LCR

Linear slide cylinder

Combined functions

ø6/ø8/ø12/ø16/ø20/ø25

Overview

With a new wide high-precision linear guide, this model is most suitable for precision assembly with a thrust twice as large as that of previous models with a twin rod construction.

Features

Significant weight reduction

The aluminum table makes it possible to reduce its weight by up to 10% compared to the previous model.

Increased rigidity

The highly rigid linear guide and slide table have significantly improved the entire rigidity compared to previous models.

Increased flexibility in design

Designing is more flexible with the multi-side piping, two-side installation, a standard positioning hole and laterally symmetrical configuration.

A variety of choices

Six bore sizes from ø6 to ø25, stroke from 10 to 150 mm and an additional switch are available.

CONTENTS

LCR :Renewal Series

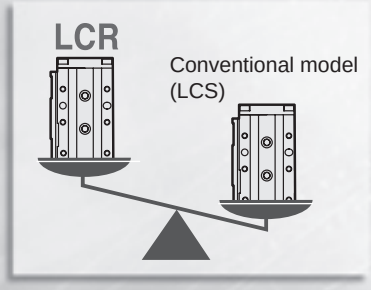
Linear slide cylinder

* The picture shows the standard product.

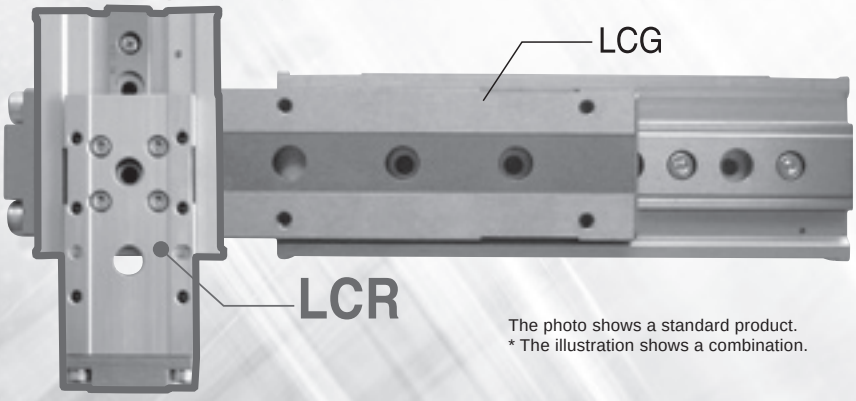
Extremely lightweight LCR :Reduce Weight

Up to 10% in weight reduction.

- **Compared to the conventional model: Up to 10% lighter!!**



- **Applications**
  Works perfectly on the Z-axis.

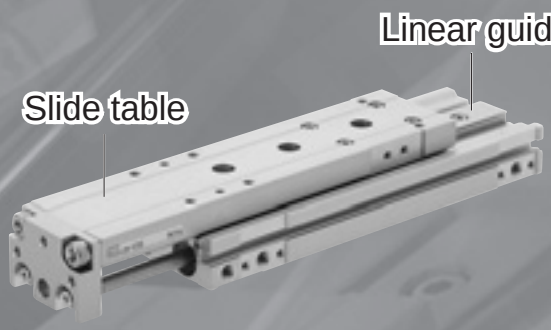


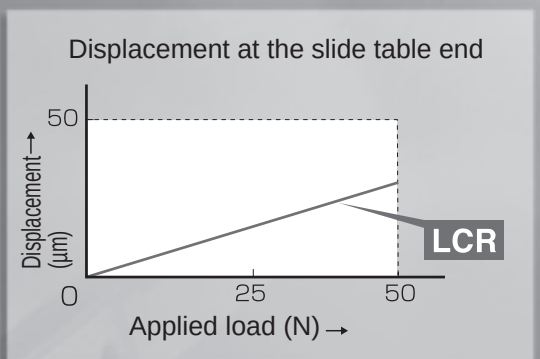
The photo shows a standard product.
* The illustration shows a combination.

The moving part is lighter, enabling efficient, energy-saving compact equipment.

Increased rigidity LCR :Rigidity

The highly rigid linear guide and slide table surpass the conventional model (LCS) in rigidity!





Flexible

RoHS

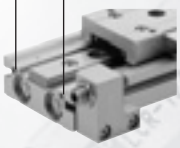
Symmetrical structure
Available for a variety of applications

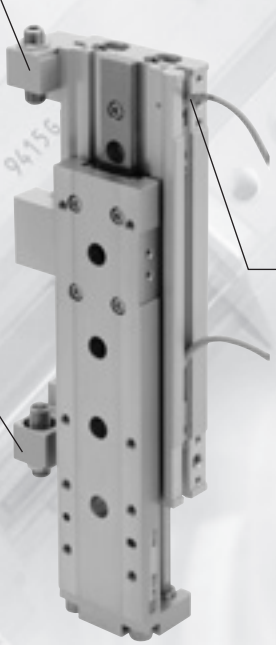
Increased flexibility in design

Designing is more flexible with the symmetrical stoppers, multi-side piping, two-side installation and availability of a positioning hole.

■ **Modification to the symmetrical configuration is possible**
⬅ shows the piping direction.

■ **Standard rear piping port (except for ø 6)**





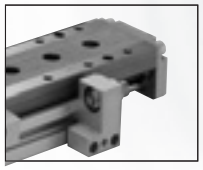
2-color display switch

The proximity 2-color display switch is available. It does not protrude from the body and thus contributes to simple appearance of the cylinder.

A wide variety of options and variations

The standard, position locking, clean room specifications and fine speed are available. The options include a stroke adjusting stopper, shock absorber stopper and more.

* A shock absorber stopper cannot be used with the clean room specifications.

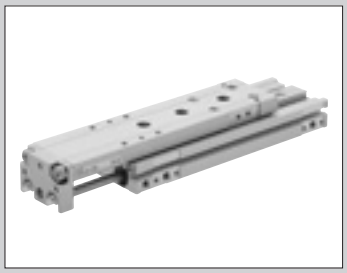


■ **Stroke adjusting stopper**
Adjusting range on one side: 0 to 5 mm

■ LCR product variations

● Option

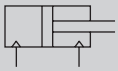
Model variations	Bore size	Stroke length (mm)									Stroke adjusting stopper	Switch
		10	20	30	40	50	75	100	125	150	S*	
 Double acting/single rod (clean room specifications) **LCR-P7***	ø 6	●	●	●	●	●					●	●
	ø 8	●	●	●	●	●	●				●	●
	ø 12	●	●	●	●	●	●	●			●	●
	ø 16	●	●	●	●	●	●	●	●		●	●
	ø 20/ø 25	●	●	●	●	●	●	●	●	●	●	●
 Double acting/fine speed (clean room specifications) **LCR-F-P7***	ø 12	●	●	●	●	●	●	●	●	●	●	●
	ø 16	●	●	●	●	●	●	●	●	●	●	●
	ø 20/ø 25	●	●	●	●	●	●	●	●	●	●	●



Linear slide cylinder Double acting/single rod

LCR Series

● Bore size: ø6/ø8/ø12/ø16/ø20/ø25

JIS symbol 

RoHS

Structure and material restriction

	Structure	Model No.
P7 Series	Exhaust treatment	P72
	Vacuum treatment	P73

Specifications

Descriptions		LCR-P7*					
Bore size mm		ø6	ø8	ø12	ø16	ø20	ø25
Actuation		Double acting					
Working fluid		Compressed air					
Max. working pressure MPa		0.7					
Min. working pressure MPa		0.15 (*2)					
Proof pressure MPa		1.05					
Ambient temperature °C		-10 to 60 (no freezing)					
Port size	Main body side	M3	M5			Rc1/8	
	Main body rear	-	M3			M5	Rc1/8
Port size (relief port)		M3	M5			Rc1/8	
Stroke tolerance mm		+2.0 0 (*1)					
Working piston speed mm/s		50 to 500 (*3)					
Cushion		With rubber cushion					
Lubrication		Not available					
Allowable energy absorption J		Refer to table 3 on page 132.					

*1: Note that there will be a slight gap between the end plate and floating bush if no stopper is attached.
*2: The stroke adjusting stopper for 0.3MPa and over working pressure is the metal sealing type.
*3: Keep within 50 to 200 mm/s when using a stroke adjusting stopper.

Stroke

Bore size (mm)	Standard stroke (mm)
ø6	10, 20, 30, 40, 50
ø8	10, 20, 30, 40, 50, 75
ø12	10, 20, 30, 40, 50, 75, 100
ø16	10, 20, 30, 40, 50, 75, 100, 125
ø20	10, 20, 30, 40, 50, 75, 100, 125, 150
ø25	10, 20, 30, 40, 50, 75, 100, 125, 150

Note: The stroke other than above is not available.

Theoretical thrust table

Refer to page 133.

Switch specifications

● 1-color/2-color display

Descriptions	Reed 2-wire				Proximity 2-wire		Proximity 3-wire		
	T0H/T0V		T5H/T5V		T2H/T2V	T2WH/ T2WV	T3H/T3V	T3PH/ T3PV	T3WH/ T3WV
Applications	Programmable controller, relay		Programmable controller, relay IC circuit (without indicator lamp), serial connection		Programmable controller		Programmable controller, relay		
Output method	-		-		-		NPN output	PNP output	NPN output
Power supply voltage	-		-		-		10 to 28 VDC		
Load voltage	12/24 VDC	110 VAC	5/12/24 VDC	110 VAC	10 to 30 VDC	24 VDC ±10%	30 VDC or less		
Load current	5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 20 mA		100 mA or less		50 mA or less
Indicator lamp	LED (Lit when ON)		Without indicator lamp		LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	0 mA				1 mA or less		10 μA or less		
Weight g	1 m: 18 3 m: 49 5 m: 80								

Descriptions	Proximity 2-wire	Proximity 3-wire	Proximity 2-wire		Proximity 3-wire		
	F2S	F3S	F2H/F2V	F2YH/ F2YV	F3H/F3V	F3PH/F3PV (custom order)	F3YH/ F3YV
Applications	Programmable controller	Programmable controller, relay	Programmable controller		Programmable controller, relay		
Output method	-	NPN output	-		NPN output	PNP output	NPN output
Power supply voltage	-	10 to 28 VDC	-		10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	10 to 30 VDC	30 VDC or less	10 to 30 VDC	24 VDC ±10%	30 VDC or less		
Load current	5 to 20 mA	50 mA or less	5 to 20 mA (*2)		100 mA or less	50 mA or less	
Indicator lamp	Red LED (Lit when ON)		LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	1 mA or less	10 μA or less	1 mA or less		10 μA or less		
Weight g	1 m: 10 3 m: 29						

*1: Refer to page 309 for detailed switch specifications and dimensions.
*2: Max. load current: 20mA at 25°C.The current is lower than 25 mA if the operating ambient temperature around the switch is higher than 20°C. (60 to 5 mA at 10°C.)
*3: The F type switch uses a bend-resistant lead wire.

Cylinder weight

● Clean room specifications (Unit: g)

Bore size (mm)	Fine speed stroke (mm)								
	10	20	30	40	50	75	100	125	150
ø6	130	130	150	180	200	-	-	-	-
ø8	220	220	240	290	320	380	-	-	-
ø12	400	410	410	450	480	610	700	-	-
ø16	620	630	630	680	740	970	1,100	1,240	-
ø20	1,160	1,170	1,180	1,260	1,350	1,650	1,860	2,070	2,280
ø25	2,010	2,030	2,040	2,150	2,250	2,740	3,010	3,280	3,550

● Weight of variation/option (stopper) (Unit: g)

Bore size (mm)	Option/stopper Code	
	S1 to S4	S5/S6
ø6	30	40
ø8	40	60
ø12	70	100
ø16	110	150
ø20	170	250
ø25	290	380

How to order

Without switch (Magnet for switch incorporated)

LCR - 8 - 40 ——— S506 DT P72

With switch (Magnet for switch incorporated)

LCR - 12 - 40 - F2H* - R - S506 DT P72

- Model No.
- Ⓐ Bore size
- Ⓑ Stroke
- Ⓒ Switch model No.
- Ⓓ Switch quantity
- Ⓔ Stopper
- Ⓕ Option
- Ⓖ Clean room specifications

Precautions for model No. selection

*1: For the port position, refer to the stopper dimensions on page 126.
*2: The port positions of the standard without stopper are (1) and (3) in the figure below.
*3: Can be selected for the type with stopper only.
*4: When two switches are necessary in the type with S*** of ø6 to ø8 with 30 mm stroke or less, select the F□H switch.
*5: Select when using rear piping.
*6: The stroke adjusting stopper for 0.3 MPa and over working pressure is the metal sealing.
*7: When changing the stopper position from the head side to the rod side, another discrete stopper may be required to be purchased depending on the stroke or the stroke adjustment amount. For details, please consult our sales staff. For some strokes, the adjustment amount of 15 mm or 25 mm is not allowed.

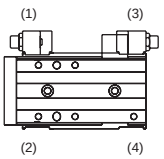
[Example of model No.]

LCR-12-40-F2H-R-S1DTP72

Model: Linear slide cylinder Double acting/single rod (clean room specifications) LCR-P7*

- Ⓐ Bore size : ø12
- Ⓑ Stroke : 40 mm
- Ⓒ Switch model No. : Proximity/2 wires/Lead wire 1 m Lead wire straight
- Ⓓ Switch quantity: 1 (on rod end)
- Ⓔ Stopper : Stroke adjusting stopper Stopper position (1)
- Ⓕ Option : Side port on stopper/Bottom port on stopper. Stopper block material: steel (nitriding)
- Ⓖ Clean room specifications : Exhaust treatment

● Stopper position



Code	Content
Ⓐ Bore size	
6	ø6
8	ø8
12	ø12
16	ø16
20	ø20
25	ø25

Ⓑ Stroke (mm)

		Bore size (ø)					
		6	**8**	**12**	**16**	**20**	**25**
10	10	●	●	●	●	●	●
20	20	●	●	●	●	●	●
30	30	●	●	●	●	●	●
40	40	●	●	●	●	●	●
50	50	●	●	●	●	●	●
75	75		●	●	●	●	●
100	100			●	●	●	●
125	125				●	●	●
150	150					●	●

Ⓒ Switch model No.

Lead wire straight	Lead wire L-shaped	Contact	Display	Lead wire	Bore size ø6	ø8	ø12	ø16	ø20	ø25
—	**F2S***	Proximity	1-color display	2 wires	●	●	●			
—	**F3S***			3 wires						
F2H*	**F2V***			2 wires						
F3H*	**F3V***			3 wires						
F3PH*	**F3PV***		1-color display (custom order)							
F2YH*	**F2YV***		2-color display	2 wires						
F3YH*	**F3YV***			3 wires						
T0H*	**T0V***	Reed	1-color display	2 wires						
T5H*	**T5V***		Without indicator lamp							
T2H*	**T2V***	Proximity	1-color display	2 wires				●	●	●
T3H*	**T3V***			3 wires						
T3PH*	**T3PV***		1-color display (PNP output)							
T2WH*	**T2WV***		2-color display	2 wires						
T3WH*	**T3WV***			3 wires						

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

Ⓓ Switch quantity

R	1 (on rod end)			●			
H	1 (on head end)			●			
D	2			●			

Ⓔ Stopper

Blank	No option			●			
S	**Stroke adjusting stopper**						
	5 mm stroke adjustment on one side						***4**
S1**	Stopper position (1) (can be changed to (4))	Stopper mounting position		●			
S2**	Stopper position (2) (can be changed to (3))			●			
S3**	Stopper position (3) (can be changed to (2))			●			
S4**	Stopper position (4) (can be changed to (1))			●			
S5**	Stopper position (1), (3)			●			
S6**	Stopper position (2), (4)			●			

Section ** Adjustable stroke range ● Applies to all. ▲ Applies to some. *3

	Extended end	Return end				
Blank	5 mm or none	5 mm or none	●			
02	15 mm or none	15 mm or none	●			
03	25 mm or none	25 mm or none	●			
04	15 mm	5 mm	▲			
05	25 mm	5 mm	▲			
06	5 mm	15 mm	▲			
07	5 mm	25 mm	▲			

Ⓕ Option

Blank	Port on the stopper: No port			●			
D	Port on the stopper: Side and bottom ports			● *1, *3			
Blank	Stopper block material: steel			●			
T	Stopper block material: steel (nitriding)			● *3			
Plug attached							
Blank	None						
N	With side piping port plug (not available for ø6 and ø25)						*5

Ⓖ Clean room specifications

	Structure
P72	Exhaust treatment
P73	Vacuum treatment

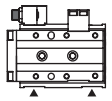
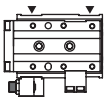
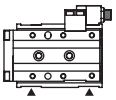
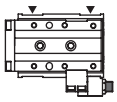
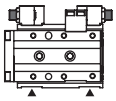
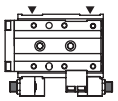
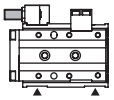
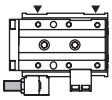
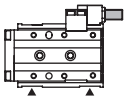
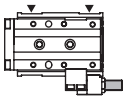
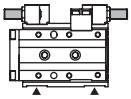
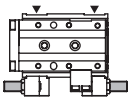
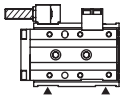
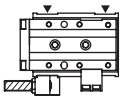
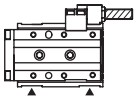
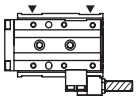
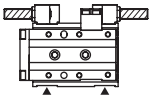
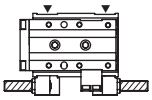
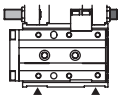
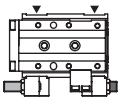
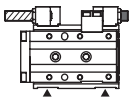
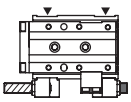
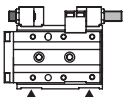
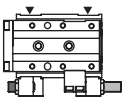
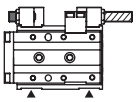
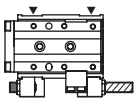
How to select stopper

Stopper combination table

Model No.−[(1) (2) stopper] [(3) adjustable stroke range]

Example) LCR-8-40-[S5] [06]-P7*

Stroke adjusting stopper S

Adjustable stroke range model No. [(3)]		Stopper adjusting range		Stopper model No. [(1) (2)]					
		Extended end	Return end	[S1]	[S2]	[S3]	[S4]	[S5]	[S6]
	Blank	5 mm or none	5 mm or none	 [S1]	 [S2]	 [S3]	 [S4]	 [S5]	 [S6]
	[02]	15 mm or none	15 mm or none	 [S102]	 [S202]	 [S302]	 [S402]	 [S502]	 [S602]
	[03]	25 mm or none	25 mm or none	 [S103]	 [S203]	 [S303]	 [S403]	 [S503]	 [S603]
	[04]	15 mm	5 mm					 [S504]	 [S604]
	[05]	25 mm	5 mm					 [S505]	 [S605]
	[06]	5 mm	15 mm					 [S506]	 [S606]
	[07]	5 mm	25 mm					 [S507]	 [S607]

: Stroke adjusting stopper (adjusting range: 5 mm)
: Stroke adjusting stopper (adjusting range: 15 mm)
: Stroke adjusting stopper (adjusting range: 25 mm)

▲ shows the piping direction.

Available combination table

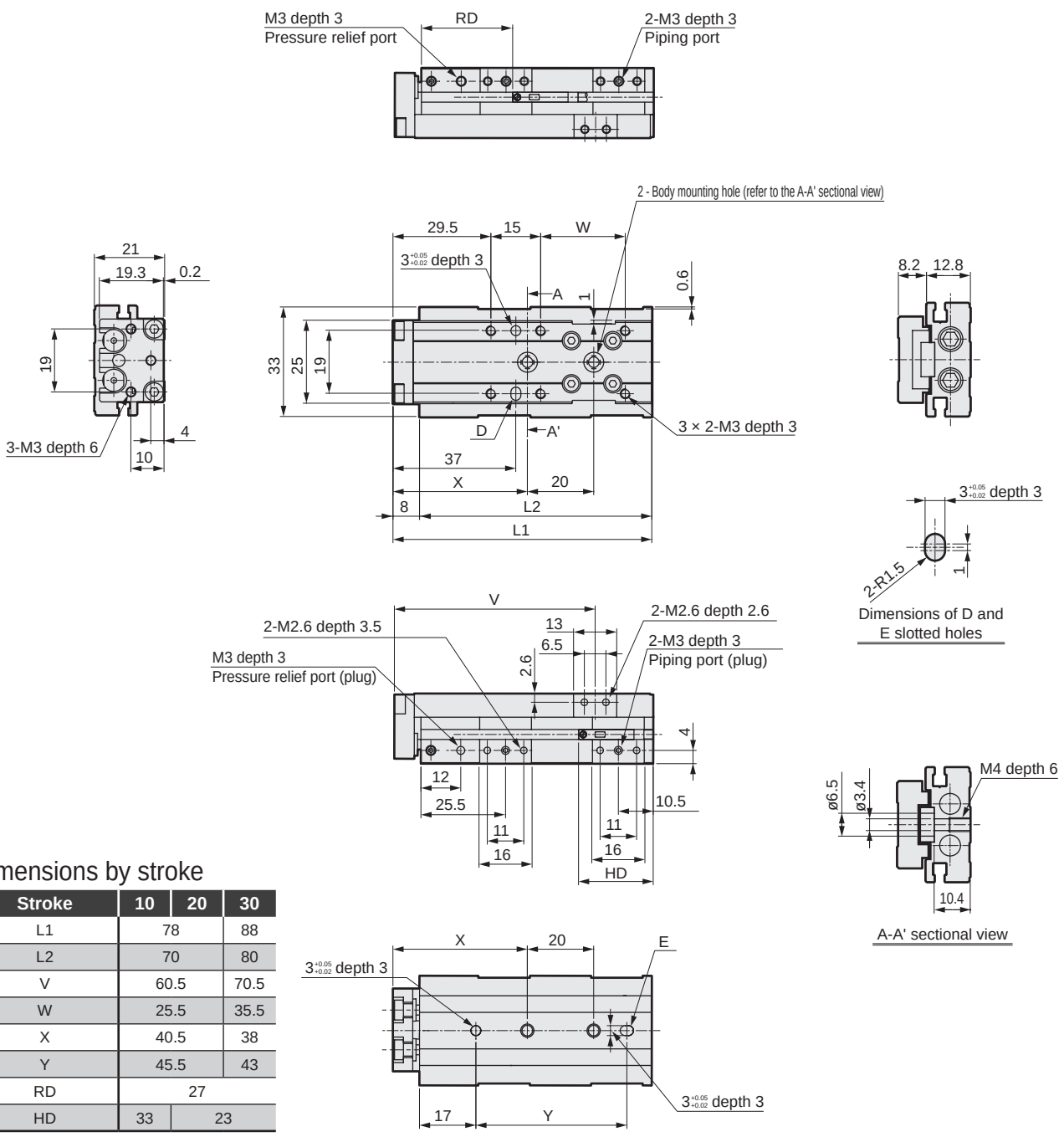
●: Available -: Unavailable

Bore size (mm)		Stopper code																								
		S1			S2			S3			S4			S5							S6						
		Adjustment length code																								
		Blank	02	03	Blank	02	03	Blank	02	03	Blank	02	03	Blank	02	03	04	05	06	07	Blank	02	03	04	05	06	07
ø6, ø8	10st	●	-	-	●	-	-	●	●	-	●	●	-	●	-	-	-	-	●	-	●	-	-	-	-	●	-
	20st or more	●	●	-	●	●	-	●	●	-	●	●	-	●	●	-	●	-	●	-	●	●	-	●	-	●	-
ø12 to ø25	10st	●	-	-	●	-	-	●	●	-	●	●	-	●	-	-	-	-	●	-	●	-	-	-	-	●	-
	20st	●	●	-	●	●	-	●	●	●	●	●	●	●	●	-	●	-	●	●	●	●	-	●	-	●	●
	30st or more	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Dimensions (bore size: ø6)

● LCR-6-P7*

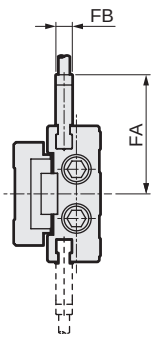
Stroke: 10, 20, 30
(Body mounting hole in the figure shows 20 mm stroke)



Dimensions by stroke

Stroke	10	20	30
L1	78		88
L2	70		80
V	60.5		70.5
W	25.5		35.5
X	40.5		38
Y	45.5		43
RD	27		
HD	33	23	

● Dimensions of projecting section when F2S or F3S cylinder switch is mounted



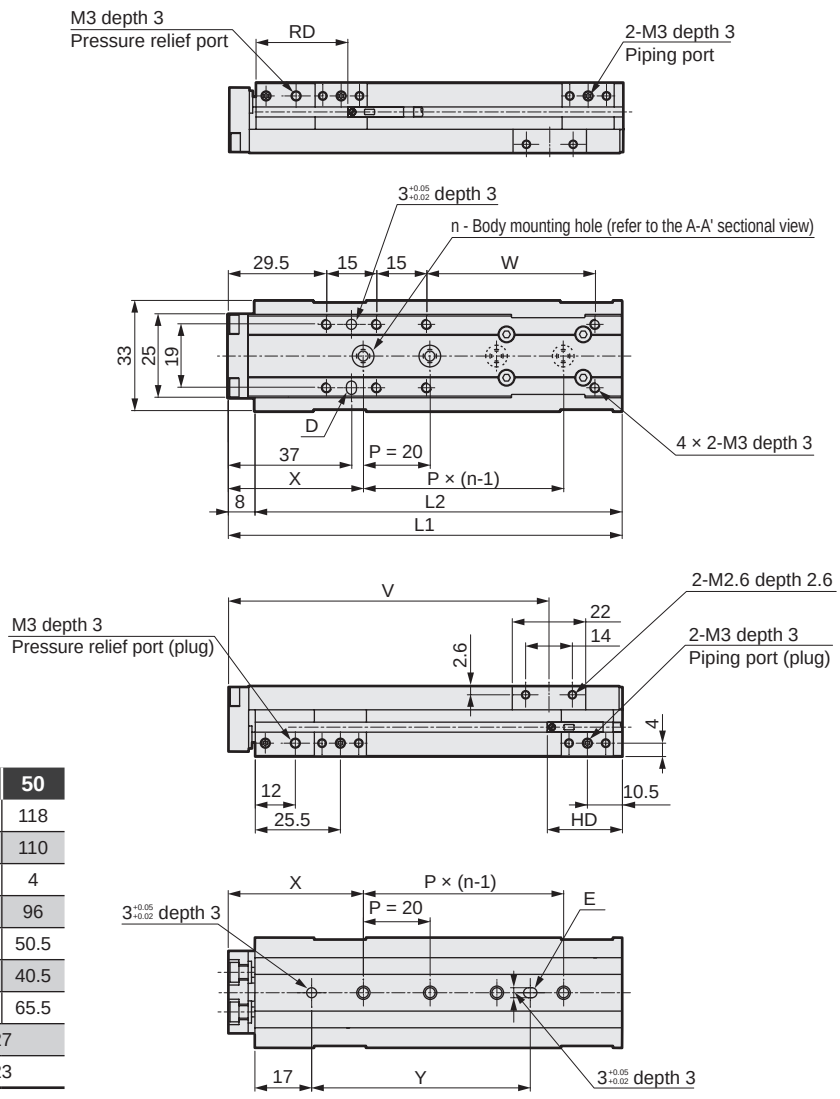
Stroke	10	20	30
FA	29.1		
FB	4		
RD	26		
HD	34	24	

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

Dimensions (bore size: ø6)

● LCR-6-P7*

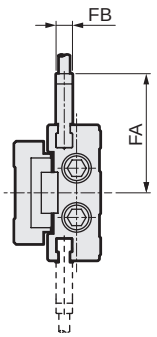
Stroke: 40, 50
(Mounting holes in the figure indicate when stroke is 50)



Dimensions by stroke

Stroke	40	50
L1	108	118
L2	100	110
n	3	4
V	86	96
W	40.5	50.5
X	39	40.5
Y	44	65.5
RD	27	
HD	23	

● Dimensions of projecting section when F2S or F3S cylinder switch is mounted



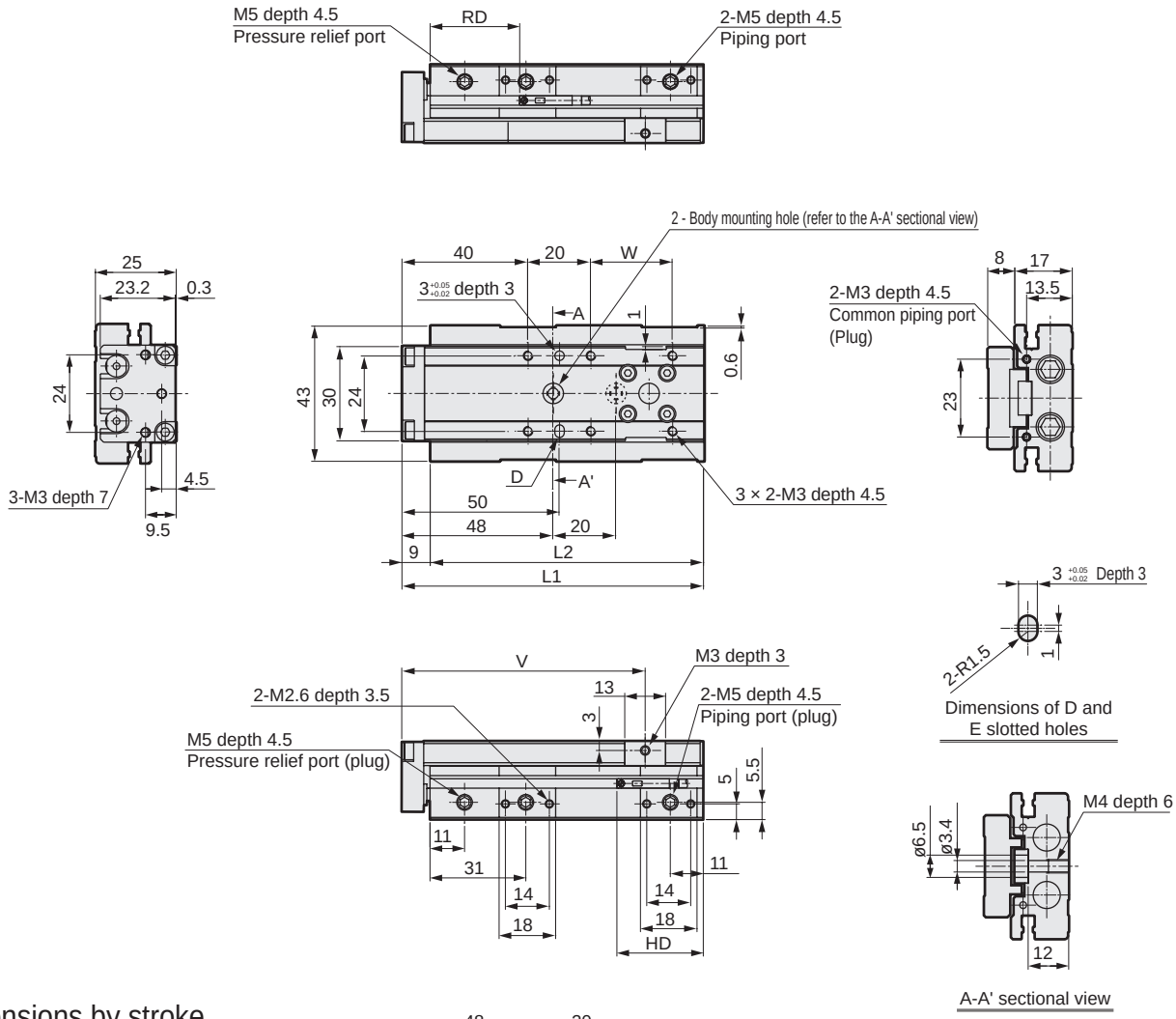
Stroke	40	50
FA	29.1	
FB	4	
RD	26	
HD	24	

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

Dimensions (bore size: ø8)

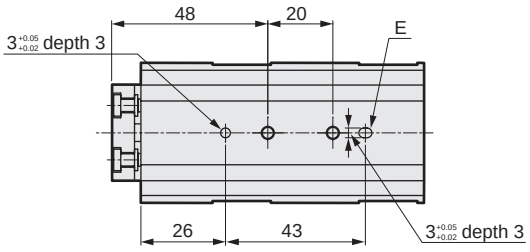
● LCR-8-P7*

Stroke: 10, 20, 30
(Mounting holes in the figure indicate when stroke is 30)

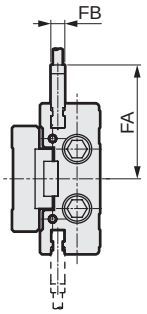


Dimensions by stroke

Stroke	10	20	30
L1	86		96
L2	77		87
V	67.5		77.5
W	16		26
RD	33		
HD	34	24	



● Dimensions of projecting section when F2S or F3S cylinder switch is mounted



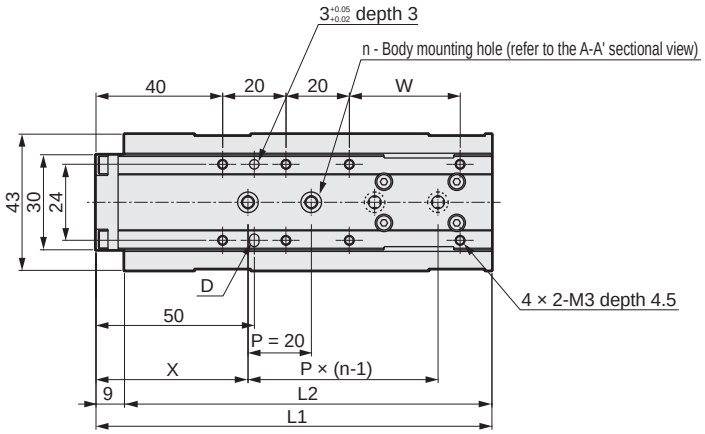
Stroke	10	20	30
FA	32.6		
FB	4		
RD	32		
HD	35	25	

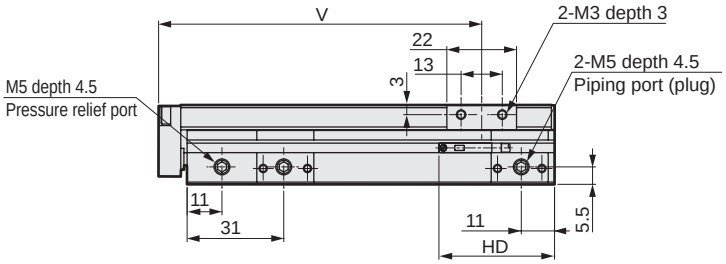
Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø8)

● LCR-8-P7*

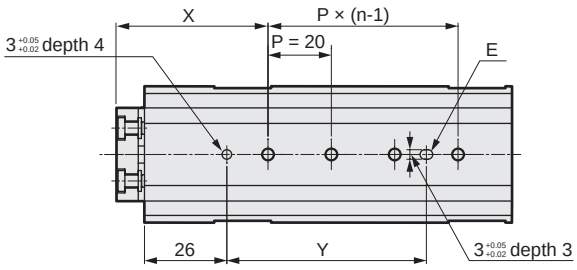
Stroke: 40, 50, 75
(Mounting holes in the figure indicate when stroke is 50)



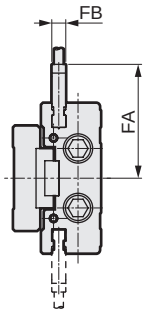


Dimensions by stroke

Stroke	40	50	75
L1	115	125	150
L2	106	116	141
n	3	4	5
V	92	102	127
W	25	35	60
X	46.5	48	45
Y	41.5	63	80
RD	33		
HD	33		



● Dimensions of projecting section when F2S or F3S cylinder switch is mounted



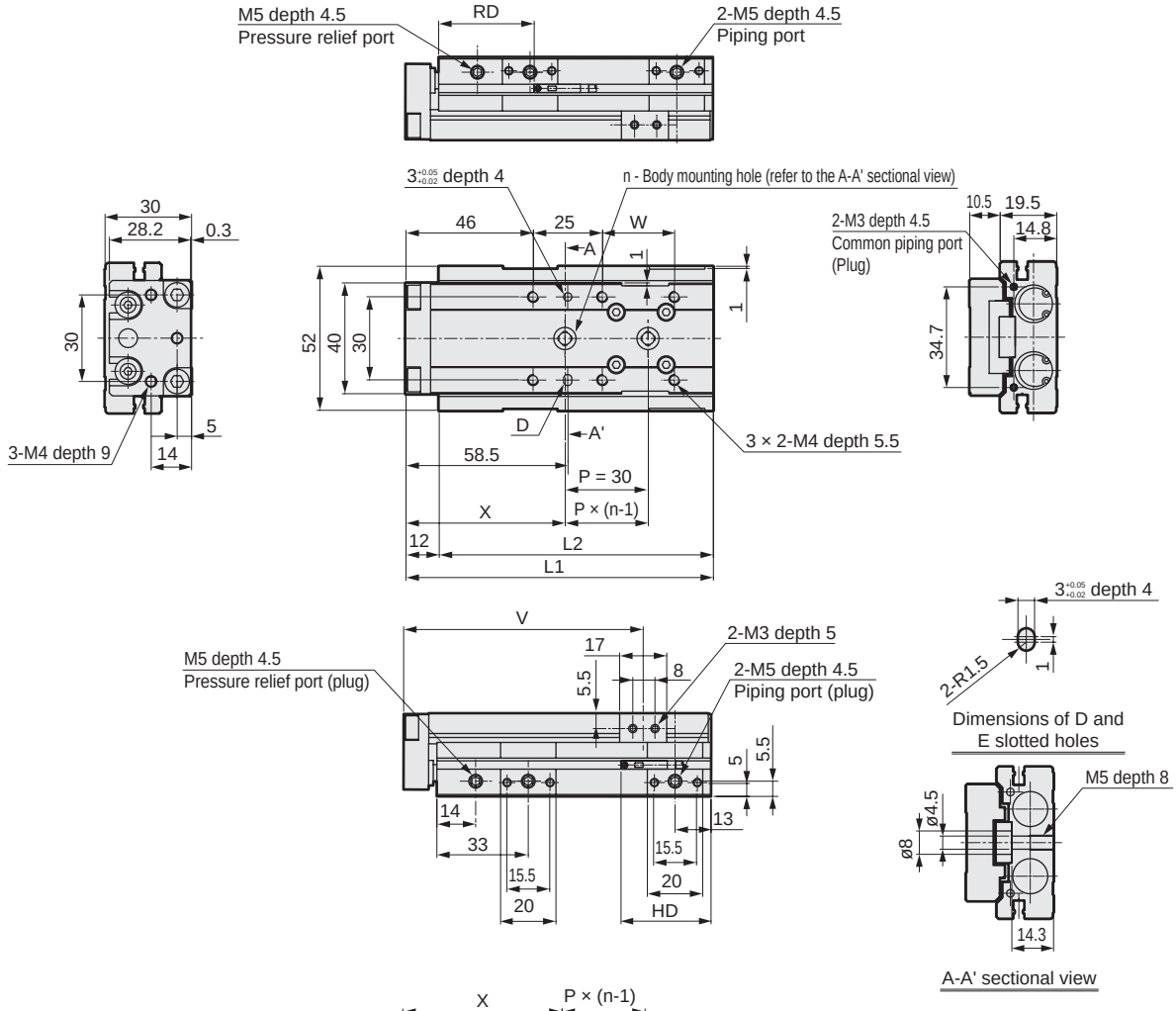
Stroke	40	50	75
FA	32.6		
FB	4		
RD	32		
HD	34		

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø12)

● LCR-12-P7*

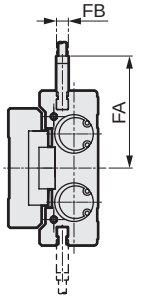
Stroke: 10, 20, 30, 40, 50
(Mounting holes in the figure indicate when stroke is 30)



Dimensions by stroke

Stroke	10	20	30	40	50
L1	111			121	131
L2	99			109	119
n	2			3	
V	88.5			96.5	106.5
W	26			36	46
X	57.5			56	52
Y	32.5			31	57
RD	36.5				
HD	52.5	42.5	32.5		

● Dimensions of projecting section when F2S or F3S cylinder switch is mounted



Stroke	10	20	30	40	50
FA	37.8				
FB	4				
RD	35.5				
HD	53.5	43.5	33.5		

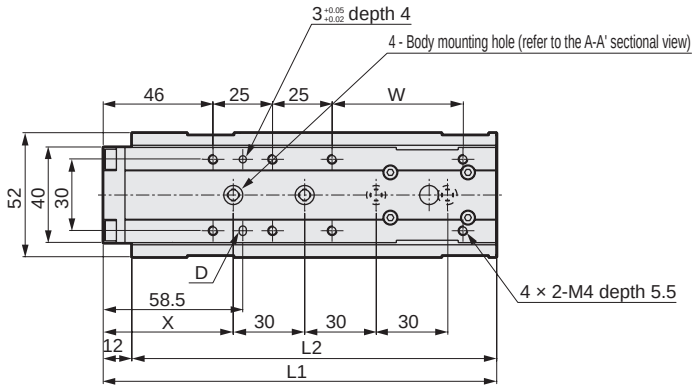
Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

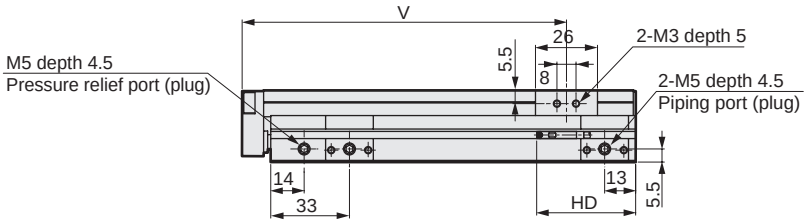
Dimensions (bore size: ø12)

● LCR-12-P7*

Stroke: 75, 100

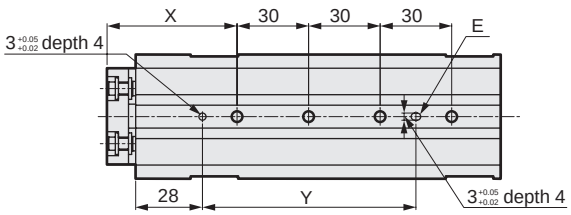
(Mounting holes in the figure indicate when stroke is 75)



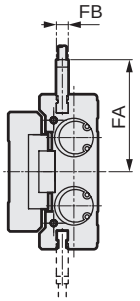


Dimensions by stroke

Stroke	75	100
L1	165	190
L2	153	178
V	136	161
W	55	80
X	54.5	67
Y	89.5	102
RD	36.5	
HD	41.5	



● Dimensions of projecting section when F2S or F3S cylinder switch is mounted



Stroke	75	100
FA	37.8	
FB	4	
RD	35.5	
HD	42.5	

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

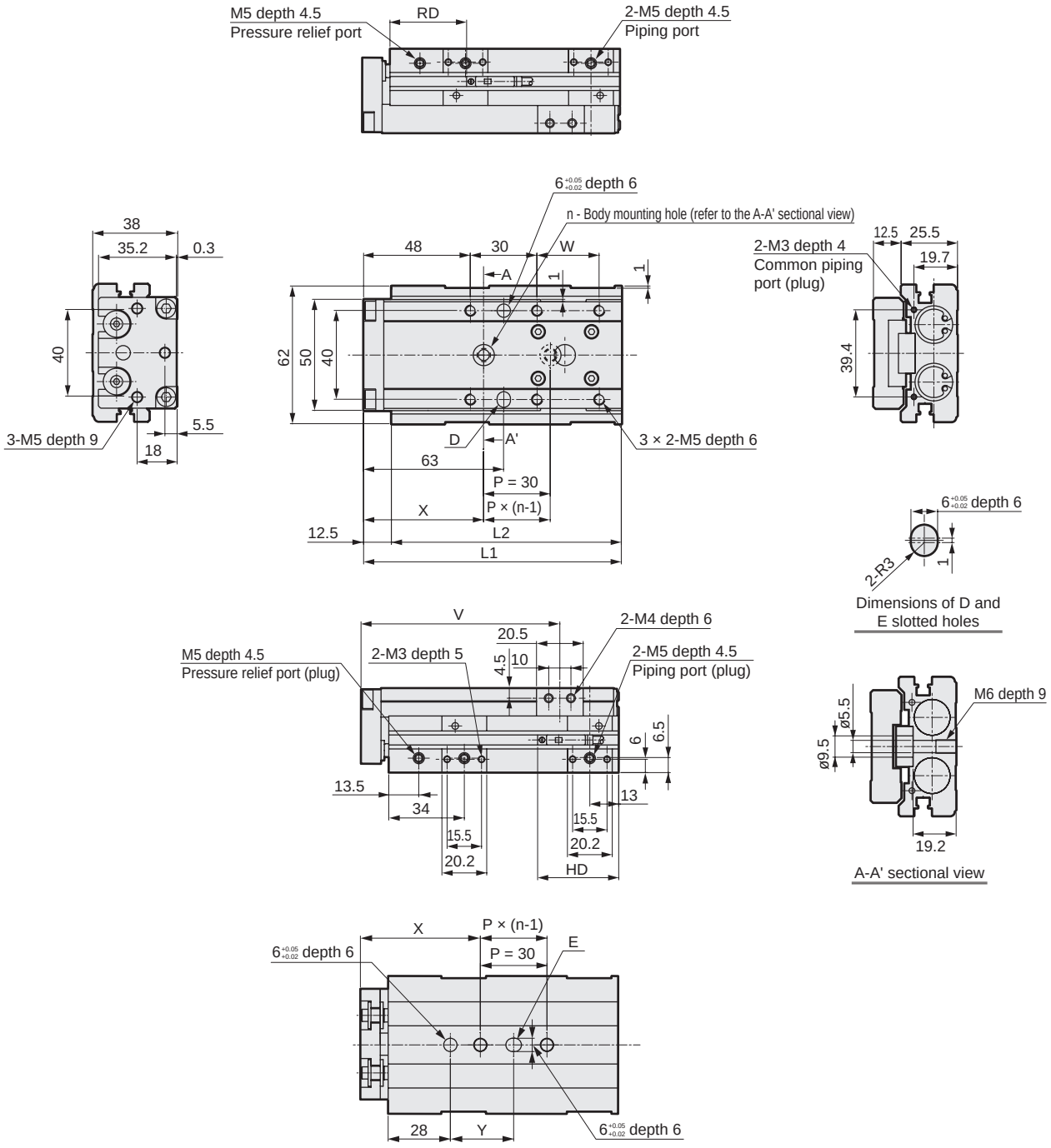
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø16)

● LCR-16-P7*

Stroke: 10, 20, 30, 40, 50

(Mounting holes in the figure indicate when stroke is 30)



Dimensions by stroke

Stroke		10	20	30	40	50
L1		116			126	136
L2		103.5			113.5	123.5
n		2				3
V		89.8			99.8	109.8
W		28			38	48
X		54			65.5	55.5
Y		28.5			40	60
T0/5*	RD	37				
T2/3*	HD	56.5	46.5	36.5		
T2/3W*	RD	39.5				
	HD	54	44	34		

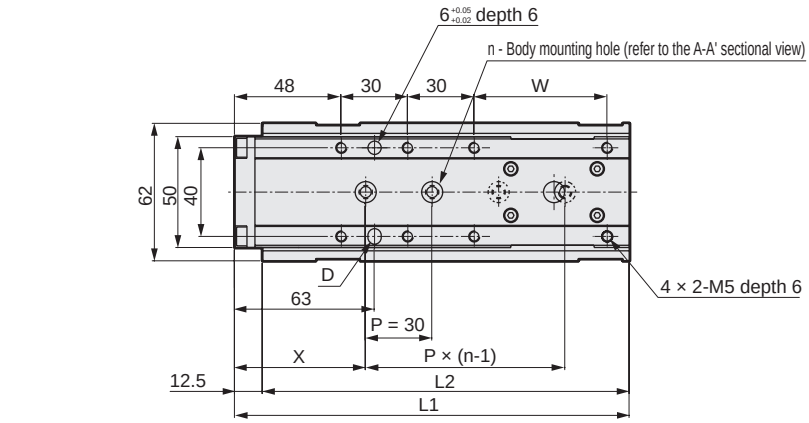
Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

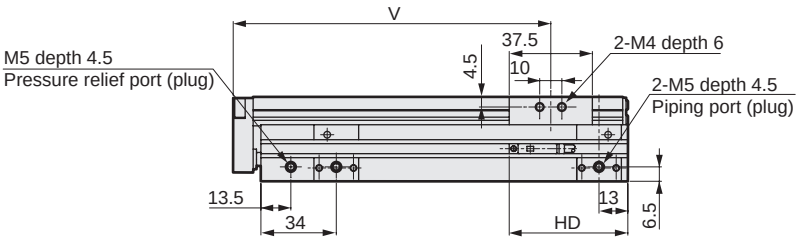
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

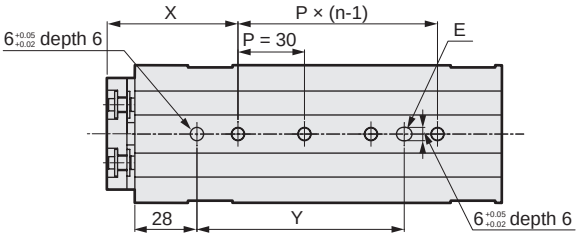
Dimensions (bore size: ø16)

● LCR-16-P7*

Stroke: 75, 100, 125
(Mounting holes in the figure indicate when stroke is 75)







Dimensions by stroke

Stroke		75	100	125
L1		178	203	228
L2		165.5	190.5	215.5
n		4	5	
V		143.3	168.3	193.3
W		60	85	110
X		59	57	69
Y		93.5	121.5	133.5
T0/5*	RD	37		
T2/3*	HD	53.5		
T2/3W*	RD	39.5		
	HD	51		

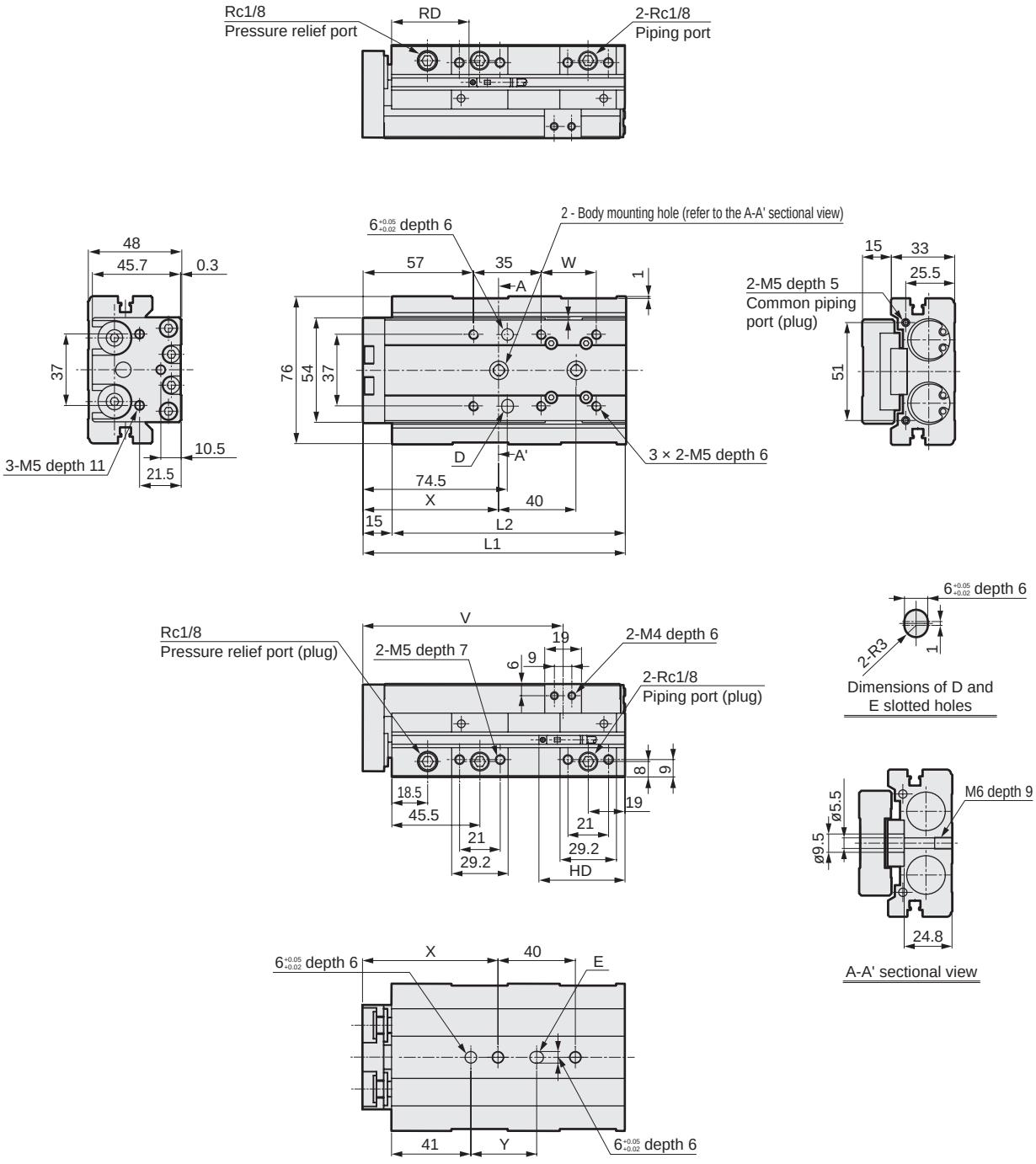
Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø20)

● LCR-20-P7*

Stroke: 10, 20, 30, 40, 50

(Mounting holes in the figure indicate when stroke is 30)



Dimensions by stroke

Stroke		10	20	30	40	50
L1		135.5			145.5	155.5
L2		120.5			130.5	140.5
V		103.5			113.5	123.5
W		28.5			38.5	48.5
X		70			76	74
Y		34			40	38
T0/5*	RD	45.5				
T2/3*	HD	65	55	45		
T2/3W*	RD	47				
	HD	63	53	43		

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

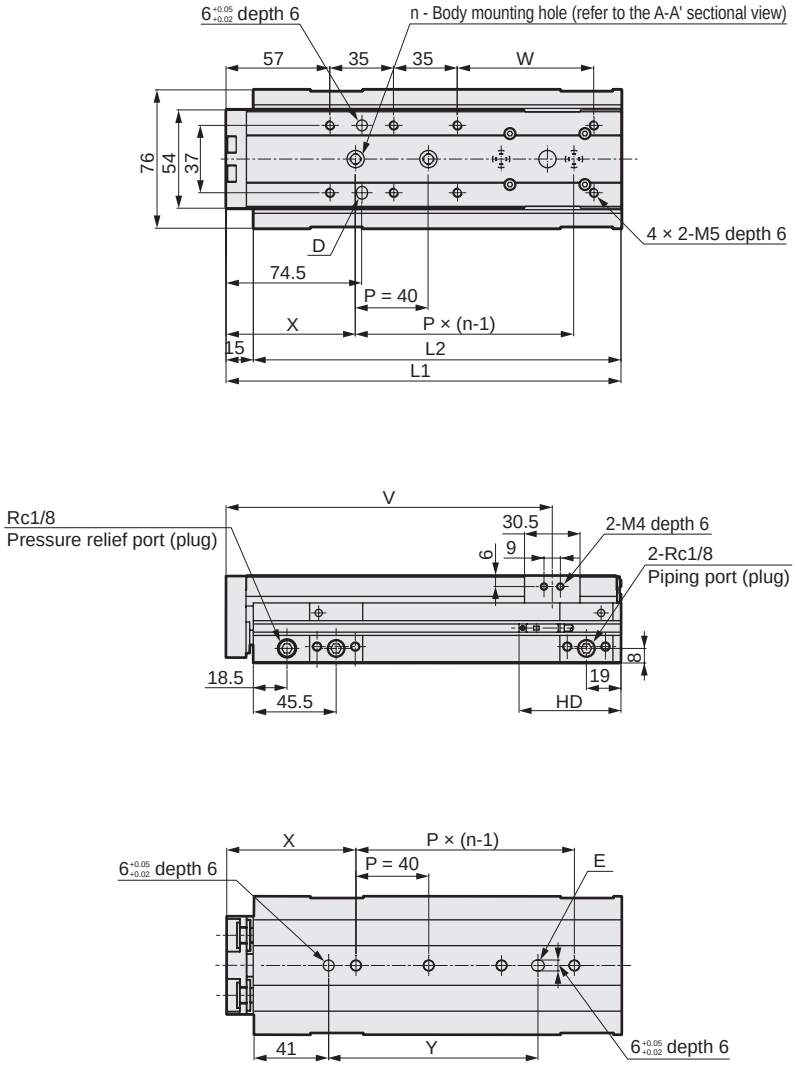
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø20)

● LCR-20-P7*

Stroke: 75, 100, 125, 150

(Mounting holes in the figure indicate when stroke is 100)



Dimensions by stroke

Stroke		75	100	125	150
L1		192	217	242	267
L2		177	202	227	252
n		3	4		5
V		154.3	179.3	204.3	229.3
W		50	75	100	125
X		71		78	76
Y		75	115	122	160
T0/5*	RD	45.5			
T2/3*	HD	57.5			
T2/3W*	RD	47			
	HD	55.5			

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

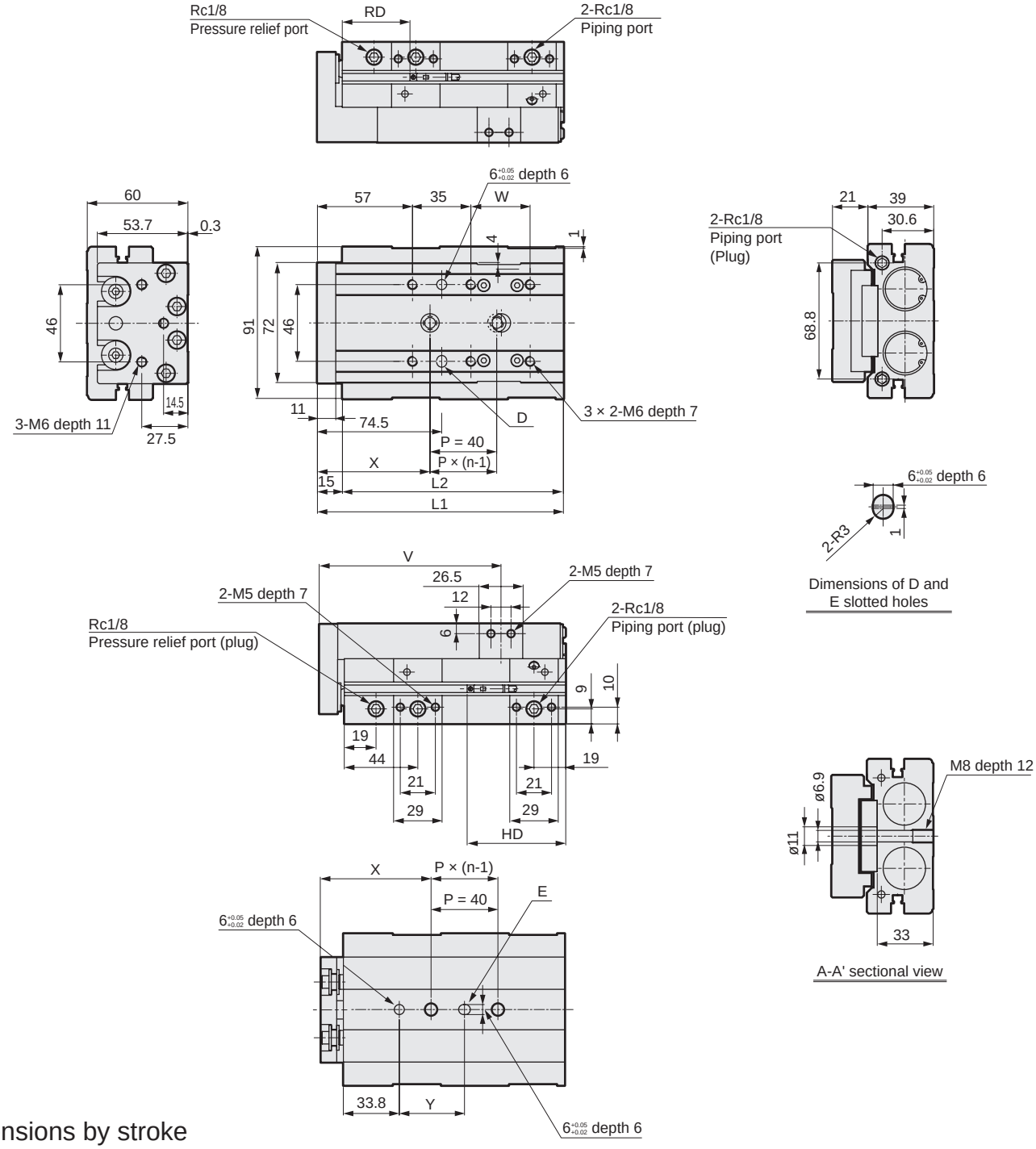
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø25)

● LCR-25-P7*

Stroke: 10, 20, 30, 40, 50

(Mounting holes in the figure indicate when stroke is 30)



Dimensions by stroke

Stroke		10	20	30	40	50
L1		147.5			157.5	167.5
L2		132.5			142.5	152.5
n		2			3	2
V		108.8			118.8	128.8
W		35.5			45.5	55.5
X		67.5			70.5	85.5
Y		39			42	57
T0/5*	RD	44				
T2/3*	HD	78.5	68.5	58.5		
T2/3W*	RD	46				
	HD	76.5	66.5	56.5		

Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

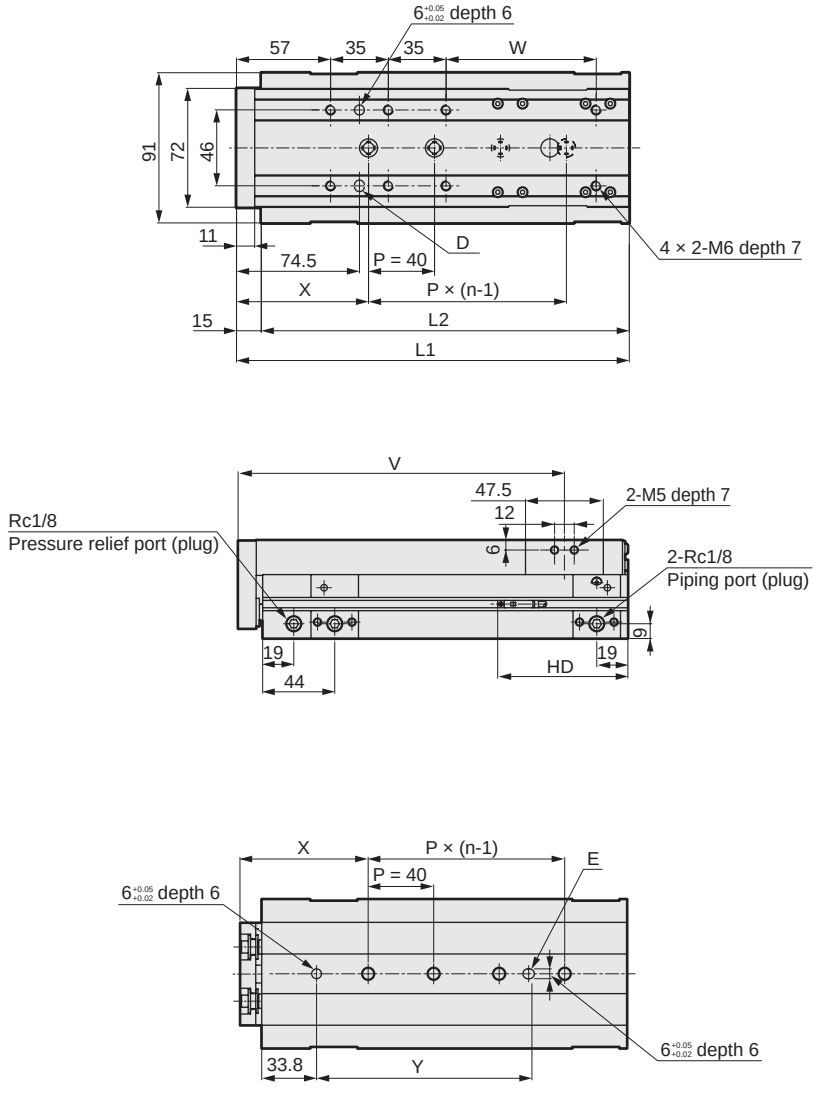
Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions (bore size: ø25)

● LCR-25-P7*

Stroke: 75, 100, 125, 150

(Mounting holes in the figure indicate when stroke is 100)



Dimensions by stroke

Stroke		75	100	125	150
L1		213	238	263	288
L2		198	223	248	273
n		3	4	5	
V		163.8	188.8	213.8	238.8
W		66	91	116	141
X		85	80	70	85
Y		96.5	131.5	161.5	176.5
T0/5*	RD	44			
T2/3*	HD	79			
T2/3W*	RD	46			
	HD	77			

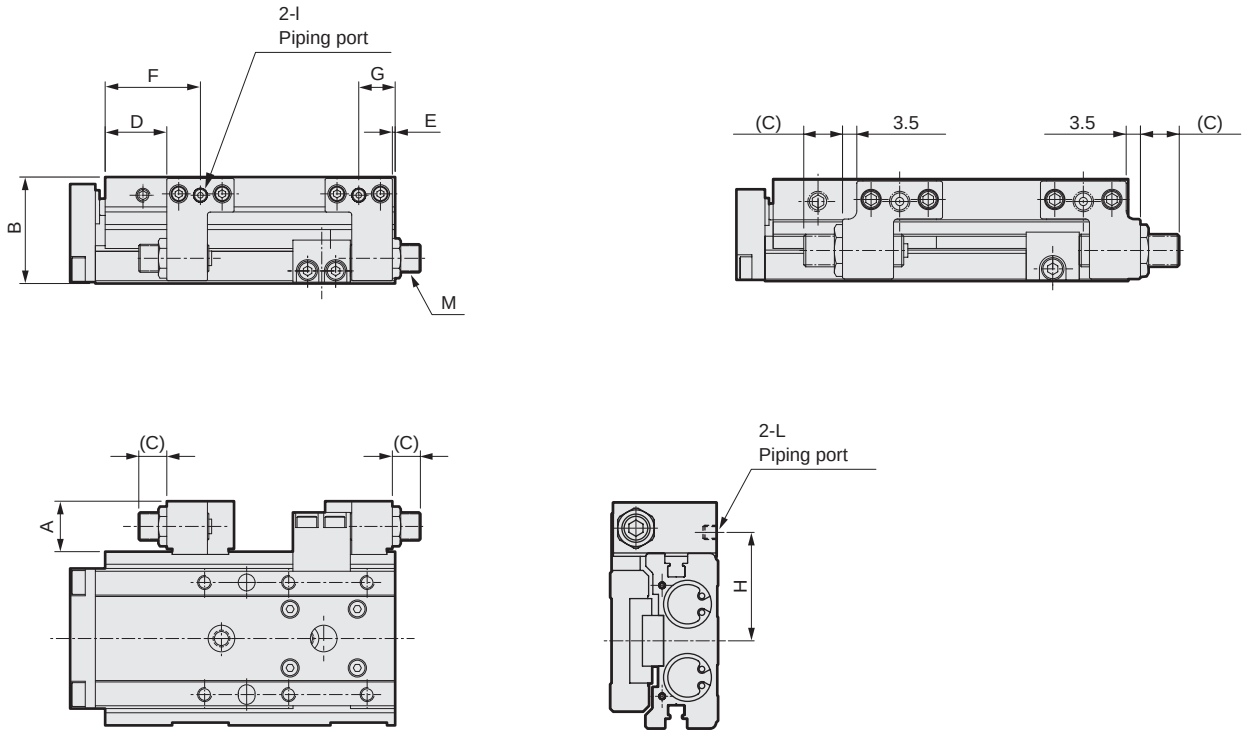
Note 1: When using a positioning hole, use a pin of the dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

Note 2: When using rear piping, refer to the cautions of 1. Common; when piping on page 140.

Dimensions: Option

● Stroke adjusting stopper (S1 to S6)

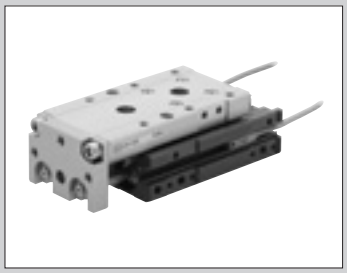
• For ø8



*1: F, G, H, I and L dimensions are only for the types with port on the stopper (S*D*).

Code / Bore size (mm)	A	B	C			D	E	F	G	H	I	L	M
			Adjustable range of stroke										
			5 mm	15 mm	25 mm								
ø6	14	19.5	11	21	–	16	1	25.5	10.5	24	M3 depth 3	M3 depth 3	M8 × 0.75
ø8	15.6	24.5	9.5	19.5	–	20.5	0.5	30.5	10.5	27.3	M5 depth 4	M5 depth 4	M8 × 0.75
ø12	15.5	29	12	22	32	21	1	33	13	31	M5 depth 4	M5 depth 4	M8 × 0.75
ø16	18	37	10	20	30	22	1	34	13	39	M5 depth 4	M5 depth 4	M10 × 1
ø20	20.5	45	14.5	24.5	34.5	29	2.5	45.5	19	46	Rc1/8	M5 depth 4	M12 × 1
ø25	20.5	57	11.5	21.5	31.5	27.5	2.5	44	19	54.5	Rc1/8	M5 depth 4	M12 × 1

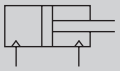
MEMO



Linear slide cylinder Double acting/fine speed

LCR-F Series

● Bore size: ø12/ø16/ø20/ø25

JIS symbol 

RoHS

Structure and material restriction

	Structure	Model No.
P7 Series	Exhaust treatment	P72
	Vacuum treatment	P73

Specifications

Descriptions		LCR-F			
Bore size mm		ø12	ø16	ø20	ø25
Actuation		Double acting			
Working fluid		Compressed air			
Max. working pressure MPa		0.7			
Min. working pressure MPa		0.15 (*3)			
Proof pressure MPa		1.05			
Ambient temperature °C		5 to 60			
Port size	Main body side	M5		Rc1/8	
	Main body rear	M3		M5	Rc1/8
Port size (relief port)		M5		Rc1/8	
Stroke tolerance mm		$^{+2.0}_{0}$ (*1)			
Working piston speed mm/s		5 to 200 (0.5 MPa with no load)			
Cushion		With rubber cushion			
Lubrication		Not available			
Allowable energy absorption J		Refer to table 2 on page 132.			

*1: Note that there will be a slight gap between the end plate and floating bush if no stopper is attached.
*2: The stroke adjusting stopper for 0.3 MPa and over working pressure is the metal sealing.

Stroke

Bore size (mm)	Standard stroke (mm)
ø12	10, 20, 30, 40, 50, 75, 100
ø16	10, 20, 30, 40, 50, 75, 100, 125
ø20	10, 20, 30, 40, 50, 75, 100, 125, 150
ø25	10, 20, 30, 40, 50, 75, 100, 125, 150

Note: The stroke other than above is not available.

Dimensions

Same as double acting/single rod clean room specifications. Refer to pages 118 to 126.

Theoretical thrust table

Refer to page 133.

Switch specifications

● 1-color/2-color display

Descriptions	Reed 2-wire				Proximity 2-wire		Proximity 3-wire		
	T0H/T0V		T5H/T5V		T2H/T2V	T2WH/T2WV	T3H/T3V	T3PH/ T3PV	T3WH/ T3WV
Applications	Programmable controller, relay		Programmable controller, relay IC circuit (without indicator lamp), serial connection		Programmable controller		Programmable controller, relay		
Output method	-		-		-		NPN output	PNP output	NPN output
Power supply voltage	-		-		-		10 to 28 VDC		
Load voltage	12/24 VDC	110 VAC	5/12/24 VDC	110 VAC	10 to 30 VDC	24 VDC ±10%	30 VDC or less		
Load current	5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 20 mA (*2)		100 mA or less		50 mA or less
Indicator lamp	LED (Lit when ON)		Without indicator lamp		LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	0 mA				1 mA or less		10 μA or less		
Weight g	1 m: 18 3 m: 49 5 m: 80								

Descriptions	Proximity 2-wire	Proximity 3-wire	Proximity 2-wire		Proximity 3-wire		
	F2S	F3S	F2H/F2V	F2YH/ F2YV	F3H/F3V	F3PH/F3PV (custom order)	F3YH/ F3YV
Applications	Programmable controller	Programmable controller, relay	Programmable controller		Programmable controller, relay		
Output method	-	NPN output	-		NPN output	PNP output	NPN output
Power supply voltage	-	10 to 28 VDC	-		10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	10 to 30 VDC	30 VDC or less	10 to 30 VDC	24 VDC ±10%	30 VDC or less		
Load current	5 to 20 mA	50 mA or less	5 to 20 mA (*2)		100 mA or less	50 mA or less	
Indicator lamp	Red LED (Lit when ON)		LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	1 mA or less	10 μA or less	1 mA or less		10 μA or less		
Weight g	1 m: 10 3 m: 29						

*1: Refer to page 309 for detailed switch specifications and dimensions.
*2: Max. load current: 20mA at 25°C.The current is lower than 25 mA if the operating ambient temperature around the switch is higher than 20˚C. (60 to 5 mA at 10°C.)
*3: The F type switch uses a bend-resistant lead wire.

Cylinder weight

● Clean room specifications (Unit: g)

Bore size (mm)	Fine speed stroke (mm)								
	10	20	30	40	50	75	100	125	150
ø12	400	410	410	450	480	610	700	-	-
ø16	620	630	630	680	740	970	1,100	1,240	-
ø20	1,160	1,170	1,180	1,260	1,350	1,650	1,860	2,070	2,280
ø25	2,010	2,030	2,040	2,150	2,250	2,740	3,010	3,280	3,550

● Weight of variation/option (stopper) (Unit: g)

Bore size (mm)	Option/stopper code	
	S1 to S4	S5/S6
ø12	70	100
ø16	110	150
ø20	170	250
ø25	290	380

How to order

Without switch (Magnet for switch incorporated)

LCR-F - 12 - 40 ——— S506 DT P72

With switch (Magnet for switch incorporated)

LCR-F - 12 - 40 - F2H* - R - S506 DT P72

Model No.
Ⓐ Bore size
Ⓑ Stroke
Ⓒ Switch model No.
Ⓓ Switch quantity
Ⓔ Stopper
Ⓕ Option
Ⓖ Clean room specifications

⚠ Precautions for model No. selection

*1: For the port position, refer to the stopper dimensions on page 126.
*2: The port positions of the standard without stopper are (1) and (3) in the figure below.
*3: Can be selected for the type with stopper only.
*4: Select when using rear piping.
*5: The stroke adjusting stopper for 0.3 MPa and over working pressure is the metal sealing.
*6: When changing the stopper position from the head side to the rod side, another discrete stopper may be required to be purchased depending on the stroke or the stroke adjustment amount. For details, please consult our sales staff. For some strokes, the adjustment amount of 15 mm or 25 mm is not allowed.

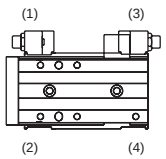
[Example of model No.]

LCR-F-12-40-F2H-R-S1DTP72

Model: Linear slide cylinder Double acting/single rod/Fine speed (clean room specifications) LCR-P7*

Ⓐ Bore size : ø12
Ⓑ Stroke : 40 mm
Ⓒ Switch model No. : Proximity/2 wires/Lead wire 1 m Lead wire straight
Ⓓ Switch quantity : 1 (on rod end)
Ⓔ Stopper : Stroke adjusting stopper Stopper position (1)
Ⓕ Option : Side port on stopper/Bottom port on stopper. Stopper block material: steel (nitriding)
Ⓖ Clean room specifications : Exhaust treatment

● Stopper position



Code	Content
Ⓐ Bore size	
12	ø12
16	ø16
20	ø20
25	ø25

Ⓑ Stroke (mm)

		Bore size (ø)			
		12	16	20	25
10	10	●	●	●	●
20	20	●	●	●	●
30	30	●	●	●	●
40	40	●	●	●	●
50	50	●	●	●	●
75	75	●	●	●	●
100	100	●	●	●	●
125	125		●	●	●
150	150			●	●

Ⓒ Switch model No.

Lead wire straight	Lead wire L-shaped	Contact	Display	Lead wire	Bore size ø12	ø16	ø20	ø25
F2S*		Proximity	1-color display	2 wires	●			
F3S*				3 wires				
F2H*	**F2V***			2 wires				
F3H*	**F3V***			3 wires				
F3PH*	**F3PV***		1-color display (custom order)					
F2YH*	**F2YV***		2-color display	2 wires				
F3YH*	**F3YV***			3 wires				
T0H*	**T0V***	Reed	1-color display Without indicator lamp	2 wires		●	●	●
T5H*	**T5V***							
T2H*	**T2V***	Proximity	1-color display	2 wires				
T3H*	**T3V***			3 wires				
T3PH*	**T3PV***		1-color display (PNP output)					
T2WH*	**T2WV***		2-color display	2 wires				
T3WH*	**T3WV***			3 wires				

Lead wire length

Blank	1 m (standard)	●
3	3 m (option)	●
5	5 m (option)	●

Ⓓ Switch quantity

R	1 (on rod end)	●
H	1 (on head end)	●
D	2	●

Ⓔ Stopper

Blank	No option		●
S	**Stroke adjusting stopper 5 mm stroke adjustment on one side**		
S1**	Stopper position (1) (can be changed to (4))	Stopper mounting position	●
S2**	Stopper position (2) (can be changed to (3))		●
S3**	Stopper position (3) (can be changed to (2))		●
S4**	Stopper position (4) (can be changed to (1))		●
S5**	Stopper position (1), (3)		●
S6**	Stopper position (2), (4)		●

** Part Adjustable stroke range ● Applies to all. ▲ Applies to some. *3

	Extended end	Return end	
Blank	5 mm or none	5 mm or none	●
02	15 mm or none	15 mm or none	●
03	25 mm or none	25 mm or none	●
04	15 mm	5 mm	▲
05	25 mm	5 mm	▲
06	5 mm	15 mm	▲
07	5 mm	25 mm	▲

Ⓕ Option

Blank	Port on the stopper: No port	●
D	Port on the stopper: Side and bottom ports	● *1, *3
Blank	Stopper block material: steel	●
T	Stopper block material: steel (nitriding)	● *3
Plug attached		
Blank	None	
N	With side piping port plug (not available for ø25) *4	

Ⓖ Clean room specifications

	Structure
P72	Exhaust treatment
P73	Vacuum treatment

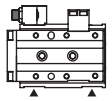
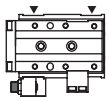
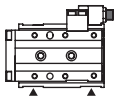
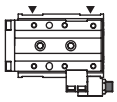
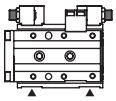
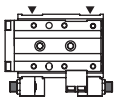
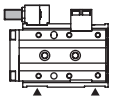
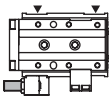
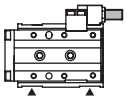
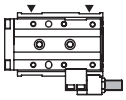
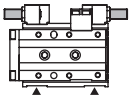
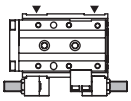
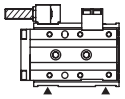
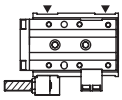
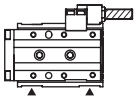
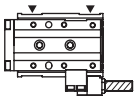
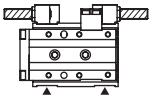
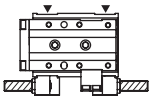
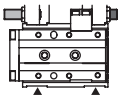
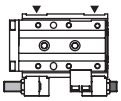
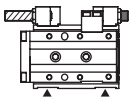
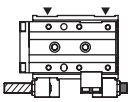
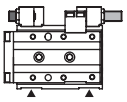
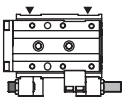
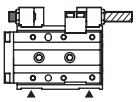
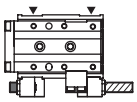
How to select stopper

Stopper combination table

Model No.−[(1) (2) stopper] [(3) adjustable stroke range]

Example) LCR-8-40-[S5] [06]-P7*

Stroke adjusting stopper S

Adjustable stroke range model No. [(3)]		Stopper adjusting range		Stopper model No. [(1) (2)]					
		Extended end	Return end	[S1]	[S2]	[S3]	[S4]	[S5]	[S6]
	Blank	5 mm or none	5 mm or none	 [S1]	 [S2]	 [S3]	 [S4]	 [S5]	 [S6]
	[02]	15 mm or none	15 mm or none	 [S102]	 [S202]	 [S302]	 [S402]	 [S502]	 [S602]
	[03]	25 mm or none	25 mm or none	 [S103]	 [S203]	 [S303]	 [S403]	 [S503]	 [S603]
	[04]	15 mm	5 mm					 [S504]	 [S604]
	[05]	25 mm	5 mm					 [S505]	 [S605]
	[06]	5 mm	15 mm					 [S506]	 [S606]
	[07]	5 mm	25 mm					 [S507]	 [S607]

: Stroke adjusting stopper (adjusting range: 5 mm)
: Stroke adjusting stopper (adjusting range: 15 mm)
: Stroke adjusting stopper (adjusting range: 25 mm)

▲ shows the piping direction.

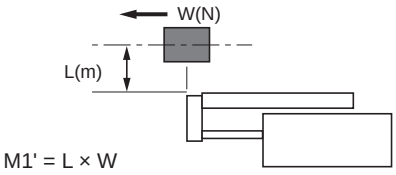
Available combination table

●: Available -: Unavailable

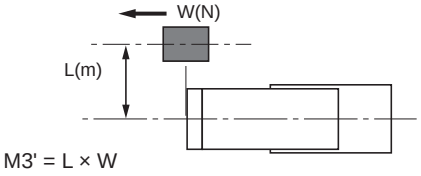
Bore size (mm)		Stopper code																								
		S1			S2			S3			S4			S5							S6						
		Adjustment length code																								
		Blank	02	03	Blank	02	03	Blank	02	03	Blank	02	03	Blank	02	03	04	05	06	07	Blank	02	03	04	05	06	07
ø12 to ø25	10st	●	-	-	●	-	-	●	●	-	●	●	-	●	-	-	-	-	●	-	●	-	-	-	-	●	-
	20st	●	●	-	●	●	-	●	●	●	●	●	●	●	●	-	●	-	●	●	●	●	-	●	-	●	●
	30st or more	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

STEP-1

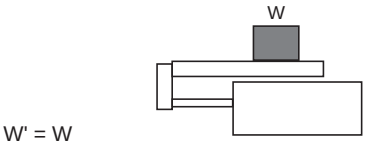
❶ Calculate the load and the moment of impact occurring at the stroke end in different directions.



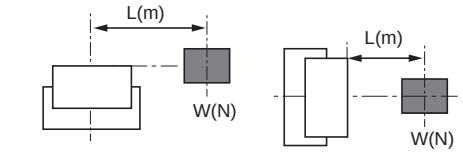
M1' = L × W



M3' = L × W



W' = W



M2' = L × W

Obtain an approximate G coefficient in (Table 1).

(Table 1) Va (average speed) = $\frac{\text{Distance traveled}}{\text{Time traveled}}$ (m/s)

Va average speed (m/s)	Vm Stroke end speed (m/s)	G coefficient
up to 0.07	up to 0.1	5
up to 0.2	up to 0.3	14
up to 0.27	up to 0.4	19
up to 0.35	up to 0.5	24

G coefficient = ☐

M1' × G = ☐ (N·m)

M2' = ☐ (N·m)

M3' × G = ☐ (N·m)

W' = ☐ (N)

$E' = \frac{1}{2} \times (m + m_\alpha) \times Vm^2$

= ☐ (J)

$(m \fallingdotseq \frac{W}{9.8})$

❷ Select a temporary bore size that satisfies the following formula.

$$M'_T = \frac{M1' \times G}{M1'max} + \frac{M2'}{M2'max} + \frac{M3' \times G}{M3'max} + \frac{W'}{W'max} < 1$$

$E' < E\,max$

M'T : Resultant moment (must be smaller than 1)

G : G coefficient

W'max : Maximum allowable value of W' (from Table 2)

M1'max : Maximum allowable value of M1' (from Table 2)

M2'max : Maximum allowable value of M2' (from Table 2)

M3'max : Maximum allowable value of M3' (from Table 2)

Emax : Maximum allowable value of Eo (from Table 3)

m_α : Table weight (from Table 4)

(Table 2) Allowable static load

Bore size	Stroke (mm)	Vertical load W'max (N)	Bending moment M1'max (N·m)	Radial moment M2'max (N·m)	Twist moment M3'max (N·m)
ø6	10 to 30	140	1.7	3.5	1.7
	40 to 50	186	10.7	5.6	10.7
ø8	10 to 30	140	1.7	3.5	1.7
	40 to 75	186	10.7	5.6	10.7
ø12	10 to 50	220.8	5.7	9.8	5.7
	75 to 100		22.2		22.2
ø16	10 to 50	380.8	17.8	19.2	17.8
	75 to 125		37.3		37.3
ø20	10 to 50	548.8	31.1	37.6	31.1
	75 to 150		56.2		56.2
ø25	10 to 50	961.5	65.1	116.3	65.1
	75 to 150		127.5		127.5

Note: When attaching a load to the end plate, even if selecting long stroke (ø6, 8: 40 or more, ø12 or more: 75 or more), calculate the allowable values with short stroke (ø6, 8: 30 or less, ø12 or more: 50 or less).

(Table 3) Allowable absorbed energy value of LCR (Eo)

Bore size	Standard (J)	With stroke adjusting stopper (J)
ø6	0.025	0.0032
ø8	0.058	0.0032
ø12	0.112	0.014
ø16	0.176	0.043
ø20	0.314	0.055
ø25	0.314	0.14

(Table 4) Table weight (Unit: kg)

Bore size	Stroke (mm)									P72/P73 Increment
	10	20	30	40	50	75	100	125	150	
ø6	0.035	0.035	0.04	0.05	0.055	-	-	-	-	0.005
ø8	0.055	0.055	0.06	0.075	0.08	0.095	-	-	-	0.015
ø12	0.13	0.13	0.13	0.14	0.155	0.195	0.225	-	-	0.025
ø16	0.185	0.185	0.185	0.2	0.215	0.285	0.325	0.365	-	0.035
ø20	0.29	0.29	0.29	0.315	0.335	0.415	0.47	0.525	0.585	0.045
ø25	0.505	0.505	0.505	0.54	0.58	0.745	0.835	0.925	1.015	0.075

STEP-2

Obtain a more accurate load factor, effectiveness thrust, stroke end speed and resultant moment.

● Calculate the load factor.

$$\alpha = \frac{Fo}{F} \times 100\ [\%]$$

α : Load factor

Fo : Force (N) required to move the workpiece

F : Theoretical cylinder thrust (N) (Table 5)

For horizontal operation	For vertical operation
Fo = Fw	Fo = W + Fw
FW : W × 0.2 Note (N)	
W : Load (N)	

Note : Coefficient of friction

(Table 5) Theoretical thrust table (Unit: N)

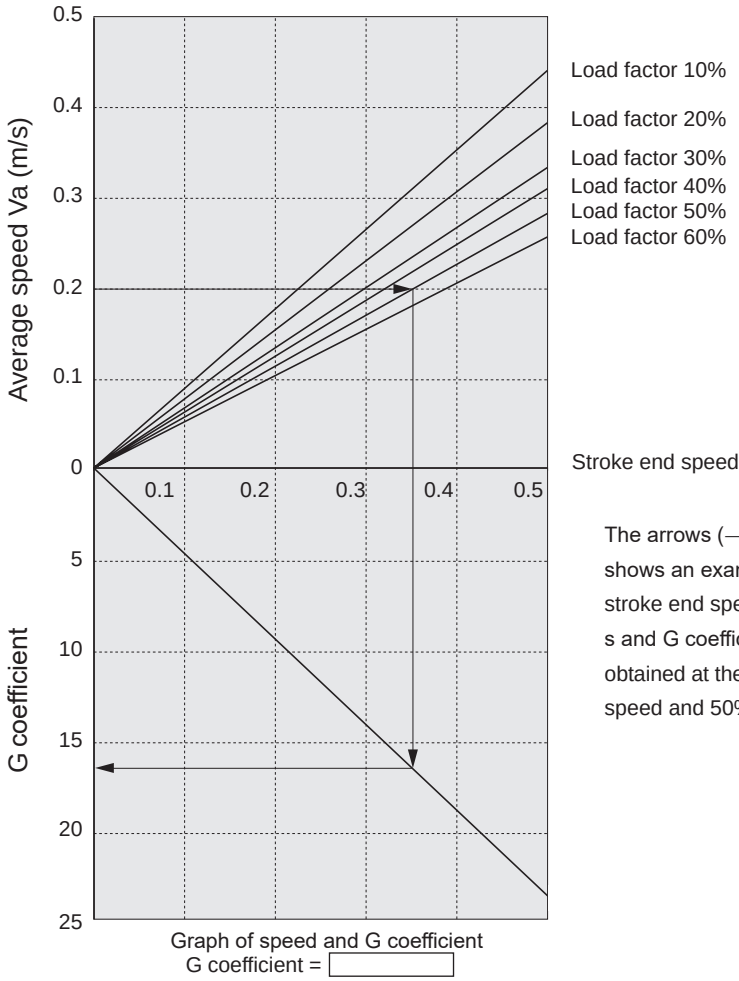
Bore size (mm)	Operating direction	Working pressure MPa						
		0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø6	PUSH	8	11	17	23	28	34	40
	PULL	6	8	13	17	21	25	30
ø8	PUSH	15	20	30	40	50	60	70
	PULL	11	15	23	30	38	45	53
ø12	PUSH	34	45	68	90	113	136	158
	PULL	25	34	51	68	85	102	119
ø16	PUSH	60	80	121	161	201	241	281
	PULL	52	69	104	138	173	207	242
ø20	PUSH	94	126	188	251	314	377	440
	PULL	79	106	158	211	264	317	369
ø25	PUSH	147	196	295	393	491	589	687
	PULL	124	165	247	330	412	495	577

(Table 6) Rough indication of load factor

Working pressure MPa	Load factor (%)
0.2 to 0.3	α ≦ 40
0.3 to 0.6	α ≦ 50
0.6 to 0.7	α ≦ 60

STEP-3

Obtain the stroke end speed (Vm) and G coefficient from the average speed (Va) and load factor obtained in STEP-2.



Graph of speed and G coefficient

G coefficient = ☐

The arrows (→) in the figure shows an example that the stroke end speed of 0.35 m/s and G coefficient of 16.8 are obtained at the 0.20 m/s average speed and 50% load factor.

STEP-4

Calculate the resultant moment (M_T) from the G factor and stroke end speed (Vm) obtained at STEP-3.

$M1' \times G = \square$ (N·m)

$M2' = \square$ (N·m)

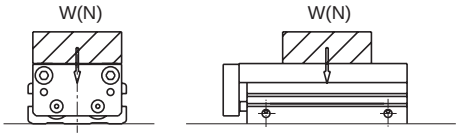
$M3' \times G = \square$ (N·m)

$W' = \square$ (N)

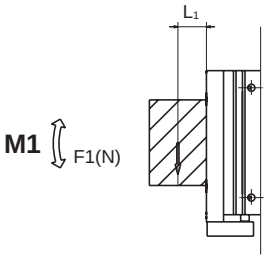
$$M'_T = \frac{M1' \times G}{M1'max} + \frac{M2'}{M2'max} + \frac{M3' \times G}{M3'max} + \frac{W'}{W'max} = \square$$

Obtain M_T (resultant moment during movement). (Note that it differs from what you obtain in STEP-1.)

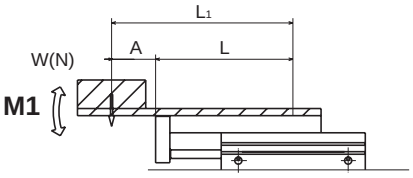
● Vertical load: W (N)



● Bending moment: M1 (N·m)

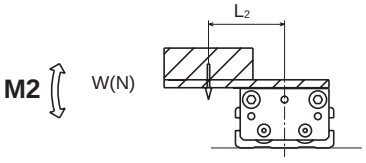


$M1 = F1 \times L_1$

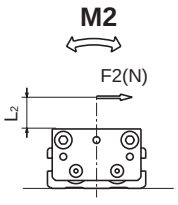


$M1 = W \times L_1$
$L_1 = A + L$
L is a value in the table below.

● Radial moment: M2 (N·m)

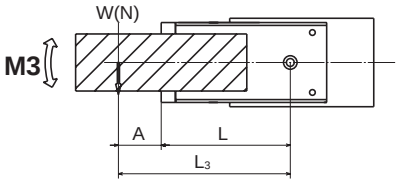


$M2 = W \times L_2$

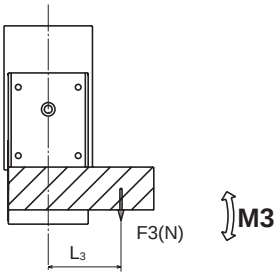


$M2 = F2 \times L_2$

● Twist moment: M3 (N·m)



$M3 = W \times L_3$
$L_3 = A + L$
L is a value in the table below.



$M3 = F3 \times L_3$

L value

Unit (m)

Bore size	Stroke									P72/P73
	10	20	30	40	50	75	100	125	150	Increment
ø6	0.048	0.048	0.058	0.073	0.083	-	-	-	-	0.012
ø8	0.048	0.048	0.058	0.072	0.082	0.107	-	-	-	0.020
ø12	0.067	0.067	0.067	0.077	0.087	0.117	0.142	-	-	0.020
ø16	0.071	0.071	0.071	0.081	0.091	0.124	0.149	0.174	-	0.020
ø20	0.081	0.081	0.081	0.091	0.101	0.126	0.151	0.176	0.201	0.025
ø25	0.085	0.085	0.085	0.095	0.105	0.14	0.165	0.19	0.215	0.025

M1 = M1 = ☐ (N·m)

M2 = M2 = ☐ (N·m)

M3 = M3 = ☐ (N·m)

W = W = ☐ (N)

$$M_T = \frac{M1}{M1max} + \frac{M2}{M2max} + \frac{M3}{M3max} + \frac{W}{Wmax} = \square$$

MT : Synthesis of moment

Wmax: Maximum allowable value of W (from Table 7)

M1max: Maximum allowable value of M1 (from Table 7)

M2max: Maximum allowable value of M2 (from Table 7)

M3max: Maximum allowable value of M3 (from Table 7)

E max: Maximum allowable value of Eo (from Table 3)

(Table 7) Allowable moving load

Bore size	Stroke (mm)	Vertical load Wmax (N)	Bending moment M1max (N·m)	Radial moment M2max (N·m)	Twist moment M3max (N·m)
ø6	10 to 30	14	0.17	0.35	0.17
	40 to 50	15.5	0.89	0.47	0.89
ø8	10 to 30	14	0.17	0.35	0.17
	40 to 75	15.5	0.89	0.47	0.89
ø12	10 to 50	27.6	0.71	1.2	0.71
	75 to 100		2.2		2.2
ø16	10 to 50	47.6	1.9	2.4	1.9
	75 to 125		4.6		4.6
ø20	10 to 50	68.6	3.4	4.7	3.4
	75 to 150		7.0		7.0
ø25	10 to 50	128.2	7.6	15.5	7.6
	75 to 150		17.0		17.0

Note: When attaching a load to the end plate, even if selecting long stroke (ø6, 8: 40 or more, ø12 or more: 75 or more), calculate the allowable values with short stroke (ø6, 8: 30 or less, ø12 or more: 50 or less).

Confirm M_T, $M'_T \leqq 1$.
↓
Bore size is decided.
↓
øA

STEP-5

Check of the allowable absorbed energy

$$E = \frac{1}{2} \times (m + m_\alpha) \times Vm^2$$

E : Kinetic energy at workpiece end (J)

m : Load weight (kg) ($m \fallingdotseq \frac{W\ (N)}{9.8}$)

m_α : Table weight (from Table 4)

Vm : Stroke end speed (m/s)

E max : Maximum allowable value of Eo (from Table 3)

Confirm E ≦ E max.
↓
Bore size is decided.
↓
øB

STEP-6

Bore size decided in STEP-4 (load conditions)

øA → øA ≦ øB → øB is selected.

or

øA → and external damper are used together or a shock absorber stopper is attached.

Bore size decided in STEP-5 (allowable absorbed energy)

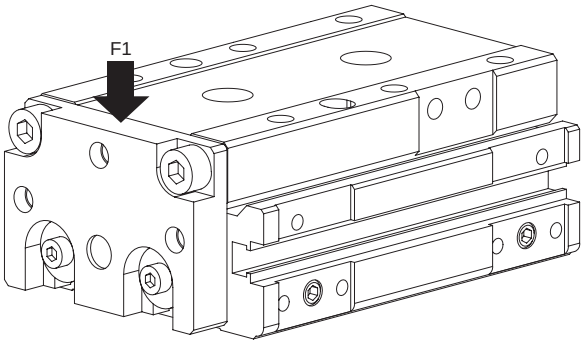
øB → øA > øB → øA is selected.

Technical data ❶: Displacement at the table end (reference value)

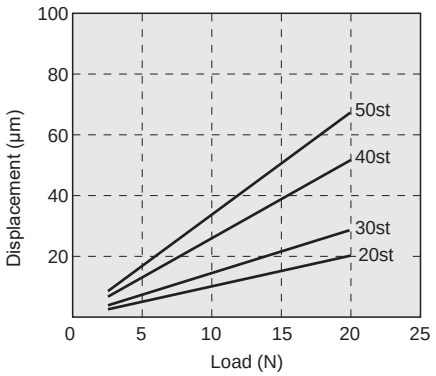
Displacement at point A

[Displacement of the table due to M1 moment]

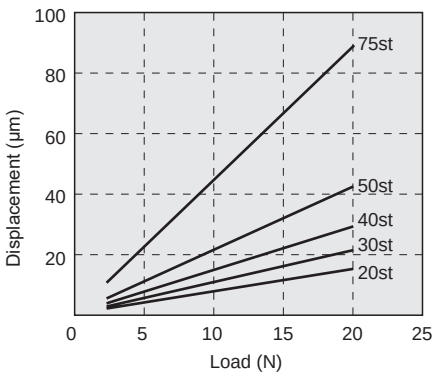
Displacement at the table end when the load (F1) is applied to the table end



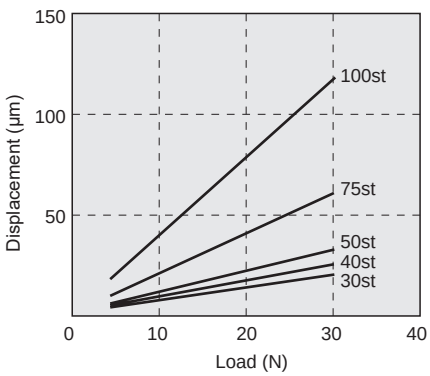
LCR-6 (M1)



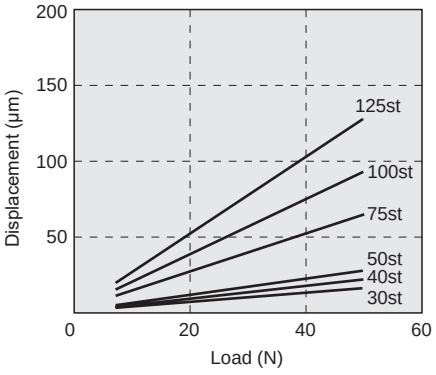
LCR-8 (M1)



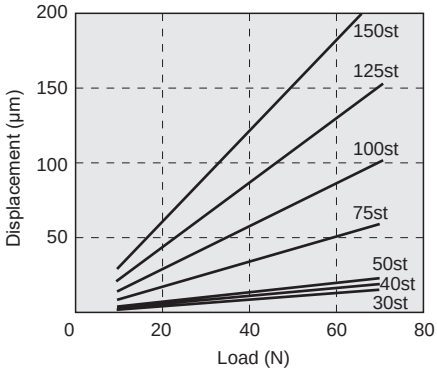
LCR-12 (M1)



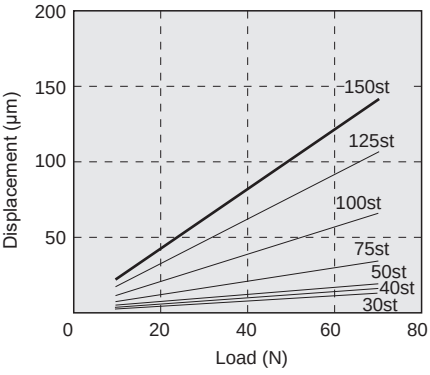
LCR-16 (M1)



LCR-20 (M1)



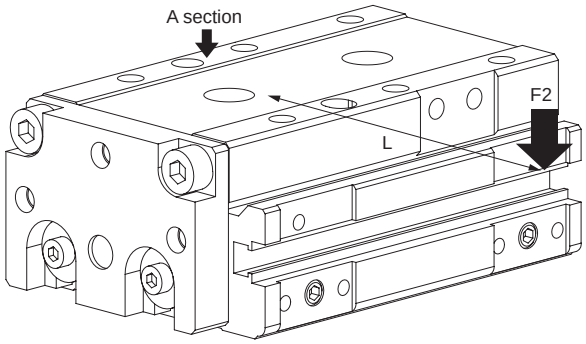
LCR-25 (M1)



Displacement at point A

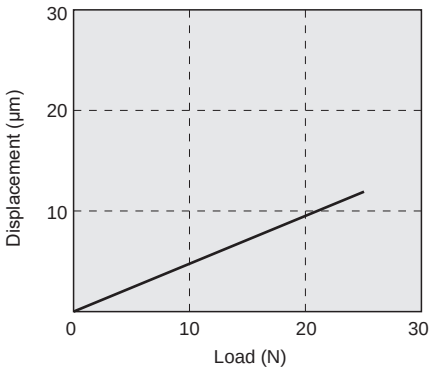
[Displacement of the table due to M2 moment]

Displacement at the table end (point A) when the load (F2) is applied to the point L mm away from the center of the cylinder

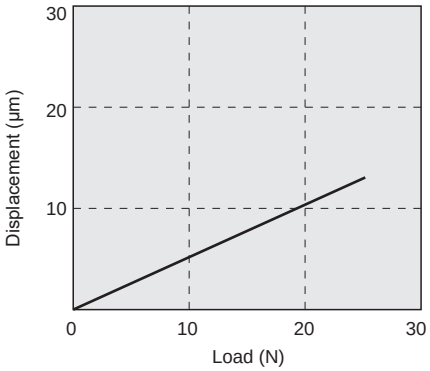


L value
ø 6: L = 70, ø 8: L = 70
ø12: L = 90, ø16: L = 100
ø20: L = 100, ø25: L = 200

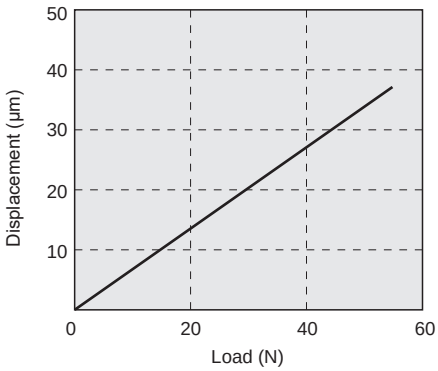
LCR-6 (M2)



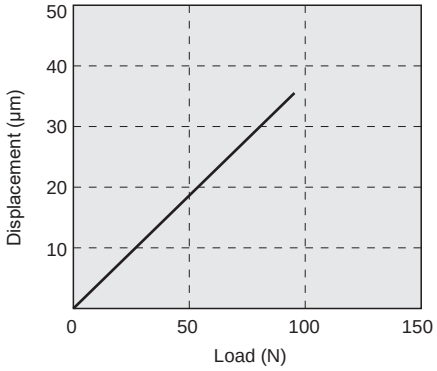
LCR-8 (M2)



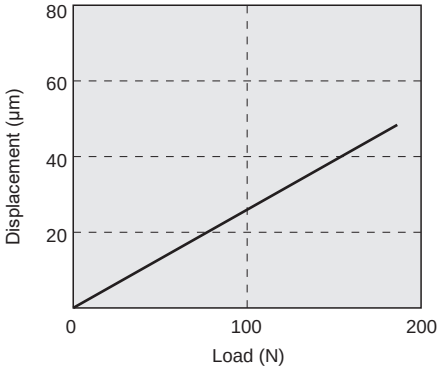
LCR-12 (M2)



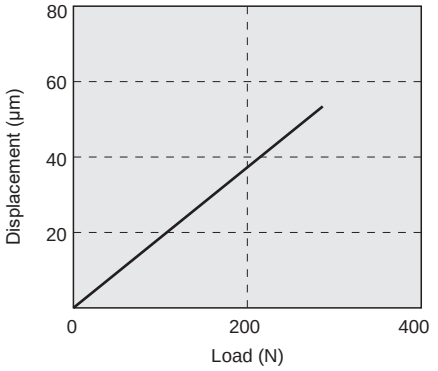
LCR-16 (M2)



LCR-20 (M2)



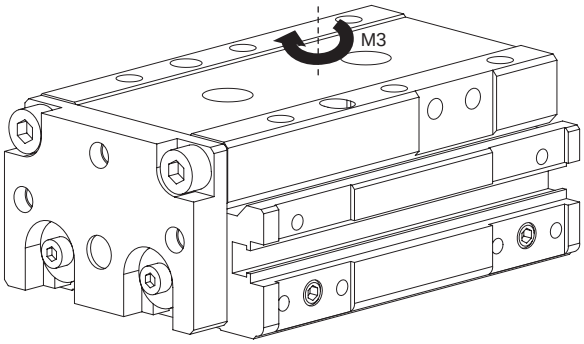
LCR-25 (M2)



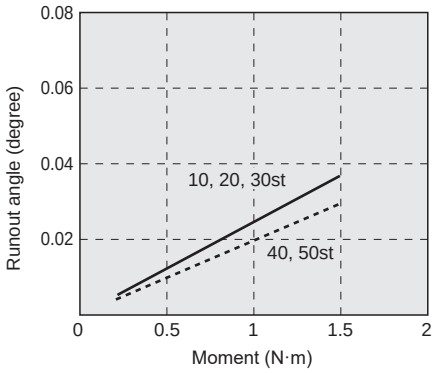
Displacement at point A

[Angular table deflection due to M3 moment]

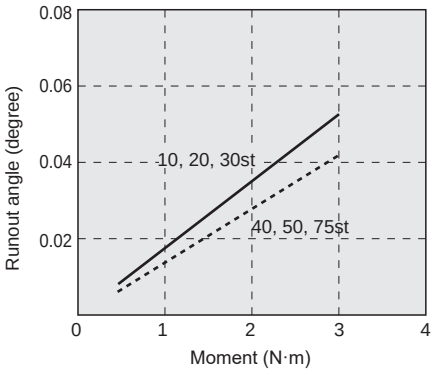
Displacement angle of the table when the rotation moment (M3) is applied to the cylinder



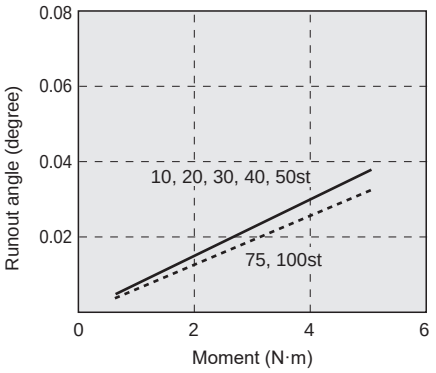
LCR-6 (M3)



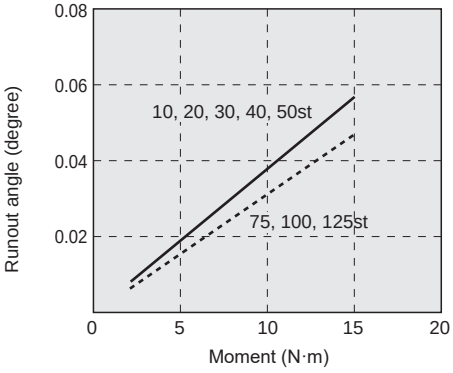
LCR-8 (M3)



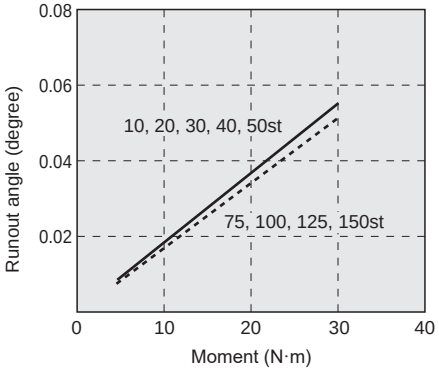
LCR-12 (M3)



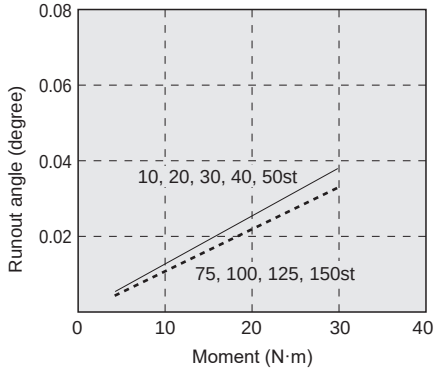
LCR-16 (M3)



LCR-20 (M3)



LCR-25 (M3)



Pneumatic components

Safety Precautions

Always read this section before use.
Refer to page 2 for general information of the cylinder, and to page 320 for general information of the cylinder switch.

Linear slide cylinder LCR Series

Design & selection

1. Common

⚠CAUTION

■ When selecting the cylinder, follow the "LCR Selection guide" on pages 132 to 135.

■ Protect the cylinder with a cover to prevent damage and malfunction in a place where it is exposed to water or oil drops, or corrosive conditions.

■ Precautions for mounting the switch
- When using the T□V switch with a stroke adjusting stopper (S3**/S4**/S5**/S6**) or shock absorber stopper (A3**/A4**/A5**/A6**), install the switch on the opposite side to the stopper. Otherwise the switch on the head end will contact with the stopper.
- Be careful of the lead wire direction when designing the 30 mm or less stroke since a switch is installed in each groove of the body.

2. Fine speed LCR-F

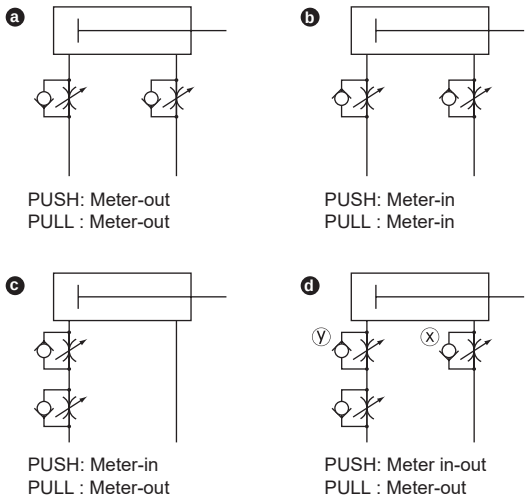
⚠CAUTION

■ Use without lubrication.
Application of lubrication may cause changes in characteristics.

■ Assemble the speed control valve near the cylinder.
When installed at a distant place from the cylinder, the speed becomes unstable.
Use the SC3R-M3/M5, SC3W, SCD-M3/M5 Series speed controllers.

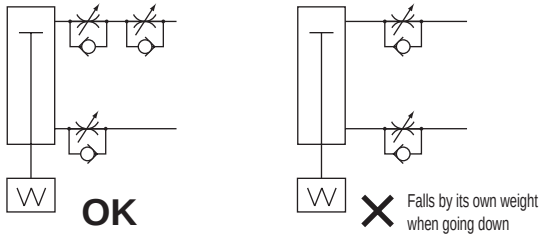
■ In general, the speed is stabler at higher air pressure and lower load factor.
Use at a 50% or less load factor.

■ Stable speed control is achieved with a meter-out circuit.

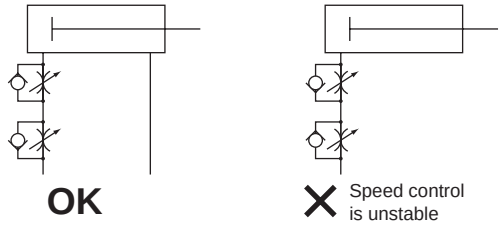


When the fine speed activation is performed while the operating direction is PUSH for the single rod cylinder, the popping out phenomenon occurs at the beginning of the operation in case the load resistance is small. For this countermeasures, use the b, c or d.
Note that circuit d is most stable.
Speed adjustment method for PUSH operation of d circuit:
1. Set the speed with the speed controller x.
2. Restrict the speed with the speed controller y until there is no popping out.
3. Check the speed again.

(Note 1) When comparing b c d, operation is the most stable with d circuit.
(Note 2) For vertical mounting, combine the cylinder with a meter-out circuit, as it will fall under its own weight when a meter-in circuit is used.



(Note 3) Use the circuit as shown in the figure below for the serial connection of the speed controllers.



(Guidelines for pop-out generation)
Popping out occurs in the following cases.
• Thrust > Resistance

*** Resistance: Thrust caused by residual pressure on the exhaust side (in the fine speed, supply pressure = residual pressure) + { When using horizontally: frictional force caused by load / When using vertically: load self-weight }**

Design & selection

■ Do not apply a lateral load to the cylinder.
With a lateral load, operation will become unstable.

■ Avoid using this product where vibration is present.
The product will be adversely affected by vibration and operation will become unstable.

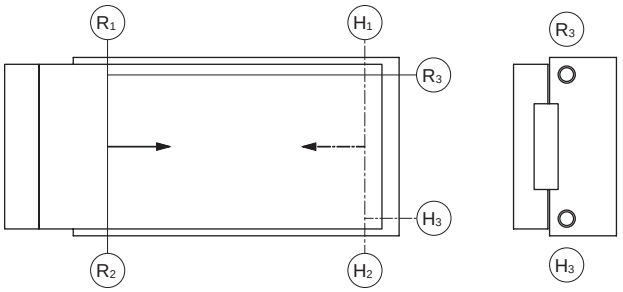
Mounting Installation & adjustment

1. Common; when piping

⚠CAUTION

■ Apply adhesive to the M3 and M5 plugs (hexagon socket set screws) when changing the piping port position. (Low strength adhesives such as LOCTITE 222/221 or ThreeBond 1344 are recommended)

■ Piping port position and operating direction



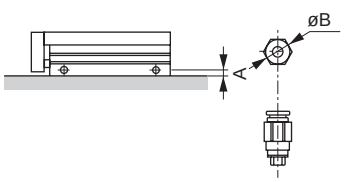
Ⓡ indicates the pressurized ports on the rod side and Ⓗ indicates the pressurized ports on the head side. When the product is shipped from the factory, ports other than Ⓡ1 and Ⓗ1 (Ⓡ2 and Ⓗ2 depending on the stopper position when a stopper is attached) are sealed with plugs.

■ Rear piping
Rear piping (ports Ⓡ3 and Ⓗ3 in the figure above) is possible except in the case of ø6 and position locking.
Remove the plugs sealing ports Ⓡ3 and Ⓗ3 and seal ports Ⓡ1 and Ⓗ1 with the plugs shown in the table below.

Descriptions	Plug
LCR-6	Ⓡ3, Ⓗ3 ports not available.
LCR-8	M5 × 5 (hexagon socket set screw)
LCR-12	
LCR-16	
LCR-20	R1/8 (hexagon socket head tapered screw plug)
LCR-25	Seal the Ⓡ3 and Ⓗ3 ports with the plugs removed from the Ⓡ3 and Ⓗ3 ports.

Prepare two separate plugs shown in the table above for ø8 to 20. Option with plug (refer to page 112) or discrete plug model No. (refer to page 68) are also available.

■ Precautions for piping fittings
Be sure to attach a speed controller during piping before use. The available fittings are as below.



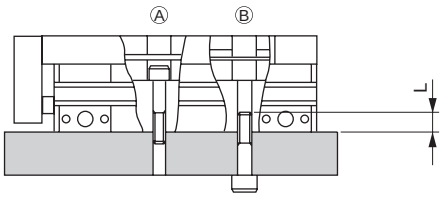
Descriptions / Bore size (mm)	Port diameter	Port location dimensions A	Applicable fitting	Fitting O.D. B
ø6	M3	4	SC3W-M3-4-P7* SC3W-M3-3.2-P7* GWS3-M3-S-P7* GWS4-M3-S-P7*	ø8 or less
ø8	M5	5.5	SC3W-M5-4-P7* SC3W-M5-6-P7* GWS4-M5-S-P7* GWS4-M5-P7*	ø11 or less
ø12		5.5		
ø16		6.5	SC3W-M5-4-P7* SC3W-M5-6-P7* GWS4-M5-S-P7* GWS4-M5-P7* GWL4-M5-P7* GWL6-M5-P7* GWS6-M5-P7*	ø13 or less
ø20	Rc1/8	8	SC3W-6-4, 6, 8-P7* GWS4-6-P7* GWS8-6-P7* GWL6-6-P7*	ø15 or less
ø25		9	GWS6-6-P7* GWL4-6-P7*	

2. Common; when installing

⚠CAUTION

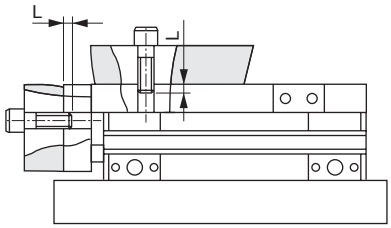
■ Do not damage the surface flatness by denting or scratching the body (tube) mounting surface or the table surface.
In addition, make sure that the flatness of the mating surface for body and table mounting is 0.02 mm or less.

■ Observe the following bolt insertion lengths and tightening torque when mounting the body.
[Fig. 1]



Descriptions	Ⓐ		Ⓑ		
	Applicable bolts	Tightening torque (N·m)	Applicable bolts	Tightening torque (N·m)	Max. insertion length L (mm)
LCR-6	M3 × 0.5	0.6 to 1.1	M4 × 0.7	1.4 to 2.4	6
LCR-8	M3 × 0.5	0.6 to 1.1	M4 × 0.7	1.4 to 2.4	6
LCR-12	M4 × 0.7	1.4 to 2.4	M5 × 0.8	2.9 to 5.1	8
LCR-16	M5 × 0.8	2.9 to 5.1	M6 × 1.0	4.8 to 8.6	9
LCR-20	M5 × 0.8	2.9 to 5.1	M6 × 1.0	4.8 to 8.6	9
LCR-25	M6 × 1.0	4.8 to 8.6	M8 × 1.25	12.0 to 21.6	12

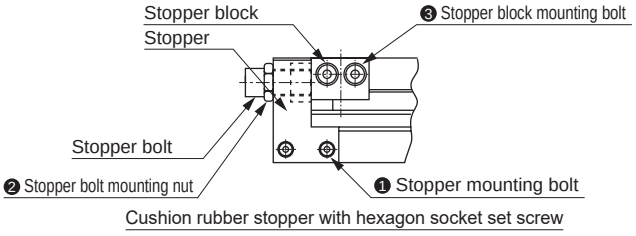
■ Observe the following bolt insertion lengths and tightening torque when installing the jig on the slide table or end plate.
[Fig. 2]



Descriptions	Table		
	Applicable bolts	Tightening torque (N·m)	Insertion length L (mm)
LCR-6	M3 × 0.5	0.6	3
LCR-8	M3 × 0.5	0.6	3 to 4.5
LCR-12	M4 × 0.7	1.4	4 to 5.5
LCR-16	M5 × 0.8	2.9	5 to 6
LCR-20	M5 × 0.8	2.9	5 to 6
LCR-25	M6 × 1.0	4.8	6 to 7

Descriptions	End plate		
	Applicable bolts	Tightening torque (N·m)	Insertion length L (mm)
LCR-6	M3 × 0.5	0.6	4.5 to 6
LCR-8	M3 × 0.5	0.6	4.5 to 7
LCR-12	M4 × 0.7	1.4	6 to 9
LCR-16	M5 × 0.8	2.9	7.5 to 9
LCR-20	M5 × 0.8	2.9	7.5 to 11
LCR-25	M6 × 1.0	4.8	9 to 11

■ Observe the following tightening torque of bolts and nuts of the stopper.
[Fig. A]

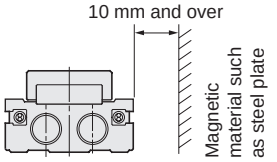


Cushion rubber stopper with hexagon socket set screw

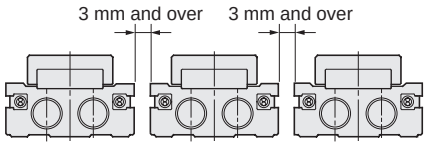
Model No.	❶ Stopper mounting bolt (N·m)	❷ Stopper bolt mounting nut (N·m)	❸ Stopper block mounting bolt (N·m)
LCR-6	0.4 to 0.5	1.2 to 2.0	0.6 to 0.8
LCR-8	0.4 to 0.5	1.2 to 2.0	0.6 to 0.8
LCR-12	0.6 to 0.8	1.2 to 2.0	0.6 to 0.8
LCR-16	0.6 to 0.8	3.0 to 4.0	1.4 to 1.8
LCR-20	2.9 to 3.5	4.5 to 6.0	1.4 to 1.8
LCR-25	2.9 to 3.5	4.5 to 6.0	2.9 to 3.5

■ When you attach/detach a workpiece onto the slide table or the end plate, be sure to support the slide table itself.

■ The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. To ensure safe operation, keep it 10 mm and over away from the cylinder surface or change the installation surface of the cylinder switch. (Common for all port sizes)



■ The cylinder switches may accidentally function if the cylinders are close to each other. Keep the distance below between the surfaces of the cylinders. (Common for all port sizes)



■ When using a positioning hole, use a pin of the dimensions which does not require press fitting. If a pin is press fitted, the stress of press fitting may damage or distort the linear guide, lowering the accuracy.
The recommended tolerance of a pin is JIS tolerance m6 or less.