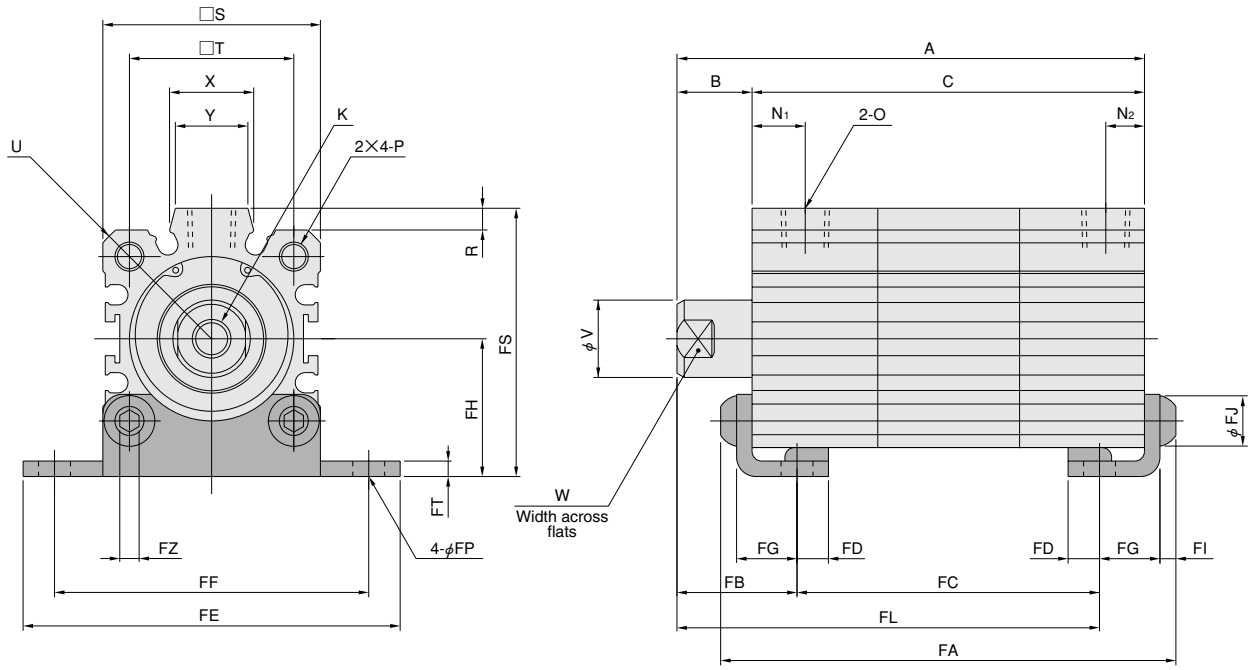
Code / Stroke / Bore mm [in.]	A					B	C					K	N1	N2	O
	10	20	30	40	50		10	20	30	40	50				
32 [1.260]	96	96	106	—	—	15	81	81	91	—	—	M8×1.25 Depth 13	11	7.5	Rc 1/8
40 [1.575]	114	114	124	134	—	17	97	97	107	117	—	M8×1.25 Depth 13	11.5	11.5	Rc 1/8
50 [1.969]	—	136	136	146	156	18	—	118	118	128	138	M10×1.5 Depth 15	12	12	Rc 1/4

Code / Stroke / Bore mm [in.]	P	R	S	T	U	V	W	X	Y	AA				
										10	20	30	40	50
32 [1.260]	M6×1 Depth 12	4.5	45	34	R30	16	14	17.4	15	125	125	135	—	—
40 [1.575]	M6×1 Depth 12	5	52	40	R34.5	16	14	20.5	17.5	141	141	151	161	—
50 [1.969]	M8×1.25 Depth 16	7	64	50	R42.5	20	17	21.6	19	—	172	172	182	192

Code / Stroke / Bore mm [in.]	AC					AD	AE	AF	AG	AH	AI	AJ	AL					AP	AS	AT	AZ
	10	20	30	40	50								10	20	30	40	50				
32 [1.260]	111	111	121	—	—	7	45	34	15	28.5	4	10.5	111	111	121	—	—	6.6	55.5	3.2	4
40 [1.575]	127	127	137	147	—	7	53	40	15	32.5	4	10.5	129	129	139	149	—	6.6	63.5	3.2	4
50 [1.969]	—	154	154	164	174	9	64	50	18	38	5	14	—	154	154	164	174	9	77	3.2	5

Dimensions of Double Acting Type (mm)

●**Axial foot mounting type** **DJDA** Bore size × Stroke **-2**



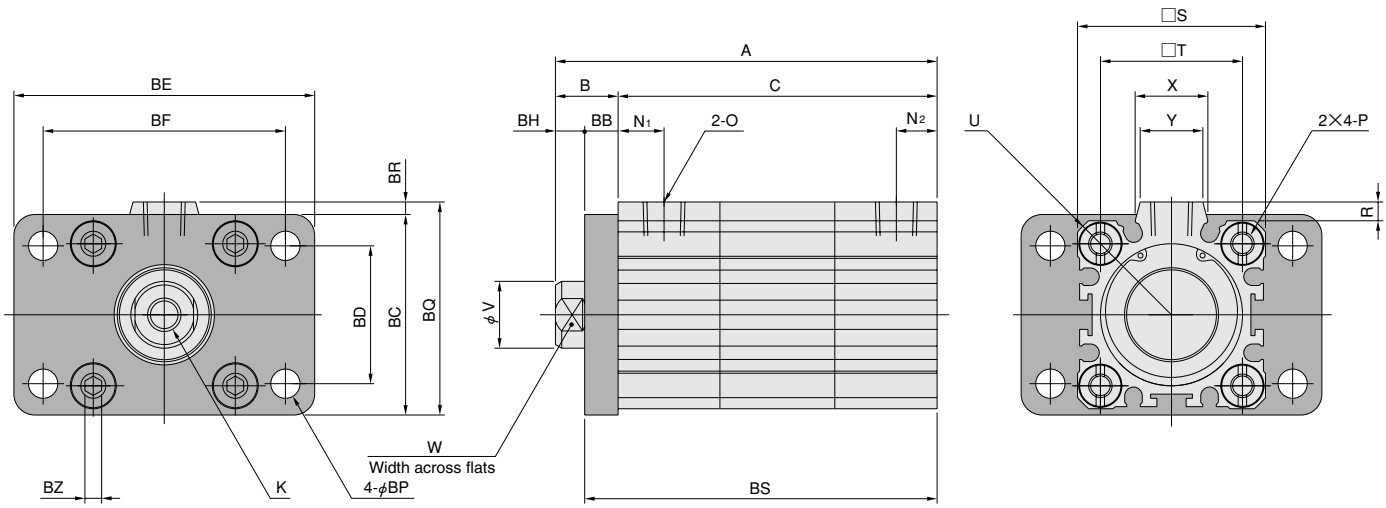
Code / Stroke / Bore mm [in.]	A					B	C					K	N1	N2	O
	10	20	30	40	50		10	20	30	40	50				
32 [1.260]	96	96	106	—	—	15	81	81	91	—	—	M8×1.25 Depth 13	11	7.5	Rc 1/8
40 [1.575]	114	114	124	134	—	17	97	97	107	117	—	M8×1.25 Depth 13	11.5	11.5	Rc 1/8
50 [1.969]	—	136	136	146	156	18	—	118	118	128	138	M10×1.5 Depth 15	12	12	Rc 1/4

Code / Stroke / Bore mm [in.]	P		R	S	T	U	V	W	X	Y	FA					FB
											10	20	30	40	50	
32 [1.260]	M6×1	Depth 12	4.5	45	34	R30	16	14	17.4	15	95.4	95.4	105.4	—	—	24.3
40 [1.575]	M6×1	Depth 12	5	52	40	R34.5	16	14	20.5	17.5	111.4	111.4	121.4	131.4	—	26.3
50 [1.969]	M8×1.25	Depth 16	7	64	50	R42.5	20	17	21.6	19	—	134.4	134.4	144.4	154.4	28.8

Code / Stroke / Bore mm [in.]	FC					FD	FE	FF	FG	FH	FI	FJ	FL					FP	FS	FT	FZ
	10	20	30	40	50								10	20	30	40	50				
32 [1.260]	62.4	62.4	72.4	—	—	6.5	78	65	12.5	28.5	4	10.5	86.7	86.7	96.7	—	—	6.6	55.5	3.2	4
40 [1.575]	78.4	78.4	88.4	98.4	—	6.5	87	73	12.5	32.5	4	10.5	104.7	104.7	114.7	124.7	—	6.6	63.5	3.2	4
50 [1.969]	—	96.4	96.4	106.4	116.4	8	103	87	14	38	5	14	—	125.2	125.2	135.2	145.2	9	77	3.2	5

Dimensions of Double Acting Type (mm)

●**Rod side flange mounting type** **DJDA** Bore size × Stroke **-3**



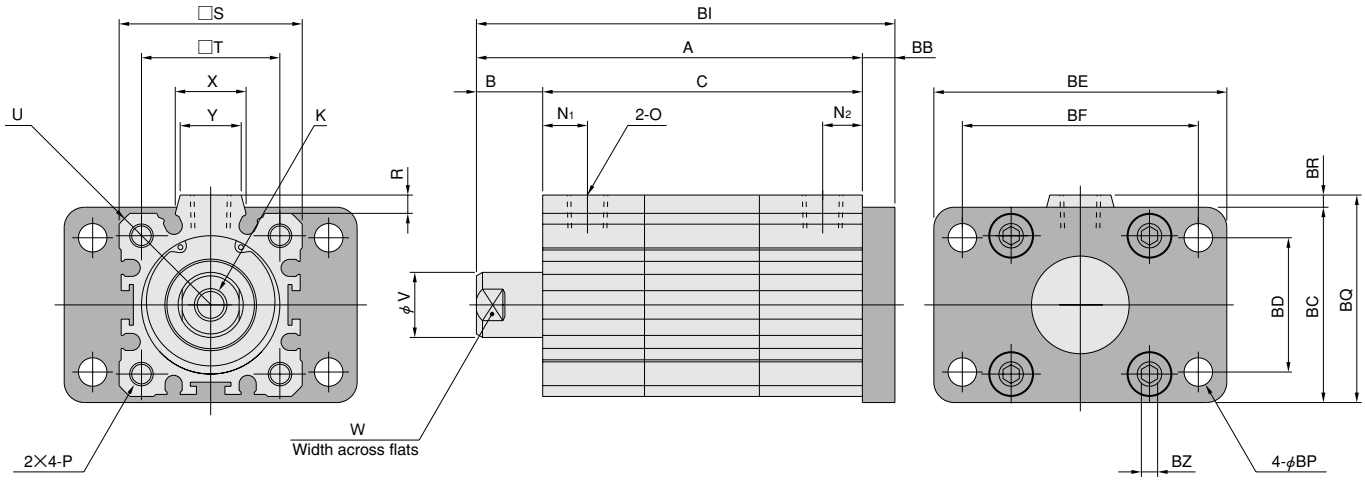
Code / Stroke / Bore mm [in.]	A					B	C					K	N1	N2	O
	10	20	30	40	50		10	20	30	40	50				
32 [1.260]	96	96	106	—	—	15	81	81	91	—	—	M8×1.25 Depth 13	11	7.5	Rc 1/8
40 [1.575]	114	114	124	134	—	17	97	97	107	117	—	M8×1.25 Depth 13	11.5	11.5	Rc 1/8
50 [1.969]	—	136	136	146	156	18	—	118	118	128	138	M10×1.5 Depth 15	12	12	Rc 1/4

Code / Bore mm [in.]	P	R	S	T	U	V	W	X	Y	BB
32 [1.260]	M6×1 Depth 12	4.5	45	34	R30	16	14	17.4	15	8
40 [1.575]	M6×1 Depth 12	5	52	40	R34.5	16	14	20.5	17.5	10
50 [1.969]	M8×1.25 Depth 16	7	64	50	R42.5	20	17	21.6	19	10

Code / Stroke / Bore mm [in.]	BC	BD	BE	BF	BH	BP	BQ	BR	BS					BZ
									10	20	30	40	50	
32 [1.260]	48	33	72	58	7	7	51	3	89	89	99	—	—	4
40 [1.575]	56	36	84	70	7	7	59	3	107	107	117	127	—	4
50 [1.969]	70	47	104	86	8	9	74	4	—	128	128	138	148	5

Dimensions of Double Acting Type (mm)

●**Head side flange mounting type** **DJDA** Bore size × Stroke **-5**



Code / Stroke / Bore mm [in.]	A					B	C					K	N_1	N_2	O
	10	20	30	40	50		10	20	30	40	50				
32 [1.260]	96	96	106	—	—	15	81	81	91	—	—	M8×1.25 Depth 13	11	7.5	Rc 1/8
40 [1.575]	114	114	124	134	—	17	97	97	107	117	—	M8×1.25 Depth 13	11.5	11.5	Rc 1/8
50 [1.969]	—	136	136	146	156	18	—	118	118	128	138	M10×1.5 Depth 15	12	12	Rc 1/4

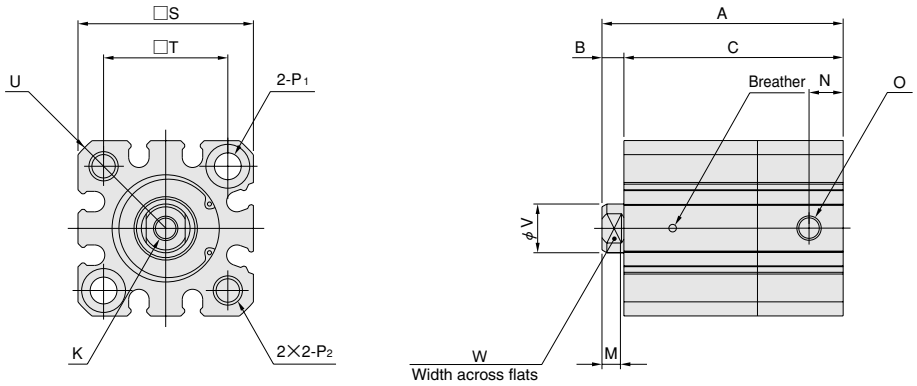
Code / Bore mm [in.]	P	R	S	T	U	V	W	X	Y	BB
32 [1.260]	M6×1 Depth 12	4.5	45	34	R30	16	14	17.4	15	8
40 [1.575]	M6×1 Depth 12	5	52	40	R34.5	16	14	20.5	17.5	10
50 [1.969]	M8×1.25 Depth 16	7	64	50	R42.5	20	17	21.6	19	10

Code / Stroke / Bore mm [in.]	BC	BD	BE	BF	BI					BP	BQ	BR	BZ
					10	20	30	40	50				
32 [1.260]	48	33	72	58	104	104	114	—	—	7	51	3	4
40 [1.575]	56	36	84	70	124	124	134	144	—	7	59	3	4
50 [1.969]	70	47	104	86	—	146	146	156	166	9	74	4	5

Dimensions of Single Acting Push Type (mm)

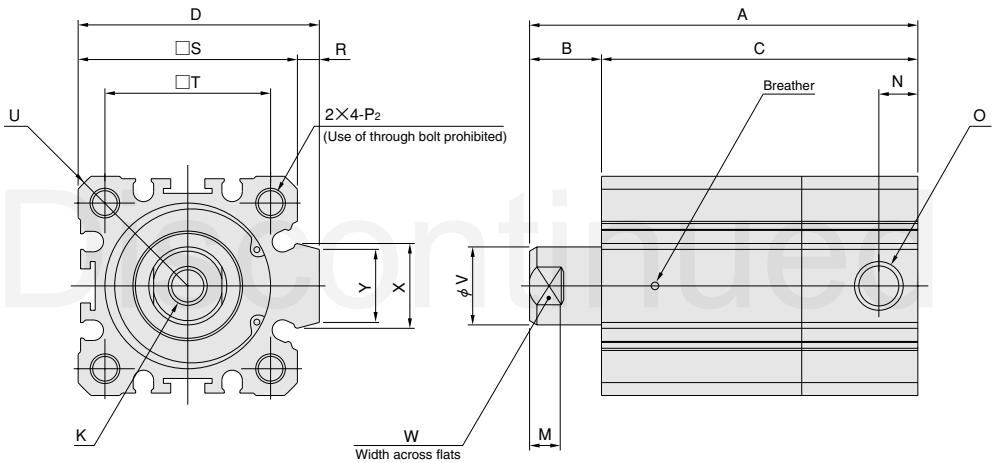
●**Basic type** **DJSA** 20×10 (φ20)

CAD DJSA 20



●**Basic type** **DJSA** Bore size ×10 (φ32～φ40)

CAD DJSA Bore size



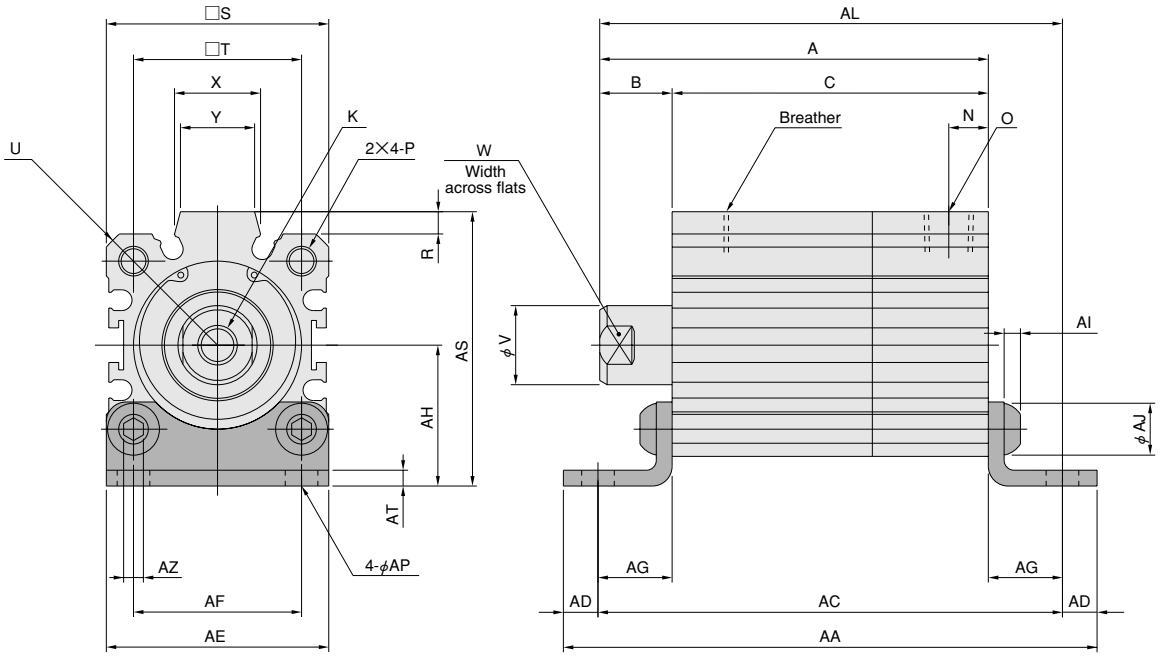
Code / Bore mm [in.]	A	B	C	D	K	M	N	O
20 [0.787]	50.5	4.5	46	—	M5×0.8 Depth 10	4	5	M5×0.8
32 [1.260]	74	15	59	49.5	M8×1.25 Depth 13	6.5	7.5	Rc 1/8
40 [1.575]	88	17	71	57	M8×1.25 Depth 13	6.5	11.5	Rc 1/8

Code / Bore mm [in.]	P_2	R	S	T	U	V	W	X	Y
20 [0.787]	M6×1 Depth 12	—	36	25.5	R23.5	10	8	—	—
32 [1.260]	M6×1 Depth 12	4.5	45	34	R30	16	14	17.4	15
40 [1.575]	M6×1 Depth 12	5	52	40	R34.5	16	14	20.5	17.5

Code / Bore mm [in.]	P_1
20 [0.787]	φ5.5 Through hole, φ9 Counterbore Depth 5.4 (Both sides)

Dimensions of Single Acting Push Type (mm)

●**Foot mounting type** **DJSA** Bore size × Stroke **-1**



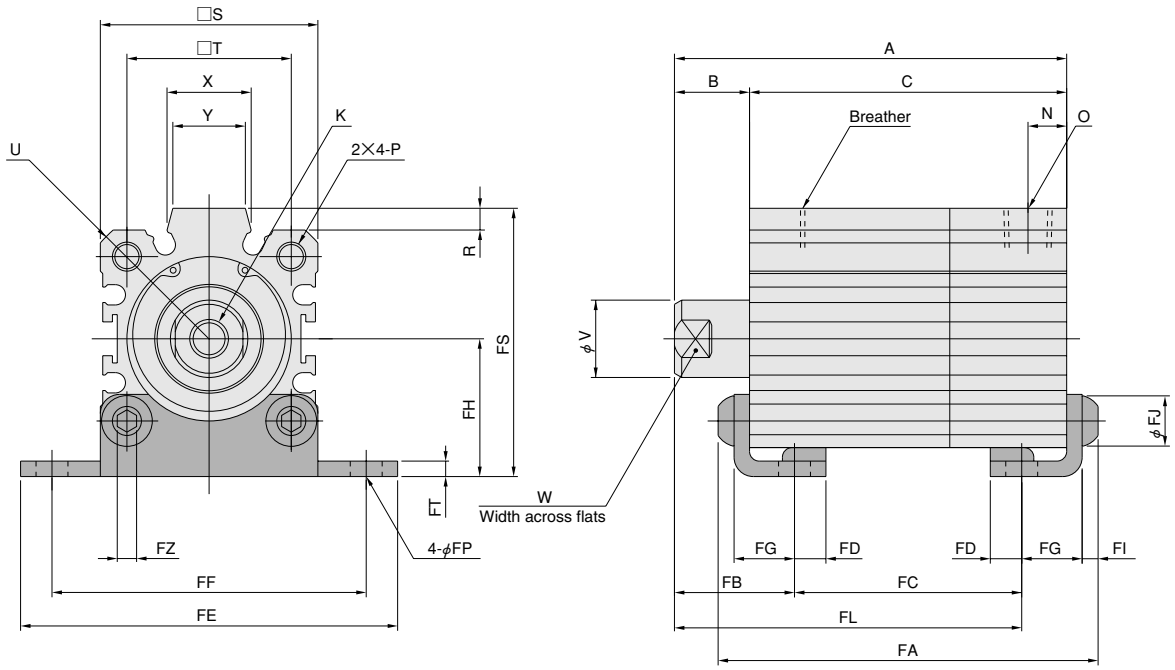
Code / Bore mm [in.]	A	B	C	K	N	O	P
32 [1.260]	74	15	59	M8×1.25 Depth 13	7.5	Rc 1/8	M6×1 Depth 12
40 [1.575]	88	17	71	M8×1.25 Depth 13	11.5	Rc 1/8	M6×1 Depth 12

Code / Bore mm [in.]	R	S	T	U	V	W	X	Y	AA	AC	AD
32 [1.260]	4.5	45	34	R30	16	14	17.4	15	103	89	7
40 [1.575]	5	52	40	R34.5	16	14	20.5	17.5	115	101	7

Code / Bore mm [in.]	AE	AF	AG	AH	AI	AJ	AL	AP	AS	AT	AZ
32 [1.260]	45	34	15	28.5	4	10.5	89	6.6	55.5	3.2	4
40 [1.575]	53	40	15	32.5	4	10.5	103	6.6	63.5	3.2	4

Dimensions of Single Acting Push Type (mm)

●**Axial foot mounting type** **DJSA** Bore size × Stroke **-2**



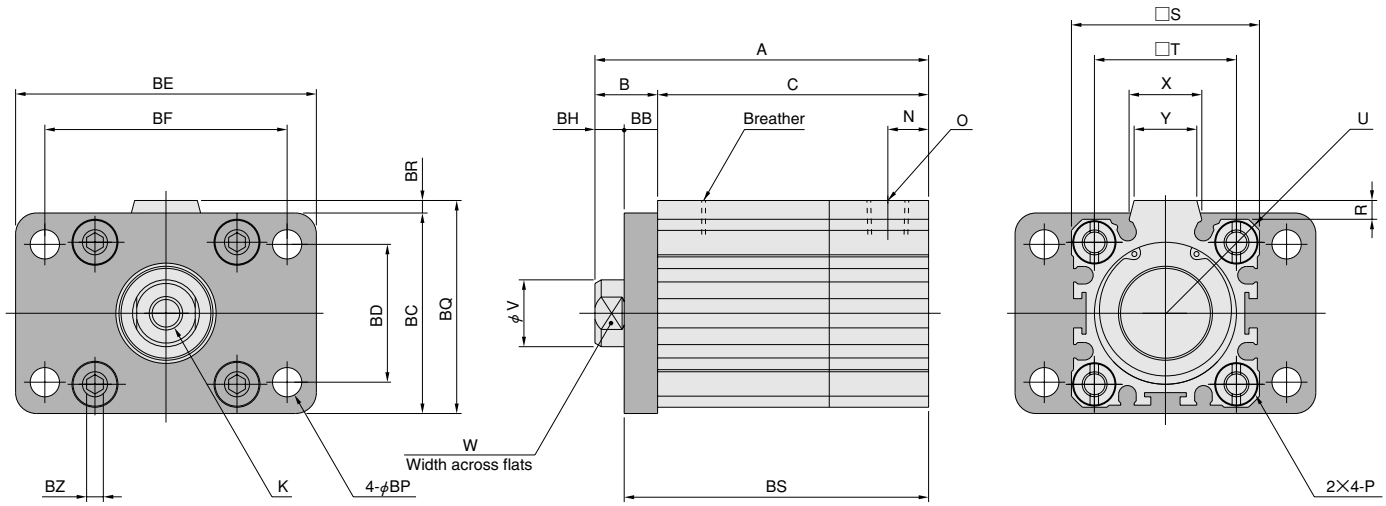
Code / Bore mm [in.]	A	B	C	K	N	O	P
32 [1.260]	74	15	59	M8×1.25 Depth 13	7.5	Rc 1/8	M6×1 Depth 12
40 [1.575]	88	17	71	M8×1.25 Depth 13	11.5	Rc 1/8	M6×1 Depth 12

Code / Bore mm [in.]	R	S	T	U	V	W	X	Y	FA	FB	FC
32 [1.260]	4.5	45	34	R30	16	14	17.4	15	73.4	24.3	40.4
40 [1.575]	5	52	40	R34.5	16	14	20.5	17.5	85.4	26.3	52.4

Code / Bore mm [in.]	FD	FE	FF	FG	FH	FI	FJ	FL	FP	FS	FT	FZ
32 [1.260]	6.5	78	65	12.5	28.5	4	10.5	64.7	6.6	55.5	3.2	4
40 [1.575]	6.5	87	73	12.5	32.5	4	10.5	78.7	6.6	63.5	3.2	4

Dimensions of Single Acting Push Type (mm)

●**Rod side flange mounting type** **DJSA** Bore size × Stroke **-3**



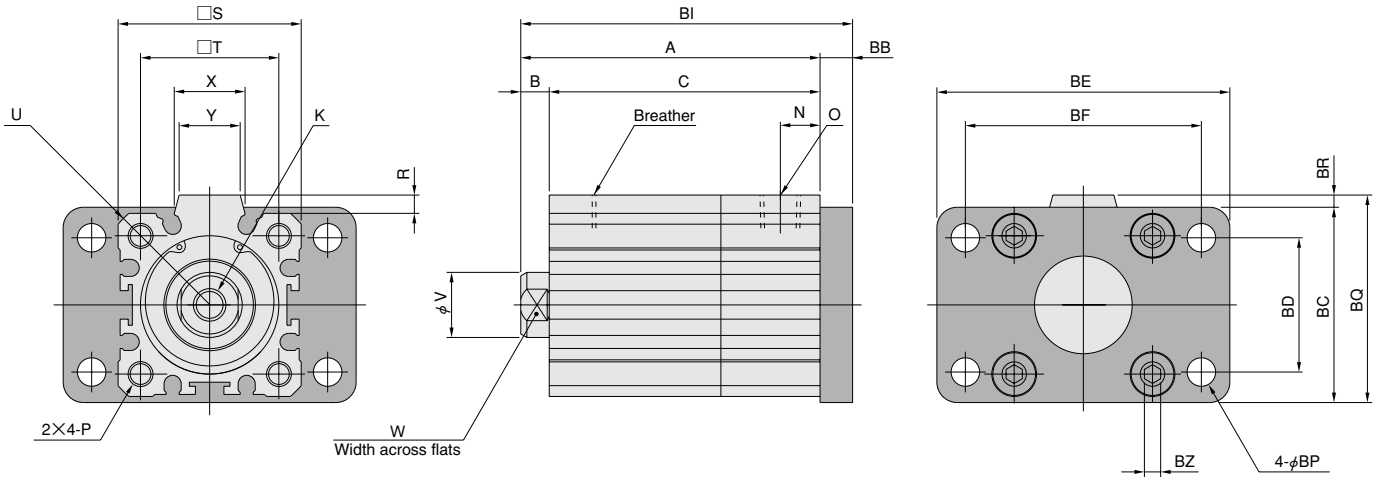
Code / Bore mm [in.]	A	B	C	K	N	O	P
32 [1.260]	74	15	59	M8×1.25 Depth 13	7.5	Rc 1/8	M6×1 Depth 12
40 [1.575]	88	17	71	M8×1.25 Depth 13	11.5	Rc 1/8	M6×1 Depth 12

Code / Bore mm [in.]	R	S	T	U	V	W	X	Y	BB	BC	BD
32 [1.260]	4.5	45	34	R30	16	14	17.4	15	8	48	33
40 [1.575]	5	52	40	R34.5	16	14	20.5	17.5	10	56	36

Code / Bore mm [in.]	BE	BF	BH	BP	BQ	BR	BS	BZ
32 [1.260]	72	58	7	7	51	3	67	4
40 [1.575]	84	70	7	7	59	3	81	4

Dimensions of Single Acting Push Type (mm)

●**Head side flange mounting type** **DJSA** Bore size × Stroke **-5**



Code / Bore mm [in.]	A	B	C	K	N	O	P
32 [1.260]	74	15	59	M8×1.25 Depth 13	7.5	Rc 1/8	M6×1 Depth 12
40 [1.575]	88	17	71	M8×1.25 Depth 13	11.5	Rc 1/8	M6×1 Depth 12

Code / Bore mm [in.]	R	S	T	U	V	W	X	Y	BB	BC	BD
32 [1.260]	4.5	45	34	R30	16	14	17.4	15	8	48	33
40 [1.575]	5	52	40	R34.5	16	14	20.5	17.5	10	56	36

Code / Bore mm [in.]	BE	BF	BI	BP	BQ	BR	BZ
32 [1.260]	72	58	82	7	51	3	4
40 [1.575]	84	70	98	7	59	3	4

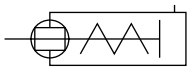
DF CYLINDERS

Non-rotating Single Acting Push Type

Features

- A thin and lightweight cylinder for precision control.
- Air leaks almost never occur with the diaphragm's perfect seal.
- With no sliding portion open to the air, solid particles are eliminated.

Symbol



Order Code

DFSAL □

DF Cylinder

Bore size×Stroke

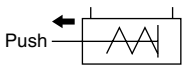
Specifications

Item \ Bore size mm [in.]	12 [0.472]	20 [0.787]	30 [1.181]	40 [1.575]
Operating type	Non-rotating single acting push type			
Media	Air			
Operating pressure range MPa {kgf/cm²} [psi.]	0.07～0.5 {0.7～5.1} [10～73]	0.02～0.5 {0.2～5.1} [3～73]		
Proof pressure MPa {kgf/cm²} [psi.]	0.75 {7.1} [109]			
Operating temperature range °C [°F]	0～60 [32～140]			
Maximum operating speed mm/s [in./sec.]	200 [7.87] (MAX.)			
Lubrication	Prohibited			
Port size	M5×0.8			
Stroke mm [in.]	3 [0.118]		5 [0.197]	
Stroke tolerance mm [in.]	±0.6 [±0.024]			
Mass g [oz.]	35 [1.23]	65 [2.29]	110 [3.88]	160 [5.64]

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.

Single acting push type



N [lbf.]

Bore size mm [in.]	Piston rod diameter mm [in.]	Operation	Pressure area mm² [in.²]	Air pressure MPa [psi.]					Spring return force	
				0.1 [15]	0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	Zero stroke	End of stroke
12 [0.472]	5 [0.197]	Single acting push type	80 [0.124]	7.4 [[1.66]	15.4 [3.46]	23.4 [5.26]	31.4 [7.06]	39.4 [8.86]	0.39 [0.0877]	0.59 [0.1326]
20 [0.787]	10 [0.394]	Single acting push type	250 [0.388]	23.2 [5.22]	48.2 [10.84]	73.2 [16.46]	98.2 [22.08]	123.2 [27.70]	0.98 [0.2203]	1.76 [0.3956]
30 [1.181]	16 [0.630]	Single acting push type	570 [0.884]	53.2 [11.96]	110.2 [24.77]	167.2 [37.59]	224.2 [50.40]	281.2 [63.21]	1.77 [0.3979]	3.77 [0.8475]
40 [1.575]	21 [0.827]	Single acting push type	1040 [1.612]	97.6 [21.94]	201.6 [45.32]	305.6 [68.70]	409.6 [92.08]	513.6 [115.46]	4.41 [0.9914]	6.37 [1.4320]

Air Flow Rate and Air Consumption

The DF cylinder's air flow rate and air consumption can be found through the following calculations.

Air flow rate $Q_1 = A^{Note} \times L \times \frac{60}{t} \times \frac{P+0.1013}{0.1013} \times 10^{-6}$

Air consumption $Q_2 = A^{Note} \times L \times n \times \frac{P+0.1013}{0.1013} \times 10^{-6}$

Q_1	: Required air flow rate for cylinder	ℓ/min (ANR)
Q_2	: Air consumption of cylinder	ℓ/min (ANR)
A	: Pressure area	mm^2
L	: Cylinder stroke	mm
t	: Time required for cylinder to travel one stroke	s
n	: Number of cylinder reciprocations per minute	times/min
P	: Operating pressure	MPa

Air flow rate $Q_1' = A'^{Note} \times L' \times \frac{60}{t} \times \frac{P'+14.696}{14.696} \times \frac{1}{1728}$

Air consumption $Q_2' = A'^{Note} \times L' \times n \times \frac{P'+14.696}{14.696} \times \frac{1}{1728}$

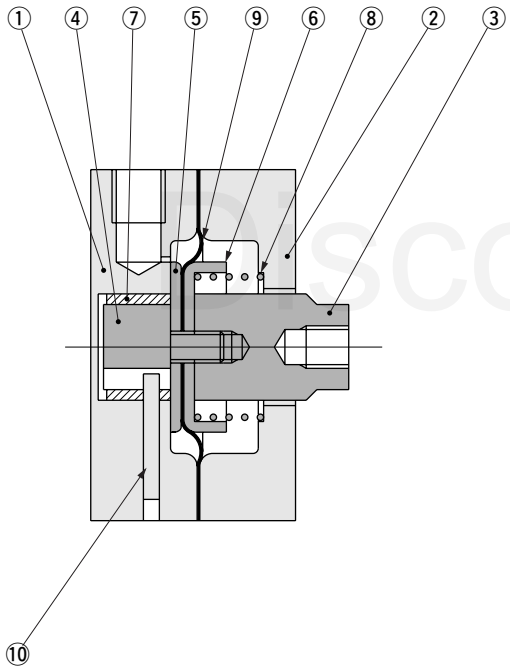
Q_1'	: Required air flow rate for cylinder	ft^3/min. (ANR)※
Q_2'	: Air consumption of cylinder	ft^3/min. (ANR)※
A′	: Pressure area	in^2
L′	: Cylinder stroke	in.
t	: Time required for cylinder to travel one stroke	sec.
n	: Number of cylinder reciprocations per minute	times/min.
P′	: Operating pressure	psi.

Note: For the pressure area, see the Thrust table on p.1391.

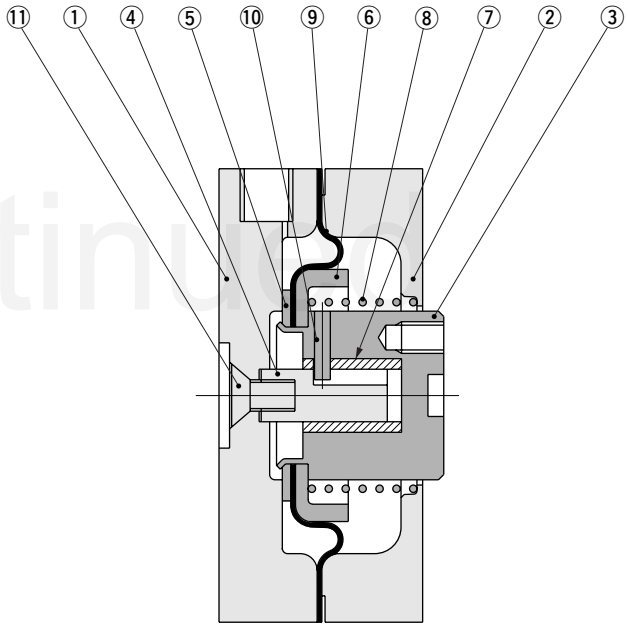
※Refer to p.42 for an explanation of ANR.

Inner Construction

● **ϕ12, ϕ20**



● **ϕ30, ϕ40**



Major Parts and Materials

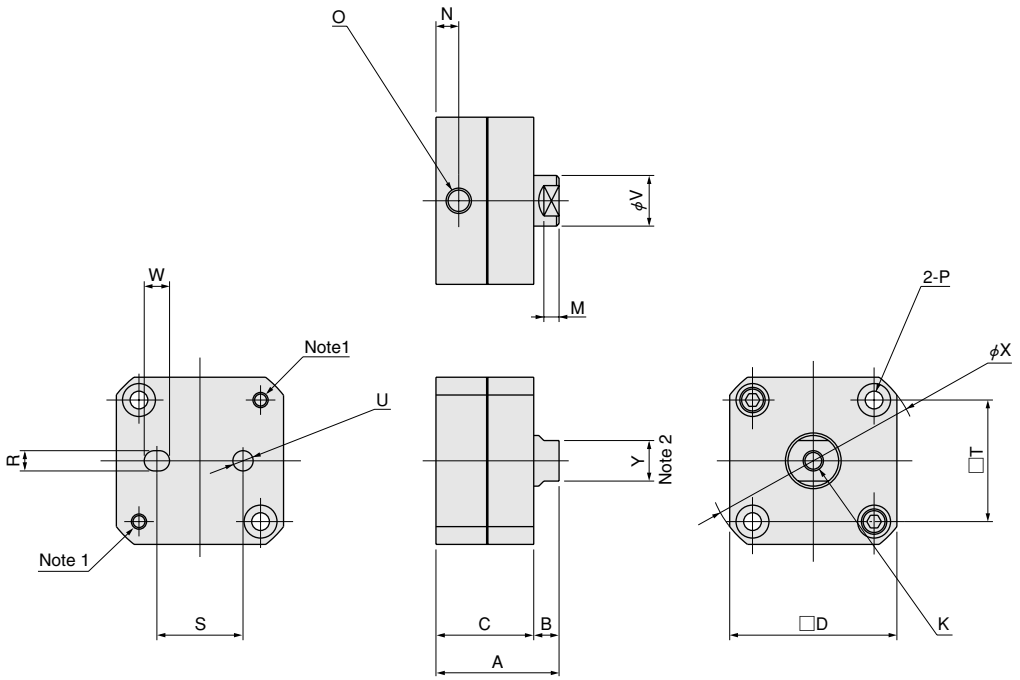
No.	Parts \ Bore mm [in.]	12 [0.472]	20 [0.787]	30 [1.181]	40 [1.575]
①	Body A	Aluminum alloy (anodized)			
②	Body B	Aluminum alloy (anodized)			
③	Rod	Stainless steel			
④	Guide rod	Stainless steel			
⑤	Retainer	Rolled steel plate (uni chrome plated)			
⑥	Piston	Rolled steel plate (uni chrome plated)			
⑦	Bushing	Plastic			
⑧	Spring	Stainless steel wire for spring			
⑨	Diaphragm	Nitrile rubber with layer cloth			
⑩	Needle roller	Steel			
⑪	Cross recessed countersunk head screw	Stainless steel			

Dimensions of DF Cylinder (mm)

DFSAL Bore size × Stroke

CAD DFSAL Bore size

● **ϕ12, ϕ20**

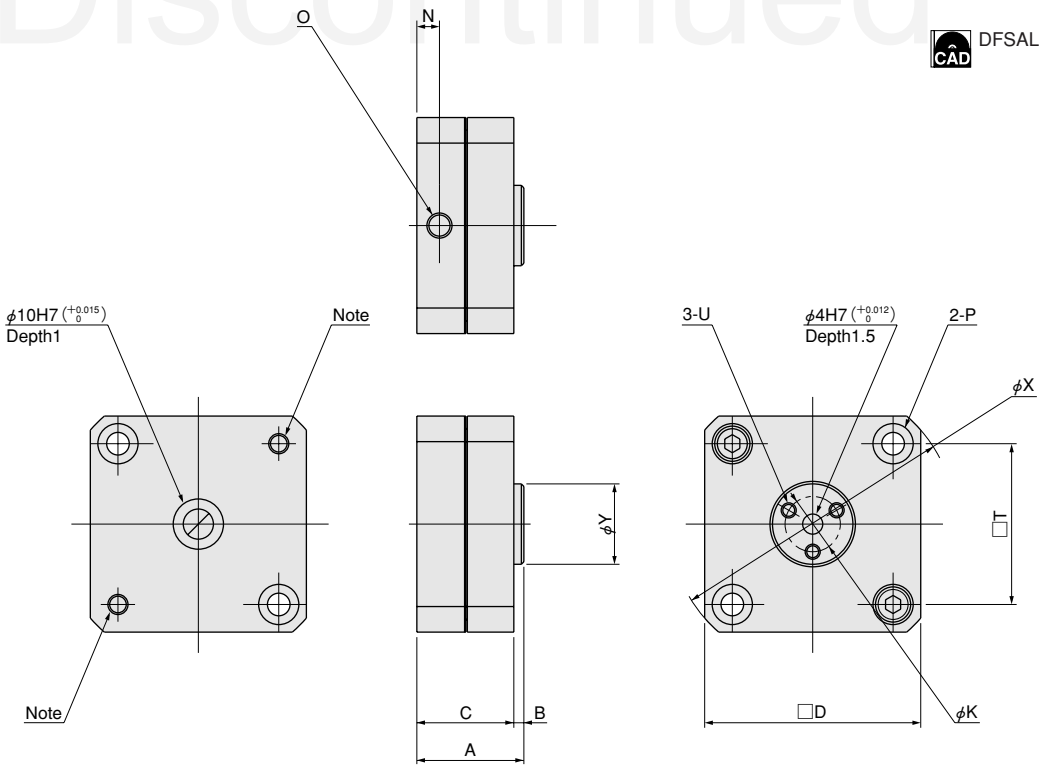


Notes: 1. Do not use these threads for mounting a cylinder.
2. Angle of the width across flats to the cylinder center line are not fixed due to the construction.

Bore mm [in.] \ Code	A	B	C	D	K	M	N	O	P	R	S	T	U	V	W	X	Y
12 [0.472]	24.3	5	19.3	25	M3×0.5 Depth 3	3	4.5	M5×0.8	ϕ3.5 (Thru hole) Counterbore ϕ6.5 Depth 3.5 (Both sides)	$4^{+0.012}_{0}$ Depth 4	15	17	ϕ4H7 $(^{+0.012}_{0})$ Depth 4	5	5	33	4
20 [0.787]	24.3	5	19.3	33	M4×0.7 Depth 4	3	4.5	M5×0.8	ϕ3.5 (Thru hole) Counterbore ϕ6.5 Depth 3.5 (Both sides)	$4^{+0.012}_{0}$ Depth 4	17	24	ϕ4H7 $(^{+0.012}_{0})$ Depth 4	10	5	42	8

● **ϕ30, ϕ40**

CAD DFSAL Bore size



Note: Do not use these threads for mounting a cylinder.

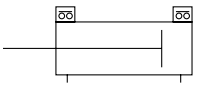
Bore mm [in.] \ Code	A	B	C	D	K	N	O	P	T	U	X	Y
30 [1.181]	21.3	2	19.3	43	11	4.5	M5×0.8	ϕ4.5 (Through hole) Counterbore ϕ8 Depth 5.5 (Both sides)	32	M3×0.5 Depth 4	57	16
40 [1.575]	21.3	2	19.3	53	16	4.5	M5×0.8	ϕ5.5 (Through hole) Counterbore ϕ9.5 Depth 5.5 (Both sides)	40	M3×0.5 Depth 4	68	21

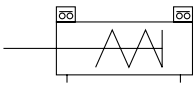
SENSOR SWITCHES

Solid State Type, Reed Switch Type

Symbols

●Double acting type ●Single acting push type





Order Code

□ □ - **DJDA**

Series
DJDA: DJ cylinder

Lead wire length
A — 1000mm [39in.]
B — 3000mm [118in.]

Sensor switch

ZE135	Solid state type	With indicator lamp	DC10～28V	Horizontal lead wire
ZE235	Solid state type	With indicator lamp	DC10～28V	Vertical lead wire
ZE155	Solid state type	With indicator lamp	DC4.5～28V	Horizontal lead wire
ZE255	Solid state type	With indicator lamp	DC4.5～28V	Vertical lead wire
ZE101	Reed switch type	Without indicator lamp	DC5～28V AC85～115V	Horizontal lead wire
ZE201	Reed switch type	Without indicator lamp	DC5～28V AC85～115V	Vertical lead wire
ZE102	Reed switch type	With indicator lamp	DC10～28V AC85～115V	Horizontal lead wire
ZE202	Reed switch type	With indicator lamp	DC10～28V AC85～115V	Vertical lead wire

●For details of sensor switches, see p.1398.

Minimum Cylinder Strokes when Using Sensor Switches

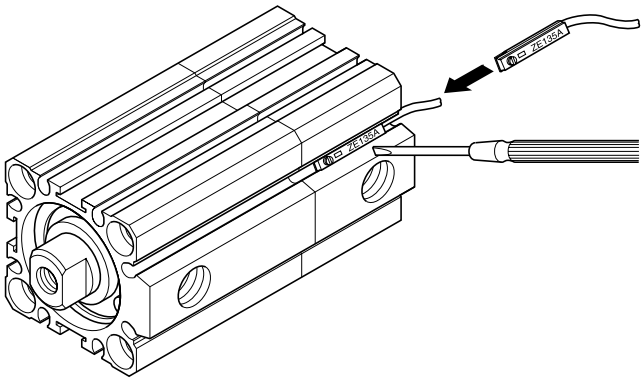
mm [in.]

Type \ Mounting / Bore size		2 pcs. mounting			1pc. mounting
		1-surface mounting		2-surface mounting	
		1-groove mounting	2-groove mounting		
Solid state type	20~50 [0.787~1.969]	20Note	10	10	10
Reed switch type	20~50 [0.787~1.969]	20Note	10	10	10

Note: The figures in the above table assume that the opposite end surfaces of the lead wires are mounted facing each other around the cylinder center.

Moving Sensor Switch

- Loosening the mounting screw allows the sensor switch to be moved along the switch mounting groove on the cylinder body.
- Tighten the mounting screw with a tightening torque of 0.1~0.2N·m {1~2kgf·cm} [0.9~1.8in·lbf]. Overtightening could damage the sensor switch and actuator.



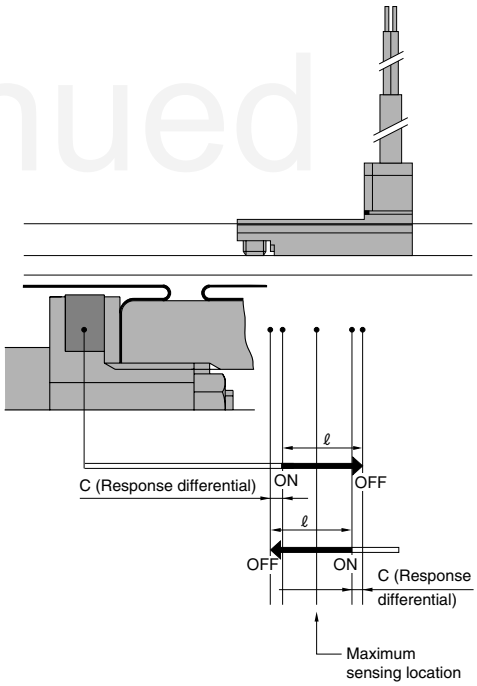
Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

●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.



●Solid state type

mm [in.]

Item \ Bore size	20 [0.787]	32 [1.260]	40 [1.575]	50 [1.969]
Operating range: ℓ	2.0~6.0 [0.079~0.236]	3.0~7.0 [0.118~0.276]	3.0~7.0 [0.118~0.276]	4.0~8.0 [0.157~0.315]
Response differential: C	1.0 [0.039] or less			
Maximum sensing location	6 [0.236]			

Note: These are values measured from the other end side of the lead wire. The above table shows reference values.

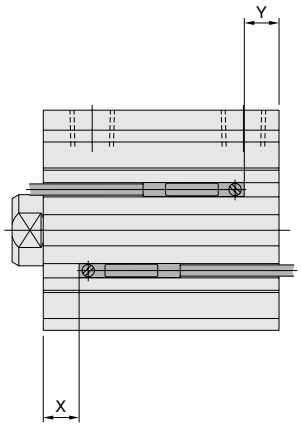
●Reed switch type

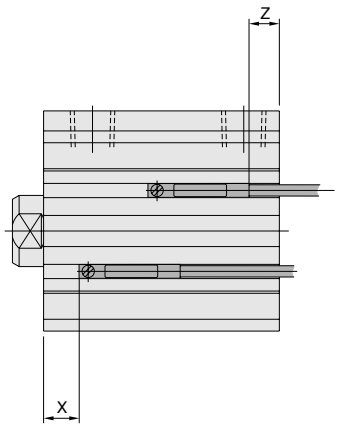
mm [in.]

Item \ Bore size	20 [0.787]	32 [1.260]	40 [1.575]	50 [1.969]
Operating range: ℓ	8.0~12.0 [0.315~0.472]	10.0~14.0 [0.394~0.551]	11.0~15.0 [0.433~0.591]	12.0~16.0 [0.472~0.630]
Response differential: C	1.5 [0.059] or less			
Maximum sensing location	10 [0.394]			

Note: These are values measured from the other end side of the lead wire. The above table shows reference values.

Mounting Location of End of Stroke Detection Sensor Switch





■Standard cylinder: Double acting type and single acting push type

●Solid state type: Double acting type

mm [in.]

Bore size / Stroke / Code	20 [0.787]	32 [1.260]		40 [1.575]		50 [1.969]	
	10～20	10	20～30	10	20～40	20	30～50
X	9 [0.354]	21.5 [0.846]	11.5 [0.453]	24.3 [0.957]	14.3 [0.563]	25 [0.984]	15 [0.591]
Y	22.5 [0.886]	37.5 [1.476]		50.7 [1.996]		61 [2.402]	
Z Note	19 [0.748]	34 [1.339]		47.2 [1.858]		57.5 [2.264]	

Note: The values show the horizontal lead wire type.
The vertical lead wire type is 0.5mm [0.020in.] longer.

●Reed switch type: Double acting type

mm [in.]

Bore size / Stroke / Code	20 [0.787]	32 [1.260]		40 [1.575]		50 [1.969]	
	10～20	10	20～30	10	20～40	20	30～50
X	5 [0.197]	17.5 [0.689]	7.5 [0.295]	20.3 [0.799]	10.3 [0.406]	21 [0.827]	11 [0.433]
Y	18.5 [0.728]	33.5 [1.319]		46.7 [1.839]		57 [2.244]	
Z Note	16 [0.630]	31 [1.220]		44.2 [1.740]		54.5 [2.146]	

Note: The values show the horizontal lead wire type.
The vertical lead wire type is 0.5mm [0.020in.] longer.

●Solid state type: Single acting push type

mm [in.]

Code / Bore size	20 [0.787]	32 [1.260]	40 [1.575]
X	8.5 [0.335]	11.5 [0.453]	18 [0.709]
Y	15.5 [0.610]	25.5 [1.004]	31 [1.220]
Z Note	12 [0.472]	22 [0.866]	27.5 [1.083]

Note: The values show the horizontal lead wire type.
The vertical lead wire type is 0.5mm [0.020in.] longer.

●Reed switch type: Single acting push type

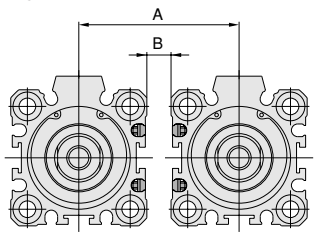
mm [in.]

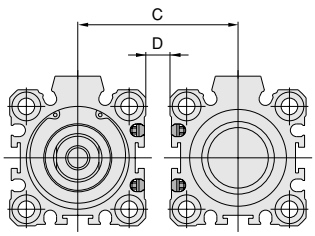
Code / Bore size	20 [0.787]	32 [1.260]	40 [1.575]
X	4.5 [0.177]	7.5 [0.295]	14 [0.551]
Y	11.5 [0.453]	21.5 [0.846]	27 [1.063]
Z Note	9 [0.354]	19 [0.748]	24.5 [0.965]

Note: The values show the horizontal lead wire type.
The vertical lead wire type is 0.5mm [0.020in.] longer.

When Mounting DJ Cylinders with Sensor Switches in Close Proximity

● If mounting a multiple number of DJ cylinders with sensor switches in close proximity to each other, always preserve spacing intervals for mounting as shown below to prevent mutual magnetic interference.





mm [in.]

Bore size	Solid state type				Reed switch type			
	A	B	C	D	A	B	C	D
20 [0.787]	41 [1.61]	5 [0.20]	43 [1.69]	7 [0.28]	36 [1.42]	0	41 [1.61]	5 [0.20]
32 [1.260]	56 [2.20]	11 [0.43]	56 [2.20]	11 [0.43]	45 [1.77]	0	59 [2.32]	14 [0.55]
40 [1.575]	64 [2.52]	12 [0.47]	64 [2.52]	12 [0.47]	58 [2.28]	6 [0.24]	67 [2.64]	15 [0.59]
50 [1.969]	79 [3.11]	15 [0.59]	79 [3.11]	15 [0.59]	64 [2.52]	0	80 [3.15]	16 [0.63]

Discontinued