High energy absorption cylinder HCM Series

● : Standard, ◎ : Option, ▩ : Not available

Variation	Model no. / JIS symbol	Bore size (mm)	Standard stroke length (mm) 200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	Min. stroke length (mm) Note 1	Max. stroke length (mm)	Custom stroke length (per mm)	Mounting style: Basic type 00	Axial foot type LB	Rod end flange type FA	Head end flange type FB	Cushion: Both sides cushioned B	Rod end cushion R	Head end cushion H	No cushion N	Option: Switch rail attached at shipment Q	Piston rod material (stainless steel) M	Accessory: Rod eye I	Rod clevis Y	Switch	Page
Double acting single rod type	HCM	ϕ20, ϕ25, ϕ32	●	●	●	●	●	●	●	●	●	●	●	▩	▩	▩	▩	▩	▩	1	700	1	●	●	●	●	●	●	●	●	◎	◎	◎	◎	◎	1960
		ϕ40, ϕ50, ϕ63	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		1000															

High speed cylinder HCA Series

● : Standard, ◎ : Option, ▩ : Not available

Variation	Model no. / JIS symbol	Bore size (mm)	Standard stroke length (mm) 400	450	500	550	600	650	700	750	800	Stroke length (mm) 850	900	950	1000	Min. stroke length (mm) Note 1	Max. stroke length (mm)	Custom stroke length (mm)	Mounting style: Basic type 00	Axial foot type LB	Rod end flange type FA	Head end flange type FB	Cushion: Both sides cushioned B	Rod end cushion R	Head end cushion H	No cushion N	Switch	Page
Double acting single rod type	HCA	ϕ20, ϕ25, ϕ32	●	●	●	●	●	●	●	▩	▩	▩	▩	▩	▩	1	700	1	●	●	●	●	●	●	●	●	◎	1978
		ϕ40, ϕ50, ϕ63 ϕ80, ϕ100	●	●	●	●	●	●	●	●	●	●	●	●	●		1000		●	●	●	●	●	●	●	●	◎	

Note: Bore size 25, 63, 80, and 100 are custom orders.

Note 1: The stroke is available from 1mm. However, this product' s cushion area is longer than a typical cylinder so that a high energy can be absorbed. Thus, the cushion is applied in the following strokes, and an effect for use at a high-speed will not be achieved.

Model no.	Stroke which effect of high-speed cannot be anticipated	Recommended stroke length
HCM	150mm mm stroke or less	300mm stroke and over
HCA	200mm mm stroke or less	400mm stroke and over

HCA

High speed cylinder

High-speed type

ϕ 20, ϕ 25, ϕ 32, ϕ 40
ϕ 50, ϕ 63, ϕ 80, ϕ 100

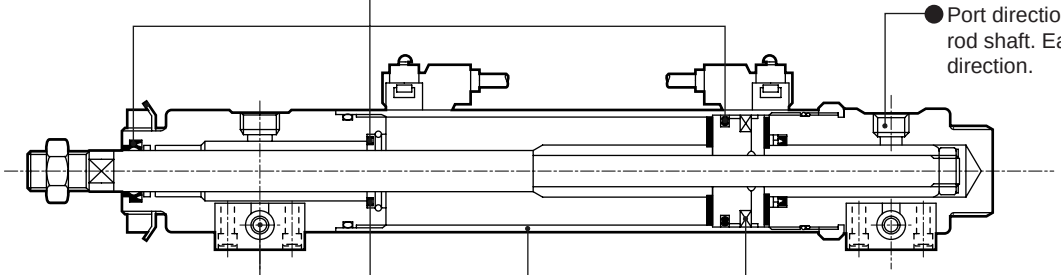
Overview

This is high speed (3000mm/s) and high energy absorbing cylinder. This can be used for ejecting model such as resin etc.

CONTENTS

Series variation	1952
Variation and option selection table	1976
⚠ Safety precautions	1977
● Double acting single rod type (HCA)	1978
Selection guide	1988

Product introduction



Pneumatic components

Safety precautions

Always read this section before starting use.
Refer to Intro 71 for general precautions of the cylinder, and to Intro 78 for general precautions of the cylinder switch.

High speed cylinder HCA Series

Design & Selection

⚠ CAUTION

■ Avoid applying a lateral load to the cylinder piston rod. The required speed may not be attained, bearings may wear abnormally, and performance may drop.

■ Cushion
The air cushion absorbs kinetic energy the piston generates using air compressibility and prevents the piston and cover from colliding at the stroke limit. The cushion is not used to decelerate the piston near the stroke limit.

■ The cylinder system selection guide differs with working conditions (working pressure, load movement direction/method, and piping length) and is for reference only.

■ If the cylinder is moved at high speed, the instantaneous airflow increases and causes drain, etc., to accumulate easily. Provide an air tank to prevent drain from entering the cylinder and to prevent pressure loss when filtering oil mist.

Installation & Adjustment

⚠ CAUTION

■ The cylinder is designed to be used high speed. A JISB1554 nut (lock nut, washer, and fitting for rolling bearings) is used to install the main unit so it will not loosen. Use the following hook spanner when fixing mounting brackets on the main unit, and when loosening the lock nut to disassemble the main unit.

(1) Fixing mounting brackets on the main unit

Model no. / Descriptions	HCA-20	HCA-25	HCA-32	HCA-40
Working nut	AN05	AN05	AN05	AN07
Applicable hook spanners	Nominal 34-38	Nominal 34-38	Nominal 34-38	Nominal 45-50
Model no. / Descriptions	**HCA-50**	**HCA-63**	**HCA-80**	**HCA-100**
Working nut	AN08	AN08	AN12	AN12
Applicable hook spanners	Nominal 52-55	Nominal 58-62	Nominal 80-90	Nominal 80-90

(2) Tightening the main unit's lock nut

Model no. / Descriptions	HCA-20	HCA-25	HCA-32	HCA-40
Applicable hook spanners			Nominal 34-48	Nominal 45-50
Wrench	Nominal 30	Nominal 35		
Model no. / Descriptions	**HCA-50**	**HCA-63**	**HCA-80**	**HCA-100**
Applicable hook spanners	Nominal 52-55	Nominal 68-75	Nominal 80-90	Nominal 110-115
Wrench				

■ The maximum speed for the working piston is 3000mm/s, which is not the average speed.

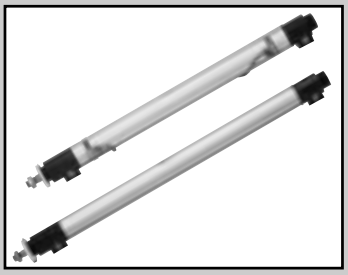
■ The cylinder main unit restriction is designed for a speed of 3000mm/s or more, and should not be restricted with piping, valves, or flow control valves.

■ When adjusting speed with the speed control valve, gradually open the needle from closed and raise speed. The piston rod may suddenly pop out and create a hazard if speed is adjusted while the needle is open.

■ The piston rod may pop out if operation is started while the exhaust side is at atmospheric pressure. Pressurize the exhaust side before starting.

■ Install the speed control valve cylinder piping port near. Otherwise, speed cannot be controlled.

■ Provide a separate shock absorber if the specifications (allowable energy absorption) are exceeded.

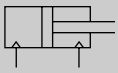


High speed cylinder Double acting single rod type

HCA Series

● Bore size: ϕ 20, ϕ 25, ϕ 32, ϕ 40, ϕ 50, ϕ 63, ϕ 80, ϕ 100

JIS symbol



RoHS CAD

Specifications

Descriptions		HCA (standard type with switch)							
Bore size mm		ϕ20	ϕ25	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100
Actuation		Double acting							
Working fluid		Compressed air							
Max. working pressure MPa		1.0							
Min. working pressure MPa		0.1							
Withstanding pressure MPa		1.6							
Ambient temperature ℃		-10 to 60 (no freezing)							
Port size		Rc1/8		Rc1/4		Rc3/8		Rc1/2	
Stroke tolerance mm		$^{+2.4}_{0}$	$^{+3.6}_{0}$	$^{+4.3}_{0}$				$^{+5.0}_{0}$	
Working piston speed mm/s		50 to 3000							
Cushion		Air cushion							
Lubrication		Not required (when lubricating, use turbine oil Class 1 ISOVG 32)							
Allowable energy absorption J	Cushioned	7.54	11.8	18.6	29.4	46.1	73.5	118	184
	No cushion	A large energy generated by an external load can not be absorbed. So an external shock absorber should be used.							
Effective cushion length mm		85	75	70	70	70	70	70	70

Note 1: Bore size (mm) 25, 63, 80, and 100 are custom orders.
Note 2: Refer to page 1990 for the absorbed energy.

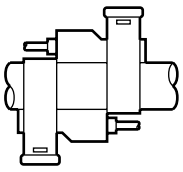
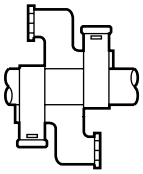
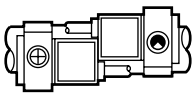
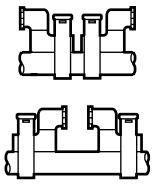
Stroke length

Bore size (mm)	Stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)
ϕ20, ϕ25, ϕ32	400 to 700	700	1
ϕ40, ϕ50, ϕ63, ϕ80, ϕ100	400 to 1000	1000	

Note 1: Custom stroke length is available per 1mm increment.
Note 2: Stroke length exceeded maximum stroke length is manufactured depending on working conditions. Consult CKD.
Note 3: For types with switch, minimum stroke length varies depending on installation method. Refer to the table below.
Note 4: The stroke is available from 1mm. However, this product's cushion area is longer than a typical cylinder so that a high energy can be absorbed. Thus, the cushion is applied in the following strokes, and an effect for use at a high-speed will not be achieved.

Model no.	Stroke at which effect of high-speed cannot be anticipated	Recommended stroke
HCA	Stroke length 200mm or less	Stroke length 400mm and over

Min. stroke length of types with switch

	Different surface installation		Same surface installation	
Rough sketch				 (A) (B)
Descriptions	Grommet	Terminal box	Grommet	Terminal box
ϕ20 to ϕ100	15 (10) mm	15 (10) mm	30mm	32mm (installation A) 80mm (installation B)

● Note 1: The value in ( ) is for the type with a switch.

Switch specifications

Descriptions	Proximity switch				
	R1	R2	R2Y (2 color indicator type)	R3	R3Y (2 color indicator type)
Applications	Programmable controller, relay, small solenoid valve	Programmable controller, relay		Programmable controller, relay, IC circuit, solenoid valve	
Output method	———			NPN output	
Power voltage	———	———		4.5V to 28 VDC	
Load voltage/current	85V to 265 VAC 5 to 100mA	10 to 30 VDC 5 to 30mA		30 VDC or less 200mA or less DC	
Light	LED (ON lighting)		Red/green LED (ON lighting)	LED (ON lighting)	Red/green LED (ON lighting)
Leakage current	1mA or less with 100 VAC 2mA or less with 200 VAC	1mA or less	1.2mA or less	10 μA or less	

Descriptions	Reed switch			
	R0	R4	R5	R6
Applications	Relay, programmable controller	High capacity relay, solenoid valve	Programmable controller, relay, IC circuit (w/o light), serial connection	Programmable controller (with DC self hold)
Load voltage/current	12/24 VDC, 5 to 50mA 110 VAC, 7 to 20mA 220 VAC, 7 to 10mA	110 VAC, 20 to 200mA 220 VAC, 10 to 200mA	5/12/24 VDC, 50mA or less 110 VAC, 20mA or less 220 VAC, 10mA or less	24 VDC, 5 to 50mA
Light	LED ON lighting	Neon light OFF lighting	None	LED ON lighting
Leakage current	0mA	1mA or less	0mA	0.1mA or less

Note 1: Refer to Ending 1 for other switch specifications.

Cylinder weight

(Unit: kg)

Bore size (mm)	Product weight when stroke length S = 0mm			Weight per switch (Including mounting bracket)		S=100mm
	Basic type (00)	Foot type (LB)	Flange type (FA/FB)	Grommet lead	Terminal box	
ϕ20	0.73	0.91	0.80	0.04	0.03	0.11
ϕ25	0.80	0.98	0.87	0.04	0.03	0.14
ϕ32	0.85	1.03	0.92	0.04	0.03	0.16
ϕ40	1.37	1.63	1.69	0.04	0.03	0.27
ϕ50	2.13	2.56	2.50	0.04	0.03	0.34
ϕ63	3.17	3.88	3.81	0.04	0.03	0.42
ϕ80	5.75	7.27	7.12	0.04	0.03	0.67
ϕ100	7.92	9.94	9.75	0.04	0.03	0.91

(E.g.) Product weight of HCA-00-40B-500-R0-D

- Product weight when stroke length 0mm: 1.37kg + 2 x 0.04kg = 1.45kg
- Additional weight when stroke length 500mm: 0.27 x $\frac{500}{100}$ = 1.35kg
- Product weight: 1.45 + 1.35 = 2.80kg

How to order

Without switch

HCA - 00 - 20 ( ) B - 400 ——— I

With switch

HCA - 00 - 20 ( ) B - 400 - R0 - R - I

Ⓐ Mounting style Note 1

Ⓑ Bore size

Ⓒ Port thread type

Ⓓ Cushion

Ⓔ Stroke length

Ⓕ Switch model no.

Ⓖ Switch quantity

Ⓗ Accessory

Symbol	Descriptions
Ⓐ Mounting style	
00	Basic type (00)
LB	Axial foot type
FA	Rod end flange type
FB	Head end flange type
Ⓑ Bore size (mm)	
20	ϕ20
25	ϕ25 (custom order)
32	ϕ32
40	ϕ40
50	ϕ50
63	ϕ63 (custom order)
80	ϕ80 (custom order)
100	ϕ100 (custom order)
Ⓒ Port thread type	
Blank	Rc thread
N	NPT thread (custom order)
G	G thread (custom order)
Ⓓ Cushion	
B	Both sides cushioned
R	Rod end cushion
H	Head end cushion
N	No cushion

Ⓔ Stroke length (mm)

Bore size	Stroke length	Custom stroke length
ϕ20 to ϕ32	**1 to 700**	**1 mm increment**
ϕ40 to ϕ100	**1 to 1000**	

Ⓕ Switch model no.

Grommet type	Terminal box type: Standard type	Terminal box type: Splash-proof	Contact	Indicator	Lead wire
R1*	**R1B**	**R1A**	Proximity	1 color indicator type	2-wire
R2*	**R2B**	**R2A**			
R2Y*	**R2YB**	**R2YA**		2 color indicator type	2-wire
R3Y*	**R3YB**	**R3YA**			3-wire
R3*	**R3B**	**R3A**		1 color indicator type	
R0*	**R0B**	**R0A**	Reed	1 color indicator type	2-wire
R4*	**R4B**	**R4A**		1 color indicator type	
R5*	**R5B**	**R5A**		Without indicator light	
R6*	**R6B**	**R6A**		1 color indicator type	

***Lead wire length**	
Blank	1m (standard)
3	3m (option)
5	5m (option)
Ⓖ Switch quantity	
R	One on rod end
H	One on head end
D	Two
T	Three
Ⓗ Accessory	
I	Rod eye
Y	Rod clevis (pin and snap ring attached)

⚠ Note on model no. selection

Note 1: Mounting bracket, nut, and toothed washer are attached to product, when shipping.

(Example of model number)

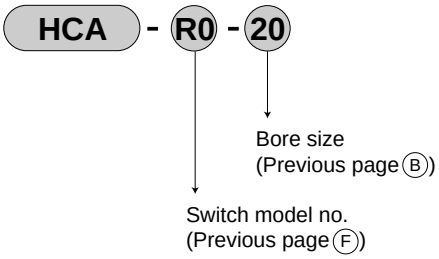
HCA-00-20B-400-R0-R-I

Model: High speed cylinder double acting single rod type

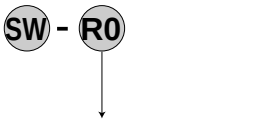
- Ⓐ Mounting style : Basic type
- Ⓑ Bore size : ϕ20mm
- Ⓒ Port thread type : Rc thread
- Ⓓ Cushion : Both sides cushioned
- Ⓔ Stroke length : 400mm
- Ⓕ Switch model no. : Reed R0 switch, lead wire 1m
- Ⓖ Switch quantity : One on rod end
- Ⓗ Accessory : Rod eye

How to order switch

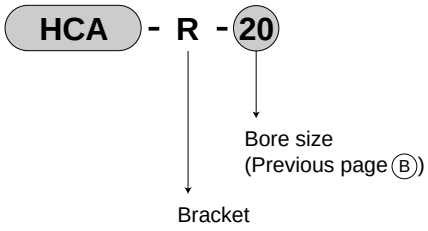
● Switch body + mounting bracket



● Only switch body



● Mounting bracket



● Only terminal box

· R*B

· R*A

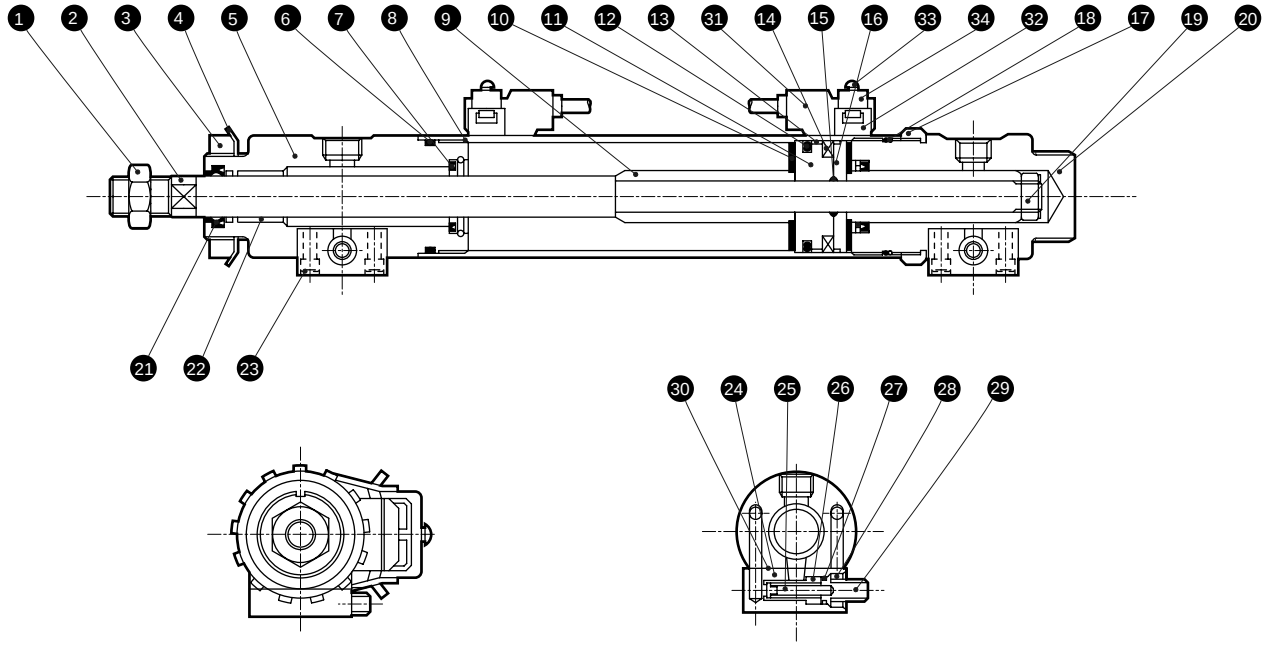
How to order mounting bracket

Bore size (mm) / Mounting bracket	20	25	32	40	50	63	80	100
Foot (LB)	HCA-LB-20	HCA-LB-25	HCA-LB-32	HCA-LB-40	HCA-LB-50	HCA-LB-63	HCA-LB-80	HCA-LB-100
Flange (FA/FB)	HCA-FA-20	HCA-FA-25	HCA-FA-32	HCA-FA-40	HCA-FA-50	HCA-FA-63	HCA-FA-80	HCA-FA-100

Note 1: The foot type mounting bracket is provided as 2 pcs./set.

Internal structure and parts list

● HCA



Note: The shape differs slightly only for the ϕ20 type.

No.	Parts name	Material	Remarks
1	Rod nut	Steel	Zinc chromate
2	Piston rod	Steel	Industrial chrome plating
3	Nut	Steel	Galvanizing
4	The toothed washer	Steel	Galvanizing
5	Rod cover	Aluminum alloy	Alumite
6	Cylinder gasket	Nitrile rubber	
7	Cushion packing seal	Urethane and steel	
8	Cylinder tube	Aluminum alloy	Hard alumite
9	Cushion ring	Steel	Industrial chrome plating
10	Cushion rubber	Urethane rubber	
11	Piston	Aluminum alloy	Chromate
12	Piston packing seal	Nitrile rubber	
13	Wear ring	Acetar resin	
14	Magnet	Plastic	
15	Piston gasket	Nitrile rubber	
16	Piston holder	Aluminum alloy	Chromate
17	Lock nut	Steel	Black chrome plating
18	Back up ring	Steel	Zinc chromate

No.	Parts name	Material	Remarks
19	Piston nut	Steel	Zinc chromate
20	Head cover	Aluminum alloy	Alumite
21	Rod packing seal	Nitrile rubber	
22	Bush	Oil impregnated bearing alloy	
23	Hexagon socket head cap bolt	Alloy steel	Blackening
24	Adjuster case	Aluminum alloy	Alumite
25	Check valve	Copper alloy	
26	Spring	Stainless steel	
27	Adjusting gasket	Nitrile rubber	
28	U nut	Steel	Zinc chromate
29	Adjusting bolt	Steel	Nickeling
30	Case gasket	Special fiber cloth	Special fiber + NBR
With switch			
31	Switch body		
32	Band	Stainless steel	
33	Pan head machine screw	Steel	
34	Bracket	Stainless steel	

Repair parts list

Bore size (mm)	Kit No.	Repair parts number
ϕ20	HCA-20K	
ϕ25	HCA-25K	
ϕ32	HCA-32K	
ϕ40	HCA-40K	6 7 10 12 13
ϕ50	HCA-50K	21 30
ϕ63	HCA-63K	
ϕ80	HCA-80K	
ϕ100	HCA-100K	

Note: Specify the kit No. when placing an order.

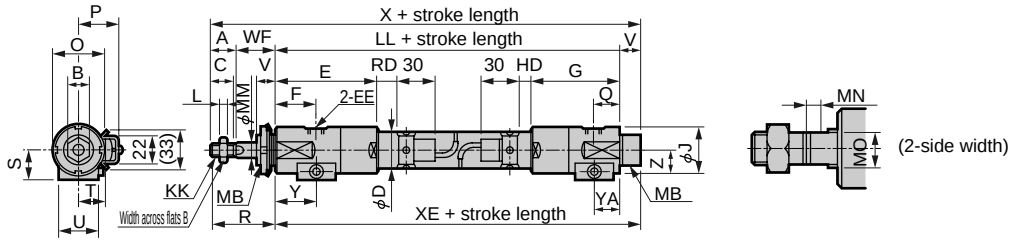
Mounting bracket material

Mounting style	Material	Remarks
LB	Steel	Galvanizing
FA/FB	Steel	Galvanizing

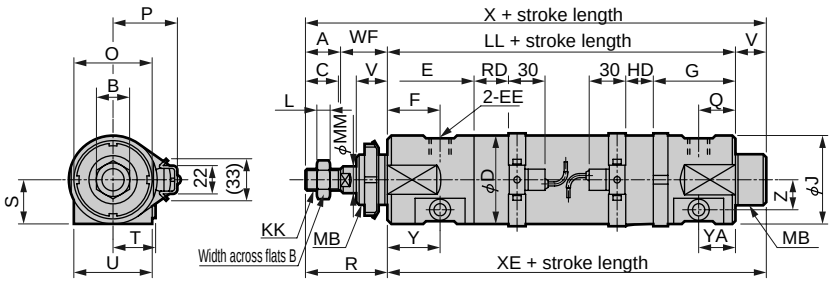
Dimensions

● HCA basic (00) R types with switch

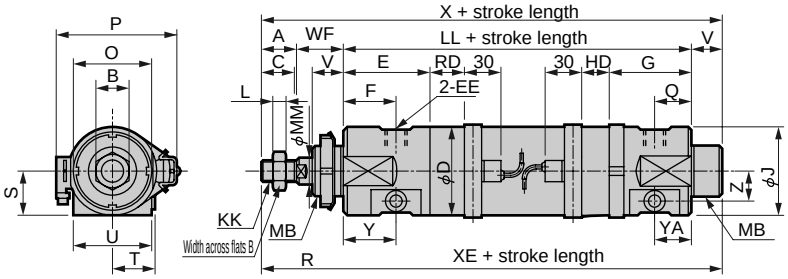
ϕ20, ϕ25



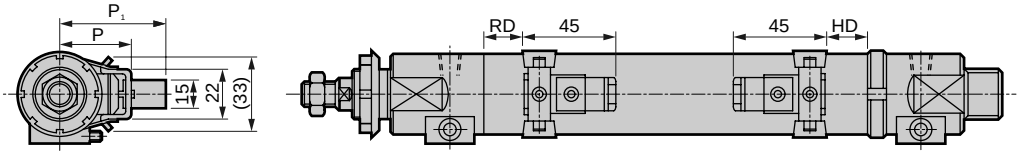
ϕ32 to ϕ63



ϕ80, ϕ100



● R type switch terminal box



Note 1: Refer to page 1987 for dimensions of accessory.

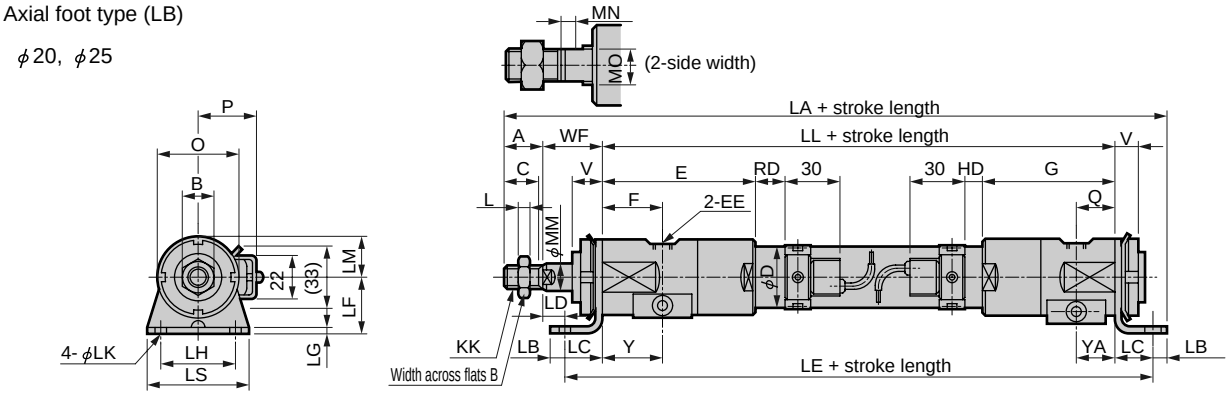
Symbol	Basic type (00) basic dimensions																	
Bore size (mm)	A	B	C	D	E	EE	F	G	J	KK	L	LL	MB	MM	MN	MO	O	Q
ϕ20	20	13	18	25	86	Rc1/8	34	74	33	M8 x 1	5	223	M25 x 1.5	10	4	8	42	22
ϕ25	20	17	18	30	82	Rc1/8	32.5	71	37	M10 x 1.25	6	213	M25 x 1.5	12	5	10	42	21.5
ϕ32	22	17	20	37	67	Rc1/4	42	57	37	M10 x 1.25	6	197	M25 x 1.5	12	5	10	42	25
ϕ40	22	22	20	46	73	Rc1/4	45.5	57	46	M14 x 1.5	8	203	M35 x 1.5	16	6	14	57	25
ϕ50	28	27	26	56.4	77	Rc3/8	47.5	60	56	M18 x 1.5	11	211	M40 x 1.5	20	7	17	62	24.5
ϕ63	28	27	26	69.4	69	Rc3/8	42	65	69.4	M18 x 1.5	11	214	M40 x 1.5	20	7	17	62	29
ϕ80	36	32	34	88	73	Rc1/2	45	70	88	M22 x 1.5	13	232	M60 x 2	25	10	22	86	31.5
ϕ100	45	41	43	108	72	Rc1/2	42	72	108	M26 x 1.5	16	235	M60 x 2	30	11	27	86	30

Symbol												With switch				
Bore size (mm)	R	S	T	U	V	WF	X	XE	Y	YA	Z	HD	P	P_1	RD	
ϕ20	44	21.5	17 to 20	29	16	24	283	239	34	22	15	15.5	28	48	17.5	
ϕ25	52	23.5	18.5 to 22	32	16	32	281	229	32.5	21.5	17	13	34	54	14.5	
ϕ32	52	23.5	18.5 to 22	32	20	30	269	217	42	25	17	22	35	55	21	
ϕ40	54	28.5	22 to 27	38	20	32	277	223	45.5	25	21	22	39	59	21	
ϕ50	61	35.5	27 to 34.5	48	20	33	292	231	47.5	24.5	25.5	19	44	64	25	
ϕ63	66	35.7	34 to 43	62	25	38	305	239	42	29	25.7	21	52	72	28	
ϕ80	78	46.5	41 to 51	76	25	42	335	257	45	31.5	34.5	24.5	114	134	33.5	
ϕ100	93	55.5	48 to 60	90	30	48	358	265	42	30	43.5	25	134	154	35	

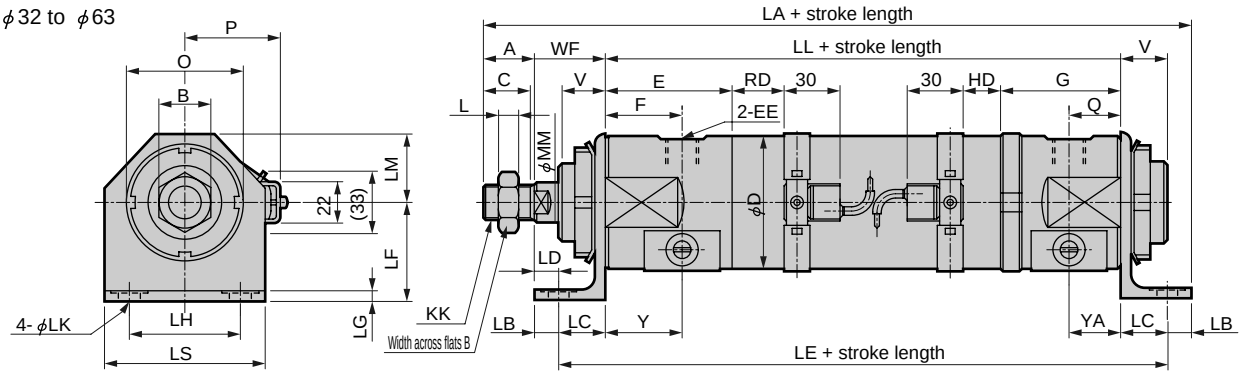
Dimensions CAD

● Axial foot type (LB)

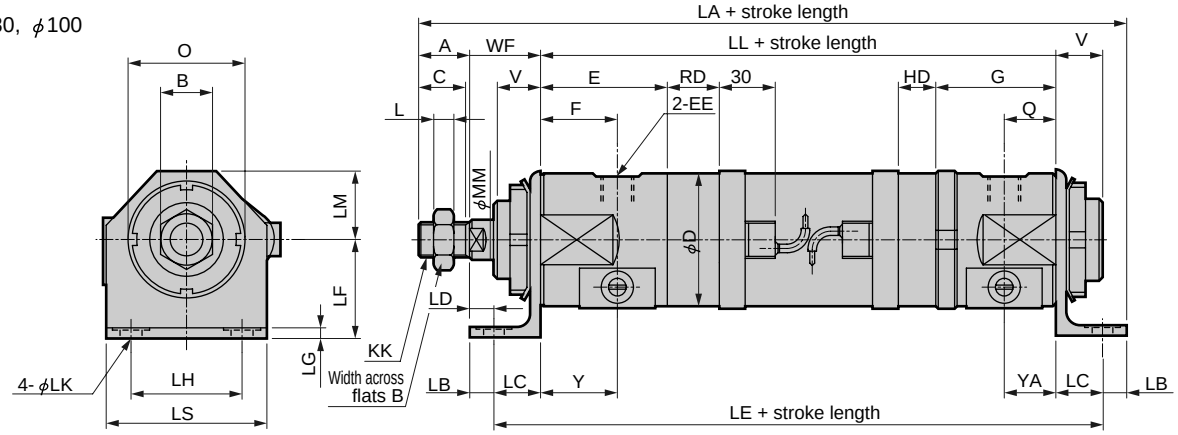
ϕ20, ϕ25



ϕ32 to ϕ63



ϕ80, ϕ100



Note 1: Refer to page 1987 for dimensions of accessory.

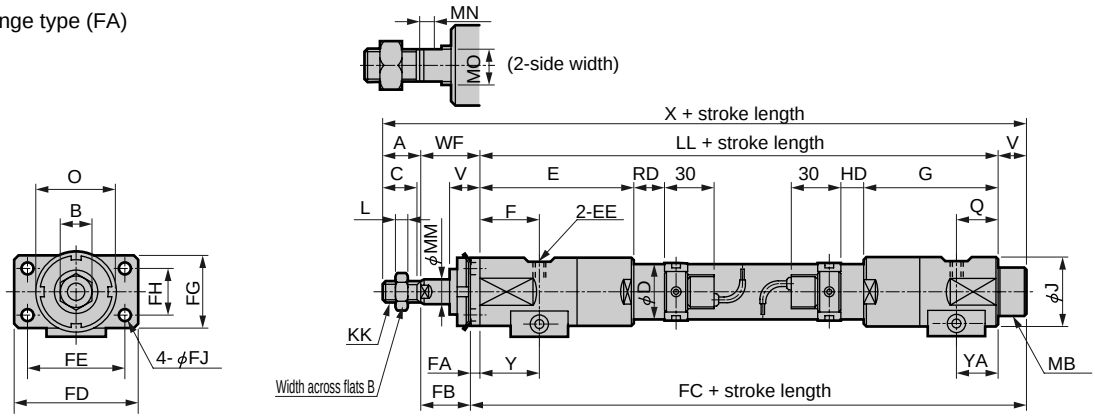
Symbol	Axial foot type (LB) basic dimensions																	
Bore size (mm)	A	B	C	D	E	EE	F	G	KK	L	LL	MM	MN	MO	O	Q	V	WF
ϕ20	20	13	18	25	86	Rc1/8	34	74	M8 x 1	5	223	10	4	8	42	22	16	24
ϕ25	20	17	18	30	82	Rc1/8	32.5	71	M10 x 1.25	6	213	12	5	10	42	21.5	16	32
ϕ32	22	17	20	37	67	Rc1/4	42	57	M10 x 1.25	6	197	12	5	10	42	25	20	30
ϕ40	22	22	20	46	73	Rc1/4	45.5	57	M14 x 1.5	8	203	16	6	14	57	25	20	32
ϕ50	28	27	26	56.4	77	Rc3/8	47.5	60	M18 x 1.5	11	211	20	7	17	62	24.5	20	33
ϕ63	28	27	26	69.4	69	Rc3/8	42	65	M18 x 1.5	11	214	20	7	17	62	29	25	38
ϕ80	36	32	34	88	73	Rc1/2	45	70	M22 x 1.5	13	232	25	10	22	86	31.5	25	42
ϕ100	45	41	43	108	72	Rc1/2	42	72	M26 x 1.5	16	235	30	11	27	86	30	30	48

Symbol			Installation dimensions											With switch			
Bore size (mm)	Y	YA	LA	LB	LC	LD	LE	LF	LG	LH	LK	LM	LS	HD	P	RD	
ϕ20	34	22	295	8	20	4	263	30	3.2	40	6.6	19	54	15.5	28	17.5	
ϕ25	32.5	21.5	293	8	20	12	253	30	3.2	40	6.6	19	54	13	34	14.5	
ϕ32	42	25	277	8	20	10	237	30	3.2	40	6.6	19	54	22	35	21	
ϕ40	45.5	25	289	10	22	10	247	40	3.2	40	9	24	58	22	39	21	
ϕ50	47.5	24.5	307	10	25	8	261	45	4.5	45	9	29	63	19	44	25	
ϕ63	42	29	318	13	25	13	264	53	5.5	60	11	36.5	86	21	52	28	
ϕ80	45	31.5	355	15	30	12	292	63	8	71	14	45	102	24.5	114	33.5	
ϕ100	42	30	373	15	30	18	295	75	8	85	14	54	118	25	134	35	

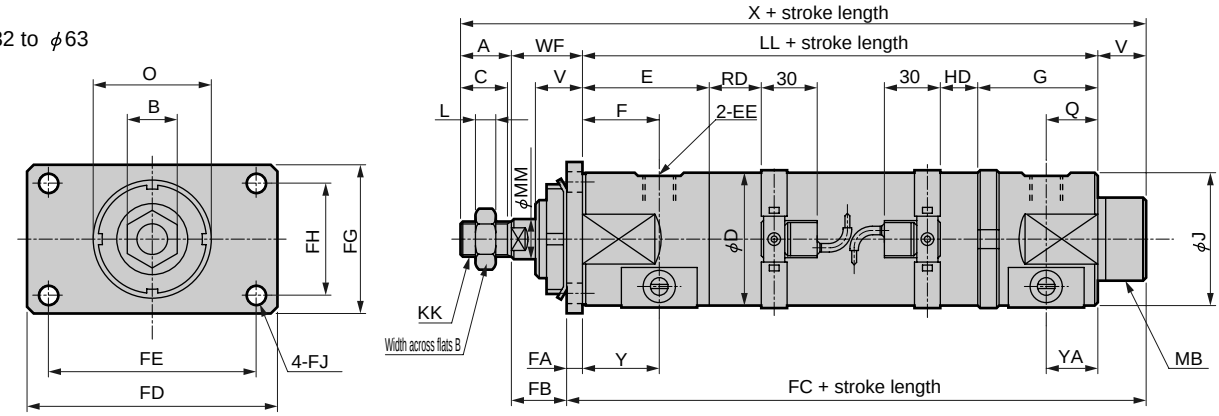
Dimensions

● Rod end flange type (FA)

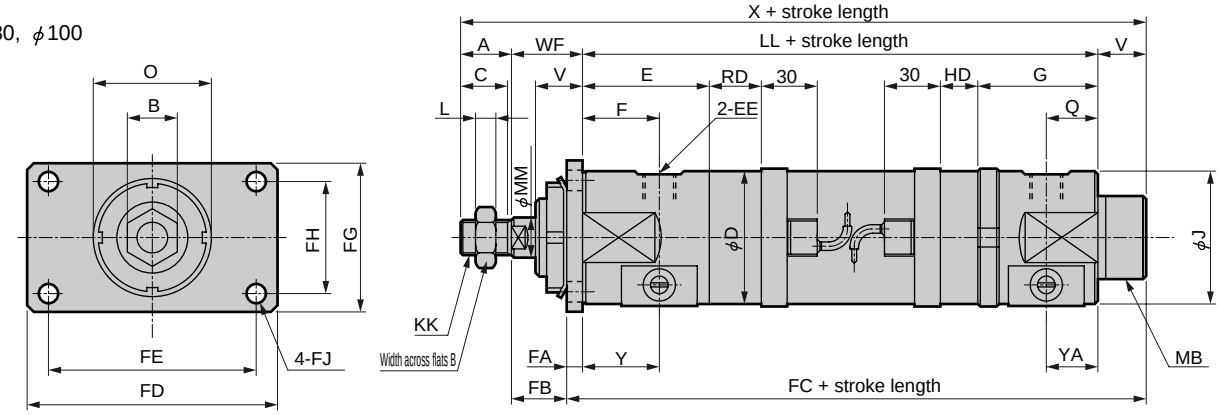
ϕ20, ϕ25



ϕ32 to ϕ63



ϕ80, ϕ100



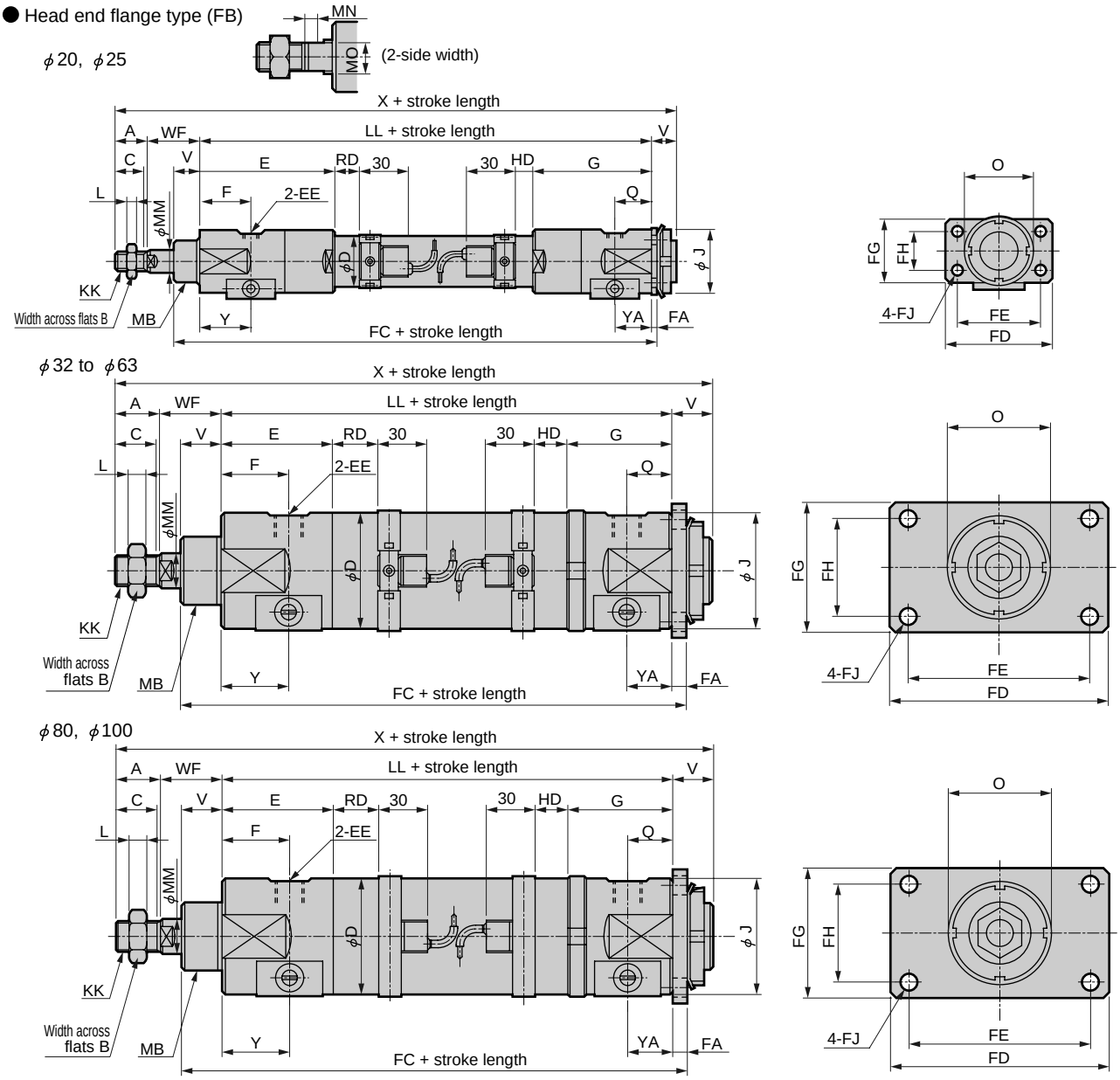
Note 1: Refer to page 1987 for dimensions of accessory.

Symbol	Rod end flange type (FA) basic dimensions																	
Bore size (mm)	A	B	C	D	E	EE	F	G	J	KK	L	LL	MB	MM	MN	MO	O	Q
ϕ20	20	13	18	25	86	Rc1/8	34	74	33	M8 x 1	5	223	M25 x 1.5	10	4	8	42	22
ϕ25	20	17	18	30	82	Rc1/8	32.5	71	37	M10 x 1.25	6	213	M25 x 1.5	12	5	10	42	21.5
ϕ32	22	17	20	37	67	Rc1/4	42	57	37	M10 x 1.25	6	197	M25 x 1.5	12	5	10	42	25
ϕ40	22	22	20	46	73	Rc1/4	45.5	57	46	M14 x 1.5	8	203	M35 x 1.5	16	6	14	57	25
ϕ50	28	27	26	56.4	77	Rc3/8	47.5	60	56	M18 x 1.5	11	211	M40 x 1.5	20	7	17	62	24.9
ϕ63	28	27	26	69.4	69	Rc3/8	42	65	69.4	M18 x 1.5	11	214	M40 x 1.5	20	7	17	62	29
ϕ80	36	32	34	88	73	Rc1/2	45	70	88	M22 x 1.5	13	232	M60 x 2	25	10	22	86	31.5
ϕ100	45	41	43	108	72	Rc1/2	42	72	108	M26 x 1.5	16	235	M60 x 2	30	11	27	86	30

Symbol						Installation dimensions								With switch	
Bore size (mm)	V	WF	X	Y	YA	FA	FB	FC	FD	FE	FG	FH	FJ	HD	RD
ϕ20	16	24	283	34	22	4.5	19.5	243.5	66	52	38	24	6.6	15.5	17.5
ϕ25	16	32	281	32.5	21.5	4.5	27.5	233.5	66	52	38	24	6.6	13	14.5
ϕ32	20	30	269	42	25	4.5	25.5	221.5	66	52	38	24	6.6	22	21
ϕ40	20	32	277	45.5	25	9	23	232	100	80	58	40	9	22	21
ϕ50	20	33	292	47.5	24.5	9	24	240	108	90	65	45	9	19	25
ϕ63	25	38	305	42	29	9	29	248	134	112	80	60	11	21	28
ϕ80	25	42	335	45	31.5	14	28	271	160	132	100	71	14	24.5	33.5
ϕ100	30	48	358	42	30	14	34	279	178	150	114	85	14	25	35

Dimensions CAD

● Head end flange type (FB)



Note 1: Refer to page 1987 for dimensions of accessory.

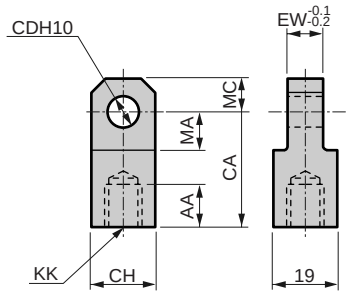
Symbol	Head end flange type (FB) basic dimensions																	
Bore size (mm)	A	B	C	D	E	EE	F	G	J	KK	L	LL	MB	MM	MN	MO	O	Q
φ20	20	13	18	25	86	Rc1/8	34	74	33	M8 x 1	5	223	M25 x 1.5	10	4	8	42	22
φ25	20	17	18	30	82	Rc1/8	32.5	71	37	M10 x 1.25	6	213	M25 x 1.5	12	5	10	42	21.5
φ32	22	17	20	37	67	Rc1/4	42	57	37	M10 x 1.25	6	197	M25 x 1.5	12	5	10	42	25
φ40	22	22	20	46	73	Rc1/4	45.5	57	46	M14 x 1.5	8	203	M35 x 1.5	16	6	14	57	25
φ50	28	27	26	56.4	77	Rc3/8	47.5	60	56	M18 x 1.5	11	211	M40 x 1.5	20	7	17	62	24.5
φ63	28	27	26	69.4	69	Rc3/8	42	65	69.4	M18 x 1.5	11	214	M40 x 1.5	20	7	17	62	29
φ80	36	32	34	88	73	Rc1/2	45	70	88	M22 x 1.5	13	232	M60 x 2	25	10	22	86	31.5
φ100	45	41	43	108	72	Rc1/2	42	72	108	M26 x 1.5	16	235	M60 x 2	30	11	27	86	30

Symbol						Installation dimensions							With switch	
Bore size (mm)	V	WF	X	Y	YA	FA	FD	FE	FG	FH	FJ	FI	HD	RD
φ20	16	24	283	34	22	4.5	66	52	38	24	6.6	251.5	15.5	17.5
φ25	16	32	281	32.5	21.5	4.5	66	52	38	24	6.6	233.5	13	14.5
φ32	20	30	269	42	25	4.5	66	52	38	24	6.6	231.5	22	21
φ40	20	32	277	45.5	25	9	100	80	58	40	9	244	22	21
φ50	20	33	292	47.5	24.5	9	108	90	65	45	9	253	19	25
φ63	25	38	305	42	29	9	134	112	80	60	11	248	21	28
φ80	25	42	335	45	31.5	14	160	132	100	71	14	271	24.5	33.5
φ100	30	48	358	42	30	14	178	150	114	85	14	279	25	35

Accessory dimensions

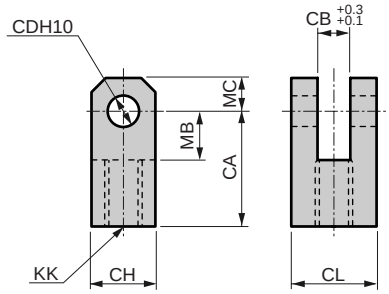
● Rod eye/clevis dimensions (ϕ20, 25, 32)

Rod eye (I) Material: Steel



Model no.	Applicable bore size (mm)	AA	CA	CD	CH	EW	KK	MA	MC	Weight (g)
M1-I-20	20	14	30	$10^{+0.058}_{0}$	19	8	M8 x 1	13	10	60
M1-I-30	25, 32	16	36	$12^{+0.070}_{0}$	25	10	M10 x 1.25	16	12	110

Rod clevis (Y) Material: Steel

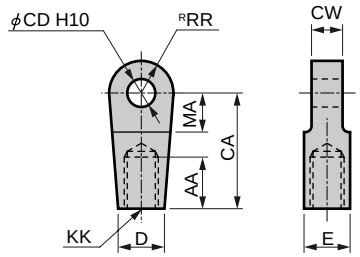


Note: A pin, a washer and a split pin are attached.

Model no.	Applicable bore size (mm)	CA	CB	CD	CH	CL	KK	MB	MC	Weight (g)
M1-Y-20	20	30	8	$10^{+0.058}_{0}$	19	19	M8 x 1	13	10	100
M1-Y-30	25, 32	36	10	$12^{+0.070}_{0}$	25	25	M10 x 1.25	16	12	210

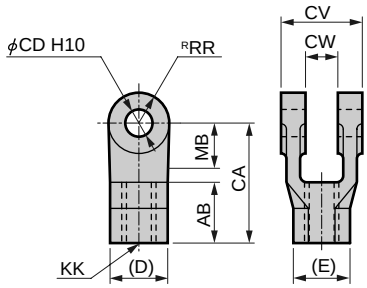
● Rod eye/clevis dimensions (ϕ40, 50, 63, 80,100)

Rod eye (I) Material: Cast iron



Model no.	Applicable bore size (mm)	AA	CA	CD	CW	D	E	KK	MA	RR	Weight (kg)
S1-I-40	40	20	50	$12^{+0.070}_{0}$	$18^{-0.1}_{-0.4}$	27	27	M14 x 1.5	21	16	0.26
S1-I-50	50	21	50	$12^{+0.070}_{0}$	$18^{-0.1}_{-0.4}$	27	27	M18 x 1.5	21	16	0.24
S1-I-63	63	21	50	$14^{+0.070}_{0}$	$20^{-0.1}_{-0.4}$	27	27	M18 x 1.5	21	16	0.25
S1-I-80	80	30	70	$20^{+0.084}_{0}$	$28^{-0.1}_{-0.4}$	46	41	M22 x 1.5	30	25	0.88
S1-I-100	100	30	70	$20^{+0.084}_{0}$	$22^{-0.1}_{-0.4}$	46	41	M26 x 1.5	30	25	0.84

Rod clevis (Y) Material: Cast iron



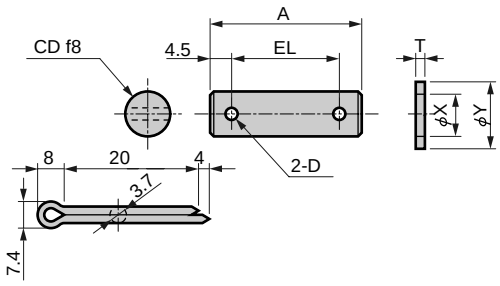
Note: A pin and a snap ring are attached.

Model no.	Applicable bore size (mm)	AB	CA	CD	CV	CW	D	E	KK	MB	RR	Weight (kg)
S1-Y-40	40	24	50	$12^{+0.070}_{0}$	36	$18^{+0.4}_{+0.1}$	27	31.2	M14 x 1.5	19	16	0.25
S1-Y-50	50	24	50	$12^{+0.070}_{0}$	36	$18^{+0.4}_{+0.1}$	27	31.2	M18 x 1.5	19	16	0.24
S1-Y-63	63	24	50	$14^{+0.070}_{0}$	40	$20^{+0.4}_{+0.1}$	27	31.2	M18 x 1.5	19	16	0.26
S1-Y-80	80	35	70	$20^{+0.084}_{0}$	56	$28^{+0.4}_{+0.1}$	41	47.3	M22 x 1.5	25	25	0.90
S1-Y-100	100	35	70	$20^{+0.084}_{0}$	56	$28^{+0.4}_{+0.1}$	41	47.3	M26 x 1.5	25	25	0.85

Note: MB dimension indicates effective length of CW dimension.

● Pin dimensions

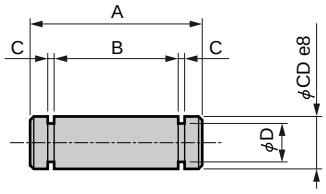
Pin (P) (ϕ20, 30) Material: Steel



Model no.	Applicable bore size (mm)	A	D	CD	EL	T	X	Y	Weight (g)
M1-P-20	20	37	4	$10^{-0.013}_{-0.035}$	28	2	10.5	18	30
M1-P-30	25, 32	46	4	$12^{-0.016}_{-0.043}$	37	2.5	13	21	50

Note: For rod clevis type, a pin, a washer and a split pin are attached to the product.

Pin (P) (ϕ40, 50, 63, 80, 100) Material: Steel



Model no.	Applicable bore size (mm)	A	B	C	D	CD	Weight (g)	Snap ring
S1-P-40	40, 50	43.5	36.2	1.15	11.5	$12^{-0.032}_{-0.059}$	40	Axis C type 12
S1-P-63	63	47.5	40.2	1.15	13.4	$14^{-0.032}_{-0.059}$	60	Axis C type 14
S1-P-80	80, 100	64	56.2	1.35	19	$20^{-0.040}_{-0.073}$	100	Axis C type 20

Note: For rod clevis type, a pin and a snap ring are attached to the product.

* Specify the model no., when placing an order.

Selection guide

When using a high speed cylinder, the cylinder speed and the kinetic energy should be considered.

Step 1 High speed cylinder selection guide

For pneumatic cylinders, average speed is different from maximum speed rush into cushion because of compressibility fluid.
When operating load W with average speed V1, find the required composite effective sectional area S and the maximum speed V according to the following table.
This table is just reference. Some values may vary depending on load direction and pipe length etc.

Average speed and max. speed at load factor of high speed cylinder (when air pressure = 0.5MPa)

Bore size (mm) / Load factor / Average speed		V1 = 500mm/s			V1 = 1,000mm/s			V1 = 2,000mm/s		
		10%	20%	30%	10%	20%	30%	10%	20%	30%
ϕ20 (A2 = 2.356)	W	1.57	3.14	4.71	1.57	3.14	4.71	1.57	3.14	4.71
	S	0.80	0.89	0.98	1.60	1.78	1.96	3.19	3.56	3.93
	V	630	689	714	1,260	1,378	1,482	2,512	2,756	2,971
ϕ25 (A2 = 3.778)	W	2.45	4.91	7.36	2.45	4.91	7.36	2.45	4.91	7.36
	S	1.28	1.43	1.57	2.56	2.85	3.15	5.12	5.71	6.30
	V	628	690	740	1,257	1,376	1,485	2,514	2,757	2,970
ϕ32 (A2 = 6.912)	W	4.02	8.04	12.1	4.02	8.04	12.1	4.02	8.04	12.1
	S	2.34	2.61	2.88	4.68	5.22	5.76	9.36	12.4	11.5
	V	630	692	747	1,261	1,383	1,494	2,521	2,758	2,983
ϕ40 (A2 = 10.56)	W	6.28	12.6	18.8	6.28	12.6	18.8	6.28	12.6	18.8
	S	3.57	3.99	4.40	7.15	7.97	8.80	14.3	15.9	17.6
	V	630	693	747	1,261	1,383	1,494	2,521	2,765	2,988
ϕ50 (A2 = 16.49)	W	9.82	19.6	29.5	9.82	19.6	29.5	9.82	19.6	29.5
	S	5.58	6.23	6.87	11.2	12.5	13.7	22.3	24.9	27.5
	V	630	693	747	1,265	1,389	1,490	2,518	2,768	2,990
ϕ63 (A2 = 28.03)	W	15.6	31.2	46.8	15.6	31.2	46.8	15.6	31.2	46.8
	S	9.49	10.6	11.7	19.0	21.2	23.4	38.0	42.3	46.7
	V	632	694	749	1,266	1,389	1,498	2,531	2,771	2,989
ϕ80 (A2 = 45.36)	W	25.1	50.3	75.4	25.1	50.3	75.4	25.1	50.3	75.4
	S	15.4	17.1	18.9	30.7	34.3	37.8	61.4	68.5	75.6
	V	634	692	744	1,264	1,388	1,495	2,527	2,773	2,990
ϕ100 (A2 = 71.47)	W	39.3	78.5	118	39.3	78.5	118	39.3	78.5	118
	S	24.2	27.0	29.8	48.4	54.0	59.6	96.8	108	119
	V	632	694	748	1,264	1,387	1,496	2,529	2,774	2,987

W: Load weight (kg) S: Composite effective sectional area (mm^2) V: Max. speed (mm/s) V1: Average speed (mm/s) A2: Piston rod side cross-section areas (cm^2)

For example, when using HCA-40 with load 6.28kgf (load factor 10%, 0.5MPa) and average speed V1 = 2,000mm/s, the maximum speed is 2,521mm/s (1.26 time larger). In this case, required composite effective sectional area is 14.3mm^2.

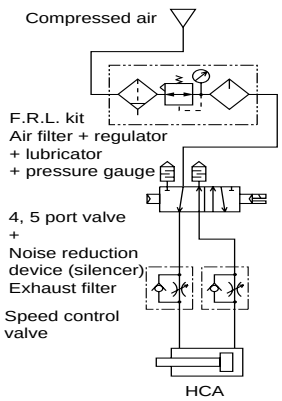
Select system components matched to composite effective sectional area from the table on the following page.

System selection guide table

Appropriate system matched to the required cylinder speed according to bore size can be selected.

Bore size	Port size	Required effective sectional area (mm^2)	4.5 port valve for pneumatic control		Pneumatic auxiliary components		Piping
			Single solenoid	Double solenoid	Speed control valve	Silencer	Piping (m) (valve and cylinder interval)
φ20	Rc1/8	1.3	4KA110-M5/4KB110-06 4GA110-M5/4GB110-06	4KA120-M5/4KB120-06 4GA120-M5/4GB120-06	SC3W-6/SC3R-6	SLW-6A	φ4 x 2.5NT
		2.0	4KA110-M5/4KB110-06 4GA110-M5/4GB110-06	4KA120-M5/4KB120-06 4GA120-M5/4GB120-06	SC3R-6	SLW-6A	φ6 x φ4NT
		2.8	4KA210-06/4KB210-06 4GA210-06/4GB210-08	4KA220-06/4KB220-06 4GA220-06/4GB220-08	SC3R-6	SLW-6A	φ8 x φ5.7NT
		3.6	4KA210-06/4KB210-06 4GA210-06/4GB210-08	4KA220-06/4KB220-06 4GA220-06/4GB220-08	SC1-6	SLW-6A	φ6 x φ4NT
		4.3	4KA210-06/4KB210-06 4GA210-06/4GB210-08	4KA220-06/4KB220-06 4GA220-06/4GB220-08	SC1-6	SLW-6A	φ8 x φ5.7NT
φ25	Rc1/8	1.4	4KA110-M5/4KB110-06 4GA110-M5/4GB110-06	4KA120-M5/4KB120-06 4GA120-M5/4GB120-06	SC3W-6	SLW-6A	φ4 x φ2.5NT
		2.4	4KA110-M5/4KB110-06 4GA110-M5/4GB110-06	4KA120-M5/4KB120-06 4GA120-M5/4GB120-06	SC3W-6	SLW-6A	φ6 x φ4NT
		4.4	4KA210-06/4KB210-06 4GA210-06/4GB210-08	4KA220-06/4KB220-06 4GA220-06/4GB220-08	SC1-6	SLW-6A	φ6 x φ4NT
		5.8	4KA210-06/4KB210-06 4GA210-06/4GB210-08	4KA220-06/4KB220-06 4GA220-06/4GB220-08	SC1-6	SLW-6A	φ8 x φ5.7NT
		6.6	4KA210-06/4KB210-06 4GA210-06/4GB210-08	4KA220-06/4KB220-06 4GA220-06/4GB220-08	SC1-8	SLW-6A	φ10 x φ7.2NT
φ32	Rc1/4	3.6	4KB210-08/4GB210-08	4KB220-08/4GB220-08	SC3W-8/SC3R-8	SLW-8A	φ6 x φ4NT
		5.9	4KB210-08/4GB210-08	4KB220-08/4GB220-08	SC1-8	SLW-8A	φ8 x φ5.7NT
		8.4	4F210-08/4KB310-08 4GB310-08	4F220-08/4KB320-08 4GB320-08	SC1-8	SLW-8A	φ10 x φ7.2NT
		9.5	4KB310-08/4F310-08 4GB310-08	4KB320-08/4F320-08 4GB320-08	SC1-8	SLW-8A	φ10 x φ7.2NT
		11.6	4F310-08/4F410-08 4GB310-08	4F320-08/4F420-08 4GB320-08	SC3W-10/SC3R-10	SLW-8A	φ12 x φ8.9NT
φ40	Rc1/4	3.6	4KB210-08/4GB310-08	4KB220-08/4GB320-08	SC3W-8/SC3R-8	SLW-8A	φ6 x φ4NT
		8.5	4F210-08/4KB310-08 4GB310-08	4F220-08/4KB320-08 4GB320-08	SC1-8	SLW-8A	φ10 x φ7.2NT
		12.0	4F310-08/4F410-08 4GB310-08	4F320-08/4F420-08 4GB320-08	SC3W-10/SC3R-10	SLW-8A	φ12 x φ8.9NT
		15.2	4F410-08	4F420-08	SC-1-10	SLW-8A	φ12 x φ8.9NT
		18.4	4F510-10	4F520-10	SC-1-10	SLW-10A	φ15 x φ11.5NT
φ50	Rc3/8	5.5	4KB310-10/4F310-10	4KB320-10/4F320-10	SC3W-10/SC3R-10	SLW-10A	φ6 x φ4NT
		12.0	4K310-10/4F310-10	4K320-10/4F320-10	SC3W-10/SC3R-10	SLW-10A	φ12 x φ8.9NT
		18.1	4F510-10	4F520-10	SC1-10	SLW-10A	φ12 x φ8.9NT
		23.5	4F510-10	4F520-10	SC1-15	SLW-10A	φ15 x φ11.5NT
		26.9	4F610-15	4F620-15	SC1-15	SLW-15A	φ15 x φ11.5NT
φ63	Rc3/8	11.0	4K310-10/4F310-10	4K320-10/4F320-10	SC3W-10/SC3R-10	SLW-10A	φ10 x φ7.2NT
		18.0	4K410-10/4F510-10	4K420-10/4F520-10	SC1-10	SL-10A	φ10 x φ7.2NT
		26.9	4F610-15	4F620-15	SC1-15	SLW-15A	φ10 x φ8.9NT
		43.1	4F610-15	4F620-15	SC-20A	SLW-15A	φ15 x φ11.5NT
		62.8	4F610-20	4F620-20	SC-20A	SL-20A	Rc1/2 steel pipe
φ80	Rc1/2	19.5	4F610-15	4F620-15	SC3W-15/SC3R-15	SLW-15A	φ12 x φ8.9NT
		31.3	4F610-15	4F620-15	SC1-15	SLW-15A	φ15 x φ11.5NT
		67.4	4F610-20	4F620-20	SC-20A	SL-20A	Rc3/4 steel pipe
		85.9	4F710-20	4F720-20	SC-20A	SL-20A	Rc3/4 steel pipe
		95.9	4F710-20	4F720-20	SC-25A	SL-20A	Rc3/4 steel pipe
φ100	Rc1/2	31.8	4F610-15	4F620-15	SC1-15	SLW-15A	φ15 x φ11.5NT
		67.4	4F610-20	4F620-20	SC-20A	SL-20A	Rc3/4 steel pipe
		85.9	4F710-20	4F720-20	SC-20A	SL-20A	Rc3/4 steel pipe
		95.9	4F710-20	4F720-20	SC-25A	SL-20A	Rc3/4 steel pipe
		109.9	4F710-25	4F720-25	SC-25A	SL-25A	Rc3/4 steel pipe

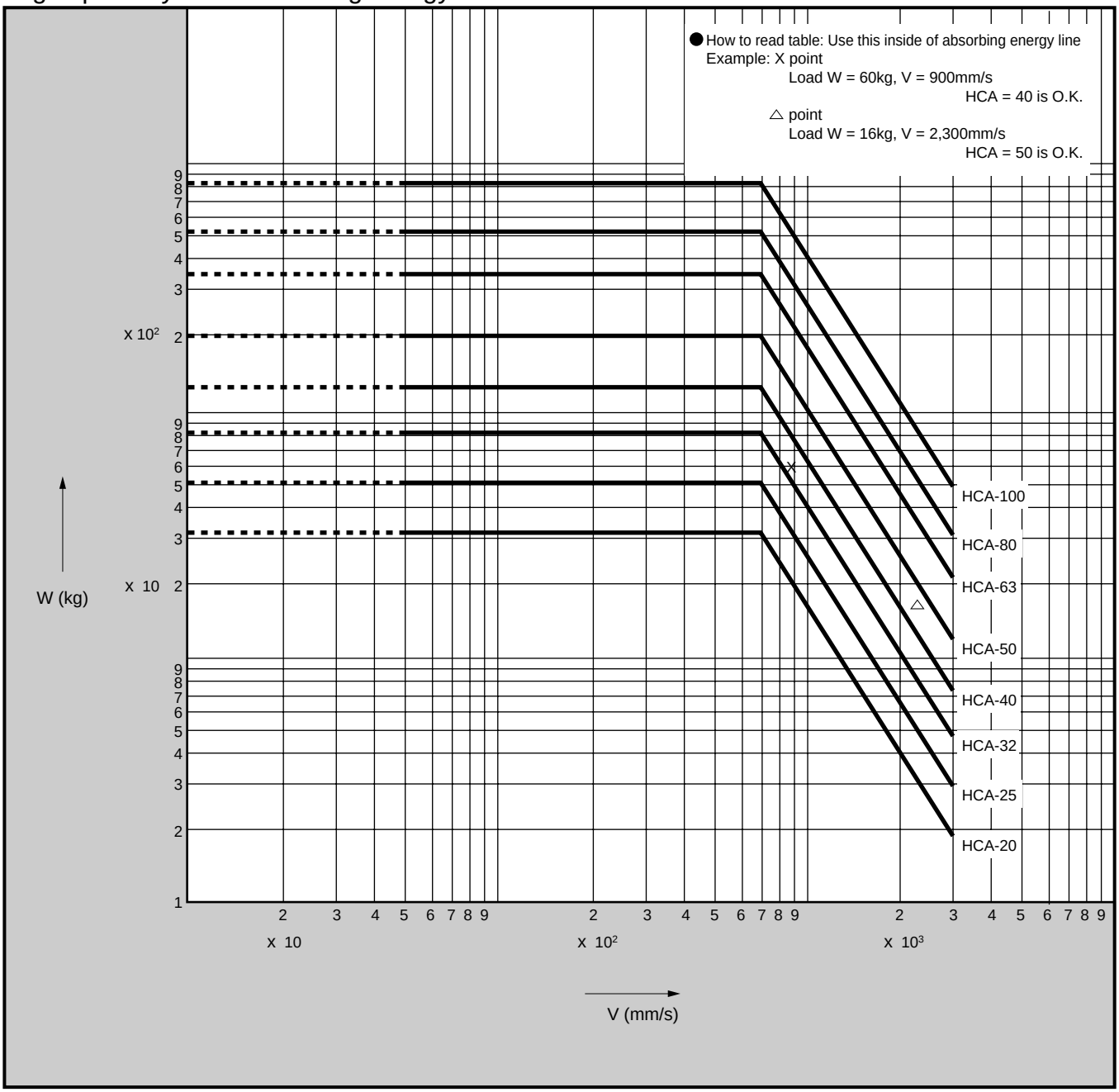
● Pneumatics basic circuit diagram



Step 2 High speed cylinder selection guide

Determine the model according to relations between load W and max. speed V on the following table.

High speed cylinder absorbing energy list



Note: This is log-log graph.

For example, when load W = 16kg, and maximum speed 2,300mm/s, △shows that HCA-40 does not meet the conditions, but HCA-50 meets the conditions.