

# Hydraulic Double-Acting Compact Swing Clamp

PAT.

Model LHC

Low Pressure (1.5 ~ 7MPa)

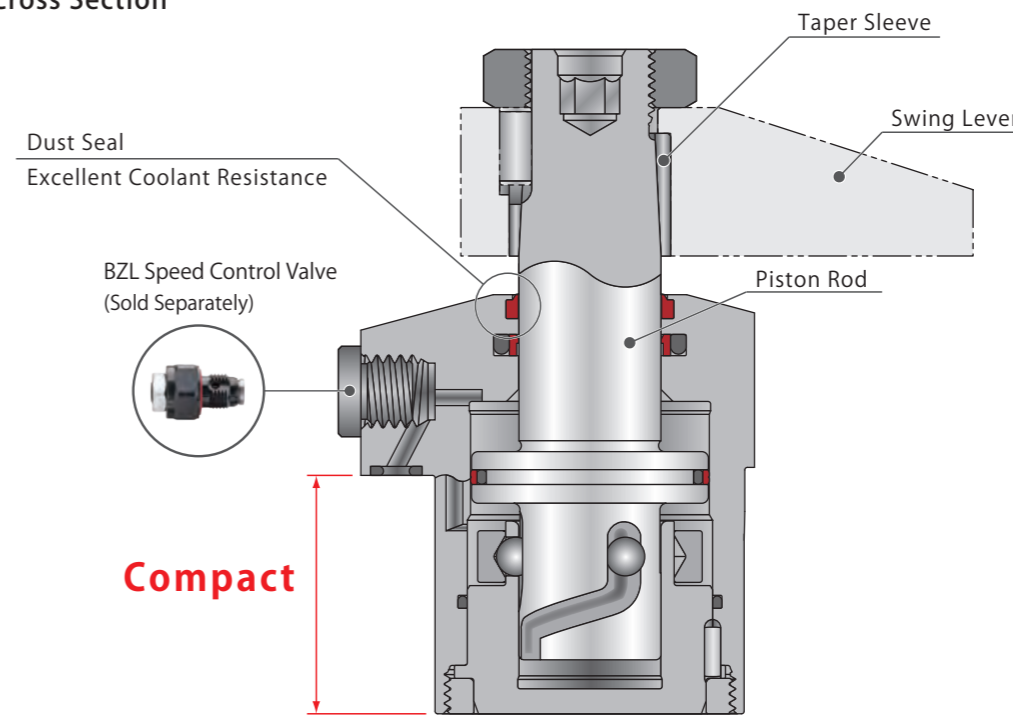
High Speed • Compact



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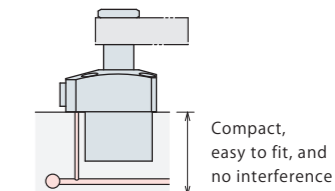
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## Cross Section



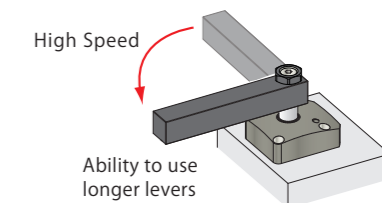
### Compact

The dimension below the flange is shortened to enable smaller footprint fixtures. The compact body enables the internal fitting to limit interference and makes fixture designing more engineer friendly.



### Able to Use Longer Levers

The long guide ratio allows for longer clamping levers by supporting the rod. The guide is located between the flange and at the edge of the rod.

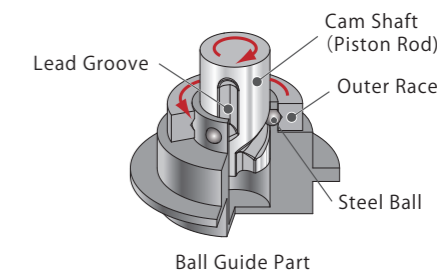


### Excellent Coolant Resistance

Our exclusive dust seal is designed to protect against high pressure coolant. It also has high durability against chlorine-based coolant by using a sealing material with excellent chemical resistance.

### High Speed and High Endurance with Rotation Mechanism

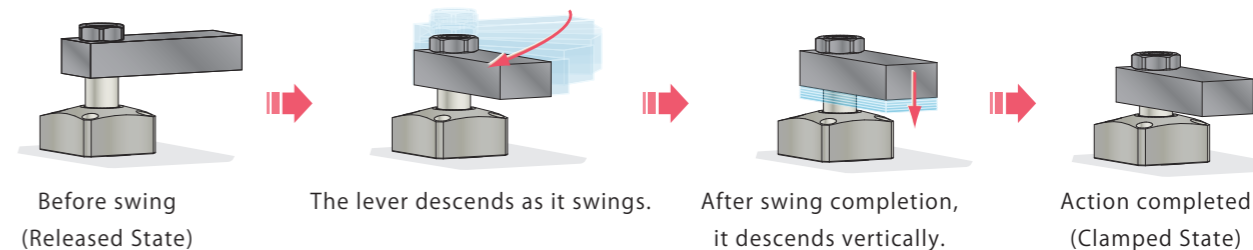
The resistance created by the swing action is minimized by having the outer race rotates in accordance with the steel ball movement. High endurance is achieved by enlarging rod diameter which decreases torque and by using bigger steel balls and making the lead groove. (Position repeatability for swing is within  $\pm 0.5^\circ$ .)



### Able to Attach Speed Control Valve Directly

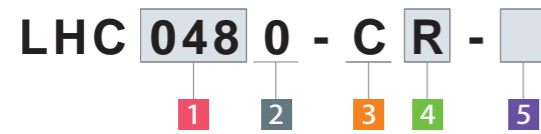
When fitting the gasket (piping option C), it is able to attach the speed control valve with air venting function. (Speed control valve is sold separately.)

## Action Description



High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others
Hole Clamp
SFA
SFC
Swing Clamp
LHA
<b>LHC</b>
LHS
LHW
LG/LT
TLA-2
TLB-2
TLA-1
Link Clamp
LKA
LKC
LKW
LJ/LM
TMA-2
TMA-1
Work Support
LD
LC
TNC
TC
Air Sensing Lift Cylinder
LLW
Linear Cylinder / Compact Cylinder
LL
LLR
LLU
DP
DR
DS
DT
Block Cylinder
DBA/DBC
Centering Vise
FVA
FVD
FVC
Control Valve
BZL
BZT
BZX/JZG
BZS
Pallet Clamp
VS/VT
Expansion Locating Pin
VFL/VFM
VFJ/VFK
Pull Stud Clamp
FP
FQ
Customized Spring Cylinder
DWA/DWB

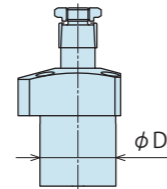
Model No. Indication



1 Body Size

- 036 : φD=36mm
- 040 : φD=40mm
- 048 : φD=48mm
- 055 : φD=55mm
- 065 : φD=65mm

※ Outer diameter (φD) of the cylinder.

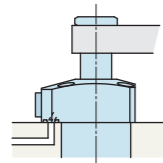


2 Design No.

- 0 : Revision Number

3 Piping Method

- C : Gasket Option (With G Thread Plug)

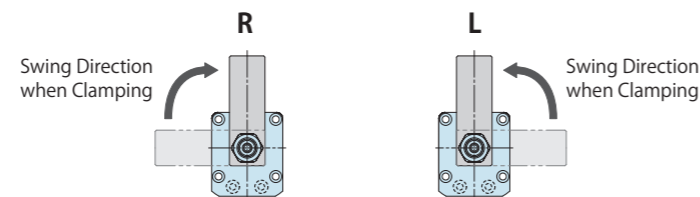


With G Thread Plug  
(able to attach Speed Control Valve)  
(Order the valve separately)  
Recommended : BZL-B

※ Speed control valve (BZL) is sold separately. Please refer to P.947.

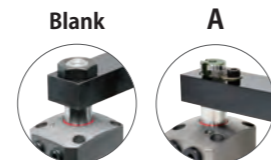
4 Swing Direction when Clamping

- R : Clockwise
- L : Counter-Clockwise



5 Option

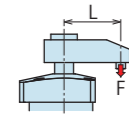
- Blank : None (Standard: Taper Lock Lever Option)
- A : Quick Change Lever Option A



Specifications

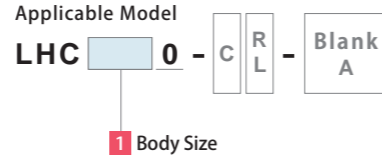
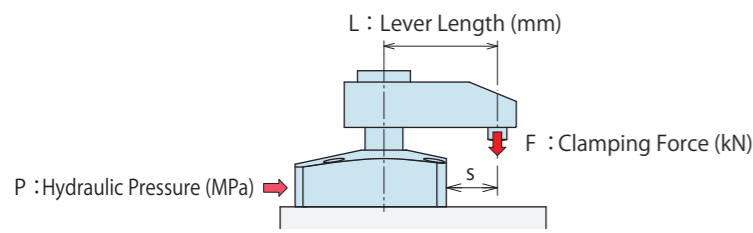
Model No.	LHC0360	LHC0400	LHC0480	LHC0550	LHC0650
Cylinder Area for Locking cm <sup>2</sup>	3.54	5.00	6.95	10.3	13.4
Clamping Force ※1 (Calculation Formula) kN	$F = \frac{P}{2.8233+0.0173 \times L}$	$F = \frac{P}{1.9988+0.0103 \times L}$	$F = \frac{P}{1.4386+0.0072 \times L}$	$F = \frac{P}{0.9712+0.0039 \times L}$	$F = \frac{P}{0.7485+0.0027 \times L}$
Cylinder Capacity cm <sup>3</sup>	Lock	4.1	6.3	9.4	14.9
	Release	6.1	9.4	14.5	22.0
Cylinder Inner Diameter ※2 mm	26	31	37	44	51
Rod Diameter ※2 mm	15	18	22	25	30
Full Stroke mm	11.5	12.5	13.5	14.5	16
Swing Stroke (90°) mm	5.5	6.5	7.5	8.5	10
Vertical Stroke mm	6	6	6	6	6
Swing Angle Accuracy	90° ±3°				
Swing Completion Position Repeatability	±0.5°				
Max. Operating Pressure MPa	7.0				
Min. Operating Pressure ※3 MPa	1.5				
Withstanding Pressure MPa	10.5				
Operating Temperature °C	0 ~ 70				
Usable Fluid	General Hydraulic Oil Equivalent to ISO-VG-32				
Weight kg	Option Blank ※4	0.6	0.8	1.2	1.8
	Option A ※5	0.6	0.8	1.1	1.7

- Notes : ※1. F : Clamping Force (kN), P : Supply Hydraulic Pressure (MPa), L : Distance between the piston center and the clamping point (mm).  
 ※2. Clamping force cannot be calculated from the cylinder inner diameter and rod diameter. Please refer to the clamping force curve.  
 ※3. Minimum pressure to operate the clamp without load.  
 ※4. It shows the weight of single swing clamp including taper sleeve and nut.  
 ※5. It shows the weight of single swing clamp without the tightening kit.



- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others
- Hole Clamp
  - SFA
  - SFC
- Swing Clamp
  - LHA
  - LHC
  - LHS
  - LHW
  - LG/LT
  - TLA-2
  - TLB-2
  - TLA-1
- Link Clamp
  - LKA
  - LKC
  - LKW
  - LJ/LM
  - TMA-2
  - TMA-1
- Work Support
  - LD
  - LC
  - TNC
  - TC
- Air Sensing Lift Cylinder
  - LLW
- Linear Cylinder / Compact Cylinder
  - LL
  - LLR
  - LLU
  - DP
  - DR
  - DS
  - DT
- Block Cylinder
  - DBA/DBC
- Centering Vise
  - FVA
  - FVD
  - FVC
- Control Valve
  - BZL
  - BZT
  - BZX/JZG
  - BZS
- Pallet Clamp
  - VS/VT
- Expansion Locating Pin
  - VFL/VFM
  - VFJ/VFK
- Pull Stud Clamp
  - FP
  - FQ
- Customized Spring Cylinder
  - DWA/DWB

### Clamping Force Curve



(Ex.) In case of LHC0480 :

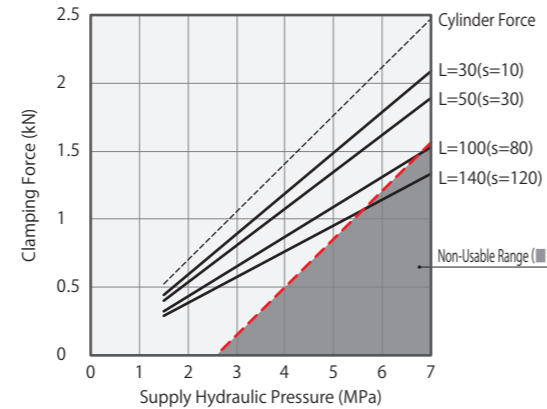
When supply hydraulic pressure P is 5.0MPa and lever length L is 50mm, clamping force becomes about 2.8kN.

Notes :

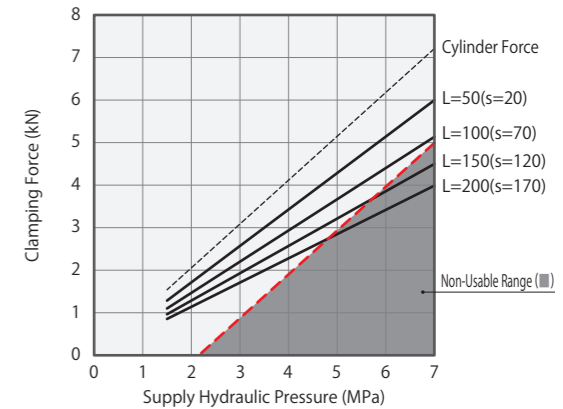
1. Tables and graphs show the relationship between the clamping force (kN) and supply hydraulic pressure (MPa).
2. Cylinder force (when L=0) cannot be calculated from the formula of clamping force.
3. Lever with a large inertia sometimes does not work depending on supply hydraulic pressure, lever mounting position, etc.
4. Values in below charts indicate clamping force when the lever locks a workpiece in horizontal position.
5. The clamping force varies depending on the lever length. Set the suitable supply hydraulic pressure based on the lever length.
6. Clamping force in the non-usable range may cause damage and fluid leakage.
7. The tables and graphs are only for reference. The exact results should be calculated based on the clamping force calculation formula.

※1. F : Clamping Force (kN), P : Supply Hydraulic Pressure (MPa), L : Lever Length (mm).

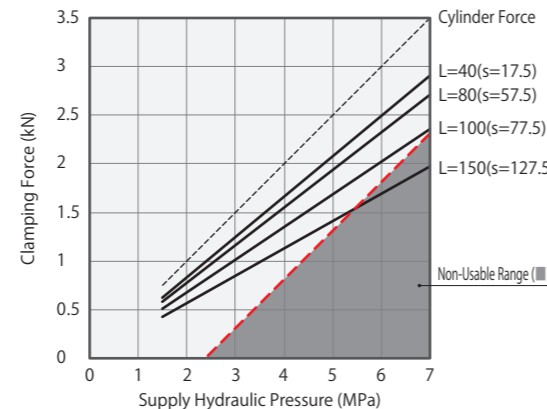
LHC0360		Clamping Force Calculation Formula <sup>※1</sup> $F = P / (2.8233 + 0.0173 \times L)$								
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) / Lever Length L (mm)								Max. Lever Length (L) (mm)
		L=30	L=40	L=50	L=60	L=80	L=100	L=120	L=140	
7	2.5	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	95
6.5	2.3	1.9	1.8	1.8	1.7	1.5	1.4	1.3	1.2	107
6	2.1	1.8	1.7	1.6	1.6	1.4	1.3	1.2	1.1	122
5.5	2.0	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1.0	143
5	1.8	1.5	1.4	1.4	1.3	1.2	1.1	1.0	1.0	150
4.5	1.6	1.3	1.3	1.2	1.2	1.1	1.0	0.9	0.9	150
4	1.4	1.2	1.1	1.1	1.0	1.0	0.9	0.8	0.8	150
3.5	1.2	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	150
3	1.1	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	150
2.5	0.9	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	150
2	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	150
1.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	150
Max. Operating Pressure (MPa)		7.0	7.0	7.0	7.0	7.0	6.7	6.0	5.5	



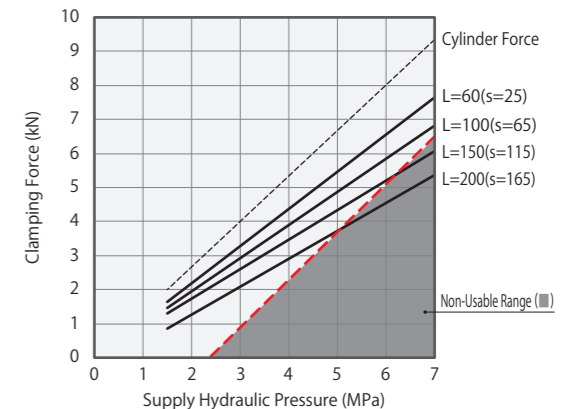
LHC0550		Clamping Force Calculation Formula <sup>※1</sup> $F = P / (0.9712 + 0.0039 \times L)$								
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) / Lever Length L (mm)								Max. Lever Length (L) (mm)
		L=50	L=60	L=80	L=100	L=120	L=140	L=160	L=200	
7	7.2	6.0	5.8	5.4	5.1	4.8	4.5	4.2	4.0	110
6.5	6.7	5.6	5.4	5.1	4.8	4.5	4.2	4.0	3.8	123
6	6.2	5.1	5.0	4.7	4.4	4.2	4.0	3.8	3.6	139
5.5	5.7	4.7	4.6	4.3	4.0	3.8	3.6	3.4	3.3	159
5	5.2	4.3	4.1	3.9	3.7	3.5	3.3	3.1	3.0	187
4.5	4.6	3.9	3.7	3.5	3.3	3.1	3.0	2.8	2.6	227
4	4.1	3.4	3.3	3.1	2.9	2.8	2.6	2.5	2.3	245
3.5	3.6	3.0	2.9	2.7	2.6	2.4	2.3	2.2	2.0	245
3	3.1	2.6	2.5	2.3	2.2	2.1	2.0	1.9	1.7	245
2.5	2.6	2.1	2.1	1.9	1.8	1.7	1.6	1.6	1.4	245
2	2.1	1.7	1.7	1.6	1.5	1.4	1.3	1.3	1.1	245
1.5	1.6	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.9	245
Max. Operating Pressure (MPa)		7.0	7.0	7.0	7.0	6.6	5.9	5.4	4.8	



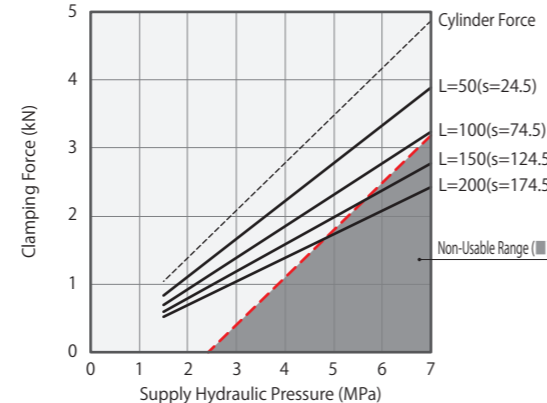
LHC0400		Clamping Force Calculation Formula <sup>※1</sup> $F = P / (1.9988 + 0.0103 \times L)$								
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) / Lever Length L (mm)								Max. Lever Length (L) (mm)
		L=40	L=50	L=60	L=70	L=80	L=100	L=120	L=150	
7	3.5	2.9	2.8	2.7	2.6	2.5	2.3	2.1	1.9	100
6.5	3.3	2.7	2.6	2.5	2.4	2.3	2.1	2.0	1.9	112
6	3.0	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	128
5.5	2.8	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	148
5	2.5	2.1	2.0	1.9	1.8	1.8	1.7	1.5	1.4	176
4.5	2.3	1.9	1.8	1.7	1.7	1.6	1.5	1.4	1.3	210
4	2.0	1.7	1.6	1.5	1.5	1.4	1.3	1.2	1.1	210
3.5	1.8	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.0	210
3	1.5	1.2	1.2	1.1	1.1	1.1	1.0	0.9	0.8	210
2.5	1.3	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.7	210
2	1.0	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	210
1.5	0.8	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.4	210
Max. Operating Pressure (MPa)		7.0	7.0	7.0	7.0	7.0	7.0	6.2	5.4	



LHC0650		Clamping Force Calculation Formula <sup>※1</sup> $F = P / (0.7485 + 0.0027 \times L)$								
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) / Lever Length L (mm)								Max. Lever Length (L) (mm)
		L=50	L=60	L=80	L=100	L=120	L=140	L=160	L=200	
7	9.4	7.9	7.7	7.2	6.9	6.6	6.3	6.0	5.7	115
6.5	8.7	7.3	7.1	6.7	6.4	6.0	5.7	5.4	5.1	128
6	8.0	6.8	6.6	6.2	5.9	5.6	5.3	5.0	4.7	144
5.5	7.4	6.2	6.0	5.7	5.4	5.1	4.9	4.6	4.4	166
5	6.7	5.7	5.5	5.2	4.9	4.7	4.4	4.2	4.0	194
4.5	6.0	5.1	4.9	4.7	4.4	4.2	4.0	3.8	3.5	235
4	5.4	4.5	4.4	4.1	3.9	3.7	3.5	3.4	3.1	260
3.5	4.7	4.0	3.8	3.6	3.4	3.3	3.1	3.0	2.7	260
3	4.0	3.4	3.3	3.1	2.9	2.8	2.7	2.5	2.3	260
2.5	3.4	2.8	2.7	2.6	2.4	2.3	2.2	2.1	1.9	260
2	2.7	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.5	260
1.5	2.0	1.7	1.6	1.6	1.5	1.4	1.3	1.3	1.2	260
Max. Operating Pressure (MPa)		7.0	7.0	7.0	7.0	6.7	6.1	5.6	4.9	



LHC0480		Clamping Force Calculation Formula <sup>※1</sup> $F = P / (1.4386 + 0.0072 \times L)$								
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) / Lever Length L (mm)								Max. Lever Length (L) (mm)
		L=50	L=60	L=80	L=100	L=120	L=140	L=160	L=200	
7	4.9	3.9	3.7	3.5	3.2	3.0	2.8	2.6	2.5	105
6.5	4.5	3.6	3.5	3.2	3.0	2.8	2.6	2.5	2.4	118
6	4.2	3.3	3.2	3.0	2.8	2.6	2.5	2.4	2.2	134
5.5	3.8	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	156
5	3.5	2.8	2.7	2.5	2.3	2.2	2.0	1.9	1.8	186
4.5	3.1	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	230
4	2.8	2.2	2.1	2.0	1.9	1.7	1.6	1.5	1.4	230
3.5	2.4	1.9	1.9	1.7	1.6	1.5	1.4	1.3	1.2	230
3	2.1	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.0	230
2.5	1.7	1.4	1.3	1.2	1.2	1.1	1.0	1.0	0.9	230
2	1.4	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	230
1.5	1.0	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.5	230
Max. Operating Pressure (MPa)		7.0	7.0	7.0	7.0	6.4	5.8	5.4	4.8	



High-Power Series

Pneumatic Series

Hydraulic Series

Valve / Coupler Hydraulic Unit

Manual Operation Accessories

Cautions / Others

Hole Clamp

SFA

SFC

Swing Clamp

LHA

**LHC**

LHS

LHW

LG/LT

TLA-2

TLB-2

TLA-1

Link Clamp

LKA

LKC

LKW

LJ/LM

TMA-2

TMA-1

Work Support

LD

LC

TNC

TC

Air Sensing Lift Cylinder

LLW

Linear Cylinder / Compact Cylinder

LL

LLR

LLU

DP

DR

DS

DT

Block Cylinder

DBA/DBC

Centering Vise

FVA

FVD

FVC

Control Valve

BZL

BZT

BZX/JZG

BZS

Pallet Clamp

VS/VT

Expansion Locating Pin

VFL/VFM

VFJ/VFK

Pull Stud Clamp

FP

FQ

Customized Spring Cylinder

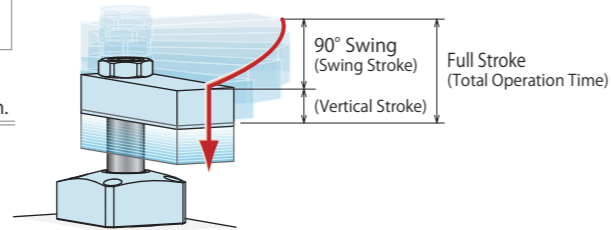
DWA/DWB

Allowable Swing Time Graph

Adjustment of Swing Time

The graph shows allowable swing time against the moment of inertia of a lever. An operation time should be longer than the operation time shown in the graph.

Excessive action speed can reduce stopping accuracy and damage internal components.



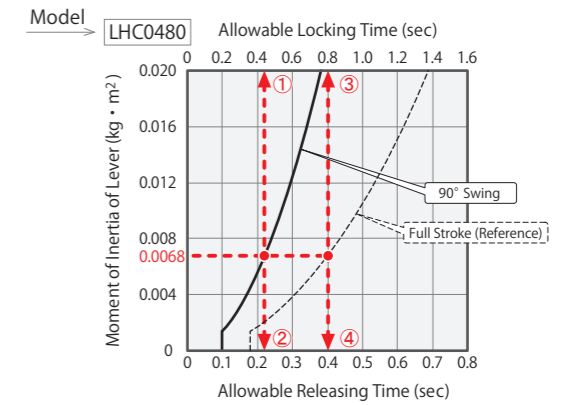
(How to read the allowable swing time graph)

In case of LHC0480

The moment of inertia of a lever : 0.0068kg·m<sup>2</sup>

- ① 90° Swing Time when Locking : About 0.44 sec or more
- ② 90° Swing Time when Releasing : About 0.22 sec or more
- ③ Total Lock Operation Time : About 0.8 sec or more
- ④ Total Release Operation Time : About 0.4 sec or more

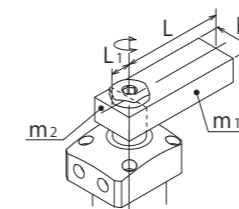
1. The total operation time on the graph represents the allowable operation time when fully stroked.



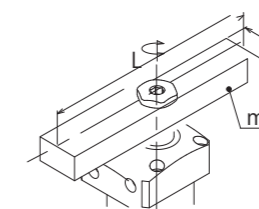
How to Calculate the Moment of Inertia (Estimated)

I : Moment of Inertia (kg·m<sup>2</sup>) L,L<sub>1</sub>,L<sub>2</sub>,K,b:Length (m) m,m<sub>1</sub>,m<sub>2</sub>,m<sub>3</sub>:Mass (kg)

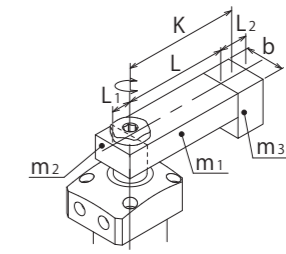
- ① For a rectangular plate (cuboid), the rotating shaft is vertically on one side of the plate.
- ② For a rectangular plate (cuboid), the rotating shaft is vertically on the gravity center of the plate.
- ③ Load is applied on the lever front end.



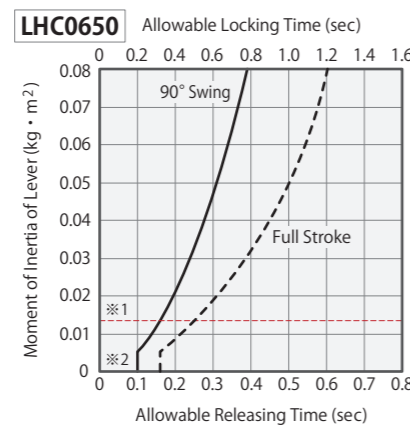
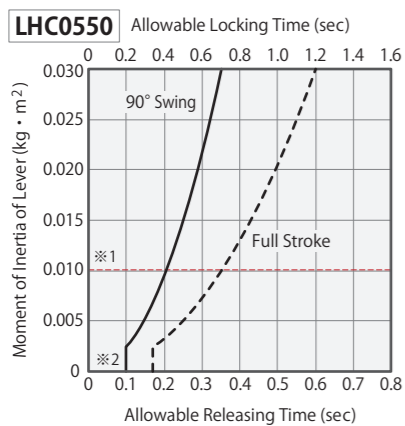
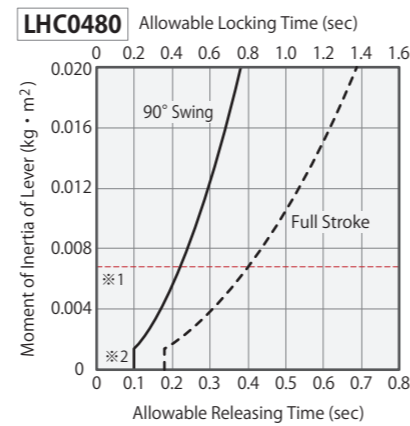
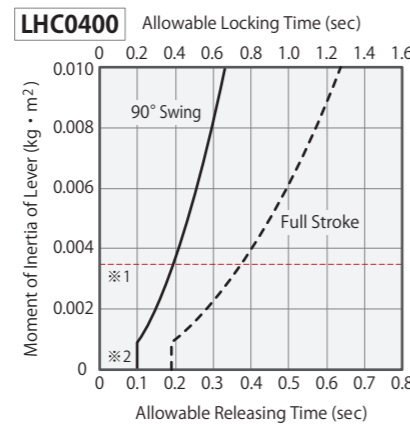
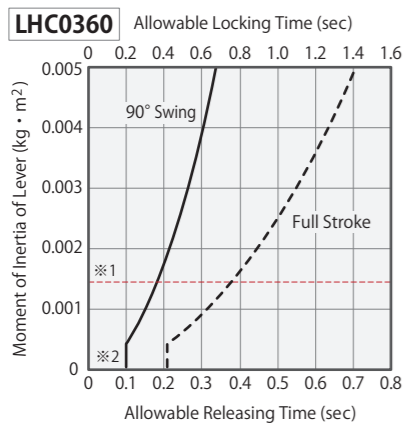
$$I = m_1 \frac{4L^2 + b^2}{12} + m_2 \frac{4L_1^2 + b^2}{12}$$



$$I = m \frac{L^2 + b^2}{12}$$



$$I = m_1 \frac{4L^2 + b^2}{12} + m_2 \frac{4L_1^2 + b^2}{12} + m_3 K^2 + m_3 \frac{L_2^2 + b^2}{12}$$



Notes:

- ※1. It shows the moment of inertia of material lever (LZH□-T).
- ※2. For any moment of inertia of a lever, the minimum 90° swing time should be 0.2 sec for locking and 0.1 sec for releasing or more.
  - 1. The graph shows the allowable action time with respect to the moment of inertia of lever when the piston rod operates at constant speed.
  - 2. Lever with a large inertia sometimes does not work depending on supply hydraulic pressure, oil flow and lever mounting position.
  - 3. For speed adjustment of clamp lever, please use meter-out flow control valve.
    - In case of meter-in control, the clamp lever may be accelerated by its own weight during swinging motion (clamp mounted horizontally) or the piston rod may be moving too fast. Please refer to P.1356 for speed control of the hydraulic cylinder.
  - 4. Excessive swing speed can reduce stopping accuracy and damage the internal parts.
  - 5. Please contact us if operational conditions differ from those shown on the graphs.

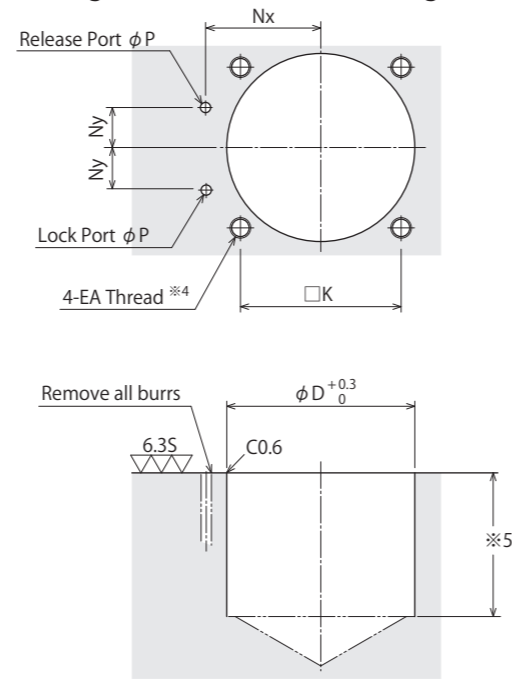
High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others
Hole Clamp
SFA
SFC
Swing Clamp
LHA
LHC
LHS
LHW
LG/LT
TLA-2
TLB-2
TLA-1
Link Clamp
LKA
LKC
LKW
LJ/LM
TMA-2
TMA-1
Work Support
LD
LC
TNC
TC
Air Sensing Lift Cylinder
LLW
Linear Cylinder / Compact Cylinder
LL
LLR
LLU
DP
DR
DS
DT
Block Cylinder
DBA/DBC
Centering Vise
FVA
FVD
FVC
Control Valve
BZL
BZT
BZX/JZG
BZS
Pallet Clamp
VS/VT
Expansion Locating Pin
VFL/VFM
VFJ/VFK
Pull Stud Clamp
FP
FQ
Customized Spring Cylinder
DWA/DWB

External Dimensions

C : Gasket Option (With G Thread Plug)

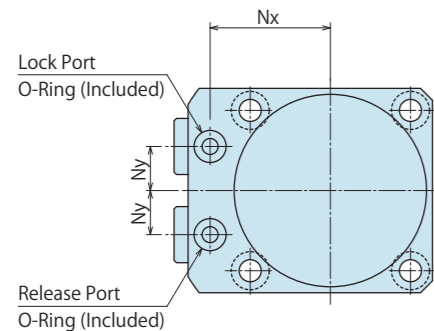
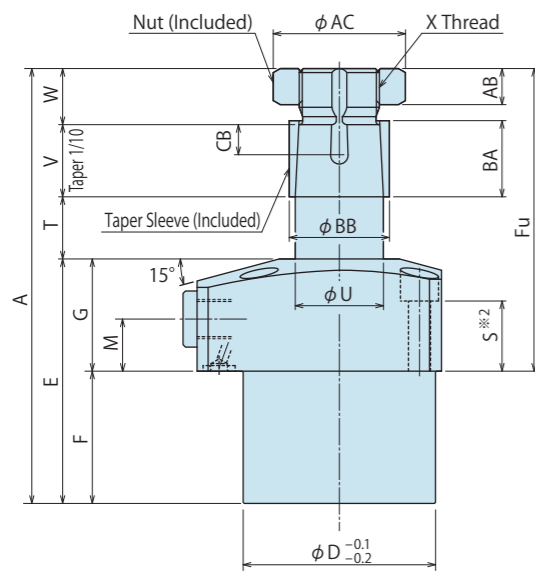
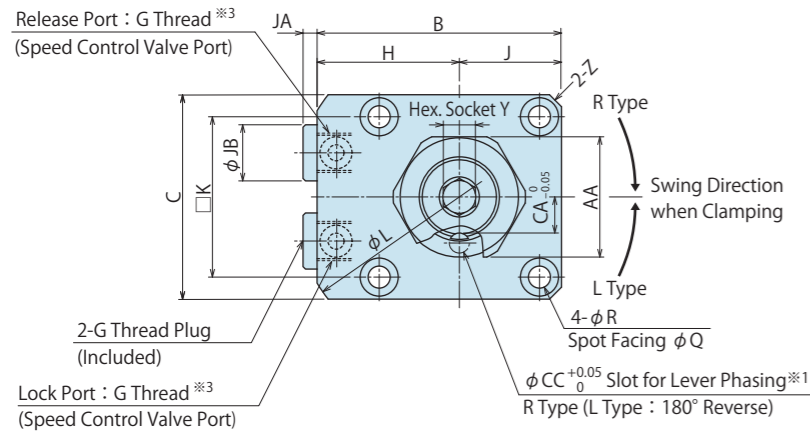
※ The drawing shows the released state of LHC-CR.

Machining Dimensions of Mounting Area



Notes :

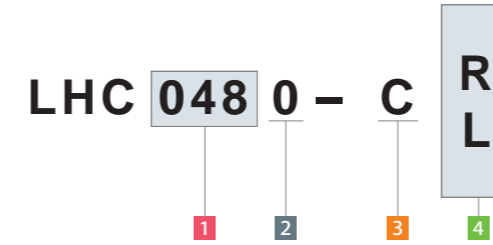
- ※4. EA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.
- ※5. The depth of the body mounting hole  $\phi D$  should be decided according to the mounting height referring to dimension 'F'.



Notes :

- ※1. The slot for lever phasing faces the oil port side when locked.
- ※2. Mounting bolts are not provided. Please prepare them based on dimension 'S'.
- ※3. Speed control valve is sold separately. Please refer to P.947.

Model No. Indication



(Format Example : LHC0550-CR, LHC0650-CL)

- 1 Body Size
- 2 Design No.
- 3 Piping Method
- 4 Swing Direction when Clamping

External Dimensions and Machining Dimensions for Mounting

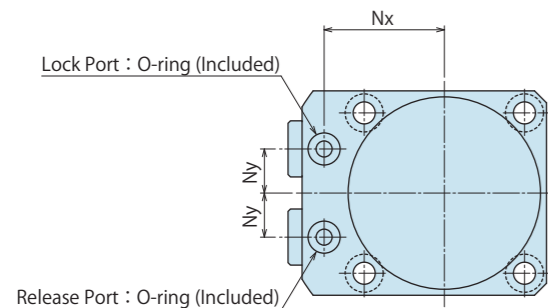
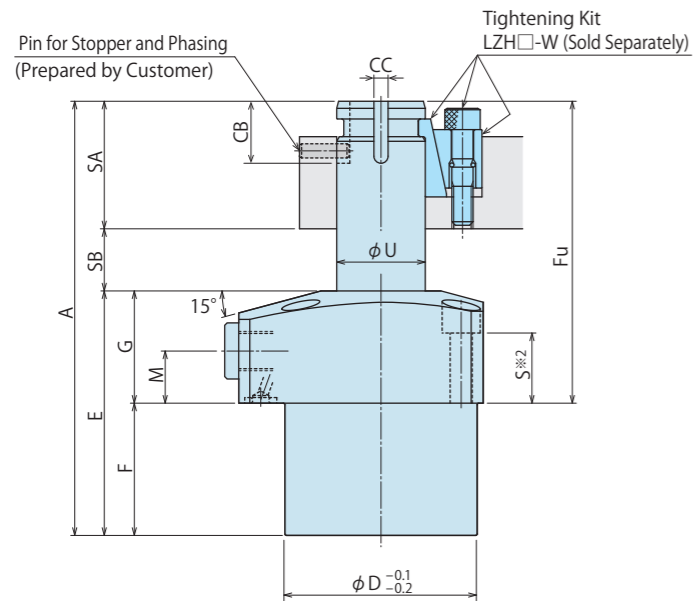
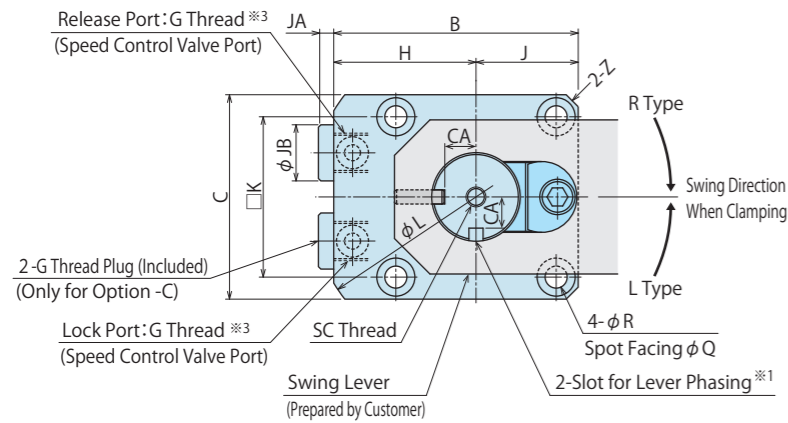
Model No.	LHC0360-C□	LHC0400-C□	LHC0480-C□	LHC0550-C□	LHC0650-C□
Full Stroke	11.5	12.5	13.5	14.5	16
Swing Stroke (90°)	5.5	6.5	7.5	8.5	10
Vertical Stroke	6	6	6	6	6
A	90.5	99.5	108.5	122	133.5
B	49	54	61	69	81
C	40	45	51	60	70
D	36	40	48	55	65
E	53	58	61	69.5	75.5
F	28	33	33	39.5	44.5
Fu	62.5	66.5	75.5	82.5	89
G	25	25	28	30	31
H	29	31.5	35.5	39	46
J	20	22.5	25.5	30	35
K	31.4	34	40	47	55
L	66	73	83	88	106
M	11	11	13	12	13
Nx	23.5	26	30	33.5	39.5
Ny	8	9	11	12	15
P	3	3	3	3	5
Q	7.5	9	9	11	11
R	4.5	5.5	5.5	6.8	6.8
S	16	15	17.5	17	17
T	13.5	14.5	15.5	16.5	18
U	15	18	22	25	30
V	13	15	18	21	24
W	11	12	14	15	16
X (Nominal×Pitch)	M14×1.5	M16×1.5	M20×1.5	M22×1.5	M27×1.5
Y	5	6	8	8	10
Z (Chamfer)	C2	C3	C3	C3	C4
AA	22	24	30	32	41
AB	7	8	9	10	11
AC	24.5	26.5	33	35.5	45
BA	14	16	19	22	25
BB	17	20	25	28	34
CA	6	7	9	10	12.5
CB	6.5	6.5	7.5	9.5	11.5
CC	4	4	5	6	6
EA (Nominal×Pitch)	M4×0.7	M5×0.8	M5×0.8	M6×1	M6×1
JA	3.5	3.5	3.5	3.5	4.5
JB	14	14	14	14	19
Lock Port : G Thread	G1/8	G1/8	G1/8	G1/8	G1/4
Release Port : G Thread	G1/8	G1/8	G1/8	G1/8	G1/4
O-Ring	1BP5	1BP5	1BP5	1BP5	1BP7

- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others
- Hole Clamp
  - SFA
  - SFC
- Swing Clamp
  - LHA
  - LHC
  - LHS
  - LHW
  - LG/LT
  - TLA-2
  - TLB-2
  - TLA-1
- Link Clamp
  - LKA
  - LKC
  - LKW
  - LJ/LM
  - TMA-2
  - TMA-1
- Work Support
  - LD
  - LC
  - TNC
  - TC
- Air Sensing Lift Cylinder
  - LLW
- Linear Cylinder / Compact Cylinder
  - LL
  - LLR
  - LLU
  - DP
  - DR
  - DS
  - DT
- Block Cylinder
  - DBA/DBC
- Centering Vise
  - FVA
  - FVD
  - FVC
- Control Valve
  - BZL
  - BZT
  - BZX/JZG
  - BZS
- Pallet Clamp
  - VS/VT
- Expansion Locating Pin
  - VFL/VFM
  - VFJ/VFK
- Pull Stud Clamp
  - FP
  - FQ
- Customized Spring Cylinder
  - DWA/DWB



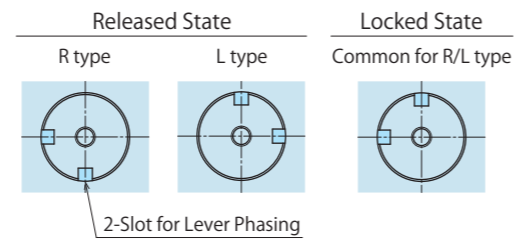
External Dimensions

C : Gasket Option (With G Thread Plug)  
 ※ The drawing shows the released state of LHC-CR-A.

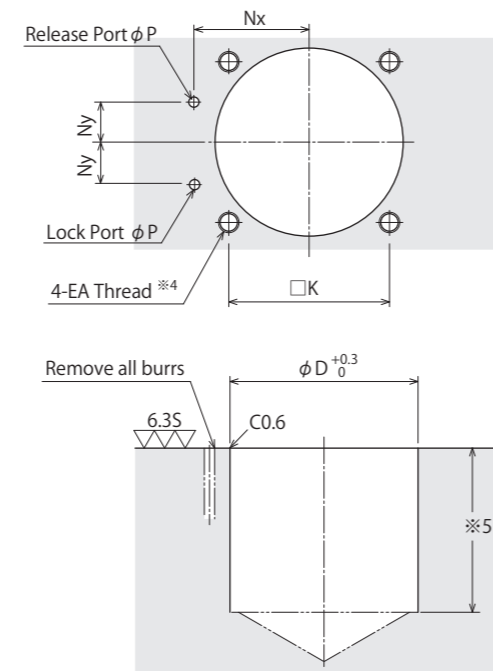


Notes :  
 ※2. Mounting bolts are not provided. Please prepare them according to the mounting height referring to dimension 'S'.  
 ※3. Speed control valve is sold separately. Please refer to P.947.

※1. Slot for Lever Phasing

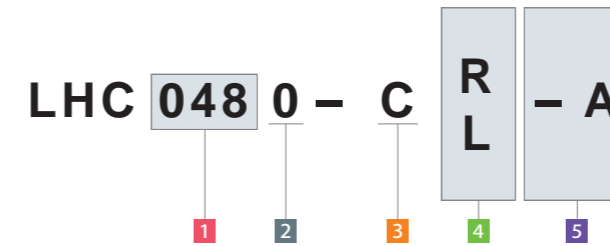


Machining Dimensions of Mounting Area



Notes :  
 ※4. EA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.  
 ※5. The depth of the body mounting hole φD should be decided according to the mounting height referring to dimension 'F'.

Model No. Indication



(Format Example : LHC0550-CR-A, LHC0650-CL-A)

- 1 Body Size
- 2 Design No.
- 3 Piping Method
- 4 Swing Direction when Clamping
- 5 Option (When selecting A)

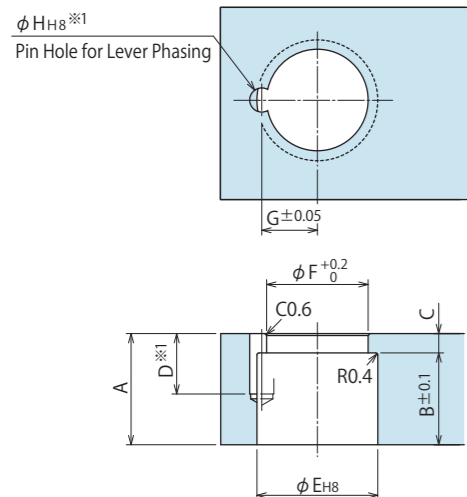
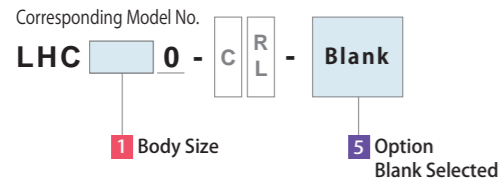
External Dimensions and Machining Dimensions for Mounting

Model No.	LHC0360-C□-A	LHC0400-C□-A	LHC0480-C□-A	LHC0550-C□-A	LHC0650-C□-A
Full Stroke	11.5	12.5	13.5	14.5	16
Swing Stroke (90°)	5.5	6.5	7.5	8.5	10
Vertical Stroke	6	6	6	6	6
A	90.5	99.5	108.5	122	133.5
B	49	54	61	69	81
C	40	45	51	60	70
D	36	40	48	55	65
E	53	58	61	69.5	75.5
F	28	33	33	39.5	44.5
Fu	62.5	66.5	75.5	82.5	89
G	25	25	28	30	31
H	29	31.5	35.5	39	46
J	20	22.5	25.5	30	35
K	31.4	34	40	47	55
L	66	73	83	88	106
M	11	11	13	12	13
Nx	23.5	26	30	33.5	39.5
Ny	8	9	11	12	15
P	3	3	3	3	5
Q	7.5	9	9	11	11
R	4.5	5.5	5.5	6.8	6.8
S	16	15	17.5	17	17
U	15	18	22	25	30
Z (Chamfer)	C2	C3	C3	C3	C4
CA	4.8	5.8	7.8	8.8	10.5
CB	12	15	16	17.5	21.5
CC	3 <sup>+0.028</sup> <sub>+0.014</sub>	4 <sup>+0.038</sup> <sub>+0.020</sub>	4 <sup>+0.038</sup> <sub>+0.020</sub>	4 <sup>+0.038</sup> <sub>+0.020</sub>	6 <sup>+0.038</sup> <sub>+0.020</sub>
EA (Nominal×Pitch)	M4×0.7	M5×0.8	M5×0.8	M6×1	M6×1
SA	24	27	32	36	40
SB	13.5	14.5	15.5	16.5	18
SC (Nominal×Pitch×Depth)	M4×0.7×7	M5×0.8×8	M5×0.8×8	M6×1×11	M6×1×11
JA	3.5	3.5	3.5	3.5	4.5
JB	14	14	14	14	19
Lock Port : G Thread	G1/8	G1/8	G1/8	G1/8	G1/4
Release Port : G Thread	G1/8	G1/8	G1/8	G1/8	G1/4
O-Ring	1BP5	1BP5	1BP5	1BP5	1BP7
Pin for Stopper and Phasing	φ3(m6)×8	φ4(m6)×10	φ4(m6)×12	φ4(m6)×14	φ6(m6)×14

- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others
- Hole Clamp
  - SFA
  - SFC
- Swing Clamp
  - LHA
  - LHC
  - LHS
  - LHW
  - LG/LT
  - TLA-2
  - TLB-2
  - TLA-1
- Link Clamp
  - LKA
  - LKC
  - LKW
  - LJ/LM
  - TMA-2
  - TMA-1
- Work Support
  - LD
  - LC
  - TNC
  - TC
- Air Sensing Lift Cylinder
  - LLW
- Linear Cylinder / Compact Cylinder
  - LL
  - LLR
  - LLU
  - DP
  - DR
  - DS
  - DT
- Block Cylinder
  - DBA/DBC
- Centering Vise
  - FVA
  - FVD
  - FVC
- Control Valve
  - BZL
  - BZT
  - BZX/JZG
  - BZS
- Pallet Clamp
  - VS/VT
- Expansion Locating Pin
  - VFL/VFM
  - VFJ/VFK
- Pull Stud Clamp
  - FP
  - FQ
- Customized Spring Cylinder
  - DWA/DWB

### Taper Lock Lever Design Dimensions

※ Reference for designing a taper lock swing lever.



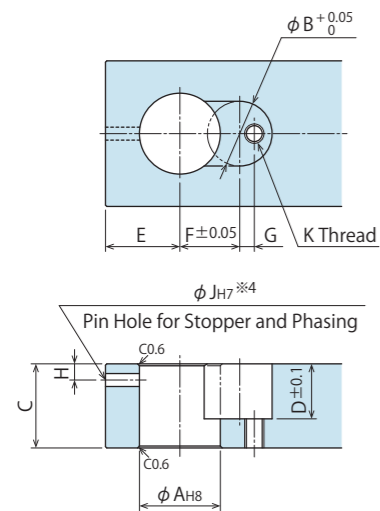
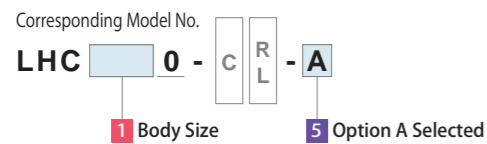
Corresponding Model No. <sup>#3</sup>	LHC0360	LHC0400	LHC0480	LHC0550	LHC0650
A	17	19	23	26	29
B	14	16	19	22	25
C	3	3	4	4	4
D	10.5	10.5	12.5	14.5	16.5
E	17 <sup>+0.027</sup>	20 <sup>+0.033</sup>	25 <sup>+0.033</sup>	28 <sup>+0.033</sup>	34 <sup>+0.039</sup>
F	15	17	21	23.5	29
G	8	9	11.5	13	15.5
H	4 <sup>+0.018</sup>	4 <sup>+0.018</sup>	5 <sup>+0.018</sup>	6 <sup>+0.018</sup>	6 <sup>+0.018</sup>
Phasing Pin <sup>#2</sup> (Reference)	φ4(h8)×10	φ4(h8)×10	φ5(h8)×12	φ6(h8)×14	φ6(h8)×16

Notes :

- Swing lever should be designed with its length according to performance curve.
- If the swing lever is not in accordance with the dimension shown above, performance may be degraded and damage can occur.
- ※1. The pin hole (φH) for determining the lever phase should be added, if necessary.
- ※2. Phasing pin is not included. Prepare it separately.
- ※3. Refer to Design Dimensions of Quick Change Lever Option A for -A (Quick Change Lever Option A).

### Quick Change Lever Option A Design Dimensions

※ Reference for designing Quick Change Swing Lever Option A.

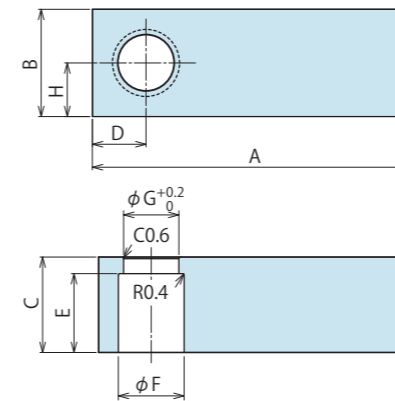
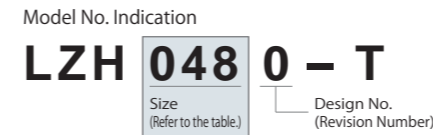


Corresponding Model No.	LHC0360	LHC0400	LHC0480	LHC0550	LHC0650
A	15 <sup>+0.027</sup>	18 <sup>+0.027</sup>	22 <sup>+0.033</sup>	25 <sup>+0.033</sup>	30 <sup>+0.033</sup>
B	12	15	18	20	24
C	17	19	23	26	29
D	11	13	15.5	17	19
E	13	16	20	23	25
F	12.5	15	16.5	18.5	20.5
G	2	2.5	4	4.5	6.5
H	3	4	4	4	6
J	3 <sup>+0.010</sup>	4 <sup>+0.012</sup>	4 <sup>+0.012</sup>	4 <sup>+0.012</sup>	6 <sup>+0.012</sup>
K	M4×0.7	M5×0.8	M5×0.8	M6×1	M6×1
Pin for Stopper <sup>#4</sup> and Phasing	φ3(m6)×8	φ4(m6)×10	φ4(m6)×12	φ4(m6)×14	φ6(m6)×14

Notes :

- Swing lever should be designed with its length according to performance curve.
- If the swing lever is not in accordance with the dimension shown above, performance may be degraded and damage can occur.
- Tightening Kit (LZH□-W) for Quick Change Lever Option A is sold separately.
- ※4. The pin hole for stopper and phasing (φJ) should be appropriately machined according to the slot for lever phasing on the clamp body. Pin for stopper and phasing (prepared by customer) is used as phasing when mounting the lever and as stopper when removing the lever. If you are not using a pin for stopper and phasing, a stopper is required to remove the lever.

### Accessories : Material Swing Lever for Taper Lock Option

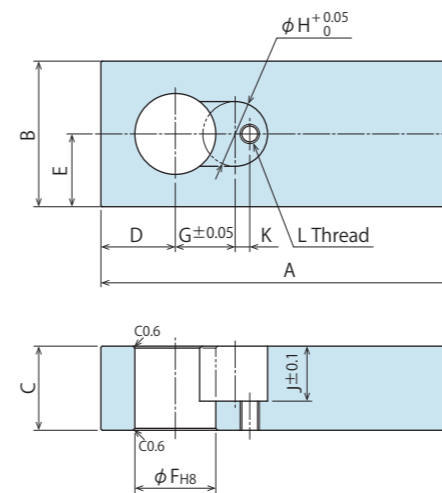
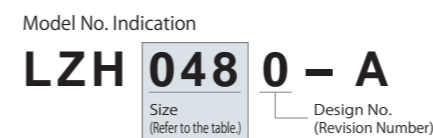


Model No.	LZH0360-T	LZH0400-T	LZH0480-T	LZH0550-T	LZH0650-T
Corresponding Model No. <sup>#5</sup>	LHC0360	LHC0400	LHC0480	LHC0550	LHC0650
A	120	145	160	170	175
B	26	32	40	45	50
C	17	19	23	26	29
D	13	16	20	23	25
E	14	16	19	22	25
F	17	20	25	28	34
G	15	17	21	23.5	29
H	13	16	20	22.5	25

Notes :

- Material : S50CH Surface Finishing : Alkaline Blackening
- If necessary, the front end should be additionally machined and finished.
- When determining the phase, refer to taper lock lever design dimensions for each model for the additional machining.
- ※5. Refer to Accessory of Quick Change Lever Option A for -A (Quick Change Lever Option A).

### Accessories : Material Swing Lever for Quick Change Lever Option A

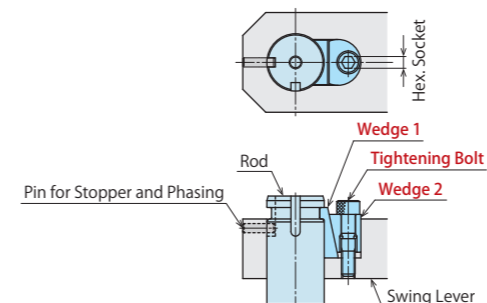
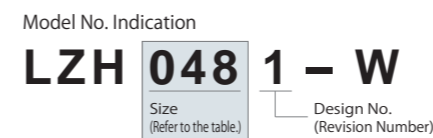


Model No.	LZH0360-A	LZH0400-A	LZH0480-A	LZH0550-A	LZH0650-A
Corresponding Model No.	LHC0360-□-A	LHC0400-□-A	LHC0480-□-A	LHC0550-□-A	LHC0650-□-A
A	120	145	160	170	175
B	26	32	40	45	50
C	17	19	23	26	29
D	13	16	20	23	25
E	13	16	20	22.5	25
F	15 <sup>+0.027</sup>	18 <sup>+0.027</sup>	22 <sup>+0.033</sup>	25 <sup>+0.033</sup>	30 <sup>+0.033</sup>
G	12.5	15	16.5	18.5	20.5
H	12	15	18	20	24
J	11	13	15.5	17	19
K	2	2.5	4	4.5	6.5
L	M4×0.7	M5×0.8	M5×0.8	M6×1	M6×1

Notes :

- Material : S50CH Surface Finishing : Alkaline Blackening
- If necessary, the front end should be additionally machined and finished.
- The pin hole for stopper and lever phasing should be additionally machined by referring to Quick Change Lever Option A Design Dimensions.
- Tightening Kit (LZH□-W) for Quick Change Lever Option A is sold separately.

### Accessories : Tightening Kit for Quick Change Lever Option A



Tightening Kit for mounting Quick Change Lever Option A. Sold separately from clamp body.

【Contents of Tightening Kit】

- Wedge 1
- Wedge 2
- Tightening Bolt

Model No.	LZH0361-W	LZH0401-W	LZH0481-W	LZH0551-W	LZH0651-W
Corresponding Model No.	LHC0360-□-A	LHC0400-□-A	LHC0480-□-A	LHC0550-□-A	LHC0650-□-A
Nominal×Pitch of Tightening Bolt	M4×0.7	M5×0.8	M5×0.8	M6×1	M6×1
Hex. Socket mm	2.5	3	3	4	4
Tightening Torque N·m	2.5	5.0	5.0	8.0	8.0

High-Power Series

Pneumatic Series

Hydraulic Series

Valve / Coupler Hydraulic Unit

Manual Operation Accessories

Cautions / Others

Hole Clamp

SFA

SFC

Swing Clamp

LHA

LHC

LHS

LHW

LG/LT

TLA-2

TLB-2

TLA-1

Link Clamp

LKA

LKC

LKW

LJ/LM

TMA-2

TMA-1

Work Support

LD

LC

TNC

TC

Air Sensing Lift Cylinder

LLW

Linear Cylinder / Compact Cylinder

LL

LLR

LLU

DP

DR

DS

DT

Block Cylinder

DBA/DBC

Centering Vise

FVA

FVD

FVC

Control Valve

BZL

BZT

BZX/JZG

BZS

Pallet Clamp

VS/VT

Expansion Locating Pin

VFL/VFM

VFJ/VFK

Pull Stud Clamp

FP

FQ

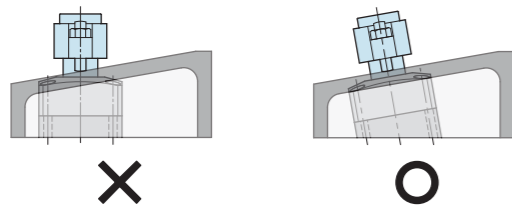
Customized Spring Cylinder

DWA/DWB

**Cautions**

● Notes for Design

- 1) Check Specifications
  - Please use each product according to the specifications.
- 2) Notes for Circuit Design
  - Please read "Notes on Hydraulic Cylinder Speed Control Unit" for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P.1356)
  - Ensure there is no possibility of supplying hydraulic pressure to the lock port and the release port simultaneously.
- 3) Swing lever should be designed to make the moment of inertia small.
  - Large moment of inertia will degrade the lever's stopping accuracy and cause undue wear to the clamp.
  - Additionally, the clamp may not function, depending on supplied hydraulic pressure and lever mounting position.
  - Set the allowable operation time after the moment of inertia is calculated. Refer to "Allowable Swing Time Graph" and make sure to operate clamps within the allowable operation time.
- 4) Protect the exposed area of the piston rod when using on a welding fixture.
  - If spatter attaches to the sliding surface it could lead to malfunction and fluid leakage.
- 5) When clamping on a sloped surface of the workpiece
  - Make sure the clamping surface and the mounting surface of the clamp are parallel.

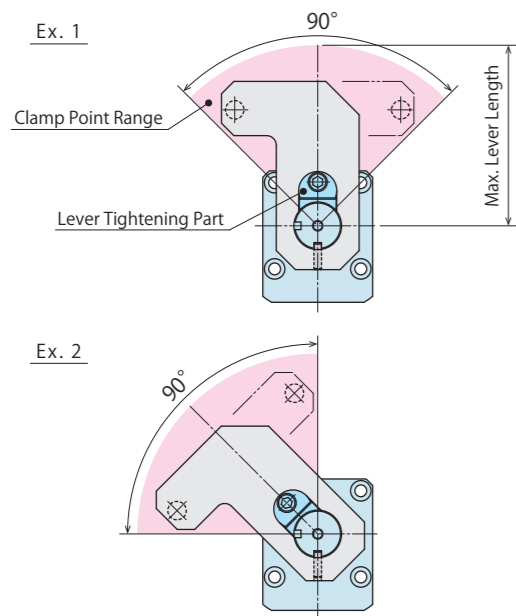


6) Notes for LHA-M/N, LHW

- When using air sensing swing clamp (LHA-M/N, LHW), make sure to check the Notes for Design • Installation • Use (Pages shown below).
  - Swing clamp with air sensing option LHA-M/N : Refer to P.457.
  - Swing clamp with air sensing valve LHW : Refer to P.503.

7) When using an offset lever for Quick Change Lever Option A.

- Clamping point should be in the range of 90° towards lever tightening part.



● Installation Notes

- 1) Check the Usable Fluid
  - Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.1355).
- 2) Installation of the Product
  - When mounting the clamp, use hexagonal socket bolts as multiple bolt holes for mounting (with tensile strength of 12.9) and tighten them with the torque shown in the table below. Tightening with greater torque than recommended can dent the seating surface or break the bolt.

	Model No.	Thread Size	Tightening Torque (N·m)	
LHA LHC LHS LHW	LHA0360 / LHC0360 LHS0360	M4×0.7	4.0	
	LHA0400 / LHC0400 LHS0400 / LHW0401	M5×0.8	8.0	
	LHA0480 / LHC0480 LHS0480 / LHW0481	M5×0.8	8.0	
	LHA0550 / LHC0550 LHS0550 / LHW0551	M6×1	14	
	LHA0650 / LHC0650 LHS0650 / LHW0651	M6×1	14	
	LHA0750 LHS0750 / LHW0751	M8×1.25	33	
	LHA0900 LHS0900	M10×1.5	65	
	LHA1050 LHS1050	M12×1.75	114	
	LG LT	LG0301 / LT0301	M4×0.7	3.2
		LG0361 / LT0361	M4×0.7	3.2
LG0401 / LT0401		M5×0.8	6.3	
LG0481 / LT0481		M5×0.8	6.3	
LG0551 / LT0551		M6×1	10	
LG0651 / LT0651		M6×1	10	
LG0751 / LT0751		M8×1.25	25	
LG0901		M10×1.5	58.8	
LG1051		M12×1.75	98	
TLA-2 TLB-2 TLA-1		TLA0401-2 / TLB0401-2 TLA0402-1	M5×0.8	6.9
	TLA0601-2 / TLB0601-2 TLA0602-1	M6×1	11.8	
	TLA0801-2 / TLB0801-2 TLA0802-1	M6×1	11.8	
	TLA1001-2 / TLB1001-2 TLA1002-1	M8×1.25	25	
	TLA1601-2 / TLB1601-2 TLA1602-1	M8×1.25	25	
	TLA2001-2 / TLB2001-2 TLA2002-1	M10×1.5	58.8	
	TLA2501-2 / TLB2501-2 TLA2502-1	M10×1.5	58.8	
	TLA4001-2 / TLB4001-2 TLA4002-1	M12×1.75	98	

- 3) Installation / Removal of the Swing Lever
  - Oil or debris on the tightened parts of the lever, taper sleeve or piston rod may cause the rod to loosen. Please clean them thoroughly before installation.
  - Tighten the tightening bolt of swing lever with the torque shown below. Tightening with greater torque than recommended can damage the bolt and lever tightening function.

LHA/LHC/LHS/LHW/LG/LT Standard : Taper Lock Lever

	Model No.	Thread Size	Tightening Torque (N·m)	
LHA LHC LHS LHW	LHA0360 / LHC0360 LHS0360	M14×1.5	21 ~ 25	
	LHA0400 / LHC0400 LHS0400 / LHW0401	M16×1.5	33 ~ 40	
	LHA0480 / LHC0480 LHS0480 / LHW0481	M20×1.5	54 ~ 65	
	LHA0550 / LHC0550 LHS0550 / LHW0551	M22×1.5	84 ~ 100	
	LHA0650 / LHC0650 LHS0650 / LHW0651	M27×1.5	120 ~ 145	
	LHA0750 LHS0750 / LHW0751	M30×1.5	175 ~ 210	
	LHA0900 LHS0900	M39×1.5	280 ~ 335	
	LHA1050 LHS1050	M48×1.5	333 ~ 400	
	LG LT	LG0301 / LT0301	M8×1	8 ~ 10
		LG0361 / LT0361	M10×1	15 ~ 18
LG0401 / LT0401		M12×1.5	24 ~ 29	
LG0481 / LT0481		M16×1.5	37 ~ 45	
LG0551 / LT0551		M18×1.5	59 ~ 71	
LG0651 / LT0651		M22×1.5	93 ~ 112	
LG0751 / LT0751		M28×1.5	147 ~ 177	
LG0901		M36×1.5	235 ~ 282	
LG1051		M45×1.5	300 ~ 360	

LHA-F/LHS-F/LG-F/LT-F : Quick Change Lever Option F,  
TLA-2/TLB-2/TLA-1 : Standard

	Model No.	Thread Size	Tightening Torque (N·m)
LHA-F LHS-F LG-F LT-F	LG0301-F / LT0301-F	M5×0.8	7.5
	LHA0360-F / LHS0360-F LG0361-F / LT0361-F	M6×1	14
	LHA0400-F / LHS0400-F LG0401-F / LT0401-F	M8×1	33
	LHA0480-F / LHS0480-F LG0481-F / LT0481-F	M10×1.25	65
	LHA0550-F / LHS0550-F LG0551-F / LT0551-F	M12×1.5	100 ~ 114
	LHA0650-F / LHS0650-F LG0651-F / LT0651-F	M14×1.5	160 ~ 180
	LHA0750-F / LHS0750-F LG0751-F / LT0751-F	M16×1.5	250 ~ 280
	LHA0900-F / LHS0900-F LG0901-F	M20×2	500 ~ 540
	LHA1050-F / LHS1050-F LG1051-F	M24×2	760 ~ 810
	TLA-2 TLB-2 TLA-1	TLA0401-2 / TLB0401-2 TLA0402-1	M6×1
TLA0601-2 / TLB0601-2 TLA0602-1		M8×1	32
TLA0801-2 / TLB0801-2 TLA0802-1		M8×1	32
TLA1001-2 / TLB1001-2 TLA1002-1		M10×1.25	63
TLA1601-2 / TLB1601-2 TLA1602-1		M12×1.5	100
TLA2001-2 / TLB2001-2 TLA2002-1		M14×1.5	160
TLA2501-2 / TLB2501-2 TLA2502-1		M16×1.5	250
TLA4001-2 / TLB4001-2 TLA4002-1		M20×2	500

LHA-A/LHC-A/LHS-A/LHW-A/LG-A/LT-A : Quick Change Lever Option A

	Model No.	Thread Size	Tightening Torque (N·m)
LHA-A LHC-A LHS-A LHW-A LG-A LT-A	LG0301-A / LT0301-A	M4×0.7	2.5
	LHA0360-A / LHC0360-A LHS0360-A LG0361-A / LT0361-A	M4×0.7	2.5
	LHA0400-A / LHC0400-A LHS0400-A / LHW0401-A LG0401-A / LT0401-A	M5×0.8	5.0
	LHA0480-A / LHC0480-A LHS0480-A / LHW0481-A LG0481-A / LT0481-A	M5×0.8	5.0
	LHA0550-A / LHC0550-A LHS0550-A / LHW0551-A LG0551-A / LT0551-A	M6×1	8.0
	LHA0650-A / LHC0650-A LHS0650-A / LHW0651-A LG0651-A / LT0651-A	M6×1	8.0
	LHA0750-A LHS0750-A / LHW0751-A LG0751-A / LT0751-A	M8×1.25	20
	LHA0900-A LHS0900-A LG0901-A	M10×1.5	40
	LHA1050-A LHS1050-A LG1051-A	M10×1.5	45

- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others

- Hole Clamp
  - SFA
  - SFC
- Swing Clamp
  - LHA
  - LHC
  - LHS
  - LHW
  - LG/LT
  - TLA-2
  - TLB-2
  - TLA-1
- Link Clamp
  - LKA
  - LKC
  - LKW
  - LJ/LM
  - TMA-2
  - TMA-1
- Work Support
  - LD
  - LC
  - TNC
  - TC

- Air Sensing Lift Cylinder
  - LLW
- Linear Cylinder / Compact Cylinder
  - LL
  - LLR
  - LLU
  - DP
  - DR
  - DS
  - DT
- Block Cylinder
  - DBA/DBC
- Centering Vise
  - FVA
  - FVD
  - FVC
- Control Valve
  - BZL
  - BZT
  - BZX/JZG
  - BZS
- Pallet Clamp
  - VS/VT
- Expansion Locating Pin
  - VFL/VFM
  - VFJ/VFK
- Pull Stud Clamp
  - FP
  - FQ
- Customized Spring Cylinder
  - DWA/DWB



**Cautions**

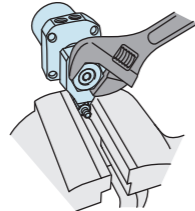
**Installation Notes**

**In case of Taper Lock Lever**

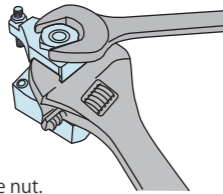
If the piston rod is subjected to excessive torque or shock, the rod or the internal mechanism may be damaged. Observe the following points to prevent such shock.

**Installation Procedure**

① With a clamp positioned to a jig, determine the lever position, and tighten the nut for fixing the lever (temporal tightening).



② Remove the clamp from the jig, fix the lever with a machine vise etc., and tighten the nut.

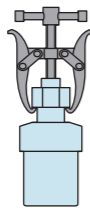


③ If tightening the nut with the clamp positioned to the jig, use a wrench to the hexagon part of piston rod, or fix the lever with a spanner. It is best to bring the lever to the middle of the swing stroke before tightening the nut.

**Removal Procedure**

① While the clamp is on the jig or vise, use a hex wrench to bring the lever to the middle of the swing stroke and then loosen the nut.

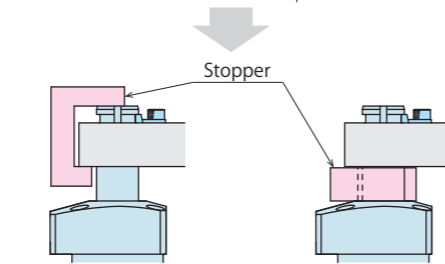
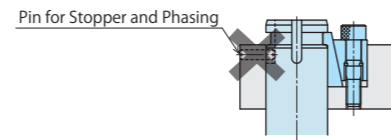
② Loosen the nut after securing the lever two or three turns then remove the lever with a puller without any rotational torque applied on the piston rod.



**In case of Quick Change Lever Option A**

A pin for stopper and phasing (prepared by customer) is used for phasing when mounting the lever and as a stopper when removing the lever. If you are not using the pin for stopper and phasing, a stopper is required to remove the lever.

Stopper example for lever removal when not using the pin for stopper and phasing.

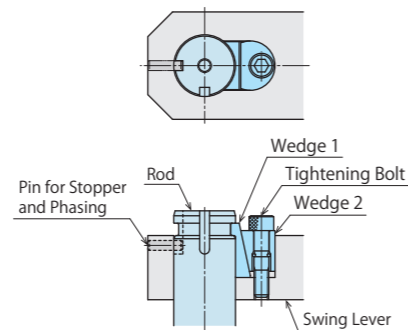


**Installation Procedure**

① Install in order of swing lever, wedge 1, wedge 2 to the rod.  
② Pull the lever towards the wedge side and tighten the tightening bolt with the specified torque.

**Removal Procedure**

① By loosening the tightening bolt, the wedges are released and the lever can be removed.



**4) Swing Speed Adjustment**

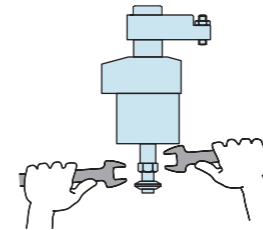
- Adjust the speed following "Allowable Swing Time Graph". If the clamp operates too fast the parts will be worn out leading to premature damage and ultimately complete equipment failure.
- Please make sure to release air from the circuit before adjusting speed. It will be difficult to adjust the speed accurately with air mixed in the circuit.
- Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

**5) Checking Looseness and Retightening**

- At the beginning of the product installation, the bolt and nut may be tightened lightly. Check the looseness and re-tighten as required.

**6) Notes on dual rod option (-D) for dog application.**

- When attaching dog, set up the piston so that it will not turn around. Please secure the dog or cam and prevent any rotation or torque on the piston rod. Tightening torque of mounting screw is shown in the table below.



Model No.	Thread Size	Tightening Torque (N·m)
LHA0360-□□D	M4×0.7	3.2
LHA0400-□□D	M6×1	10
LHA0480-□□D	M8×1.25	25
LHA0550-□□D	M8×1.25	25
LHA0650-□□D	M8×1.25	25
LHA0750-□□D	M10×1.5	50
LHA0900-□□D	M10×1.5	50
LHA1050-□□D	M10×1.5	50

※ Please refer to P.1355 for common cautions. • Installation Notes • Hydraulic Fluid List • Notes on Hydraulic Cylinder Speed Control Circuit • Notes on Handling • Maintenance/Inspection • Warranty

- High-Power Series
- Pneumatic Series
- Hydraulic Series**
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others

- Hole Clamp
  - SFA
  - SFC

- Swing Clamp**
  - LHA
  - LHC
  - LHS
  - LHW
  - LG/LT
  - TLA-2
  - TLB-2
  - TLA-1

- Link Clamp
  - LKA
  - LKC
  - LKW
  - LJ/LM
  - TMA-2
  - TMA-1

- Work Support
  - LD
  - LC
  - TNC
  - TC

- Air Sensing Lift Cylinder
  - LLW

- Linear Cylinder / Compact Cylinder
  - LL
  - LLR
  - LLU
  - DP
  - DR
  - DS
  - DT

- Block Cylinder
  - DBA/DBC

- Centering Vise
  - FVA
  - FVD
  - FVC

- Control Valve
  - BZL
  - BZT
  - BZX/JZG
  - BZS

- Pallet Clamp
  - VS/VT

- Expansion Locating Pin
  - VFL/VFM
  - VFJ/VFK

- Pull Stud Clamp
  - FP
  - FQ

- Customized Spring Cylinder
  - DWA/DWB

● Cautions

● Installation Notes (For Hydraulic Series)

- 1) Check the Usable Fluid
  - Please use the appropriate fluid by referring to the Hydraulic Fluid List.
- 2) Procedure before Piping
  - The pipeline, piping connector and fixture circuits should be cleaned by thorough flushing.
  - The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
  - There is no filter provided with Kosmek's product except for a part of valves which prevents foreign materials and contaminants from getting into the circuit.

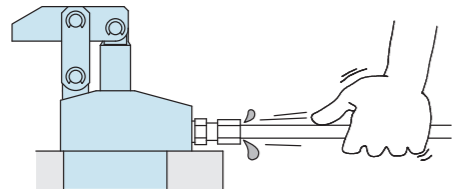
3) Applying Sealing Tape

- Wrap with tape 1 to 2 times following the screw direction.
- Pieces of the sealing tape can lead to oil leakage and malfunction.
- Please implement piping construction in a clear environment to prevent anything getting in products.

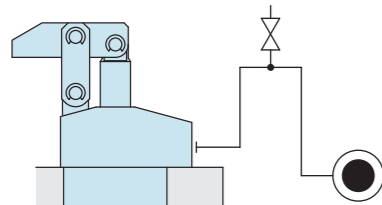
4) Air Bleeding of the Hydraulic Circuit

- If the hydraulic circuit has excessive air, the action time may become very long. If air enters the circuit after connecting the hydraulic port or under the condition of no air in the oil tank, please perform the following steps.

- ① Reduce hydraulic pressure to less than 2MPa.
- ② Loosen the cap nut of pipe fitting closest to the clamp by one full turn.
- ③ Shake the pipeline to loosen the outlet of pipe fitting.  
Hydraulic fluid mixed with air comes out.



- ④ Tighten the cap nut after bleeding.
- ⑤ It is more effective to release air at the highest point inside the circuit or at the end of the circuit.  
(Set an air bleeding valve at the highest point inside the circuit.)



5) Checking Looseness and Retightening

- At the beginning of the machine installation, the bolt and nut may be tightened lightly. Check the looseness and re-tighten as required.

● Hydraulic Fluid List

Maker	ISO Viscosity Grade ISO-VG-32	
	Anti-Wear Hydraulic Oil	Multi-Purpose Hydraulic Oil
Showa Shell Sekiyu	Tellus S2 M 32	Morlina S2 B 32
Idemitsu Kosan	Daphne Hydraulic Fluid 32	Daphne Super Multi Oil 32
JX Nippon Oil & Energy	Super Hyrando 32	Super Mulpus DX 32
Cosmo Oil	Cosmo Hydro AW32	Cosmo New Mighty Super 32
ExxonMobil	Mobil DTE 24	Mobil DTE 24 Light
Matsumura Oil	Hydol AW-32	
Castrol	Hyspin AWS 32	

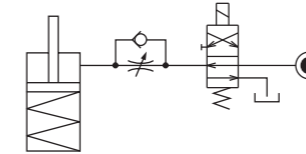
Note : Please contact manufacturers when customers require products in the list above.

● Notes on Hydraulic Cylinder Speed Control Unit

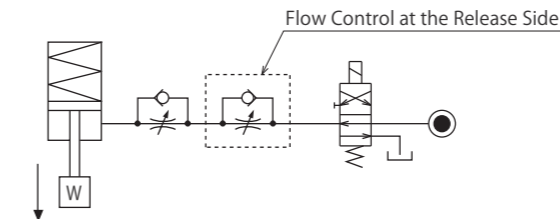
- ⚠ Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

● Flow Control Circuit for Single Acting Cylinder

For spring return single acting cylinders, restricting flow during release can extremely slow down or disrupt release action. The preferred method is to control the flow during the lock action using a valve that has free-flow in the release direction. It is also preferred to provide a flow control valve at each actuator.



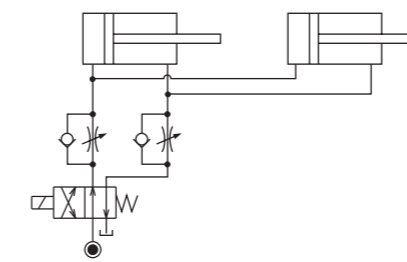
Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)



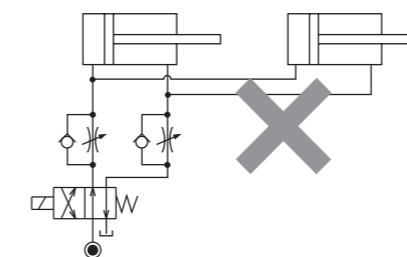
● Flow Control Circuit for Double Acting Cylinder

Flow control circuit for double acting cylinder should have meter-out circuits for both the lock and release sides. Meter-in control can have adverse effect by presence of air in the system. However, in the case of controlling LKE, TMA, TLA, both lock side and release side should be meter-in circuit. Refer to P.75 for speed adjustment of LKE. For TMA and TLA, if meter-out circuit is used, abnormal high pressure is created, which causes oil leakage and damage.

【Meter-out Circuit】 (Except LKE/TMA/TLA)

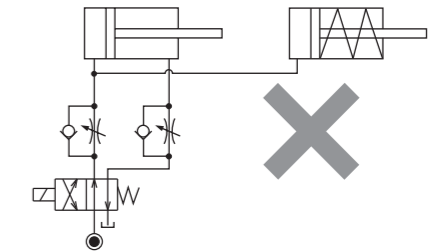


【Meter-in Circuit】 (LKE/TMA/TLA must be controlled with meter-in.)

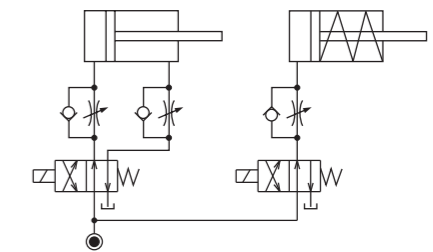


In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

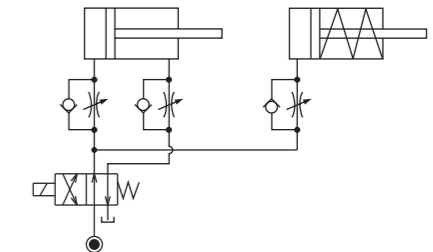
- ① Single acting components should not be used in the same flow control circuit as the double acting components. The release action of the single acting cylinders may become erratic or very slow.



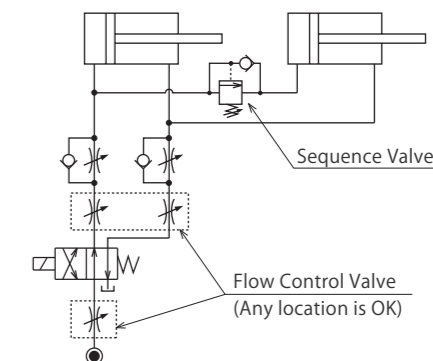
Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.  
○ Separate the control circuit.



- Reduce the influence of double acting cylinder control unit. However, due to the back pressure in tank line, single action cylinder is activated after double action cylinder works.



- ② In the case of meter-out circuit, the inner circuit pressure may increase during the cylinder action because of the fluid supply. The increase of the inner circuit pressure can be prevented by reducing the supplied fluid beforehand via the flow control valve. Especially when using sequence valve or pressure switches for clamping detection. If the back pressure is more than the set pressure then the system will not work as it is designed to.



High-Power Series  
Pneumatic Series  
Hydraulic Series  
Valve / Coupler Hydraulic Unit  
Manual Operation Accessories  
Cautions / Others

Cautions  
Installation Notes (For Hydraulic Series)  
Hydraulic Fluid List  
Notes on Hydraulic Cylinder Speed Control Circuit  
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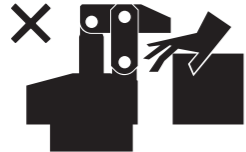
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**Cautions**

● Notes on Handling

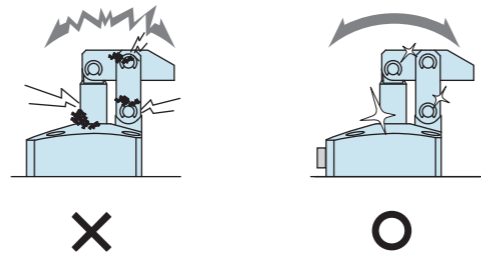
- 1) It should be operated by qualified personnel.
  - The hydraulic machine and air compressor should be operated and maintained by qualified personnel.
- 2) Do not operate or remove the product unless the safety protocols are ensured.
  - ① The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
  - ② Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
  - ③ After stopping the product, do not remove until the temperature drops.
  - ④ Make sure there is no abnormality in the bolts and respective parts before restarting the machine or equipment.
- 3) Do not touch a clamp (cylinder) while it is working. Otherwise, your hands may be injured due to clinching.



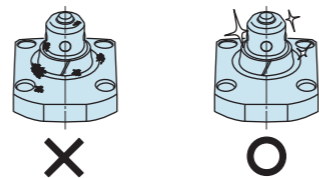
- 4) Do not disassemble or modify.
  - If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

● Maintenance and Inspection

- 1) Removal of the Machine and Shut-off of Pressure Source
  - Before the machine is removed, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
  - Make sure there is no abnormality in the bolts and respective parts before restarting.
- 2) Regularly clean the area around the piston rod and plunger.
  - If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning and fluid leakage.



- 3) Please clean out the reference surfaces on a regular basis (taper reference surface and seating surface) of the locating products. (VS/VT/VFL/VFM/VFJ/VFK/WVS/VWM/VWK/VX/VXE/VXF)
  - The locating products, except VX/VXE/VXF model, can remove contaminants with cleaning functions. However, hardened cutting chips, adhesive coolant and others may not be removed. Make sure there are no contaminants before installing a workpiece/pallet.
  - Continuous use with contaminant on components will lead to locating accuracy failure, malfunction and fluid leakage.



- 4) If disconnecting by couplers, air bleeding should be carried out on a regular basis to avoid air mixed in the circuit.
- 5) Regularly tighten nut, bolt, pin, cylinder, pipe line and others to ensure proper use.
- 6) Make sure the hydraulic fluid has not deteriorated.
- 7) Make sure there is a smooth action without an irregular noise.
  - Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.
- 8) The products should be stored in the cool and dark place without direct sunshine or moisture.
- 9) Please contact us for overhaul and repair.

● Warranty

- 1) Warranty Period
  - The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.
- 2) Warranty Scope
  - If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense. Defects or failures caused by the following are not covered.
    - ① If the stipulated maintenance and inspection are not carried out.
    - ② If the product is used while it is not suitable for use based on the operator's judgment, resulting in defect.
    - ③ If it is used or operated in an inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
    - ④ If the defect is caused by reasons other than our responsibility.
    - ⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
    - ⑥ Other caused by natural disasters or calamities not attributable to our company.
    - ⑦ Parts or replacement expenses due to parts consumption and deterioration. (Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.

- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others

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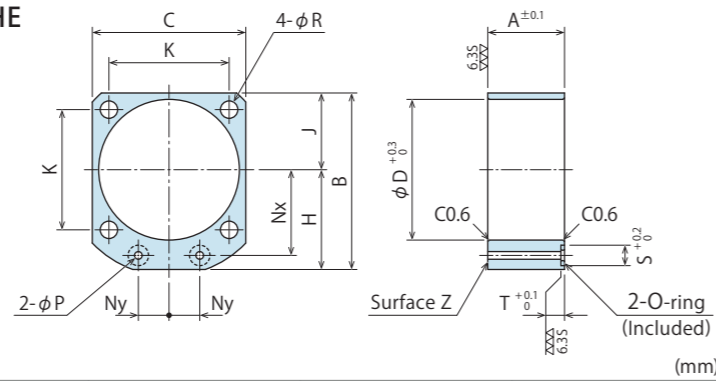
Manifold Block for WCA/WCE/WHA/WHE

Model No. Indication

**WHZ 048 0 - MD**

Size  
(Refer to following table)

Design No.  
(Revision Number)



Model No.	WHZ0600-MD	WHZ0320-MD	WHZ0400-MD	WHZ0500-MD	WHZ0630-MD
Corresponding Model No.	WCE0602 WHE0600	WCA0321 WHA0320	WCE1002 WHE1000	WCA0401 WHA0400	WCE1602 WHE1600
A	23	25	27	31	35
B	54	60	67	77	88.5
C	45	50	58	68	81
D	40	46	54	64	77
H	31.5	35	38	43	48
J	22.5	25	29	34	40.5
K	34	39	45	53	65
Nx	26	28	31	36	41
Ny	9	10	13	15	20
P	3	5	5	5	5
R	5.5	5.5	5.5	6.5	6.5
S	8	10	10	10	10
T	1.4	1.4	1.4	1.4	1.4
O-ring	1BP5	1BP7	1BP7	1BP7	1BP7
Weight kg	0.1	0.1	0.1	0.2	0.2

- Notes : 1. Material: A2017BE-T4 Surface Finishing: Zircon Finishing (Zirconium Chemical Conversion Treatment)  
2. Mounting bolts are not provided. Prepare mounting bolts according to the mounting height using the dimension A as a reference.  
3. For other block thickness (dim. A), machine the surface Z or design a block referring to the drawing and apply surface treatment if necessary.

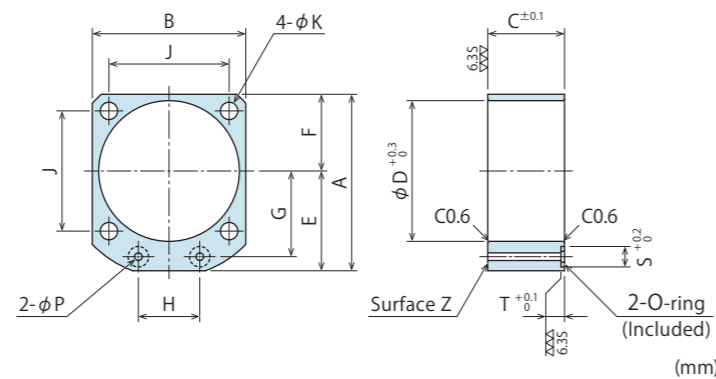
Manifold Block for LKA/LKC/LKE/LHA/LHC/LHE/LHS/LL

Model No. Indication

**LZY 048 0 - MD**

Size  
(Refer to following table)

Design No.  
(Revision Number)



Model No.	LZY0360-MD	LZY0400-MD	LZY0480-MD	LZY0550-MD	LZY0650-MD	LZY0750-MD	LZY0900-MD	LZY1050-MD
Corresponding Model No.	LKA0360 / LKE0360 LHA0360 / LHC0360 LHE0360 / LHS0360 LL0360	LKA0400 / LKC0400 LKE0400 / LHA0400 LHC0400 / LHE0400 LHS0400 / LL0400	LKA0480 / LKC0480 LKE0480 / LHA0480 LHC0480 / LHE0480 LHS0480 / LL0480	LKA0550 / LKC0550 LKE0550 / LHA0550 LHC0550 / LHE0550 LHS0550 / LL0550	LKA0650 / LKC0650 LKE0650 / LHA0650 LHC0650 / LHE0650 LHS0650 / LL0650	LKA0750 / LHA0750 LHA0750 / LHC0750 LHC0750 / LHE0750 LHS0750 / LL0750	LKA0900 / LHA0900 LHA0900 / LHC0900 LHC0900 / LHE0900 LHS0900 / LL0900	LKA1050 / LHA1050 LHA1050 / LHC1050 LHC1050 / LHE1050 LHS1050 / LL1050
A	49	54	61	69	81	92	107	122
B	40	45	51	60	70	80	95	110
C	20	20	27	30	32	37	45	50
D	36	40	48	55	65	75	90	105
E	29	31.5	35.5	39	46	52	59.5	67
F	20	22.5	25.5	30	35	40	47.5	55
G	23.5	26	30	33.5	39.5	45	52.5	60
H	16	18	22	24	30	32	37	45
J	31.4	34	40	47	55	63	75	88
K	4.5	5.5	5.5	6.8	6.8	9	11	14
P	3	3	3	3	5	5	5	5
S	8	8	8	8	10	10	10	10
T	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
O-ring	1BP5	1BP5	1BP5	1BP5	1BP7	1BP7	1BP7	1BP7
Weight kg	0.2	0.2	0.3	0.4	0.5	0.8	1.2	1.7

- Notes : 1. Material: S45C Surface Finishing: Alkaline Blackening  
2. Mounting bolts are not provided. Prepare mounting bolts according to the mounting height using the dimension C as a reference.  
3. For other block thickness (dim. C), machine the surface Z or design a block referring to the drawing and apply surface treatment if necessary.

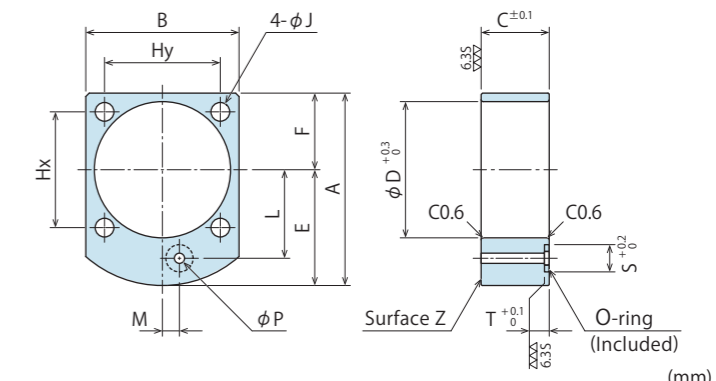
Manifold Block for LJ/LM/LG/LT

Model No. Indication

**LZ 048 0 - MS**

Size  
(Refer to following table)

Design No.  
(Revision Number)



Model No.	LZ0300-MS	LZ0360-MS	LZ0400-MS	LZ0480-MS	LZ0550-MS	LZ0650-MS	LZ0750-MS	LZ0900-MS	LZ1050-MS
Corresponding Model No.	LG0301 / LT0301 LJ0302 / LM0300	LG0361 / LT0361 LJ0362 / LM0360	LG0401 / LT0401 LJ0402 / LM0400	LG0481 / LT0481 LJ0482 / LM0480	LG0551 / LT0551 LJ0552 / LM0550	LG0651 / LT0651 LJ0652 / LM0650	LG0751 / LT0751 LJ0752 / LM0750	LG0901 / LT0901 LJ0902	LG1051 / LT1051 LJ1052
A	48	51.5	56.5	62	70	82	93	107	122
B	34	40	45	51	60	70	80	95	110
C	18	20	20	27	30	32	37	45	50
D	30	36	40	48	55	65	75	90	105
E	28.5	31.5	34	36.5	40	47	53	59.5	67
F	19.5	20	22.5	25.5	30	35	40	47.5	55
Hx	30	31.4	34	40	47	55	63	75	88
Hy	23	31.4	34	40	47	55	63	75	88
J	4.5	4.5	5.5	5.5	6.8	6.8	9	11	14
L	20.5	23.5	26	30	33.5	39.5	45	52.5	60
M	3	5	5	0	0	0	0	0	0
P	3	3	3	3	3	5	5	5	5
S	8	8	8	8	8	10	10	10	10
T	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
O-ring	1BP5	1BP5	1BP5	1BP5	1BP5	1BP7	1BP7	1BP7	1BP7
Weight kg	0.1	0.2	0.2	0.3	0.4	0.5	0.8	1.2	1.7

- Notes : 1. Material: S45C Surface Finishing: Alkaline Blackening  
2. Mounting bolts are not provided. Prepare mounting bolts according to the mounting height using the dimension C as a reference.  
3. For other block thickness (dim. C), machine the surface Z or design a block referring to the drawing and apply surface treatment if necessary.

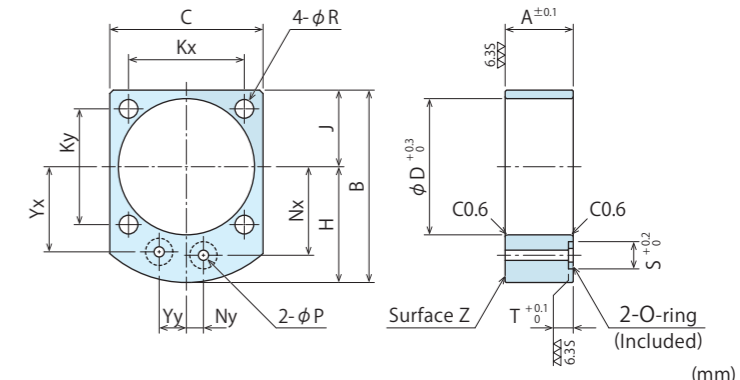
Manifold Block for LC/TC

Model No. Indication

**LZ 048 0 - MP**

Size  
(Refer to following table)

Design No.  
(Revision Number)



Model No.	LZ0260-MP	LZ0300-MP	LZ0360-MP	LZ0400-MP	LZ0480-MP	LZ0550-MP	LZ0650-MP	LZ0750-MP	LZ0900-MP
Corresponding Model No.	LC0262	LC0302	LC0362	LC0402 / TC0402	LC0482 / TC0482	LC0552 / TC0552	LC0652 / TC0652	LC0752 / TC0752	LC0902
A	18	18	20	20	27	30	32	37	45
B	43	48	51.5	56.5	62	70	82	93	107
C	29	34	40	45	51	60	70	80	95
D	26	30	36	40	48	55	65	75	90
H	26.5	28.5	31.5	34	36.5	40	47	53	59.5
J	16.5	19.5	20	22.5	25.5	30	35	40	47.5
Kx	25	30	31.4	34	40	47	55	63	75
Ky	21	23	31.4	34	40	47	55	63	75
Nx	18.5	20.5	23.5	26	30	33.5	39.5	45	52.5
Ny	3	3	5	5	0	0	0	0	0
R	3.4	4.5	4.5	5.5	5.5	6.8	6.8	9	11
Yx	18.5	20.5	23.5	25	28	31	37	42.5	50
Yy	7	7	8	8	11	13	14	15	15
P	3	3	3	3	3	3	5	5	5
S	8	8	8	8	8	8	10	10	10
T	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
O-ring	1BP5	1BP5	1BP5	1BP5	1BP5	1BP5	1BP7	1BP7	1BP7
Weight kg	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.8	1.2

- Notes : 1. Material: S45C Surface Finishing: Alkaline Blackening  
2. Mounting bolts are not provided. Prepare mounting bolts according to the mounting height using the dimension A as a reference.  
3. For other block thickness (dim. A), machine the surface Z or design a block referring to the drawing and apply surface treatment if necessary.

- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others

- Screw Locator
- VXF/VXE
- Manual Expansion Locating Pin
- VX
- Manifold Block
- WHZ-MD
- LZY-MD
- LZ-MS
- LZ-MP
- TMZ-1MB
- TMZ-2MB
- DZ-M

- Manifold Block / Nut
- DZ-R
- DZ-C
- DZ-P
- DZ-B
- LZ-S
- LZ-SQ
- WNZ-SQ
- TNZ-S
- TNZ-SQ

- Pressure Switch
- JBA

- Pressure Gauge
- JGA/JGB

- Manifold
- JX

- Coupler Switch
- PS

- G-Thread Fitting