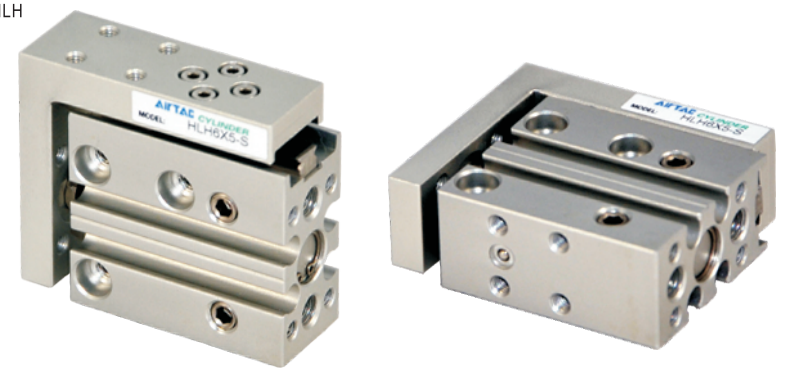
Product series

Series name	Acting type	Bore size	Collocation of sensor switch
			DS1-H
HLH 	Double acting	6 10 16 20	
Page 304			397

Installation and application

1. Dirty substances in the pipe must be eliminated before cylinder is connected with pipeline to prevent the entrance of impurities into the cylinder.
2. The medium used by cylinder should be filtered to 40 μ m or below.
3. Anti-freezing measure shall be adopted under low temperature environment to prevent moisture freezing.
4. If the cylinder is dismantled and stored for a long time, pay attention to conduct anti-rust treatment to the surface. Anti-dust caps shall be added in air inlet and outlet ports.

Criteria for selection: Cylinder thrust

Unit: Newton(N)

Bore size (mm)	Rod size (mm)	Acting type		Pressure area (mm^2)	Operating pressure(MPa)						
					0.1	0.2	0.3	0.4	0.5	0.6	0.7
6	3	Double acting	Push side	28.3	-	5.7	8.5	11.3	14.2	17.0	19.8
			Pull side	21.2	-	4.2	6.4	8.5	10.6	12.7	14.8
10	4	Double acting	Push side	78.5	7.9	15.7	23.6	31.4	39.3	47.1	55.0
			Pull side	66.0	6.6	13.2	19.8	26.4	33.0	39.6	46.2
16	6	Double acting	Push side	201.0	20.1	40.2	60.3	80.4	100.5	120.6	140.7
			Pull side	172.7	17.3	34.5	51.8	69.1	86.4	103.6	120.9
20	8	Double acting	Push side	314.0	31.4	62.8	94.2	125.6	157.0	188.4	219.8
			Pull side	263.8	26.4	52.8	79.1	105.5	131.9	158.3	184.7

Specification

Bore size(mm)		6	10	16	20
Guide rail width mm		5	7	9	12
Acting type		Double acting			
Fluid		Air(to be filtered by 40 μ m filter element)			
Operating pressure	Φ6	0.15~0.7MPa(22~100psi)(1.5~7.0bar)			
	Others	0.06~0.7MPa(9~100psi)(0.6~7.0bar)			
Proof pressure		1.05MPa(150psi)(10.5bar)			
Temperature ℃		-20~70			
Speed range mm/s		50~500			
Allowable kinetic energy J		0.008	0.025	0.05	0.1
Stroke tolerance		$^{+1.0}_{0}$			
Cushion type		Bumper			
Sensor switches ①		DS1-H□N、DS1-H□P			
Port size		M5×0.8			

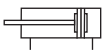
① Sensor switch should be ordered additionally, please refer to P397~420 for detail of sensor switch.

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke
6	5 10 15 20 25 30	30
10	5 10 15 20 25 30 40 50	50
16, 20	5 10 15 20 25 30 40 50 60	60

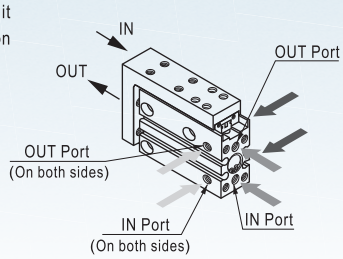
Note) Consult us for non-standard stroke.

Symbol



Product feature

1. Miniature linear roller ball bearing integrated wise cylinder.
2. With the excellent straightness and non-rotation precision, it is more suitable for precision assembly.
3. Mounting is possible from 4 directions.
4. Piping is possible from 3 directions.



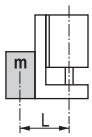
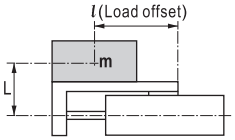
Ordering code

HLH 20 × 30 S

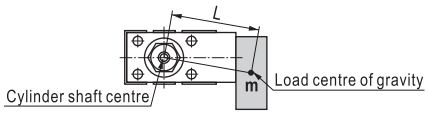
- **Model**: HLH: Compact slide cylinder(Double acting type)
- **Bore size**: 6, 10, 16, 20
- **Magnet**: S: With magnet
- **Stroke**: Refer to stroke table for details

Model Selection Method

1. Select the bore size according to the thrust and practicality. Refer to the table on page 303.
2. Determine the selection conditions in order, starting from the upper row in the table below, and choose one of the selection graphs to be used.

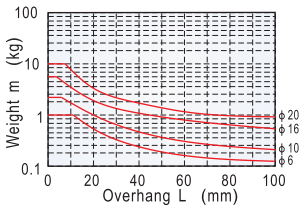
	Vertical			Horizontal								
Mounting position												
Maximum speed(mm/s)	⩽100	⩽300	⩽500	⩽100			⩽300			⩽500		
Load offset *l* (mm)	–	–	–	50	100	200	50	100	200	50	100	200
Selection graph	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

L: Overhang
(the distance from the cylinder shaft centre to the load centre of gravity)

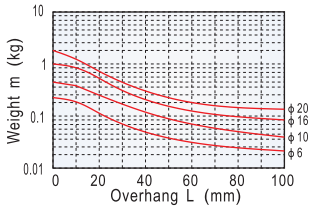


2.1) The relation between loading and overhang(Selection graphs)

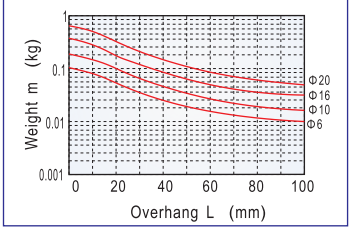
Selection Graphs(1)
Maximum speed 100(mm/s) or less



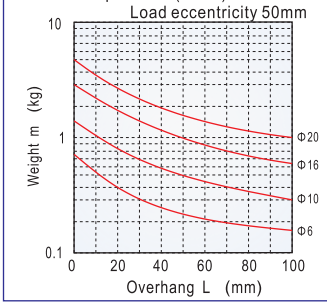
Selection Graphs(2)
Maximum speed 300(mm/s) or less



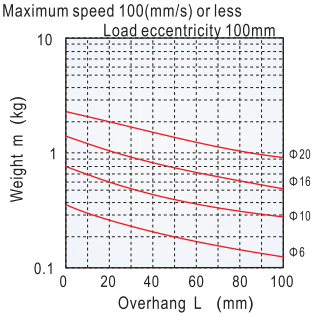
Selection Graphs(3)
Maximum speed 500(mm/s) or less



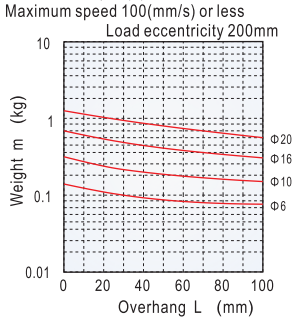
Selection Graphs(4)
Maximum speed 100(mm/s) or less
Load eccentricity 50mm



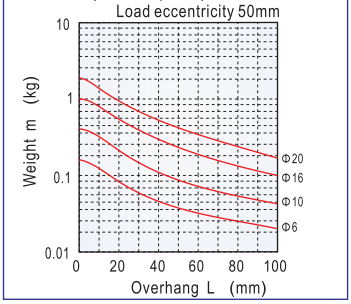
Selection Graphs(5)
Maximum speed 100(mm/s) or less
Load eccentricity 100mm



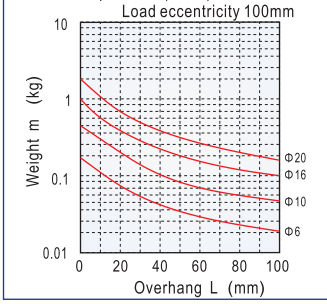
Selection Graphs(6)
Maximum speed 100(mm/s) or less
Load eccentricity 200mm



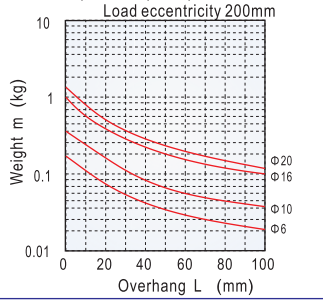
Selection Graphs(7)
Maximum speed 300(mm/s) or less
Load eccentricity 50mm



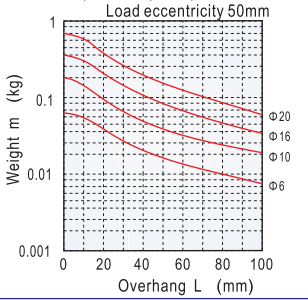
Selection Graphs(8)
Maximum speed 300(mm/s) or less
Load eccentricity 100mm



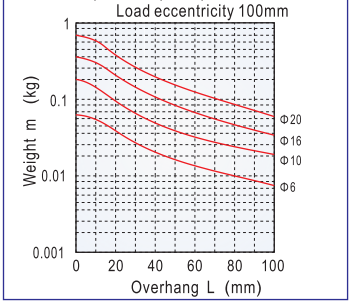
Selection Graphs(9)
Maximum speed 300(mm/s) or less
Load eccentricity 200mm



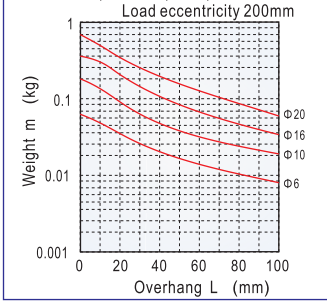
Selection Graphs(10)
Maximum speed 500(mm/s) or less
Load eccentricity 50mm



Selection Graphs(11)
Maximum speed 500(mm/s) or less
Load eccentricity 100mm



Selection Graphs(12)
Maximum speed 500(mm/s) or less
Load eccentricity 200mm



2.2) Selection Examples

Example ①: Mounting: Vertical
Maximum speed: 500mm/s
Overhang: 40mm
Load weight: 0.1Kg

Refer to Graph based on vertical mounting and a speed of 500mm/s. In Graph , find the intersection of a 40mm overhang and load weight of 0.1Kg, which results in a selection of ø20.

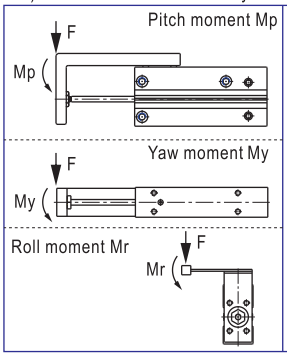
Example ②: Mounting: Horizontal
Maximum speed: 500mm/s
Load eccentricity: 50mm
Overhang: 30mm
Load weight: 0.1Kg

Refer to Graph based on horizontal mounting, a speed of 500mm/s and load eccentricity of 50mm.In Graph , find the intersection of a 30mm overhang and load weight of 0.1Kg, which results in a selection of ø16.

Installation and application

1. The actual loading and moment of cylinder must be less than it's allowable loading and moment:

1.1) The allowable moment of cylinder

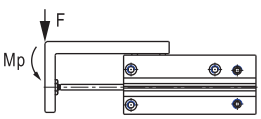


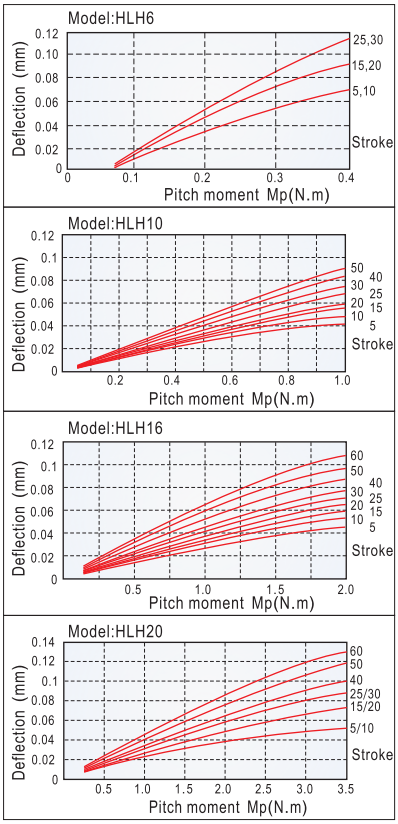
Model	Allowable torque (Nm)		
	Pitch moment Mp	Yaw moment My	Roll moment Mr
HLH6	0.25	0.25	0.41
HLH10	0.95	0.95	1.49
HLH16	3.28	3.28	3.45
HLH20	6.29	6.29	6.61

1.2) When the cylinder is subjected to different type of moment, there will be different degree of shift in performance, please refer to the following table for details.

Table deflection due to pitch moment

Table deflection (arrow) when a load acts upon the section marked with the arrow at the full stroke of the compact slide.

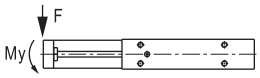


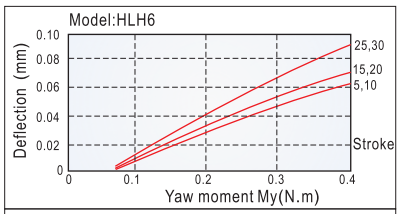


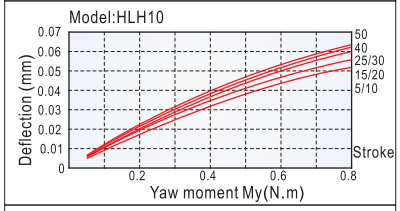
HLH

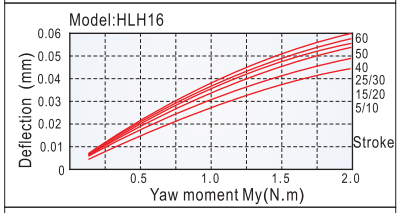
Table deflection due to yaw moment

Table deflection (arrow) when a load acts upon the section marked with the arrow at the full stroke of the compact slide.









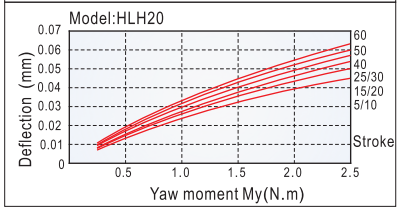
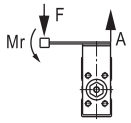
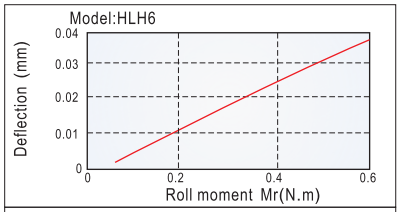
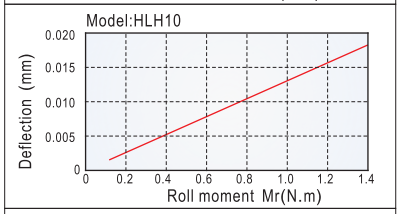


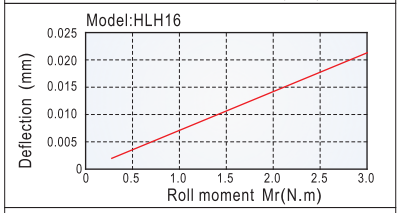
Table deflection due to roll moment

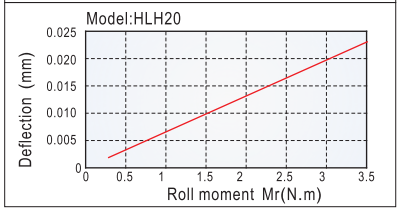
Table deflection(at A) when a load acts upon section F at the full stroke of the compact slide.



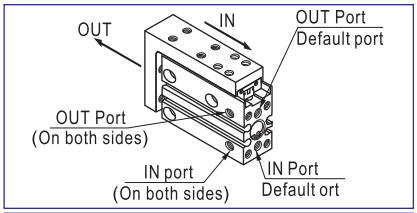




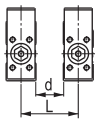




2. The compact slide can be piped from 3 directions. Confirm the pressure ports and operating direction. (See drawing right)

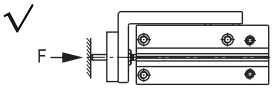


3. In compact slides with sensor switch, there is a danger of sensor switch malfunction if the mounting pitch is less than the dimensions shown in Table right. Be sure to allow at least the indicated interval.

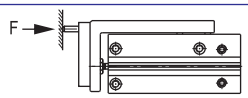


Model	At least indicated interval (mm)	
	d	L
HLH6	5	21
HLH10	5	25
HLH16	10	35
HLH20	15	47

4. When the output of the compact slide will be directly applied to the table, it should be applied along the rod axis. (See drawing below.)



The loading and piston rod are coaxial

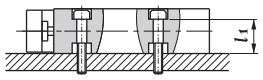


The loading and piston rod are offset

5. Be sure to use a flow control value, and adjust the speed to 500mm/s or less.

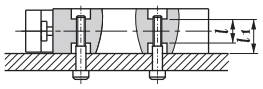
6. A compact slide can be mounted from 4 directions. Don't exceed the max.fastering torque then fightening the mounting bolts.

Lateral Mounting(Through Holes)



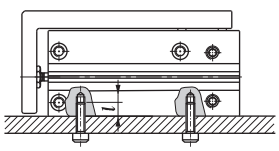
Model	Bolts	Max.fastening torque	L1
HLH6	M3 × 0.5	1.1(Nm)	12.7
HLH10	M4 × 0.7	2.5(Nm)	15.6
HLH16	M4 × 0.7	2.5(Nm)	20.6
HLH20	M5 × 0.8	5.1(Nm)	24.0

Lateral Mounting(Tapped Holes)



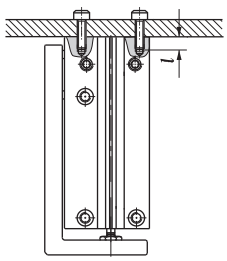
Model	Bolts	Max.fastening torque	L1	L
HLH6	M4 × 0.7	2.5(Nm)	12.7	9.4
HLH10	M5 × 0.8	5.1(Nm)	15.6	11.2
HLH16	M5 × 0.8	5.1(Nm)	20.6	16.2
HLH20	M6 × 1.0	8.1(Nm)	24.0	16.0

Vertical Mounting(Tapped Holes)



Model	Bolts	Max.fastening torque	L
HLH6	M3 × 0.5	1.1(Nm)	5
HLH10	M4 × 0.7	2.5(Nm)	6
HLH16	M4 × 0.7	2.5(Nm)	6
HLH20	M5 × 0.8	5.1(Nm)	8

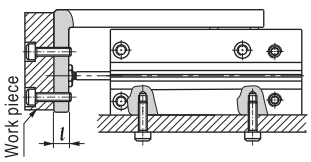
Axial Mounting(Tapped Holes)



7. Work Piece Mounting

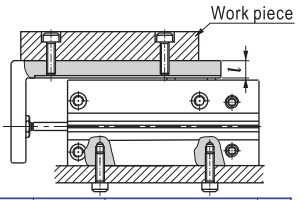
7.1) Work pieces can be mounted on 2 surfaces of the compact slide. When mounting a work piece, tighten the bolts properly at a torque value within the limiting range.

Front Mounting



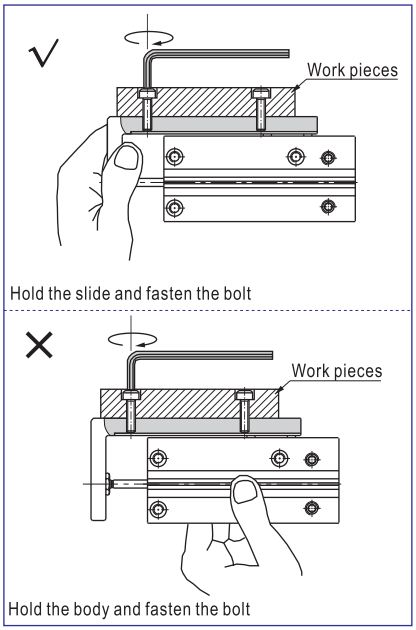
Model	Bolts	Max.fastening torque	L
HLH6	M3 × 0.5	1.1(Nm)	5.5
HLH10	M4 × 0.7	2.5(Nm)	7.5
HLH16	M4 × 0.7	2.5(Nm)	10
HLH20	M5 × 0.8	5.1(Nm)	11

Top Mounting

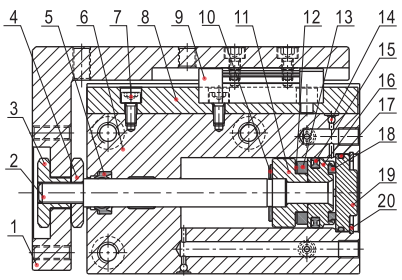


Model	Bolts	Max.fastening torque	L
HLH6	M3 × 0.5	1.1(Nm)	6.5
HLH10	M4 × 0.7	2.5(Nm)	8
HLH16	M4 × 0.7	2.5(Nm)	9
HLH20	M5 × 0.8	5.1(Nm)	9.5

7.2) Since the table is supported by the linear guide, take care not to apply strong impact or large moment to the guide section.
7.3) Hold the slide when fastening work pieces with bolts, If the body is held while tightening bolts, excessive moment may damage guide section.



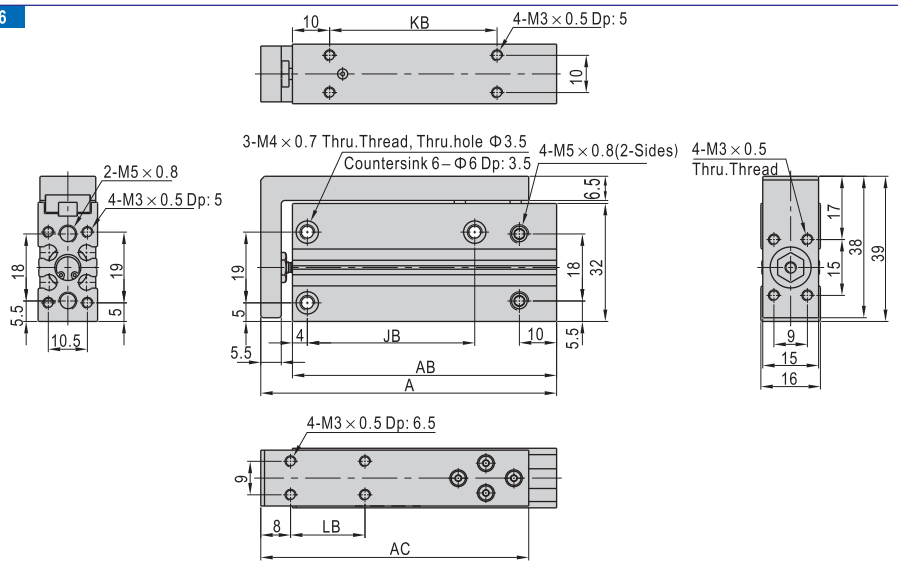
Inner structure



NO.	Item	Material
1	Slide table	Aluminum alloy
2	Piston rod	Stainless steel
3	Hexagon nut	Carbon steel
4	Hexagon nut	Carbon steel
5	Rod seal	NBR
6	Body	Aluminum alloy
7	Screw	Carbon steel
8	Linear guide	Stainless steel
9	Slide block	
10	Bumper	TPU
11	Magnet holder	Aluminum alloy
12	Magnet washer	NBR
13	Magnet	Sintered metal (Neodymium-iron-boron)
14	Steel ball	SUS304
15	Piston seal	NBR
16	Piston	Aluminum alloy
17	O-ring	NBR
18	Bumper	TPU
19	Back cover	Aluminum alloy
20	C clip	Spring steel

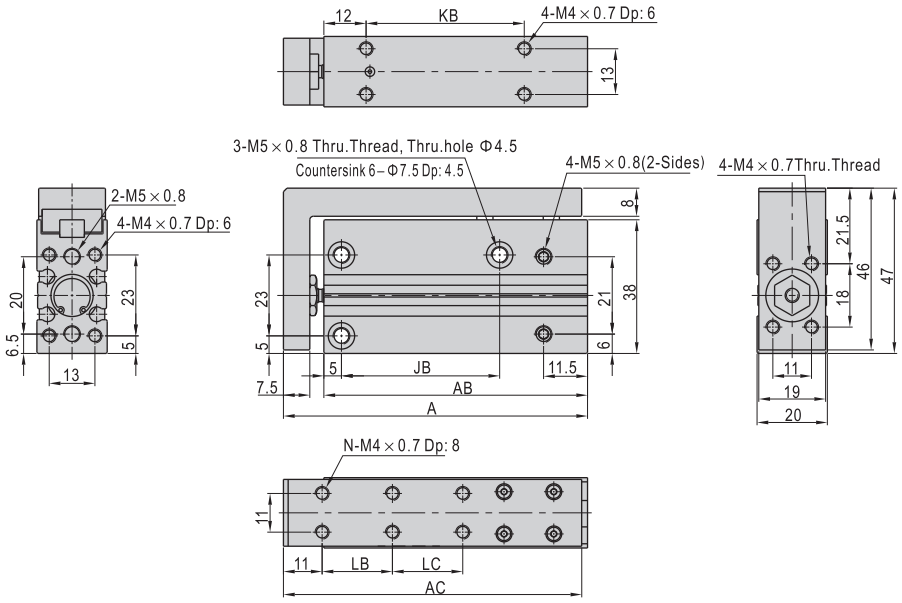
Dimensions

HLH6



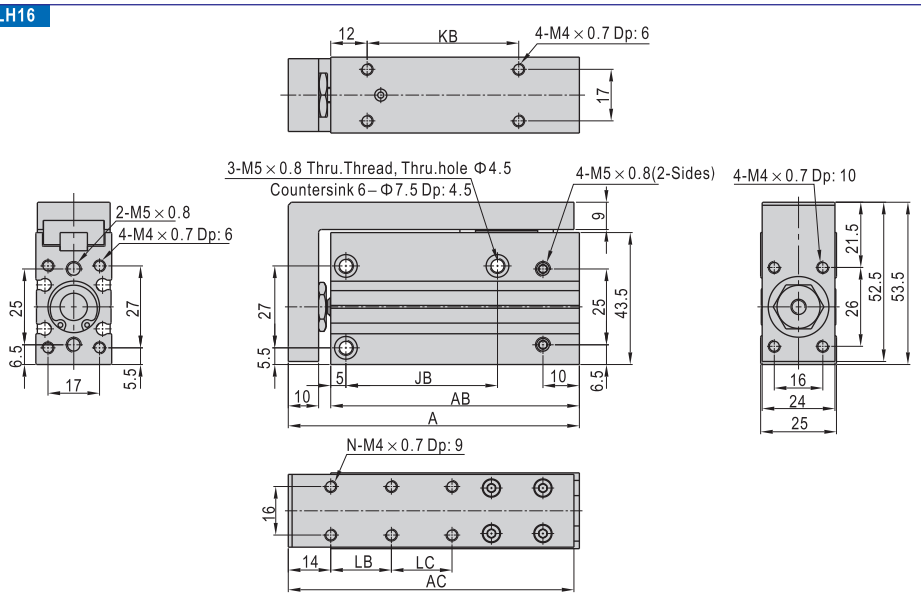
Stroke\Item	A	AB	AC	JB	KB	LB
5	44.5	36	42	14	10	10
10	49.5	41	42	14	15	10
15	54.5	46	52	24	20	20
20	59.5	51	52	24	25	20
25	64.5	56	62	30	30	30
30	69.5	61	62	30	35	30

HLH10



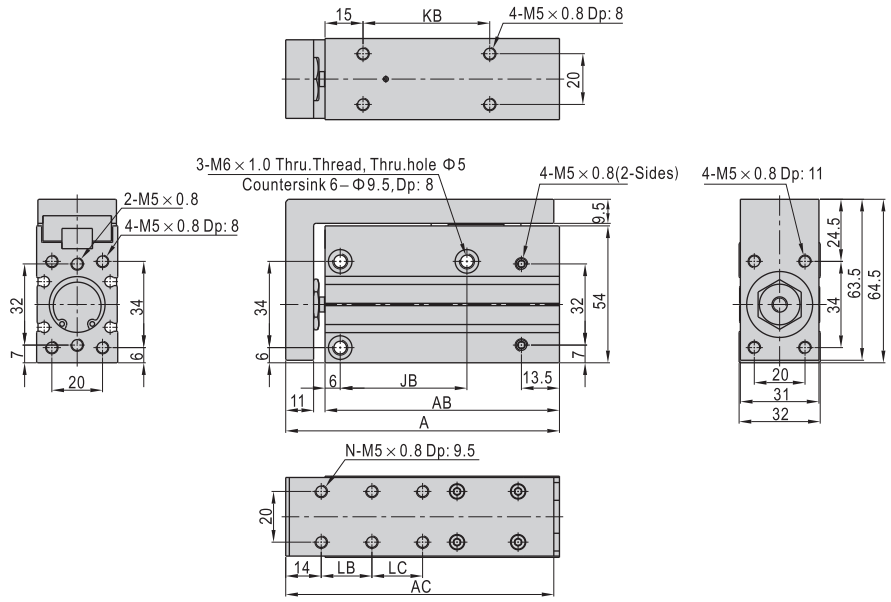
Stroke\Item	A	AB	AC	JB	KB	LB	LC	N
5	51.5	40	50	14	10	10	-	4
10	56.5	45	55	14	15	10	-	4
15	61.5	50	60.5	24	20	20	-	4
20	66.5	55	63	24	25	20	-	4
25	71.5	60	70.5	30	30	30	-	4
30	76.5	65	75.5	30	35	30	-	4
40	86.5	75	85.5	45	45	20	20	6
50	96.5	85	93	55	55	25	25	6

HLH16



Stroke\Item	A	AB	AC	JB	KB	LB	LC	N
5	61	47	60	20	15	10	-	4
10	66	52	64.5	20	20	10	-	4
15	71	57	69.5	30	25	20	-	4
20	76	62	75	30	30	20	-	4
25	81	67	80	40	35	30	-	4
30	86	72	84.5	40	40	30	-	4
40	96	82	95	50	50	20	20	6
50	106	92	104.5	60	60	25	25	6
60	116	102	114.5	60	70	30	30	6

HLH20



Stroke\Item	A	AB	AC	JB	KB	LB	LC	N
5	73	57.5	72	20	15	10	-	4
10	78	62.5	72	20	20	10	-	4
15	83	67.5	82	25	25	20	-	4
20	88	72.5	82	25	30	20	-	4
25	93	77.5	92	40	35	30	-	4
30	98	82.5	92	40	40	30	-	4
40	108	92.5	100	50	50	20	20	6
50	118	102.5	113.5	70	60	25	25	6
60	128	112.5	122.5	70	70	30	30	6