ULK

Brake Cylinder

ø20, ø25, ø32, ø40

Overview

It is a cylinder with brake that attaches a compact and highly reliable brake to the small and medium bore (ø20 to ø40) series among general type cylinders.

Features

Durability UP

By adopting the new swash plate brake method, the rod contact point during braking changes from 2 points in the conventional swash plate method to surface contact, dispersing the drag force applied to the rod. Wear resistance has improved, and durability has significantly increased compared to the conventional swash plate system.

Space Saving

The height of the brake unit has been reduced compared to our conventional products, achieving space savings.

Improved Holding Force

By adopting the new swash plate brake system, the rod holding force is comparable to the cylinder thrust at 0.8 MPa.

Easy Brake Release

To release the brake, simply screw in a bolt to tilt the brake plate, or use a flat-head screwdriver or similar tool to return the brake plate to its original inclination.

Simple Structure

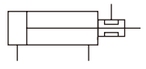
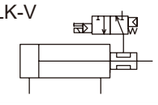
The number of components in the brake section is extremely small, and the structure is simple.

Stopping Accuracy ±1.0 mm

Stopping accuracy is as high as ±1.0 mm at cylinder speed of 300 mm/s and no load.

CONTENTS

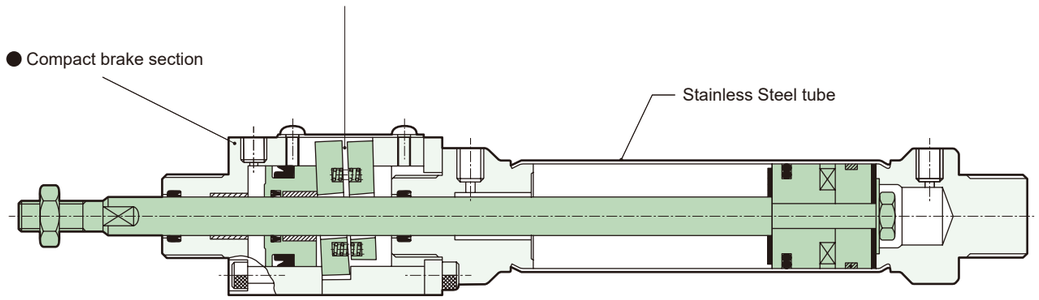
●: Standard ◎: Option ○: Custom Products ▒: Not Available

Variations	Model Number Circuit Diagram Code	Bore Size (mm)	Standard Stroke (mm) 15	25	30	45	50	60	75	100	150	200	250	300	Min Stroke (mm)		Max Stroke (mm)	Intermediate stroke (per mm)	Mounting Type: Basic type 00	Axial Foot Type LB	Rod side axial foot type LS	Rod Side Flange Type FA	Single clevis type CA	Double clevis type CB	Single clevis integrated type CC	Single clevis bush press-fit type CC1	Rod side trunnion type TA	Head side trunnion type TB	Options: Bellows (100 °C) J	Bellows (250 °C) L	Piston Rod material change M	Boss Cut V	Single Knuckle I	Double Knuckle Y	Single Bracket B1	Double bracket B2	Switch	Page
Double Acting Type	ULK 	ø20, ø25, ø32, ø40		●			●		●	●	●	●	●	●	5		700	1	●	●		●	●		●	●	●	●	◎	◎	◎	◎	◎	◎		◎	◎	296
Double Acting Type with Valve	ULK-V 	ø20, ø25, ø32, ø40		●			●		●	●	●	●	●	●	5		700	1	●	●		●	●		●	●	●	●	◎	◎	◎	◎	◎	◎		◎	◎	296

Product Introduction

● Stopping accuracy ±1.0 mm or less
Cylinder speed 300 mm/s at no load

● To release brake, simply screw the bolt and turn the brake plate.



Realized space saving.

With Brake / With Lock
ULK□
JSK2/ JSM2
JSG
JSC3, JSC4
USSD
UFCD
USC
Cylinder Switch
Ending

Cell Top Cylinder Double Acting, Double Acting with Brake Valve

ULK, ULK-V Series

●Bore Size: ø20, ø25, ø32, ø40

Circuit Diagram Code ●Double Acting Type

RoHS

Model No. Notation

●Without valve

Without Switch
(Built-in magnet for switch)

ULK - 00 - 20 - 100 ——— V I
1 2 3 4 8 9

With Switch
(Built-in magnet for switch)

ULK - 00 - 20 - 100 ——— T0H - R - V I
1 2 3 4 6 7 8 9

●With Valve for Brake

Without Switch
(Built-in magnet for switch)

ULK-V - 00 - 20 - 100 - 1 ——— V I
1 2 3 4 5 8 9

With Switch
(Built-in magnet for switch)

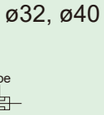
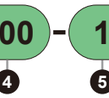
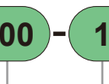
ULK-V - 00 - 20 - 100 - 1 - T0H - R - V I

1 Model No. 2 Mounting Type 3 Bore Size 4 Stroke 5 Valve voltage 6 Switch Model 7 Number of Switches 8 Option 9 Accessories

1 Model Number

Code	Description
ULK	Double Acting Type
ULK-V	Double Acting with Valve

2 Mounting Type

Code	Content	
00	Basic type	
LB	Axial Foot Type	
FA	Rod Side Flange Type	
CA	Single clevis type	
CC	Single clevis integrated type	
CC1	Single clevis bush press-fit type	
TA	Rod Side Trunnion Type	
TB	Head Side Trunnion Type	

3 Bore Size (mm)

Code	Content
20	ø20
25	ø25
32	ø32
40	ø40

4 Stroke (mm)

Bore Size	Stroke	Intermediate Stroke
ø20	5 to 700	in 1 mm increments
ø25	5 to 700	
ø32	5 to 700	
ø40	5 to 700	

Note: For minimum stroke with switch, refer to P. 298.

5 Valve voltage

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

Note: Valve voltage can be selected only for ULK-V (with brake valve).

6 Switch Model

For switch details, refer to P. 1457.
Switches are shipped with the product.

Contact	Indicator LED Special Function	Wiring (Output)	Load Voltage (V) AC	Load Voltage (V) DC	Load Current (mA) AC	Load Current (mA) DC	Lead wire *1 Straight	Lead wire *1 L-shape	
Solid State	1-Color	2-wire	85 to 265	-	5 to 100	—	T5V□	T1V□	
			—	10 to 30	-	5 to 20 *2	T2H□	T2V□	
		3-wire (NPN)	-	30 or less	-	100 or less	T3H□	T3V□	
		3-wire (PNP)	-		—		T3PH□	T3PV□	
	2-Color	2-wire	-	24 ± 10%	-	5 to 20	T2WH□	T2WV□	
		3-wire (NPN)	-	30 or less	-	50 or less	T3WH□	T3WV□	
	1-Color Off-Delay Type	2-wire	-	10 to 30	-	5 to 20 *2	T5V□	T2JV□	
	1-Color Flexible Lead Wire Type		-	10 to 30	—		T2HR3	T2VR3	
Reed	1-Color	2-wire	110	12/24	7 to 20	5 to 50	T0H□	T0V□	
	No Indicator LED		110	5/12/24	20 or less	50 or less	T5H□	T5V□	
	1-Color		110/220	12/24	7 to 20 / 7 to 10	5 to 50	T5V□	T8V□	

*1: Enter the code selected in the "Lead wire length" table into "□" of the Switch Model.
*2: The maximum load current of 20 mA mentioned above is at 25°C. If the switch operating Ambient Temperature is higher than 25°C, it will be lower than 20 mA. (At 60°C, it will be 5 to 10 mA.)
*3: Switches other than the above models are also available. (Custom Product) For details, refer to P. 1457.

***Lead Wire Length**

Code	Content
Blank	1 m (Standard)
3	3 m (Option)
5	5m (Option)

Example) Lead wire length
1 m T0H
3 m T0H3
5 m T0H5

7 Number of Switches

Code	Content
R	With 1 pc on rod side
H	With 1 pc on head side
D	With 2 pcs
T	With 3 pcs

Note: The maximum number of switches mounted is limited to 3. If 4 or more are required, please order the additional switches and mounting brackets separately.

8 Option

Code	Content	Max Ambient Temperature	Instantaneous Max Temperature	
J	Bellows	100°C	200°C	
L	Bellows	250°C	400°C	
M	Piston Rod material (Stainless Steel)			
V	Boss cut			

*1: For bellows "J", stroke must be 25 mm or more. Please contact us for strokes less than 25 mm.
*2: Maximum instantaneous temperature is the temperature when sparks or chips hit the bellows momentarily.

9 Accessories

Code	Content	
I	Single Knuckle	
Y	Double knuckle (Pin, washer, cotter pin attached)	
B2	Double bracket (Pin, Retaining Ring attached)	

Note: "I" and "Y" cannot be selected at the same time.

About specifications of custom products

For details, please refer to P. 313.

Code	Content
-XJ9	Without Bellows
-A2	With 2 rod nuts
Rod End thread custom order	Refer to Ending P. 11.

Model No. Ex.)
ULK - . . . . - XJ9

Switch Individual Model No. Notation

●Switch body+Mounting bracket set
ULK - T0H - 20
6 Switch Model, 3 Bore Size

● Switch Body Only
SW - T0H
6 Switch Model

●Mounting bracket set
ULK - T - 20
Mounting Bracket, 3 Bore Size

For individual order model numbers for brake valves and brake units, please refer to P. 311.

Specifications

Item		ULK				ULK-V			
Bore Size mm		ø20	ø25	ø32	ø40	ø20	ø25	ø32	ø40
Actuation method		Double Acting Type				Double Acting with brake valve			
Operating Fluid		Compressed Air							
Max Operating Pressure MPa		1.0				Cylinder section: 1.0 Brake section: 0.6			
Min Operating Pressure	Brake Part MPa	0.3							
	Cylinder Part MPa	0.15							
Proof Pressure MPa		1.6							
Ambient Temperature °C		-10 to 60 (No freezing)				-10 to 50 (No freezing)			
Port Size	Brake Part	Rc1/8							
	Cylinder Part	Rc1/8							
Stroke Tolerance mm		$^{+2.0}_{0}$ (up to 200) $^{+2.4}_{0}$ (200 or more)							
Operating Piston Speed mm/s		50 to 500							
Cushion		Rubber Cushion							
Lubrication		Not required (Use Turbine Oil Class 1 ISO VG32 if lubricated)							
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 the valve (P5136 series), refer to "Directional Control Valve (2)" No. RJ-012AA.

Brake Valve Electrical Specifications

Item	ULK-V- Bore Size -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%		
Insulation class	Class B molded coil		

Note: 100/200 VAC coil can be used with 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: Intermediate strokes can be manufactured in 1 mm increments.
*2: The minimum stroke varies depending on how the switch is mounted. Refer to the table below.

Minimum stroke with switch

(Unit: mm)

Number of Switches	1					2				
	Solid State			Reed		Solid State			Reed	
Bore Size (mm)	T2, T3	T1	T□W	T0, T5	T8	T2, T3	T1	T□W	T0, T5	T8
ø20	10					25	35	30	25	35
ø25	10					25	35	30	25	35
ø32	10					25	35	30	25	35
ø40	10					25	35	30	25	35

Cylinder Weight

● ULK

(Unit: kg)

Item / Mounting Style / Bore Size (mm)	Product Weight at Stroke (S) = 0 mm: Basic Type (OO)	Axial Foot Type (LB)	Flange type (FA)	Clevis type (CA)	Clevis type (CC)	Trunnion type (TA/TB)	Switch Weight	Switch rail + band Weight	Added Weight per S = 10 mm
ø20	0.47	0.62	0.53	0.62	0.48	0.52	Refer to the Weight listed in the Switch Specifications on P. 1457.	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 Brake Valve)

(Unit: kg)

Item / Mounting Style / Bore Size (mm)	Product Weight at Stroke (S) = 0 mm: Basic Type (OO)	Axial Foot Type (LB)	Flange type (FA)	Clevis type (CA)	Clevis type (CC)	Trunnion type (TA/TB)	Switch Weight	Switch rail + band Weight	Added Weight per S = 10 mm
ø20	0.53	0.68	0.59	0.68	0.54	0.58	Refer to the Weight listed in the Switch Specifications on P. 1457.	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	Operating 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	1.26×10^2	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	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
ø25	Push	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	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
ø32	Push	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	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
ø40	Push	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	1.65×10^2	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

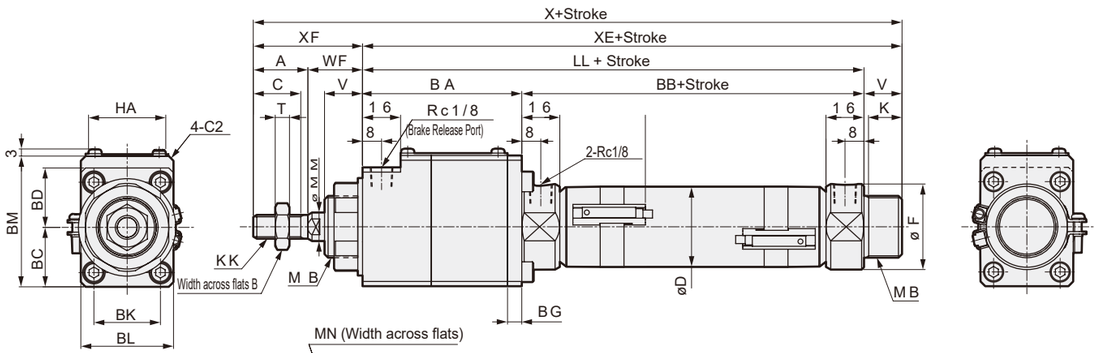
Mounting Bracket Model No. Notation

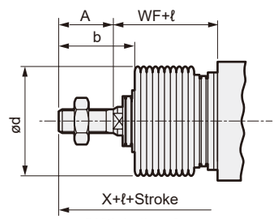
Bore Size (mm) / Mounting Bracket	ø20	ø25	ø32	ø40
Basic type (00) *3	M1-00-20	M1-00-30	M1-00-30	M1-00-30
Axial Foot Type (LB)	M1-LB-20	M1-LB-30	M1-LB-30	M1-LB-30
Flange (FA)	M1-FA-20	M1-FA-30	M1-FA-30	M1-FA-30
Single clevis (CA)	M1-CA-20	M1-CA-30	M1-CA-30	M1-CA-30
Trunnion (TA/TB)	M1-TA-20	M1-TA-30	M1-TA-30	M1-TA-40

*1: Mounting nut and toothed washer are attached to the axial foot type and flange type mounting brackets. Also, mounting nut is attached to the trunnion type.
2: For axial foot type, 2 sets of "M1-LB-" in the above table are required.
*3: Only mounting nut and toothed washer. One set is attached to the basic type (00) of the product, but use it when additional parts are required.

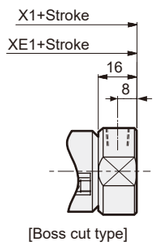
Dimensional Drawings

●Basic Type (OO)





[With bellows]



[Boss cut type]

Code	Basic Type (OO) Basic Dimensions													
Bore Size (mm)	A	B	BA	BB	BC	BD	BG	BK	BL	BM	C	D	F	HA
ø20	20	13	58	66	20	20	6	20	29	45	18	21.4	28	26
ø25	23	17	67	69	25	25	6	28	39	55	20	26.4	32	35
ø32	23	17	67	69	25	25	6	28	39	55	20	33.6	36	35
ø40	25	19	74	73	29	30	9	39	50	69	22	41.6	45	35

Code													
Bore Size (mm)	K	KK	LL	MB	MM	MN	MO	T	V	WF	X	XE	XF
ø20	12	M8x1.0	124	M18x1.5	10	8	5	5	14	24	182	138	44
ø25	14	M10x1.25	136	M26x1.5	12	10	5	6	16	23	198	152	46
ø32	14	M10x1.25	136	M26x1.5	12	10	5	6	16	23	198	152	46
ø40	14	M12x1.5	147	M26x1.5	14	12	6	7	16	23	211	163	48

Code	With Bellows			Boss cut type	
Bore Size (mm)	b	d	ℓ	X1	XE1
ø20	30	30	(Stroke/3)+6	168	124
ø25	32	46	(Stroke/3.25)+7	182	136
ø32	32	46	(Stroke/3.25)+7	182	136
ø40	34	46	(Stroke/3.25)+7	195	147

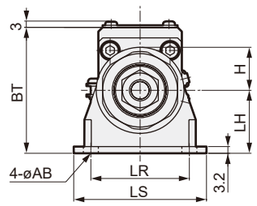
*1: Round up the ℓ dimension to the nearest integer.

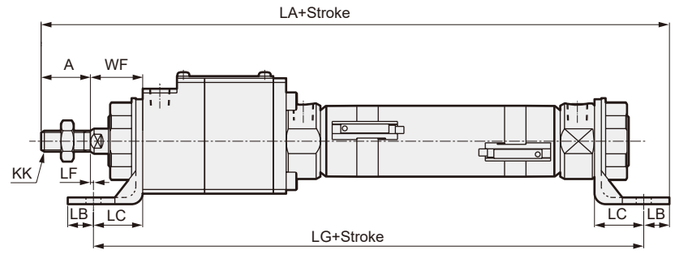
***2: For the external dimensions diagram of accessories, please refer to P. 308.**

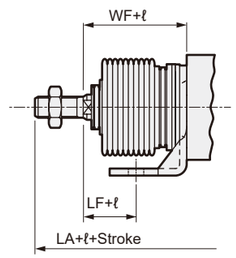
***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

●Axial Foot Type (LB)







[With bellows]

Code	Axial Foot Type (LB) Mounting Dimensions													
Bore Size (mm)	A	AB	BT	H	KK	WF	LA	LB	LC	LF	LG	LH	LR	LS
ø20	20	6	50	15	M8x1.0	24	196	10	18	6	160	25	30	44
ø25	23	7	60	20.5	M10x1.25	23	217	12	23	0	182	30	46	62
ø32	23	7	60	20.5	M10x1.25	23	217	12	23	0	182	30	46	62
ø40	25	7	70	20.5	M12x1.5	23	230	12	23	0	193	30	46	62

Code	With bellows
Bore Size (mm)	ℓ
ø20	(Stroke/3)+6
ø25	(Stroke/3.25)+7
ø32	(Stroke/3.25)+7
ø40	(Stroke/3.25)+7

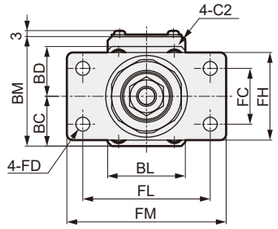
*1: Round up the ℓ dimension to the nearest integer.

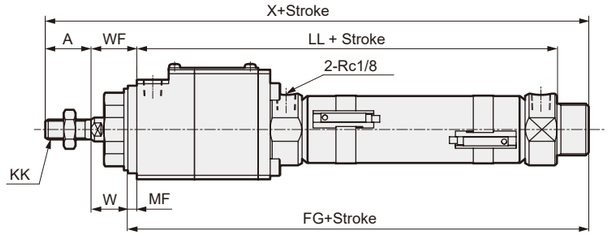
***2: For the external dimensions diagram of accessories, please refer to P. 308.**

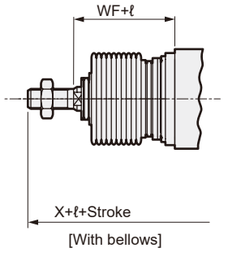
***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

●Rod Side Flange Type (FA)







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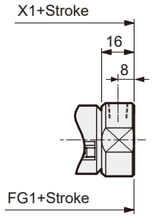


[Boss cut type]

Code	Rod Side Flange Type (FA) Mounting Dimensions																
Bore Size (mm)	A	BC	BD	BL	BM	KK	LL	MF	W	WF	X	FC	FD	FG	FH	FL	FM
ø20	20	20	20	29	45	M8x1.0	124	3.2	20.8	24	182	20	6	141.2	34	40	54
ø25	23	25	25	39	55	M10x1.25	136	4.5	18.5	23	198	28	7	156.5	44	64	80
ø32	23	25	25	39	55	M10x1.25	136	4.5	18.5	23	198	28	7	156.5	44	64	80
ø40	25	29	30	50	69	M12x1.5	147	4.5	18.5	23	211	28	7	167.5	44	64	80

Code	With Bellows	Boss cut type	
Bore Size (mm)	ℓ	X1	FG1
ø20	(Stroke/3)+6	168	127.2
ø25	(Stroke/3.25)+7	182	140.5
ø32	(Stroke/3.25)+7	182	140.5
ø40	(Stroke/3.25)+7	195	151.5

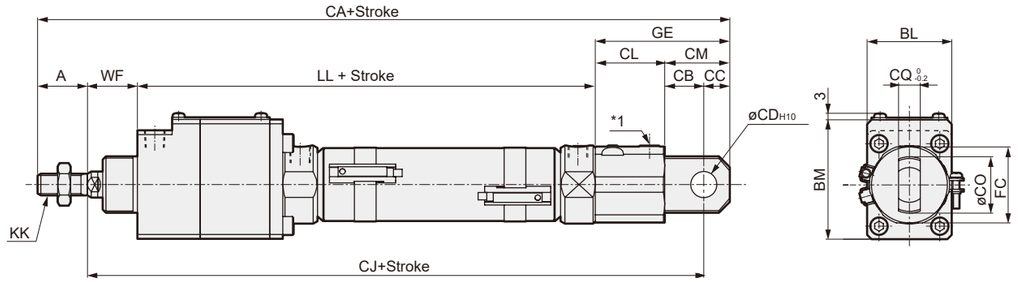
*1: Round up the ℓ dimension to the nearest integer.

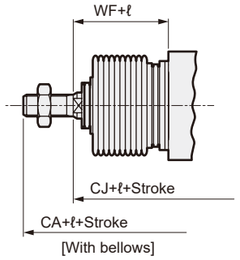
***2: For the external dimensions diagram of accessories, please refer to P. 308.**

***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

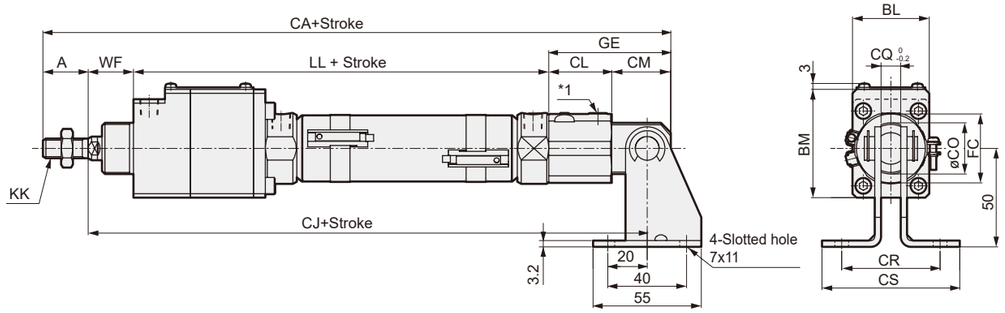
●Single Clevis Type (CA)





[With bellows]

● Eye bracket (CA) with bracket (Option B2)



Code	Single Clevis Type (CA) Mounting Dimensions																	
Bore Size (mm)	A	BL	BM	FC	GE	KK	LL	WF	CA	CB	CC	CD	CJ	CL	CM	CO	CQ	CR	CS
ø20	20	29	45	26	55	M8x1.0	124	24	223	14	10	10	193	31	24	22	8	48	68
ø25	23	39	55	35	62	M10x1.25	136	23	244	18	12	12	209	32	30	26	10	50	70
ø32	23	39	55	35	62	M10x1.25	136	23	244	18	12	12	209	32	30	26	10	50	70
ø40	25	50	69	35	62	M12x1.5	147	23	257	18	12	12	220	32	30	26	10	50	70

Code	With bellows
Bore Size (mm)	ℓ
ø20	(Stroke/3)+6
ø25	(Stroke/3.25)+7
ø32	(Stroke/3.25)+7
ø40	(Stroke/3.25)+7

*1: This is not a piping port.

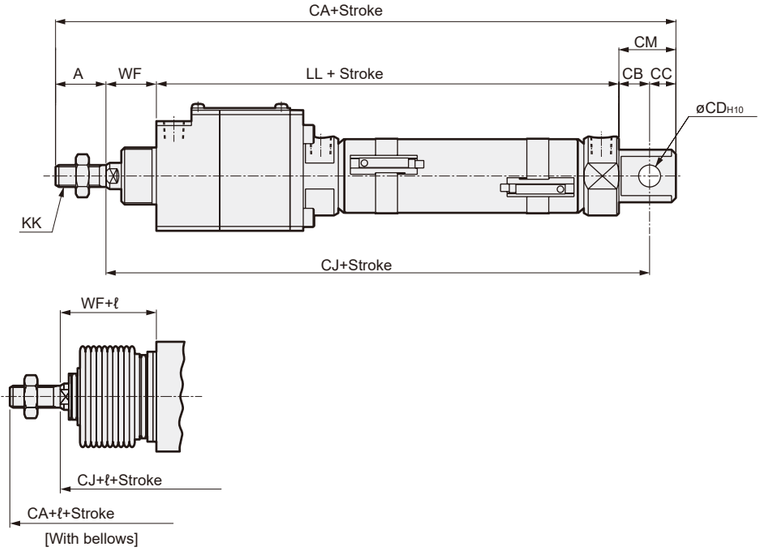
*2: Round up the ℓ dimension to the nearest integer.

***3: For outer dimensions diagram of accessories, refer to P. 308.**

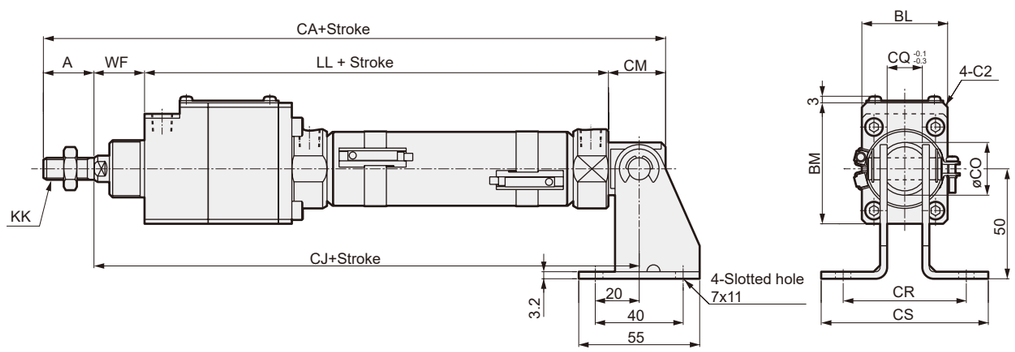
***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

● Single Clevis Integrated Type (CC)



● Eye bracket (CC) with bracket (Option B2)



Code	Single Clevis Integrated Type (CC) Mounting Dimensions															
Bore Size (mm)	A	BL	BM	KK	LL	WF	CA	CB	CC	CD	CJ	CM	CO	CQ	CR	CS
ø20	20	29	45	M8x1.0	124	24	189	12	9	8	160	21	22	16	56	76
ø25	23	39	55	M10x1.25	136	23	203	12	9	8	171	21	24	16	56	76
ø32	23	39	55	M10x1.25	136	23	208	14	12	10	173	26	24	16	56	76
ø40	25	50	69	M12x1.5	147	23	225	16	14	12	186	30	30	20	60	80

Code	With bellows
Bore Size (mm)	ℓ
ø20	(Stroke/3)+6
ø25	(Stroke/3.25)+7
ø32	(Stroke/3.25)+7
ø40	(Stroke/3.25)+7

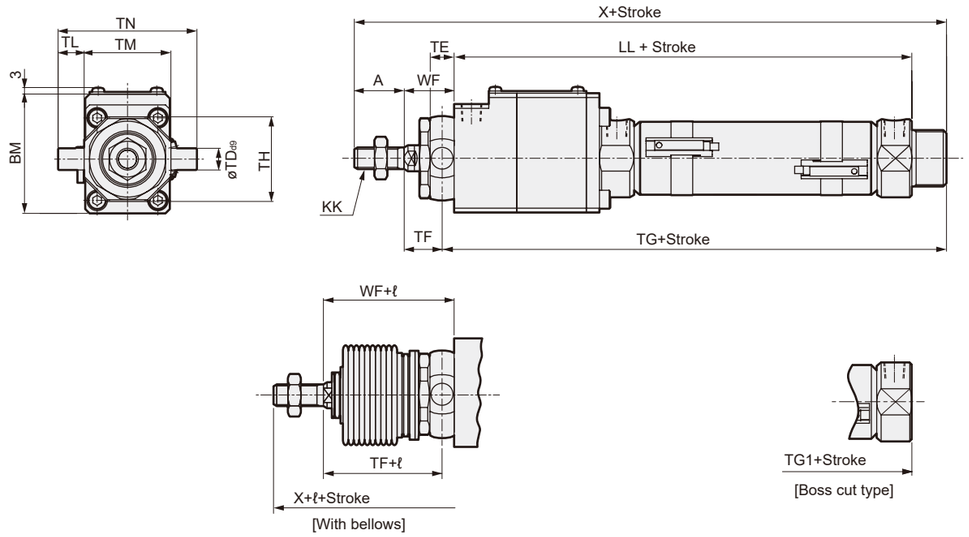
*1: Round up the ℓ dimension to the nearest integer.

***2: For the external dimensions diagram of accessories, please refer to P. 308.**

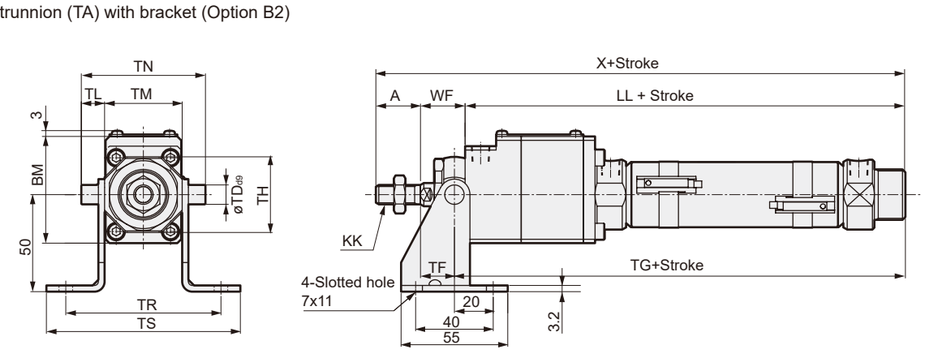
***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

●Rod side trunnion type (TA)



● Rod side trunnion (TA) with bracket (Option B2)



Code	Rod Side Trunnion Type (TA) Mounting Dimensions															
Bore Size (mm)	A	BM	KK	LL	WF	X	TD	TE	TF	TG	TH	TL	TM	TN	TR	TS
ø20	20	45	M8x1.0	124	24	182	8	9	19.5	142.5	29.5	8	30	46	70	90
ø25	23	55	M10x1.25	136	23	198	10	11	17.5	157.5	39	12	40	64	80	100
ø32	23	55	M10x1.25	136	23	198	10	11	17.5	157.5	39	12	40	64	80	100
ø40	25	69	M12x1.5	147	23	211	10	11	17.5	168.5	44	9.5	53	72	93	113

Code	With Bellows	Boss cut type
Bore Size (mm)	ℓ	TG1
ø20	(Stroke/3)+6	128.5
ø25	(Stroke/3.25)+7	141.5
ø32	(Stroke/3.25)+7	141.5
ø40	(Stroke/3.25)+7	152.5

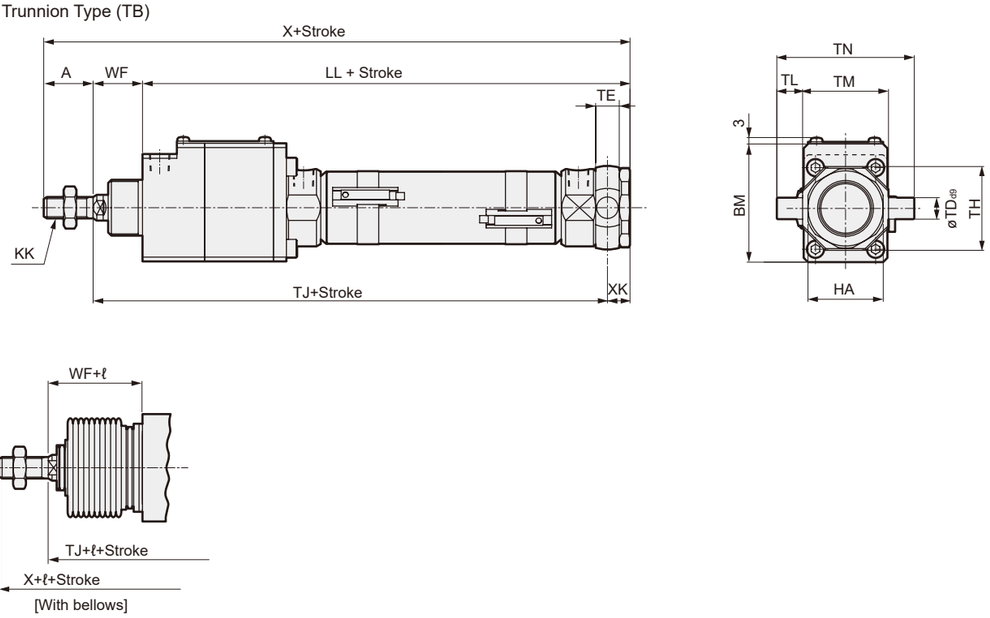
*1: Round up the ℓ dimension to the nearest integer.

***2: For the external dimensions diagram of accessories, please refer to P. 308.**

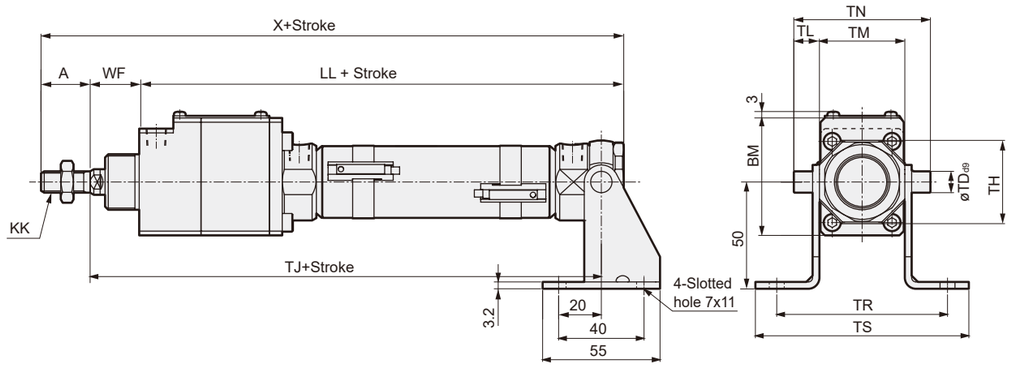
***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

●Head Side Trunnion Type (TB)



● Head side trunnion (TB) with bracket (option B2)



Code	Head Side Flange Type (TB) Mounting Dimensions															
Bore Size (mm)	A	BM	KK	LL	WF	X	XK	TD	TE	TH	TJ	TL	TM	TN	TR	TS
ø20	20	45	M8x1.0	124	24	182	9.5	8	9	29.5	152.5	8	30	46	70	90
ø25	23	55	M10x1.25	136	23	198	10.5	10	11	39	164.5	12	40	64	80	100
ø32	23	55	M10x1.25	136	23	198	10.5	10	11	39	164.5	12	40	64	80	100
ø40	25	69	M12x1.5	147	23	211	10.5	10	11	44	175.5	9.5	53	72	93	113

Code	With bellows
Bore Size (mm)	ℓ
ø20	(Stroke/3)+6
ø25	(Stroke/3.25)+7
ø32	(Stroke/3.25)+7
ø40	(Stroke/3.25)+7

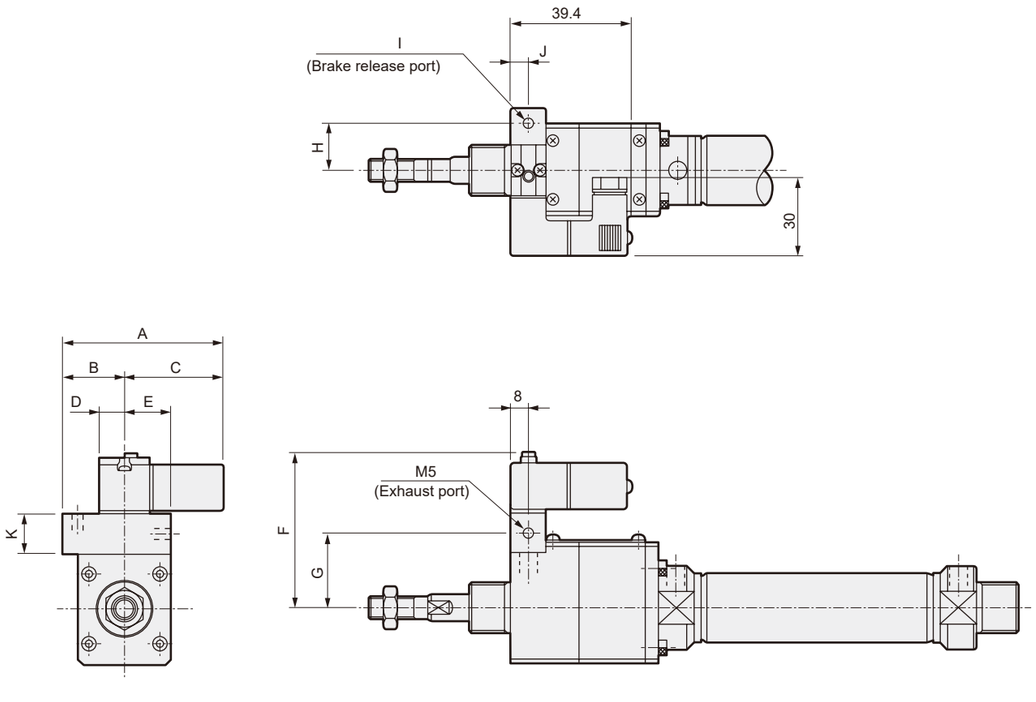
*1: Round up the ℓ dimension to the nearest integer.

***2: For the external dimensions diagram of accessories, please refer to P. 308.**

***3: For dimensions with each switch, refer to P. 313.**

Dimensional Drawings

● With Valve for Brake



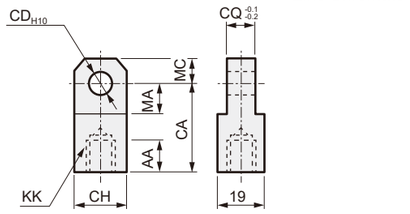
Code	A	B	C	D	E	F	G	H	I	J	K
Bore Size (mm)											
ø20	56.5	25	31.5	8	15	54	26.5	17	M5	8	12
ø25	57	21	36	4	18	60	31	16	Rc1/8	9	13
ø32	57	21	36	4	18	60	31	16	Rc1/8	9	13
ø40	57	24	33	7	18	65	36	16	Rc1/8	9	13

*1: Dimensions other than the above are the same as the basic type on P. 300.

Accessory External Dimensions

● Single Knuckle (I)

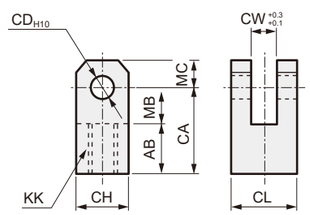
Material: Steel
Zinc Chromate



Model Number	Applicable Bore Size (mm)	AA	CA	CD	CH	CQ	KK	MA	MC	Weight (g)
M1-I-20	20	14	30	10	19	8	M8×1.0	13	10	60
M1-I-30	25/32	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

●Double Knuckle (Y)

Material: Steel
Zinc Chromate

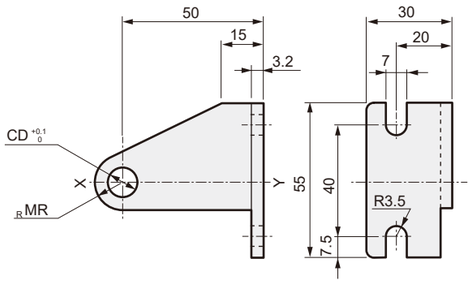


Pin, washer, and cotter pin are attached.

Model Number	Applicable Bore Size (mm)	AB	CA	CD	CH	CL	CW	KK	MB	MC	Weight (g)
M1-Y-20	20	17	30	10	19	19	8	M8×1.0	13	10	99
M1-Y-30	25/32	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

●Double Bracket (B2)

Material: Steel, Zinc Chromate

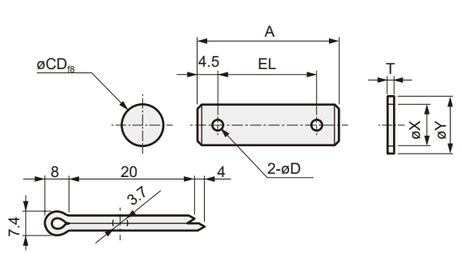


Model Number	Applicable Model	Applicable Bore Size (mm)	CD	MR	Weight (g)
M1-B2-20-CC	ULK-CC	20/25	8	8	145
M1-B2-30-CC		32	10	11	163
M1-B2-40-CC		40	12	11	170
M1-B2-30-CA	ULK-CA	20	10	11	158
M1-B2-40-CA		25, 32, 40	12	11	162
M1-B2-20-TA	ULK-TA/TB	20	8	8	132
M1-B2-30-TA		25, 32, 40	10	11	142

*1: A pair is symmetrical to the XY line.
*2: The above model numbers include Retaining Ring and pin. 2 pcs/set (However, not attached for trunnion type)

●Pin for Double Knuckle (P)

Material: Steel, Zinc Chromate

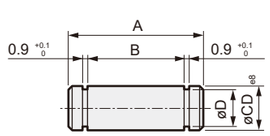


Model Number	Applicable Bore Size (mm)	A	D	CD	EL	T	X	Y	Weight (g)
M1-P-20	20	37	4	10	28	1.6	10.5	18	29
M1-P-30	25, 32, 40	46	4	12	37	2.3	12.5	22	50

Note: Pin, washer, and cotter pin for double knuckle use are attached to the product.

●Pin for Double Bracket (P1) (P2)

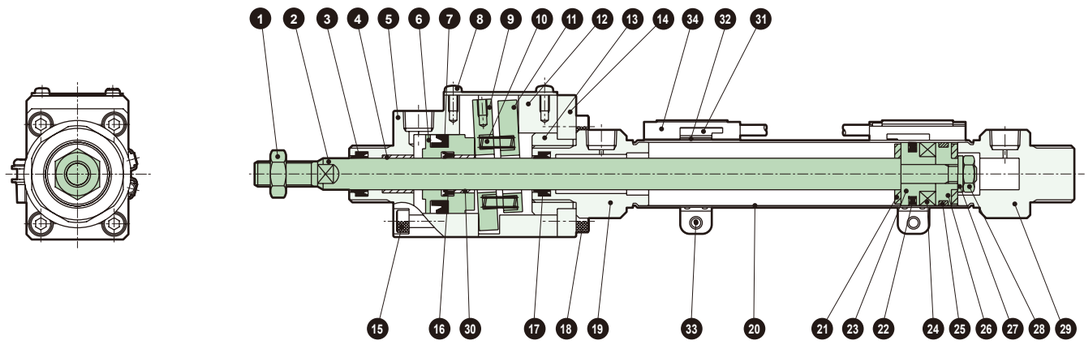
Material: Steel
Zinc Chromate

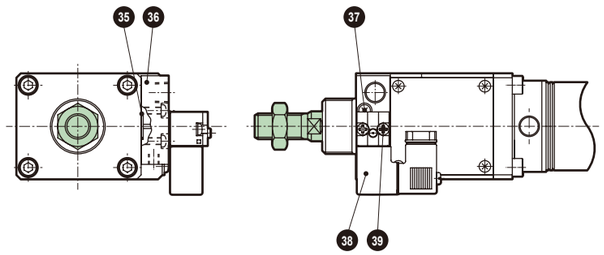


Model Number	Applicable Model and Applicable Bore Size (mm)	A	B	CD	D	Retaining Ring to Use	Weight (g)
M1-P1-20	ULK-CC-20/25	33	28	8	7	E-type 7	13
M1-P1-30	ULK-CC-32	33	28	10	9	E-type 9	21
M1-P1-40	ULK-CC-40	37	32	12	9	E-type 9	32
M1-P2-20	ULK-CA-20	25	20	10	9	E-type 9	16
M1-P2-30	ULK-CA-25/32/40	27	22	12	9	E-type 9	24

Note: Pin and Retaining Ring for bracket use are attached to the product. (However, not attached for trunnion type)

Internal Structure Diagram/Material





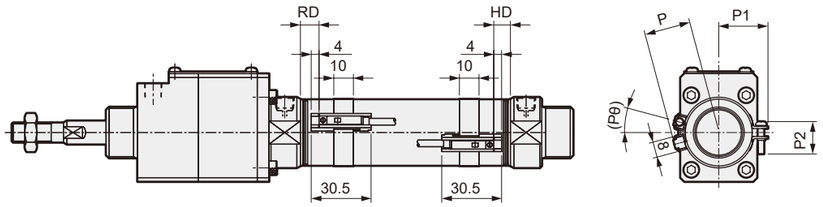
Do not disassemble

No.	Part Name	Material	Remarks	Part No.	Part Name	Material	Remarks
1	Rod Nut	Steel	Zinc Chromate	21	Cushion Rubber	Urethane Rubber	
2	Piston Rod	ø20, ø25: Stainless Steel ø32, ø40: Steel	Industrial Chrome Plating	22	Piston Packing	Nitrile Rubber	
				23	Piston A	Aluminum Alloy	
3	Brake Rod Packing	Nitrile Rubber		24	Magnet	Plastic	
4	Bearing	Polyacetal		25	Wear ring	Polyacetal	
5	Body A	Aluminum Alloy	Alumite	26	Piston B	Aluminum Alloy	
6	Release Piston	Aluminum Alloy	Alumite	27	Spacer	Steel	(ø20 to ø32 only)
7	Release Piston Packing	Nitrile Rubber		28	Hexagon Nut	Steel	Zinc Chromate
8	Pan Head Screw	Steel		29	Head cover	Aluminum Alloy	
9	Brake Plate A	Special Steel	Zinc Chromate	30	Release rod metal	Polyacetal	
10	Brake Spring	Piano Wire	Black Oxide	With Switch			
11	Brake Plate B	Special Steel	Zinc Chromate	31	Switch		
12	Body B	Aluminum Alloy	Alumite	32	Band	Stainless Steel	
13	Fixing Nut	Steel	Zinc Chromate	33	Pan Head Screw	Stainless Steel	
14	Brake flange	Steel	Zinc Chromate	34	Switch Rail	Stainless Steel	
15	Hexagon Socket Head Cap Screw	Steel	Black Oxide	With Valve			
16	Release Rod Packing	Nitrile Rubber		35	Gasket	Nitrile Rubber	
17	Rod Packing	Nitrile Rubber		36	Sub plate	Aluminum Alloy	Alumite
18	Hexagon Socket Head Cap Screw	Steel	Black Oxide	37	Cross-Recessed Pan Head Screw	Steel	Zinc Chromate
19	Rod Cover	Aluminum Alloy		38	Brake release valve		
20	Cylinder Tube	Stainless Steel		39	Cross-Recessed Pan Head Screw	Steel	Zinc Chromate

ULK Series Dimensions with Switch

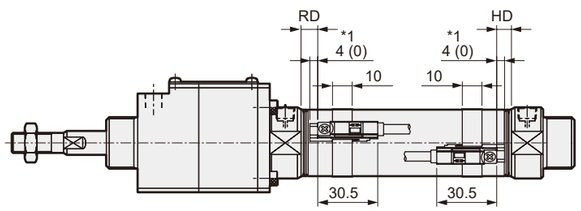
● T0H/V, T5H/V, T2H/V, T3H/V, T3PH/V, T2WH/V, T3WH/V, T2WLH/V

• ULK, ULK-V

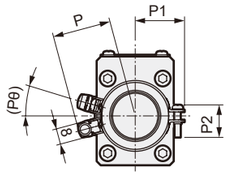


● T1H/V, T8H/V, T2JH/V

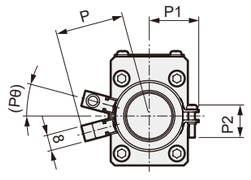
• ULK, ULK-V



[n case of T8H/V, T2JH/V]



[In case of T1H/V]



Code	ULK, ULK-V														
	P1	P2	(Pθ)	T0, T5, T2, T3, T3P, T2*R3			T2W, T3W, T2WL			T1, T2J			T8		
Bore Size (mm)				P	RD	HD	P	RD	HD	P	RD	HD	P	RD	HD
ø20	19.5	14	22	17.3	8	7	17.3	10	9	28.5	7	6	23.1	2	1
ø25	22	14	18	19.8	9.5	8.5	19.8	11.5	10.5	31	8.5	7.5	25.6	3.5	2.5
ø32	25.5	16	15	24.3	9.5	8.5	24.3	11.5	10.5	35.5	8.5	7.5	30.1	3.5	2.5
ø40	29.5	16	12	28.3	11.5	10.5	28.3	13.5	12.5	39.5	10.5	9.5	34.1	5.5	4.5

*1: In case of T1□, T2J□ switch and stroke less than 35 mm, it becomes ( ) dimension.
*2: For switch mountability, refer to the model number display method for each variation.

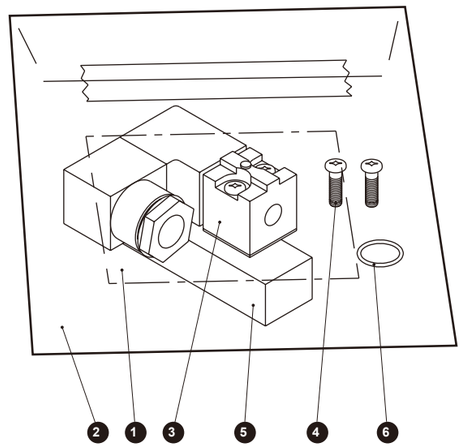
Single Unit Model No. Notation and Part Configuration

● Valve kit for brake

ULK-V - 20 - VALVE-KIT - Voltage - 1

❸ Bore Size

❺ Valve voltage

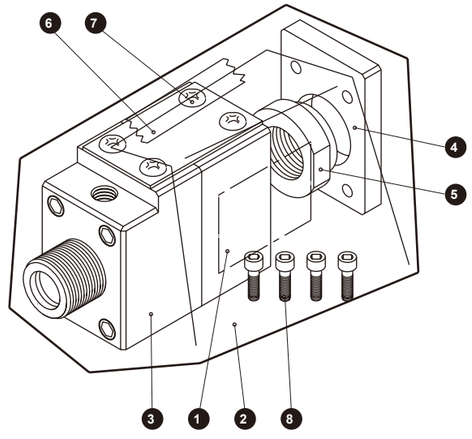


No.	Part Name	Quantity
1	Label	1
2	Plastic bag or vinyl sheet	1
3	Brake release valve	1
4	Cross-Recessed Pan Head Screw	2
5	Sub plate	1
6	Gasket	1

● Brake Unit

ULK - 20 - BRAKE-UNIT

❸ Bore Size



No.	Part Name	Quantity
1	Label	1
2	Plastic bag or vinyl sheet	1
3	Brake Assembly	1
4	Brake flange	1
5	Fixing Nut	1
6	Cover	1
7	Cross-Recessed Pan Head Screw	4
8	Hexagon Socket Head Cap Screw	4

Applications
It can be used for devices and equipment requiring the following functions.

1 When multipoint positioning is required (Transfer/Positioning)

It can stop accurately at multiple target positions.

2 When fall prevention is required

When the air pressure source and power supply are turned OFF (during power outage or accident), the brake is applied instantly and can be held, preventing equipment damage and ensuring safety.

3 When emergency stop is required

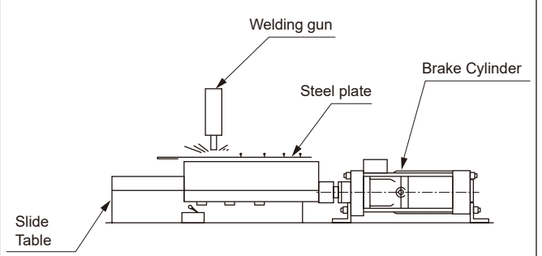
When a worker enters a dangerous area, the cylinder can be stopped by an electrical signal, etc.

4 Work lock

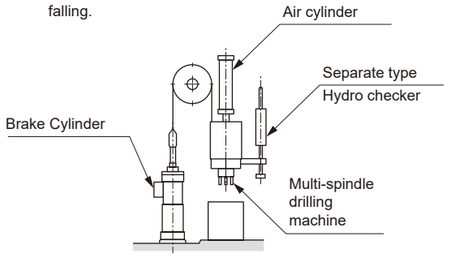
When locking a workpiece to a jig, mounting base, etc., it can be locked even without air pressure source or power supply. It can be transported while locked to the jig.

Usage Example

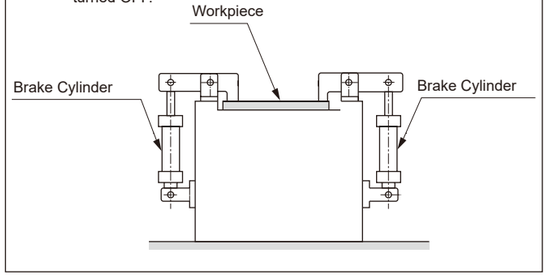
1 Linear multipoint welding
Movement and positioning of slide table or welding gun when welding many steel plates etc. in a straight line.



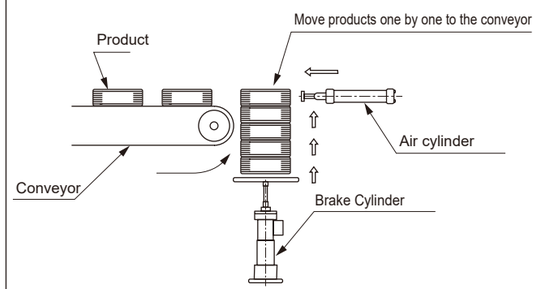
2 Fall prevention
When there is a load in the vertical direction and the pressure source stops, if it is problematic for the load to drop due to its own weight, the brake of the Cell Top cylinder is applied to prevent falling.



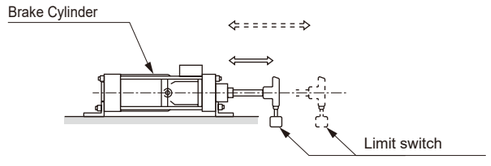
3 Work lock
When locking a workpiece to a jig etc., using a Cell Top cylinder ensures it remains locked even if the air pressure source power is turned OFF.



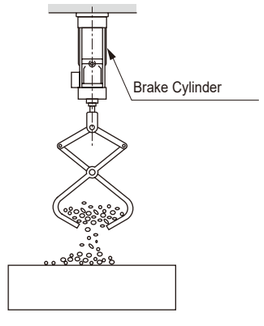
4 Move to conveyor
Move products one by one to the conveyor.



5 When it is necessary to have many cylinders with different strokes
When items of different sizes flow on a conveyor etc., the cylinders set there often need to change their strokes. In that case, using a Cell Top cylinder allows you to create cylinders with various strokes electrically.



6 Opening and closing of hopper
When closing when powder etc. reaches a predetermined weight, to ensure accurate weighing, stop the hopper opening just before fully closed to weigh accurately, and then fully close it.



Without Bellows (-XJ9)
Content: Piston Rod with dimensions for bellows, but bellows not assembled

Model No. Notation

ULK - 00 - 20 - 100 - XJ9

Model No.

Please refer to the ULK Series model No. Notation.

Dimensional Drawings
Same dimensions as with bellows, but bellows are not included.

With 2 Rod Nuts (-A2)
Content: Shipped with 2 rod nuts, same as standard.

Model No. Notation

ULK - 00 - 20 - 100 - A2

Model No.

Please refer to the ULK Series model No. Notation.

Dimensions
Same as standard type except that 2 rod nuts are included.

Pneumatic Equipment

To Use This Product Safely

Be sure to read this before use. For general cylinder information, see Intro 41, and for cylinder switches, see P. 1512.

Specific Precautions: Cell Top Cylinder ULK Series

Design / Selection

1. Common

Warning

■ Structure so that the human body does not directly touch the driven object and the moving parts of the cylinder with brake.

Install a protective cover so that the human body cannot touch it directly. Or, if there is a risk of touching, provide a sensor etc. to make a safe structure such as emergency stop before touching or sounding a warning sound to notify danger.

■ Use a balanced circuit that accommodates the protrusion of the Piston Rod.

If the brake is operated at any position during the stroke such as intermediate stop, and air pressure is applied to only one side of the cylinder, the Piston Rod will pop out at high speed when the brake is released. In such a case, there is a risk of causing injury to the human body such as pinching hands and feet, and causing damage to the machine, so use a balance circuit like the recommended pneumatic circuit to prevent shooting out. Since Cell Top cylinder is a non-lube specification, never lubricate it. It causes brake 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.

Therefore, please be careful when using near the upper limit of the holding force at all times.

■ Do not apply impact load, strong vibration, or rotational force when the brake is operating.

If impact load, strong vibration, or rotational force is applied from the outside, the holding force will decrease and it is dangerous, so please be careful.

■ When performing intermediate stop, consider the stopping accuracy and overrun amount.

Because it is a mechanical lock, it does not stop instantly in response to the stop signal, but stops with a time delay. The stroke sliding due to this delay is the overrun amount. And the range between the maximum and minimum overrun amount is the stopping accuracy.

- Place the limit switch in front of the desired stop position by the overrun amount.
- The limit switch requires a detection length (dog length) of the overrun amount + α.
- The operating range of CKD cylinder switches is 7 to 16 mm, depending on the switch model. . If the overrun amount exceeds this, perform self-holding of the contact on the switch load side.

■ Do not use multiple cylinders with brakes in synchronization. If synchronization is lost, excessive moment load or load concentration may occur on the cylinder where the brake worked first, causing brake release failure, reduced life, damage, etc.

■ In order to improve stopping accuracy, ensure that the brake stops the cylinder as soon as possible after receiving the stop signal.

To do so, use a DC type control electric circuit and valve with good response, and place the valve and cylinder as close as possible.

■ Please note that stopping accuracy is affected by changes in piston speed.

If the piston speed changes due to load fluctuation or disturbance during the reciprocating stroke of the cylinder, the dispersion of the stop position will increase, so consider keeping the piston speed constant immediately before the stop position. Also, during the cushion stroke and while in the acceleration range from the start of operation, the speed change is large, so the dispersion of the stop position becomes large. The stopping accuracy at piston speed 300 mm/s and no load is ±1.0 mm (reference value). It varies depending on the equipment used. For details, refer to the page on stopping accuracy and overrun.

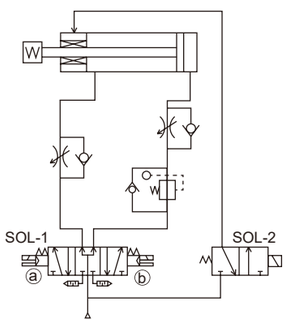
■ Basic circuit

Even when used for fall prevention or emergency stop, be sure to use the following circuit. 2-position valves cannot be used because the cylinder's own thrust acts on the brake part even when stopped. Balance the thrust and load with the following circuit. The brake may not release if a load is applied to the brake.

● For Horizontal Load

If piped as shown in Fig. 1, equal pressure is applied to both sides of the piston when stopped, preventing the rod from popping out when the brake is released. Also, install a regulator with check valve on the head side to balance the thrust.

Fig. 1

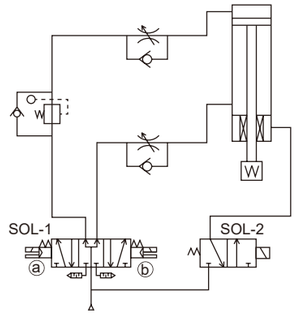


ⓐ SOL-1 ⓑ		SOL-2	Operating State
OFF	OFF	OFF	Stop
ON	OFF	ON	Retract
OFF	ON	ON	Advance

● For downward vertical load

As shown in Fig. 2, if the load is downward, the rod will malfunction in the Load Direction when the brake is released. Therefore, install a pressure reducing valve with a check valve on the head side, reduce the thrust in the Load Direction, and balance the load.

Fig. 2

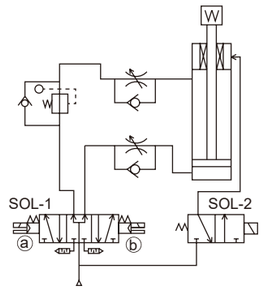


ⓐ SOL-1 ⓑ		SOL-2	Operating State
OFF	OFF	OFF	Stop
ON	OFF	ON	Descend
OFF	ON	ON	Ascend

● For upward vertical load

As shown in Fig. 3, if the load is upward, the rod will malfunction in the Load Direction when the brake is released. Therefore, install a pressure reducing valve with a check valve on the rod side, reduce the thrust in the Load Direction, and balance the load.

Fig. 3



ⓐ SOL-1 ⓑ		SOL-2	Operating State
OFF	OFF	OFF	Stop
ON	OFF	ON	Descend
OFF	ON	ON	Ascend

■ When releasing the brake, make sure to release the brake earlier than the cylinder operation. If the cylinder operation is faster, the brake may not release.

■ If back pressure is applied during locking, the lock may be released, so use a single valve or an individual exhaust type manifold for the brake release valve.

■ To prevent the piston from shooting out at startup, be sure to use a 3-position PAB connection (both-side pressurization) valve for cylinder drive.

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

CAUTION

■ Stopping accuracy

● Stop Pitch and Load Factor

Stopping accuracy varies depending on stop pitch and load factor. The load factors in the table below are recommended to obtain the 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 Brake Valve

Stopping accuracy and overrun amount vary depending on the response of the brake valve. Select by referring to the ULK-V brake valve electrical specifications. Also, connect the valve directly to the brake port to improve stopping accuracy.

● When using a PLC (programmable controller)

If a PLC (Programmable Logic Controller) is used for the electrical control device of the brake valve, the stopping accuracy will deteriorate due to the scan time (calculation processing time). When using a PLC, do not incorporate only the brake valve into the PLC circuit.

■ Do not change the load weight significantly when the brake is stopped. The stop position may change.

■ Although the contact service life of the reed switch varies depending on usage conditions, it will generally last several million cycles. If the device used is in continuous operation day and night or high frequency operation, it will reach the contact life region in a short period of time, so use a solid state switch that does not have a contact part.

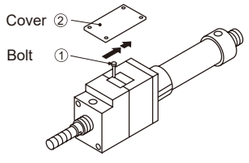
During Use

1. Common

⚠Warning

■ Release brakes before coupling the load to the end of the rod.
If done with the brake activated, rotational force or load exceeding the holding force will act on the Piston Rod, causing damage to 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 work, etc., 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:
  · Placing the load at the lower end
  · Pressurizing both sides
  · Placing a support
  Implement fall prevention measures such as these.
- Confirm that air is not pressurized 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 side will be released if the brake plate is not entirely pushed down. Since there are two brake plates, it will not release unless both brake plates are tilted. (During normal use, always remove the bolt and attach the cover before use.)①②



■ Brakes are released manually or by pressurizing the brake release port. During load installation, if the brake is left released by this operation, the load may fall. Therefore, always return the manual release operation to its initial state, or confirm that the brake is effective with no air in the brake release port before installation.

■ Do not apply torque to the rod when braking, as the holding force will decrease, creating hazardous conditions. Also, use with a mechanism that prevents rod rotation.

■ Do not apply force exceeding the brake holding force listed in the catalog to the cylinder.

■ 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. Note that if the dog length is short, the stop signal will not be output and it will not stop.

■ The brake section can be removed from the Cylinder Body. Do not disassemble or inspect brakes or hazards may result when brakes are used again.

■ The required amount of grease is applied to the brake part, so avoid applying more grease and do not wipe off the grease.

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

■ Please always use with the dust cover attached except during manual release, as it may cause a malfunction.

⚠CAUTION

■ Adjust the air balance in the cylinder.
With the brake released, attach the load to the cylinder and balance the load by adjusting the air pressure on the rod side and head side of the cylinder. By ensuring this load balance, problems such as the Piston Rod popping out when the brake is released or the brake not releasing normally can be prevented.

■ Adjust the mounting position of the detection part such as the cylinder switch.
When performing intermediate stop, adjust the mounting position of the detection part such as the cylinder switch considering the overrun amount with respect to the desired stop position.

■ Load fluctuation during the reciprocating stroke of the cylinder causes changes in piston speed, and changes in piston speed increase the dispersion of the stop position. Adjust the mounting so that there is no load fluctuation during the cylinder reciprocating stroke, especially immediately before stopping.

■ During the cushion stroke and while in the acceleration range from the start of operation, the speed change is large, so the dispersion of the stop position becomes large. Therefore, be careful when performing step operation where the stroke from the start of operation to the next position is short.

■ Load to Piston Rod
More strictly than general air cylinders, use in a state where the load on the Piston Rod is always applied in the axial direction. Furthermore, when moving the load, regulate it sufficiently with a guide so that there is no backlash or twisting.

■ Maintaining the rod sliding parts
Be careful not to scratch or dent the Piston Rod sliding part. It causes damage to packings, leading to leakage or brake failure.

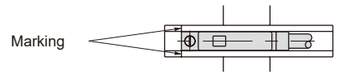
■ Air supply pipes that are too narrow or too long can reduce stopping accuracy.

■ If the cylinder has been stopped for a long time, such as first thing in the morning or afternoon, the frictional resistance increases and the piston speed changes, so the stopping accuracy may deteriorate. Perform a break-in operation to obtain stable stopping accuracy.

2. Common (With T-type Switch)

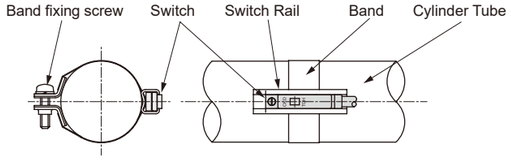
⚠CAUTION

■ When Moving the Switch Position in the Stroke Direction
- The 1-color indicator switch can be finely adjusted by about ±3 mm from the mounting position at the time of shipment. If the adjustment range exceeds ±3 mm, or if fine-tuning the position of a 2-color indicator switch, move the band position.
- Loosen the switch mounting screw, move the switch along the rail, and tighten at the specified position. For T2, T3, T0, T5, T2W, T3W, use a flathead screwdriver (watch screwdriver, precision screwdriver, etc.) with a grip diameter of 5 to 6 mm, tip width 2.4 mm or less, and thickness 0.3 mm or less to tighten the switch fixing screw with a tightening torque of 0.1 to 0.2 N·m. For T1, T□C, T2J, T2Y, T3Y, T8, tighten with a tightening torque of 0.5 to 0.7 N·m.
- The switch rail has a marking 4 mm from the end face of the rail. Use it as a guide for mounting position when replacing the switch. The switch rail marking is set to the switch maximum sensitivity position at factory shipment. If the switch type changes or the band is moved, the maximum sensitivity position changes, so adjust the position each time.



■ When Moving the Switch Position in the Circumferential Direction
- Loosen the band fixing screw, move the switch rail circumferentially, and tighten it at the specified position. The tightening torque is 0.6 to 0.8 N·m.

■ When Moving the Band Position
- Loosen the band fixing screw, move the switch rail and band along the cylinder tube, and tighten them at the specified position. The tightening torque is 0.6 to 0.8 N·m.



For precautions during mounting, installation, adjustment, use, and maintenance, please see "Precautions for Use" in this catalog and the CKD Components product site (https://www.ckd.co.jp/kiki/en/) → "Model No." → Instruction Manual.