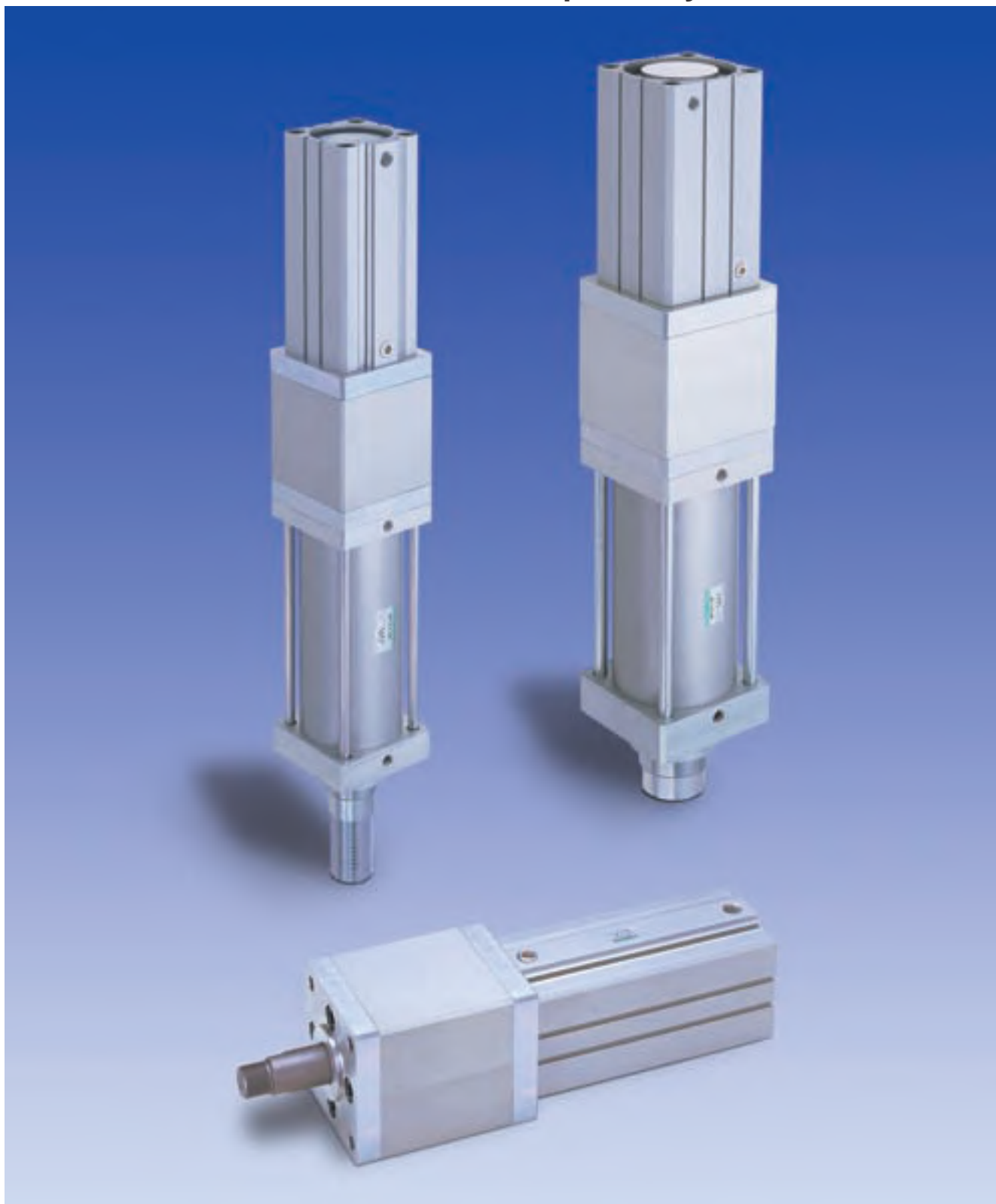


# Mechanical power cylinder MCP Series

## Mechanical power cylinder MCP Series



**Realize high thrust at any position using  
only a pneumatic pressure source!  
Incorporate flexibly into a multiple production line**

## **Mechanical power cylinder**

# **MCP Series**

Only pneumatic units are used for driving.  
Since no hydraulic devices such as pneumatic units  
or high-pressure hoses are used with this eco-friendly  
cylinder, no waste oil is generated.

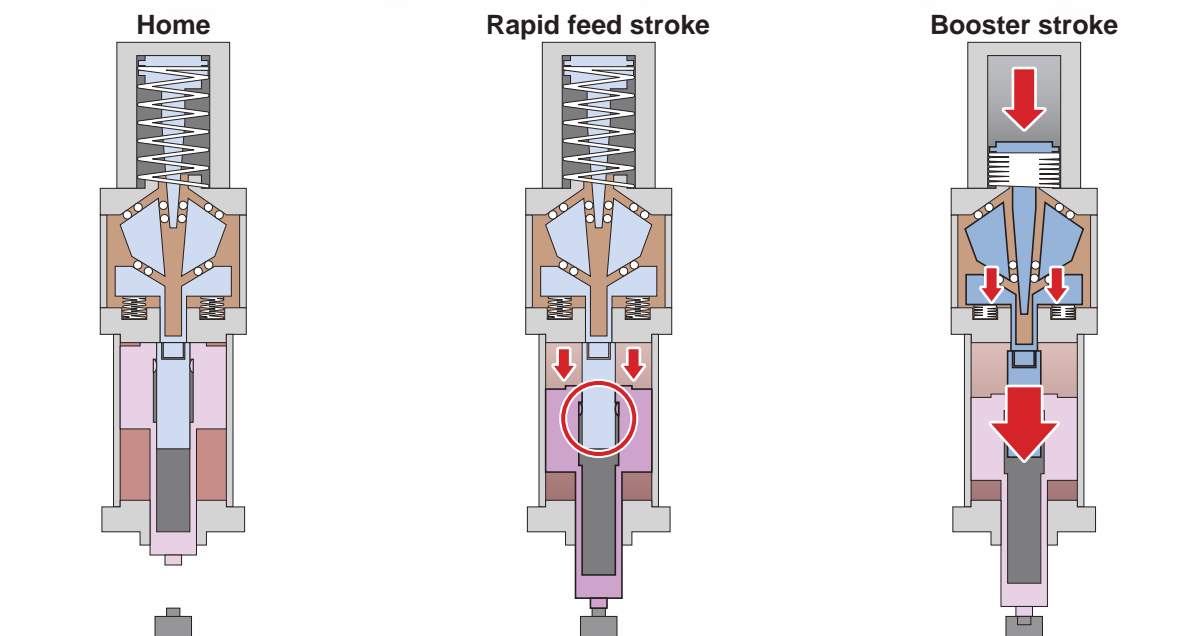
- Thrust eight times higher than a cylinder with the same bore size is achieved during boosting.
- Space saving design needs no dedicated units.
- Oil-free is used, eliminating the need for maintenance such as lubrication and oil replacement.
- Free installation

# RoHS

### **RoHS-Compatible**

All substances adversely affecting the environment, including lead and hexavalent chrome, have been eliminated.

## ■ Operation principle



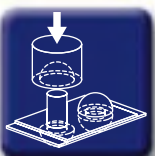
When the rapid feed section's cylinder contacts the workpiece, the red section is coupled by the internal mechanism.

After coupling, force is conveyed to the rapid feed section by operating the booster section, generating high thrust.

**Boost power at a random position!**

**x8**

■ **Application**



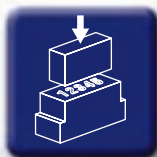
Caulking



Press-fit



Punch



Stamp



Bending



Rivetting



Chopping



POWER



# Safety precautions

Always read this section before starting use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.

Observe warnings and precautions to ensure device safety.

Check that device safety is ensured, and manufacture a safe device.

## WARNING

**1 This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience in handling.**

**2 Use this product in accordance of specifications.**

This product must be used within its stated specifications. It must not be modified or machined.

This product is intended for use as a general-purpose industrial device or part. It is not intended for use outdoors or for use under the following conditions or environment.

(Note that this product can be used when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)

① Use for special applications including nuclear energy, railway, aircraft, marine vessel, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.

② Use for applications where life or assets could be adversely affected, and special safety measures are required.

**3 Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.**

ISO4414, JIS B8370 (pneumatic system rules)

JFPS2008 (principles for pneumatic cylinder selection and use)

Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.

**4 Do not handle, pipe, or remove devices before confirming safety.**

① Inspect and service the machine and devices after confirming safety of the entire system related to this products.

② Note that there may be hot or charged sections even after operation is stopped.

③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.

④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

**5 Observe warnings and cautions on the pages below to prevent accidents.**

■ The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.



**DANGER** : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.



**WARNING** : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.



**CAUTION** : When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.

In any case, important information that must be observed is explained.

### Disclaimer

1. CKD cannot be held liable for any business interruption, loss of profit, personal injury, delay cost, or any other ancillary or indirect loss, cost, or damage resulting from the use of or faults in the use of CKD products.

2. CKD cannot be held responsible for the following damage.

① Damage resulting from disaster or failure of CKD parts due to fire from reasons not attributable to CKD, or by intentional or negligence of a third party or customer.

② When a CKD product is assembled into customer equipment, damage that could have been avoided if customer equipment were provided with functions and structure, etc., generally accepted in the industry.

③ Damage resulting from use exceeding the scope of specifications provided in CKD catalogs or instruction manuals, etc., or from actions not following precautions for installation, adjustment, or maintenance, etc.

④ Damage resulting from product modifications not approved by CKD, or from faults due to combination with other software or other connected devices.



## Pneumatic components

# Safety precautions

Always read this section before starting use.

Refer to "Pneumatic Cylinders (No. CB-029SA)" for the general cylinder or cylinder switch.

### Mechanical power cylinder MCP Series

## Design & Selection

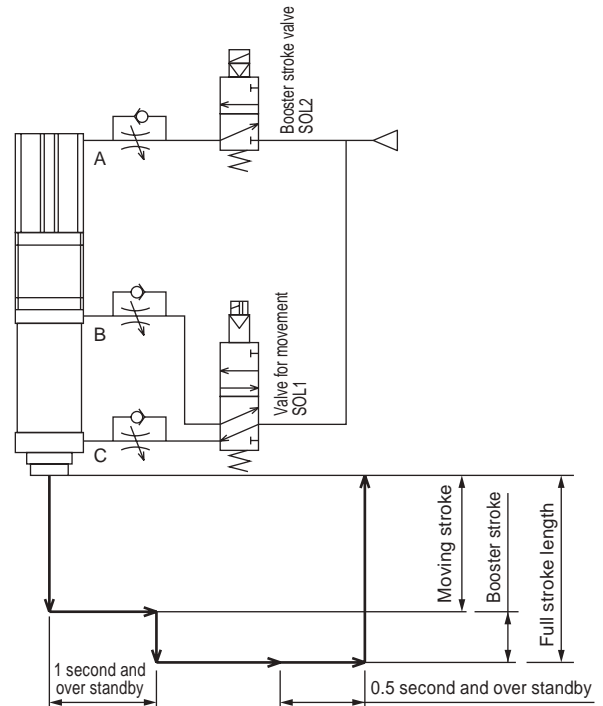
### ⚠ DANGER

- Before starting, supply air to the travel section's retract side to apply back pressure. Otherwise the piston rod could pop out and pose a hazard.

### ⚠ CAUTION

- Check that no imbalance load is applied to the piston rod.
- Do not use several cylinders in synchronization.
- Check that the reactionary force is not applied to the piston rod after the boosting stroke.
- Avoid applying rotary torque to the piston rod. Use with a mechanism in which the rod does not rotate.
- Provide sufficient allowance in the travel section stroke when using the boosting stroke. Example: If the working cylinder's travel stroke is 100 mm and the boosting stroke is 10 mm, the travel stroke actually used must start doubling within 85 mm.
- Otherwise the rod could pop out and damage the cylinder after the workpiece is punched out. For punching, provide an external cushioning stopper.
- After force is boosted, provide a time lag of 0.5 seconds or more between booster section retract travel and travel section retraction. If the moving section retracts before the power stroke cylinder, the cylinder could be damaged if the power stroke cylinder pops out when coupling is released. Do not use metering out for the power stroke cylinder. Otherwise the power stroke cylinder could pop out and damage the cylinder when coupling is released.
- Use discrete solenoid valves for booster and moving sections. When assembling into a manifold, provide measures such as discrete exhaust spacers.
- Do not advance the power stroke cylinder simultaneously with the end of the travel section advance because a coupling fault could occur. Provide a time lag of one second or longer from after the travel section moves forward and contacts the workpiece to when the booster section starts traveling.

### Circuit



Solenoid valve	Moving stroke	Booster stroke
Operation state	SOL1	SOL2
Moving stroke advance	ON	OFF
Moving stroke end	ON	OFF
1 second and over standby	ON	OFF
Booster stroke advance	ON	ON
Booster stroke return Note 1	ON	OFF
0.5 second and over standby	ON	OFF
Moving stroke return	OFF	OFF

Note 1: The piston rod does not retract when the boosting stroke retracts.

- If used near a welding machine, etc., the cylinder could be magnetized by the magnetic field generated and cause the cylinder field to malfunction. Use this cylinder in an environment free of magnetic fields.

## Installation & Adjustment

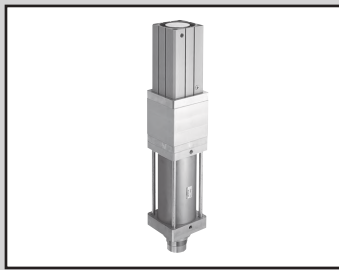
### CAUTION

- Do not disassemble.
- Check that tightening torque is not applied to the cylinder. When fixing the workpiece onto the end of the piston rod, use a wrench.

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MEMO

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Mechanical power cylinder

# MCP Series

● Thrust: 2t/5t

RoHS

## Specifications

Descriptions		Thrust	
		2 (2t)	5 (5t)
Working fluid		Compressed air	
Actuation		Rapid feed section: double acting booster section: single acting extend type	
Min. working pressure	MPa	0.30	
Max. working pressure	MPa	0.60	
Withstanding pressure	MPa	1.0	
Ambient temperature	°C	-5 to 60 (no freezing)	
Rod end form		Female thread (male thread is option.)	
Rapid feed stroke	mm	Max.500	
Booster stroke	mm	10 <sup>+5</sup> <sub>0</sub>	
Rapid feed port size		Rc1/4	Rc3/8
Booster section port size		Rc3/8	
Rapid feed working piston speed	mm/s	Max.300	
Booster section working piston speed	mm/s	Max.50	
Booster section theoretical thrust (Advance) Note 1	0.30MPa	S = 12318 W = 14625	S = 30074 W = 34597
	0.40MPa	S = 16424 W = 19501	S = 40099 W = 46130
	0.50MPa	S = 20531 W = 24377	S = 50124 W = 57663
	0.60MPa	S = 24637 W = 29252	S = 60149 W = 69195
Rapid feed section theoretical thrust (return) N		Φ80 pneumatic cylinder or equivalent (0.5MPa: Approx. 2600)	Φ120 pneumatic cylinder or equivalent (0.5MPa: Approx. 4700)

Note 1: Actual thrust is 80% of theoretical thrust.

## Air consumption

Air consumption per reciprocation of booster stroke (L)

Pressure (MPa)	0.3	0.4	0.5	0.6
2t	2.51	3.13	3.76	4.38
5t	6.13	7.65	9.18	10.70

Air consumption per 100 mm reciprocation for travel stroke(L)

Pressure (MPa)	0.3	0.4	0.5	0.6
2t	5.28	6.60	7.91	9.23
5t	9.95	12.43	14.91	17.39

## Stroke length

Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)	Min. stroke length with switch (mm)
50,100,150,200,250,300,350,400,450,500	500	50	50

### Switch specifications (T type switch)

● 1 color/2 color indicator

Descriptions	Proximity 2 wire	Proximity 2 wire			Proximity 3 wire				Reed 2 wire						
	T1H/T1V	T2H/T2V/ T2JH/T2JV	T2YH/ T2YV	T2WH/ T2WV	T3H/ T3V	T3PH/ T3PV (custom order)	T3YH/ T3YV	T3WH/ T3WV	T0H/T0V		T5H/T5V		T8H/T8V		
Applications	Programmable controller, relay, small solenoid valve	Programmable controller			Programmable controller, relay				Programmable controller, relay		Programmable controller, relay, IC circuit (w/o indicator light), serial connection		Programmable controller, relay		
Output method	-				NPN output	PNP output	NPN output	NPN output	-						
Power voltage	-				10 to 28 VDC				-						
Load voltage	85 to 265 VAC	10 to 30 VDC		24 VDC ±10%	30 VDC or less				12/24 VDC	100/110 VAC	5/12/24 VDC	100/110 VAC	12/24 VDC	110 VAC	220 VAC
Load current	5 to 100mA	5 to 20mA (Note 1)			100mA or less		50mA or less		5 to 50mA	7 to 20mA	50mA or less	20mA or less	5 to 50mA	7 to 20mA	7 to 10mA
Light	LED (ON lighting)	LED (ON lighting)	Red/green LED (ON lighting)	Red/green LED (ON lighting)	LED (ON lighting)	Green LED (ON lighting)	Red/green LED (ON lighting)	Red/green LED (ON lighting)	LED (ON lighting)		Without indicator light		LED (ON lighting)		
Leakage current	At 100VAC 1mA or less, 200VAC 2mA or less	1mA or less			10μA or less				0mA						

### Cylinder weight

● MCP-S. Booster stroke only

Unit: kg

Descriptions	Product weight of stroke length 10st		Increase per 100 mm	Increase for male threads (N)
	Basic type (00)	Rod end flange type (FA)		
MCP-S-2-10	14.3	16.9	-	0.4
MCP-S-5-10	36.1	43.4	-	1.2

● MCP-W. Rapid feed + Booster stroke

Unit: kg

Descriptions	Product weight of stroke length 0mm		Increase per 100 mm	Increase for male threads (N)
	Basic type (00)	Rod end flange type (FA)		
MCP-W-2	24.3	26.9	1.9	0.95
MCP-W-5	63.8	71.1	4.5	4.6

## How to order

Without switch

**MCP-W** - **00** - **2** - **100** - **N**

With switch

**MCP-W** - **00** - **2** - **100** - **T2H** - **R** - **N**

**A** Model no.

**B** Mounting style

**C** Thrust

**D** Stroke length  
Note 1

**E** Switch model no.  
\* indicates lead wire length.

**F** Switch quantity

**G** Option

### ⚠ Note on model no. selection

Note 1: For MCP-S, stroke = Booster stroke = 10 mm fixed.

**D** stroke length can not be selected.

(Example of model number 1)

**MCP-W-00-2-100-T2H-D-N**

Model: Mechanical power cylinder MCP Series

**A** Model no. : Rapid feed + Booster stroke

**B** Mounting style : Basic type

**C** Thrust : 2t

**D** Stroke length : 100mm

**E** Switch model No : Proximity T2H, lead wire length 1m

**F** Switch quantity : 2

**G** Option : Rod end male thread

## How to order switch

**SW** - **T0H**

Switch model no.  
(Item **E**)

Symbol	Descriptions
<b>A Model no.</b>	
<b>MCP-W</b>	Rapid feed + Booster stroke
<b>MCP-S</b>	Only booster section

<b>B Mounting style</b>	
<b>00</b>	Basic type
<b>FA</b>	Rod end flange type

<b>C Thrust</b>	
<b>2</b>	2t
<b>5</b>	5t

<b>D Stroke length (mm)</b>	
50,100,150,200,250,300,350,400,450,500	

E Switch model no.				
Lead wire Axial	Lead wire Radial	Contact	Indicator	Lead wire
T0H*	T0V*	Reed	1 color indicator type	2-wire
T5H*	T5V*		Without indicator light	
T8H*	T8V*		1 color indicator type	
T1H*	T1V*	Proximity	1 color indicator type	2-wire
T2H*	T2V*			3-wire
T3H*	T3V*		1 color indicator type (custom order)	
T3PH*	T3PV*			2 color indicator type
T2YH*	T2YV*		3-wire	
T2WH*	T2WV*			
T3YH*	T3YV*		2-wire	
T3WH*	T3WV*			
T2JH*	T2JV*		Off-delay type	2-wire

<b>*Lead wire length</b>	
<b>Blank</b>	1m (standard)
<b>3</b>	3m (option)
<b>5</b>	5m (option)

<b>F Switch quantity</b>	
<b>R</b>	1 on rod end
<b>H</b>	1 on head end
<b>D</b>	2
<b>T</b>	3

<b>G Option</b>	
<b>Blank</b>	Rod end female thread
<b>N</b>	Rod end male thread

(Example of model number 2)

**MCP-S-00-2-T2H-D-N**

Model: Mechanical power cylinder MCP Series

**A** Model No : Only booster section

**B** Mounting style : Basic type

**C** Thrust : 2t

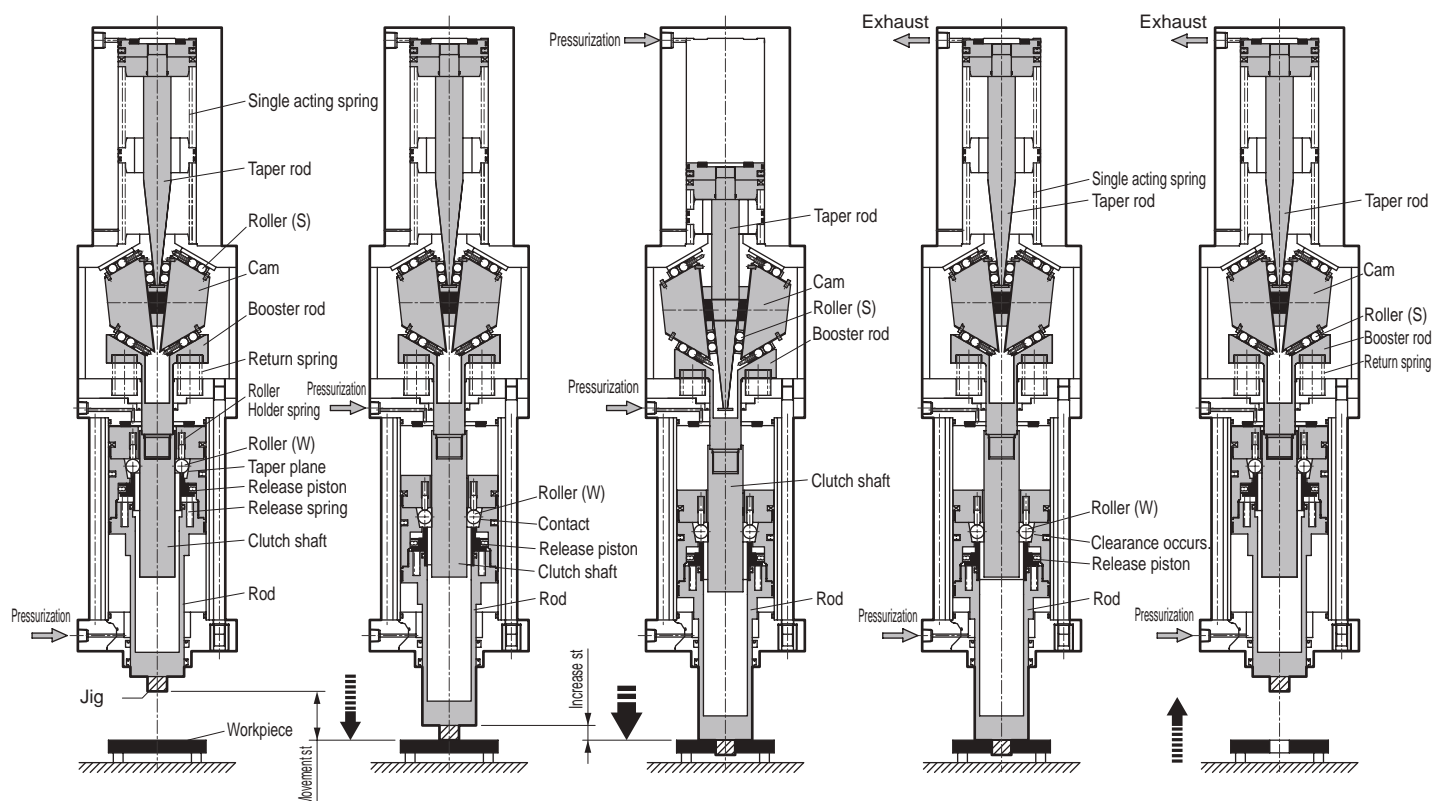
**E** Switch model No : Proximity T2H, lead wire length 1m

**F** Switch quantity : 2

**G** Option : Rod end male thread

### Operational principle

1. Standby (Retract end)
2. Travel section advance end
3. Booster section advance
4. Start of retract
5. During retract



The release spring creates a clearance between the six rollers (W) and the tapered surface, so when pressure is applied to the travel section head, the rod starts advancing. When the rod advances and contacts the workpiece, the release piston is pressed, the release spring contracts, and the roller (W) contacts the clutch shaft and taper surface.

When pressure is applied to the booster head, force moving the taper rod forward is amplified by a wedge effect. The cam is spread open to the left and right by a roller (S), and the clutch shaft integrated with the power stroke rod is boosted vertically. The wedge effect boosts the rod so that it couples with the clutch shaft and punches out the workpiece.

When pressure is applied to the travel section's rod side, the release piston is pressed back, and a clearance is formed between the roller (W) and tapered surface. This releases the coupling and the rod retracts. When pressure at the power stroke cylinder is released at the same time, the single-action spring presses the taper rod back.

When the taper rod is pressed back, the power stroke rod is pushed back by the return spring, and the cam is returned to the original position by the roller (S).

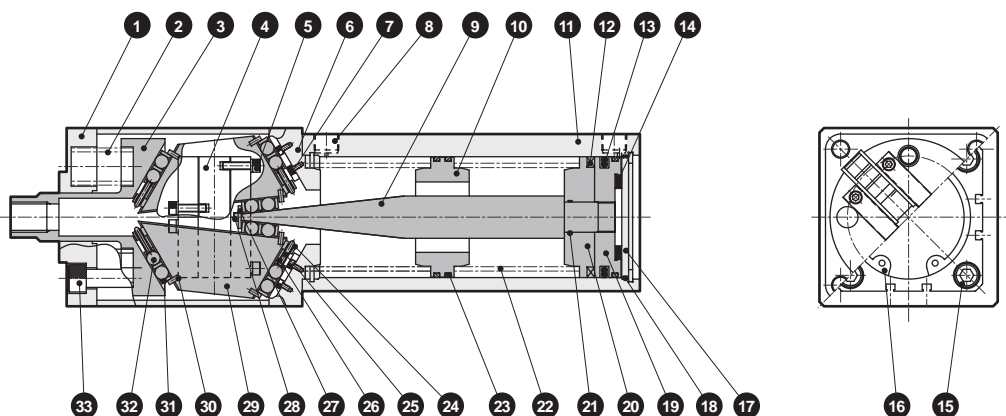
Force is boosted in 10 mm increments in the travel stroke by repeatedly pressurizing and releasing the booster section alone.

### CAUTION

Start boosting within (travel stroke -15 mm) of the working cylinder's travel stroke.

## Internal structure and parts list

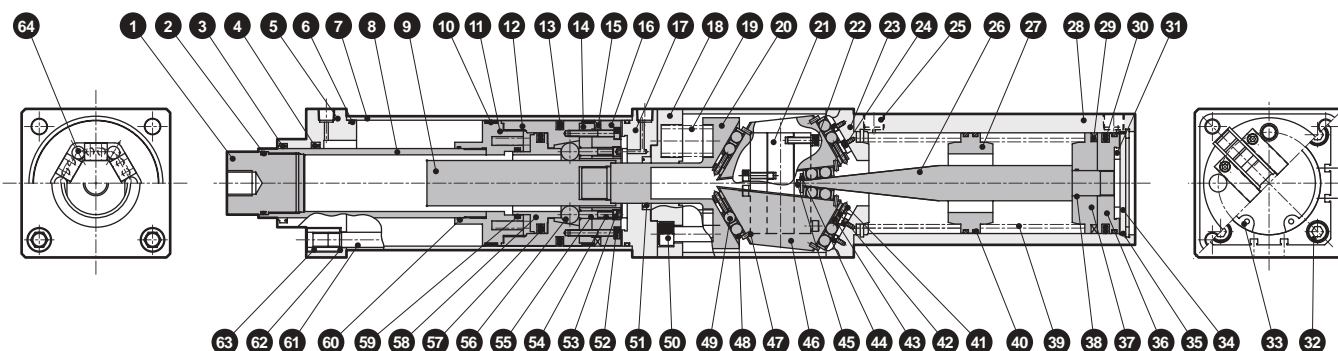
● MCP-S (only booster section)



No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Rod cover (S)	Cast iron	Trivalent chromate	18	Gasket	Nitrile rubber	
2	Return spring	Steel	Blackening	19	Piston	Aluminum alloy	Alumite treatment
3	Booster rod	Alloy steel		20	Spacer	Aluminum alloy	Alumite treatment
4	Slide bar	Steel		21	Gasket	Nitrile rubber	
5	Hexagon socket head cap bolt	Alloy steel	Blackening	22	Single acting spring	Steel	Blackening
6	Intermediate guard	Steel	Trivalent chromate	23	Wear ring (S)	Polyacetal resin	
7	Hexagon socket head cap bolt	Alloy steel	Blackening	24	Spring holder	Steel	Trivalent chromate
8	Plug silencer	Steel + sintering alloy	Zinc plating	25	Spring holder pin	Stainless steel	
9	Taper rod	Alloy steel		26	Retainer spring	Steel	Blackening
10	Single acting spring holder	Steel	Trivalent chromate	27	End plate	Steel	Trivalent chromate
11	Booster cylinder tube	Aluminum alloy	Hard alumite	28	Hexagon socket head cap bolt	Alloy steel	Blackening
12	Magnet (S)	Plastic		29	Cam	Alloy steel	
13	Piston packing seal (S)	Nitrile rubber		30	Pin	Steel	
14	Cushion rubber	Urethane rubber		31	Retainer	Steel	Trivalent chromate
15	Hexagon socket head cap bolt	Alloy steel	Blackening	32	Roller (S)	Alloy steel	
16	C type snap ring (hole)	Steel	Blackening	33	Hexagon socket head cap bolt	Alloy steel	Blackening
17	Guard	Aluminum alloy					

### Internal structure and parts list

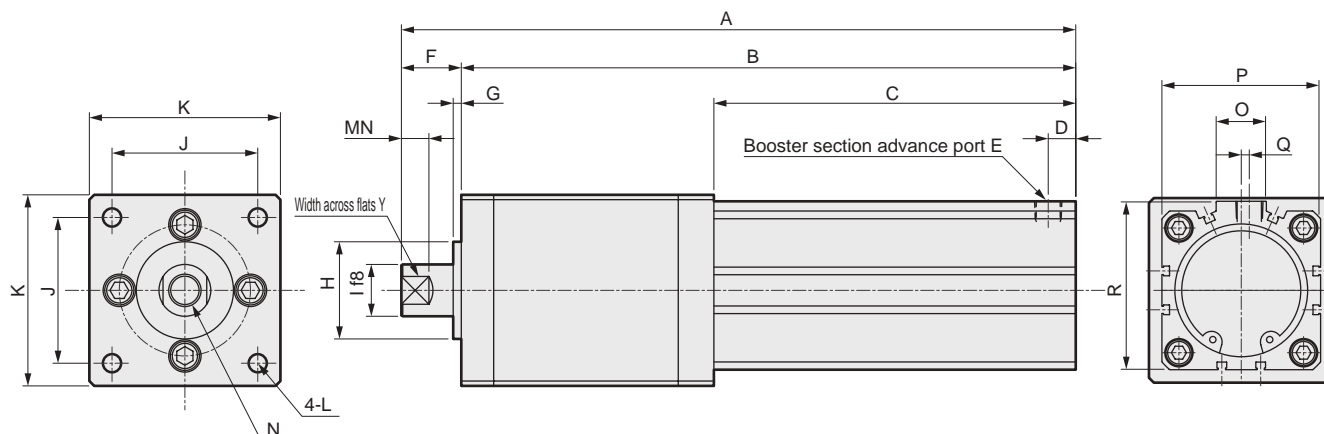
● MCP-W (Rapid feed + Booster stroke)



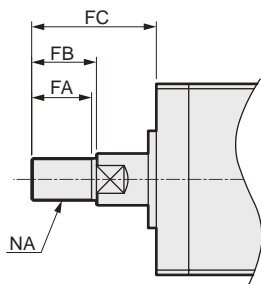
No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Plug	Steel	Trivalent chromate	33	C type snap ring (hole)	Steel	Blackening
2	Gasket	Nitrile rubber		34	Gasket	Nitrile rubber	
3	Dust wiper	Nitrile rubber		35	Guard	Aluminum alloy	
4	Rod packing seal (W)	Nitrile rubber		36	Piston	Aluminum alloy	Alumite treatment
5	Rod cover (W)	Cast iron	Trivalent chromate	37	Spacer	Aluminum alloy	Alumite treatment
6	Gasket	Nitrile rubber		38	Gasket	Nitrile rubber	
7	Moving cylinder tube	Aluminum alloy	Alumite treatment	39	Single acting spring	Steel	Blackening
8	Piston rod	Steel	Rigid plating	40	Wear ring (S)	Polyacetal resin	
9	Clutch shaft	Steel		41	Spring holder	Steel	Trivalent chromate
10	Wear ring (W)	Cloth entrance phenol resin		42	Spring holder pin	Stainless steel	
11	Connection piston B	Steel	Trivalent chromate	43	Retainer spring	Steel	Blackening
12	Connection piston A	Alloy steel		44	End plate	Steel	Trivalent chromate
13	Piston packing seal (W)	Nitrile rubber		45	Hexagon socket head cap bolt	Alloy steel	Blackening
14	Magnet spacer A	Stainless steel		46	Cam	Alloy steel	
15	Magnet (W)	Plastic		47	Pin	Steel	
16	Magnet spacer B	Aluminum alloy	Alumite treatment	48	Retainer	Steel	Trivalent chromate
17	Head cover (W)	Aluminum alloy	Alumite treatment	49	Roller (S)	Alloy steel	
18	Rod cover (S)	Cast iron	Trivalent chromate	50	Hexagon socket head cap bolt	Alloy steel	Blackening
19	Return spring	Steel	Blackening	51	Rod packing seal (S)	Nitrile rubber	
20	Booster rod	Alloy steel		52	Hexagon socket head cap bolt	Stainless steel	
21	Slide bar	Steel		53	Hexagon socket head set screw	Alloy steel	Blackening
22	Hexagon socket head cap bolt	Alloy steel	Blackening	54	Roller holder spring	Steel	Blackening
23	Intermediate guard	Steel	Trivalent chromate	55	Roller holder	Alloy steel	
24	Hexagon socket head cap bolt	Alloy steel	Blackening	56	Roller (W)	Alloy steel	
25	Plug silencer	Steel + sintering alloy	Zinc plating	57	Release piston packing seal	Nitrile rubber	
26	Taper rod	Alloy steel		58	Release piston	Steel	Trivalent chromate
27	Single acting spring holder	Steel	Trivalent chromate	59	Gasket	Nitrile rubber	
28	Booster cylinder tube	Aluminum alloy	Hard alumite	60	Gasket	Nitrile rubber	
29	Magnet (S)	Plastic		61	Tie rod	Steel	Trivalent chromate
30	Piston packing seal (S)	Nitrile rubber		62	Conical spring washer	Steel	Blackening
31	Cushion rubber	Urethane rubber		63	Round nut	Steel	Trivalent chromate
32	Hexagon socket head cap bolt	Alloy steel	Blackening	64	Guide rubber	Urethane rubber	

## Dimensions (MCP-S)

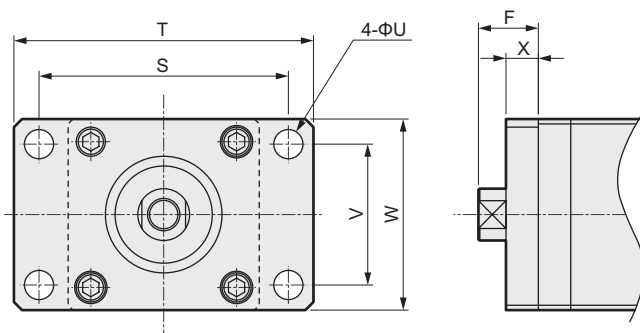
### • Basic type (00)



### • Rod end male thread (N)



### • Rod end flange type (FA)



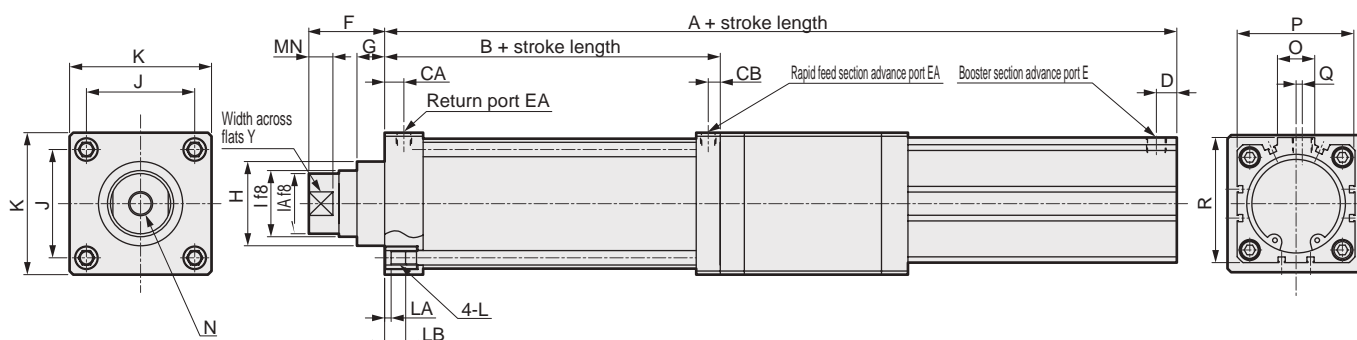
Symbol	Basic dimensions											
Thrust	A	B	C	D	E	F	G	H	I	J	K	L
2 (2t)	416.5	379.5	223.5	17	Rc3/8	37	5	60	32	90	118	M12 depth 20
5 (5t)	501	447	252	23.5	Rc3/8	54	12	100	45	128	167	M16 depth 25

Symbol	Basic dimensions						
Thrust	MN	N	O	P	Q	R	Y
2 (2t)	17	M20 depth 24	31	98	-	104	27
5 (5t)	24	M30 depth 36	-	142	36	142	41

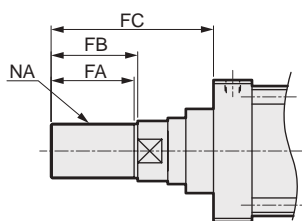
Symbol	Rod end flange type (FA)						Rod end male thread (N)			
Thrust	S	T	U	V	W	X	FA	FB	FC	NA
2 (2t)	154	185	18	87	118	20	37	40	77	M26×1.5
5 (5t)	208	250	22	126	171	30	60	63	117	M40×1.5

### Dimensions (MCP-W)

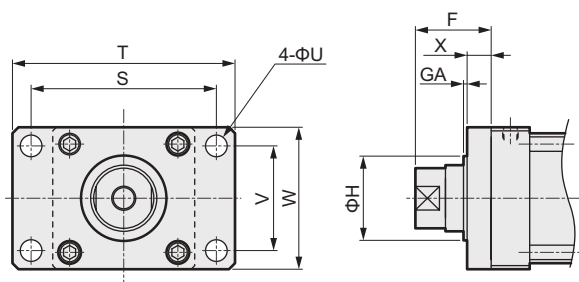
#### • Basic type (00)



#### • Rod end male thread (N)



#### • Rod end flange type (FA)



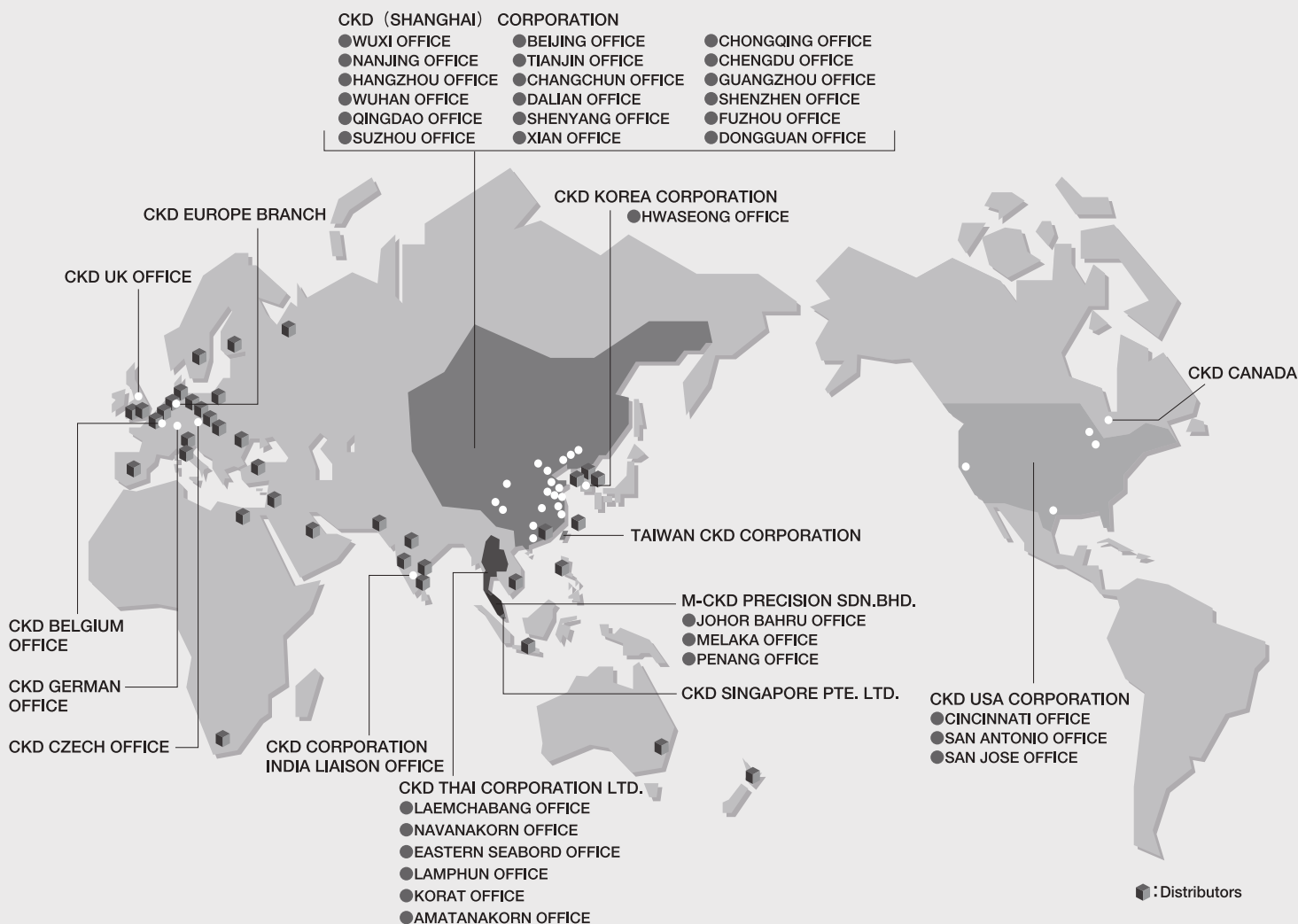
Symbol	Basic dimensions															
Thrust	A	B	CA	CB	D	E	EA	F	G	H	I	IA	J	K	L	LA
2 (2t)	558.5	179	16	10	17	Rc3/8	Rc1/4	63	23	70	55	50	90	118	M12	(5.4)
5 (5t)	691	244	24	15	23.5	Rc3/8	Rc3/8	73	33	110	85	80	128	167	M16	(6.5)

Symbol	Basic dimensions							
Thrust	LB	MN	N	O	P	Q	R	Y
2 (2t)	16	20	M20 depth 24	31	98	-	104	46
5 (5t)	25	25	M30 depth 36	-	142	36	142	75

Symbol	Rod end flange type (FA)							Rod end male thread (N)			
Thrust	S	T	U	V	W	GA	X	FA	FB	FC	NA
2 (2t)	154	185	18	87	118	3	20	69	72	135	M45×1.5
5 (5t)	208	250	22	126	171	3	30	135	140	213	M72×2.0



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Contents revised

• Such as dimension correction

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