

HCM

High energy absorption cylinder

High speed

ø20/ø25/ø32/ø40/ø50/ø63

Overview

This is a high speed (2000 mm/s) and high energy absorbing cylinder. This can be used for mold ejection of resins, etc.

Features

New cushion mechanism adopted
Smooth stop at the stroke end.

Meets wide range of conditions
Easy adjustment mechanism.

Excellent properties in heavy load and medium speed range.

Five times higher impact absorption than conventional cylinder.

Floating method provided for cushion packing
Eliminates popping out caused by cracking pressure at starting.

Switch integrated in rail realizes simple appearance.
Direct mount and easy maintenance realized by 4 bolts.



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

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

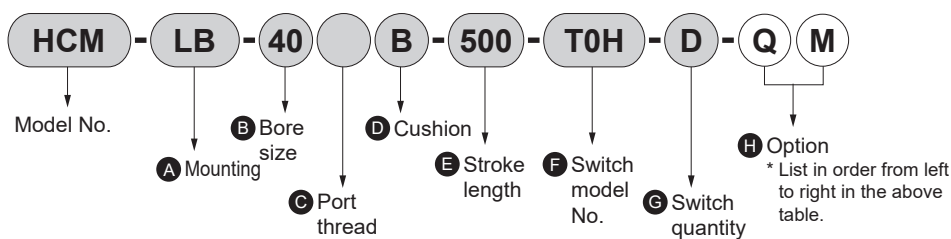
Variation and option combination selection table

◎ : Option
 ○ : Available (made-to-order product)
 △ : Available depending on conditions (Contact CKD.)
 × : Not available

Category		Category	Variation		Port thread		Option		
			Double acting basic	With cylinder switch	NPT	G	Switch rail attached at shipment	Piston rod material stainless steel	Specify piston rod end form
		Code	None	None	N	G	Q	M	N*
Variation	Double acting basic	Blank	◎		○	○	×	◎	○
	With cylinder switch	Blank			○	○	◎	◎	○
Port thread	NPT	N				×	○	○	○
	G	G					○	○	○
Option	Switch rail attached at shipment	Q					◎	○	
	Piston rod material stainless steel *1	M						○	
	Specify piston rod end form	N*							
Accessory	Cylinder switch	Listed separately	◎	◎	○	○	◎	◎	○
	Rod eye	I	◎	◎	○	○	◎	◎	△
	Rod clevis	Y	◎	◎	○	○	◎	◎	△

*1 : ø20 and ø25 are piston rod material SUS as standard. Only ø32 to ø63 are available as an option.

[Example of model No.]



Model No.: High energy absorption cylinder

● Variation : Double acting/basic

A Mounting : Axial foot

B Bore size : ø40 mm

C Port thread : Rc thread

D Cushion : Both sides cushioned

E Stroke : 500 mm

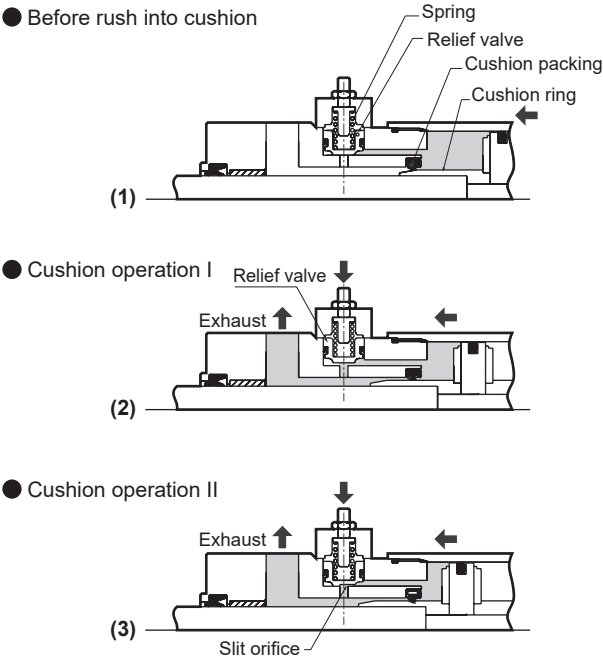
F Switch model No.: Reed T0H switch, lead wire 1 m

G Switch quantity : 2

H Option : Switch rail attached at shipment, piston rod material (stainless steel)

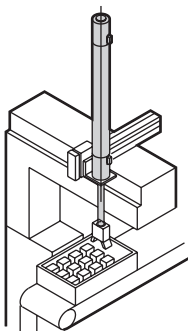
Cushion operational principle

- (1) When the piston operates and the cushion ring rushes into the cushion packing, an airtight space is formed in the []. As the piston moves further, the air in the [] is compressed, absorbing the kinetic energy in the operating direction.
- (2) The relief valve is opened by compressed air at the same time. Compressed air is instantaneously discharged and the relief valve closes.
- (3) After the relief valve closes, the remaining compressed air is exhausted from the slit orifice. The piston moves and contacts the cover. The energy absorption stroke is completed at this time.

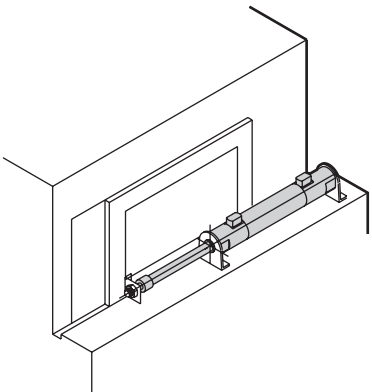


Applications

- Resin molding machine ejection robot



- Machine door open/close



LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
UFCD
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending



High energy absorption cylinder Double acting/single rod

HCM Series

● Bore size: $\varnothing 20/\varnothing 25/\varnothing 32/\varnothing 40/\varnothing 50/\varnothing 63$

JIS symbol



Specifications

Item		HCM					
Bore size	mm	ø20	ø25	ø32	ø40	ø50	ø63
Actuation		Double acting					
Working fluid		Compressed air					
Max. working pressure	MPa	1.0 (≈150 psi, 10 bar)					
Min. working pressure	MPa	0.15 (≈22 psi, 1.5 bar)					
Proof pressure	MPa	1.6 (≈230 psi, 16 bar)					
Ambient temperature	°C	-10 (14°F) to 60 (140°F) (no freezing)					
Port size		Rc1/8	Rc1/8	Rc1/4	Rc1/4	Rc3/8	Rc3/8
Stroke tolerance	mm	^{+2.0} ₀					
Working piston speed	mm/s	50 to 2000 (Operate within the allowable absorbed energy.)					
Cushion		With air cushion					
Lubrication		Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)					
Max absorbed energy J *1	With air cushion	3	5	9	14	23	30
Effective air cushion length	mm	56.5	56.5	56.5	55.5	58.5	58.5

*1 : If kinetic energy exceeds these values, consider using a separate shock absorber.
Refer to pages 970 to 973 for energy calculation and size selection.

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke (mm)
ø20	200 to 700	700	1
ø25			
ø32			
ø40	200 to 1000	1000	
ø50			
ø63			

*1 : The custom stroke is available in 1 mm increments.

*2 : Consult with CKD about strokes other than the above.

*3 : The stroke is available from 1 mm. However, this product's cushion area is longer than a typical cylinder, allowing high absorbed energy. Therefore, at the stroke below or less, the cushion is usually applied, and the effects of high-speed use cannot be obtained.

Model No.	Stroke at which high-speed effects cannot be obtained	Recommended stroke
HCM	150 mm stroke or less	300 mm stroke or more

Number of installed switches and min. stroke (mm)

Switch quantity	1		2		3		4		5	
Bore size (mm)	Proximity	Reed	Proximity	Reed	Proximity	Reed	Proximity	Reed	Proximity	Reed
$\varnothing 20$	10		25		40	50	55		75	85
$\varnothing 25$	10		25		40	50	55		75	85
$\varnothing 32$	10		25		40	50	55		75	85
$\varnothing 40$	10		25		40	50	55		75	85
$\varnothing 50$	10		25		40	50	55		75	85
$\varnothing 63$	10		25		40	50	55		75	85

Switch specifications

● 1-color/2-color LED/for AC magnetic field proof

Item	Proximity 2-wire	Proximity 2-wire			Proximity 3-wire				Reed 2-wire						Proximity 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		T2YD(*4) T2YDT	
Applications	For programmable controller, relay, compact solenoid valve	Dedicated for programmable controller			For programmable controller, relay				For programmable controller, relay		For programmable controller, relay, IC circuit (no indicator lamp), serial connection		For programmable controller, relay		For programmable controller	
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	24 VDC ±10%
Load current	5 to 100 mA	5 to 20 mA (*3)			100 mA or less		50 mA or less		5 to 50 mA	7 to 20 mA	≤50 mA	≤20 mA	5 to 50 mA	7 to 20 mA	7 to 10 mA	5 to 20 mA
Indicator lamp	LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		Without LED		LED (Lit when ON)		Red/green LED (Lit when ON)	
Leakage current	≤ 1 mA at 100 VAC, ≤ 2 mA at 200 VAC	1 mA or less			10 µA or less				0 mA						1 mA or less	
Weight g	1 m:33	1 m:18	1 m:33	1 m:18	1 m:18		1 m:33	1 m:18	1 m:18			1 m:33			1 m:61	
	3 m:87	3 m:49	3 m:87	3 m:49	3 m:49		3 m:87	3 m:49	3 m:49			3 m:87			3 m:166	
	5 m:142	5 m:80	5 m:142	5 m:80	5 m:80		5 m:142	5 m:80	5 m:80			5 m:142			5 m:272	

*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)

*4 : AC magnetic field proof switch (T2YD/T2YDT) cannot be used in DC magnetic fields.

Cylinder weight

(Unit: kg)

Bore size (mm)		ø20	ø25	ø32	ø40	ø50	ø63
Product weight for 0 mm stroke	Basic 00	0.33	0.47	0.62	0.98	1.58	2.27
	Axial foot LB	0.44	0.6	0.78	1.2	2.06	2.99
	Flange FA/FB	0.36	0.51	0.68	1.06	1.92	2.77
Switch weight (per 1 pc.)		Refer to the weight indicated in the switch specifications.					
Additional weight per stroke without switch rail 100 mm		0.012	0.016	0.017	0.027	0.040	0.044
Additional weight per stroke with switch rail 100 mm		0.014	0.018	0.019	0.029	0.042	0.046

[Example of calculation]

Product weight of HCM-LB-40B-500-T2H-D

Product weight for stroke 0 mm 1.2 kg
 Additional weight for stroke 500 mm $0.029 \times \frac{500}{100} = 0.145$ kg
 Weight of 2 switches $0.018 \times 2 = 0.036$ kg
 Product weight $1.2 + 0.145 + 0.036 = 1.381$ kg

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	1.26×10^2	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	1.58×10^2	2.11×10^2	3.17×10^2	4.22×10^2	5.28×10^2	6.33×10^2	7.39×10^2	8.44×10^2	9.50×10^2	1.06×10^3
ø50	Push	2.95×10^2	3.93×10^2	5.89×10^2	7.85×10^2	9.82×10^2	1.18×10^3	1.37×10^3	1.57×10^3	1.77×10^3	1.96×10^3
	Pull	2.47×10^2	3.30×10^2	4.95×10^2	6.60×10^2	8.25×10^2	9.90×10^2	1.15×10^3	1.32×10^3	1.48×10^3	1.65×10^3
ø63	Push	4.68×10^2	6.23×10^2	9.35×10^2	1.25×10^3	1.56×10^3	1.87×10^3	2.18×10^3	2.49×10^3	2.81×10^3	3.12×10^3
	Pull	4.20×10^2	5.61×10^2	8.41×10^2	1.12×10^3	1.40×10^3	1.68×10^3	1.96×10^3	2.24×10^3	2.52×10^3	2.80×10^3

How to order

Without switch (built-in magnet for switch)

HCM - **LB** - **40** - **B** - **500** - **I**

With switch (built-in magnet for switch)

HCM - **LB** - **40** - **B** - **500** - **T2H*** - **D** - **Q** - **I**

A Mounting
*1

B Bore size

C Port thread

D Cushion

E Stroke

F Switch model No.
*2

G Switch quantity

H Option

I Accessory
*3

⚠ Precautions for model No. selection

*1 : Mounting bracket will be shipped with the product.

*2 : Switches other than **F** Switch model No. are also available.

(Made to order) Refer to Ending Page 1 for details.

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

[Example of model No.]

HCM-LB-40B-500-T2H-D-QI

Model: High energy absorption cylinder double acting

- A** Mounting : Axial foot
- B** Bore size : $\phi 40$ mm
- C** Port thread : Rc thread
- D** Cushion : Both sides cushioned
- E** Stroke : 500 mm
- F** Switch model No.: Proximity T2H switch, lead wire 1 m
- G** Switch quantity : 2
- H** Option : Switch rail attached at shipment
- I** Accessory : Rod eye

Code	Description
A Mounting	
00	Basic
LB	Axial foot
FA	Rod side flange
FB	Head side flange

B Bore size (mm)	
20	$\phi 20$
25	$\phi 25$
32	$\phi 32$
40	$\phi 40$
50	$\phi 50$
63	$\phi 63$

C Port thread	
Blank	Rc thread
N	NPT thread(made-to-order product)
G	G thread (made-to-order product)

D Cushion	
B	Both sides cushioned
R	Rod side cushioned
H	Head side cushioned
N	Without cushion

E Stroke (mm)		
Bore size	Stroke	Custom stroke
$\phi 20$ to $\phi 32$	1 to 700	In 1 mm increments
$\phi 40$ to $\phi 63$	1 to 1000	

F Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire
			AC	DC		
T0H*	T0V*	Reed	●	●	1-color LED	2-wire
T5H*	T5V*		●	●	Without LED	
T8H*	T8V*		●	●	1-color LED	
T1H*	T1V*	Proximity	●	●	1-color LED	2-wire
T2H*	T2V*		●	●		3-wire
T3H*	T3V*		●	●		
T3PH*	T3PV*		●	●	2-color LED	2-wire
T2WH*	T2WV*		●	●		
T2YH*	T2YV*		●	●		
T3WH*	T3WV*		●	●	Strong magn field proof (For AC magnetic field)	2-wire
T3YH*	T3YV*		●	●		
T2YD*	-		●	●		
T2YDT*	-		●	●	Off-delay	2-wire
T2JH*	T2JV*		●	●		

* Lead wire length	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

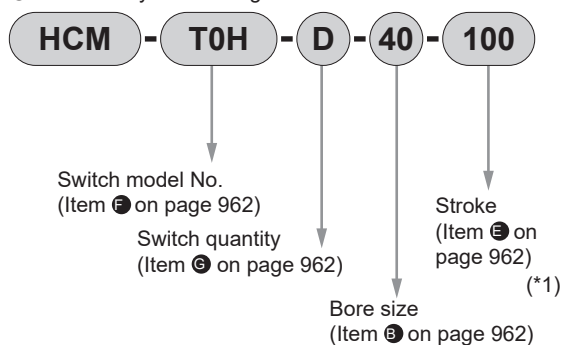
G Switch quantity	
R	1 on rod side
H	1 on head side
D	2
T	3
4	4
5	5

H Option	
Q	Switch rail attached at shipment
M	Piston rod material (stainless steel)

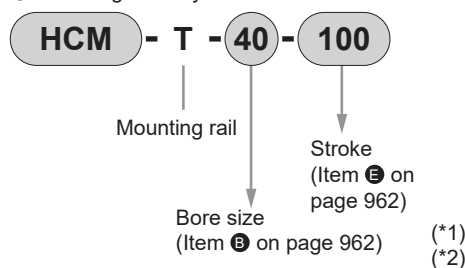
I Accessory	
I	Rod eye
Y	Rod clevis (pin and snap ring attached)

How to order switch

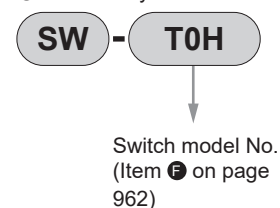
● Switch body + mounting rail set



● Mounting rail only



● Switch only



*1 : Indicate x if the stroke exceeds 300 mm. If exceeding 300 mm, a short rail (with 100 mm switch adjustment travel distance) will be included per switch.

*2 : If indicating X when ordering mounting rails only, order the same number of rails as that of applicable switches.

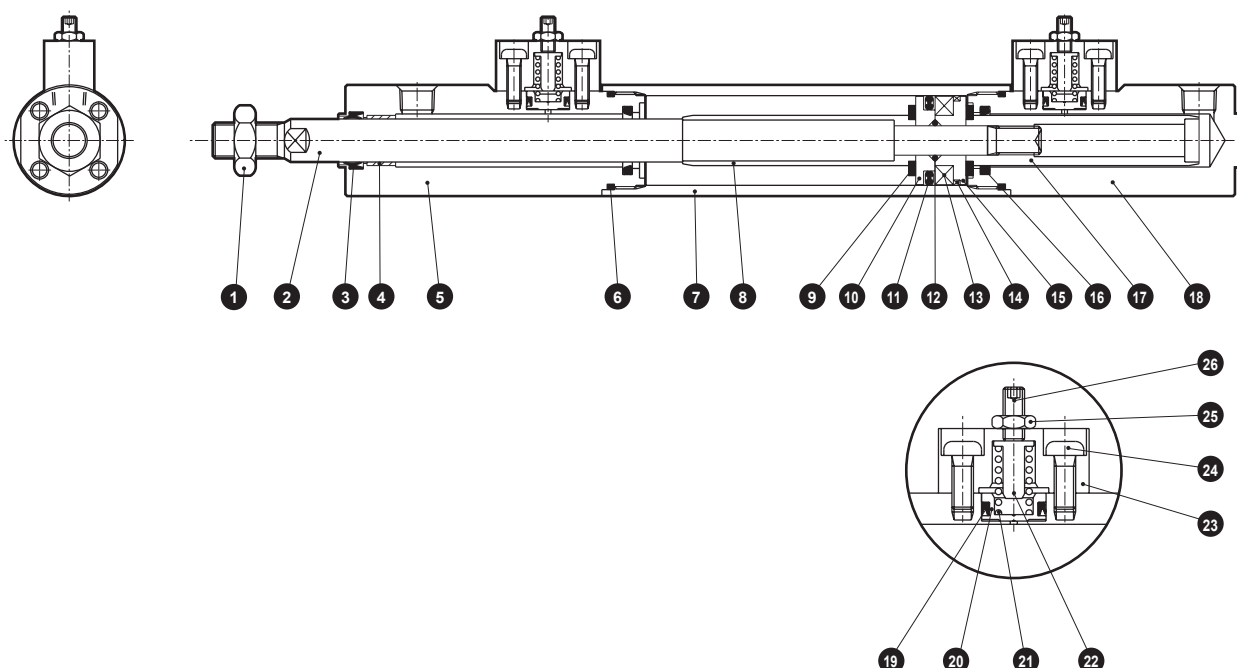
Mounting bracket model No.

Bore size Mounting	Foot (LB)	Flange (FA/FB)
ø20	HCM-LB-20	HCM-FA-20
ø25	HCM-LB-25	HCM-FA-25
ø32	HCM-LB-32	HCM-FA-32
ø40	HCM-LB-40	HCM-FA-40
ø50	HCM-LB-50	HCM-FA-50
ø63	HCM-LB-63	HCM-FA-63

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

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
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Internal structure and parts list



No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Rod nut	Steel	Nickeling	14	Wear ring	Resin	
2	Piston rod	ø20/ø25: Stainless steel ø32 to ø63: Steel	Industrial chrome plating	15	Piston (H)	Aluminum alloy	Chromate treatment
3	Rod packing	Nitrile rubber		16	Cushion packing	ø20 to ø32: Urethane ø40 to ø63: Urethane, steel	
4	Bush	Oil impregnated bearing alloy		17	Cushion ring (H)	Aluminum alloy	Chromate treatment
5	Rod cover	Aluminum alloy	Black alumite	18	Head cover	Aluminum alloy	Black alumite
6	Cylinder gasket	Nitrile rubber		19	Relief valve packing	Nitrile rubber	
7	Cylinder tube	Aluminum alloy	Hard alumite	20	Relief valve	Copper alloy	
8	Cushion ring (R)	Aluminum alloy	Chromate treatment	21	Spring	Steel	Electrodeposition
9	Cushion rubber	Urethane rubber		22	Spring collar	Steel	Chromate treatment
10	Piston (R)	Aluminum alloy	Chromate treatment	23	Relief valve holder	Aluminum alloy	Black alumite
11	Piston packing	Nitrile rubber		24	Cross-recessed pan head machine screw	Steel	Zinc chromate
12	Piston gasket	Nitrile rubber	ø25 to ø63	25	Hexagon nut	Steel	Black finish
13	Magnet	Plastic		26	Hexagon socket set screw	Steel	Black finish

Repair parts list

Bore size (mm)	Kit No.	Repair parts No.
ø 20	HCM-20K	
ø 25	HCM-25K	
ø 32	HCM-32K	
ø 40	HCM-40K	
ø 50	HCM-50K	
ø 63	HCM-63K	

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

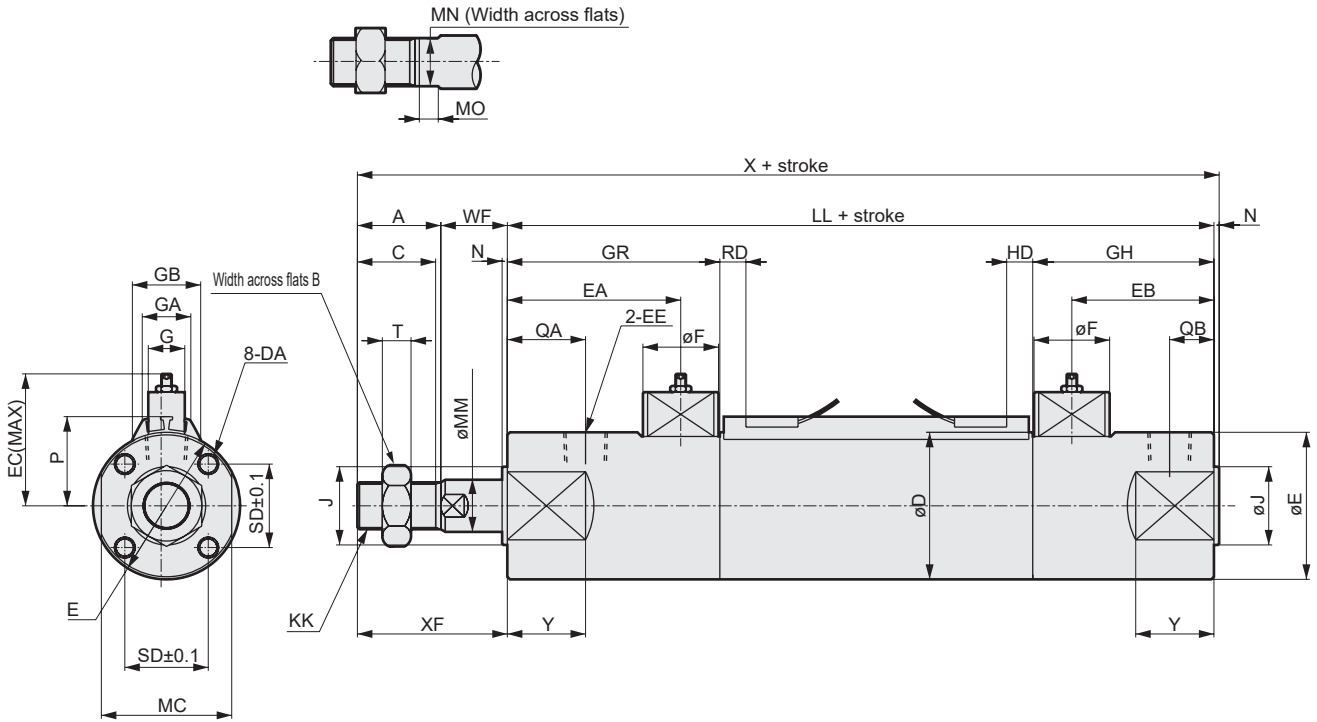
Material and treatment of mounting bracket

Mounting	Material	Treatment
LB	Steel	Zinc chromate
FA/FB	ø20 to ø40 Aluminum alloy	Black alumite
	ø50/ø63 Steel	Zinc chromate

Dimensions



● Basic (00)



Code	A	B	C	D	DA	E	EA	EB	EC	EE	F	G	J	KK	LL	MC	MM	MN	MO	N
Bore size																				
ø20	18	13	16	26	M4 depth 8	28	52	43	32.7	Rc1/8	29	14	13	M8	164	24	10	8	5	2
ø25	20	17	18	31	M5 depth 9	31	56.5	47.5	34.5	Rc1/8	29	14	15	M10X1.25	173	27	12	10	6	2
ø32	20	17	18	37	M5 depth 9	37	56.5	47.5	37.8	Rc1/4	29	14	18	M10X1.25	173	32	12	10	6	2
ø40	26	22	24	46	M6 depth 10	46	62	51	47.3	Rc1/4	29	14	25	M14X1.5	186	41	16	14	7	2
ø50	32	27	30	56.4	M8 depth 12	56.4	66.5	54.5	52.6	Rc3/8	29	14	30	M18X1.5	196	50	20	17	8	2
ø63	32	27	30	69.4	M10 depth 15	69.4	66.5	54.5	59.3	Rc3/8	29	14	32	M18X1.5	196	60	20	17	8	2
Code	QA	QB	SD	T	WF	X	XF	Y	GR	GH	GA	GB	P	T0/T5/T2/T3	T8	T2W/T3W	T1/T2/T2Y/T3Y/T2YD			
Bore size														RD	HD	RD	HD	RD	HD	RD
ø20	18	10	14	5	15.5	199.5	33.5	20	67	58	18	23	19.5	10	10	4	4	12	12	9
ø25	20	10	16.5	6	17	212	37	20	71.5	62.5	18	24.4	22	11	9	5	3	13	11	10
ø32	20	12	20	6	17	212	37	28	71.5	62.5	18	25	25	11	9	5	3	13	11	10
ø40	26	14	26	8	20.5	234.5	46.5	28	77	66	18	25.7	29.5	13	11	7	5	15	13	12
ø50	30	17	32	11	25.5	255.5	57.5	30	81.5	69.5	18	26.2	34.7	14	12	8	6	16	14	13
ø63	30	17	38	11	25.5	255.5	57.5	30	81.5	69.5	18	26.5	41.2	14	12	8	6	16	14	13

*1 : Tube outer diameter øD and cover outer diameter øE are different for ø20 only.

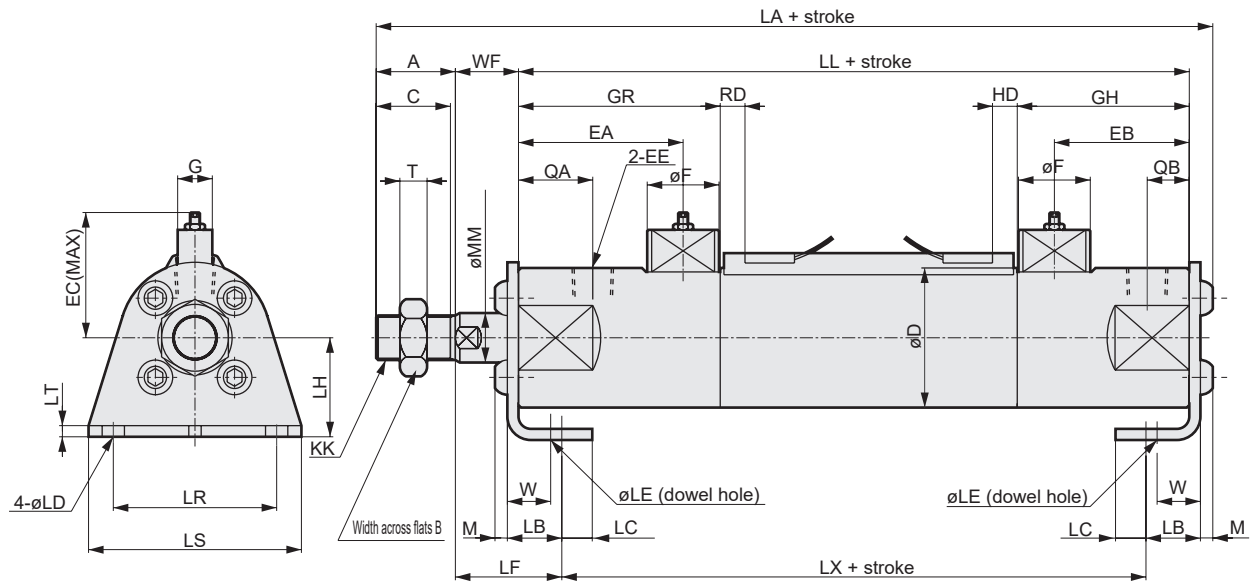
*2 : For the dimensions of the accessories, refer to page 969.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions



● Axial foot (LB)



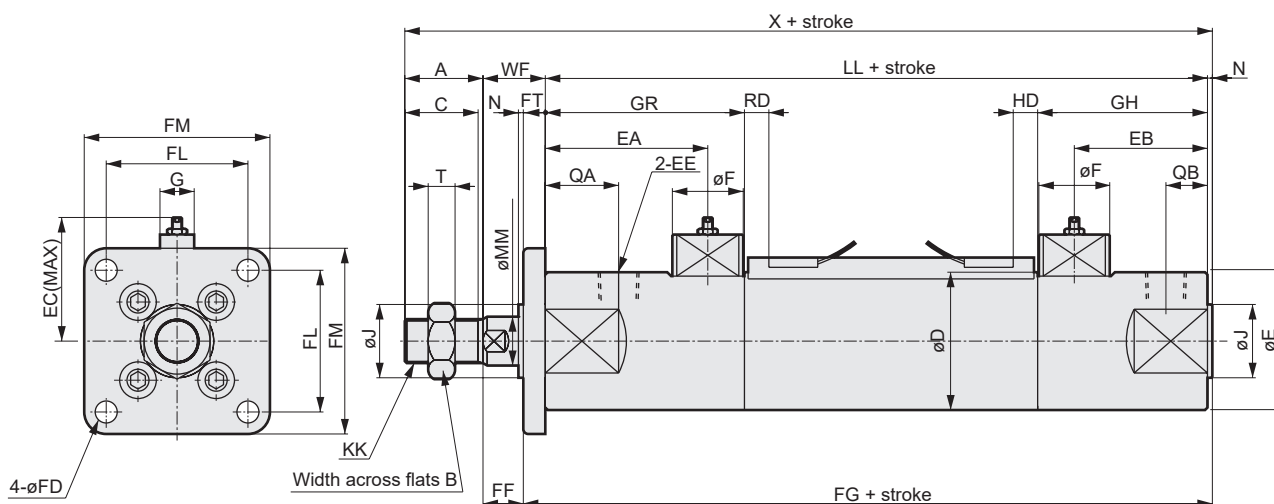
Code	A	B	C	D	EA	EB	EC	EE	F	G	KK	LA	LB	LC	LD	LE	LF	LH	LL		
Bore size																					
ø20	18	13	16	26	52	43	32.7	Rc1/8	29	14	M8	203.3	15.1	7.1	5.7	4	27	20	164		
ø25	20	17	18	31	56.5	47.5	34.5	Rc1/8	29	14	M10X1.25	216.6	15.1	7.1	5.7	4	28.9	22	173		
ø32	20	17	18	37	56.5	47.5	37.8	Rc1/4	29	14	M10X1.25	216.6	16.1	8.1	6.8	4	29.9	25	173		
ø40	26	22	24	46	62	51	47.3	Rc1/4	29	14	M14X1.5	239.7	16.6	9.1	6.8	4	33.9	30	186		
ø50	32	27	30	56.4	66.5	54.5	52.6	Rc3/8	29	14	M18X1.5	263	22	11	9	5	43	40	196		
ø63	32	27	30	69.4	66.5	54.5	59.3	Rc3/8	29	14	M18X1.5	263	22	13	11	5	43	45	196		
Code	LR	LS	LT	LX	M	MM	QA	QB	T	W	WF	GR	GH	T0/T5/T2/T3	T8	T2W/T3W	T1/T2J/T2Y/T3Y/T2YD				
Bore size														RD	HD	RD	HD	RD	HD		
ø20	32	44	3.2	140.2	2.6	10	18	10	5	10	15.5	67	58	10	10	4	4	12	12	9	9
ø25	36	49	3.2	149.2	3.4	12	20	10	6	10	17	71.5	62.5	11	9	5	3	13	11	10	8
ø32	44	58	3.2	147.2	3.4	12	20	12	6	10	17	71.5	62.5	11	9	5	3	13	11	10	8
ø40	54	71	3.2	159.2	4	16	26	14	8	10	20.5	77	66	13	11	7	5	15	13	12	10
ø50	66	86	4.5	161	5	20	30	17	11	17.5	25.5	81.5	69.5	14	12	8	6	16	14	13	11
ø63	82	106	4.5	161	5	20	30	17	11	17.5	25.5	81.5	69.5	14	12	8	6	16	14	13	11

*1 : For the dimensions of the accessories, refer to page 969.

Dimensions



- Rod side flange (FA)



Code	A	B	C	D	E	EA	EB	EC	EE	F	FD	FF	FG	FL	FM	FT	G	J	KK	LL	
Bore size	ø20	18	13	16	26	28	52	43	32.7	Rc1/8	29	5.5	9.5	172	28	40	6	14	13	M8	164
ø25	20	17	18	31	31	56.5	47.5	34.5	Rc1/8	29	5.5	10	182	32	44	7	14	15	M10X1.25	173	
ø32	20	17	18	37	37	56.5	47.5	37.8	Rc1/4	29	6.6	10	182	38	53	7	14	18	M10X1.25	173	
ø40	26	22	24	46	46	62	51	47.3	Rc1/4	29	6.6	12.5	196	46	61	8	14	25	M14X1.5	186	
ø50	32	27	30	56.4	56.4	66.5	54.5	52.6	Rc3/8	29	9	16.5	207	58	76	9	14	30	M18X1.5	196	
ø63	32	27	30	69.4	69.4	66.5	54.5	59.3	Rc3/8	29	11	16.5	207	70	92	9	14	32	M18X1.5	196	
Code	MM	N	QA	QB	T	WF	X	GR	GH	T0/T5/T2/T3	T8	T2W/T3W	T1/T2/T2Y/T3Y/T2YD								
Bore size	ø20	10	2	18	10	5	15.5	199.5	67	58	10	10	4	4	12	12	9	9			
ø25	12	2	20	10	6	17	212	71.5	62.5	11	9	5	3	13	11	10	8				
ø32	12	2	20	12	6	17	212	71.5	62.5	11	9	5	3	13	11	10	8				
ø40	16	2	26	14	8	20.5	234.5	77	66	13	11	7	5	15	13	12	10				
ø50	20	2	30	17	11	25.5	255.5	81.5	69.5	14	12	8	6	16	14	13	11				
ø63	20	2	30	17	11	25.5	255.5	81.5	69.5	14	12	8	6	16	14	13	11				

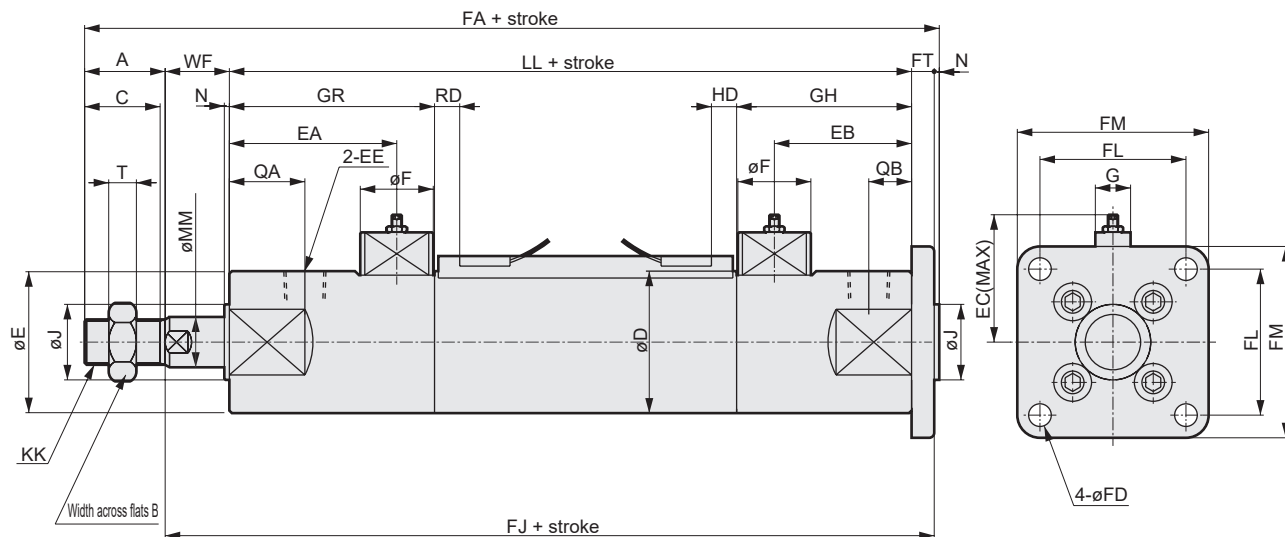
*1 : Tube outer diameter øD and cover outer diameter øE are different for ø20 only.
 *2 : For the dimensions of the accessories, refer to page 969.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions



● Head side flange (FB)



Code	A	B	C	D	E	EA	EB	EC	EE	F	FA	FD	FJ	FL	FM	FT	G	J	KK		
Bore size																					
ø20	18	13	16	26	28	52	43	32.7	Rc1/8	29	205.5	5.5	185.5	28	40	6	14	13	M8		
ø25	20	17	18	31	31	56.5	47.5	34.5	Rc1/8	29	219	5.5	197	32	44	7	14	15	M10X1.25		
ø32	20	17	18	37	37	56.5	47.5	37.8	Rc1/4	29	219	6.6	197	38	53	7	14	18	M10X1.25		
ø40	26	22	24	46	46	62	51	47.3	Rc1/4	29	242.5	6.6	214.5	46	61	8	14	25	M14X1.5		
ø50	32	27	30	56.4	56.4	66.5	54.5	52.6	Rc3/8	29	264.5	9	230.5	58	76	9	14	30	M18X1.5		
ø63	32	27	30	69.4	69.4	66.5	54.5	59.3	Rc3/8	29	264.5	11	230.5	70	92	9	14	32	M18X1.5		
Code	LL		MM	N	QA		QB		T	WF		GR	GH	T0/T5/T2/T3		T8		T2W/T3W		T1/T2J/T2Y/T3Y/T2YD	
Bore size														RD	HD	RD	HD	RD	HD	RD	HD
ø20	164		10	2	18		10		5	15.5		67	58	10	10	4	4	12	12	9	9
ø25	173		12	2	20		10		6	17		71.5	62.5	11	9	5	3	13	11	10	8
ø32	173		12	2	20		12		6	17		71.5	62.5	11	9	5	3	13	11	10	8
ø40	186		16	2	26		14		8	20.5		77	66	13	11	7	5	15	13	12	10
ø50	196		20	2	30		17		11	25.5		81.5	69.5	14	12	8	6	16	14	13	11
ø63	196		20	2	30		17		11	25.5		81.5	69.5	14	12	8	6	16	14	13	11

*1 : Tube outer diameter ϕD and cover outer diameter ϕE are different for $\phi 20$ only.

*2 : For the dimensions of the accessories, refer to page 969.

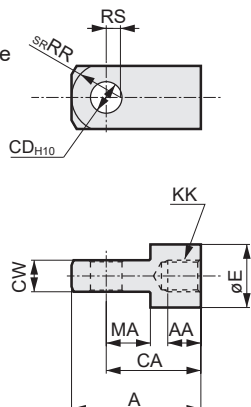
Accessory dimensions

Rod eye

● HCM-I- $\phi 20$ to $\phi 25$

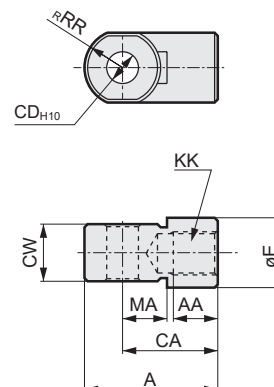


Material: Steel
Zinc chromate treatment



● HCM-I- $\phi 40$ to $\phi 63$

Material: Cast iron
Painting



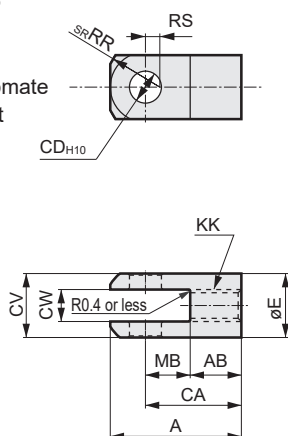
Model No.	Applicable bore size (mm)	A	AA	CA	CD	CW	E	KK	MA	RR	RS	Weight (g)
HCM-I-20	20	34	8.5	25	8	$8^{+0.2}_{-0.4}$	16	M8	11.5	13.4	3.1	39
HCM-I-25	25/32	41	10.5	30	10	$10^{+0.2}_{-0.4}$	20	M10x1.25	14	17.1	4.5	72
HCM-I-40	40	42	14	30	10	$18^{+0.3}_{-0.5}$	22	M14x1.5	14	12	-	152
HCM-I-50	50/63	56	18	40	14	$22^{+0.3}_{-0.5}$	28	M18x1.5	20	16	-	158

Rod clevis

● HCM-Y- $\phi 20$ to $\phi 25$

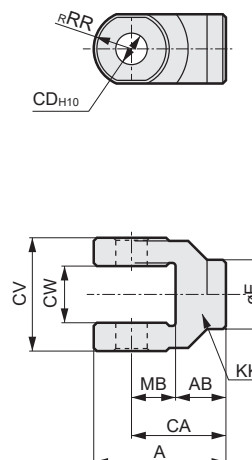


Material: Steel
Zinc chromate treatment



● HCM-Y- $\phi 40$ to $\phi 63$

Material: Cast iron
Painting

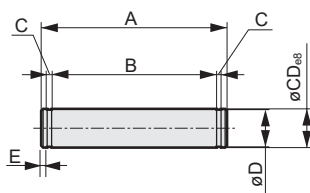


Model No.	Bore size (mm)	A	AB	CA	CD	CV	CW	E	KK	MB	RR	RS	Weight (g)	Applicable pin No.
HCM-Y-20	20	34	13.5	25	8	16	$8^{+0.2}_{-0.4}$	16	M8	11.5	13.4	3.1	46	HCM-P-20
HCM-Y-25	25/32	41	16	30	10	20	$10^{+0.2}_{-0.4}$	20	M10x1.25	14	17.1	4.5	85	HCM-P-25
HCM-Y-40	40	42	16	30	10	36	$18^{+0.3}_{-0.5}$	22	M14x1.5	14	12	-	122	HCM-P-40
HCM-Y-50	50/63	56	20	40	14	44	$22^{+0.3}_{-0.5}$	28	M18x1.5	20	16	-	258	HCM-P-50

Note : A pin and a snap ring are attached with the rod clevis.

Pin for rod eye

Material: Steel
Zinc chromate treatment



Model No.	Bore size (mm)	A	B	C	CD	D	E	Weight (g)	Applicable snap ring
HCM-P-20	20	21	16.2	0.9	8	7.6	1.5	9	C type for shaft 8
HCM-P-25	25/32	25.6	20.2	1.15	10	9.6	1.6	16	C type for shaft 10
HCM-P-40	40	41.6	36.2	1.15	10	9.6	1.6	26	C type for shaft 10
HCM-P-50	50/63	50.6	44.2	1.15	14	13.4	2.1	60	C type for shaft 14

Note : A pin and a snap ring are attached with the rod clevis.

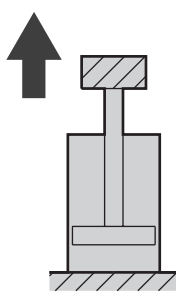
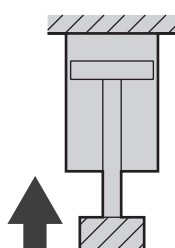
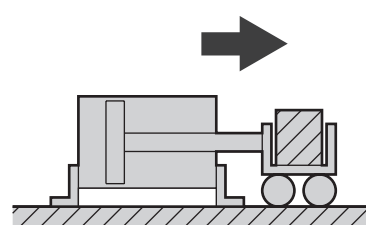
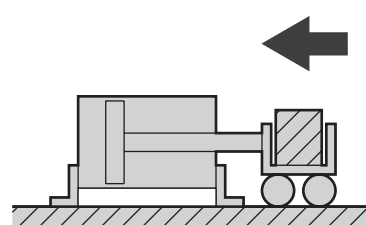
LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Cylinder and system selection guide

Some values may vary depending on conditions. Use the following values as guidelines.

STEP 1 Confirming working conditions

- (1) Load weight M(kg)
- (2) Stroke St(mm)
- (3) Travel time T(s)
- (4) Cylinder average speed $V_0(m/s)$
 $V_0 = St / (T \times 1000)$
- (5) Working pressure P(MPa)
- (6) Mounting method/direction

A	B	C	D
Vertical upward push operation	Vertical downward pull operation	Horizontal pushing operation	Horizontal pull operation
			

Note : When lifting downward vertically, cylinder thrust is virtually unnecessary. Select the cylinder size with the lifting side requiring thrust.

STEP 2 Overview of cylinder size selection

- (1) Set load factor (α) according to the piston speed.

High speed operation (1 to 2 m/s) $\alpha = 20\%$
 Medium speed operation (1 m/s or less) $\alpha = 50\%$

- (3) Find the cylinder bore size (D).

$$D(mm) = \sqrt{\frac{F}{0.25 \times P \times \pi}}$$

P : Working pressure (MPa)

F : Required cylinder thrust (N)

- (2) Calculate required cylinder thrust (F).

$$F(N) = \frac{980 \times M \times \mu}{\alpha}$$

M : Load weight (kg)

α : Load factor (%)

μ : Coefficient of friction

Mounting method C/D horizontal rolling = 0.1

Mounting method A/B perpendicular and vertical = 1

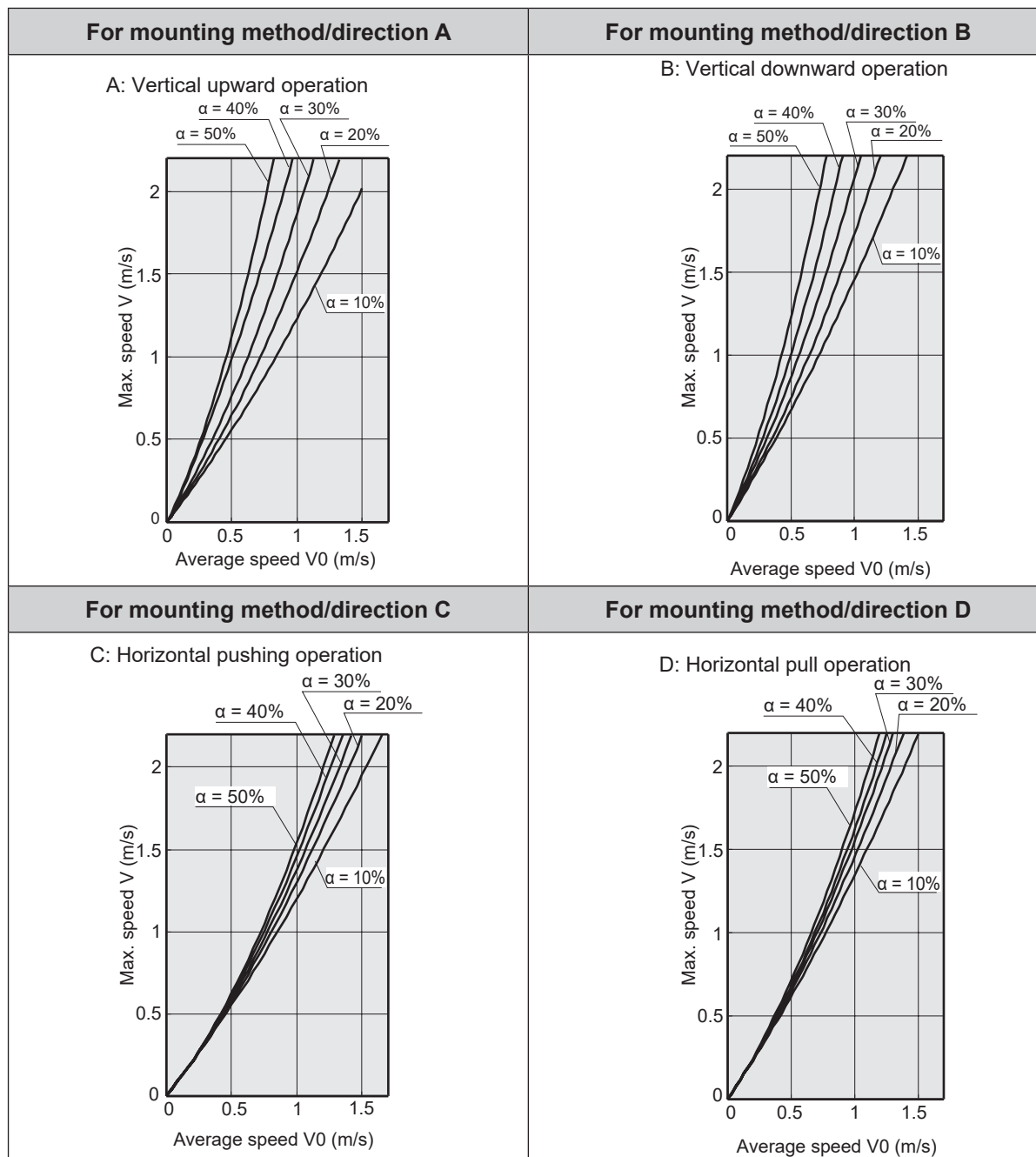
- (4) Select a larger size than the value obtained in "(3)".

Size	Cylinder bore size (mm)
ø20	20
ø25	25
ø32	32
ø40	40
ø50	50
ø63	63

STEP 3 Calculation of max. speed

- Find maximum speed (V_{max}) in [Graph 1] according to working conditions (average speed V_0 /mounting method/direction) of Step 1 and load factor α of Step 2. When maximum speed (V_{max}) exceeds 2 m/s, go back to Step 1, and decrease average speed V_0 .

[Graph 1]



Pipe length is approx. 2 m under working pressure $P = 0.5$ MPa.
When using under other conditions, use this for reference.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

STEP 4 Confirming cushion capacity

- Check if the kinetic energy generated by movement of load is absorbed by the cylinder cushion.

Calculate kinetic energy (E1) according to load weight M of Step 1 and max. speed Vmax found at Step 3.

$$E1(J) = 0.5 \times (V_{\max})^2 \times M$$

- E1 should not be greater than allowable absorbed energy E2 in Table 1.

When $E1 > E2$, decrease average speed V_0 or install an external buffer device (shock absorber).

[Table 1]

Bore size	Allowable absorbed energy E2 (J)
ø20	3
ø25	5
ø32	9
ø40	14
ø50	23
ø63	30

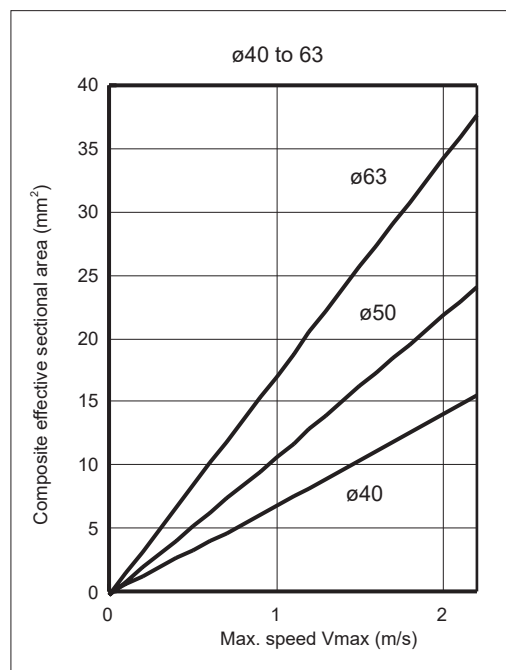
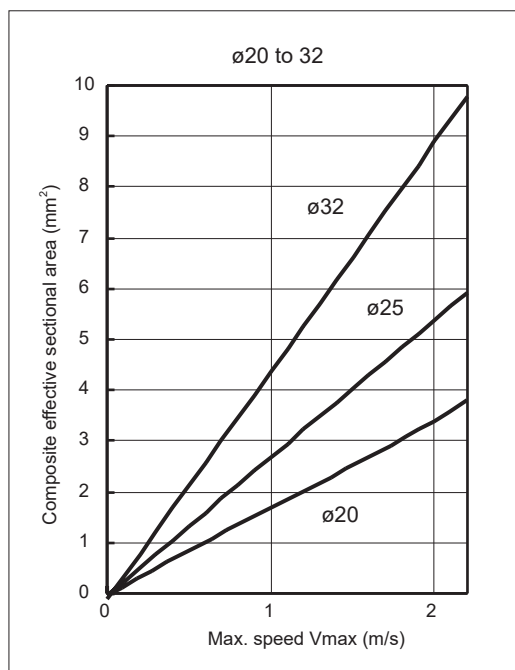
Note : During perpendicular-upward pull operation and perpendicular-downward push operation, energy can be absorbed, but a smooth stop is not possible. (Bounding, etc., is generated.)

When smooth stop is necessary, as reference, load factor should be 10% or less and max. speed should be 1 m/s or less.

STEP 5 Calculation of required composite effective sectional area

Find required effective sectional area S according to max. speed Vmax found at Step 3 and cylinder bore size found at Step 2.

[Graph 2]



STEP 6 System circuit selection

● Using [Table 2], select the system circuit according to the required composite effective sectional area found in Step 5.

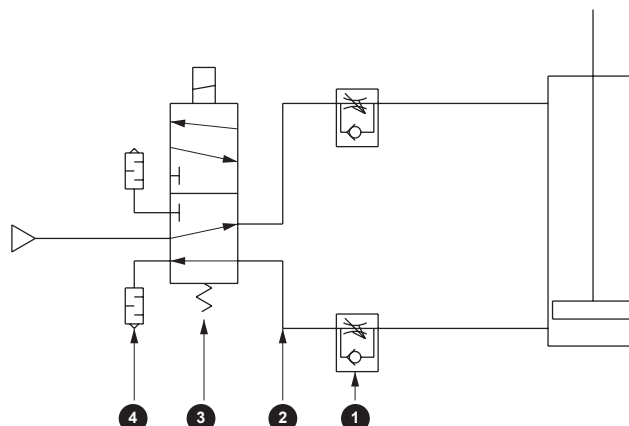
[Table 2]

Code S in the table shows individual effective cross-sectional area (mm²).

Composite effective sectional area (mm ²)	Solenoid valve								Speed controller		Silencer		Piping
	Direct mounting				Sub-plate								
	Single solenoid		S	Double solenoid		S	Single Solenoid		S	Double solenoid		S	(Pipe length 2 m)
1.2	4KA110-M5 4GA110R-M5	3	4KA120-M5 4GA120R-M5	3	4KB110-06 4GB110R-06	4	4KB120-06 4GB120R-06	4	SC3W-6-4	2.8	SLW-6A	10	ø4Xø2.5
2	4KA110-M5 4GA110R-M5	3	4KA120-M5 4GA120R-M5	3					SC3W-6-6	3.6	SLW-6A	10	ø6Xø4
2.3					4KB110-06 4GB110R-06	4	4KB120-06 4GB120R-06	4	SC3W-6-6	3.6	SLW-6A	10	ø6Xø4
3.1	4KA210-06 4GA210R-06	13	4KA220-06 4GA220R-06	12.5					SC3W-6-8	3.6	SLW-6A	10	ø8Xø5.7
3.2					4KB210-06 4GB210R-06	14	4KB220-06 4GB220R-06	14	SC3W-6-8	3.6	SLW-6A	10	ø8Xø5.7
3.6	4KA210-06 4GA210R-06	13	4KA220-06 4GA220R-06	12.5					SC1-6	8	SLW-6A	10	ø6Xø4
3.7					4KB210-06 4GB210R-06	14	4KB220-06 4GB220R-06	14	SC1-6	8	SLW-6A	10	ø6Xø4
5	4KA210-06 4GA210R-06	13	4KA220-06 4GA220R-06	12.5	4KB210-06 4GB210R-06	14	4KB220-06 4GB220R-06	14	SC1-6	8	SLW-6A	10	ø8Xø5.7
5.3					4KB210-08 4GB210R-08	14	4KB220-08 4GB220R-08	14	SC3W-8-8	7	SLW-8A	20	ø8Xø5.7
5.9					4KB210-08 4GB210R-08	14	4KB220-08 4GB220R-08	14	SC3W-8-10	7	SLW-8A	20	ø10Xø7.2
6.1	4F210-08	18	4F220-08	18					SC3W-8-10	7	SLW-8A	20	ø10Xø7.2
6.4	4KA310-08 4GA310R-08	25	4KA320-08 4GA320R-08	25	4KB310-08 4GB310R-08	28	4KB320-08 4GB320R-08	28	SC3W-8-10	7	SLW-8A	20	ø10Xø7.2
6.5	4KA210-06 4GA210R-06	13	4KA220-06 4GA220R-06	12.5					SC1-8	13	SLW-6A	10	ø10Xø7.2
6.9					4KB210-08 4GB210R-08	14	4KB220-08 4GB220R-08	14	SC1-8	13	SLW-8A	20	ø8Xø5.7
8.5					4F210-08	18	4F220-08	18	SC1-8	13	SLW-8A	20	ø10Xø7.2
9	4KA310-08 4GA310R-08	25	4KA320-08 4GA320R-08	25	4KB310-08 4GB310R-08	28	4KB320-08 4GB320R-08	28	SC1-8	13	SLW-8A	20	ø10Xø7.2
9.9	4F310-10	32	4F320-10	32					SC3W-10-10	15	SLW-8A	20	ø10Xø7.2
10	4KA410-10 4GA410-10	50	4KA420-10 4GA420-10	50	4KB410-10 4GB410-10	60	4KB420-10 4GB420-10	60	SC3W-10-10	15	SLW-8A	20	ø10Xø7.2
11	4KA410-10 4GA410-10	50	4KA420-10 4GA420-10	50	4KB410-10 4GB410-10	60	4KB420-10 4GB420-10	60	SC3W-10-12	15	SLW-8A	20	ø12Xø8.9
13					4F410-10	32	4F420-10	32	SC1-10	25	SLW-8A	20	ø12Xø8.9
15.8					4F510-10	47	4F520-10	47	SC1-10	25	SLW-10A	30	ø12Xø8.9
17					4F510-10	47	4F520-10	47	SC1-10	25	SLW-10A	30	ø15Xø11.5
19.6					4F510-10	47	4F520-10	47	SC1-15	36	SLW-10A	30	ø15Xø11.5
20					4F610-15	90	4F620-15	90	SC1-15	36	SLW-15A	40	ø12Xø8.9
24					4F610-15	90	4F620-15	90	SC1-15	36	SLW-15A	40	ø15Xø11.5
30					4F610-15	90	4F620-15	90	SC-20A	110	SLW-15A	40	ø15Xø11.5
41					4F610-15	90	4F620-15	90	SC-20A	110	SL-15A	92	ø15Xø11.5
45					4F610-15	90	4F620-15	90	SC-20A	110	SL-20A	160	ø15Xø11.5

[Circuit diagram]

- Speed controller
- Piping
- Solenoid valve
- Silencer





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: High energy absorption cylinder HCM Series

Design/selection

CAUTION

- Although the cylinder port is designed to achieve speeds of 2000 mm/s or more, be sure to mount a speed controller in order to use it within the specified range.
- Note that the working piston speed of 2000 mm/s is the max. speed, not the average speed.
- Avoid using the product so as to apply lateral load to the piston rod of the cylinder. The required speed may not be attained, bearings may wear abnormally, and performance may drop.

■ Cushion

The air cushion absorbs kinetic energy that the piston generates by using air compressibility and prevents the piston and cover from colliding at the stroke end. Therefore, note that it is not a function for reducing the piston speed near the stroke end.

- Consider the system selection guide of the cylinder only as a guideline, as it may vary depending on the operating conditions (working pressure, travel method and direction of the load and piping length).
- Operating the cylinder at high speed increases the instantaneous flow rate of the air, allowing drainage to accumulate more easily. Provide an air tank to prevent drain from entering the cylinder and to prevent pressure loss when filtering oil mist.

Mounting, installation and adjustment

CAUTION

- When adjusting speed with the speed controller, gradually open the needle from the closed state and increase speed. The piston rod may suddenly pop out and create a hazard if speed is adjusted while the needle is open.
- If operation is started while the exhaust side is at atmospheric pressure, the rod could pop out and cause a dangerous situation. Pressurize the exhaust side before starting.
- Switch rails are adhered with industrial adhesive tape. If used in an atmosphere containing inorganic or organic solvents or water vapor, rails may become loose.
Main inorganic solvents/organic solvents
Inorganic solvents : Sodium hydroxide, hydrochloric acid, etc.
Organic solvents : Toluene, ethanol, hexane, gasoline, kerosene, etc.

- Remove all oil, moisture, dust, etc., from the body (tube) in order to adhere the switch rail.
(Perform adhesion by referring to instructions attached to the part.)

- Mount the speed controller near the cylinder piping port. Otherwise, speed cannot be controlled.

- When the unit will be used where the specifications of the cushion (allowable absorbed energy) will be exceeded, provide a separate external shock absorber.

Use/maintenance

CAUTION

- When disassembling the cylinder, grip the width across flats portion of either of the head cover or the rod cover with a vice, etc., apply a wrench or an adjustable wrench to the width across flats portion of the other cover and loosen it to remove the cover.

When retightening the cover with “LB” foot bracket, tighten so brackets on both sides have no play. When using other than an “LB” foot bracket, retighten from the position set before disassembly.