ULKP/ULK

Brake cylinder

With brake/position locking

ø16/ø20/ø25/ø32/ø40

Overview

A reliable brake unit is integrated to the medium bore size (ø16 to ø40) standard cylinder series.

Features

Increased durability

The new swash plate braking method provides surface contact instead of the two-point contact of the conventional swash plate method. This method disperses resistance applied to the rod, increases abrasion resistance, and dramatically improves durability compared to the conventional swash plate method.

Space saving

Brake part height is reduced compared to CKD conventional products. This realizes space saving.

Increased holding force

Use of a new swash plate brake method generates rod holding force equal to 0.8 MPa cylinder thrust.

Easy brake release

To release the brake, screw the bolt in and tilt the brake plate, or simply return the brake plate to the original position.

Simple structure

This simple structure has very few components in the brake section.

Stopping accuracy 1.0 mm

At a cylinder speed of 300 mm/s with no load, the stopping accuracy achieves a high-precision ± 1.0 mm.

CONTENTS

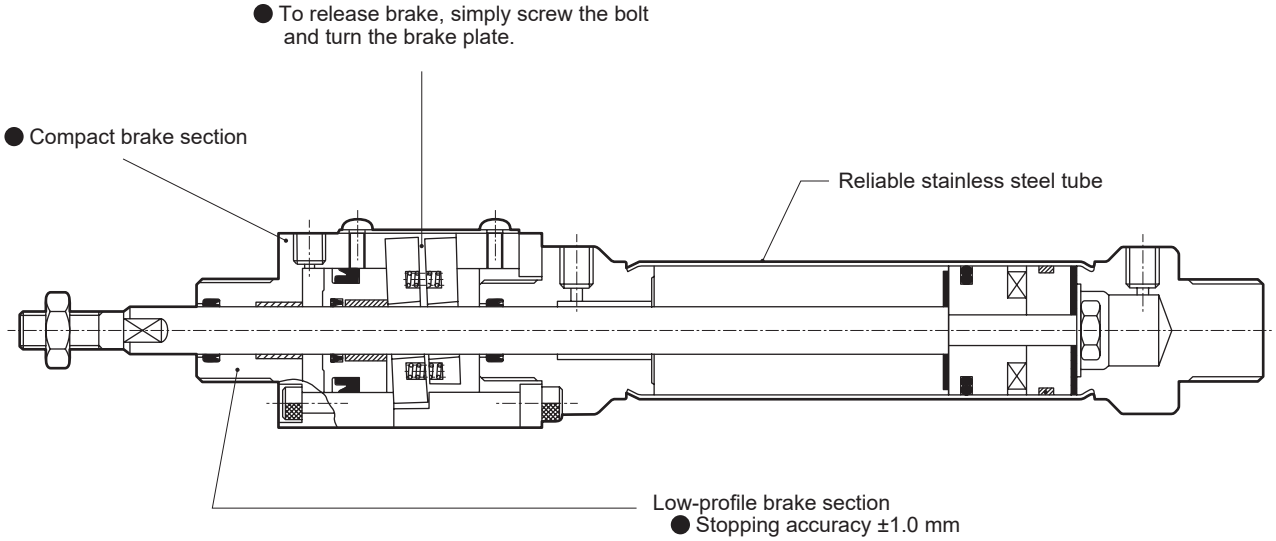
The cylinder switches T2YH, T2YV, T3YH, and T3YV are scheduled for end of production at the end of December 2023.

Series variation

Brake cylinder ULKP/ULK Series

Variation	Model No. JIS symbol	Bore size (mm)	Standard stroke (mm)												Min. stroke (mm)	
			15	25	30	45	50	60	75	100	150	200	250	300		
Double acting	ULKP	ø16	●		●	●		●							5	
Double acting	ULK	ø20/ø25/ ø32/ø40		●			●		●	●	●	●	●	●	5	
Double acting/with valve	ULK-V	ø20/ø25/ ø32/ø40		●			●		●	●	●	●	●	●	5	

Product introduction



Space-saving model.

● : Standard, ◎ : Option, ○ : Made to order, ■ : Not available

Max. stroke (mm)	Custom stroke (per mm)	Mounting										Option								Switch	Page
		Basic	Axial foot	Rod side axial foot	Rod side flange	Eye bracket	Clevis bracket	Eye bracket integrated	Eye bracket bush pressfit	Rod side trunnion	Head side trunnion	Bellows (100°C)	Bellows (250°C)	Piston rod material change	Boss cutoff	Rod eye	Rod clevis	Eye bracket	Clevis bracket		
		00	LB	LS	FA	CA	CB	CC	CC1	TA	TB	J	L	M	V	I	Y	B1	B2		
260	1	●		●	●		●									◎	◎	◎	◎	◎	674
700	1	●	●		●	●		●	●	●	●	◎	◎	◎	◎	◎	◎		◎	◎	680
700	1	●	●		●	●		●	●	●	●	◎	◎	◎	◎	◎	◎		◎	◎	680

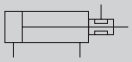
Brake cylinder double acting/single rod

ULKP Series

● Bore size : ø16

Made-to-order product

JIS symbol ● Double acting cylinder with brake



RoHS CAD

Specifications

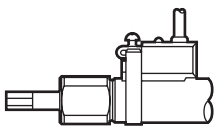
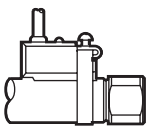
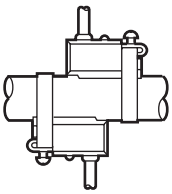
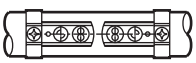
Item		ULKP/ULKP-L
Actuation		Double acting
Working fluid		Compressed air
Max. working pressure	MPa	1.0 (≈150 psi, 10 bar)
Min. working pressure	MPa	Cylinder section: 0.15 (≈22 psi, 1.5 bar) Brake section: 0.3 (≈44 psi, 3 bar)
Proof pressure	MPa	1.6 (≈230 psi, 16 bar)
Ambient temperature	°C	-10 (14°F) to 60 (140°F) (no freezing)
Bore size	mm	ø16
Port size		M5
Stroke tolerance	mm	$^{+1.0}_{0}$
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)
Holding force	N	160

Stroke

Model No.	Standard stroke (mm)	Max. stroke (mm)	Min. stroke (mm)
ULKP/ULKP-L	15/30/45/60	260	5

* For types with switch, minimum stroke varies depending on mounting method. Refer to the table below for details.
The custom stroke is available in 1 mm increments.

Min. stroke with switch

	1		2	
Sketch				
	Rod side mounting	Head side mounting	Different surface mounting	Same surface mounting
Min. stroke	5 mm		10 mm	28 mm

Switch specifications

Item	Proximity 2-wire		Proximity 3-wire		
	M2V	M2WV (2-color LED)	M3V	M3PV (Made to order)	M3WV
Applications	Programmable controller		For programmable controller, relay, IC circuit, compact solenoid valve		
Output method	-		NPN output	PNP output	NPN output
Power supply voltage	-		4.5 to 28 VDC		10 to 28 VDC
Load voltage	10 to 30 VDC		30 VDC or less		
Load current	5 to 30 mA		100 mA or less	100 mA or less	100 mA or less
Indicator lamp	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)
Leakage current	1 mA or less		10 μA or less	0.05 mA or less	10 μA or less
Weight g	1 m:22 3 m:57 5 m:93				

Item	Reed 2-wire	
	M0V	M5V
Applications	Programmable controller, relay	For programmable controller, relay IC circuit (without indicator), serial connection
Power supply voltage	-	-
Load voltage/ current	5 to 50 mA with 12/24 VDC, 7 to 20 mA with 110 VAC	50 mA or less with 12/24 VDC, 20 mA or less with 110 VAC
Indicator lamp	LED (Lit when ON)	Without LED
Leakage current	0 mA	
Weight g	1 m:22 3 m:57 5 m:93	

*1 : Refer to Ending Page 1 for other switch specifications.
*2 : Dimensions depend on switch model No. Refer to Ending Page 13 for details.

Product weight

(Unit: g)

Item	Stroke (mm)	ULKP-16
Without switch	15	138
	30	143
	45	148
	60	153
With switch (with 2 switches)	15	186
	30	191
	45	196
	60	201
Switch mounting bracket		2
Switch weight (per switch)		Refer to the weight in the switch specifications.

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa									
		0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø16	Push	30.2	40.2	60.3	80.4	101	121	141	161	181	201
	Pull	27.2	36.3	54.4	72.6	90.7	109	127	145	163	181

How to order

Without switch (without magnet for switch)

ULKP — 00 - 16 - 60 - 0 ——— Y

With switch (built-in magnet for switch)

ULKP-L - 00 - 16 - 60 - 0 - M2V - R - Y

Ⓐ Model
Ⓑ Mounting
Ⓒ Bore size
Ⓓ Stroke
Ⓔ Head side port direction
Ⓕ Switch model No.
Ⓖ Switch quantity *3
Ⓗ Accessory

My end of production ended May 2022.

Code	Description
Ⓐ Model	
ULKP	Double acting
ULKP-L	Double acting with switch
Ⓑ Mounting	
00	Basic
LS	Axial foot (single) (rod side)
FA	Rod side flange
CB	Clevis bracket
Ⓒ Bore size	
16	ø16
Ⓓ Stroke	

Bore size	Stroke *1	Custom stroke
ø16	**5 to 260**	In 1 mm increments

Code	Description
Ⓔ Head side port direction	
Blank	Vertical
0	Axial direction (*2)

Ⓕ Switch model No.

Radial lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
M0V*	Reed	●	●	1-color LED	2-wire
M5V*		●	●	Without LED	
M2V*	Proximity		●	1-color LED	
M2WV*			●	2-color LED	
M3V*			●	1-color LED	3-wire
M3WV*			●	2-color LED	
M3PV*			●	1-color LED (made to order)	

* 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
Ⓗ Accessory	
I	Rod eye
Y	Rod clevis (pin, washer, split pin attached)
B1	Eye bracket
B2	Clevis bracket (pin, snap ring attached)

⚠ Precautions for model No. selection

*1 : Refer to page 674 for the min. stroke with switch.
*2 : The CB mounting is not available for port direction/axial direction.
*3 : "I" and "Y" cannot be selected together.

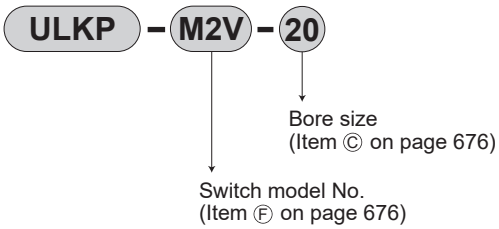
[Example of model No.]

ULKP-L-00-16-60-0-M2V-R-Y

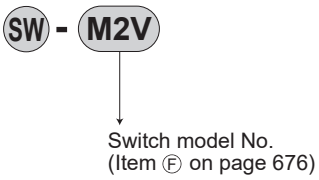
Ⓐ Model : Brake cylinder with switch double acting
Ⓑ Mounting : Basic
Ⓒ Bore size : ø16
Ⓓ Stroke : 60 mm
Ⓔ Head side port direction : Axial direction
Ⓕ Switch model No. : Proximity switch, lead wire length: 1 m
Ⓖ Switch quantity : 1 on rod side
Ⓗ Accessory : Rod clevis

How to order switch

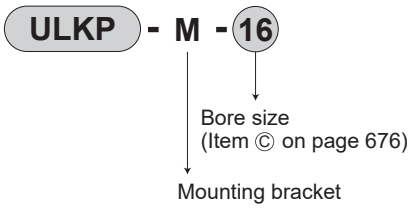
● Switch body + mounting bracket set



● Switch body only



● Mounting bracket set

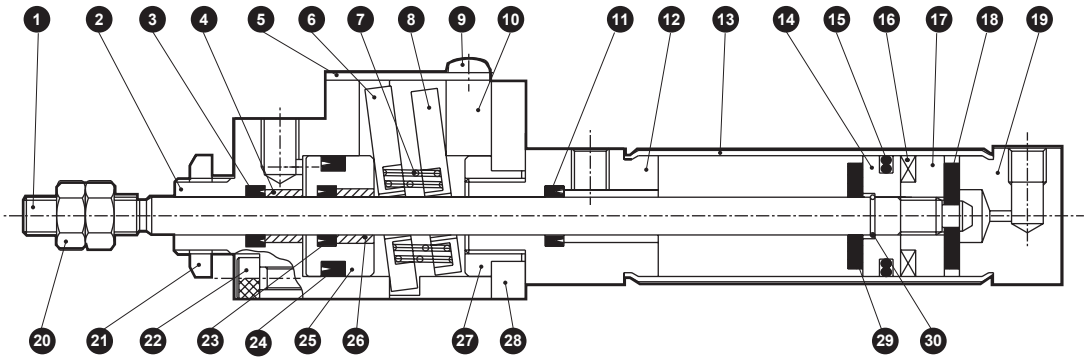


How to order mounting bracket

Bore size (mm) / Mounting bracket	ø16
Foot (LS)	P2-LS-16
Flange (FA)	P2-FA-16

*1 : The foot mounting bracket is provided as 1 pc./set.

Internal structure and parts list



Cannot be disassembled

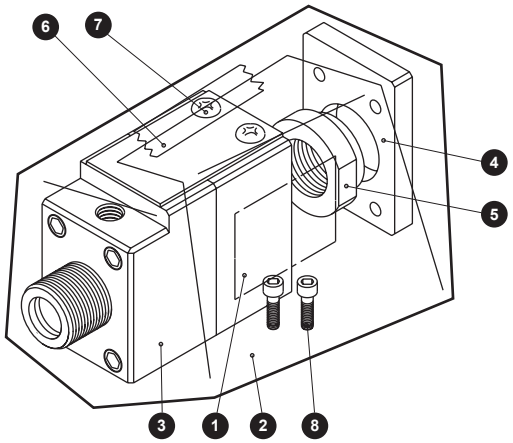
* This product cannot be disassembled.

No.	Part name	Material	Remarks
1	Piston rod	Stainless steel	
2	Body A	Aluminum alloy	Alumite
3	Brake rod packing	Nitrile rubber	
4	Bearing	Acetal resin	
5	Cover	Aluminum alloy	Alumite
6	Brake plate A	Copper alloy	
7	Brake spring	Piano wire	
8	Brake plate B	Copper alloy	
9	Cross-recessed pan head machine screw	Steel	Zinc chromate
10	Body B	Aluminum alloy	Alumite
11	Rod packing	Nitrile rubber	
12	Rod cover	Aluminum alloy	Hard alumite
13	Cylinder tube	Stainless steel	
14	Piston	Aluminum alloy	
15	Piston packing	Nitrile rubber	
16	Magnet	Plastic (With switch only)	
17	Spacer	Aluminum alloy	
18	Cushion rubber H	Urethane rubber	
19	Head cover	Aluminum alloy	Hard alumite
20	Rod nut	Steel	Nickeling
21	Hexagon nut	Steel	Nickeling
22	Hexagon socket head cap screw	Steel	
23	Release rod packing	Nitrile rubber	
24	Release piston packing	Nitrile rubber	
25	Release piston	Aluminum alloy	Alumite
26	Release piston bearing	Acetal resin	
27	Fixing nut	Steel	Zinc chromate
28	Brake flange	Steel	Zinc chromate
29	Cushion rubber R	Urethane rubber	
30	Retaining ring	Stainless steel	

Configurations table

● Brake unit

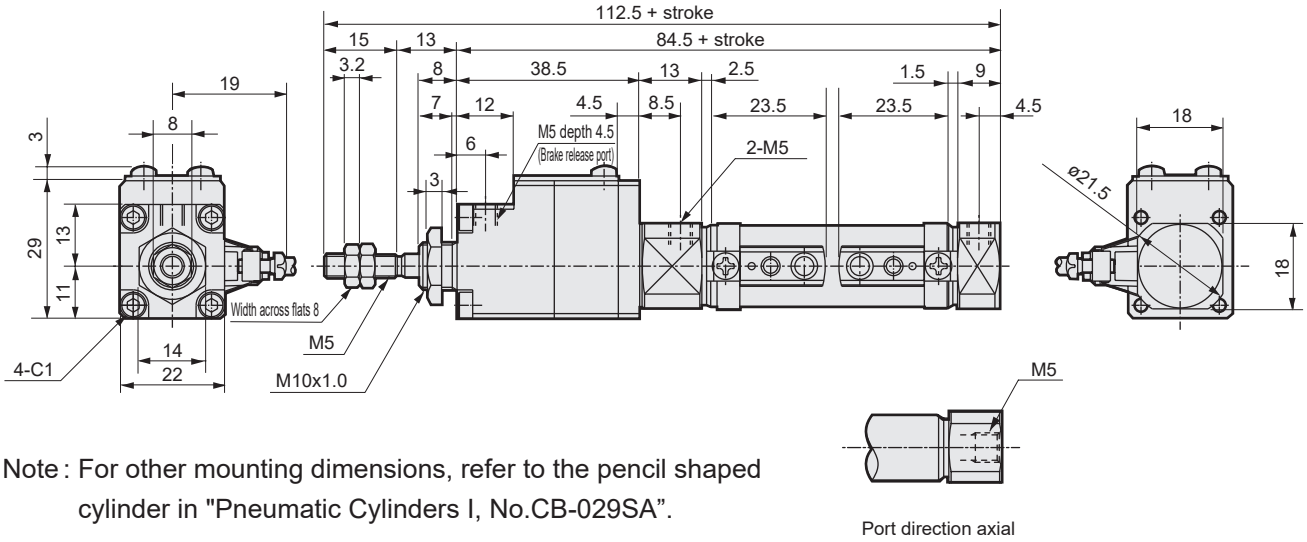
ULKP – 16 – BRAKE-UNIT



No.	Part name	Quantity
1	Label	1
2	Plastic sheets or plastic bag	1
3	Brake assembly	1
4	Brake flange	1
5	Fixing nut	1
6	Cover	1
7	Cross-recessed pan head machine screw	2
8	Hexagon socket head cap screw	2

Dimensions

● ULKP-*-00-16



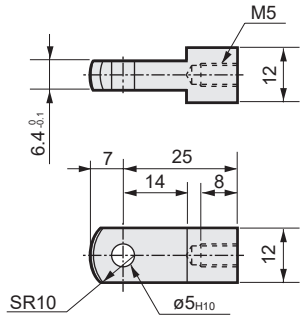
Port direction axial

Note : For other mounting dimensions, refer to the pencil shaped cylinder in "Pneumatic Cylinders I, No.CB-029SA".

Accessory dimensions

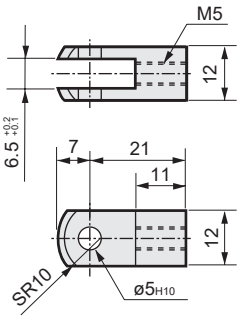
● Rod eye (I)
Model No. : P2-I-16

Material : Steel
Zinc chromate treatment
Weight : 21 g



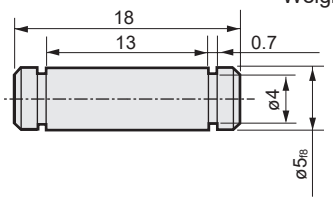
● Rod clevis (Y)
Model No. : P2-Y-16

Material : Steel
Zinc chromate treatment
Weight : 20 g



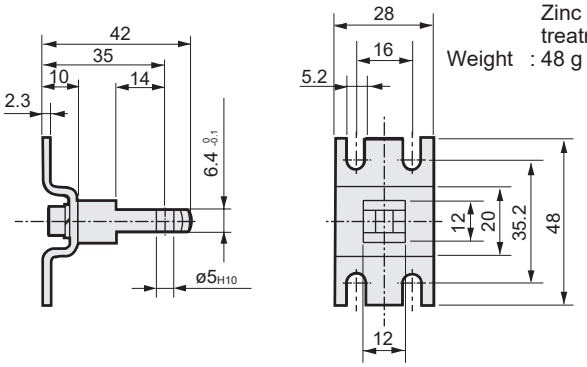
● Rod eye pin
Model No.: P2-P-16

Material : Stainless steel
Weight : 3 g



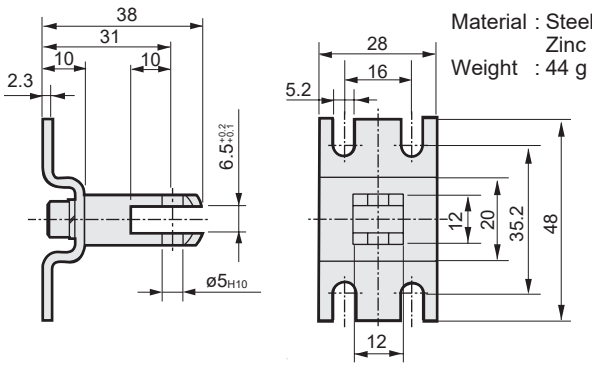
● Eye bracket (B1)
Model No.: P2-B1-16

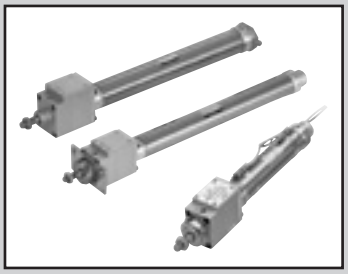
Material : Steel
Zinc chromate treatment
Weight : 48 g



● Clevis bracket (B2)
Model No.: P2-B2-16

Material : Steel
Zinc chromate treatment
Weight : 44 g



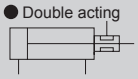


Brake cylinder Double acting, double acting/with valve for brake

ULK/ULK-V Series

● Bore size: ø20/ø25/ø32/ø40

JIS symbol ● Double acting



RoHS CAD

Specifications

Item		ULK				ULK-V			
Bore size mm		ø20	ø25	ø32	ø40	ø20	ø25	ø32	ø40
Actuation		Double acting				Double acting/with valve for brake			
Working fluid		Compressed air							
Max. working pressure MPa		1.0				Cylinder section: 1.0 Brake section: 0.6			
Min. working pressure	Brake section MPa	0.3							
	Cylinder section MPa	0.15							
Proof pressure MPa		1.6							
Ambient temperature °C		-10 to 60 (no freezing)				-10 to 50 (no freezing)			
Port size	Brake section	Rc1/8							
	Cylinder	Rc1/8							
Stroke tolerance mm		$^{+2.0}_{0}$ (up to 200) $^{+2.4}_{0}$ (201 up)							
Working piston speed mm/s		50 to 500							
Cushion		Rubber cushion							
Lubrication		Not required (use turbine oil class 1 ISO VG32 if lubrication is necessary)							
Holding force N		251	393	643	1005	251	393	643	1005
Allowable absorbed energy J		0.166	0.308	0.424	0.639	0.166	0.308	0.424	0.639

Note: For details of valves (P5136 Series), refer to "Pneumatic Valves" CB-023SA.

Electrical specification for brake valve

Item	ULK-V-Bore size-VALVE-KIT-Voltage		
Rated voltage (V)	100 AC (50/60Hz)	200 AC (50/60Hz)	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%		
Insulation class	Class B molded coil		

*1: 100/200 VAC coil is available for 110/220 VAC (60 Hz).

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke (mm)
ø20	25/50 /75/100/150 200/250/300	700	5
ø25			
ø32			
ø40			

*1: The custom stroke is available in 1 mm increments.
*2: The min. stroke varies depending on switch mounting method. Refer to the following table.

Min. stroke with switch

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
ø20	10					25	35	30	25	35	50	55	55	50	55
ø25	10					25	35	30	25	35	50	55	55	50	55
ø32	10					25	35	30	25	35	50	55	55	50	55
ø40	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 LED

Item	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	T3YH/ T3YV	T3WH/ T3WV	T0H/T0V		T5H/T5V		T8H/T8V		
Applications	Programmable controller For relay, compact solenoid valve	Dedicated for programmable controller			For programmable controller, relay				For programmable controller, relay		Programmable controller, relayIC circuit (no indicator lamp), for 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 100mA	5 to 20 mA (*3)			100 mA or less		50 mA or less		5 to 50mA	7 to 20mA	50 mA or less	20 mA or less	5 to 50mA	7 to 20mA	7 to 10mA
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)		No indicator lamp		LED (Lit when ON)		
Leakage current	1 mA or less with 100 VAC, 2 mA or less with 200 VAC	1 mA or less			10 μA or less				0mA						
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 detailed switch specifications and dimensions.
*2 : Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.
*3 : The 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)

Cylinder weight

● ULK

(Unit: kg)

Item/mounting	STROKE = 0Product weight when mm						Switch weight	SwitchH Rail + band weight	Additional weight per S = 10 mm
Bore size (mm)	Basic (00)	Axial foot (LB)	Flange (FA)	Clevis (CA)	Clevis (CC)	Trunnion (TA/TB)			
ø20	0.47	0.62	0.53	0.62	0.48	0.52	Refer to the weightin theUse this as a reference.	0.005	0.01
ø25	0.84	1.10	0.99	1.08	0.84	0.94		0.005	0.01
ø32	0.88	1.14	1.03	1.12	0.88	0.98		0.009	0.02
ø40	1.47	1.73	1.62	1.71	1.49	1.63		0.009	0.02

● ULK-V (with valve for brake)

(Unit: kg)

Item/mounting	STROKE = 0Product weight when mm						Switch weight	SwitchH Rail + band weight	Additional weight per S = 10 mm
Bore size (mm)	Basic (00)	Axial foot (LB)	Flange (FA)	Clevis (CA)	Clevis (CC)	Trunnion (TA/TB)			
ø20	0.53	0.68	0.59	0.68	0.54	0.58	Refer to the weightin theUse this as a reference.	0.005	0.01
ø25	0.90	1.16	1.05	1.14	0.90	1.00		0.005	0.01
ø32	0.94	1.20	1.09	1.18	0.94	1.04		0.009	0.02
ø40	1.53	1.79	1.68	1.77	1.55	1.69		0.009	0.02

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa									
		0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø20	Push	47.1	62.8	94.2	1.26 x10^2	1.57 x10^2	1.88 x10^2	2.20 x 10^2	2.51 x10^2	2.83 x10^2	3.14 x 10^2
	Pull	35.3	47.1	70.7	94.2	1.18 x10^2	1.41 x10^2	1.65 x 10^2	1.88 x10^2	2.12 x 10^2	2.36 x 10^2
ø25	Push	73.6	98.2	1.47 x 10^2	1.96 x 10^2	2.45 x 10^2	2.95 x 10^2	3.44 x 10^2	3.93 x 10^2	4.42 x 10^2	4.91 x 10^2
	Pull	56.7	75.6	1.13 x 10^2	1.51 x 10^2	1.89 x 10^2	2.27 x 10^2	2.64 x 10^2	3.02 x 10^2	3.40 x 10^2	3.78 x 10^2
ø32	Push	1.21 x 10^2	1.61 x 10^2	2.41 x 10^2	3.22 x 10^2	4.02 x 10^2	4.83 x 10^2	5.63 x 10^2	6.43 x 10^2	7.24 x 10^2	8.04 x 10^2
	Pull	1.04 x 10^2	1.38 x 10^2	2.07 x 10^2	2.76 x 10^2	3.46 x 10^2	4.15 x 10^2	4.84 x 10^2	5.53 x 10^2	6.22 x 10^2	6.91 x 10^2
ø40	Push	1.88 x 10^2	2.51 x 10^2	3.77 x 10^2	5.03 x 10^2	6.28 x 10^2	7.54 x 10^2	8.80 x 10^2	1.01 x 10^3	1.13 x 10^3	1.26 x 10^3
	Pull	1.65 x 10^2	2.21 x 10^2	3.31 x 10^2	4.41 x 10^2	5.51 x 10^2	6.62 x 10^2	7.72 x 10^2	8.82 x 10^2	9.92 x 10^2	1.10 x 10^3

How to order

● Without valve

Without switch (built-in magnet for switch)

ULK - 00 - 20 - 100 —— V I

With switch (built-in magnet for switch)

ULK - 00 - 20 - 100 —— T0H - R - V I

● With valve for brake

Without switch (built-in magnet for switch)

ULK-V - 00 - 20 - 100 - 1 —— V I

With switch (built-in magnet for switch)

ULK-V - 00 - 20 - 100 - 1 - T0H - R - V I

Ⓐ Model No. Ⓑ Mounting Ⓒ Bore size Ⓓ Stroke Ⓔ Valve voltage Ⓕ Switch model No. Ⓖ Switch quantity *5 Ⓗ Option *3 Ⓘ Accessory *4

⚠ Precautions for model No. selection

*1 : Refer to page 680 for the min. stroke with switch.
*2 : The stroke will be 25 mm and over with bellows "J". Contact CKD when stroke is shorter than 25 mm.
*3 : The instantaneous max. temperature is the temperature when sparks, cutting chips, etc., instantaneously contact the bellows.
*4 : "I" and "Y" cannot be selected together.
*5 : 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.
*6 : Refer to Ending Page 85 for custom specifications of rod end form.

[Example of model No.]

ULK-V-LB-20-100-1-T0H-R-JI

Model:Brake cylinder

Ⓐ Model No.	: Double acting/With valve for brake
Ⓑ Mounting	: Axial foot
Ⓒ Bore size	: ø20 mm
Ⓓ Stroke	: 100 mm
Ⓔ Valve voltage	: 100 VAC (50/60 Hz)
Ⓕ Switch model No.	: Reed T0H switch
Ⓖ Switch quantity	: 1 on rod side
Ⓗ Option	: Bellows material, max. ambient temperature 100°C, instantaneous max. temperature 200°C
Ⓘ Accessory	: Rod eye

Ⓐ Model No.		Double acting	Double acting/ with valve -V
Code	Description		
Ⓑ Mounting			
00	Basic	●	●
LB	Axial foot	●	●
FA	Rod side flange	●	●
CA	Eye bracket	●	●
CC	Eye bracket integrated	●	●
CC1	Eye bracket bush pressfit	●	●
TA	Rod side trunnion	●	●
TB	Head side trunnion	●	●

Ⓒ Bore size (mm)			
20	ø20	●	●
25	ø25	●	●
32	ø32	●	●
40	ø40	●	●

Ⓓ Stroke (mm)

Bore size	Stroke *1	Custom stroke
ø20	5 to 700	In 1 mm increments
ø25	5 to 700	
ø32	5 to 700	
ø40	5 to 700	

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

Ⓕ Switch model No.

Straight lead wire	L-shaped lead wire	Contact	Voltage AC	Voltage DC	Indicator	Lead wire
T0H*	T0V*	Reed	●	●	1-color LED	2-wire
T5H*	T5V*	Reed	●	●	No indicator lamp	2-wire
T8H*	T8V*	Reed	●	●	1-color LED	2-wire
T1H*	T1V*	Proximity	●		1-color LED	2-wire
T2H*	T2V*	Proximity		●	1-color LED	2-wire
T3H*	T3V*	Proximity		●		3-wire
T2WH*	T2WV*	Proximity		●	2-color LED	2-wire
T2YH*	T2YV*	Proximity		●		
T3WH*	T3WV*	Proximity		●		3-wire
T3YH*	T3YV*	Proximity		●		
T3PH*	T3PV*	Proximity		●	1-color LED	3-wire
T2JH*	T2JV*	Proximity		●	1-color LED 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			●	●

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

How to order switch

● Switch body + mounting bracket set

ULK – T0H – 20

- T0H: Switch model No. (Item Ⓕ on page 682)
- 20: Bore size (Item Ⓒ on page 682)

● Switch body only

SW - T0H

- T0H: Switch model No. (Item Ⓕ on page 682)

● Mounting bracket set

ULK - T - 20

- T: Mounting bracket
- 20: Bore size (Item Ⓒ on page 682)

How to order brake valve only

ULK-V – Ⓒ Bore size – **VALVE-KIT** – ⒺValve voltage

How to order brake unit only

ULK – Ⓒ Bore size – **BRAKE-UNIT**

How to order mounting bracket

Bore size (mm) / Mounting bracket	ø20	ø25	ø32	ø40
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.

Specifications for rechargeable battery

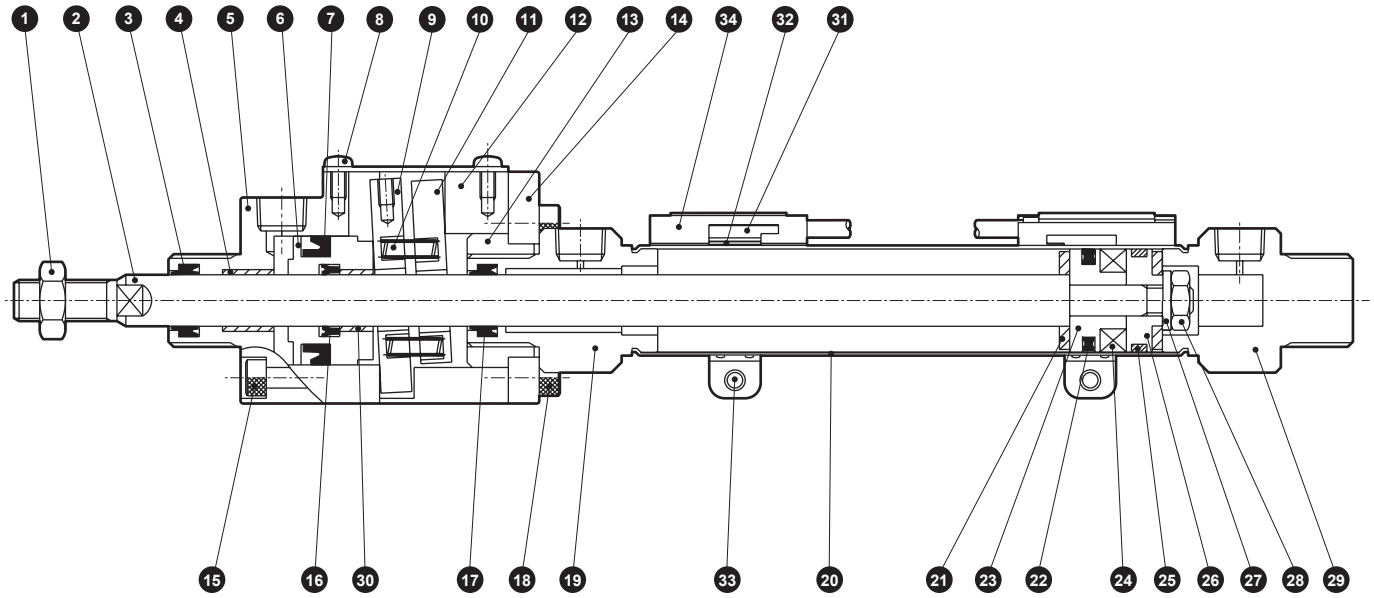
(Catalog No. CC-1226A)

ULK - … - P4*

● Design compatible with rechargeable battery manufacturing process.

* Contact CKD for details.

Internal structure and parts list



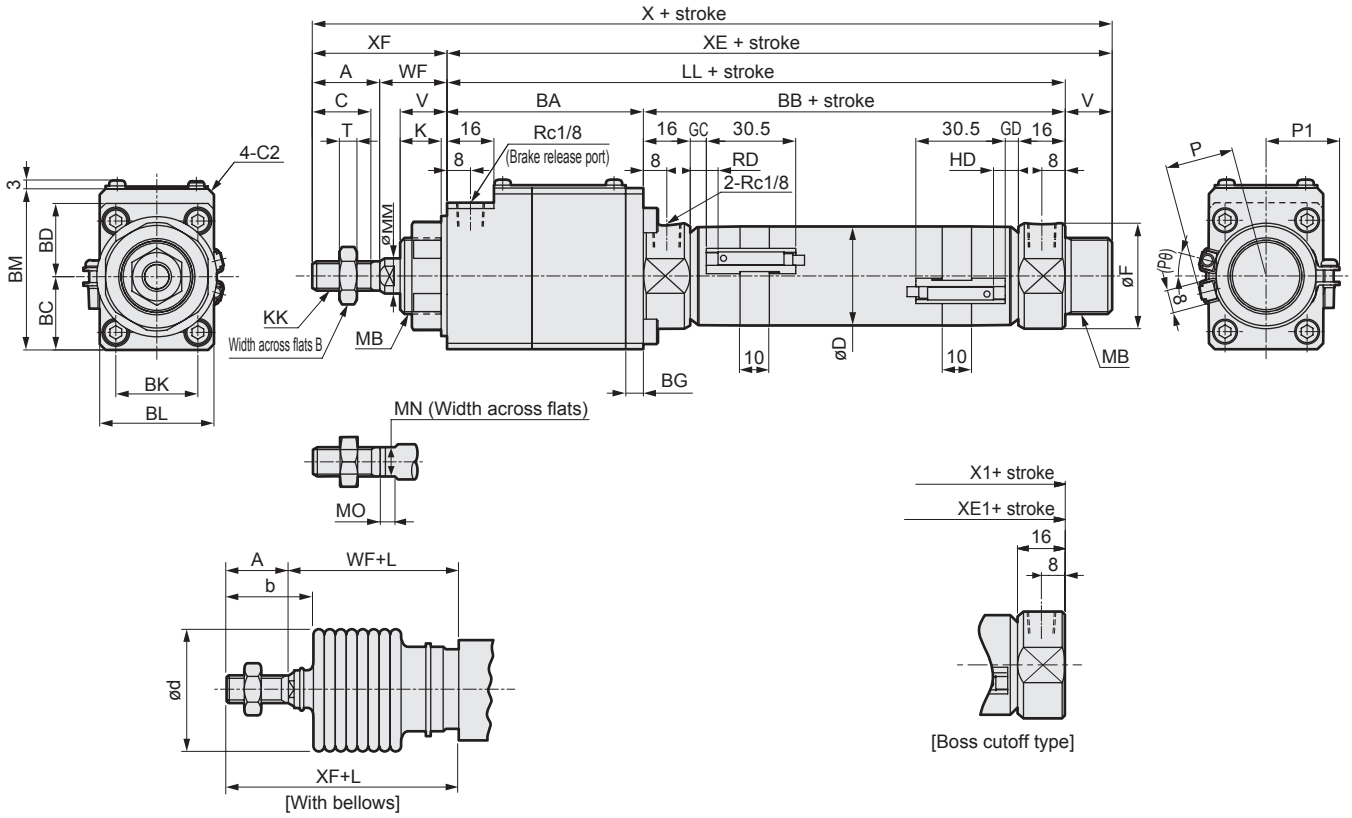
Cannot be disassembled

* This product cannot be disassembled.

No.	Part name	Material	Remarks
1	Rod nut	Steel	Zinc chromate
2	Piston rod	ø20/ø25: stainless steel ø32/ø40: steel	Industrial chrome plating
3	Brake rod packing	Nitrile rubber	
4	Bearing	Acetal resin	
5	Body A	Aluminum alloy	Alumite
6	Release piston	Aluminum alloy	Alumite
7	Release piston packing	Nitrile rubber	
8	Pan head machine screw	Steel	
9	Brake plate A	Special steel	Zinc chromate
10	Brake spring	Piano wire	Black finish
11	Brake plate B	Special steel	Zinc chromate
12	Body B	Aluminum alloy	Alumite
13	Fixing nut	Steel	Zinc chromate
14	Brake flange	Steel	Zinc chromate
15	Hexagon socket head cap screw	Steel	Black finish
16	Release rod packing	Nitrile rubber	
17	Rod packing	Nitrile rubber	
18	Hexagon socket head cap screw	Steel	Black finish
19	Rod cover	Aluminum alloy	
20	Cylinder tube	Stainless steel	
21	Cushion rubber	Urethane rubber	
22	Piston packing	Nitrile rubber	
23	Piston A	Aluminum alloy	
24	Magnet	Plastic	
25	Wear ring	Acetal resin	
26	Piston B	Aluminum alloy	
27	Spacer	Steel	
28	Hexagon nut	Steel	Zinc chromate
29	Head cover	Aluminum alloy	
30	Release rod metal	Acetal resin	
31	Switch body		
32	Band	Stainless steel	
33	Pan head machine screw	Stainless steel	
34	Switch rail	Stainless steel	

Dimensions CAD

● Basic (00)



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

1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : For the L dimension, round up below the decimal point.
*3 : For the dimensions of the accessories, refer to page 694.

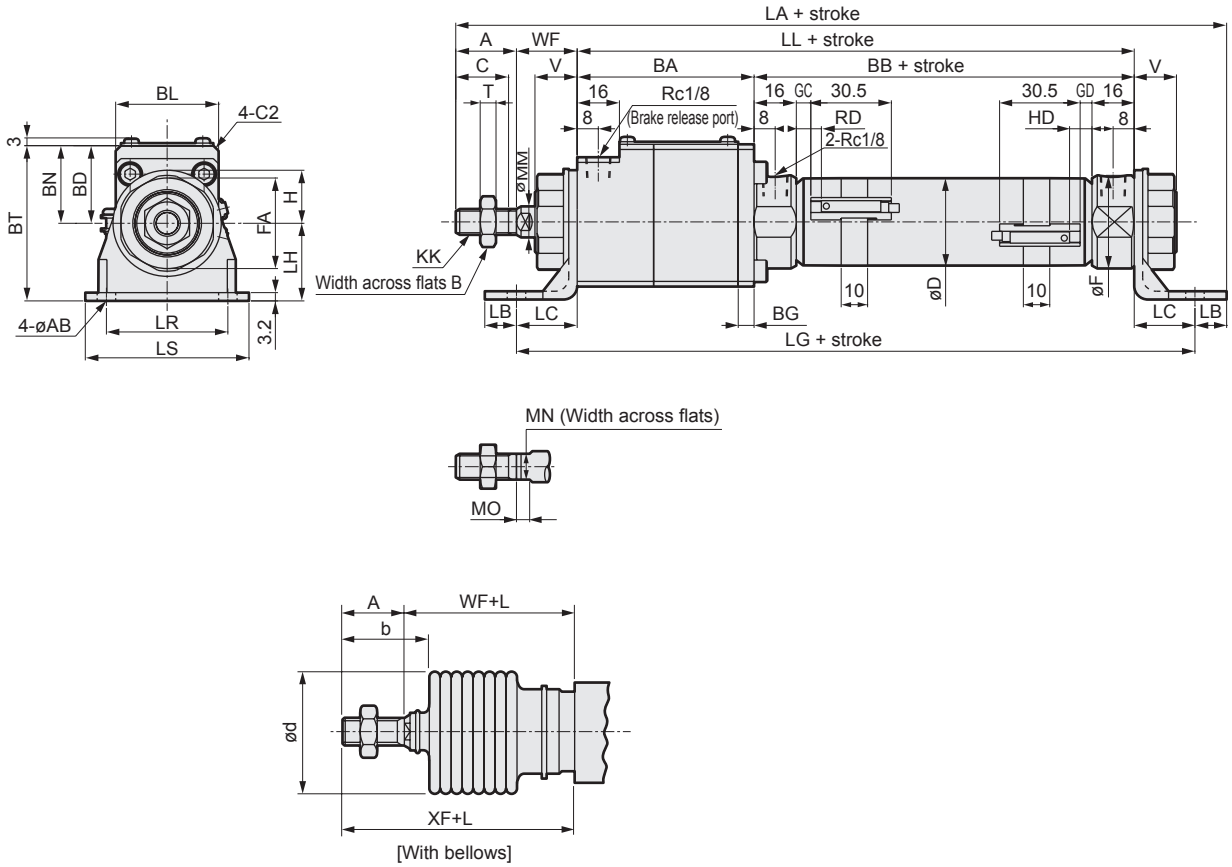
Code	Basic (00) basic dimensions													
Bore size (mm)	A	B	BA	BB	BC	BD	BG	BK	BL	BM	C	D	F	K
ø20	20	13	58	66	20	20	6	20	29	45	18	21.4	28	12
ø25	23	17	67	69	25	25	6	28	39	55	20	26.4	32	14
ø32	23	17	67	69	25	25	6	28	39	55	20	33.6	36	14
ø40	25	19	74	73	29	30	9	39	50	69	22	41.6	45	14

Code													With switch (T0, T5, T2, T3)			
Bore size (mm)	KK	LL	MB	MM	MN	MO	T	V	WF	X	XE	XF	GC	GD	RD	HD
ø20	M8x1.0	124	M18x1.5	10	8	5	5	14	24	182	138	44	4.0	3.0	8.0	7.0
ø25	M10x1.25	136	M26x1.5	12	10	5	6	16	23	198	152	46	5.5	4.5	9.5	8.5
ø32	M10x1.25	136	M26x1.5	12	10	5	6	16	23	198	152	46	5.5	4.5	9.5	8.5
ø40	M12x1.5	147	M26x1.5	14	12	6	7	16	23	211	163	48	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	P	P1	(Pθ)°	b	d	L	X1	XE1
ø20	6.0	5.0	10.0	9.0	17.3	19.5	22	30	30	(Stroke/3) + 6	168	124
ø25	7.5	6.5	11.5	10.5	19.8	22.0	18	32	46	(Stroke/3.25) + 7	182	136
ø32	7.5	6.5	11.5	10.5	24.3	25.5	15	32	46	(Stroke/3.25) + 7	182	136
ø40	9.5	8.5	13.5	12.5	28.3	29.5	12	34	46	(Stroke/3.25) + 7	195	147

Dimensions CAD

● Axial foot (LB)



1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : For the L dimension, round up below the decimal point.
*3 : For the dimensions of the accessories, refer to page 694.

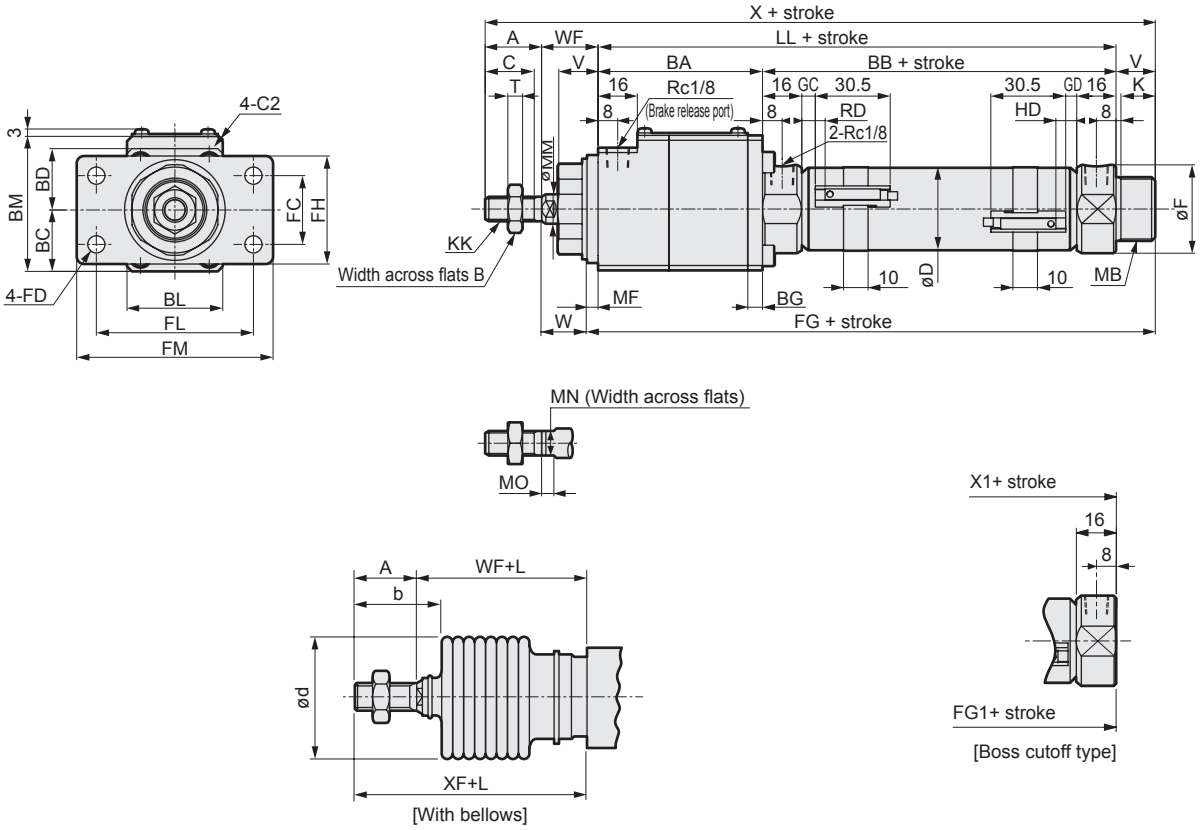
Code	Axial foot (LB) basic dimensions															
Bore size	A	AB	B	BA	BB	BD	BG	BL	BN	BT	C	D	F	FA	H	KK
ø20	20	6	13	58	66	20	6	29	25	50	18	21.4	28	26	15	M8x1.0
ø25	23	7	17	67	69	25	6	39	30	60	20	26.4	32	35	20	M10x1.25
ø32	23	7	17	67	69	25	6	39	30	60	20	33.6	36	35	20	M10x1.25
ø40	25	7	19	74	73	30	9	50	40	70	22	41.6	45	35	20	M12x1.5

Code								Mounting dimensions							With switch (T0, T5, T2, T3)			
Bore size	LL	MM	MN	MO	T	V	WF	LA	LB	LC	LG	LH	LR	LS	GC	GD	RD	HD
ø20	124	10	8	5	5	14	24	196	10	18	160	25	30	44	4.0	3.0	8.0	7.0
ø25	136	12	10	5	6	16	23	217	12	23	182	30	46	62	5.5	4.5	9.5	8.5
ø32	136	12	10	5	6	16	23	217	12	23	182	30	46	62	5.5	4.5	9.5	8.5
ø40	147	14	12	6	7	16	23	230	12	23	193	30	46	62	7.5	6.5	11.5	10.5

Code	With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	XF	b	d	L
ø20	6.0	5.0	10.0	9.0	44	30	30	(Stroke/3) + 6
ø25	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø32	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø40	9.5	8.5	13.5	12.5	48	34	46	(Stroke/3.25) + 7

Dimensions CAD

● Rod side flange (FA)



1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : For the L dimension, round up below the decimal point.
*3 : For the dimensions of the accessories, refer to page 694.

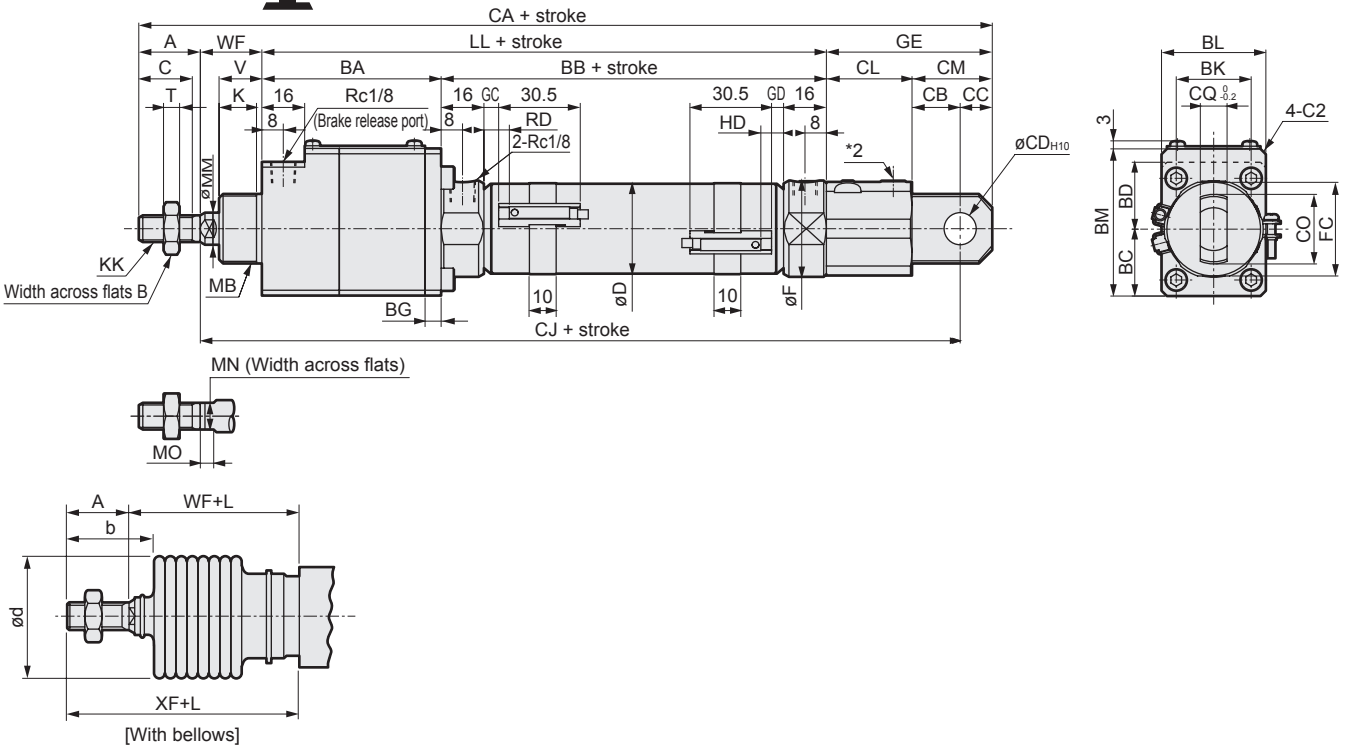
Code	Rod side flange (FA) basic dimensions															
Bore size (mm)	A	B	BA	BB	BC	BD	BG	BL	BM	C	D	F	K	KK	LL	MB
ø20	20	13	58	66	20	20	6	29	45	18	21.4	28	12	M8x1.0	124	M18x1.5
ø25	23	17	67	69	25	25	6	39	55	20	26.4	32	14	M10x1.25	136	M26x1.5
ø32	23	17	67	69	25	25	6	39	55	20	33.6	36	14	M10x1.25	136	M26x1.5
ø40	25	19	74	73	29	30	9	50	69	22	41.6	45	14	M12x1.5	147	M26x1.5

Code										Mounting dimensions						With switch (T0, T5, T2, T3)			
Bore size (mm)	MF	MM	MN	MO	T	V	W	WF	X	FC	FD	FG	FH	FL	FM	GC	GD	RD	HD
ø20	3.2	10	8	5	5	14	20.8	24	182	20	6	141.2	34	40	54	4.0	3.0	8.0	7.0
ø25	4.5	12	10	5	6	16	18.5	23	198	28	7	156.5	44	64	80	5.5	4.5	9.5	8.5
ø32	4.5	12	10	5	6	16	18.5	23	198	28	7	156.5	44	64	80	5.5	4.5	9.5	8.5
ø40	4.5	14	12	6	7	16	18.5	23	211	28	7	167.5	44	64	80	7.5	6.5	11.5	10.5

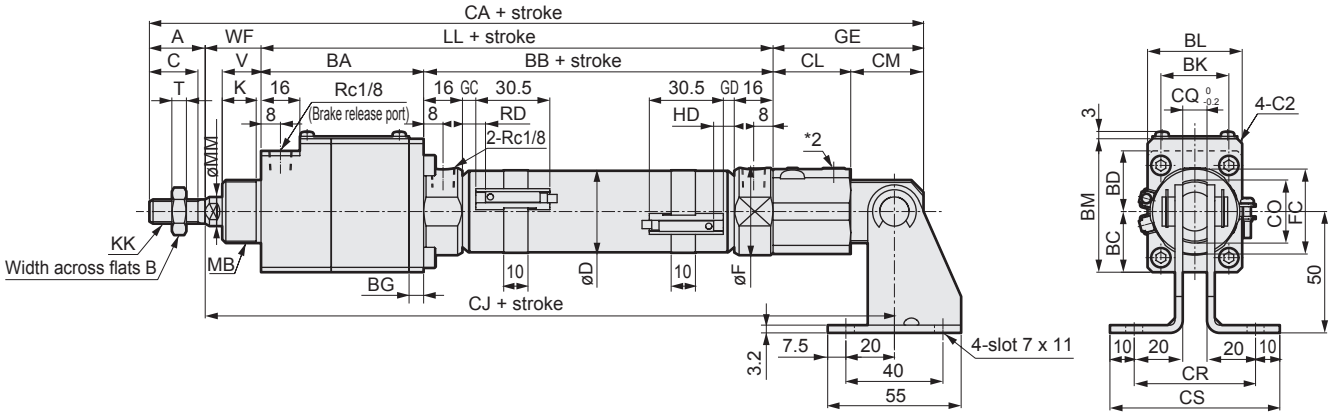
Code	With switch (T2W, T3W)				With bellows				Boss cutoff type	
Bore size (mm)	GC	GD	RD	HD	XF	b	d	L	X1	FG1
ø20	6.0	5.0	10.0	9.0	44	30	30	(Stroke/3) + 6	168	127.2
ø25	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7	182	140.5
ø32	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7	182	140.5
ø40	9.5	8.5	13.5	12.5	48	34	46	(Stroke/3.25) + 7	195	151.5

Dimensions

● Eye bracket (CA)



● With bracket (Option B2)



1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : It is not a piping port. *3 : For the L dimension, round up below the decimal point.
*4 : For the dimensions of the accessories, refer to page 694.

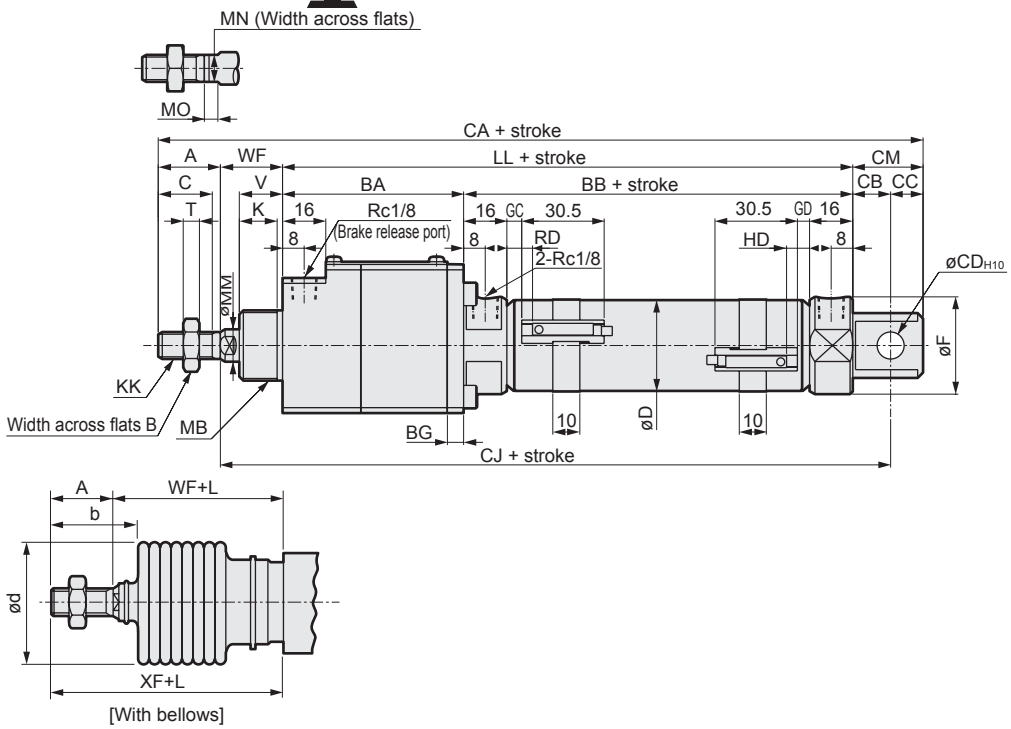
Code	Eye bracket (CA) basic dimensions																		
Bore size (mm)	A	B	BA	BB	BC	BD	BG	BK	BL	BM	C	D	F	FC	GE	K	KK	LL	MB
ø20	20	13	58	66	20	20	6	20	29	45	18	21.4	28	26	55	12	M8x1.0	124	M18x1.5
ø25	23	17	67	69	25	25	6	28	39	55	20	26.4	32	35	62	14	M10x1.25	136	M26x1.5
ø32	23	17	67	69	25	25	6	28	39	55	20	33.6	36	35	62	14	M10x1.25	136	M26x1.5
ø40	25	19	74	73	29	30	9	39	50	69	22	41.6	45	35	62	14	M12x1.5	147	M26x1.5

Code							Mounting dimensions											With switch (T0, T5, T2, T3)			
Bore size (mm)	MM	MN	MO	T	V	WF	CA	CB	CC	CD	CJ	CL	CM	CO	CQ	CR	CS	GC	GD	RD	HD
ø20	10	8	5	5	14	24	223	14	10	10	193	31	24	22	8	48	68	4.0	3.0	8.0	7.0
ø25	12	10	5	6	16	23	244	18	12	12	209	32	30	26	10	50	70	5.5	4.5	9.5	8.5
ø32	12	10	5	6	16	23	244	18	12	12	209	32	30	26	10	50	70	5.5	4.5	9.5	8.5
ø40	14	12	6	7	16	23	257	18	12	12	220	32	30	26	10	50	70	7.5	6.5	11.5	10.5

Code	With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	XF	b	d	L
ø20	6.0	5.0	10.0	9.0	44	30	30	(Stroke/3) + 6
ø25	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø32	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø40	9.5	8.5	13.5	12.5	48	34	46	(Stroke/3.25) + 7

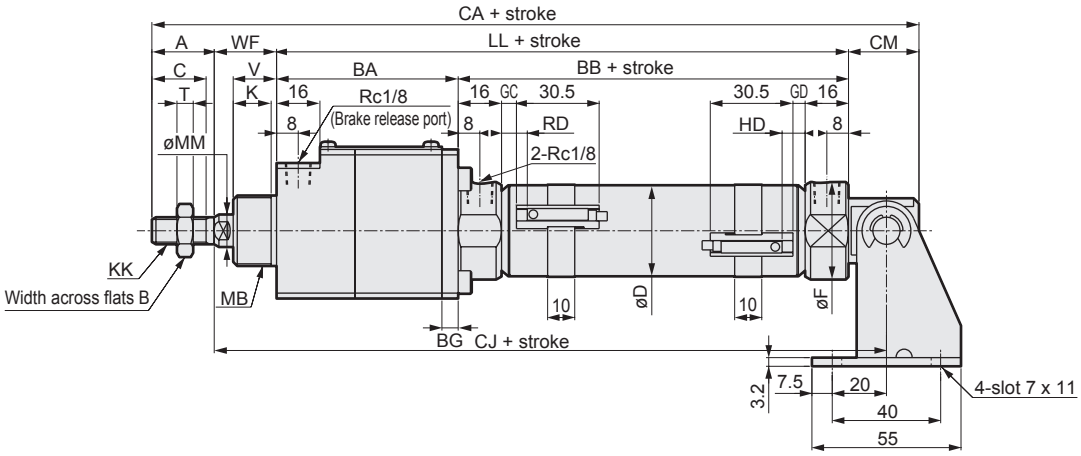
Dimensions

● Eye bracket integrated (CC) CAD



[With bellows]

● With bracket (Option B2)



1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : For the L dimension, round up below the decimal point.
*3 : For the dimensions of the accessories, refer to page 694.

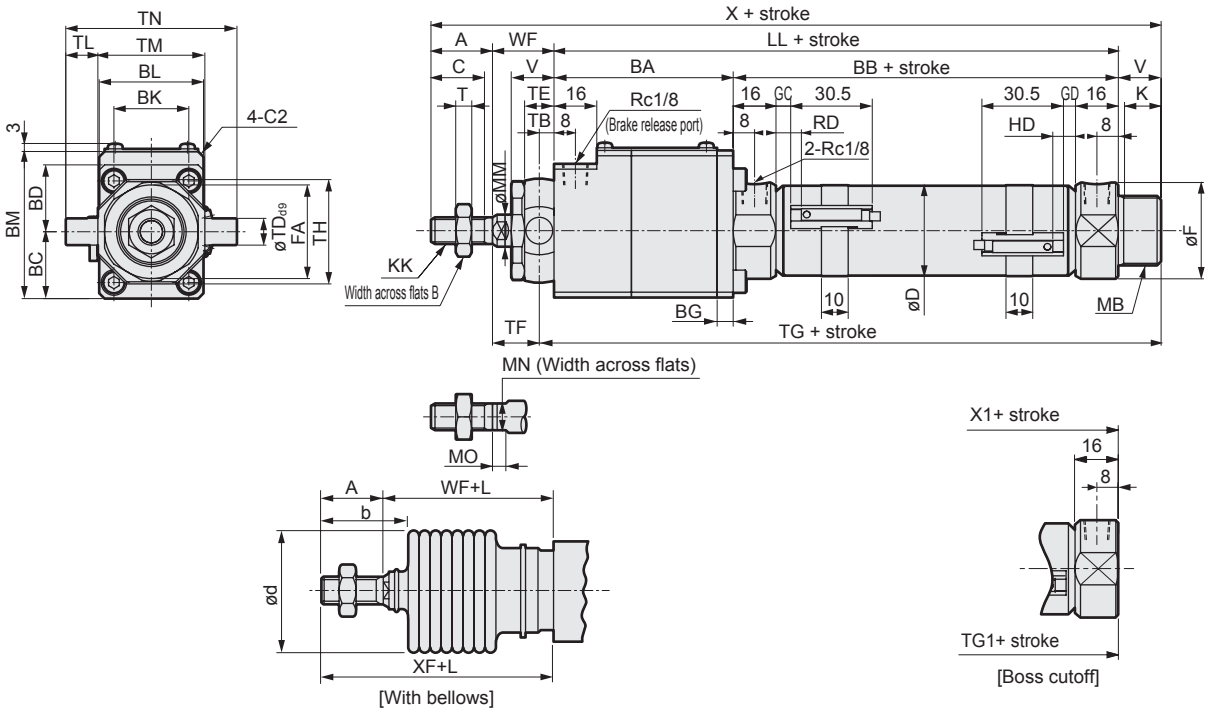
Code	Eye bracket integrated (CC) basic dimensions															
Bore size (mm)	A	B	BA	BB	BC	BD	BG	BK	BL	BM	C	D	F	K	KK	LL
ø20	20	13	58	66	20	20	6	20	29	45	18	21.4	28	12	M8x1.0	124
ø25	23	17	67	69	25	25	6	28	39	55	20	26.4	32	14	M10x1.25	136
ø32	23	17	67	69	25	25	6	28	39	55	20	33.6	36	14	M10x1.25	136
ø40	25	19	74	73	29	30	9	39	50	69	22	41.6	45	14	M12x1.5	147

Code								Mounting dimensions										With switch (T0, T5, T2, T3)			
Bore size (mm)	MB	MM	MN	MO	T	V	WF	CA	CB	CC	CD	CJ	CM	CO	CQ	CR	CS	GC	GD	RD	HD
ø20	M18x1.5	10	8	5	5	14	24	189	12	9	8	160	21	22	16	56	76	4.0	3.0	8.0	7.0
ø25	M26x1.5	12	10	5	6	16	23	203	12	9	8	171	21	24	16	56	76	5.5	4.5	9.5	8.5
ø32	M26x1.5	12	10	5	6	16	23	208	14	12	10	173	26	24	16	56	76	5.5	4.5	9.5	8.5
ø40	M26x1.5	14	12	6	7	16	23	225	16	14	12	186	30	30	20	60	80	7.5	6.5	11.5	10.5

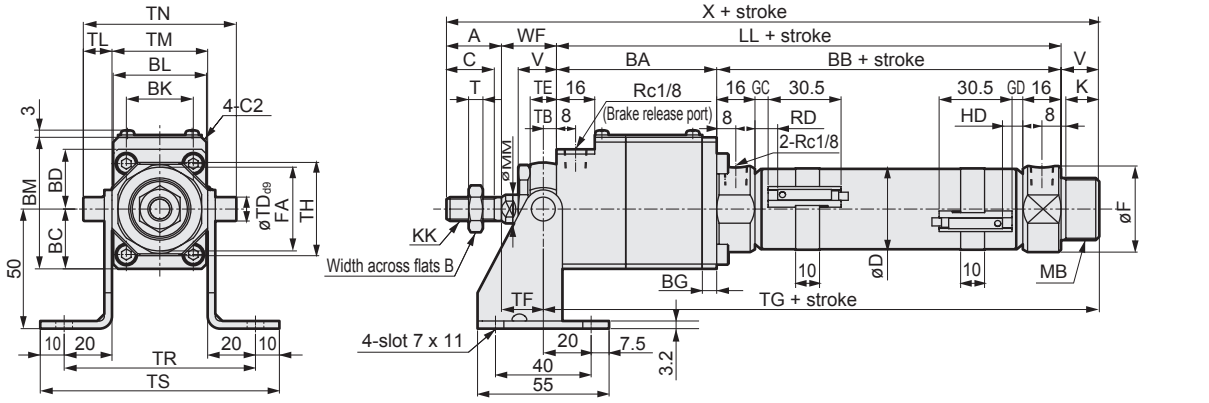
Code	With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	XF	b	d	L
ø20	6.0	5.0	10.0	9.0	44	30	30	(Stroke/3) + 6
ø25	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø32	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø40	9.5	8.5	13.5	12.5	48	34	46	(Stroke/3.25) + 7

Dimensions

● Rod side trunnion (TA)



● With bracket (Option B2)



1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : For the L dimension, round up below the decimal point.
*3 : For the dimensions of the accessories, refer to page 694.

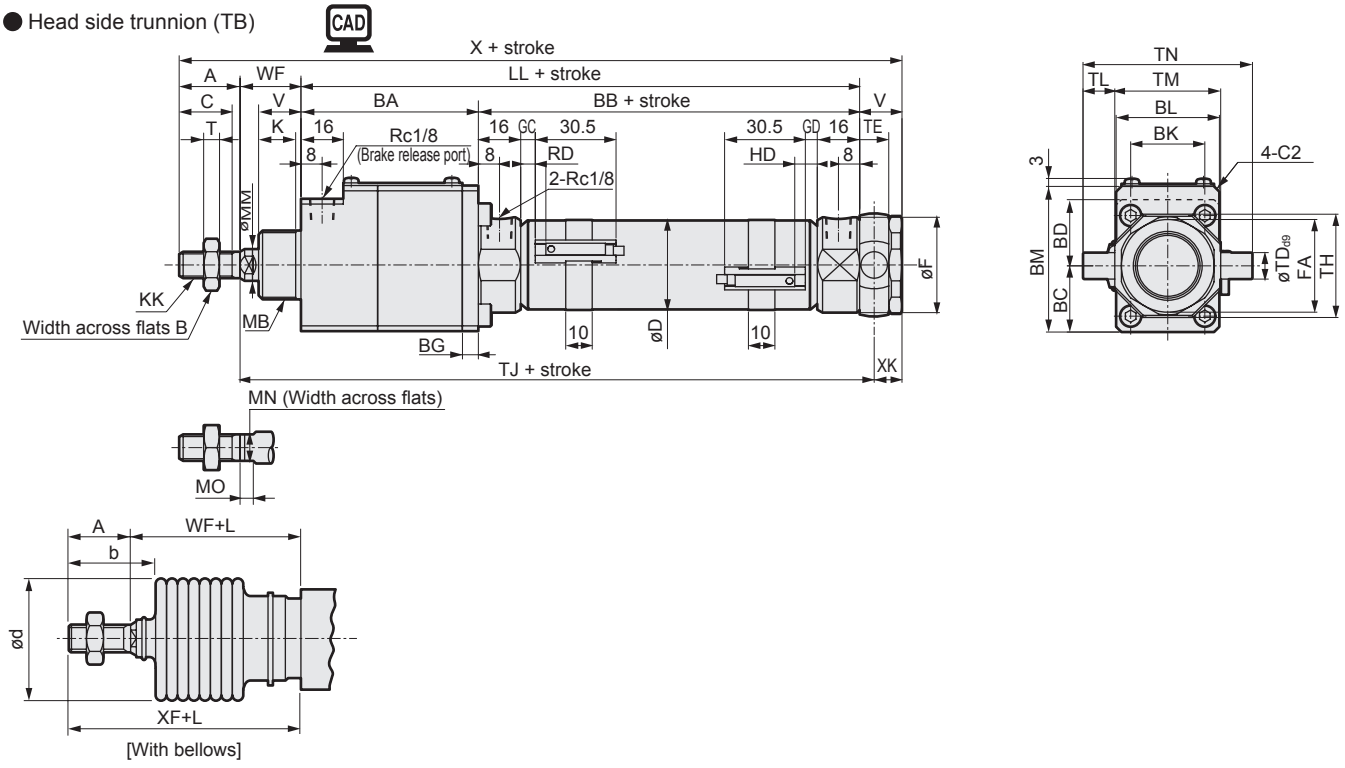
Code	Rod side trunnion (TA) basic dimensions																	
Bore size (mm)	A	B	BA	BB	BC	BD	BG	BK	BL	BM	C	D	F	FA	K	KK	LL	MB
ø20	20	13	58	66	20	20	6	20	29	45	18	21.4	28	26	12	M8x1.0	124	M18x1.5
ø25	23	17	67	69	25	25	6	28	39	55	20	26.4	32	35	14	M10x1.25	136	M26x1.5
ø32	23	17	67	69	25	25	6	28	39	55	20	33.6	36	35	14	M10x1.25	136	M26x1.5
ø40	25	19	74	73	29	30	9	39	50	69	22	41.6	45	35	14	M12x1.5	147	M26x1.5

Code								Mounting dimensions											With switch (T0, T5, T2, T3)			
Bore size (mm)	MM	MN	MO	T	V	WF	X	TB	TD	TE	TF	TG	TH	TL	TM	TN	TR	TS	GC	GD	RD	HD
ø20	10	8	5	5	14	24	182	4.5	8	9	19.5	142.5	29.5	8	30	46	70	90	4.0	3.0	8.0	7.0
ø25	12	10	5	6	16	23	198	5.5	10	11	17.5	157.5	39	12	40	64	80	100	5.5	4.5	9.5	8.5
ø32	12	10	5	6	16	23	198	5.5	10	11	17.5	157.5	39	12	40	64	80	100	5.5	4.5	9.5	8.5
ø40	14	12	6	7	16	23	211	5.5	10	11	17.5	168.5	44	9.5	53	72	93	113	7.5	6.5	11.5	10.5

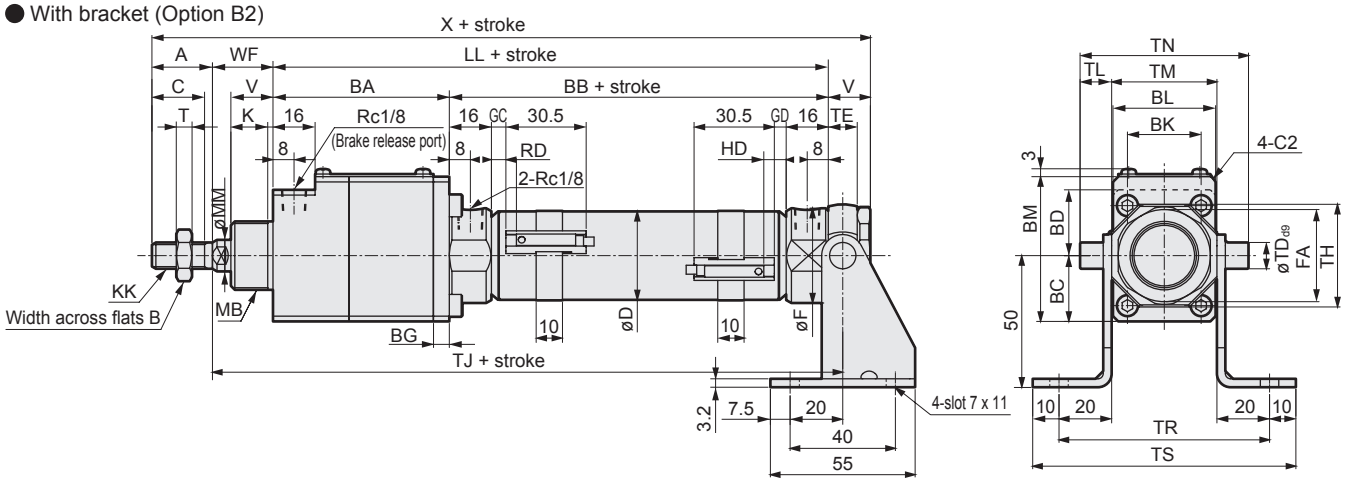
Code	With switch (T2W, T3W)				With bellows				Boss cutoff	
Bore size (mm)	GC	GD	RD	HD	XF	b	d	L	X1	TG1
ø20	6.0	5.0	10.0	9.0	44	30	30	(Stroke/3) + 6	168	128.5
ø25	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7	182	141.5
ø32	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7	182	141.5
ø40	9.5	8.5	13.5	12.5	48	34	46	(Stroke/3.25) + 7	195	152.5

Dimensions

● Head side trunnion (TB)



● With bracket (Option B2)



1 : Refer to page 693 for HD, RD and protruding dimensions of T1, T8* and 2-color LED switches.
*2 : For the L dimension, round up below the decimal point.
*3 : For the dimensions of the accessories, refer to page 694.

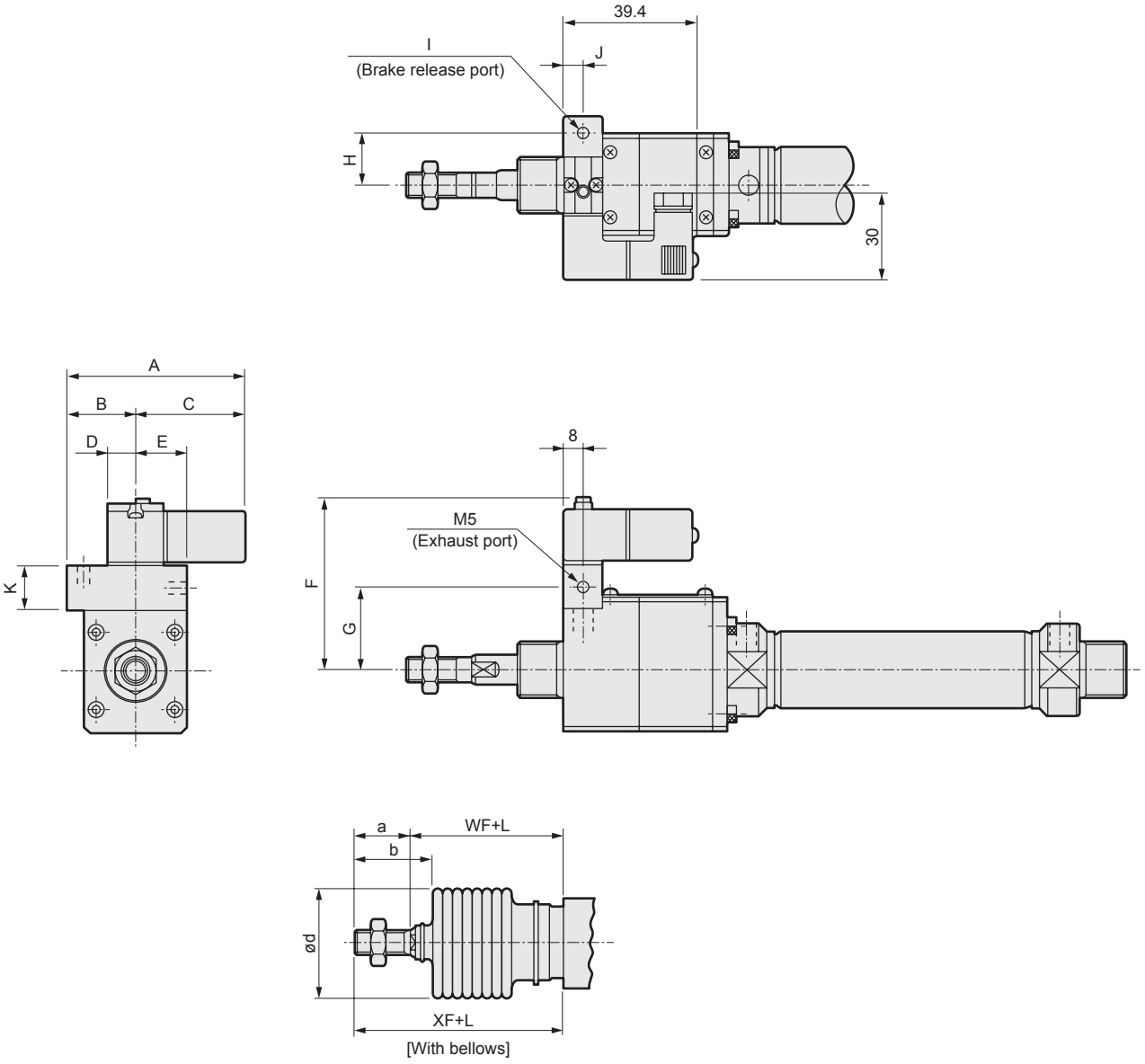
Code	Rod side flange (TB) basic dimensions																
Bore size (mm)	A	B	BA	BB	BC	BD	BG	BK	BL	BM	C	D	F	FA	K	KK	LL	MB
ø20	20	13	58	66	20	20	6	20	29	45	18	21.4	28	26	12	M8x1.0	124	M18x1.5
ø25	23	17	67	69	25	25	6	28	39	55	20	26.4	32	35	14	M10x1.25	136	M26x1.5
ø32	23	17	67	69	25	25	6	28	39	55	20	33.6	36	35	14	M10x1.25	136	M26x1.5
ø40	25	19	74	73	29	30	9	39	50	69	22	41.6	45	35	14	M12x1.5	147	M26x1.5

Code									Mounting dimensions									With switch (T0, T5, T2, T3)			
Bore size (mm)	MM	MN	MO	T	V	WF	X	XK	TD	TE	TH	TJ	TL	TM	TN	TR	TS	GC	GD	RD	HD
ø20	10	8	5	5	14	24	182	9.5	8	9	29.5	152.5	8	30	46	70	90	4.0	3.0	8.0	7.0
ø25	12	10	5	6	16	23	198	10.5	10	11	39	164.5	12	40	64	80	100	5.5	4.5	9.5	8.5
ø32	12	10	5	6	16	23	198	10.5	10	11	39	164.5	12	40	64	80	100	5.5	4.5	9.5	8.5
ø40	14	12	6	7	16	23	211	10.5	10	11	44	175.5	9.5	53	72	93	113	7.5	6.5	11.5	10.5

Code	With switch (T2W, T3W)				With bellows			
Bore size (mm)	GC	GD	RD	HD	XF	b	d	L
ø20	6.0	5.0	10.0	9.0	44	30	30	(Stroke/3) + 6
ø25	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø32	7.5	6.5	11.5	10.5	46	32	46	(Stroke/3.25) + 7
ø40	9.5	8.5	13.5	12.5	48	34	46	(Stroke/3.25) + 7

Dimensions CAD

● With valve for brake



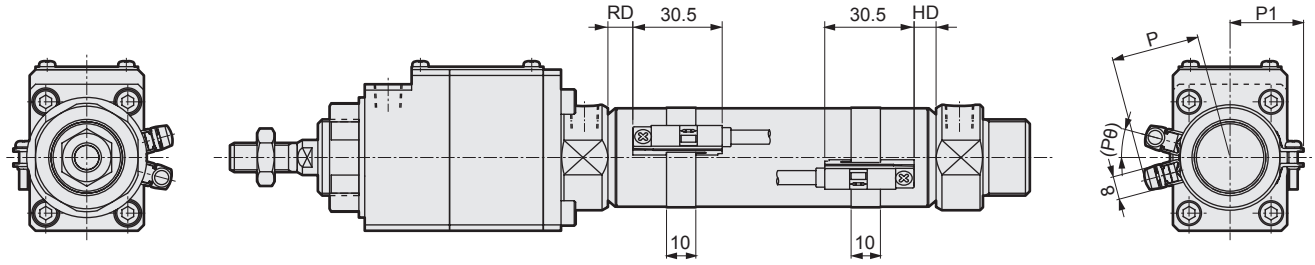
*Dimensions not listed below are the same as the basic type on page 685.
*1 : For the L dimension, round up below the decimal point.
*2 : For the dimensions of the accessories, refer to page 694.

Code / Bore size (mm)	A	B	C	D	E	F	G	H	I	J	K
ø20	56.5	25	31.5	8	15	54	26.5	17	M5	8	12
ø25	57	21	36	4	18	60	31	16	Rc1/8	9	13
ø32	57	21	36	4	18	60	31	16	Rc1/8	9	13
ø40	57	24	33	7	18	65	36	16	Rc1/8	9	13

Code	With bellows					
Bore size (mm)	a	WF	XF	b	d	L
ø20	20	24	44	30	30	(Stroke/3) + 6
ø25	23	23	46	32	46	(Stroke/3.25) + 7
ø32	23	23	46	32	46	(Stroke/3.25) + 7
ø40	25	23	48	34	46	(Stroke/3.25) + 7

ULK Series common dimensions (with T1, T8 switches, with 2-color LED switch)

● ULK-**-**-T1H/V, T8H/V, T $^{2}_{3}$YH/V



Switch installation dimensions

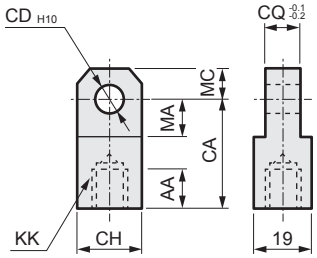
Code / Bore size (mm)	1-color LED (T1, T8) 2-color LED (T $Y)^{2}_{3}$							
	RD		HD		P		P1	(Pθ)°
	T1,T$^{2}_{3}$Y	T8	T1,T$^{2}_{3}$Y	T8	T1	T$^{2}_{3}$Y,T8		
ø20	7.0	2.0	6.0	1	28.5	23.1	19.5	22
ø25	8.5	3.5	7.5	2.5	31.0	25.6	22.0	18
ø32	8.5	3.5	7.5	2.5	35.5	30.1	25.5	15
ø40	10.5	5.5	9.5	4.5	39.5	34.1	29.5	12

Accessory dimensions (rod/bracket/pin) with bellows

● Rod eye (I)

CAD

Material: Steel
Zinc chromate treatment

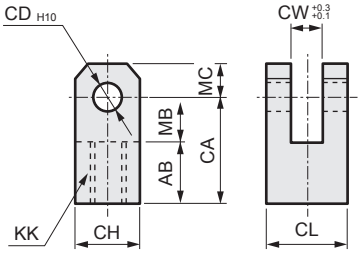


Model No.	Applicable bore size (mm)	AA	CA	CD	CH	CQ	KK	MA	MC	Wt (g)
M1-I-20	20	14	30	10	19	8	M8x1.0	13	10	60
M1-I-30	25/32	14	36	12	25	10	M10x1.25	16	12	106
M1-I-40	40	14	36	12	25	10	M12x1.5	16	12	100

● Rod clevis (Y)

CAD

Material: Steel
Zinc chromate treatment



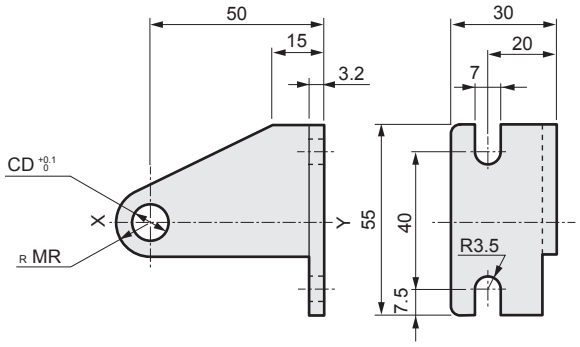
A pin, a washer, and a split pin are attached.

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	M8x1.0	13	10	99
M1-Y-30	25/32	20	36	12	25	25	10	M10x1.25	16	12	197
M1-Y-40	40	20	36	12	25	25	10	M12x1.5	16	12	193

● Clevis bracket (B2)

CAD

Material: Steel, zinc chromate treatment

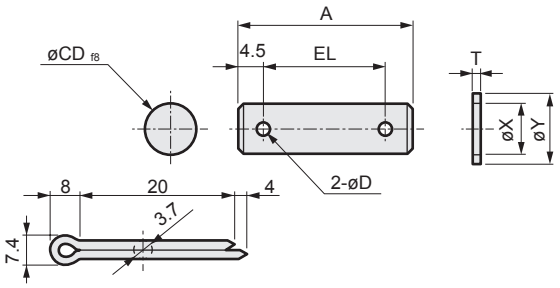


Model No.	Compatibility	Applicable bore size (mm)	CD	MR	Weight (g)
M1-B2-20-CC	ULK-CC	20/25	8	8	145
M1-B2-30-CC		32	10	11	163
M1-B2-40-CC		40	12	11	170
M1-B2-30-CA	ULK-CA	20	10	11	158
M1-B2-40-CA		25/32/40	12	11	162
M1-B2-20-TA	ULK-TA/TB	20	8	8	132
M1-B2-30-TA		25/32/40	10	11	142

*1: One pair is composed of two pieces with XY symmetry.
*2: The model No. above includes snap ring and pin. 2 pieces are included in a set. (However, the pin and snap rings are not included with the trunnion.)

● Rod clevis pin (P)

Material: Steel, zinc chromate treatment

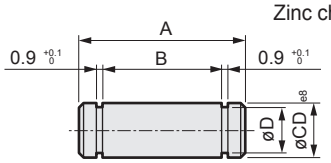


Model No.	Applicable bore size (mm)	A	D	CD	EL	T	X	Y	Weight (g)
M1-P-20	20	37	4	10	28	1.6	10.5	18	29
M1-P-30	25/32/40	46	4	12	37	2.3	12.5	22	50

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	ULK-CC-20/25	33	28	8	7	E type 7	13
M1-P1-30	ULK-CC-32	33	28	10	9	E type 9	21
M1-P1-40	ULK-CC-40	37	32	12	9	E type 9	32
M1-P2-20	ULK-CA-20	25	20	10	9	E type 9	16
M1-P2-30	ULK-CA-25/32/40	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 included with the trunnion.)

Applications This product can be used with devices and equipment requiring the following of functions.

1 When multipoint positioning is required (transfer/positioning)

The equipment can be accurately stopped at several required positions.

2 When position locking is required

The brakes can be applied and held instantly when the air source or power is turned OFF (during power failure or accident), preventing equipment damage and securing safety.

3 When emergency stop is required

The cylinder can be stopped with electric signals, etc., when a worker enters a hazardous area.

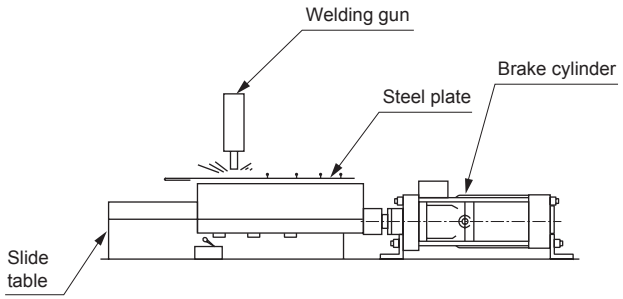
4 Workpiece lock

When locking the workpiece to the jig or mounting base, etc., it can be locked even if there is no pneumatic source or power. The workpiece can be transferred while locked to the jig.

Applications

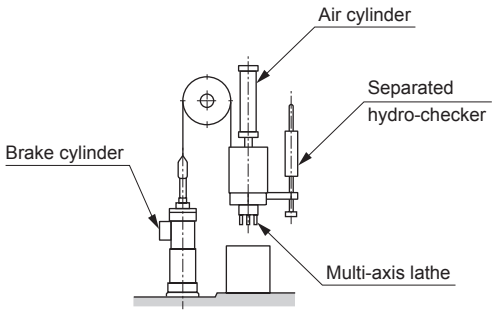
1 Linear multipoint welding

When welding steel plates, etc., linearly at several points, this cylinder can be used to move and position the slide table or welding gun.



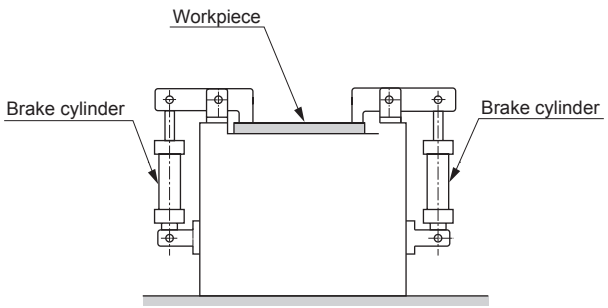
2 Position locking

If there is a load in the vertical direction and the load could fall with its own weight when the pressure source is cut off, the brake cylinder brakes will be applied to prevent falling.



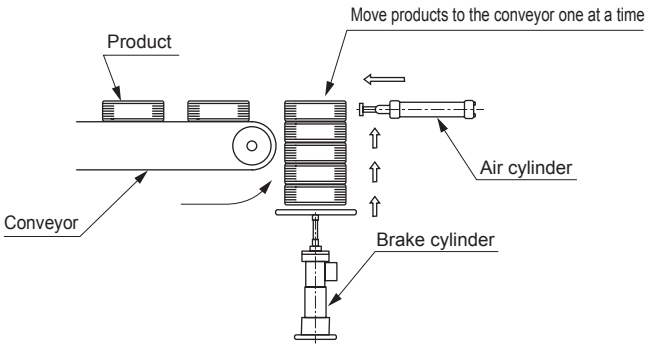
3 Workpiece lock

When locking the workpiece to the jig, etc., if the brake cylinder is used, it will be locked even when the pneumatic source or power is OFF.



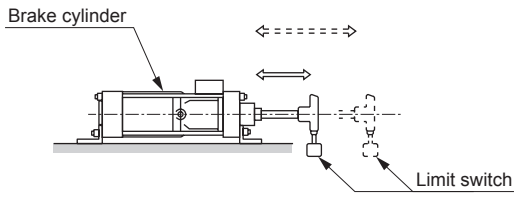
4 Movement to conveyor

Move products to the conveyor one at a time.



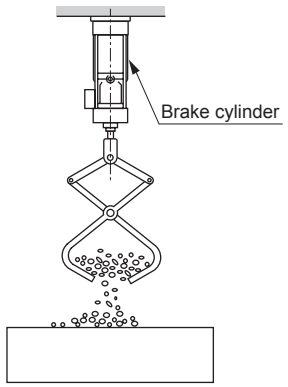
5 When several cylinders with different strokes are required

When different-sized products are in motion on a conveyor, etc., in many cases the stroke for the cylinders set there must also be changed. Using the brake cylinder, a cylinder compatible with different strokes is created electrically.



6 Hopper open/close

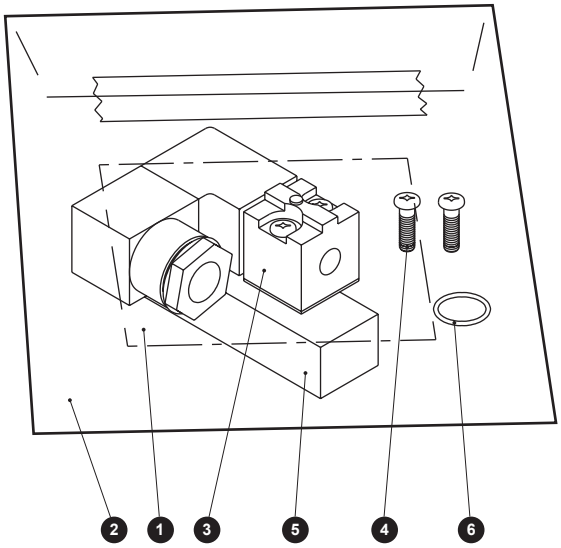
In the case where a hopper must be closed at a specific weight of powder, accurate measurement is obtained by stopping the hopper, measuring it accurately and then completely closing it.



Configurations table

● Valve kit for brake

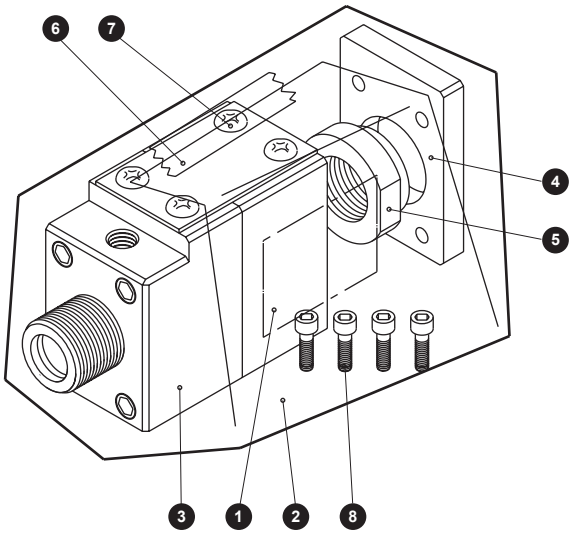
ULK-V – Bore size – **VALVE-KIT** – Voltage



No.	Part name	Quantity
1	Label	1
2	Plastic bag or plastic sheets	1
3	Brake release valve	1
4	Cross-recessed pan head machine screw	2
5	Sub-plate	1
6	Gasket	1

● Brake unit

ULK – Bore size – **BRAKE-UNIT**



No.	Part name	Quantity
1	Label	1
2	Plastic bag or plastic sheets	1
3	Brake assembly	1
4	Brake flange	1
5	Fixing nut	1
6	Cover	1
7	Cross-recessed pan head machine screw	4
8	Hexagon socket head cap screw	4

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 ULKP/ULK 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 brake cylinder has no-lubrication specifications. Never lubricate this cylinder. This may cause the brake to malfunction.

■ The holding force (max. static load) 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.

■ Do not use multiple synchronized cylinders with brakes.

If the synchronization deviates, an excess moment load or load concentration is applied to the cylinder where the brake was applied first, risking brake release defects, shortened service life, or damage.

■ 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.

The stopping accuracy with piston speed of 300 mm/s with no load is ±1.0 mm (reference value). This value differs based on the device used. For more information, refer to the page on stopping accuracy and overrun.

■ Basic circuit

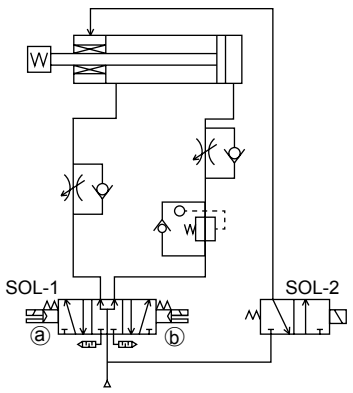
Always adopt the following circuit even for position locking and emergency stop applications. A 2-position valve cannot be used because it affects the brake section even when the cylinder thrust is stopped.

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

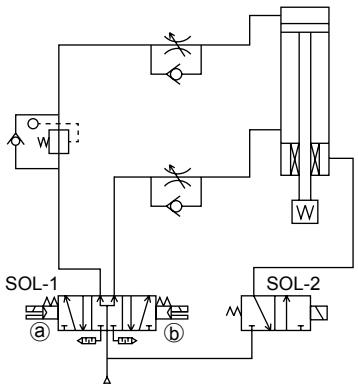


ⓐ SOL-1 ⓑ		SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Reverse
OFF	ON	ON	Forward

● 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

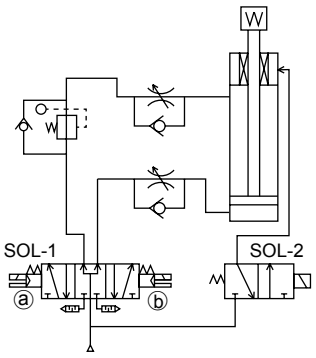


ⓐ SOL-1	ⓑ	SOL-2	Operational status
OFF	OFF	OFF	Stop
ON	OFF	ON	Drop
OFF	ON	ON	Rise

● 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

■ 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 valve as a single unit, or use an individual exhaust manifold.

■ Use a 3-position P/A/B connection (pressurization on both sides) 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

■ 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 ULK-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.

■ 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.

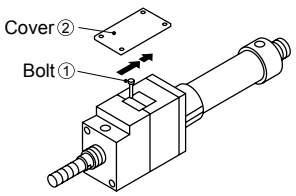
Mounting, installation and adjustment

⚠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.
- The ULK Series can be manually released by pushing down the brake plate in the direction of the arrow using a bolt or the like. However, note that only the PUSH will be released if the brake plate is not entirely pushed down. Since there are 2 brake plates, brakes are not released unless both brake plates are pressed over. (Always remove the bolt ① and attach the cover ② during normal use.)



■ 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.

■ 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. Therefore, be careful during step operation with short stroke length from the operation start point to the next position.

■ 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.

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.

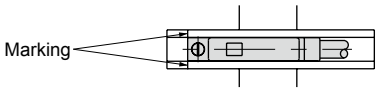
⚠CAUTION

- 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, T5, T2W or T3W, 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 T1, T*C, 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 0.8 N·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 0.8 N·m.