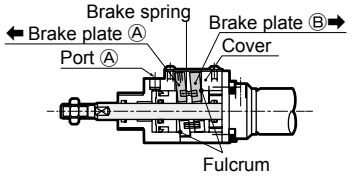
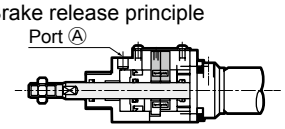
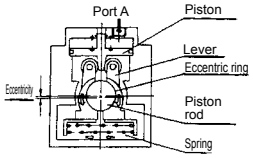
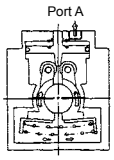
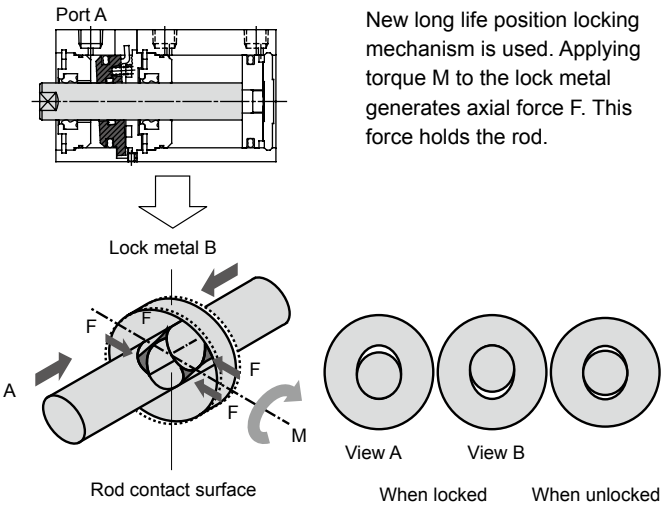
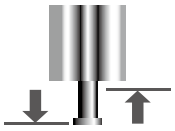
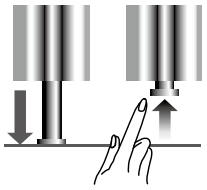
Product MAP with brake function

1) Cylinder with position locking and brake

Model	Function	Structure/Operational principle	Driving cylinder	Features
ULKP ULK	With brake (Stop when operating)	Swash plate ● Brake operating principle  When air is discharged from port A, the brake plates A and B tilt to the arrow direction from the fulcrum. This boosts the brake force by generating cylinder thrust, enabling retention of the piston rod. When air is supplied from port A, the brake plates A and B are pushed by the release piston. The brake plates A and B become perpendicular to the piston rod, and the piston rod becomes free to move. ● Brake release principle 	SCP*2 φ16 CMK2 φ20 to φ40	Cylinder with brake. It can be stopped or held stationary during operation. JSG saves more space in the brake area when compared to the conventional JSC3 Series. The ULK also saves more space by reducing the brake height compared to the conventional JSK2 Series. [Applications] (1) When multipoint positioning is required (2) When position locking is required (3) When emergency stop is required (4) When locking a workpiece
JSK2 JSM2 JSG JSC3 · JSC4		Rod clamping ● Brake release principle  Air supplied from port A pushes the piston under it and opens the lever. The eccentric rings directly connected to the lever rotate and release the piston rod. ● Brake operating principle  If air is discharged from port A, the eccentric rings rotate with the spring force, generating an eccentric load to brake the piston rod.	CMK2 φ20 to φ40 CMA2 φ20 to φ40 SCG φ40 to φ100 SCA2 φ40 to φ100 SCS2 φ125 to φ180	
USSD UFCD USC	Free position locking (Retain stationary state)	Round slit method  New long life position locking mechanism is used. Applying torque M to the lock metal generates axial force F. This force holds the rod.	SSD φ25 to φ100 FCD φ25 to φ63 SCA2 φ40 to φ100	Cylinder with position locking mechanism (for holding cylinder stationary). 2 lock direction  Opposite locking direction is free  [Application] When position locking is required

2) Braking unit

Model	Function	Size	Features
JSB3	Brake (Stop when operating)	Rod size φ16 to φ45	A module of the brake mechanism of JSC3 Series. Able to stop the movable rod immediately and lock it firmly, it can be used in safety mechanisms and clamping mechanisms of many kinds of devices.
LMB	Stationary state locked	THK Rail width: 15/20/25	A lock unit installed in a linear guide. When used with a system incorporating a linear guide, this lock unit can be used to lock a workpiece after moving it to a specified position, or to enable emergency stop for safety, etc. LMB is narrower than LML, and LML is lower-profile than LMB.
LML		THK, IKO Rail width: 15/20/25/30/35	

JSK2/JSM2

With brake/position locking Brake cylinder (small bore size)

φ20/φ25/φ30/φ32/φ40

Overview

A reliable brake is integrated to the medium bore size (φ20 to φ40 mm) standard cylinder (CMA2/CMK2) series.

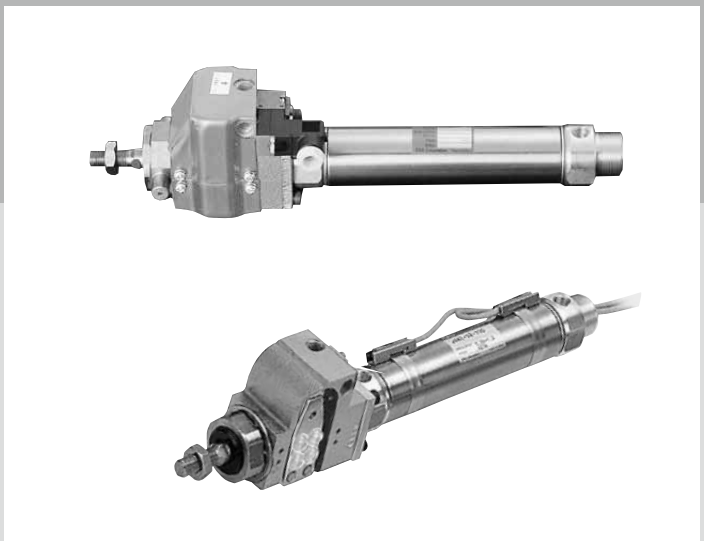
Features

[JSK2]

Swaging with stainless steel tube.
Aluminum cover is used to reduce weight.

[JSM2]

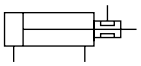
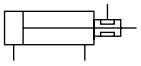
Robust design enduring severe use conditions.
The cover screw-in model is easy to assemble/ disassemble.



CONTENTS

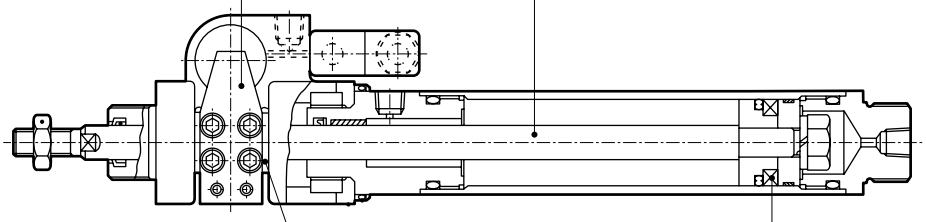
Series variation

Brake cylinder JSK2/JSM2 Series

Variation	Model No. JIS symbol	Bore size (mm)	Standard stroke length (mm)										Min. stroke length (mm)	Max. stroke length (mm)	
			25	50	75	100	125	150	175	200	250	300			
Swaging model/ double acting	JSK2 	φ20/φ25/φ32/φ40	●	●	●	●	●	●	●	●	●	●	5	700	
Swaging model/double acting with valve	JSK2-V	φ20/φ25/φ32/φ40	●	●	●	●	●	●	●	●	●	●	5	700	
Disassembly/ double acting	JSM2 	φ20/φ30/φ40	●	●	●	●	●	●	●	●	●	●	1	700	
Disassembly/double acting with valve	JSM2-V	φ20/φ30/φ40	●	●	●	●	●	●	●	●	●	●	1	700	

Product introduction (JSK2)

- Stopping accuracy ±1.0 mm or less
  Cylinder speed 300 mm/s with no load
- Enhanced safety
  The rod will immediately be locked with a holding force equivalent to thrust at 0.49 MPa even if the air pressure source and power are OFF.
- Air cylinder
  No-lubrication air cylinder
  CMK2 is adopted.
- Brake section



- Brake shoe metal
  FCD cast iron material used.
  Excellent durability and soft braking force.
- Piston magnet
  The plastic magnet parts attached as standard allow easy modification to cylinder with switch.

This unique braking mechanism ensures high stopping accuracy and sufficient holding force. Enhanced safety.

●: Standard ◎: Option : Not available

	Custom stroke length (per mm)	Mounting							Option						Accessory			Switch	Page
		Basic	Axial foot	Rod side flange	Eye bracket	Eye bracket integrated	Rod side trunnion	Head side trunnion	Bellows (100°C)	Bellows (250°C)	Piston rod material change	Same port position	Boss cutoff	Brake section with cover*1	Rod eye	Rod clevis	Clevis bracket		
		00	LB	FA	CA	CC	TA	TB	J	L	M	P	V	U	I	Y	B2		
	1	●	●	●	●	●	●	●	◎	◎	◎		◎	◎	◎	◎	◎	◎	696
	1	●	●	●	●	●	●	●	◎	◎	◎		◎	◎	◎	◎	◎	◎	696
	1	●	●	●	●		●	●	◎	◎	◎	◎		◎	◎	◎	◎	◎	710
	1	●	●	●	●		●	●	◎	◎	◎	◎		◎	◎	◎	◎	◎	710

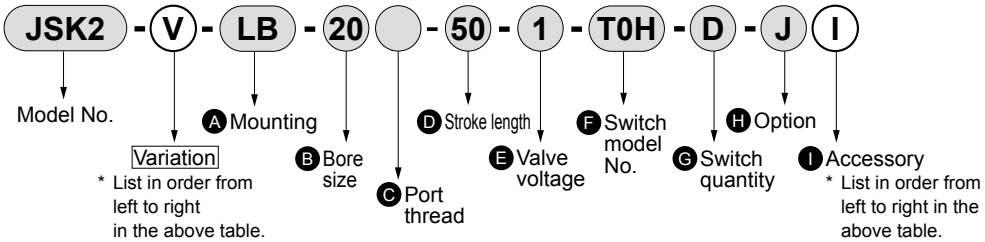
*1: For a TA mounting, the brake section with cover “U” cannot be selected.

Variation and option combination selection table

● : Standard
◎ : Option
○ : Available (custom order product)
△ : Available depending on conditions (Contact CKD.)
× : Not available

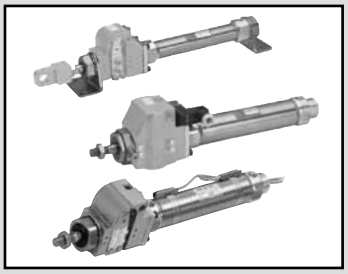
Category		Category	Variation		Port thread		Option					
			Double acting basic	With valve	NPT	G	Polyolefin with bellows	Silicone rubber with bellows	Piston rod material stainless steel	Specify piston rod end form	Boss cutoff	Brake section with cover
		Code	None	V	N	G	J	L	M	N	V	U
Variation	Double acting basic	Blank			○	○	◎	◎	◎	○	◎	◎
	With valve	V			○	○	◎	◎	◎	○	◎	◎
Port thread	NPT	N				×	○	○	○	○	○	○
	G	G					○	○	○	○	○	○
Option	Polyolefin with bellows	J						×	◎	○	◎	◎
	Silicone rubber with bellows	L							◎	○	◎	◎
	Piston rod material stainless steel	M								○	◎	◎
	Specify piston rod end form	N									○	○
	Boss cutoff	V										◎
	Brake section with cover	U										
Accessory	Cylinder switch	Listed separately	◎	◎			◎	◎	◎	○	◎	◎
	Rod eye	I	◎	◎			◎	◎	◎	○	◎	◎
	Rod clevis	Y	◎	◎			◎	◎	◎	○	◎	◎
	B2 bracket	B2	◎	◎			◎	◎	◎	○	◎	◎

[Example of model No.]



Model No.: Brake cylinder
● Variation : With valve
A Mounting : Axial foot
B Bore size : φ20 mm
C Port thread : Rc thread
D Stroke length : 50 mm
E Valve voltage : 100 VAC
F Switch model No. : Reed T0H switch, lead wire 1m
G Switch quantity : 2
H Option : Bellows max. ambient temperature 100°C
I Accessory : Rod eye

MEMO

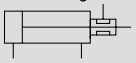


Brake cylinder Small bore size/swaging
Double acting/double acting with valve

JSK2/JSK2-V Series

● Bore size: φ20/φ25/φ32/φ40

JIS symbol ● Double acting



RoHS CAD

Specifications

Descriptions		JSK2				JSK2-V			
Bore size mm		φ20	φ25	φ32	φ40	φ20	φ25	φ32	φ40
Actuation		Double acting				Double acting/with valve			
Working fluid		Compressed air							
Max. working pressure MPa		1.0 (≈150 psi, 10 bar)				0.6 (≈87 psi, 6 bar)			
Min. working pressure MPa		0.35 (≈51 psi, 3.5 bar)				0.35 (≈51 psi, 3.5 bar)			
Proof pressure MPa		1.6 (≈230 psi, 16 bar)							
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)				-10 (14°F) to 50 (122°F) (no freezing)			
Port size	Brake section	M5	Rc1/8			M5	Rc1/8		
	Cylinder port	Rc1/8				Rc1/8			
Stroke tolerance mm		$^{+2.0}_{0}$(to 200), $^{+2.4}_{0}$(200 to)							
Working piston speed mm/s		50 to 500							
Cushion		Rubber cushion							
Lubrication		Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)							
Stopping accuracy mm		±1.0 (300 mm/s, no load)							
Holding force N		186	431	431	765	186	431	431	765
Allowable absorbed energy J		0.166	0.308	0.424	0.639	0.166	0.308	0.424	0.639

Electrical specification for brake valve

Descriptions	JSK2-V-VALVE-KIT- Voltage		
Rated voltage (V)	100 AC(50/60 Hz)	200 AC(50/60 Hz)	24 DC
Starting current (A)	0.056/0.044	0.034/0.026	0.075
Holding current (A)	0.028/0.022	0.017/0.013	
Power consumption (W)	1.8/1.4	2.1/1.6	1.8
Voltage fluctuation range	±10%		
Thermal class	Class B molded coil		

●*1 : 100/200 VAC coil is available for 110/220 VAC (60 Hz).
●*2 : Refer to “Pneumatic Valves (CB-23SA)” for details on valves (P5136 Series).

Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)		Min. stroke length (mm)	
		Without bellows	With bellows	Without bellows	With bellows
φ20	25/50/75/100/125/150 175/200/250/300	700	600	5	5
φ25					
φ30					
φ40					

The min. stroke length varies depending on the switch mounting method. Refer to the following table.

Min. stroke length with switch

(Unit: mm)

Switch quantity	1					2					3				
	Proximity			Reed		Proximity			Reed		Proximity			Reed	
Bore size (mm)	T2,T3	T1,T*Y	T*W	T0,T5	T8	T2,T3	T1,T*Y	T*W	T0,T5	T8	T2,T3	T1,T*Y	T*W	T0,T5	T8
φ20	10					25	35	30	25	35	50	55	55	50	55
φ25	10					25	35	30	25	35	50	55	55	50	55
φ32	10					25	35	30	25	35	50	55	55	50	55
φ40	10					25	35	30	25	35	50	55	55	50	55

*1: Up to 3 switches can be mounted.

Switch specifications

● 1-color/2-color display

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)	T3YH/ T3YV	T3WH/ T3WV	T0H/T0V		T5H/T5V		T8H/T8V		
Applications	For programmable controller, relay, compact solenoid valve	Dedicated for programmable controller			For programmable controller, relay				For programmable controller, relay		For programmable controller, relay, IC circuit (no indicator lamp), serial connection		For programmable controller, relay		
Output method	-				NPN output	PNP output	NPN output	NPN output	-						
Pwr. supp. V.	-				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 100 mA	5 to 20 mA (*2)			100 mA or less		50 mA or less		5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 50 mA	7 to 20 mA	7 to 10 mA
Indicator lamp	LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		Without indicator lamp		LED (Lit when ON)		
Leakage current	≤ 1 mA at 100 VAC, ≤ 2 mA at 200 VAC	1 mA or less			10 μA or less				0 mA						
Weight g	1 m:33	1 m:18	1 m:33	1 m:18	1 m:18		1 m:33	1 m:18	1 m:18				1 m:33		
	3 m:87	3 m:49	3 m:87	3 m:49	3 m:49		3 m:87	3 m:49	3 m:49				3 m:87		
	5 m:142	5 m:80	5 m:142	5 m:80	5 m:80		5 m:142	5 m:80	5 m:80				5 m:142		

*1 : Refer to Ending Page 1 for other switch specifications.
*2 : The above max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)
*3 : The T0/T5 switch can also be used with 220 VAC. Contact CKD about working conditions.
*4 : Dimensions depend on switch model No. Refer to Ending Page 18 for details.

Cylinder weight

● JSK2

(Unit: kg)

Item/mounting / Bore size (mm)	Product weight when stroke length (S) = 0 mm						Switch weight	Switch rail + band weight	Additional weight per S = 10 mm
	Basic (00)	Axial foot (LB)	Flange (FA)	Clevis (CA)	Clevis (CC)	Trunnion (TA)			
φ20	0.67	0.82	0.73	0.82	0.68	0.72	Refer to the weight in the switch specifications.	0.005	0.01
φ25	1.18	1.44	1.33	1.42	1.18	1.28		0.005	0.01
φ32	1.22	1.48	1.37	1.46	1.22	1.32		0.009	0.02
φ40	1.91	2.17	2.06	2.15	1.93	2.07		0.009	0.02

● JSK2-V (with valve)

(Unit: kg)

Item/mounting / Bore size (mm)	Product weight when stroke length (S) = 0 mm						Switch weight	Switch rail + band weight	Additional weight per S = 10 mm
	Basic (00)	Axial foot (LB)	Flange (FA)	Clevis (CA)	Clevis (CC)	Trunnion (TA)			
φ20	0.72	0.87	0.78	0.87	0.73	0.77	Refer to the weight in the switch specifications.	0.005	0.01
φ25	1.23	1.49	1.38	1.47	1.23	1.33		0.005	0.01
φ32	1.27	1.53	1.42	1.51	1.27	1.37		0.009	0.02
φ40	1.96	2.22	2.11	2.20	1.98	2.12		0.009	0.02

(Example) JSK2-V-LB-20-100-2-TOH-D

Product weight when S = 0 mm..... 0.87 kg
Additional weight when S = 100 mm .. 0.01 x $\frac{100}{10}$ = 0.1 kg
Weight of 2 switches..... 0.018 x 2 = 0.036 kg
Weight of switch rail + 2 bands..... 0.005 × 2 = 0.010 kg
Product weight..... 0.87 kg + 0.1 kg + 0.036 kg + 0.010 kg = 1.016 kg

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
φ20	Push	31.4	47.1	62.8	94.2	1.26×10^2	1.57×10^2	1.88×10^2	2.20×10^2	2.51×10^2	2.83×10^2	3.14×10^2
	Pull	23.6	35.3	47.1	70.7	94.2	1.18×10^2	1.41×10^2	1.65×10^2	1.88×10^2	2.12×10^2	2.36×10^2
φ25	Push	49.1	73.6	98.2	1.47×10^2	1.96×10^2	2.45×10^2	2.95×10^2	3.44×10^2	3.93×10^2	4.42×10^2	4.91×10^2
	Pull	37.8	56.7	75.6	1.13×10^2	1.51×10^2	1.89×10^2	2.27×10^2	2.64×10^2	3.02×10^2	3.40×10^2	3.78×10^2
φ32	Push	80.4	1.21×10^2	1.61×10^2	2.41×10^2	3.22×10^2	4.02×10^2	4.83×10^2	5.63×10^2	6.43×10^2	7.24×10^2	8.04×10^2
	Pull	69.1	1.04×10^2	1.38×10^2	2.07×10^2	2.76×10^2	3.46×10^2	4.15×10^2	4.84×10^2	5.53×10^2	6.22×10^2	6.91×10^2
φ40	Push	1.26×10^2	1.88×10^2	2.51×10^2	3.77×10^2	5.03×10^2	6.28×10^2	7.54×10^2	8.80×10^2	1.01×10^3	1.13×10^3	1.26×10^3
	Pull	1.10×10^2	1.65×10^2	2.21×10^2	3.31×10^2	4.41×10^2	5.51×10^2	6.62×10^2	7.72×10^2	8.82×10^2	9.92×10^2	1.10×10^3

How to order

● Without valve

Without switch (built-in magnet for switch)

JSK2 - LB - 20 ○ - 50 - 1 ——— J I

With switch (built-in magnet for switch)

JSK2 - LB - 20 ○ - 50 - 1 - T0H - R - J I

● With valve

Without switch (built-in magnet for switch)

JSK2-V - LB - 20 ○ - 50 - 1 ——— J I

With switch (built-in magnet for switch)

JSK2-V - LB - 20 ○ - 50 - 1 - T0H - R - J I

Ⓑ Mounting *2

Ⓐ Model No. *1

Ⓓ Port thread

Ⓒ Bore size

Ⓔ Stroke length

Ⓕ Valve voltage

Ⓖ Switch model No.

Ⓗ Switch quantity *6

Ⓘ Option *4 *7

Ⓙ Accessory *5

Code	Content	Ⓐ Model No. Double acting JSK2	Ⓐ Model No. With valve JSK2-V
Ⓑ Mounting			
00	Basic	●	●
LB	Axial foot	●	●
FA	Rod side flange	●	●
CA	Eye bracket	●	●
CC	Eye bracket integrated	●	●
TA	Rod side trunnion	●	●
TB	Head side trunnion	●	●
Ⓒ Bore size (mm)			
20	φ20	●	●
25	φ25	●	●
32	φ32	●	●
40	φ40	●	●
Ⓓ Port thread			
Blank	Rc thread		
NN	NPT thread (φ25 and over) (custom order product)		
GN	G thread (φ25 and over) (custom order product)		

Ⓔ Stroke length (mm)

Bore size	Stroke length *3	Custom stroke length
φ20	**5 to 700**	**In 1 mm increments**
φ25	**5 to 700**	
φ32	**5 to 700**	
φ40	**5 to 700**	

Ⓕ Valve voltage			
1	100 VAC(50/60 Hz)		●
2	200 VAC(50/60 Hz)		●
3	24 VDC		●

Ⓖ Switch model No.

Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
T0H*	**T0V***	Reed	●	●	1-color display	2-wire
T5H*	**T5V***		●	●	Without indicator lamp	
T8H*	**T8V***		●	●	1-color display	2-wire
T1H*	**T1V***	Proximity	●		1-color display	2-wire
T2H*	**T2V***			●	1-color display	2-wire
T3H*	**T3V***			●		3-wire
T3PH*	**T3PV***			●	1-color display (custom)	3-wire
T2WH*	**T2WV***			●	2-color display	2-wire
T2YH*	**T2YV***			●		
T3WH*	**T3WV***			●		3-wire
T3YH*	**T3YV***			●		
T2JH*	**T2JV***			●	Off-delay	2-wire

*** Lead wire length**			
Blank	1 m (standard)	●	●
3	3 m (option)	●	●
5	5 m (option)	●	●
Ⓗ Switch quantity			
R	1 on rod side	●	●
H	1 on head side	●	●
D	2	●	●
T	3	●	●

Ⓘ Option

		Max. ambient temperature	Instantaneous max. temp		
J	Bellows	100°C	200°C	●	●
L	Bellows	250°C	400°C	●	●
M	Piston rod material (stainless steel)			●	●
V	Boss cutoff			●	●
U	Brake section with cover			●	●

Ⓙ Accessory			
I	Rod eye	●	●
Y	Rod clevis (pin, washer, split pin attached)	●	●
B2	Clevis bracket (pin, snap ring attached)	●	●

⚠ Precautions for model No. selection

*1 : Low hydraulic can also be supplied as custom order product
Model numbers are JSK2-H and JSK2-VH.

*2 : For a TA mounting, the brake section with cover and the clevis bracket cannot be selected together since they may interfere with each other.

*3 : For the min. stroke length with switch and the max. and min. stroke lengths with bellows, refer to page 696.

*4 : The instantaneous max. temperature is the temperature when sparks, cutting chips, etc., instantaneously contact the bellows.

*5 : "I" and "Y" cannot be selected together.

*6 : Up to three switches can be installed. If four or more switches are required, switch mounting brackets for the extra switches must be prepared separately.

*7 : For mounting TA (rod side trunnion), the option U (brake section with cover) cannot be selected.

[Example of model No.]

JSK2-V-LB-20-50-1- T0H-R-JI

Model: Brake cylinder with valve

Ⓐ Model No. : With valve
Ⓑ Mounting : Axial foot
Ⓒ Bore size : φ20 mm
Ⓓ Port thread : Rc thread
Ⓔ Stroke length : 50 mm
Ⓕ Valve voltage : 100 VAC
Ⓖ Switch model No. : Reed switch T0H, lead wire 1 m
Ⓗ Switch quantity : 1 on rod side
Ⓘ Option : Bellows
Max. ambient temperature 100°C, instantaneous max. temperature 200°C
Ⓙ Accessory : Rod eye

How to order switch

● Switch body + mounting bracket set

JSK2 - T0H - 20

- T0H: Switch model No. (Item Ⓖ on the previous page)
- 20: Bore size (Item Ⓒ on the previous page)

● Switch body only

SW - T0H

- T0H: Switch model No. (Item Ⓖ on the previous page)

● Mounting bracket set

JSK2 - T - 20

- T: Mounting bracket
- 20: Bore size (Item Ⓒ on the previous page)

How to order brake valve

JSK2-V - VALVE-KIT - 1

❶ Valve voltage

Code	Content
1	100 VAC(50/60 Hz)
2	200 VAC(50/60 Hz)
3	24 VDC

How to order mounting bracket

Bore size (mm) / Mounting bracket	φ20	φ25	φ32	φ40
Basic (00) *3	M1-00-20	M1-00-30	M1-00-30	M1-00-30
Axial foot (LB)	M1-LB-20	M1-LB-30	M1-LB-30	M1-LB-30
Flange (FA)	M1-FA-20	M1-FA-30	M1-FA-30	M1-FA-30
Eye bracket (CA)	M1-CA-20	M1-CA-30	M1-CA-30	M1-CA-30
Trunnion (TA/TB)	M1-TA-20	M1-TA-30	M1-TA-30	M1-TA-40

*1 : As for mounting brackets, the axial foot and flange include mounting nuts and toothed washers, and the trunnion includes mounting nuts.
2 : For axial foot, 2 sets of the above “M1-LB-” are required.
*3 : Mounting nut, toothed washer only. Although 1 set is attached with the basic of the product (00), use this when needed.

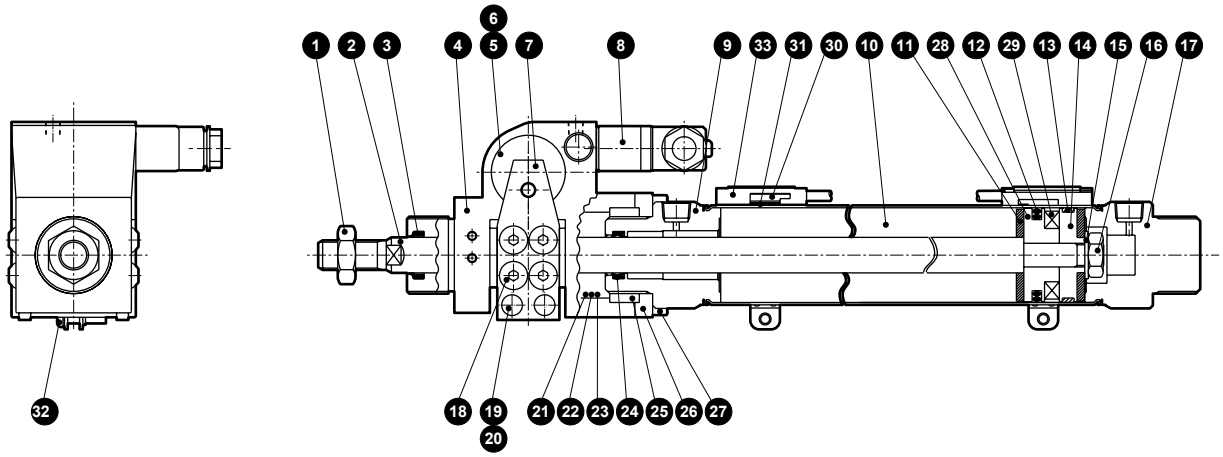
Material of mounting bracket

Mounting	Material	Remarks
LB	Steel	Zinc chromate
FA	Steel	Zinc chromate
TA/TB	Steel	Zinc chromate
CA	Steel	Zinc chromate

Note: Mounting bracket will be shipped with the product.
However, if the product is supplied with bellows and the mounting bracket is LB, FA, or TA, it will be shipped assembled.

Internal structure and parts list

- JSK2-V (with valve and switch)
- JSK2 (with switch)



Note: This product is a caulked and cannot be disassembled.

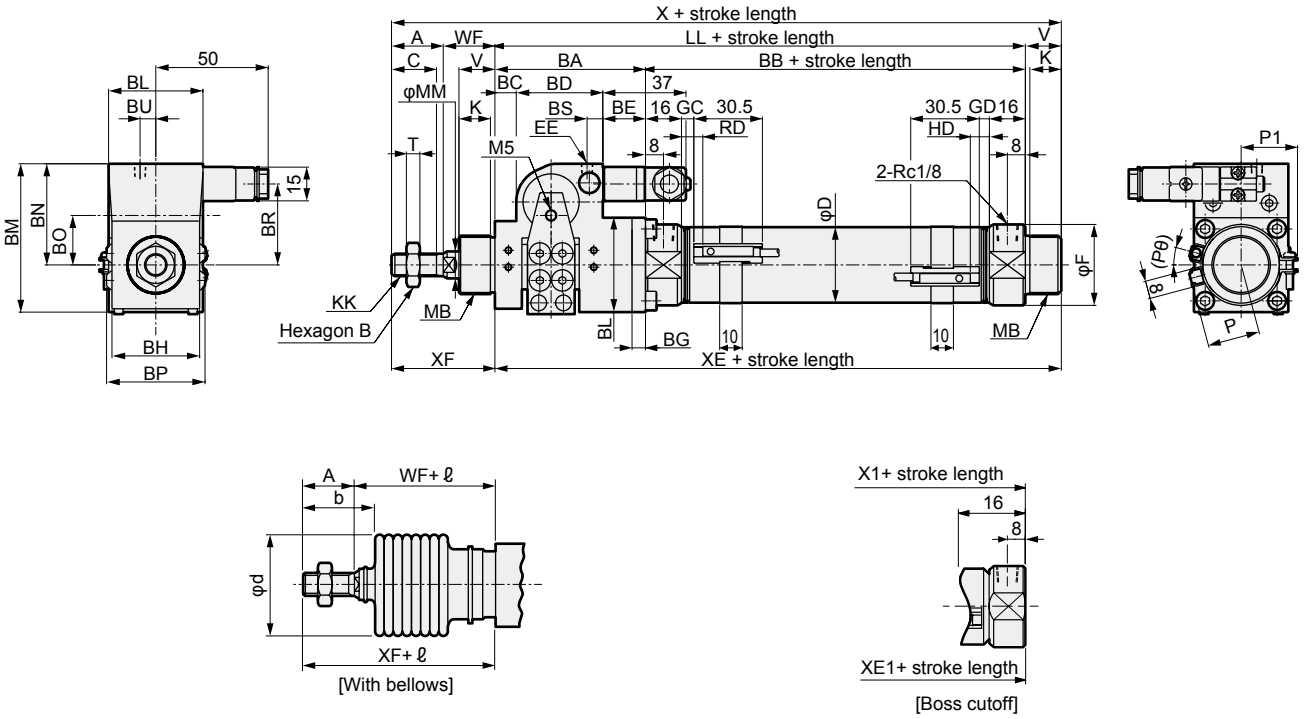
Cannot be disassembled

Parts list

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Rod nut	Steel	Zinc chromate	18	Hex socket screw	Steel	Black finish treatment
2	Piston rod	φ20/φ25 stainless steel φ32/φ40 steel	Industrial chrome plating	19	Hex socket screw	Steel	Black finish treatment
				20	Brake spring	Steel	Black finish treatment
3	Scraper	Nitrile rubber		21	Brake shoe metal	Cast iron	
4	Brake body	Cast iron	Zinc chromate	22	Bush	Dry bearing	
5	Brake piston	Copper alloy casting		23	Ring	Steel	
6	Piston packing	Nitrile rubber		24	Rod packing	Nitrile rubber	
7	Lever	Steel	Zinc chromate	25	Fixed ring	Steel	Zinc chromate
8	Valve for brake release	---	P5136MO	26	Square flange	Steel	Zinc chromate
9	Rod cover	Aluminum alloy		27	Hex socket screw	Steel	Black finish treatment
10	Cylinder tube	Stainless steel		28	Piston A	Aluminum alloy	
11	Cushion rubber	Urethane rubber		29	Magnet	Plastic	
12	Piston packing	Nitrile rubber		With switch			
13	Wear ring	Acetal resin		30	Switch body	---	
14	Piston B	Aluminum alloy		31	Band	Stainless steel	
15	Spacer	Steel	Zinc chromate	32	Pan head machine screw	Stainless steel	
16	Hexagon nut	Steel	Zinc chromate	33	Switch rail	Stainless steel	
17	Head cover	Aluminum alloy					

Dimensions CAD

● Basic (00)



[With bellows]

[Boss cutoff]

RD: Rod side max. sensitivity position
HD: Head side max. sensitivity position
1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 721.

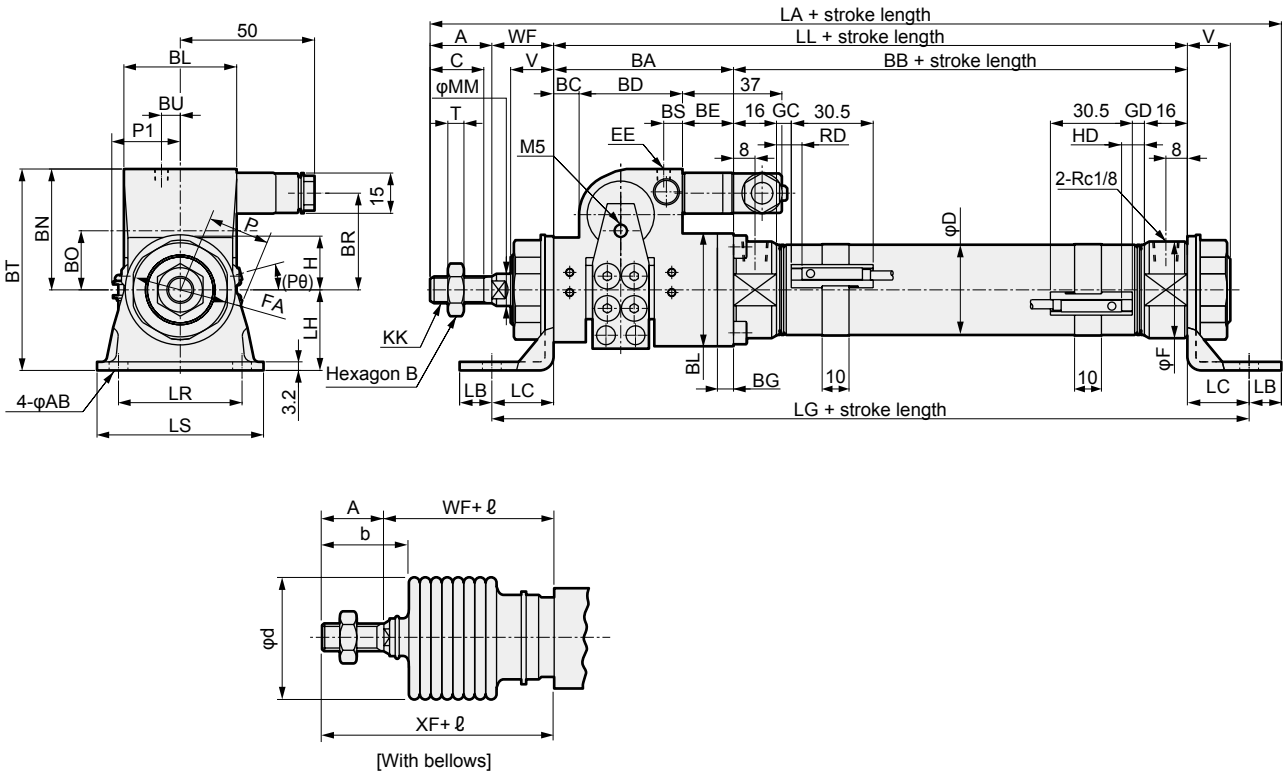
Code	Basic (00) basic dimensions																		
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BL	BM	BN	BO	BP	BR	BS	BU	C	D
φ20	20	13	58	66	9	30	19	5	29	34	55	38	19	38	29	4	3.8	18	21.4
φ25	23	17	67	69	9.5	38.5	19	6	39	42	66	45	22	43.8	34.5	7	7	20	26.4
φ32	23	17	67	69	9.5	38.5	19	6	39	42	66	45	22	43.8	34.5	7	7	20	33.6
φ40	25	19	74	73	8	48	18	8	50	50	80.5	55.5	25	52	39.5	7	7	22	41.6

Code														With switch (T0, T5, T2, T3)			
Bore size (mm)	EE	F	K	KK	LL	MB	MM	T	V	WF	X	XE	XF	GC	GD	RD	HD
φ20	M5	28	12	M8×1.0	124	M18×1.5	10	5	14	24	182	138	44	4.0	3.0	8.0	7.0
φ25	Rc1/8	32	14	M10×1.25	136	M26×1.5	12	6	16	23	198	152	46	5.5	4.5	9.5	8.5
φ32	Rc1/8	36	14	M10×1.25	136	M26×1.5	12	6	16	23	198	152	46	5.5	4.5	9.5	8.5
φ40	Rc1/8	45	14	M12×1.5	147	M26×1.5	14	7	16	23	211	163	48	7.5	6.5	11.5	10.5

Code	With switch (T2W, T3W)							With bellows			Boss cutoff	
Bore size (mm)	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ	X1	XE1
φ20	6.0	5.0	10.0	9.0	17.3	19.5	22	30	30	(Stroke length/3) + 6	168	124
φ25	7.5	6.5	11.5	10.5	19.8	22.0	18	32	46	(Stroke length/3.25) + 7	182	136
φ32	7.5	6.5	11.5	10.5	24.3	25.5	15	32	46	(Stroke length/3.25) + 7	182	136
φ40	9.5	8.5	13.5	12.5	28.3	29.5	12	34	46	(Stroke length/3.25) + 7	195	147

Dimensions CAD

● Axial foot (LB)



[With bellows]

1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 721.

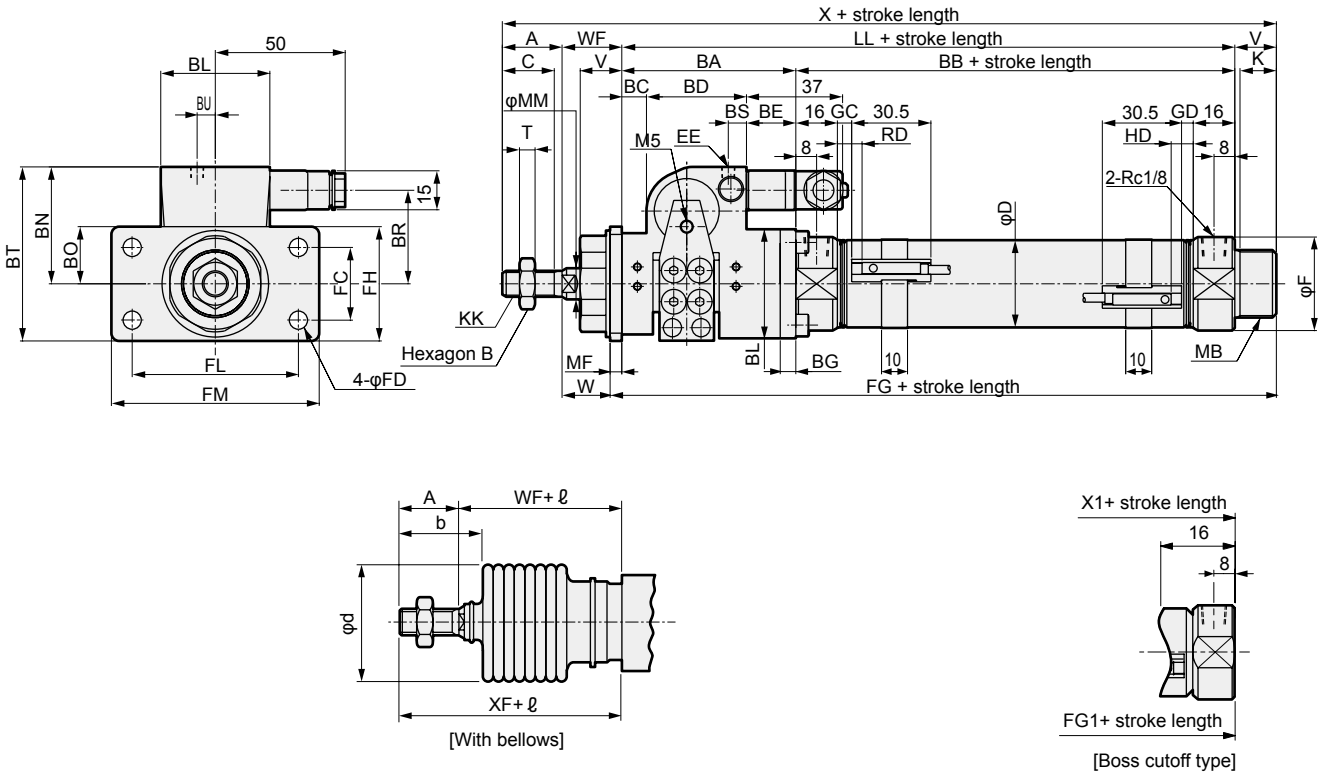
Code	Axial foot (LB) basic dimensions																		
Bore size (mm)	A	AB	B	BA	BB	BC	BD	BE	BG	BL	BT	BN	BO	BR	BS	BU	C	D	EE
φ20	20	6	13	58	66	9	30	19	5	34	63	38	19	29	4	3.8	18	21.4	M5
φ25	23	7	17	67	69	9.5	38.5	19	6	42	75	45	22	34.5	7	7	20	26.4	Rc1/8
φ32	23	7	17	67	69	9.5	38.5	19	6	42	75	45	22	34.5	7	7	20	33.6	Rc1/8
φ40	25	7	19	74	73	8	48	18	8	50	85.5	55.5	25	39.5	7	7	22	41.6	Rc1/8

Code										Mounting dimensions							With switch (T0, T5, T2, T3)		
Bore size (mm)	F	FA	H	KK	LL	MM	T	V	WF	LA	LB	LC	LG	LH	LR	LS	GC	GD	RD
φ20	28	26	15	M8×1.0	124	10	5	14	24	196	10	18	160	25	30	44	4.0	3.0	8.0
φ25	32	35	20	M10×1.25	136	12	6	16	23	217	12	23	182	30	46	62	5.5	4.5	9.5
φ32	36	35	20	M10×1.25	136	12	6	16	23	217	12	23	182	30	46	62	5.5	4.5	9.5
φ40	45	35	20	M12×1.5	147	14	7	16	23	230	12	23	193	30	46	62	7.5	6.5	11.5

Code		With switch (T2W, T3W)							With bellows			
Bore size (mm)	HD	GC	GD	RD	HD	P	P1	(Pθ°)	XF	b	d	ℓ
φ20	7.0	6.0	5.0	10.0	9.0	17.3	19.5	22	44	30	30	(Stroke length/3) + 6
φ25	8.5	7.5	6.5	11.5	10.5	19.8	22.0	18	46	32	46	(Stroke length/3.25) + 7
φ32	8.5	7.5	6.5	11.5	10.5	24.3	25.5	15	46	32	46	(Stroke length/3.25) + 7
φ40	10.5	9.5	8.5	13.5	12.5	28.3	29.5	12	48	34	46	(Stroke length/3.25) + 7

Dimensions CAD

● Rod side flange (FA)



1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 721.

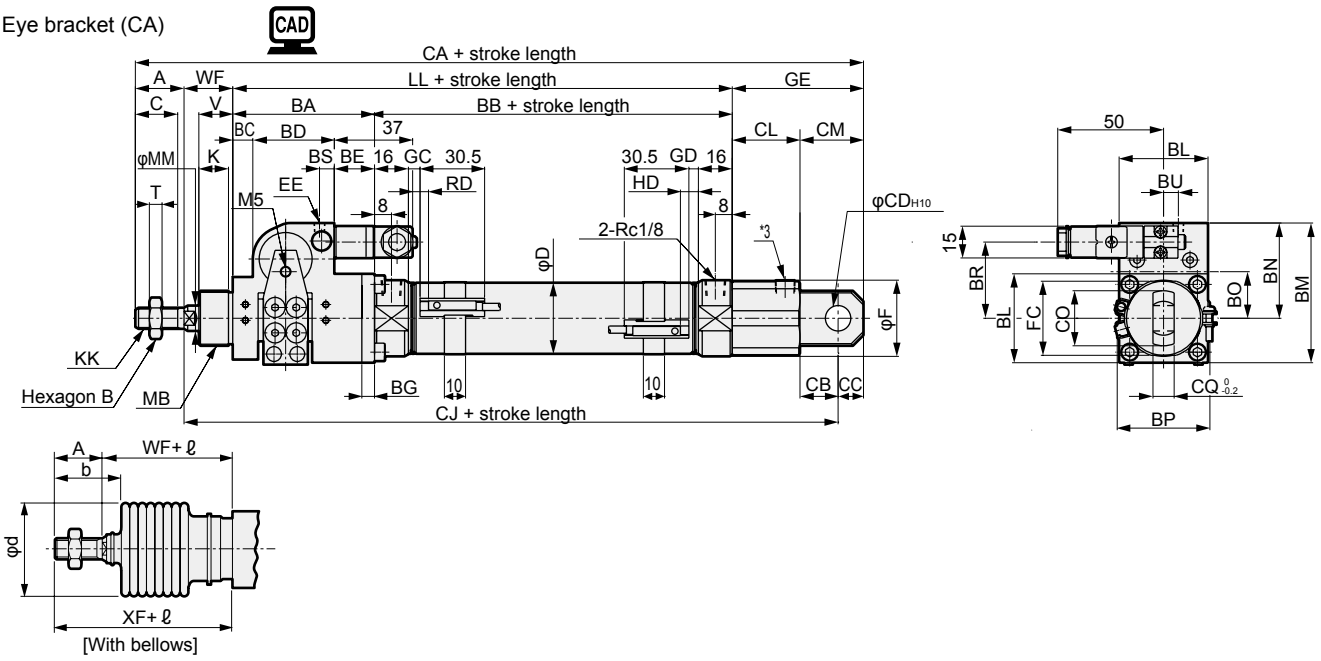
Code	Rod side flange (FA) basic dimensions																				
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BT	BL	BN	BO	BR	BS	BU	C	D	EE	F	K	KK
φ20	20	13	58	66	9	30	19	5	55	34	38	19	29	4	3.8	18	21.4	M5	28	12	M8×1.0
φ25	23	17	67	69	9.5	38.5	19	6	67	42	45	22	34.5	7	7	20	26.4	Rc1/8	32	14	M10×1.25
φ32	23	17	67	69	9.5	38.5	19	6	67	42	45	22	34.5	7	7	20	33.6	Rc1/8	36	14	M10×1.25
φ40	25	19	74	73	8	48	18	8	77.5	50	55.5	25	39.5	7	7	22	41.6	Rc1/8	45	14	M12×1.5

Code										Mounting dimensions						With switch (T0, T5, T2, T3)			
Bore size (mm)	LL	MB	MF	MM	T	V	W	WF	X	FC	FD	FG	FH	FL	FM	GC	GD	RD	HD
φ20	124	M18×1.5	3.2	10	5	14	20.8	24	182	20	6	141.2	34	40	54	4.0	3.0	8.0	7.0
φ25	136	M26×1.5	4.5	12	6	16	18.5	23	198	28	7	156.5	44	64	80	5.5	4.5	9.5	8.5
φ32	136	M26×1.5	4.5	12	6	16	18.5	23	198	28	7	156.5	44	64	80	5.5	4.5	9.5	8.5
φ40	147	M26×1.5	4.5	14	7	16	18.5	23	211	28	7	167.5	44	64	80	7.5	6.5	11.5	10.5

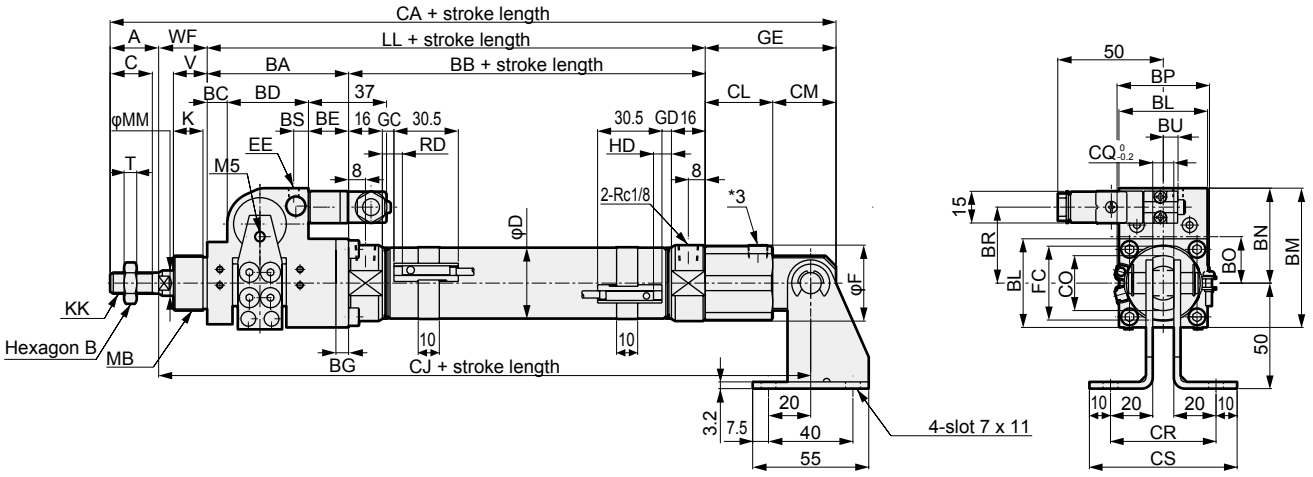
Code	With switch (T2W, T3W)				With bellows				Boss cutoff type	
Bore size (mm)	GC	GD	RD	HD	XF	b	d	ℓ	X1	FG1
φ20	6.0	5.0	10.0	9.0	44	30	30	(Stroke length/3) + 6	168	127.2
φ25	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7	182	140.5
φ32	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7	182	140.5
φ40	9.5	8.5	13.5	12.5	48	34	46	(Stroke length/3.25) + 7	195	151.5

Dimensions

● Eye bracket (CA)



● Eye bracket (CA) with bracket (option)



1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : Not piping port.
*4 : For the ℓ dimension, round up below the decimal point.
*5 : For the dimensions of the accessories, refer to page 721.

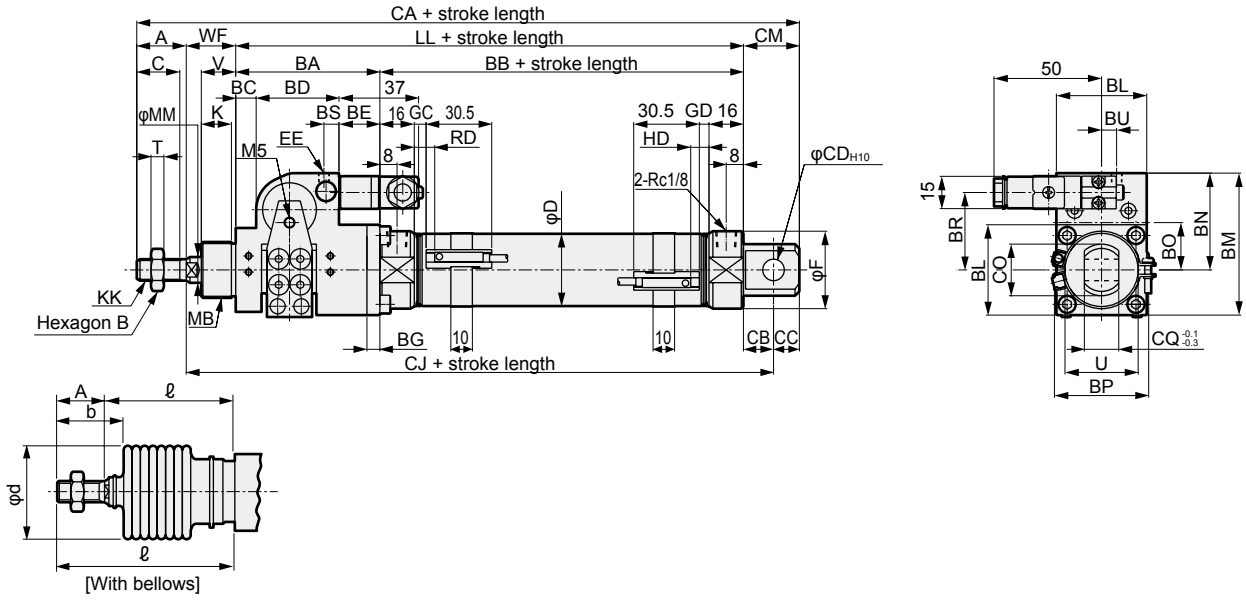
Code	Eye bracket (CA) basic dimensions																					
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BL	BM	BN	BO	BP	BR	BS	BU	C	D	EE	F	FC	GE
φ20	20	13	58	66	9	30	19	5	34	55	38	19	38	29	4	3.8	18	21.4	M5	28	26	55
φ25	23	17	67	69	9.5	38.5	19	6	42	66	45	22	43.8	34.5	7	7	20	26.4	Rc1/8	32	35	62
φ32	23	17	67	69	9.5	38.5	19	6	42	66	45	22	43.8	34.5	7	7	20	33.6	Rc1/8	36	35	62
φ40	25	19	73	73	8	48	18	8	50	80.5	55.5	25	52	39.5	7	7	22	41.6	Rc1/8	45	35	62

Code								Mounting dimensions									
Bore size (mm)	K	KK	LL	MB	MM	T	V	WF	CA	CB	CC	CD	CJ	CL	CM	CO	CQ	CR	CS
φ20	12	M8×1.0	124	M18×1.5	10	5	14	24	223	14	10	10	193	31	24	22	8	48	68
φ25	14	M10×1.25	135	M26×1.5	12	6	16	23	244	18	12	12	209	32	30	26	10	50	70
φ32	14	M10×1.25	136	M26×1.5	12	6	16	23	244	18	12	12	209	32	30	26	10	50	70
φ40	14	M12×1.5	147	M26×1.5	14	7	16	23	257	18	12	12	220	32	30	26	10	50	70

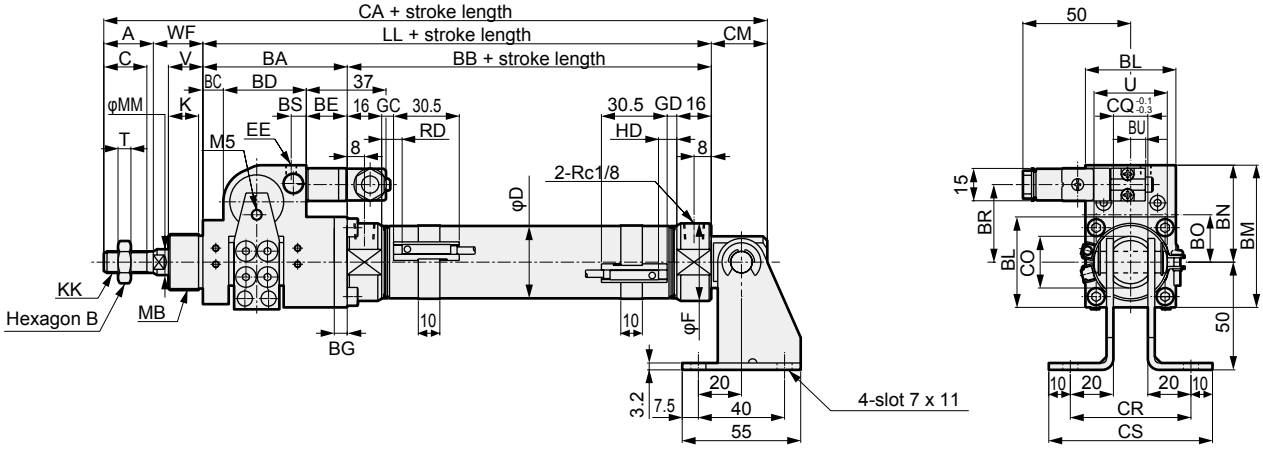
Code	With switch (T0, T5, T2, T3)				With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	GC	GD	RD	HD	XF	b	d	ℓ
φ20	4.0	3.0	8.0	7.0	6.0	5.0	10.0	9.0	44	30	30	(Stroke length/3) + 6
φ25	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7
φ32	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7
φ40	7.5	6.5	11.5	10.5	9.5	8.5	13.5	12.5	48	34	46	(Stroke length/3.25) + 7

Dimensions

● Eye bracket integrated (CC)



● Eye bracket (CC) with bracket (option)



1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 721.

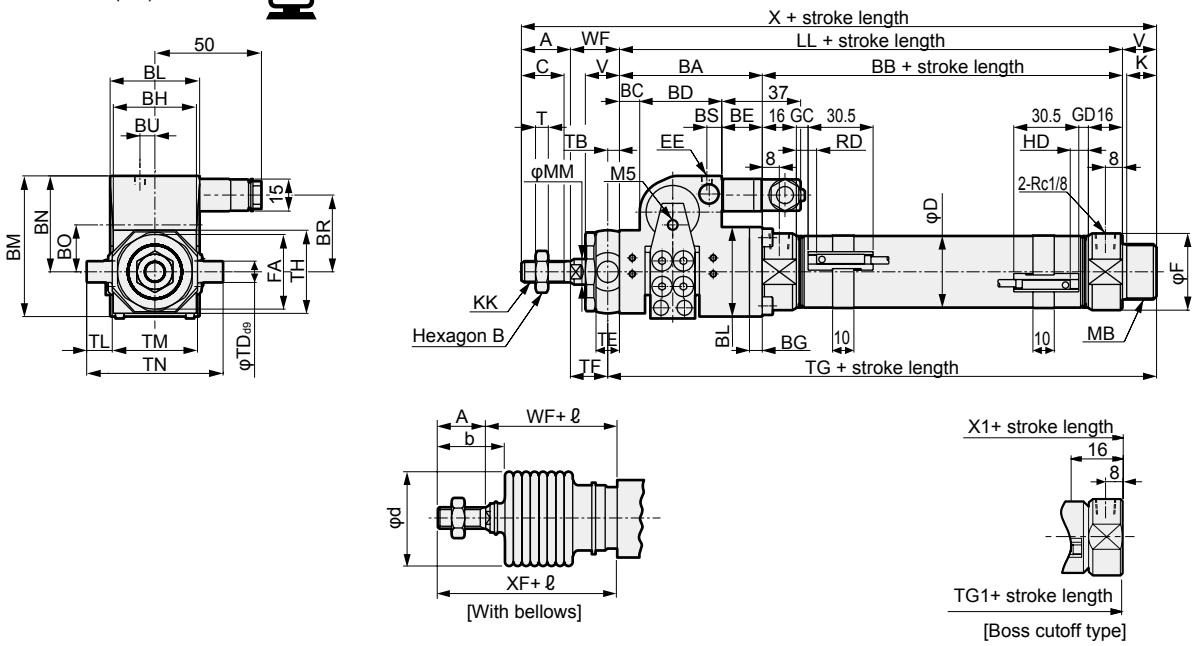
Code	Eye bracket integrated (CC) basic dimensions																			
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BL	BM	BN	BO	BP	BR	BS	BU	C	D	EE	F
φ20	20	13	58	66	9	30	19	5	34	55	38	19	38	29	4	3.8	18	21.4	M5	28
φ25	23	17	67	69	9.5	38.5	19	6	42	66	45	22	43.8	34.5	7	7	20	26.4	Rc1/8	32
φ32	23	17	67	69	9.5	38.5	19	6	42	66	45	22	43.8	34.5	7	7	20	33.6	Rc1/8	36
φ40	25	19	74	73	8	48	18	8	50	80.5	55.5	25	52	39.5	7	7	22	41.6	Rc1/8	45

Code										Mounting dimensions									
Bore size (mm)	K	KK	LL	MB	MM	T	U	V	WF	CA	CB	CC	CD	CJ	CM	CO	CQ	CR	CS
φ20	12	M8×1.0	124	M18×1.5	10	5	24	14	24	189	12	9	8	160	21	22	16	56	76
φ25	14	M10×1.25	135	M26×1.5	12	6	30	16	23	203	12	9	8	171	21	24	16	56	76
φ32	14	M10×1.25	136	M26×1.5	12	6	34	16	23	208	14	12	10	173	26	24	16	56	76
φ40	14	M12×1.5	147	M26×1.5	14	7	43	16	23	225	16	14	12	186	30	30	20	60	80

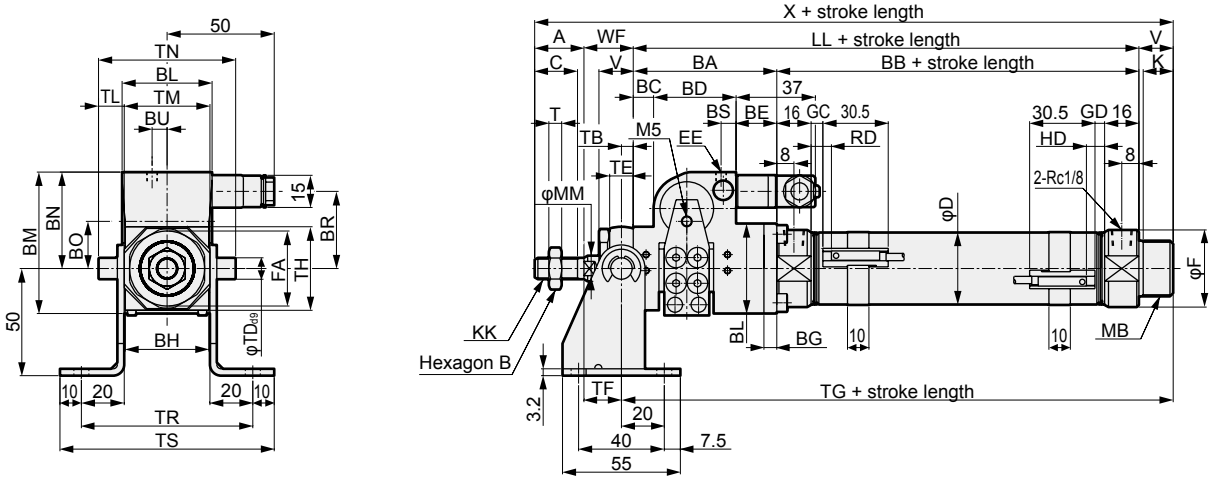
Code	With switch (T0, T5, T2, T3)				With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	GC	GD	RD	HD	XF	b	d	ℓ
φ20	4.0	3.0	8.0	7.0	6.0	5.0	10.0	9.0	44	30	30	(Stroke length/3) + 6
φ25	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7
φ32	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7
φ40	7.5	6.5	11.5	10.5	9.5	8.5	13.5	12.5	48	34	46	(Stroke length/3.25) + 7

Dimensions

● Rod side trunnion (TA)



● Rod side trunnion (TA) with bracket (option)



1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : Option with bracket cannot be selected for the brake section with cover "U".
*5 : For the dimensions of the accessories, refer to page 721.

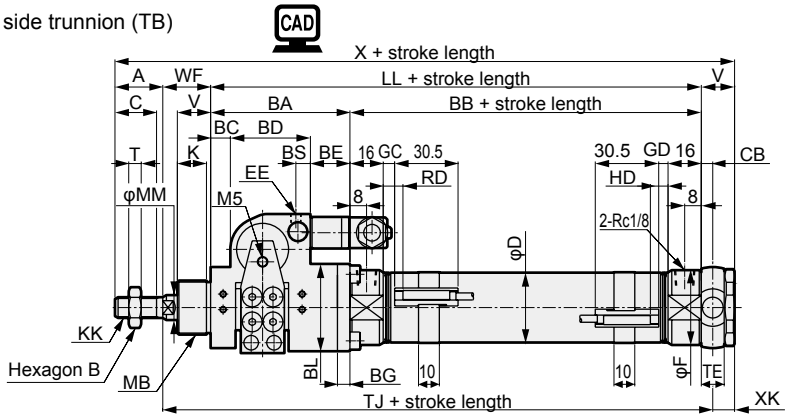
Code	Rod side trunnion (TA)																					
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BL	BM	BN	BO	BR	BS	BU	C	D	EE	F	FA	K
φ20	20	13	58	66	9	30	19	5	29	34	55	38	19	29	4	3.8	18	21.4	M5	28	26	12
φ25	23	17	67	69	9.5	38.5	19	6	39	42	66	45	22	34.5	7	7	20	26.4	Rc1/8	32	35	14
φ32	23	17	67	69	9.5	38.5	19	6	39	42	66	45	22	34.5	7	7	20	33.6	Rc1/8	36	35	14
φ40	25	19	74	73	8	48	18	8	50	50	80.5	55.5	25	39.5	7	7	22	41.6	Rc1/8	45	35	14

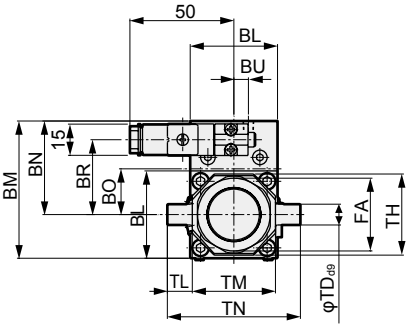
Code												Mounting dimensions						
Bore size (mm)	KK	LL	MB	MM	T	TL	TM	TR	TS	V	WF	X	TB	TD	TE	TF	TG	TH	TL
φ20	M8×1.0	124	M18×1.5	10	5	8	30	70	90	14	24	182	4.5	8	9	19.5	142.5	29.5	8
φ25	M10×1.25	136	M26×1.5	12	6	12	40	80	100	16	23	198	5.5	10	11	17.5	157.5	39	12
φ32	M10×1.25	136	M26×1.5	12	6	12	40	80	100	16	23	198	5.5	10	11	17.5	157.5	39	12
φ40	M12×1.5	147	M26×1.5	14	7	9.5	53	93	113	16	23	211	5.5	10	11	17.5	168.5	44	9.5

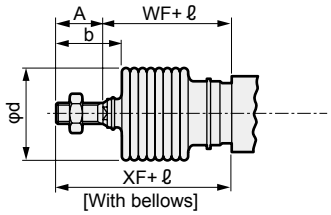
Code			With switch (T0, T5, T2, T3)				With switch (T2W, T3W)				With bellows				Boss cutoff	
Bore size (mm)	TM	TN	GC	GD	RD	HD	GC	GD	RD	HD	XF	b	d	ℓ	X1	TG1
φ20	30	46	4.0	3.0	8.0	7.0	6.0	5.0	10.0	9.0	44	30	30	(Stroke length/3) + 6	168	128.5
φ25	40	64	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7	182	141.5
φ32	40	64	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7	182	141.5
φ40	53	72	7.5	6.5	11.5	10.5	9.5	8.5	13.5	12.5	48	34	46	(Stroke length/3.25) + 7	195	152.5

Dimensions

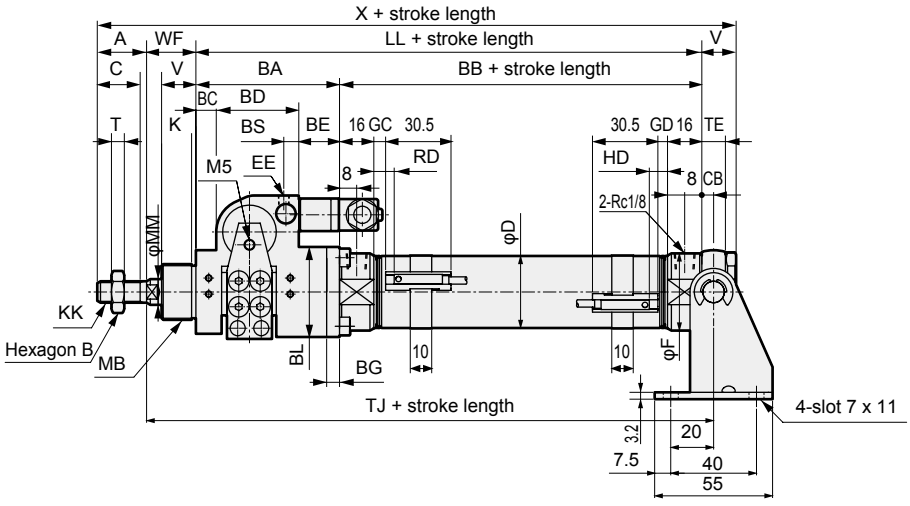
● Head side trunnion (TB)

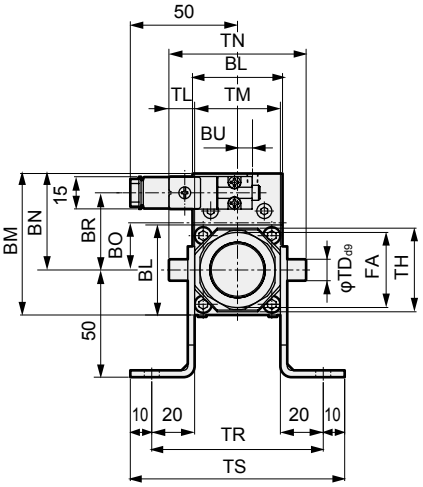






● Head side trunnion (TB) with bracket (option)





1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The size of the exhaust port of brake section is the same as that of EE.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 721.

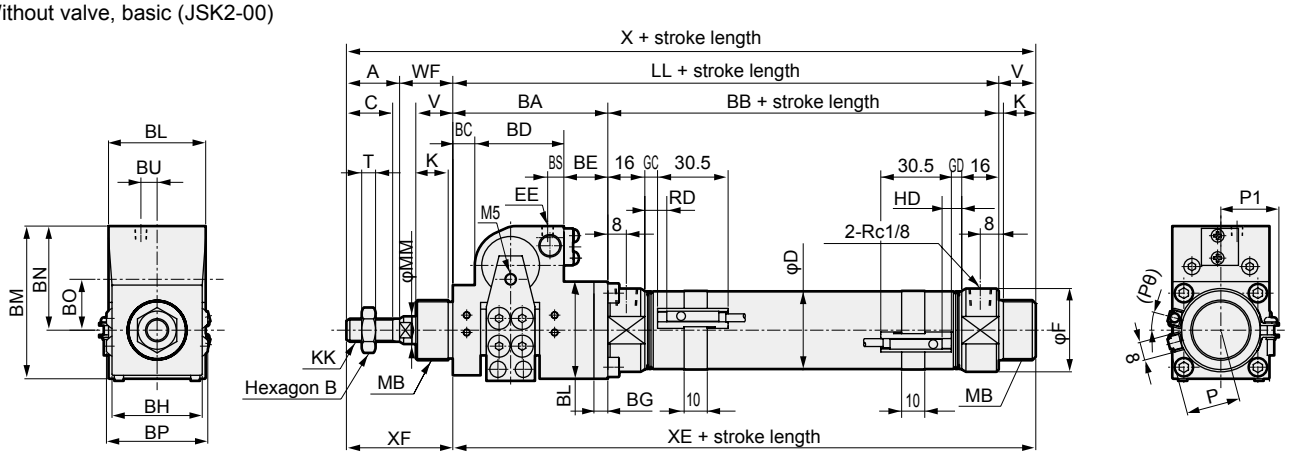
Code	Head side trunnion (TB) basic dimensions																				
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BL	BM	BN	BO	BR	BS	BU	C	CB	D	EE	F	FA
φ20	20	13	58	66	9	30	19	5	34	55	38	19	29	4	3.8	18	4.5	21.4	M5	28	26
φ25	23	17	67	69	9.5	38.5	19	6	42	66	45	22	34.5	7	7	20	5.5	26.4	Rc1/8	32	35
φ32	23	17	67	69	9.5	38.5	19	6	42	66	45	22	34.5	7	7	20	5.5	33.6	Rc1/8	36	35
φ40	25	19	74	73	8	48	18	8	50	80.5	55.5	25	39.5	7	7	22	5.5	41.6	Rc1/8	45	35

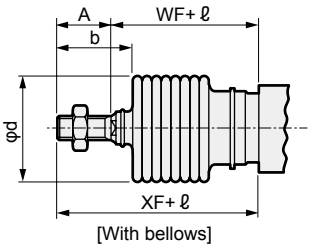
Code											Mounting dimensions								
Bore size (mm)	K	KK	LL	MB	MM	T	V	WF	X	XK	TD	TE	TH	TJ	TL	TM	TN	TR	TS
φ20	12	M8×1.0	124	M18×1.5	10	5	14	24	182	9.5	8	9	29.5	152.5	8	30	46	70	90
φ25	14	M10×1.25	136	M26×1.5	12	6	16	23	198	10.5	10	11	39	164.5	12	40	64	80	100
φ32	14	M10×1.25	136	M26×1.5	12	6	16	23	198	10.5	10	11	39	164.5	12	40	64	80	100
φ40	14	M12×1.5	147	M26×1.5	14	7	16	23	211	10.5	10	11	44	175.5	9.5	53	72	93	113

Code	With switch (T0, T5, T2, T3)				With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	GC	GD	RD	HD	XF	b	d	ℓ
φ20	4.0	3.0	8.0	7.0	6.0	5.0	10.0	9.0	44	30	30	(Stroke length/3) + 6
φ25	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7
φ32	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	46	32	46	(Stroke length/3.25) + 7
φ40	7.5	6.5	11.5	10.5	9.5	8.5	13.5	12.5	48	34	46	(Stroke length/3.25) + 7

Dimensions CAD

● Without valve, basic (JSK2-00)





[With bellows]

1 : Refer to page 709 for HD, RD and protruding dimensions of T, T8*, and 2-color display switches.
*2 : The mounting dimensions are the same as those of JSK2-V (with valve). Refer to pages 702 to 707.
*3 : For the ℓ dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 721.

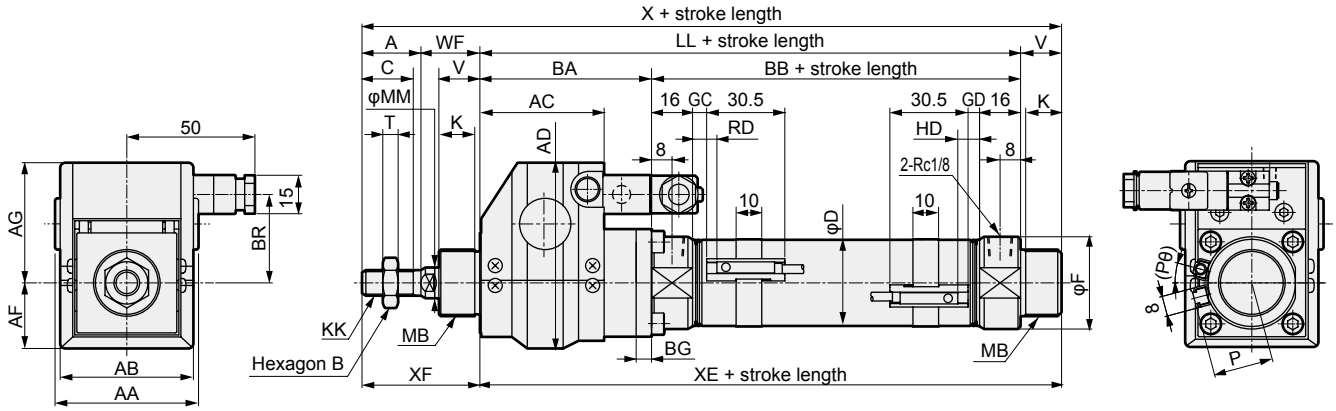
Code	Without valve/basic (JSK2-00) basic dimensions																		
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BL	BM	BN	BO	BP	BS	BU	C	D	EE
φ20	20	13	58	66	9	30	19	5	29	34	55	38	19	38	4	3.8	18	21.4	M5
φ25	23	17	67	69	9.5	38.5	19	6	39	42	66	45	22	43.8	7	7	20	26.4	Rc1/8
φ32	23	17	67	69	9.5	38.5	19	6	39	42	66	45	22	43.8	7	7	20	33.6	Rc1/8
φ40	25	19	74	73	8	48	18	8	50	50	80.5	55.5	25	52	7	7	22	41.6	Rc1/8

Code														With switch (T0, T5, T2, T3)				With switch (T2W, T3W)		
Bore size (mm)	F	K	KK	LL	MB	MM	T	V	WF	X	XE	XF		GC	GD	RD	HD	GC	GD	RD
φ20	28	12	M8×1.0	124	M18×1.5	10	5	14	24	182	138	44		4.0	3.0	8.0	7.0	6.0	5.0	10.0
φ25	32	14	M10×1.25	136	M26×1.5	12	6	16	23	198	152	46		5.5	4.5	9.5	8.5	7.5	6.5	11.5
φ32	36	14	M10×1.25	136	M26×1.5	12	6	16	23	198	152	46		5.5	4.5	9.5	8.5	7.5	6.5	11.5
φ40	45	14	M12×1.5	147	M26×1.5	14	7	16	23	211	163	48		7.5	6.5	11.5	10.5	9.5	8.5	13.5

Code					With bellows		
Bore size (mm)	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	9.0	17.3	19.5	22	30	30	(Stroke length/3) + 6
φ25	10.5	19.8	22.0	18	32	46	(Stroke length/3.25) + 7
φ32	10.5	24.3	25.5	15	32	46	(Stroke length/3.25) + 7
φ40	12.5	28.3	29.5	12	34	46	(Stroke length/3.25) + 7

Dimensions

● Brake section with cover (U)/basic (JSK2-00)



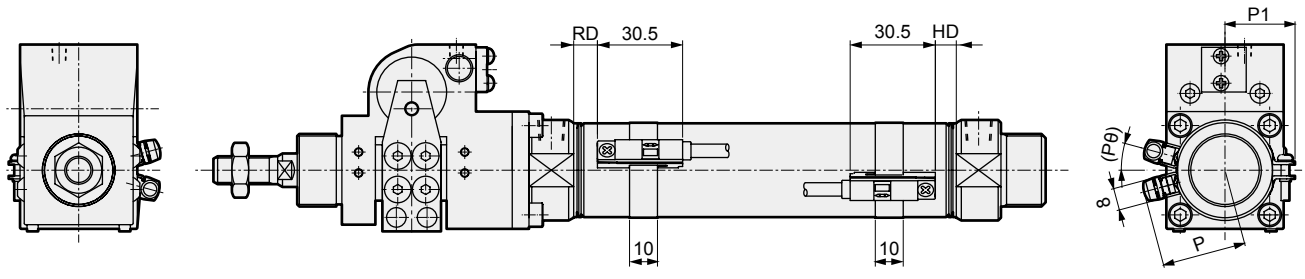
RD: Rod side max. sensitivity position
HD: Head side max. sensitivity position

Code	Basic (00) basic dimensions																	
Bore size (mm)	A	AA	AB	AC	AD	AF	AG	B	BA	BB	BG	BR	C	D	F	K	KK	LL
φ20	20	51	47	39	58.5	19.5	39	13	58	66	5	29	18	21.4	28	12	M8×1.0	124
φ25	23	56	52	48.5	72.5	25	47.5	17	67	69	6	34.5	20	26.4	32	14	M10×1.25	136
φ32	23	56	52	48.5	72.5	25	47.5	17	67	69	6	34.5	20	33.6	36	14	M10×1.25	136
φ40	25	69	65	56	85.75	28.75	57	19	74	73	8	39.5	22	41.6	45	14	M12×1.5	147

Code									With switch (T0, T5, T2, T3)				With switch (T2W, T3W)					
Bore size (mm)	MB	MM	T	V	WF	X	XE	XF	GC	GD	RD	HD	GC	GD	RD	HD	P	(Pθ)°
φ20	M18×1.5	10	5	14	24	182	138	44	4.0	3.0	8.0	7.0	6.0	5.0	10.0	9.0	17.3	22
φ25	M26×1.5	12	6	16	23	198	152	46	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	19.8	18
φ32	M26×1.5	12	6	16	23	198	152	46	5.5	4.5	9.5	8.5	7.5	6.5	11.5	10.5	24.3	15
φ40	M26×1.5	14	7	16	23	211	163	48	7.5	6.5	11.5	10.5	9.5	8.5	13.5	12.5	28.3	12

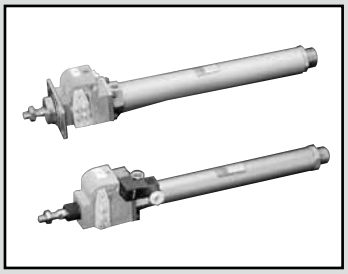
JSK2 Series common dimensions (with T1, T8 switches, with 2-color display switch)

● JSK2-**-**-T1H/V, T8H/V, T$\frac{2}{3}$YH/V



Switch installation dimensions

Code	1-color display (T1, T8) 2-color display (T $\frac{2}{3}$ Y)							
	RD *1		HD *2		P		P1	(Pθ)°
Bore size (mm)	T1,T$\frac{2}{3}$Y	T8	T1,T$\frac{2}{3}$Y	T8	T1	T$\frac{2}{3}$Y,T8		
φ20	7.0	2.0	6.0	1	28.5	23.1	19.5	22
φ25	8.5	3.5	7.5	2.5	31.0	25.6	22.0	18
φ32	8.5	3.5	7.5	2.5	35.5	30.1	25.5	15
φ40	10.5	5.5	9.5	4.5	39.5	34.1	29.5	12

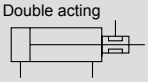


Brake cylinder Small bore size, disassembly
Double acting/double acting with valve

JSM2/JSM2-V Series

● Bore size: φ20/φ30/φ40

JIS symbol ● Double acting



RoHS CAD

Specifications

Descriptions		JSM2			JSM2-V		
Bore size mm		φ20	φ30	φ40	φ20	φ30	φ40
Actuation		Double acting			Double acting/with valve		
Working fluid		Compressed air					
Max. working pressure MPa		0.7 (≈100 psi, 7 bar)			0.6 (≈87 psi, 6 bar)		
Min. working pressure MPa	Brake section	0.35 (≈51 psi, 3.5 bar)					
	Cylinder	0.10 (≈15 psi, 1 bar)					
Proof pressure MPa		1.05 (≈150 psi, 10.5 bar)					
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)			-10 (14°F) to 50 (122°F) (no freezing)		
Port size	Brake section	M5	Rc1/8		M5	Rc1/8	
	Cylinder	Rc1/8					
Stroke tolerance mm		$^{+1.0}_{0}$ (to 200)			$^{+1.2}_{0}$ (to 1000)		
Working piston speed mm/s		50 to 500					
Cushion		None					
Lubrication		Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)					
Stopping accuracy mm		±1.0 (300 mm/s, no load)					
Holding force N		186	431	765	186	431	765
Allowable absorbed energy J		0.024	0.05	0.093	0.024	0.05	0.093

Note: This product cannot absorb high energy generated by external load. We recommend attaching an external shock absorber.

Electrical specification for brake valve

Descriptions	JSM2-V-VALVE-KIT- Voltage		
Rated voltage (V)	100 AC(50/60 Hz)	200 AC(50/60 Hz)	24 DC
Starting current (A)	0.056/0.044	0.034/0.026	0.075
Holding current (A)	0.028/0.022	0.017/0.013	
Power consumption (W)	1.8/1.4	2.1/1.6	1.8
Voltage fluctuation range	±10%		
Thermal class	Class B molded coil		

*1 : 100/200 VAC coil is available for 110/220 VAC (60 Hz).
*2 : Refer to “Pneumatic Valves (CB-23SA)” for details on valves (P5136 Series).

Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)
φ20	25/50/75/100/125/150 175/200/250/300	700	1
φ30			
φ40			

● For types with switch, minimum stroke length varies depending on mounting method. Refer to the following table.
The custom stroke length is available in 1 mm increments.

Min. stroke length with switch (T switch)

Switch model No.	1	2	3
T0, T5, T2, T3	10	27	51
T2W, T3W	10	31	55
T2Y, T3Y, T1	10	25	49
T8	10	23	47

Switch specifications (T type switch)

● 1-color/2-color display

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)	T3YH/ T3YV	T3WH/ T3WV	T0H/T0V		T5H/T5V		T8H/T8V		
Applications	For programmable controller, relay, compact solenoid valve	Dedicated for programmable controller			For programmable controller, relay				For programmable controller, relay		For programmable controller, relay, IC circuit (no indicator lamp), serial connection		For programmable controller, relay		
Output method	-				NPN output	PNP output	NPN output	NPN output	-						
Pwr. supp. V.	-				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 100 mA	5 to 20 mA (*2)			100 mA or less		50 mA or less		5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 50 mA	7 to 20 mA	7 to 10 mA
Indicator lamp	LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		Without indicator lamp		LED (Lit when ON)		
Leakage current	≤ 1 mA at 100 VAC, ≤ 2 mA at 200 VAC	1 mA or less			10 μA or less				0 mA						
Weight g	1 m:33 3 m:87 5 m:142	1 m:18 3 m:49 5 m:80	1 m:33 3 m:87 5 m:142	1 m:18 3 m:49 5 m:80	1 m:18 3 m:49 5 m:80		1 m:33 3 m:87 5 m:142	1 m:18 3 m:49 5 m:80	1 m:18 3 m:49 5 m:80				1 m:33 3 m:87 5 m:142		

*1 : Refer to Ending Page 1 for other switch specifications.
*2 : The above max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)
*3 : The T0/T5 switch can also be used with 220 VAC. Contact CKD about working conditions.
*4 : Dimensions depend on switch model No. Refer to Ending Page 18 for details.

Cylinder weight

(Unit: kg)

Item/mounting / Bore size (mm)	Product weight when stroke length (S) = 0 mm					Switch weight	Switch rail + band weight	Valve weight	Additional weight per S = 10 mm
	Basic (00)	Axial foot (LB)	Flange (FA)	Clevis (CA)	Trunnion (TA/TB)				
φ20	0.48	0.63	0.54	0.61	0.53	Refer to the weight in the switch specifications.	0.005	0.07	0.01
φ30	0.94	1.20	1.09	1.15	1.04		0.005		0.014
φ40	1.57	1.83	1.72	1.79	0.73		0.009		0.02

(Example) JSM2-V-LB-20-100-2-TOH-D

Product weight when S = 0 mm ..... 0.73 kg
Additional weight when S = 100 mm ... $0.01 \times \frac{100}{10} = 0.1$ kg
Weight of 2 switches ..... (0.018 + 0.005) × 2 = 0.046 kg
Product weight ..... 0.73 kg + 0.1 kg + 0.046 kg = 0.88 kg

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
φ20	Push	31.4	47.1	62.8	94.2	1.26×10^2	1.57×10^2	1.88×10^2	2.20×10^2
	Pull	23.6	35.3	47.1	70.7	94.2	1.18×10^2	1.41×10^2	1.65×10^2
φ30	Push	70.7	1.06×10^2	1.41×10^2	2.12×10^2	2.83×10^2	3.53×10^2	4.24×10^2	4.95×10^2
	Pull	59.4	89.1	1.19×10^2	1.78×10^2	2.38×10^2	2.97×10^2	3.56×10^2	4.16×10^2
φ40	Push	1.26×10^2	1.88×10^2	2.51×10^2	3.77×10^2	5.03×10^2	6.28×10^2	7.54×10^2	8.80×10^2
	Pull	1.10×10^2	1.65×10^2	2.21×10^2	3.31×10^2	4.41×10^2	5.51×10^2	6.62×10^2	7.72×10^2

How to order

●Without valve

Without switch (built-in magnet for switch)

JSM2 - LB - 20 - 50 - 1 ——— P I

With switch (built-in magnet for switch)

JSM2 - LB - 20 - 50 - 1 - T0H - R - P I

●With valve

Without switch (built-in magnet for switch)

JSM2-V - LB - 20 - 50 - 1 ——— P I

With switch (built-in magnet for switch)

JSM2-V - LB - 20 - 50 - 1 - T0H - R - P I

Ⓐ Model No. *1

Ⓑ Mounting

Ⓒ Bore size

Ⓓ Stroke length

Ⓔ Valve voltage

Ⓕ Switch model No.

Ⓖ Switch quantity

Ⓗ Option *3

Ⓘ Accessory

Code	Content	Ⓐ Model No. Double acting JSM2	Ⓐ Model No. With valve JSM2-V
Ⓑ Mounting			
00	Basic	●	●
LB	Axial foot	●	●
FA	Rod side flange	●	●
CA	Eye bracket	●	●
TA	Rod side trunnion	●	●
TB	Head side trunnion	●	●
Ⓒ Bore size (mm)			
20	φ20	●	●
30	φ30	●	●
40	φ40	●	●

Ⓓ Stroke length (mm)

Bore size	Stroke length *2	Custom stroke length
φ20	**1 to 700**	**In 1 mm increments**
φ30	**1 to 700**	
φ40	**1 to 700**	

Code	Content	Ⓐ Model No. Double acting JSM2	Ⓐ Model No. With valve JSM2-V
Ⓔ Valve voltage			
1	100 VAC(50/60 Hz)		●
2	200 VAC(50/60 Hz)		●
3	24 VDC		●
Ⓕ Switch model No.			
	Refer to the switch model No. table on the following page.		
*** Lead wire length**			
Blank	1 m (standard)	●	●
3	3 m (option)	●	●
5	5 m (option)	●	●
Ⓖ Switch quantity			
R	1 on rod side	●	●
H	1 on head side	●	●
D	2	●	●
T	3	●	●
4	4 (when there are more than 4 switches, indicate switch quantity.)	●	●

Ⓗ Option

		Max. ambient temperature	Instantaneous max. temp		
J	Bellows	100°C	200°C	●	●
L	Bellows	250°C	400°C	●	●
M	Piston rod material (stainless steel)			●	●
P	Same port position			●	●
U	Brake section with cover			●	●

Code	Content	Ⓐ Model No. Double acting JSM2	Ⓐ Model No. With valve JSM2-V
Ⓘ Accessory			
I	Rod eye	●	●
Y	Rod clevis (pin, washer, split pin attached)	●	●
B2	Clevis bracket (pin, snap ring attached)	●	●

⚠ Precautions for model No. selection

*1 : Low hydraulic can also be supplied as custom order product
Model numbers are JSM2-H and JSM2-VH.

*2 : Refer to page 710 for the min. stroke length with switch.

*3 : For a TA mounting, the brake section with cover (U) cannot be selected.

[Example of model No.]

JSM2-V-LB-20-50-1-T0H-R-PI

Model: Brake cylinder with valve

Ⓐ Model No. : With valve
Ⓑ Mounting : Axial foot
Ⓒ Bore size : φ20 mm
Ⓓ Stroke length : 50 mm
Ⓔ Valve voltage : 100 VAC
Ⓕ Switch model No. : Reed T0H switch,
Ⓖ Switch quantity : 1 on rod side
Ⓗ Option : Same port position
Ⓘ Accessory : Rod eye

[F] Switch model No.

T type switch						
Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
TOH*	TOV*	Reed	●	●	1-color display	2-wire
T5H*	T5V*		●	●	Without indicator lamp	
T8H*	T8V*		●	●	1-color display	
T1H*	T1V*	Proximity	●		1-color display	2-wire
T2H*	T2V*			●		
T3H*	T3V*			●		3-wire
T3PH*	T3PV*			●	1-color display (custom order)	3-wire
T2WH*	T2WV*			●	2-color display	2-wire
T2YH*	T2YV*			●		
T3WH*	T3WV*			●		3-wire
T3YH*	T3YV*			●		
T2JH*	T2JV*			●	Off-delay	2-wire

How to order switch

[T type switch]

● Switch body + mounting bracket set

JSM2 - T0H - 20

- 20: Bore size (Item Ⓒ on the previous page)
- T0H: Switch model No. (Item Ⓕ on the previous page)

● Switch body only

SW - T0H

- T0H: Switch model No. (Item Ⓕ on the previous page)

● Mounting bracket set

JSM2 - T - 20

- 20: Bore size (Item Ⓒ on the previous page)
- T: Mounting bracket

How to order brake valve

JSK2-V - VALVE-KIT - 1

❶ Valve voltage

Code	Content
1	100 VAC(50/60 Hz)
2	200 VAC(50/60 Hz)
3	24 VDC

How to order mounting bracket

Bore size (mm) / Mounting bracket	φ20	φ30	φ40
Basic (00) *3	M1-0020	M1-00-30	M1-00-30
Axial foot (LB)	M1-LB-20	M1-LB-30	M1-LB-30
Flange (FA)	M1-FA-20	M1-FA-30	M1-FA-30
Eye bracket (CA)	M1-CA-20	M1-CA-30	M1-CA-30
Trunnion (TA/TB)	M1-TA-20	M1-TA-30	M1-TA-40

*1: As for mounting brackets, the axial foot and flange include mounting nuts and toothed washers, and the trunnion includes mounting nuts.
2: For axial foot, 2 sets of the above "M1-LB-" are required.
*3: Mounting nut, toothed washer only. Although 1 set is attached with the basic of the product (00), use this when needed.

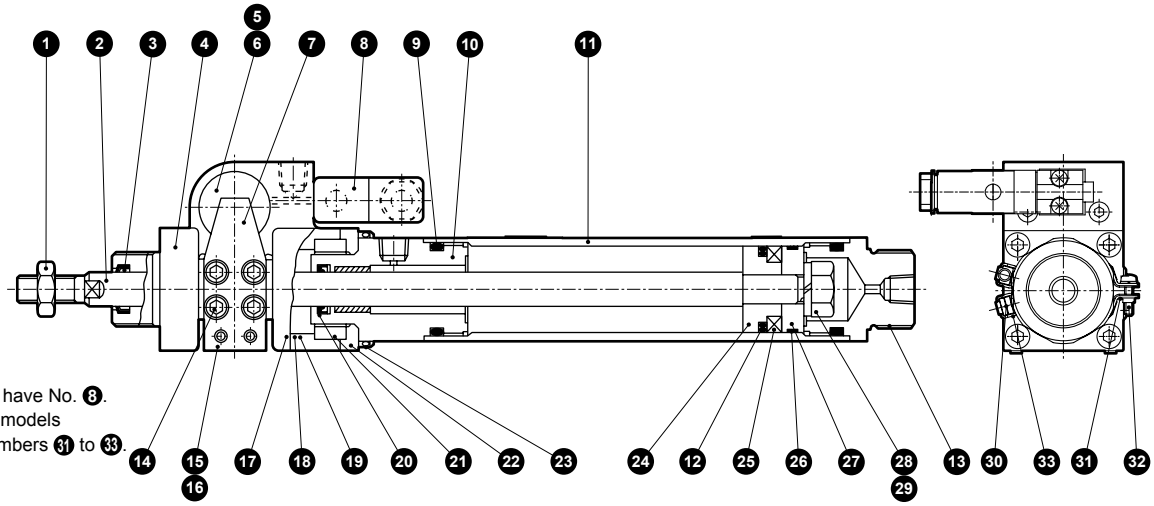
Material of mounting bracket

Mounting	Material	Remarks
LB	Steel	Zinc chromate
FA	Steel	Zinc chromate
TA/TB	Steel	Zinc chromate
CA	Steel	Zinc chromate

Note: Mounting bracket will be shipped with the product.
However, if the product is supplied with bellows and the mounting bracket is LB, FA, or TA, it will be shipped assembled.

Internal structure and parts list

- JSM2 (double acting/with switch)
- JSM2-V (with valve and switch)



- Note: JSM2 does not have No. 8.
- Note: The switchless models do not have numbers 31 to 33.

Parts list

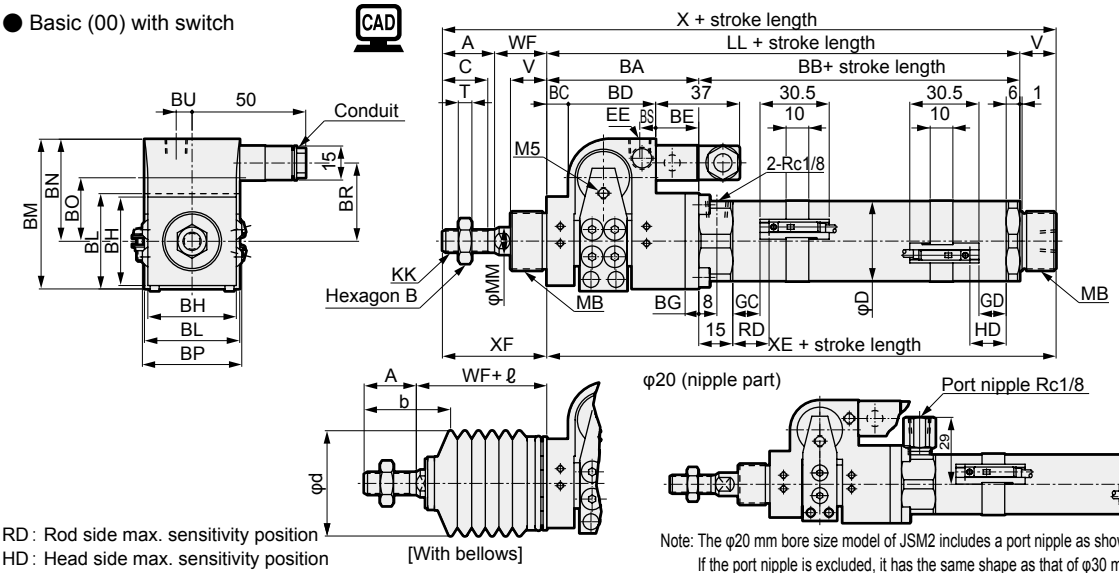
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Rod nut	Steel	Zinc chromate	17	Brake shoe metal	Cast iron	
2	Piston rod	φ20/φ30 stainless steel φ40 carbon steel	Industrial chrome plating	18	Bush	Dry bearing	
				19	Ring	Steel	
3	Scraper	Nitrile rubber		20	Rod packing	Nitrile rubber	
4	Brake body	Cast iron	Zinc chromate	21	Fixed ring	Steel	Zinc chromate
5	Brake piston	Copper alloy casting		22	Square flange	Steel	Zinc chromate
6	Piston packing	Nitrile rubber		23	Hex socket screw	Steel	Black finish
7	Lever	Steel	Zinc chromate	24	Piston A	Aluminum alloy	
8	Valve for brake release	---	P5136MO	25	Magnet	Plastic	
9	Cylinder gasket	Nitrile rubber		26	Wear ring	Acetal resin	
10	Rod cover	Aluminum alloy		27	Piston B	Aluminum alloy	
11	Cylinder tube	Aluminum alloy	Alumite	28	Hexagon nut	Steel	Zinc chromate
12	Piston packing	Nitrile rubber		29	Spring washer	Steel	Zinc chromate
13	Head cover	Aluminum alloy		With switch			
14	Hex socket screw	Steel	Black finish	30	Switch body	---	
15	Hex socket screw	Steel	Black finish	31	Band	Stainless steel	
16	Brake spring	Steel	Black finish	32	Pan head machine screw	Stainless steel	
				33	Switch rail	Stainless steel	

Repair parts list

No./part name / Bore size (mm)	Kit No.	Repair parts No.
φ20	JSM2-20K	3 9 12 20 27
φ30	JSM2-30K	
φ40	JSM2-40K	

Dimensions

● Basic (00) with switch



RD : Rod side max. sensitivity position
HD : Head side max. sensitivity position

Note: The φ20 mm bore size model of JSM2 includes a port nipple as shown above (for rod side only).
If the port nipple is excluded, it has the same shape as that of φ30 mm and φ40 mm bore size cylinders.

*1 : The size of the exhaust port of brake section is the same as that of EE.

*2 : Conduit on the valve terminal box for φ30 and φ40 mm is on the opposite side of that shown in the figure.

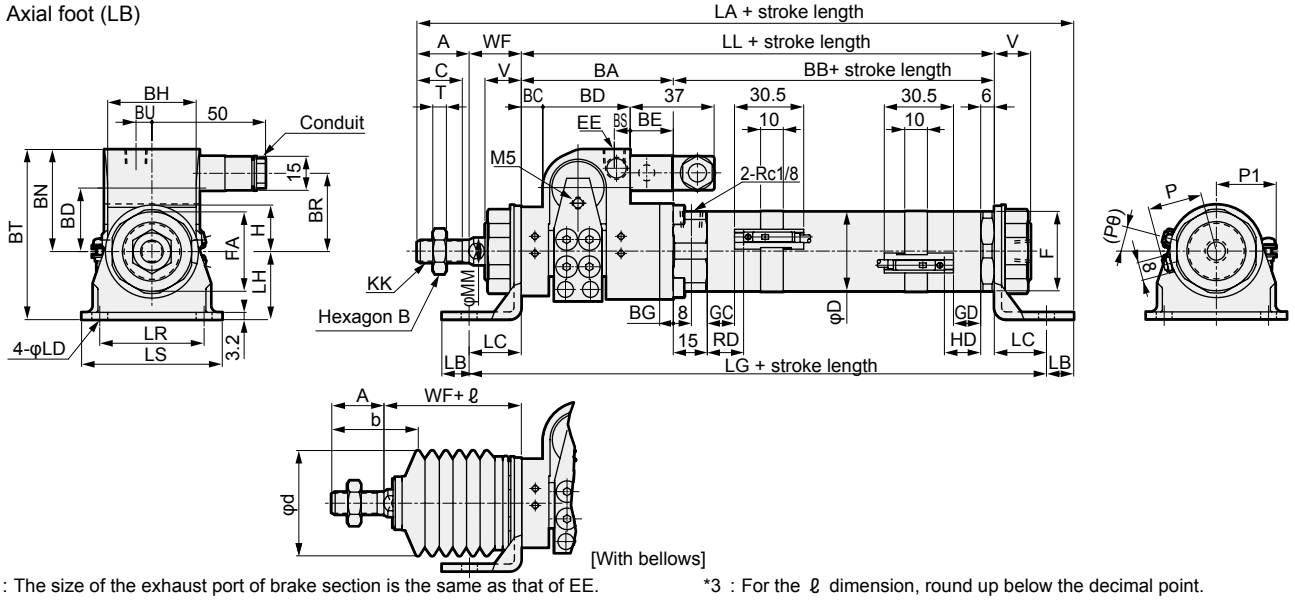
*3 : For the dimensions of the accessories, refer to page 721.

*4 : For the ℓ dimension, round up below the decimal point.

Code	Basic (00) basic dimensions																						
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BL	BM	BN	BO	BP	BR	BS	BU	C	D	EE	F	KK	LL
φ20	20	13	58	66	9	30	19	5	29	34	55	38	19	38	29	4	3.8	18	25	M5	26	M8×1.0	124
φ30	23	17	67	72	9.5	38.5	19	6	39	42	66	45	22	43.8	34.5	7	7	20	35	Rc1/8	35	M10×1.25	139
φ40	25	19	74	74	8	48	18	8	50	50	80.5	55	25	52	39.5	7	7	22	45	Rc1/8	46	M12×1.5	148

Code									With switch (T0, T5, T2, T3)				With switch (T2W, T3W)							With bellows		
Bore size (mm)	MB	MM	T	V	WF	X	XE	XF	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	M18×1.5	10	5	14	24	182	138	44	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke length/3) + 6
φ30	M26×1.5	12	6	16	23	201	155	46	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke length/3.25) + 7
φ40	M26×1.5	14	7	16	23	212	164	48	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke length/3.25) + 7

● Axial foot (LB)



*1 : The size of the exhaust port of brake section is the same as that of EE.

*2 : For the dimensions of the accessories, refer to page 721.

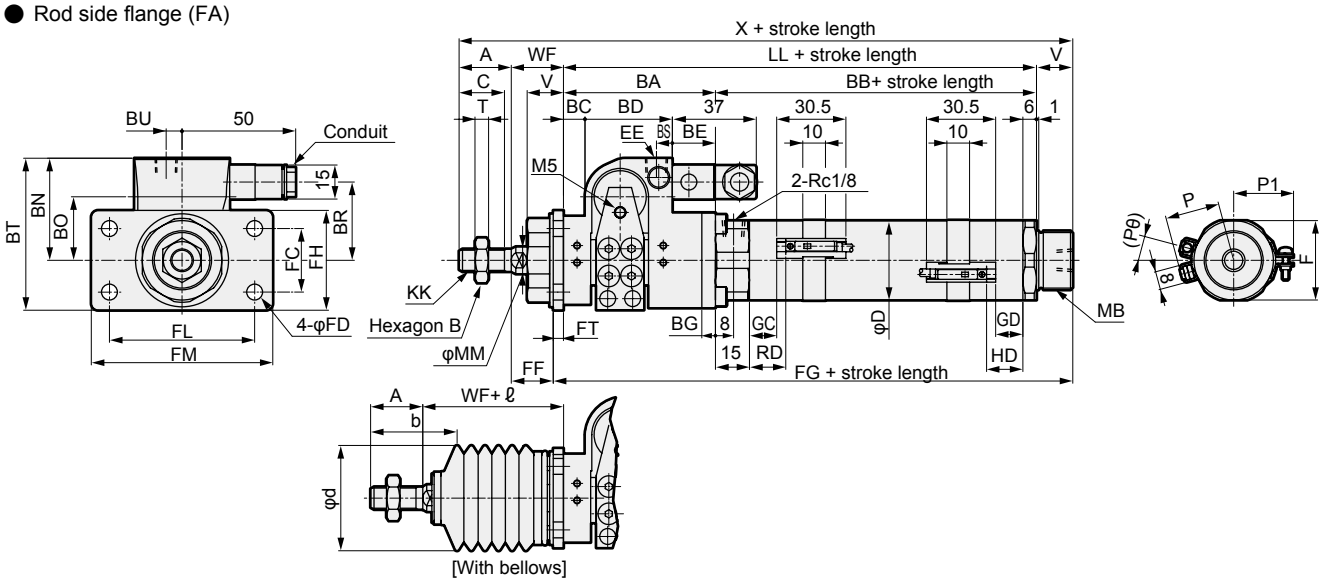
*3 : For the ℓ dimension, round up below the decimal point.

Code	Axial foot (LB) basic dimensions																						
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BT	BN	BO	BR	BS	BU	C	D	EE	F	FA	H	KK	LL
φ20	20	13	58	66	9	30	19	5	29	63	38	19	29	4	3.8	18	25	M5	26	26	15	M8×1.0	124
φ30	23	17	67	72	9.5	38.5	19	6	39	75	45	22	34.5	7	7	20	35	Rc1/8	35	35	20	M10×1.25	139
φ40	25	19	74	74	8	48	18	8	50	85.5	55.5	25	39.5	7	7	22	45	Rc1/8	46	35	20	M12×1.5	148

Code					Mounting dimensions								With switch (T0, T5, T2, T3)				With switch (T2W, T3W)							With bellows		
Bore size (mm)	MM	T	V	WF	LA	LB	LC	LD	LG	LH	LR	LS	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	10	5	14	24	196	10	18	6	160	25	30	44	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke length/3) + 6
φ30	12	6	16	23	220	12	23	7	185	30	46	62	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke length/3.25) + 7
φ40	14	7	16	23	231	12	23	7	194	30	46	62	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke length/3.25) + 7

Dimensions CAD

● Rod side flange (FA)

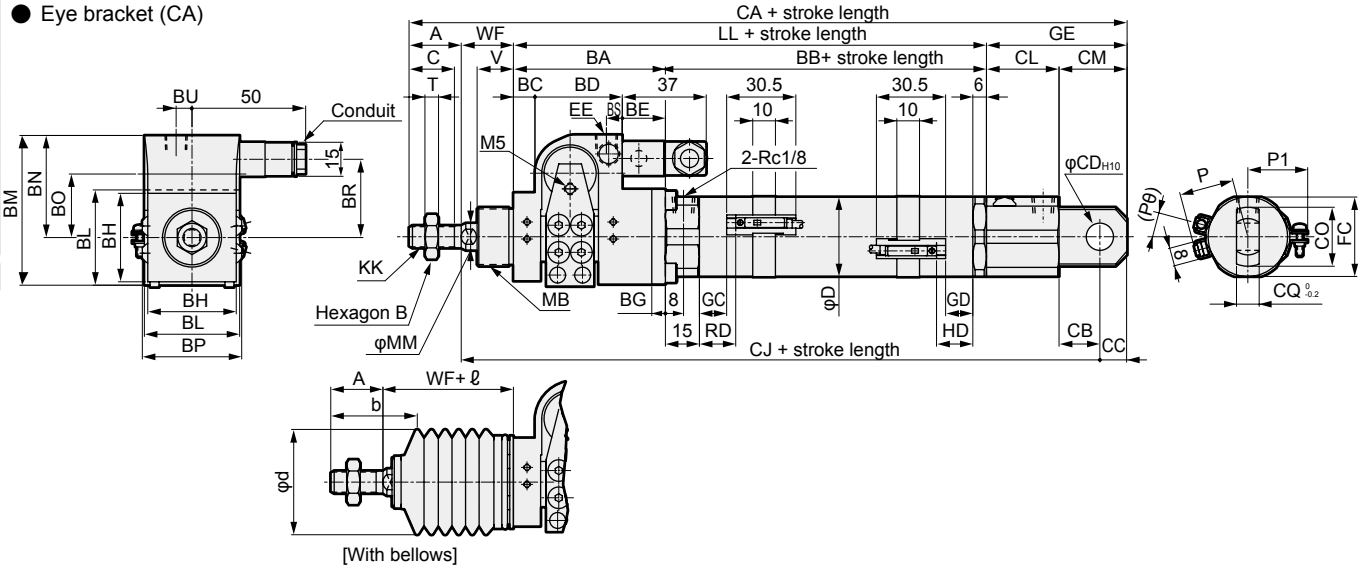


*1 : The size of the exhaust port of brake section is the same as that of EE.
*2 : For the dimensions of the accessories, refer to page 721.
*3 : For the ℓ dimension, round up below the decimal point.

Code	Rod side flange (FA) basic dimensions																							
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BT	BN	BO	BR	BS	BU	C	D	EE	F	KK	LL	MB	MM	MB
φ20	20	13	58	66	9	30	19	5	55	38	19	29	4	3.8	18	25	M5	26	M8×1.0	124	M18×1.5	10	M18×1.5
φ30	23	17	67	72	9.5	38.5	19	6	67	45.5	22	34.5	7	7	20	35	Rc1/8	35	M10×1.25	139	M26×1.5	12	M26×1.5
φ40	25	19	74	74	8	48	18	8	77.5	55.5	25	39.5	7	7	22	45	Rc1/8	46	M12×1.5	148	M26×1.5	14	M26×1.5

Code						Mounting dimensions								With switch (T0, T5, T2, T3)				With switch (T2W, T3W)							With bellows		
Bore size (mm)	MM	T	V	WF	X	FC	FD	FF	FG	FH	FL	FM	FT	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	10	5	14	24	182	20	6	20.8	141.2	34	40	54	3.2	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke length/3) + 6
φ30	12	6	16	23	201	28	7	18.5	159.5	44	64	80	4.5	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke length/3.25) + 7
φ40	14	7	16	23	212	28	7	18.5	168.5	44	64	80	4.5	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke length/3.25) + 7

● Eye bracket (CA)



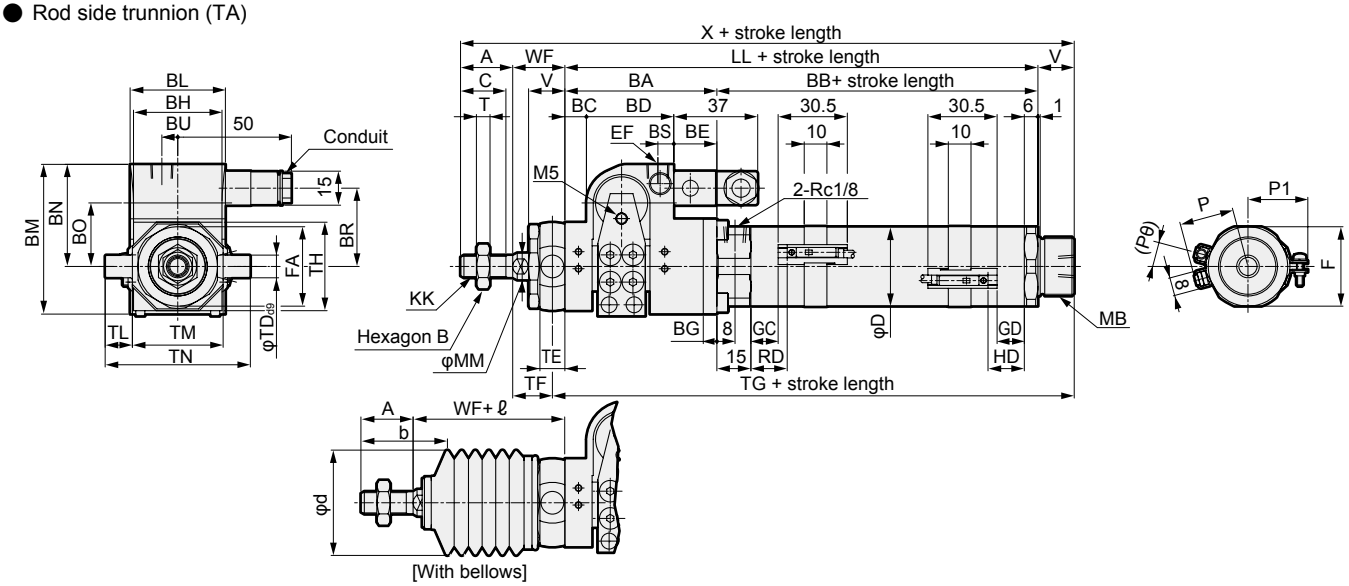
*1 : The size of the exhaust port of brake section is the same as that of EE.
*2 : For the dimensions of the accessories, refer to page 721.
*3 : For the ℓ dimension, round up below the decimal point.

Code	Eye bracket (CA) basic dimensions																							
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BL	BM	BN	BO	BP	BR	BS	BU	C	D	EE	F	GE	KK	LL	MB
φ20	20	13	58	66	9	30	19	5	34	55	38	19	38	29	4	3.8	18	25	M5	26	55	M8×1.0	124	M18×1.5
φ30	23	17	67	72	9.5	38.5	19	6	42	66	45	22	43.8	34.5	7	7	20	35	Rc1/8	35	62	M10×1.25	139	M26×1.5
φ40	25	19	74	74	8	48	18	8	50	80.5	55.5	25	52	39.5	7	7	22	45	Rc1/8	35	62	M12×1.5	148	M26×1.5

Code					Mounting dimensions									With switch (T0, T5, T2, T3)				With switch (T2W, T3W)							With bellows		
Bore size (mm)	MM	T	V	WF	CA	CB	CC	CD	CJ	CL	CM	CN	CO	CQ	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	10	5	14	24	223	14	10	10	193	31	24	8	22	8	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke/3) + 6
φ30	12	6	16	23	247	18	12	12	212	32	30	7	26	10	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke/3.25) + 7
φ40	14	7	16	23	258	18	12	12	221	32	30	7	26	10	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke/3.25) + 7

Dimensions CAD

● Rod side trunnion (TA)



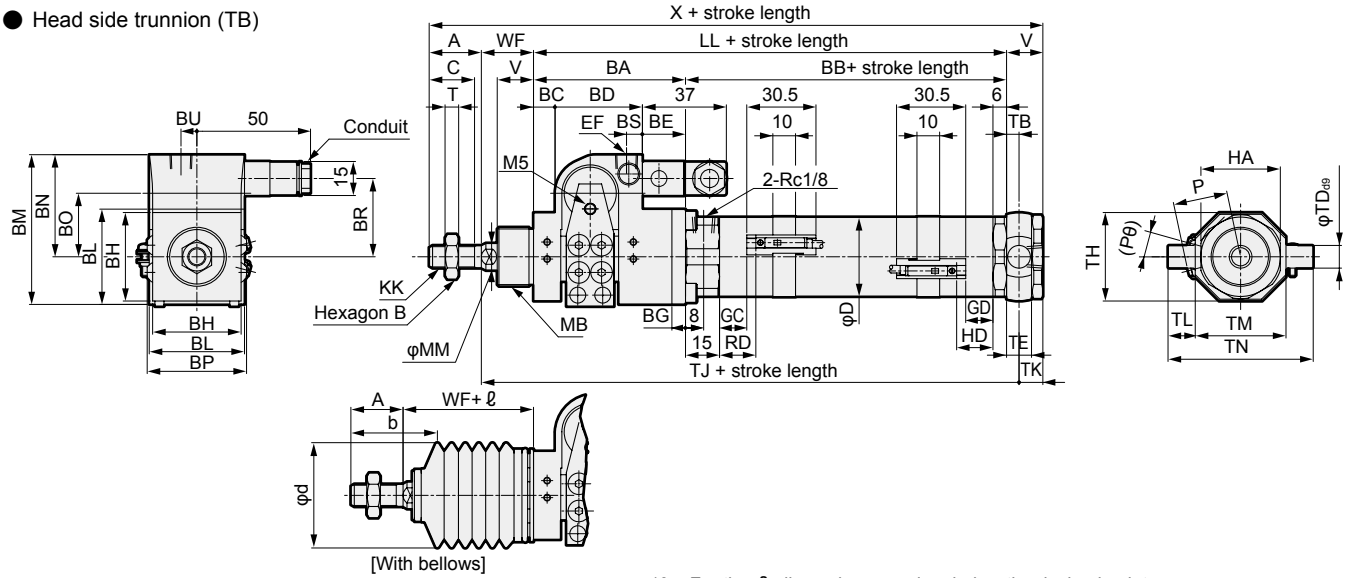
*1 : The size of the exhaust port of brake section is the same as that of EE. *3 : For the ℓ dimension, round up below the decimal point.

*2 : For the dimensions of the accessories, refer to page 721.

Code	Rod side trunnion (TA) basic dimensions																							
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BL	BM	BN	BO	BR	BS	BU	C	D	EE	F	FA	KK	LL	MB
φ20	20	13	58	66	9	30	19	5	29	34	55	38	19	29	4	3.8	18	25	M5	26	26	M8×1.0	124	M18×1.5
φ30	23	17	67	72	9.5	38.5	19	6	39	42	66	45.5	22	34.5	7	7	20	35	Rc1/8	35	35	M10×1.25	139	M26×1.5
φ40	25	19	74	74	8	48	18	8	50	50	80.5	55.5	25	39.5	7	7	22	45	Rc1/8	46	35	M12×1.5	148	M26×1.5

Code	Mounting dimensions													With switch (T0, T5, T2, T3)				With switch (T2W, T3W)						With bellows		
Bore size (mm)	MM	T	V	WF	X	TB	TD	TE	TF	TG	TH	TL	TM	TN	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	10	5	14	24	182	4.5	8	9	19.5	142.5	29.5	8	30	46	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke length/3) + 6
φ30	12	6	16	23	201	5.5	10	11	17.5	160.5	39	12	40	64	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke length/3.25) + 7
φ40	14	7	16	23	212	5.5	10	11	17.5	169.5	44	9.5	53	72	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke length/3.25) + 7

● Head side trunnion (TB)



*1 : The size of the exhaust port of brake section is the same as that of EE. *3 : For the ℓ dimension, round up below the decimal point.

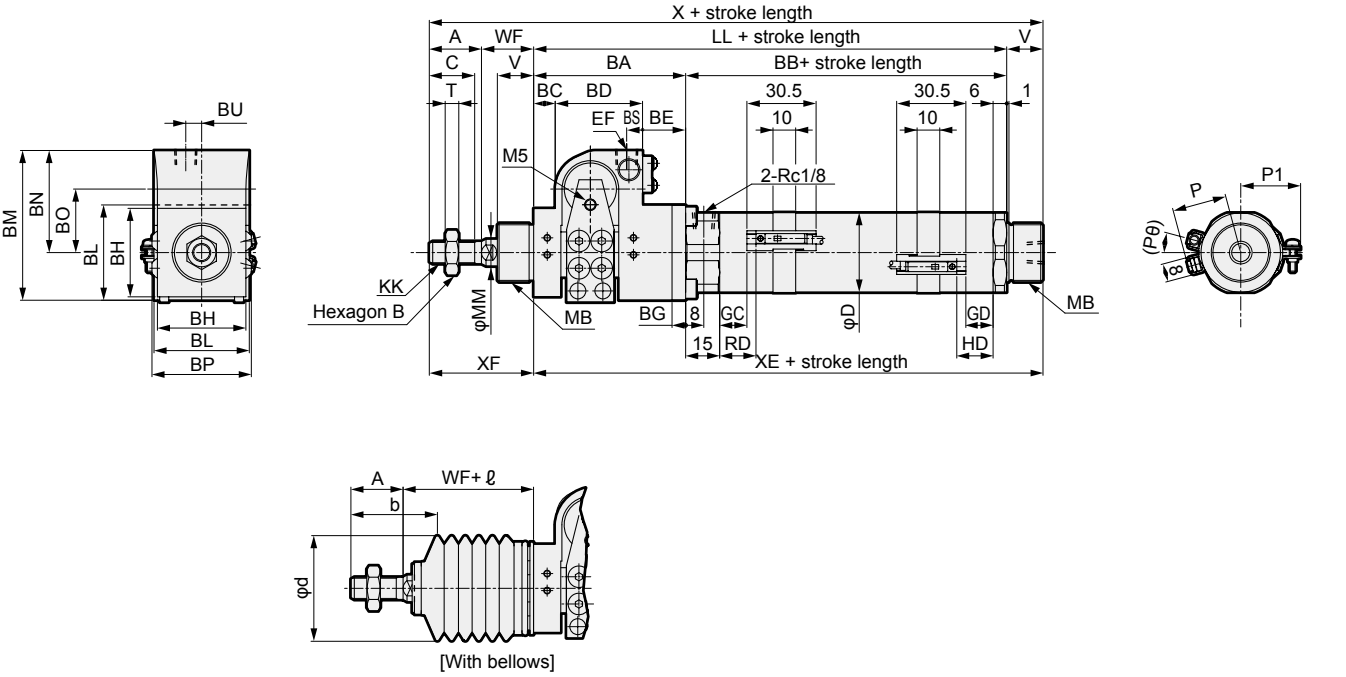
*2 : For the dimensions of the accessories, refer to page 721.

Code	Head side trunnion (TB) basic dimensions																							
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BL	BM	BN	BO	BR	BS	BU	C	D	EE	FA	KK	LL	MB	MM
φ20	20	13	58	66	9	30	19	5	34	55	38	19	29	4	3.8	18	25	M5	26	M8×1.0	124	M18×1.5	10
φ30	23	17	67	72	9.5	38.5	19	6	42	66	45	22	34.5	7	4	20	35	Rc1/8	35	M10×1.25	139	M26×1.5	12
φ40	25	19	74	74	8	48	18	8	50	80.5	55.5	25	39.5	7	7	22	45	Rc1/8	35	M12×1.5	148	M26×1.5	14

Code	Mounting dimensions													With switch (T0, T5, T2, T3)				With switch (T2W, T3W)						With bellows		
Bore size (mm)	T	V	WF	X	TB	TD	TE	TH	TJ	TK	TL	TM	TN	GC	GD	RD	HD	GC	GD	RD	HD	P	(Pθ)°	b	d	ℓ
φ20	5	14	24	182	4.5	8	9	29.5	152.5	9.5	8	30	46	9	9	13	13	11	11	15	15	19.5	19	32	30	(Stroke length/3) + 6
φ30	6	16	23	201	5.5	10	11	39	167.5	10.5	12	40	64	12	12	16	16	14	14	18	18	24.5	15	38	46	(Stroke length/3.25) + 7
φ40	7	16	23	212	5.5	10	11	44	176.5	10.5	9.5	53	72	13	13	17	17	15	15	19	19	29.5	12	40	46	(Stroke length/3.25) + 7

Dimensions

● Without valve, basic (JSM2-00)



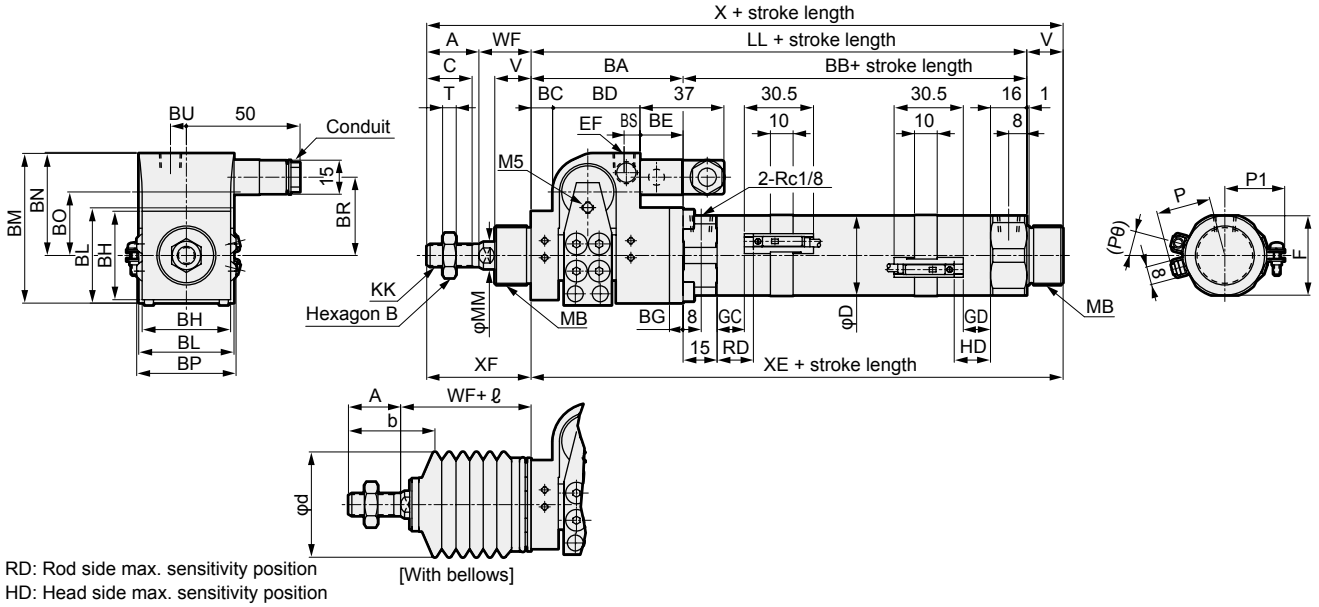
*1 : The mounting dimensions are the same as those of JSM2-V (with valve). Refer to pages 715 to 717.
*2 : For the dimensions of the accessories, refer to page 721.
*3 : For the ℓ dimension, round up below the decimal point.

Code	Without valve, basic (JSM2-00) basic dimensions																					
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BH	BL	BM	BN	BO	BP	BS	BU	C	D	EE	F	KK	LL
φ20	20	13	58	66	9	30	19	5	29	34	55	38	25	38	4	3.8	18	25	M5	26	M8×1.0	124
φ30	23	17	67	72	9.5	38.5	19	6	39	42	66	45	32	43.8	7	7	20	35	Rc1/8	35	M10×1.25	139
φ40	25	19	74	74	8	48	18	8	50	50	80.5	55.5	36.5	52	7	7	22	45	Rc1/8	46	M12×1.5	148

Code									With switch (T0, T5, T2, T3)				With switch (T2W, T3W)						With bellows		
Bore size (mm)	MB	MM	T	V	WF	X	XE	XF	GC	GD	RD	HD	GC	GD	RD	HD	P	(Pθ)°	b	d	ℓ
φ20	M18×1.5	10	5	14	24	182	138	44	9	9	13	13	11	11	15	15	19.5	19	32	30	(Stroke length/3) + 6
φ30	M26×1.5	12	6	16	23	201	155	46	12	12	16	16	14	14	18	18	24.5	15	38	46	(Stroke length/3.25) + 7
φ40	M26×1.5	14	7	16	23	212	164	48	13	13	17	17	15	15	19	19	29.5	12	40	46	(Stroke length/3.25) + 7

Dimensions

● Same port position (P)/basic (JSM2-00)

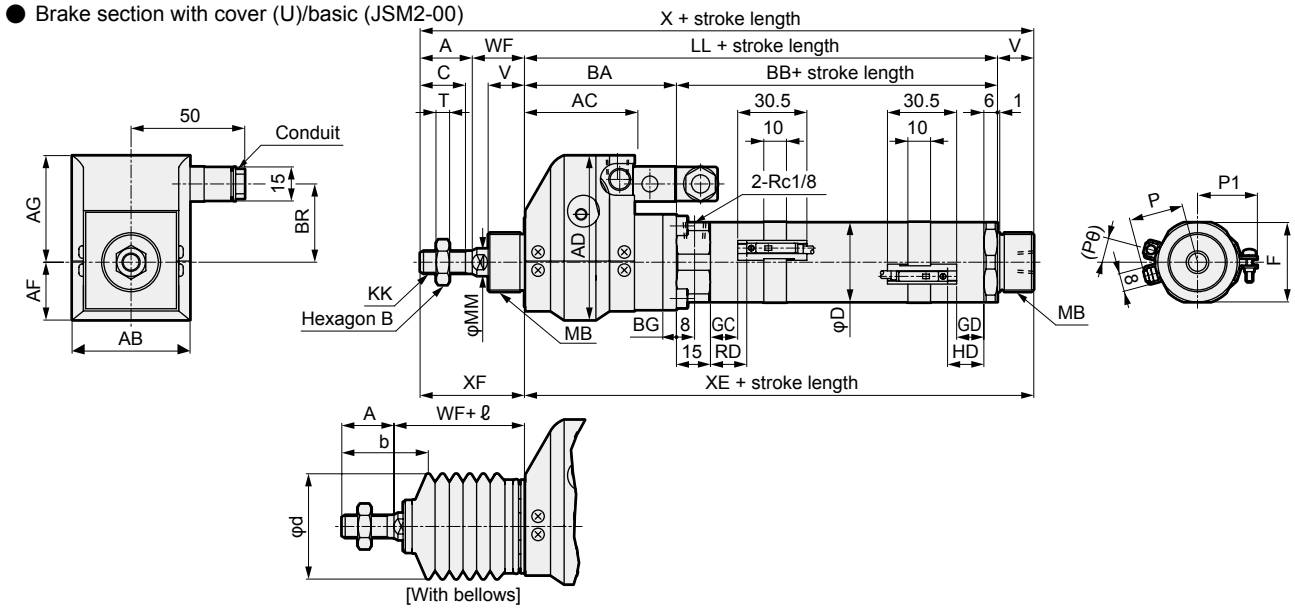


RD: Rod side max. sensitivity position
HD: Head side max. sensitivity position

Code	Basic (00) basic dimensions																	
Bore size (mm)	A	B	BA	BB	BC	BD	BE	BG	BS	C	D	EE	F	KK	LL	MB	MM	T
φ20	20	13	58	76	9	30	19	5	4	18	25	M5	26	M8×1.0	134	M18×1.5	10	5
φ30	23	17	67	82	9.5	38.5	19	6	7	20	35	Rc1/8	35	M10×1.25	149	M26×1.5	12	6
φ40	25	19	74	84	8	48	18	8	7	22	45	Rc1/8	46	M12×1.5	158	M26×1.5	14	7

Code						With switch (T0, T5, T2, T3)				With switch (T2W, T3W)							With bellows		
Bore size (mm)	V	WF	X	XE	XF	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	14	24	192	138	44	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke length/3) + 6
φ30	16	23	211	155	46	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke length/3.25) + 7
φ40	16	23	222	164	48	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke length/3.25) + 7

● Brake section with cover (U)/basic (JSM2-00)

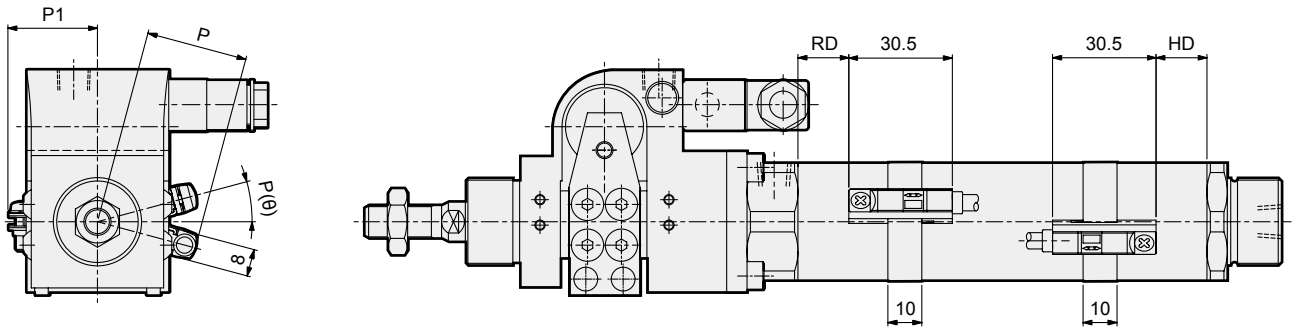


Code	Basic (00) basic dimensions																	
Bore size (mm)	A	AB	AC	AD	AF	AG	B	BA	BB	BG	BR	C	D	F	KK	LL	MB	MM
φ20	20	47	39	58.5	19.5	39	13	58	66	5	29	18	25	26	M8×1.0	124	M18×1.5	10
φ30	23	52	48.5	72.5	25	47.5	17	67	72	6	34.5	20	35	35	M10×1.25	139	M26×1.5	12
φ40	25	65	56	85.75	28.75	57	19	74	74	8	39.5	22	45	46	M12×1.5	148	M26×1.5	14

Code							With switch (T0, T5, T2, T3)				With switch (T2W, T3W)							With bellows		
Bore size (mm)	T	V	WF	X	XE	XF	GC	GD	RD	HD	GC	GD	RD	HD	P	P1	(Pθ)°	b	d	ℓ
φ20	5	14	24	182	138	44	9	9	13	13	11	11	15	15	19.5	21	19	32	30	(Stroke length/3) + 6
φ30	6	16	23	201	155	46	12	12	16	16	14	14	18	18	24.5	26	15	38	46	(Stroke length/3.25) + 7
φ40	7	16	23	212	164	48	13	13	17	17	15	15	19	19	29.5	31	12	40	46	(Stroke length/3.25) + 7

JSM2 Series common dimensions (with T1, T8 switches, with 2-color display switch)

● JSM2-**-**-T1H/V, T8H/V, T $\frac{2}{3}$ YH/V



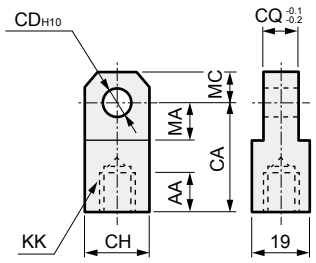
Switch installation dimensions

Code	1-color display (T1, T8) 2-color display (T2/3 Y)							
	RD		HD		P		P1	(Pθ)°
Bore size (mm)	T1,T2/3Y,T2J	T8	T1,T2/3Y,T2J	T8	T2/3Y,T8,T2J	T1		
φ20	12	7	12	7	25	30	21	19
φ30	15	10	15	10	30	35	26	15
φ40	16	11	16	11	36	41	31	12

JSK2/JSM2 Series common accessory dimensions (rod eye, bracket, pin)

● Rod eye (I)

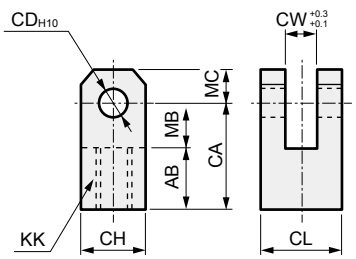
Material: Steel
Zinc chromate treatment



Model No.	Applicable bore size (mm)	AA	CA	CD	CH	CQ	KK	MA	MC	Wt (g)
M1-I-20	20	14	30	10	19	8	M8×1.0	13	10	60
M1-I-30	25/30/32	14	36	12	25	10	M10×1.25	16	12	106
M1-I-40	40	14	36	12	25	10	M12×1.5	16	12	100

● Rod clevis (Y)

Material: Steel
Zinc chromate treatment

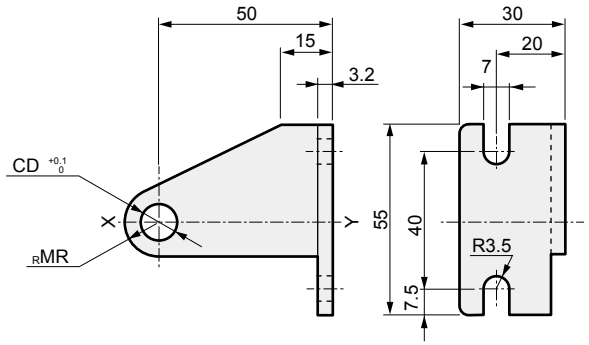


Model No.	Applicable bore size (mm)	AB	CA	CD	CH	CL	CW	KK	MB	MC	Wt (g)
M1-Y-20	20	17	30	10	19	19	8	M8×1.0	13	10	99
M1-Y-30	25/30/32	20	36	12	25	25	10	M10×1.25	16	12	197
M1-Y-40	40	20	36	12	25	25	10	M12×1.5	16	12	193

Note: A pin, a washer and a split pin are attached.

● Clevis bracket (B2)

Material: Steel
Zinc chromate treatment

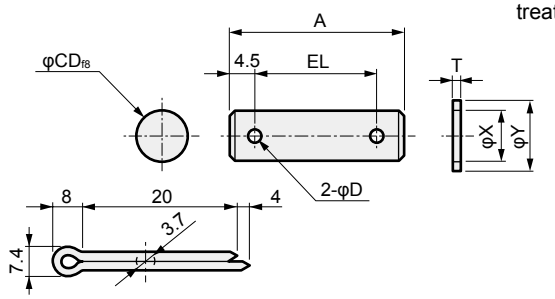


Model No.	Compatibility	Applicable bore size (mm)	CD	MR	Weight (g)
M1-B2-20-CC	JSK2-CC	20/25	8	8	145
M1-B2-30-CC		32	10	11	163
M1-B2-40-CC		40	12	11	170
M1-B2-20-CA	JSK2-CA JSM2-CA	20	10	11	158
M1-B2-30-CA		25/32/40	12	11	162
M1-B2-20-TA	JSK2-TA/TB JSM2-TA/TB	20	8	8	132
M1-B2-30-TA		25/32/40	10	11	142

*1 : One pair is composed of two pieces with XY symmetry.
*2 : The model No. above includes snap rings and pins. 2 pieces are included in a set. (However, the pin and snap rings are not attached with the trunnion.)
*3 : For mounting TA, this cannot be attached to the brake section with cover (U).

● Rod clevis pin (P)

Material: Steel
Zinc chromate treatment

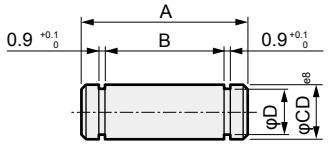


Model No.	Applicable bore size (mm)	A	D	CD	EL	T	X	Y	Weight (g)
M1-P-20	20	37	4	10	28	2	10.5	18	29
M1-P-30	25/30/32/40	46	4	12	37	2.5	13	21	50

Note: A pin, a washer and a split pin for rod clevis use are attached with the product.

● Clevis bracket pin (P1) (P2)

Material: Steel
Zinc chromate treatment



Model No.	Compatible model and bore size (mm)	A	B	CD	D	Applicable snap ring	Weight (g)
M1-P1-20	JSK2-CC-20/25	33	28	8	7	E type 7	13
M1-P1-30	JSK2-CC-32	33	28	10	9	E type 9	21
M1-P1-40	JSK2-CC-40	37	32	12	9	E type 9	32
M1-P2-20	JSK2-CA-20 JSM2-CA-20	25	20	10	9	E type 9	16
M1-P2-30	JSK2-CA-25/32/40 JSM2-CA-30/40	27	22	12	9	E type 9	24

Note: A pin and snap ring for bracket use are attached with the product. (However, the pin and snap rings are not attached with the trunnion.)

Pneumatic components

Safety Precautions

Be sure to read this section before use.
Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Brake cylinder JSK2/JSM2 Series

Design/selection

⚠WARNING

■ Design a structure that prevents person(s) from coming into contact with the driven workpiece as well as the moving parts of the cylinder with brakes.
Provide a protective cover so that no human body directly touches the unit. In case of possible contact, provide safety measures such as a sensor for emergency stop before making contact and a buzzer to warn of danger.

■ Use a balanced circuit that accommodates the protrusion of the piston rod.
If the cylinder is stopped part-way in the stroke with the brake, etc., and air pressure is applied to one side of the cylinder, the piston rod will pop out at high speeds when the brake is released. This could cause physical harm, such as pinched hands or feet, or mechanical damage. Use a balance circuit, such as the recommended pneumatic pressure circuit, to prevent popping out.

■ The holding force is the ability to hold static load that is not accompanied by vibration or shock, in a state where the brake is operating under no load.
Take care when constantly using near the upper limit of the holding force.

■ Do not apply loads with impact, strong vibration, or torque while brakes are activated.
If load is externally applied with impact, or if strong vibration or rotational force is externally applied, the holding force can be reduced, creating a dangerous situation.

■ Consider the stopping accuracy and overrun distance during the braking.
Because a mechanical lock is applied, the cylinder does not stop instantly when the stop signal is issued, but stops with a time-wise delay. The stroke at which the cylinder slides due to this delay is the overrun distance. The max. and min. width of the overrun distance is the stopping accuracy.
- To achieve the required stop position, move the limit switch forward by the overrun distance.
- The limit switch must have a detection length (dog length) of the overrun distance + α.
- The operating range of CKD cylinder switches is 7 to 16 mm, depending on the switch model. . If overrun distance exceeds this, provide self-holding of the contact at the switch load.

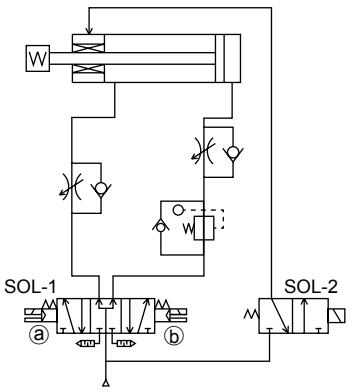
■ In order to improve stopping accuracy, ensure that the brake stops the cylinder as soon as possible after receiving the stop signal.
Use a high response DC control electricity circuit or valve, and set the valve as close to the cylinder as possible.

■ The stopping accuracy is susceptible to fluctuations in piston speed.
If the piston speed changes due to load fluctuations or by some disturbance while the cylinder is moving, the stopping position may vary sharply. Make sure that the piston speed stays the same up to just before the stop position. As well, since the speed changes significantly in the cushioned range and in the acceleration range after starting operation, the variability of the stopping position will increase.

■ Basic circuit
Always adopt the following circuit even for position locking and emergency stop applications. A 2-position valve cannot be used because it affects the brake section even when the cylinder thrust is stopped.
Maintain thrust and load balance with the following circuit. Brakes may not be released when load is applied to brakes.
- Horizontal load

When piping is as shown in Fig. 1, equal pressure is applied to both ends of the piston when stopped to prevent the rod from popping out when the brakes are released. Install a regulator with check valve on the head side to maintain thrust balance.

Fig.1

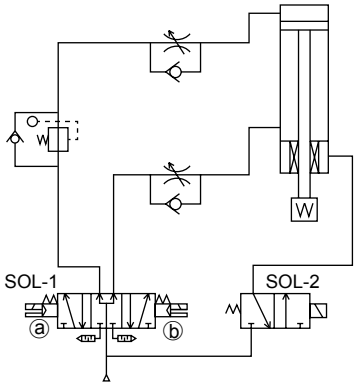


ⓐ SOL-1 ⓑ		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Reverse
OFF	ON	ON	Forward

● For downward vertical load

If load faces downward as shown in Fig. 2, the rod malfunctions in the load direction when brakes are released. Place a regulator with a check valve on the head side to reduce thrust in the load direction and balance the load.

Fig.2

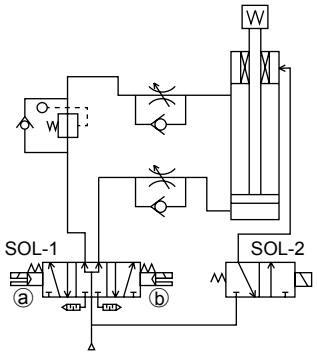


ⓐ SOL-1 ⓑ		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Drop
OFF	ON	ON	Rise

● For upward vertical load

If load faces upward as shown in Fig. 3, the rod malfunctions in the load direction when brakes are released. Place a regulator with a check valve on the rod side to reduce thrust in the load direction and balance the load.

Fig.3



ⓐ SOL-1 ⓑ		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Drop
OFF	ON	ON	Rise

⚠ WARNING

■ Drain

If the piping capacity is larger than the brake release cylinder capacity, the compressed air in the cylinder will not be completely exhausted when switching with the solenoid valve. This compressed air will condense, form water drops, and cause drainage.
Drainage will cause lubricant to flow and cause lubrication faults, temporarily block the passage, corrode the inside of the brakes, cause faulty brake operation, obstruct the stopping accuracy, and/or prevent application or release of the brakes, etc.

Calculate the working compressed air's atmospheric dew point from the scale factor A of the piping capacity with respect to the cylinder capacity. Install a dryer and adjust the air quality so that the value is kept below the following values and drainage is not generated. This can also be done by adjusting the bore size and length of the tube from the release port to the solenoid valve to match the working compressed air's atmospheric dew point so that the following conditions are satisfied.

Magnification A<1 : Atmospheric dew point -20°C or below
1 ≤ Magnification A<2 : Atmospheric dew point -25°C or below
Magnification A ≥ 2 : Atmospheric dew point -30°C or below

Calculation of scale factor A of the piping capacity with respect to the cylinder capacity

$$A=\frac{V_t+V_1}{V_0(10P+1)}$$

V_t : Piping volume (mm^3)
V_0: Brake release cylinder volume (mm^3)
V_1: Brake release cylinder blank volume (mm^3)
P : Working pressure (MPa)

	$V_0(mm^3)$	$V_1(mm^3)$
JSK2-20 JSM2-20	754	754
JSK2-25 JSK2-32 JSM2-30	1963	1865
JSK2-40 JSM2-40	4021	3860

Example)JSK2-20, Piping to the brake release port, Tube I.D.: φ4 / length: 1.5m Operating pressure: 0.5MPa

Piping volume V_t = Cross-sectional area x length = 4 x 4 x π / 4 x 1500
≈ 18,850 mm^3

$$A=\frac{18850+754}{754\times(10\times0.5+1)}=4.3$$

Adjust the air quality so that the atmospheric dew point is -30°C or below.

● If adjustment is difficult, consider using a cylinder with valve (JSK2-V, JSM2-V).

■ Release brakes before cylinder operation. The brake may not be released when the cylinder is operating at high speed.

■ If back pressure is applied to the locking mechanism, the lock may be released. Use the brake release solenoid valve as a single unit, or use an individual exhaust manifold.

■ Use a 3-position P/A/B connection (pressurization on both sides) solenoid valve for the cylinder drive to prevent the piston from popping out when starting.

■ To maintain balance of the thrust, including the load, the side with the larger thrust should have a regulator with a check valve.

⚠ CAUTION

■ Notes for stopping accuracy

● Stopping pitch and load factor

Stopping accuracy differs with stopping pitch and load factor. The load factor below is recommended for achieving specified stopping accuracy.

Stop pitch	Load factor
50 mm or less	20% of thrust
50 mm to 100 mm	40% of thrust
100 mm or more	60% of thrust

● Selection of valve for brake

The stopping accuracy and overrun distance will change according to the responsiveness of the brake valve. Refer to the JSK2-V and JSM2-V brake valve electric specifications. Connect the valve directly to the brake port to improve stopping accuracy.

● When using a PLC (programmable controller)
If a PLC (programmable controller) is used as the electrical control unit for the valve for brake, stopping accuracy drops due to scan time (computing time). When using a PLC, do not assemble the valve for brake into the PLC circuit.

■ Do not make major changes in applied load when stopped with brakes, or the stopping position may change.

■ For a TA mounting, the brake section with cover and the clevis bracket cannot be selected together since they may interfere with each other.

■ Although the contact service life of the reed switch varies depending on usage conditions, it will generally last several million cycles. The contact service life is reached sooner if the device is used continuously or operated at a high frequency. In this case, use a proximity switch with no contact.

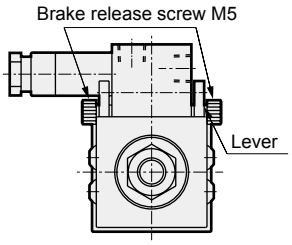
Mounting, installation and adjustment

⚠WARNING

■ Release brakes before coupling the load to the end of the rod.
If coupled while brakes are applied, torque or load exceeding holding force may be applied to the piston rod and damage the brake mechanism.

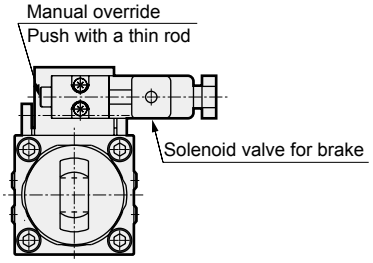
■ If the brake is released while air is applied to only one side of the cylinder, the piston rod can pop out at high speed, creating a dangerous situation. When releasing the brake during adjustment or other maintenance, always observe the following:
● Check that no one is in the movable range of the load and that no problems will arise if the load moves when brakes are released.
● When releasing the brake, perform position locking or take other measures:
·Place the load to the bottom end
·Pressurize both sides
·Place a strut
to prevent the load from falling.
● Confirm that air is not pressured on only one side of the cylinder when releasing brakes.

■ How to manually release the brake
● When there is no pneumatic source/power supply



As shown in the above figure, the brakes are released by turning the lever screws on both sides two or three turns past the point where they offer resistance.
Note ① The brake may go out if screwed in too far.
② Always remove the screw during normal operation.

● When manually operating the solenoid valve for the brake (with pneumatic source)



As shown in the above figure, the brakes are released when the manual override on the solenoid valve is pushed with a bar. Note that a non-locking method is incorporated, so the brakes will be applied when the manual device is released.

■ Brakes are released manually or by pressurizing the brake release port. When mounting the load, the brake release operation may cause the load to fall; make sure to check that the brake is operational when the manual release operation is set to default or when there is no air in the brake release port.

■ Do not apply torque to the rod when braking, as the holding force will decrease, creating hazardous conditions. Also, use this product in mechanisms in which the rod does not rotate.

■ Do not apply to the cylinder any force that exceeds the brake holding force listed in the catalog.

■ With the JSM2 Series, the brakes can be manually released by screwing a hexagon socket head cap bolt into the brake release female thread on the side or top of the brakes. However, the brakes may be damaged if the bolt is screwed in too far; use the bolts attached with the product, or if using commercially available bolts, use the appropriate screw insertion depth for the release bolt shown in the table below.

Bore size	No. of bolt rotations
φ20	8 to 9 rotations
φ25	11 to 12 rotations
φ30	
φ32	
φ40	14 to 15 rotations

φ20 to φ40 : Bolts M5 x 15 or over

■ If there is any play, such as looseness, in the brake signal dog, stopping accuracy is affected. Securely fix to eliminate play, etc.

■ If the piston speed is fast, the detection dog must be long enough to match relay response time. If the dog is short, the stop signal is not output and operation does not stop.

⚠CAUTION

■ Adjust the air balance in the cylinder.
With brakes released, place a load on the cylinder and balance the load by adjusting pneumatic pressure applied to the cylinder rod side and head side. Malfunctions such as piston popping out during brake release or abnormal brake release can be prevented by accurately balancing the load.

■ Adjust the installation position of the detector parts, including the cylinder switch.
When braking, consider the overrun distance vis-a-vis the desired stop position and adjust the installation positions for detector parts, including the cylinder switch.

■ Load fluctuations during the reciprocating stroke of the cylinder can cause inconsistent piston speed, leading to greater variation in the stop position. Adjust the mounting of the load so as to prevent any load fluctuations during the reciprocating stroke of the cylinder, especially before the stop position.

■ Since the speed changes significantly in the cushioned range and in the acceleration range after starting operation, the variability of the stopping position will increase. For this reason, the accuracy described in the specifications may not be obtained when a step just after start of the operation has a short stroke length to the next point.

■ Load to piston rod
Operate the cylinder so that load applied to the piston rod is always applied in the axial direction more strictly than with a general-purpose air cylinder. Limit load movement using guides so play and torsion do not occur.

■ Maintaining the rod sliding parts
Protect the piston rod sliding surface from scratches and dents. Such scratches and dents can cause damage to packings, resulting in leakage and/or brake failure.

■ The terminal box is shipped facing inward (φ20: downward) when shipped to prevent damage. Set it to the orientation to be used when wiring the terminal box.

Use/maintenance

1. Common

⚠WARNING

■ The brake section can be removed from the cylinder body. Do not disassemble or inspect brakes, or a hazardous situation may occur when brakes are used again.

■ The required grease is applied to brakes. Avoid applying extra grease and do not wipe grease off.

■ The required grease is applied when brakes are replaced, so there is no need to apply grease to rods.

■ Always use the product with the dust cover on, except for when performing manual release, in order to prevent failure or malfunction.

⚠CAUTION

■ Air supply pipes that are too narrow or too long can reduce stopping accuracy.

■ Frictional resistance increases and causes the piston speed to change when the cylinder has been stopped for a long time, such as when using first thing in the morning or afternoon. This may impair stopping accuracy. Conduct conditioning operations to obtain a stable stopping accuracy.

2. Common (With T type switch)

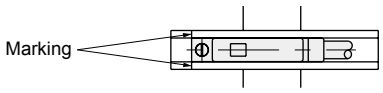
⚠CAUTION

■ When moving the switch position to the stroke length direction

● The 1-color display switch can be fine-tuned by ±3 mm from the default. If the adjusting range exceeds ±3 mm, or when fine-tuning the 2-color display switch, move the band position.

● Loosen the switch fixing screw, shift the switch along the rail, then tighten at the specified position.
When using T2, T3, T0, or T5, use a flathead screwdriver (clockwork screwdriver, precision screwdriver, etc.) with a grip diameter of 5 to 6 mm, a 2.4 mm or smaller tip, and a thickness of 0.3 mm or less to tighten the screws with a tightening torque of 0.1 to 0.2 N·m.
When using T*C, T1, T2J, T2Y, T3Y, or T8, tighten the screw with a tightening torque of 0.5 to 0.7 N·m.

● The switch bracket rail has a marking 4 mm from the rail end. Use as a guide to the mounting position when replacing the switch.
Switch rail markings are set to the default switch max. sensitivity position.
The max. sensitivity position will change when the switch is changed or when the band is moved. Adjust the position accordingly in this case.



■ When moving the switch position to the circumferential direction

● Loosen the band fixing screw, shift the switch rail in the circumferential direction, then tighten at the specified position. Tightening torque is 0.6 to 0.8N·m.

■ Shifting the band position

● Loosen the band fixing screw, shift the switch rail and band along the cylinder tube, and tighten at the specified position. Tightening torque is 0.6 to 0.8N·m.