# **KNOCK CYLINDERS**

**Single Acting Push Type** 

#### Symbol



### Specifications

Bo	re size mm [in.]	6 [0.236]	10 [0.394]	16 [0.630]		
Operation type		Sing	le Acting Push 1	Гуре		
Media			Air			
Operating press	ure range MPa [psi.]	0.2~0.7 [29~102]	0.15 <sup>.</sup> [22~	~0.7 102]		
Proof pressure	MPa [psi.]		1.03 [149]			
Operating temperature	range °C [°F]	0~60 [32~140]				
Operating spee mm	d range /s [in./sec.]	$50 \sim 500$ (In applications with high load ratio or high $[2.0 \sim 19.7]$ (speed, use externally mounted stopper.)				
Cushion			None			
Lubrication		Not required (If lubrication is	required, use Turbine Oil Class	1 [ISO VG32] or equivalent.)		
Mounting type		Panel mo	unt, Foot mount, Ins	ert mount		
Port size			M5×0.8			
Stroke toleranc	e mm [in.]		$^{+1}_{0} \begin{bmatrix} +0.039\\ 0 \end{bmatrix}$			

### Cylinder Thrust (Push Side)

							N [lbf.]			
Bore size	Pressure area mm²[in.²]		Air pressure MPa [psi]							
mm [in.]		0.2 [29]	0.3 [44]	0.4 [58]	0.5 [73]	0.6 [87]	0.7 [102]			
6 [0.236]	28.3 [0.0439]	2.3 [0.52]	5.1 [1.15]	7.9 [1.78]	10.8 [2.43]	13.6 [3.06]	16.4 [3.69]			
10 [0.394]	78.5 [0.1216]	8.3 [1.87]	16.2 [3.64]	24.0 [5.40]	31.9 [7.17]	39.7 [8.92]	47.6 [10.70]			
16 [0.630]	201 [0.312]	25.5 [5.73]	45.6 [10.25]	65.7 [14.77]	85.8 [19.29]	105.9 [23.81]	126.0 [28.32]			

### Order Codes for Single Acting Push Type



#### Remark: For the cylinder joint and cylinder rod end mounted on the piston rod end, see p.1568.

### Bore Size and Stroke

	mm
Bore size	Standard strokes
6	
10	5, 10, 15
16	

#### Mass

				g [oz.]				
Mounting type	Bore size	Stroke mm						
wounting type	mm	5	10	15				
Panal mount	6	13 [0.459]	15 [0.529]	17 [0.600]				
Parlet mount	10	28 [0.988]	31 [1.093]	35 [1.235]				
insen mount	16	77 [2.716]	85 [2.998]	94 [3.316]				
	6	29 [1.023]	31 [1.093]	33 [1.164]				
Foot mount	10	58 [2.046]	61 [2.152]	65 [2.293]				
	16	166 [5.855]	174 [6.138]	183 [6.455]				

Remarks: 1. One mounting nut is included with the panel mount and insert mount.

2. Two mounting bolts with foot mounting brackets are included with the foot mount.

### **Spring Return Force**

		N [lbf.]
Bore size mm [in.]	Zero stroke	End of stroke
6 [0.236]	1.5 [0.34]	3.4 [0.76]
10 [0.394]	2.5 [0.56]	7.4 [1.66]
16 [0.630]	5.4 [1.21]	14.7 [3.30]

Remarks: 1. Avoid application that carries loads on the spring return side. 2. This value is virtually constant regardless of the cylinder stroke.

### Inner Construction and Major Parts (Figure below shows insert mount type)



### **Major Parts and Materials**

No	Dorto	Mate	erials
INO.	Faits	Standard specification	Non-ion specification
1	Cylinder body	Brass (nickel plated)	Special steel
2	Piston, Piston rod	Stainless steel	+
3	Rod bushing	Phosphor bronze	Special steel
4	Spring	Steel (zinc plated)	←
5	Piston seal	Synthetic rubber (NBR)	+
6	Mounting nut	Brass (nickel plated)	Special steel
1	Rod end nut	Steel (nickel plated)	+
8*	Gasket	Synthetic rubber (NBR)	←

\* The gasket is for the insert mount only.

### Dimensions of Panel and Insert Mount Type (mm)



#### Insert mounting hole



Stroy		BA		BB			BC	BD	BE	BF
Bore	5	10	15	5	10	15				
6	17.4±0.2	$24.4 \pm 0.2$	31.4±0.2	13 or more	15 or more	15 or more	2	9	4 or less	10 <sup>+0.15</sup> +0.05
10	19.4±0.2	$25.9 \pm 0.2$	$32.9 \pm 0.2$	15 or more	18 or more	18 or more	2	12.7	4 or less	14 <sup>+0.15</sup> +0.05
16	21.4±0.2	27.4±0.2	33.9±0.2	17 or more	20 or more	20 or more	2.5	20.4	4 or less	22 <sup>+0.15</sup> +0.05

### Dimensions of Foot Mount Type (mm)



Code Strok		Α		В		С		Е		F		G	н	I	J	K	L	Lo	S	Т	U	V	AB	AD	AE
Bore	5	10	15		5	10	15		5	10	15														
6	29	36	43	13	16	23	30	9	11.5	13	13	2.5	7	5.5	1.8	M3×0.5	M10×1	10 _0_05	13.9	12	8.5	3	17.5	4.5	22
10	34.5	41	48	16.5	18	24.5	31.5	12	13.5	16.5	16.5	3	10	7	2.4	M4×0.7	M14×1.25	$14_{-0.05}^{0}$	18.5	16	12.3	5	21	4.5	32
16	39.5	45.5	52	19.5	20	26	32.5	14	15.5	18	18	4	12	8	3.2	M5×0.8	M22×1.5	22 _0_05	27.7	24	20	6	25.5	6	42

Strok	AF	AF AG		AG		AG		AG		AG		AG		AG		AG		AI	AO	AP	AQ	AR	AT	AX	AY
Bore		5	10	15					(Comes with foot mounting bracket)																
6	14	11.5	18.5	25.5	14	7	(5.3)	$\phi$ 3.4 Counterbore $\phi$ 6.2 Depth 3.3	Hexagon socket head bolt $\text{M3}{\times}0.5$ Below head length 16	3	9	13.9	12												
10	20	13.5	20	27	20	10	(6.4)	$\phi$ 4.5 Counterbore $\phi$ 7.8 Depth 4.4	Hexagon socket head bolt $\rm M4{\times}0.7$ Below head length 22	4	9	19.6	17												
16	30	14	20	26.5	32	16	(8.4)	$\phi$ 5.5 Counterbore $\phi$ 9.5 Depth 5.4	Hexagon socket head bolt $\text{M5}\times 0.8$ Below head length 35	5	12	31.2	27												

# **SENSOR SWITCHES**

Solid State Type, Reed Switch Type

### Symbol



### Order Codes (For Sensor Switches Only)

		Sensor switch model	<ul> <li>Option</li> <li>Lead wire</li> <li>length</li> </ul>	With — sensor — holder
Solid state type With indicator lamp	DC10~28V	ZC130		
Solid state type With indicator lamp	DC4.5~28V	ZC153	A	
Reed switch type Without indicator lamp	DC5~28V AC85~115V	CS5T	В	-NDA5
Reed switch type With indicator lamp	DC10~28V	CS11T		
	●A : ●B : ●Thu	1000mm [39in.] 3000mm [118in.] e same sensor h $\phi$ 6, $\phi$ 10, and $\phi$	older is used − ↓ 16.	
		<ul> <li>For sense</li> <li>Order coordinate</li> <li>C1-NDAS</li> </ul>	or switch detail de for the sens	s, see p.1544. or holder only.

### **Moving Sensor Switch**

- Loosening mounting screw allows the sensor switch to be moved freely in the cylinder's axial direction.
- Tighten the mounting screw with a tightening torque of 19.6N-cm [1.73in·lbf] or less.



# Minimum Cylinder Stroke When Using Sensor Switch

				mm [in.]
Poro oizo	Solid state type	e sensor switch	Reed switch typ	e sensor switch
Bore size	Mounting 2 pcs.	Mounting 1 pc.	Mounting 2 pcs.	Mounting 1 pc.
6 [0.236]	_	_		_
10 [0.394]	5	5 [0 197]	10 [0 394]	5 [0 197]
16 [0.630]	[0.107]	[0.107]	[0.00 1]	[0.107]

Remark: In the reed switch type sensor switch, 1 sensor switch installation is standard for the 5mm cylinder stroke.

### 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.

				mm [in.]		
	ZC130□,	ZC153	CS5T , CS11T			
Bore Size	Operating range	Response differential	Operating range	Response differential		
6 [0.236]	2.5~4.0	0.3 [0.012]	3.5~7.5	1.3 [0.051]		
	[0.098~0.157]	or less	[0.138~0.295]	or less		
10 [0.394]	2.0~4.0	0.3 [0.012]	3.5~8.5	1.6 [0.063]		
	[0.079~0.157]	or less	[0.138~0.335]	or less		
16 [0.630]	2.5~4.0	0.3 [0.012]	5.0~10.5	1.9 [0.075]		
	[0.098~0.157]	or less	[0.197~0.413]	or less		

Remark: The above table shows reference values.



### Mounting Location of End of Stroke Detection Sensor Switch

#### For strokes 5 and 10



					mm [in.]
Bore size	Mounting	Sensor switch model			
	location	ZC130	ZC153	CS5T	CS11T
6, 10 [0.236, 0.394]	Х	10 [0.394]		8.5 [0.335]	12 [0.472]
	Y	5 [0.197]		3.5 [0.138]	7 [0.276]
16	Х	10.5 [0.413]		9 [0.354]	12.5 [0.492]
[0.630]	Y	5.5 [0	).217]	4 [0.157]	7.5 [0.295]



Remarks: 1. The table at left gives reference values for the standard strokes. For the procedure to find-out the best position, see p.92.

- The above figures show the piping connection port when it has been turned to face upward.
- Mount the sensor switch so that the surface showing the model marking faces up.
   Sensor holder (A) is not available for the 5mm and 10mm strokes,
- 4. Sensor holder (A) is not available for the 5mm and 10mm strokes, and only sensor holder (B) is available. Two sensor switches can be mounted with a single sensor holder (B). In this case, the sensor switch mounting position on the rod side becomes the Y dimension (shown in the figure) + stroke.

### Dimensions of Sensor Switch Mounting (mm)

- \$\phi\$ 6 [0.236in.]
- \$\phi\$ 10 [0.394in.]







#### Double acting type

- 1. In applications with high load ratio or high speed, use an externally mounted stopper to prevent direct shock to the cylinder.
- Do not let the tightening torque for the mounting nut exceed the figures in the table below.

Bore size	Maximum tightening torque	
6 [0.236in.]	1079 [95.5]	
10 [0.394in.]	1275 [113]	
16 [0.630in.]	1961 [174]	

#### Single acting push type

1. Using the centering location on the body can improve mounting precision on panel mounting. In addition, set the end face of the wrench flat as a reference plane does not need any adjustment of the rod end position. Moreover, the rod end position can be freely set through the use of cylindrical spacer matching the outer diameter of the cylinder body. For the maximum thickness of the panel, use the values in the table below as guidelines.





	-
Bore size	Maximum panel thickness
6 [0.236]	8 [0.315]
10 [0.394]	9 [0.354]
16 [0.630]	10 [0.394]

2. Do not let the tightening torque for the mounting nut exceed the figures in the table below.

Bore size	Maximum tightening torque	
6 [0.236in.]	1226 [109]	
10 [0.394in.]	1716 [152]	
16 [0.630in.]	4903 [434]	

3. Let the surface roughness of the bottom of the insert mounting hole (gasket seat surface) be of medium finish (▽▽). Moreover, mounting without a gasket can be done by applying a sealing agent to the thread of the body.





Sensor switches

#### Double acting type

#### • Setting the head side stroke end

- 1. Push piston rod to the fully retracted position.
- 2. Install a sensor switch in a holder without tightening a mounting screw all the way, move the switch from head side to rod side until it turns ON (for ZC130, ZC153, CS11T, when the LED lights up), then move the switch 1 notch (= 1mm [0.039in.]) for ZC130 and ZC153, or 2 notches (= 2mm [0.079in.]) for CS5T and CS11T toward the rod side, and tighten the mounting screw.



#### •Setting the rod side stroke end

Conduct the same procedure as the head side, but on the reversed way.

- 1. Pull piston rod to the fully extended position.
- Install a sensor switch in a holder without tightening a mounting screw all the way, move the switch from rod side to head side until it turns ON, then move the switch 1 notch (=1mm [0.039in.]) for ZC130, ZC153, or 2 notches (=2mm [0.079in.]) for CS5T and CS11T toward head side and tighten the mounting screw.



#### Caution when installing cylinder with sensor switch



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

When installing 2 or more knock cylinders with magnets, which are located close to each other in parallel, follow the conditions shown below.



Bore size	ℓ dimension
6 [0.236in.]	23mm [0.906in.] or more
10 [0.394in.]	24mm [0.945in.] or more
16 [0.630in.]	26mm [1.024in.] or more