Pull Stud Clamp

Model **FP**

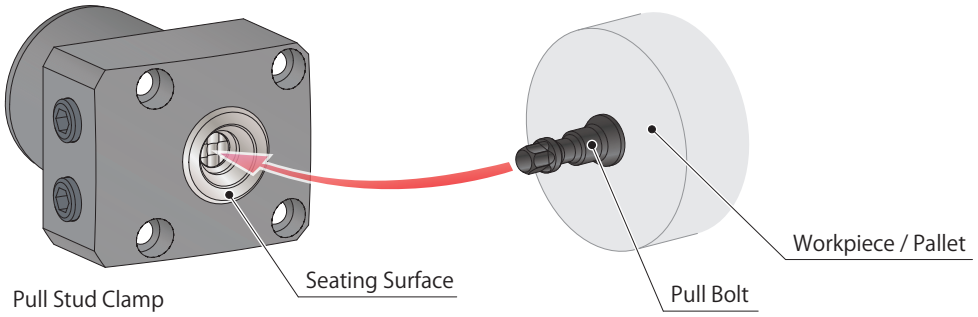
Model **FQ**

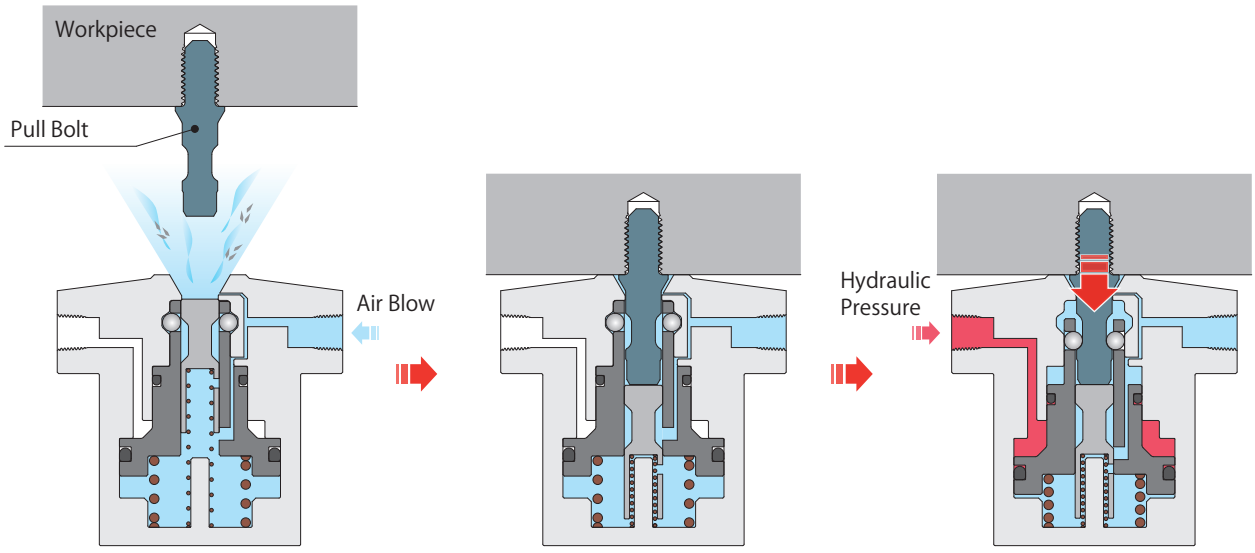
Pulling clamp using pull-bolt for workpiece through hole or screw hole.

Five sided surface machining is possible for workpiece.
This drastically reduces the number of operations needed.

PAT.

Action Description





Released State

Air blowing removes foreign substances on top of the clamp and the pull bolt.

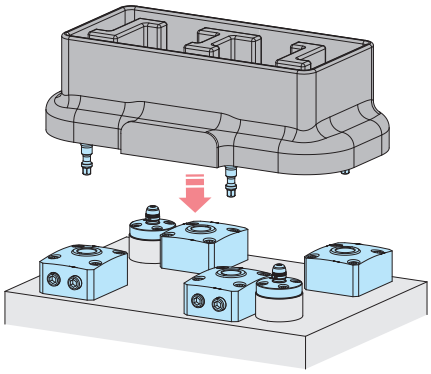
Workpiece set
(Before clamping)

Locked State

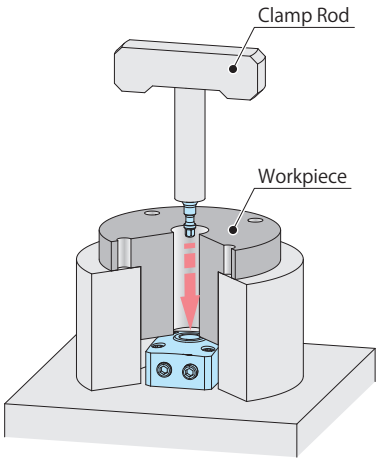
Supply hydraulic pressure to complete the locking operation.

※This internal structure is simplified. The component of parts is different from it's real.

Application Examples

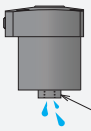


For five sided surface machining.
It is difficult to clamp on many surfaces such us curved and slanted surfaces.



Mounting pull-bolt on clamp rod creates ability to one-touch action of work piece switching.

※If using like this example, please contact us.
Depending on clamp rod weight, sleeve return spring force can cause work piece lift up.

		 Model FP → P.805	 Model FQ → P.813
Classification		Low Pressure • Single Action Hydraulic Lock/Spring Release	High Pressure • Single Action Hydraulic Lock/Spring Release
Operating Pressure Range		1～7MPa	1～25MPa
Standard Model		External Dimensions → P.807	External Dimensions → P.815
Option	With Coolant Discharge Port  Coolant Discharge Port	External Dimensions → P.809	External Dimensions → P.817
Accessories	Pull Bolt 	LZ-FP1 → P.811	LZ-FP1 → P.819

PAT.

Hydraulic Pull Stud Clamp

Model FP

Low Pressure (1～7MPa)

Single Action

Index

Model No. Indication

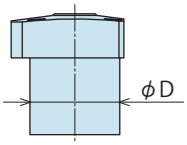
FP 055 0 - G □

1 2 3 4

1 Body Size

039： φD=39mm
055： φD=55mm
065： φD=65mm
075： φD=75mm
090： φD=90mm

※ Outer diameter (φD) of the cylinder.

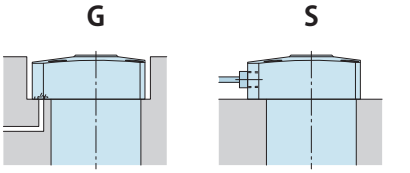


2 Design No.

0 ： Revision Number

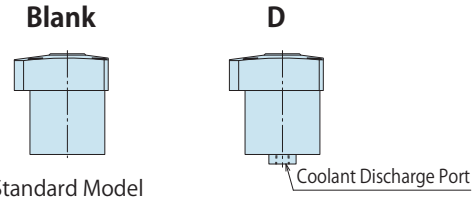
3 Piping Method

G ： Gasket Option (With R Thread Plug)
S ： Piping Option (Rc Thread Port)



4 Option

Blank ：None (Standard)
D ：With Coolant Discharge Port

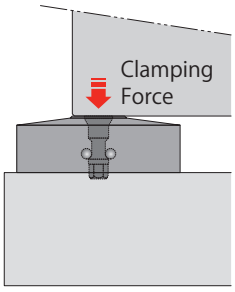


Specifications

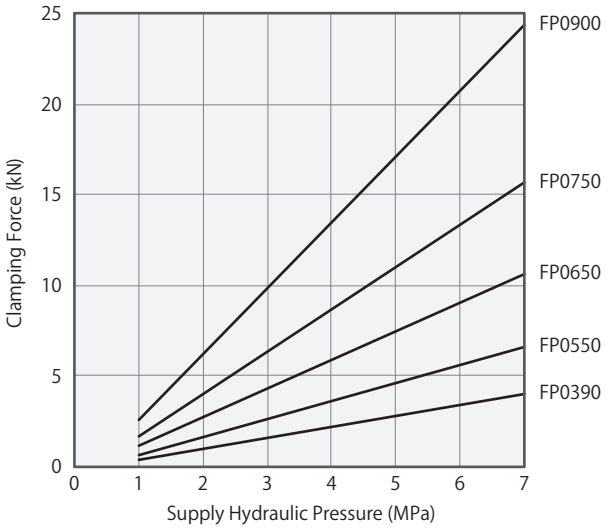
Model No.		FP0390-□□	FP0550-□□	FP0650-□□	FP0750-□□	FP0900-□□
Cylinder Area for Locking	cm^2	6.0	9.9	15.7	23.3	36.4
Clamping Force (Calculation Formula)※1	kN	F=0.60×P-0.20	F=0.99×P-0.29	F=1.57×P-0.42	F=2.33×P-0.69	F=3.64×P-1.10
Full Stroke	mm	6.7	7.5	8.5	10	12
Lock Stroke	mm	3.8	5	5.3	7	8.7
Cylinder Capacity (Lock Side)	cm^3	4.0	7.4	13.4	23.3	43.7
Release Spring Force	N	116 ～ 215	198 ～ 318	306 ～ 475	459 ～ 763	733 ～ 1214
Sleeve Return Spring Force	N	6.1	9.3	11.3	18.0	21.6
Allowable Offset	mm	±0.5	±0.7	±1	±1	±1.2
Max. Operating Pressure	MPa	7.0				
Min. Operating Pressure	MPa	1.0				
Withstanding Pressure	MPa	10.5				
Air Pressure (For Air Blow)	MPa	0.4 ～ 0.5				
Operating Temperature	℃	0 ～ 70				
Mass	kg	0.7	1.5	2.3	3.5	6.0

Note ※1. Clamping force (Calculation formula) symbols show F : Clamping Force (kN), P : Supply Hydraulic Pressure (MPa).

Clamping Force Curve



Model No. / Supply Hydraulic Pressure (MPa)	Clamping Force (kN) FP0390	FP0550	FP0650	FP0750	FP0900
7	4.00	6.64	10.57	15.62	24.38
6.5	3.70	6.15	9.79	14.46	22.56
6	3.40	5.65	9.00	13.29	20.74
5.5	3.10	5.16	8.22	12.13	18.92
5	2.80	4.66	7.43	10.96	17.10
4.5	2.50	4.17	6.65	9.80	15.28
4	2.20	3.67	5.86	8.63	13.46
3.5	1.90	3.18	5.08	7.47	11.64
3	1.60	2.68	4.29	6.30	9.82
2.5	1.30	2.19	3.51	5.14	8.00
2	1.00	1.69	2.72	3.97	6.18
1.5	0.70	1.20	1.94	2.81	4.36
1	0.40	0.70	1.15	1.64	2.54

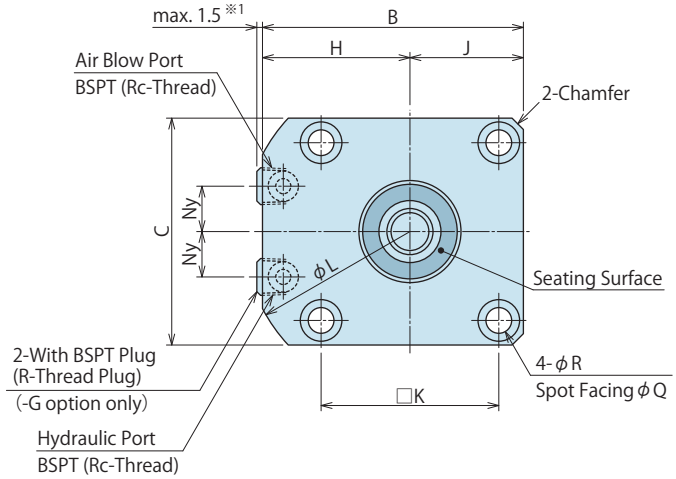


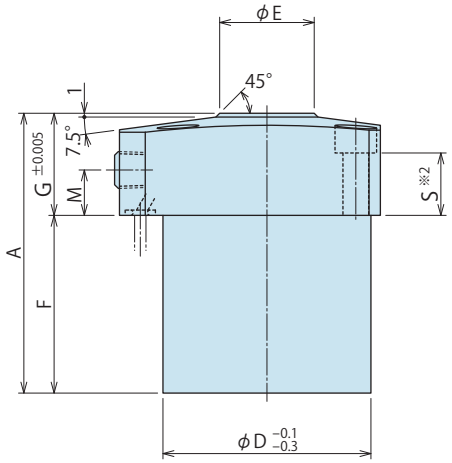
Notes
1. This performance curve shows Clamping Force (kN) and Supply Hydraulic Pressure (MPa).
2. Clamping force means pulling force onto seating surface.
3. The maximum hydraulic pressure is 7.0 MPa and the minimum is 1.0 MPa.

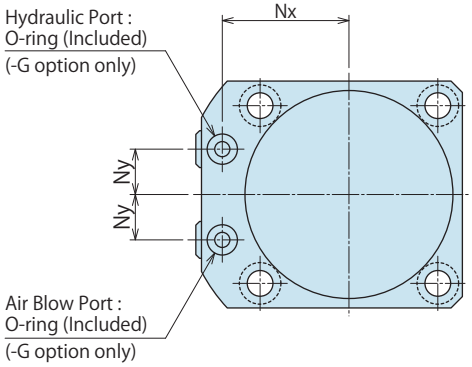
External Dimensions

G：Gasket Option (With R Thread Plug)

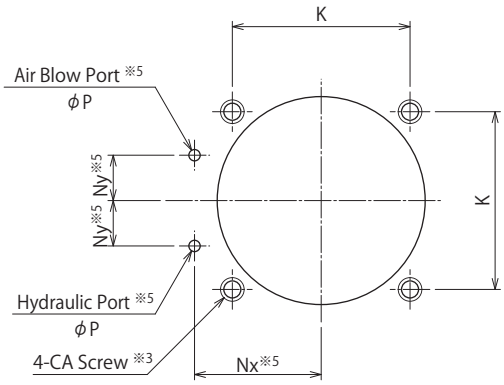
※This drawing indicates FP-G

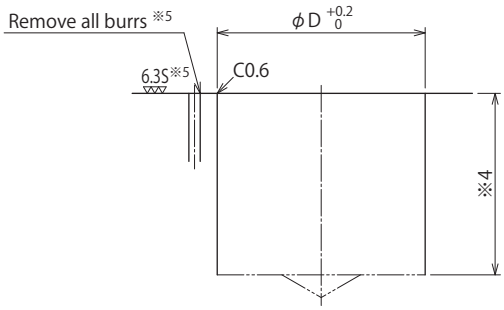






Machining Dimensions of Mounting Area





Notes

※3. The CA thread depth for mounting bolts is to be decided by the customer according to the mounting height using the S dimensions as a reference.

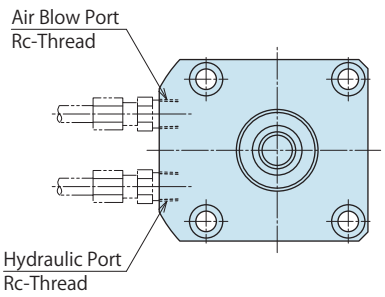
※4. The depth of diameter D for the mounting hole on the unit should be decided by customer according to the mounting height using the F dimensions as a reference.

※5. This machining drawing shows G: Gasket option.

Piping Method

S：Rc-Thread Piping Option

※This drawing indicates FP-S.



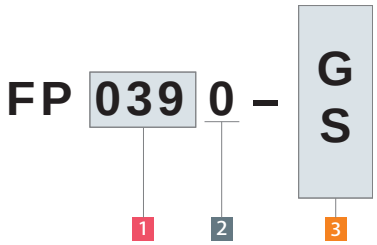
Notes

※1. The protrusion of R thread plug is between 0 to 1.5 mm.

※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height.
Please refer to S dimensions.

1. Pull bolts not included.
Pull bolts sold separately. Refer to P.811 for dimensions.

Model No. Indication



(Format Example：FP0390-G、FP0550-S)

1 Body Size
2 Design No.
3 Piping Method
4 Option (Blank)

External Dimensions and Machining Dimensions for Mounting

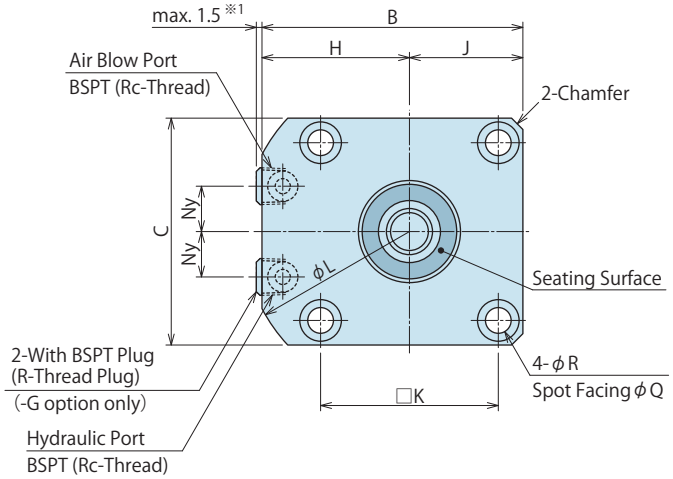
(mm)

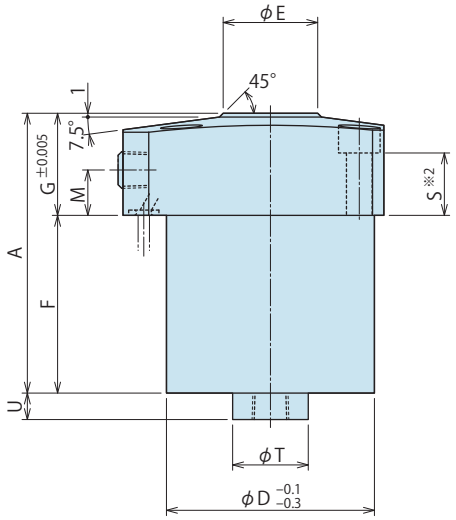
Model No.		FP0390-□	FP0550-□	FP0650-□	FP0750-□	FP0900-□
Full Stroke		6.7	7.5	8.5	10	12
Lock Stroke		3.8	5	5.3	7	8.7
A		65	74	85	100	120
B		54	69	81	92	107
C		45	60	70	80	95
D		39	55	65	75	90
E		20	25	30	38	47.5
F		38	47	57	68	83
G		27	27	28	32	37
H		31.5	39	46	52	59.5
J		22.5	30	35	40	47.5
K		34	47	55	63	75
L		73	88	106	116	136
M		12	12	12	16	16
Nx		26	33.5	39.5	45	52.5
Ny		9	12	15	16	18.5
P		3	3	5	5	5
Q		9	11	11	14	17.5
R		5.5	6.8	6.8	9	11
S		18.5	16.5	17	19	21
Chamfer		3	3	4	5	6
CA (Nominal×Pitch)		M5×0.8	M6×1	M6×1	M8×1.25	M10×1.5
Hydraulic Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
Air Blow Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
O-ring	-G option	1BP5	1BP5	1BP7	1BP7	1BP7
BSPT Plug (R-Thread Plug)	-G option	R1/8	R1/8	R1/8	R1/4	R1/4

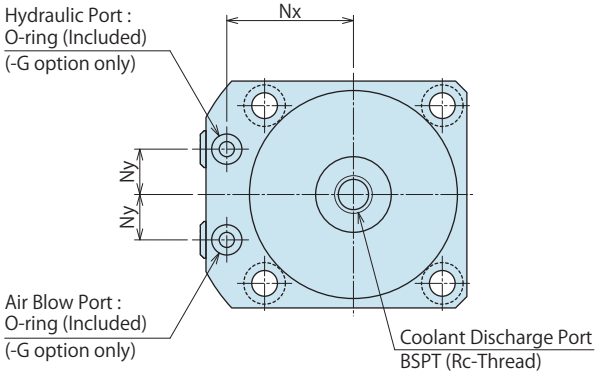
External Dimensions

G：Gasket Option (With R Thread Plug)

※This drawing indicates FP-GD







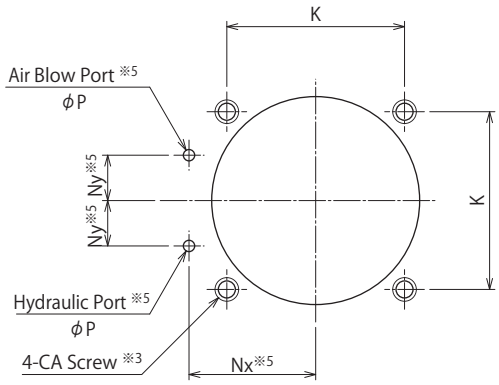
Notes

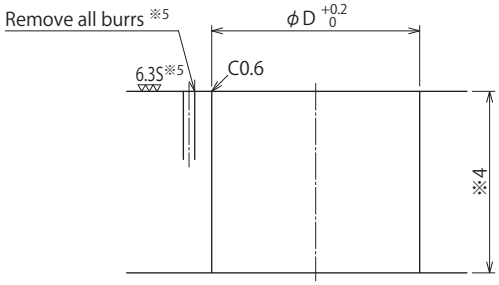
※1. The protrusion of R thread plug is between 0 to 1.5 mm.

※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height.
Please refer to S dimensions.

1. Pull bolts not included.
Pull bolts sold separately. Refer to P.811 for dimensions.

Machining Dimensions of Mounting Area





Notes

※3. The CA thread depth for mounting bolts is to be decided by the customer according to the mounting height using the S dimensions as a reference.

※4. The depth of diameter D for the mounting hole on the unit should be decided by customer according to the mounting height using the F dimensions as a reference.

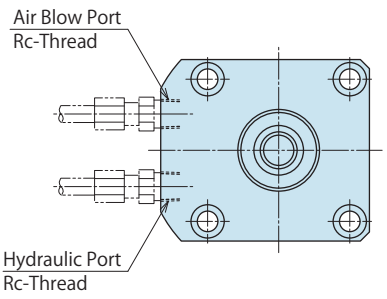
※5. This machining drawing shows G: Gasket option.

2. Please drain coolant to prevent clogging.

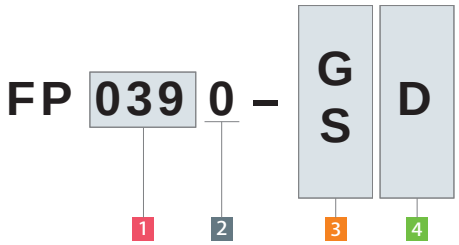
Piping Method

S：Rc-Thread Piping Option

※This drawing indicates FP-SD.



Model No. Indication



(Format Example：FP0390-GD、FP0550-SD)

1 Body Size
2 Design No.
3 Piping Method
4 Option (When D is chosen)

External Dimensions and Machining Dimensions for Mounting

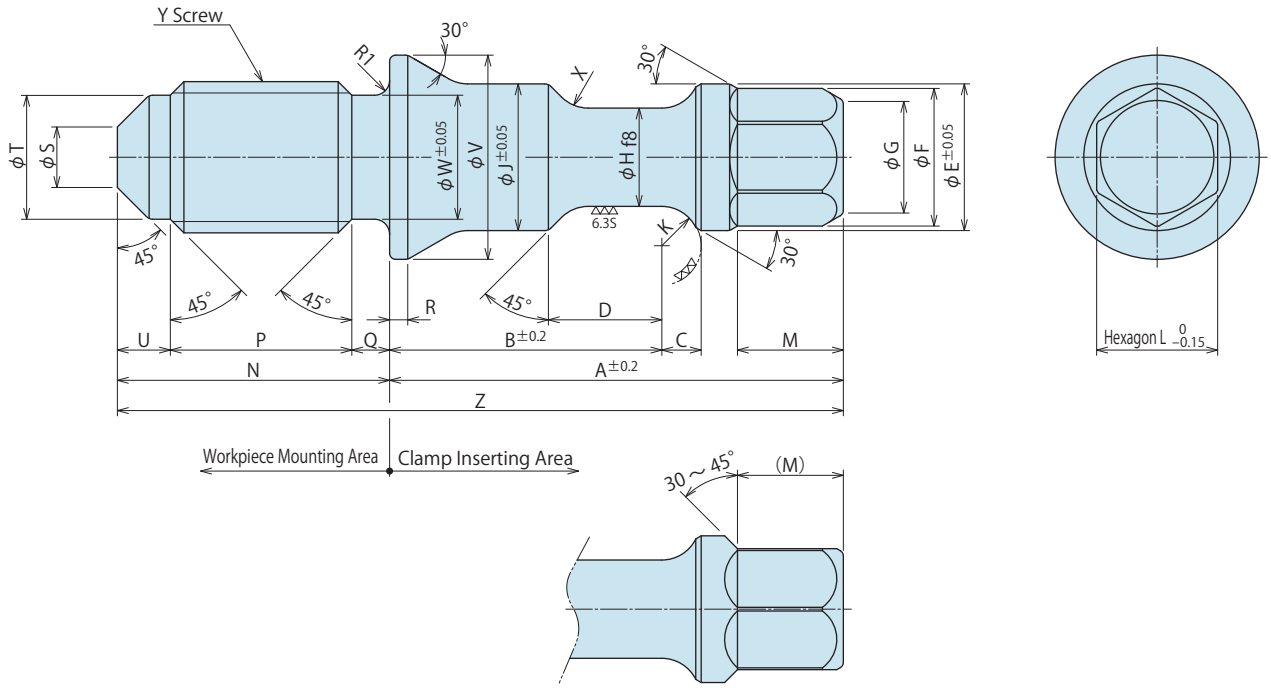
(mm)

Model No.		FP0390-□D	FP0550-□D	FP0650-□D	FP0750-□D	FP0900-□D
Full Stroke		6.7	7.5	8.5	10	12
Lock Stroke		3.8	5	5.3	7	8.7
A		65	74	85	100	120
B		54	69	81	92	107
C		45	60	70	80	95
D		39	55	65	75	90
E		20	25	30	38	47.5
F		38	47	57	68	83
G		27	27	28	32	37
H		31.5	39	46	52	59.5
J		22.5	30	35	40	47.5
K		34	47	55	63	75
L		73	88	106	116	136
M		12	12	12	16	16
Nx		26	33.5	39.5	45	52.5
Ny		9	12	15	16	18.5
P		3	3	5	5	5
Q		9	11	11	14	17.5
R		5.5	6.8	6.8	9	11
S		18.5	16.5	17	19	21
T		16	20	30	30	30.5
U		7	7	7	11	11
Chamfer		3	3	4	5	6
CA (Nominal×Pitch)		M5×0.8	M6×1	M6×1	M8×1.25	M10×1.5
Hydraulic Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
Air Blow Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
Coolant Discharge Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
O-ring	-G option	1BP5	1BP5	1BP7	1BP7	1BP7
BSPT Plug (R-Thread Plug)	-G option	R1/8	R1/8	R1/8	R1/4	R1/4

Accessories：Pull Bolt

Model No. Indication **LZ 055 0 – FP1**

- 055: Size (Refer to following table)
- 0: Design No. (Revision Number)



(mm)

Model No.	LZ0390-FP1	LZ0550-FP1	LZ0650-FP1	LZ0750-FP1	LZ0900-FP1
Corresponding Product Model	FP0390-□□ FQ0360-□□	FP0550-□□ FQ0390-□□	FP0650-□□ FQ0470-□□	FP0750-□□ FQ0550-□□	FP0900-□□ FQ0750-□□
A	25.8	30	35.5	45	56
B	15.8	18	21.5	27	33.5
C	2	2.6	3	3.8	5
D	5.5	7.5	8	10.5	12.5
E	7.7	9.7	11.5	14.5	18.5
F	6.3	9.1	9.1	11.3	14.8
G	5	7.5	7.5	9.5	12.2
H	5.3 -0.010 -0.028	6.5 -0.013 -0.035	8 -0.013 -0.035	10 -0.013 -0.035	12.5 -0.016 -0.043
J	7.7	9.7	11.5	14.5	18.5
K	R2	R2.5	R3	R3.75	R4.76
L	5.5	8	8	10	13
M	5	7	7	8.5	11
N	15	18	20	26	33
P	9.5	12	13.5	18	22
Q	2.5	2.5	2.5	3	4
R	1.2	1.2	1.5	2	2.5
S	3.5	4	5	7	8.5
T	6.5	8.2	10	13.5	17
U	3	3.5	4	5	7
V	11.5	13.5	16	21	26
W	6.5	8.2	10	13.5	17
X	R2	R2.5	R3	R4	R5
Y (Nominal × Pitch)	M8×1.25	M10×1.5	M12×1.75	M16×2	M20×2.5
Z	40.8	48	55.5	71	89

Notes
1. When using LZ-FP1 pull bolt, the space between the top of the clamp and the bottom of the work piece must be 0 (firm contact) to 0.3 mm.
2. Refer to this figure when manufacturing pull bolts.
   - Dimensions for clamp mounting must be strictly followed.
   - The recommended material is tempered SCM435 steel (HB300-330).
   - If tolerance is not specified, dimensions should be in accordance with the class 14 general dimension tolerance of JIS B 0405. (Refer to the graph on the right)

(mm)

Greater than	or less	Tolerance
–	6	±0.1
6	30	±0.2
30	120	±0.3

MEMO

PAT.

Hydraulic Pull Stud Clamp

Model FQ

High Pressure (1～25MPa)

Single Action

Index

Model No. Indication

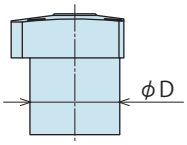
FQ 047 0 - G □

1 2 3 4

1 Body Size

036： φD=36mm
039： φD=39mm
047： φD=47mm
055： φD=55mm
075： φD=75mm

※ Outer diameter (φD) of the cylinder.

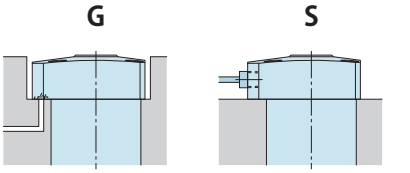


2 Design No.

0 ： Revision Number

3 Piping Method

G ： Gasket Option (With R Thread Plug)
S ： Piping Option (Rc Thread Port)

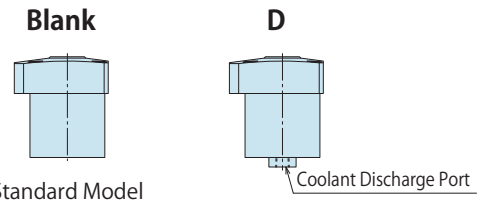


Gasket Option
With R Thread Plug

Piping Option
Rc Thread Port
No Gasket Port

4 Option

Blank ： None (Standard)
D ： With Coolant Discharge Port



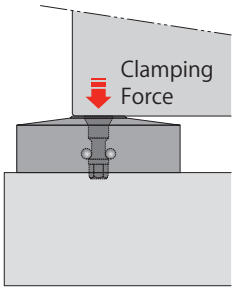
Standard Model

Specifications

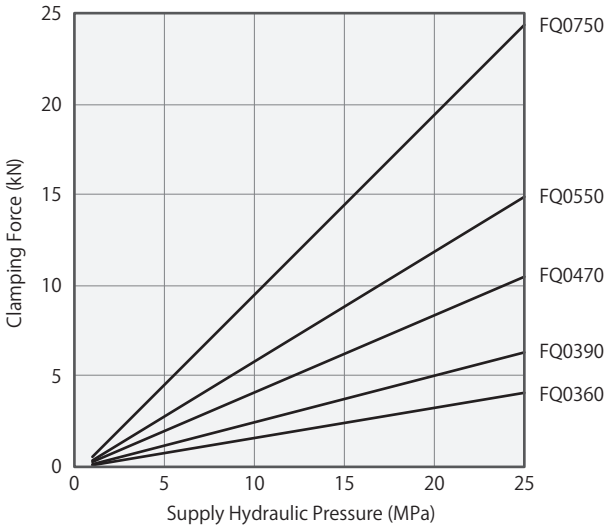
Model No.	FQ0360-□□	FQ0390-□□	FQ0470-□□	FQ0550-□□	FQ0750-□□
Cylinder Area for Locking cm²	1.8	2.7	4.5	6.4	10.6
Clamping Force (Calculation Formula) ※1 kN	F=0.166×P-0.073	F=0.257×P-0.114	F=0.425×P-0.154	F=0.605×P-0.254	F=0.992×P-0.441
Full Stroke mm	6.7	7.5	8.5	10	12
Lock Stroke mm	3.8	5	5.3	7	8.7
Cylinder Capacity (Lock Side) cm³	1.2	2.1	3.8	6.4	12.7
Release Spring Force N	40 ~76	73 ~ 121	103 ~ 163	145 ~ 270	240 ~ 469
Sleeve Return Spring Force N	6.1	9.3	11.3	18.0	21.6
Allowable Offset mm	±0.5	±0.7	±1	±1	±1.2
Max. Operating Pressure MPa	25.0				
Min. Operating Pressure MPa	1.0				
Withstanding Pressure MPa	37.5				
Air Pressure (For Air Blow) MPa	0.4 ~ 0.5				
Operating Temperature ℃	0 ~ 70				
Mass kg	0.65	0.85	1.25	1.95	4.30

Note ※1. Clamping force (Calculation formula) symbols show F : Clamping Force (kN), P : Supply Hydraulic Pressure (MPa).

Clamping Force Curve



Model No. / Supply Hydraulic Pressure (MPa)	Clamping Force (kN) FQ0360	FQ0390	FQ0470	FQ0550	FQ0750
25	4.08	6.31	10.47	14.87	24.36
24	3.91	6.05	10.05	14.27	23.37
23	3.75	5.80	9.62	13.66	22.38
22	3.58	5.54	9.20	13.06	21.38
21	3.41	5.28	8.77	12.45	20.39
20	3.25	5.03	8.35	11.85	19.40
19	3.08	4.77	7.92	11.24	18.41
18	2.92	4.51	7.50	10.64	17.42
17	2.75	4.26	7.07	10.03	16.42
16	2.58	4.00	6.65	9.43	15.43
15	2.42	3.74	6.22	8.82	14.44
14	2.25	3.48	5.80	8.22	13.45
13	2.09	3.23	5.37	7.61	12.46
12	1.92	2.97	4.95	7.01	11.46
11	1.75	2.71	4.52	6.40	10.47
10	1.59	2.46	4.10	5.80	9.48
9	1.42	2.20	3.67	5.19	8.49
8	1.26	1.94	3.25	4.59	7.50
7	1.09	1.69	2.82	3.98	6.50
6	0.92	1.43	2.40	3.38	5.51
5	0.76	1.17	1.97	2.77	4.52
4	0.59	0.91	1.55	2.17	3.53
3	0.43	0.66	1.12	1.56	2.54
2	0.26	0.40	0.70	0.96	1.54
1	0.09	0.14	0.27	0.35	0.55

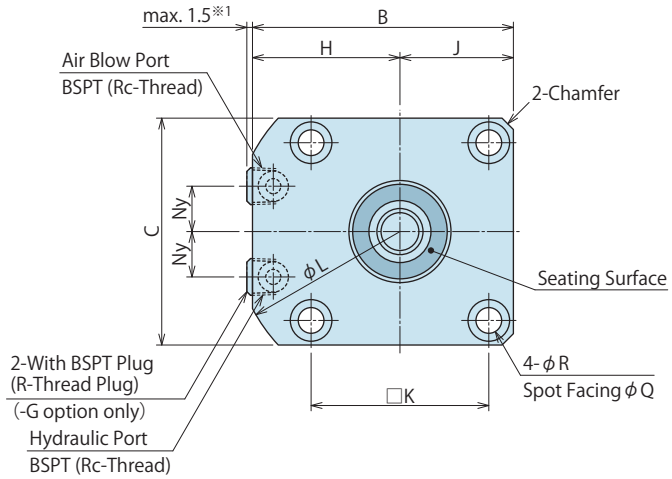


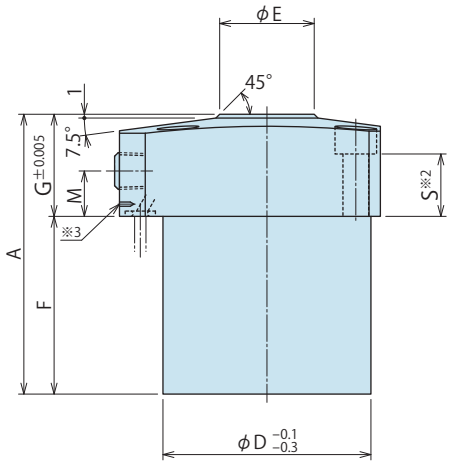
Notes
1. This performance curve shows Clamping Force (kN) and Supply Hydraulic Pressure (MPa).
2. Clamping force means pulling force onto seating surface.
3. The maximum hydraulic pressure is 25.0 MPa and the minimum is 1.0 MPa.

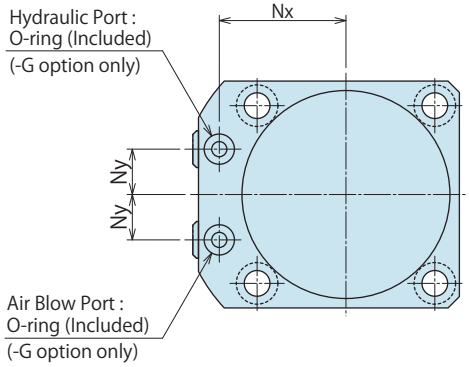
External Dimensions

G：Gasket Option (With R Thread Plug)

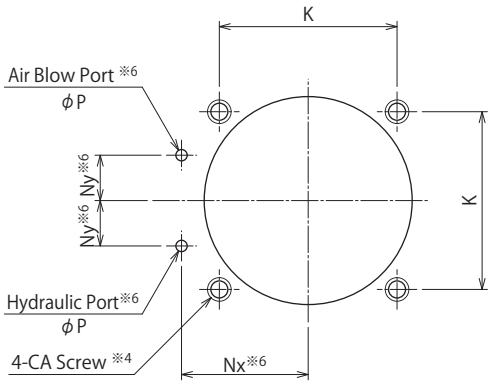
※This drawing indicates FQ-G

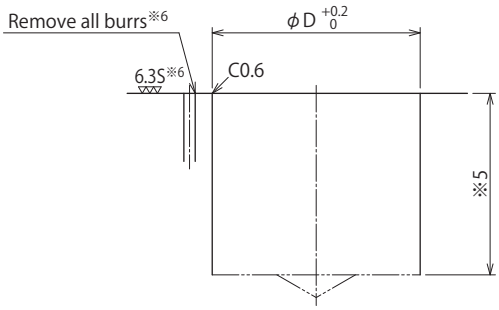






Machining Dimensions of Mounting Area





Notes

※4. The CA thread depth for mounting bolts is to be decided by the customer according to the mounting height using the S dimensions as a reference.

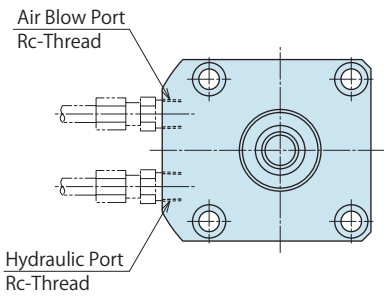
※5. The depth of diameter D for the mounting hole on the unit should be decided by customer according to the mounting height using the F dimensions as a reference.

※6. This machining drawing shows G: Gasket option.

Piping Method

S：Rc-Thread Piping Option

※This drawing indicates FQ-S.



Notes

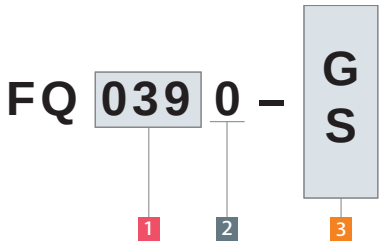
※1. The protrusion of R thread plug is between 0 to 1.5 mm.

※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height.
Please refer to S dimensions.

※3. Identifying mark of FQ series (To distinguish it from FP series)

1. Pull bolts not included.
Pull bolts sold separately. Refer to P.819 for dimensions.

Model No. Indication



(Format Example：FQ0360-G、FQ0550-S)

1 Body Size
2 Design No.
3 Piping Method
4 Option (When Blank is chosen)

External Dimensions and Machining Dimensions for Mounting

(mm)

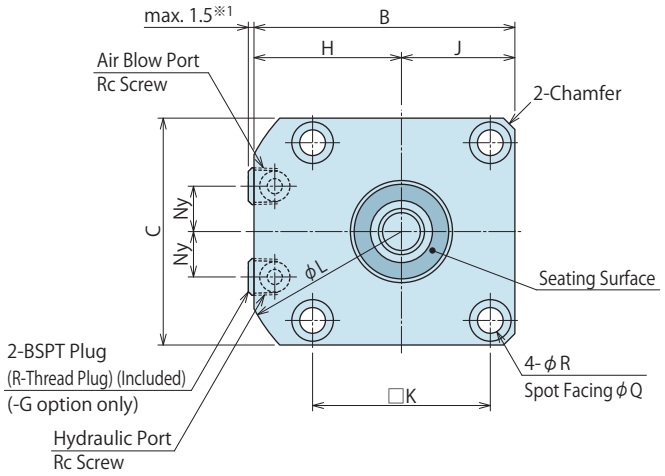
Model No.		FQ0360-□	FQ0390-□	FQ0470-□	FQ0550-□	FQ0750-□
Full Stroke		6.7	7.5	8.5	10	12
Lock Stroke		3.8	5	5.3	7	8.7
A		65	74	85	100	120
B		49	54	61	69	92
C		40	45	51	60	80
D		36	39	47	55	75
E		20	25	30	38	47.5
F		38	47	57	68	83
G		27	27	28	32	37
H		29	31.5	35.5	39	52
J		20	22.5	25.5	30	40
K		31.4	34	40	47	63
L		66	73	83	88	116
M		12	12	12	12	16
Nx		23.5	26	30	33.5	45
Ny		8	9	11	12	16
P		3	3	3	3	5
Q		7.5	9	9	11	14
R		4.5	5.5	5.5	6.8	9
S		20	18.5	19	22	24
Chamfer		2	3	3	3	5
CA (Nominal×Pitch)		M4×0.7	M5×0.8	M5×0.8	M6×1	M8×1.25
Hydraulic Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
Air Blow Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
O-ring	-G option	1BP5	1BP5	1BP5	1BP5	1BP7
BSPT Plug (R-Thread Plug)	-G option	R1/8	R1/8	R1/8	R1/8	R1/4

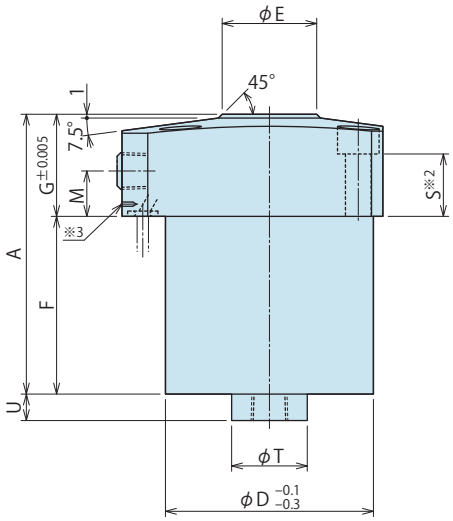
High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others
Hole Clamp
SFA
SFC
Swing Clamp
LHA
LHC
LHS
LHW
LT/LG
TLA-2
TLB-2
TLA-1
Link Clamp
LKA
LKC
LKW
LM/LJ
TMA-2
TMA-1
Work Support
LD
LC
TNC
TC
Air Sensing Lift Cylinder
LLW
Compact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

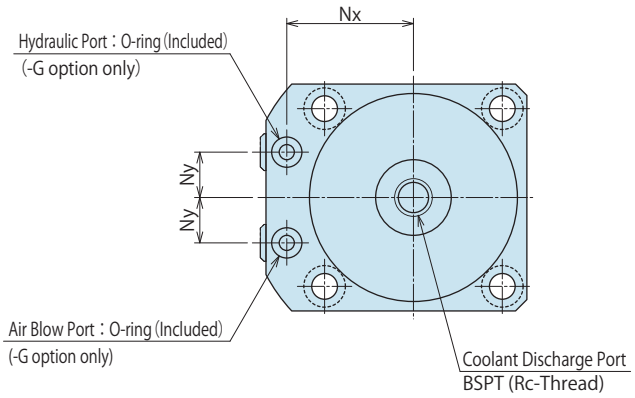
External Dimensions

G：Gasket Option (With R Thread Plug)

※This drawing indicates FQ-GD







Notes

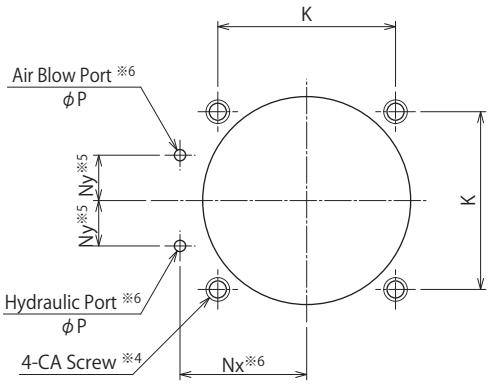
※1. The protrusion of R thread plug is between 0 to 1.5 mm.

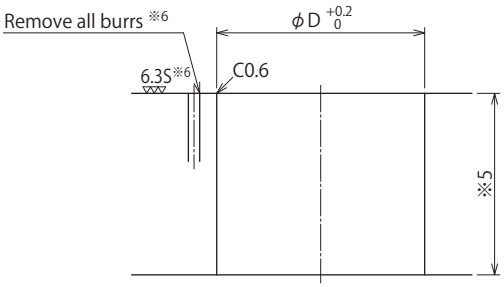
※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height.
Please refer to S dimensions.

※3. Identifying mark of FQ series (To distinguish it from FP series)

1. Pull bolts not included.
Pull bolts sold separately. Refer to P.819 for dimensions.

Machining Dimensions of Mounting Area





Notes

※4. The CA thread depth for mounting bolts is to be decided by the customer according to the mounting height using the S dimensions as a reference.

※5. The depth of diameter D for the mounting hole on the unit should be decided by customer according to the mounting height using the F dimensions as a reference.

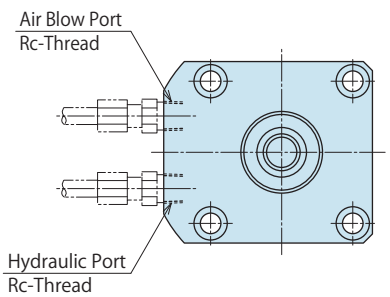
※6. This machining drawing shows G: Gasket option.

2. Please drain coolant to prevent clogging.

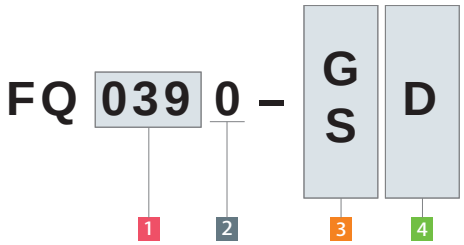
Piping Method

S：Rc-Thread Piping Option

※This drawing indicates FQ-SD.



Model No. Indication



(Format Example：FQ0360-GD、FQ0550-SD)

1 Body Size
2 Design No.
3 Piping Method
4 Option (When D is chosen)

External Dimensions and Machining Dimensions for Mounting

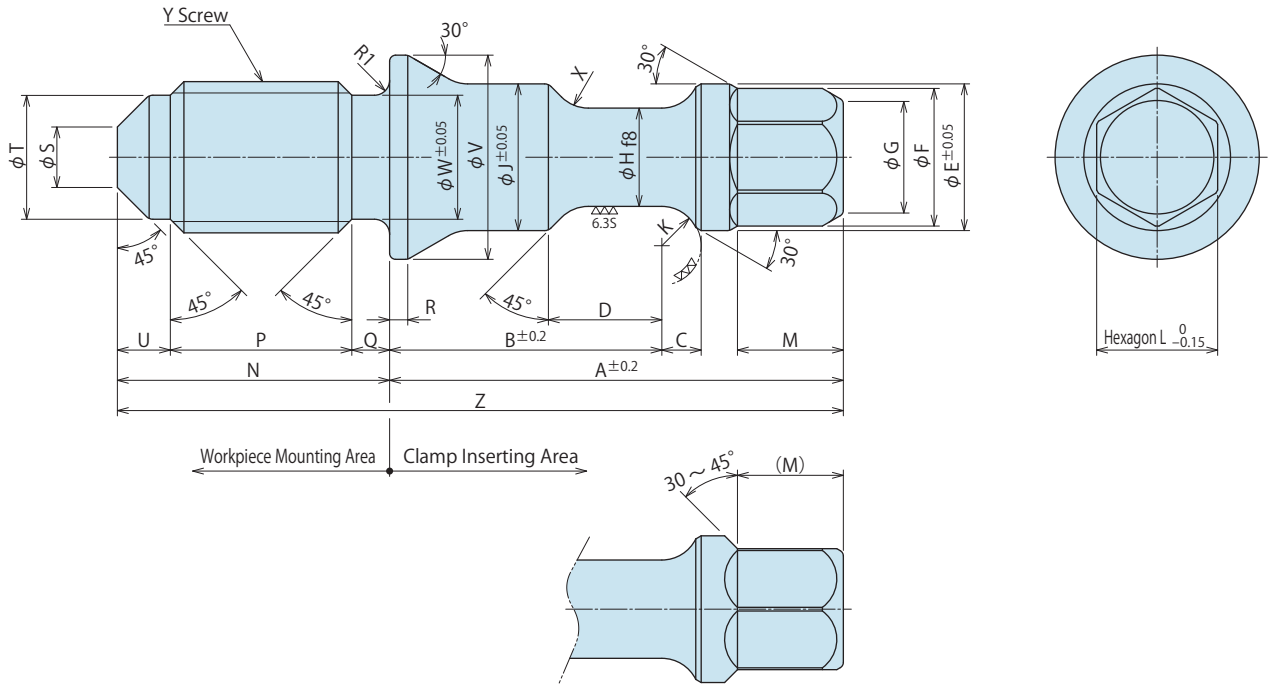
(mm)

Model No.		FQ0360-□D	FQ0390-□D	FQ0470-□D	FQ0550-□D	FQ0750-□D
Full Stroke		6.7	7.5	8.5	10	12
Lock Stroke		3.8	5	5.3	7	8.7
A		65	74	85	100	120
B		49	54	61	69	92
C		40	45	51	60	80
D		36	39	47	55	75
E		20	25	30	38	47.5
F		38	47	57	68	83
G		27	27	28	32	37
H		29	31.5	35.5	39	52
J		20	22.5	25.5	30	40
K		31.4	34	40	47	63
L		66	73	83	88	116
M		12	12	12	12	16
Nx		23.5	26	30	33.5	45
Ny		8	9	11	12	16
P		3	3	3	3	5
Q		7.5	9	9	11	14
R		4.5	5.5	5.5	6.8	9
S		20	18.5	19	22	24
T		16	16	20	20	30
U		7	7	7	7	11
Chamfer		2	3	3	3	5
CA (Nominal×Pitch)		M4×0.7	M5×0.8	M5×0.8	M6×1	M8×1.25
Hydraulic Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
Air Blow Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
Coolant Discharge Port	BSPT (Rc-Thread)	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
O-ring	-G option	1BP5	1BP5	1BP5	1BP5	1BP7
BSPT Plug (R-Thread Plug)	-G option	R1/8	R1/8	R1/8	R1/8	R1/4

Accessories : Pull Bolt

Model No. Indication **LZ 055 0 – FP1**

- 055: Size (Refer to following table)
- 0: Design No. (Revision Number)



(mm)

Model No.	LZ0390-FP1	LZ0550-FP1	LZ0650-FP1	LZ0750-FP1	LZ0900-FP1
Corresponding Product Model	FP0390-□□ FQ0360-□□	FP0550-□□ FQ0390-□□	FP0650-□□ FQ0470-□□	FP0750-□□ FQ0550-□□	FP0900-□□ FQ0750-□□
A	25.8	30	35.5	45	56
B	15.8	18	21.5	27	33.5
C	2	2.6	3	3.8	5
D	5.5	7.5	8	10.5	12.5
E	7.7	9.7	11.5	14.5	18.5
F	6.3	9.1	9.1	11.3	14.8
G	5	7.5	7.5	9.5	12.2
H	5.3 -0.010 -0.028	6.5 -0.013 -0.035	8 -0.013 -0.035	10 -0.013 -0.035	12.5 -0.016 -0.043
J	7.7	9.7	11.5	14.5	18.5
K	R2	R2.5	R3	R3.75	R4.76
L	5.5	8	8	10	13
M	5	7	7	8.5	11
N	15	18	20	26	33
P	9.5	12	13.5	18	22
Q	2.5	2.5	2.5	3	4
R	1.2	1.2	1.5	2	2.5
S	3.5	4	5	7	8.5
T	6.5	8.2	10	13.5	17
U	3	3.5	4	5	7
V	11.5	13.5	16	21	26
W	6.5	8.2	10	13.5	17
X	R2	R2.5	R3	R4	R5
Y (Nominal × Pitch)	M8×1.25	M10×1.5	M12×1.75	M16×2	M20×2.5
Z	40.8	48	55.5	71	89

Notes
1. When using LZ-FP1 pull bolt, the space between the top of the clamp and the bottom of the workpiece must be 0 (firm contact) to 0.3 mm.
2. Refer to this figure when manufacturing pull bolts.
   - Dimensions for clamp mounting must be strictly followed.
   - The recommended material is tempered SCM435 steel (HB300-330).
   - If tolerance is not specified, dimensions should be in accordance with the class 14 general dimension tolerance of JIS B 0405. (Refer to the graph on the right)

(mm)

Greater than	or less	Tolerance
–	6	±0.1
6	30	±0.2
30	120	±0.3

MEMO

Cautions

Notes for Design

1) Check Specifications

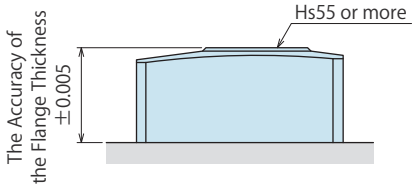
● Please use each product according to the specifications.

2) Notes for Circuit Design

● Please read "Notes on Hydraulic Cylinder Speed Control Circuit" on P.1044 to assist with proper hydraulic circuit design. Improper circuit design will lead to applications malfunction and damages.

3) Height of Workpiece Seating Surface

● Flange thickness accuracy is ± 0.005 mm.
The hardness of the top of the clamp is Hs55 or higher.
The top of the clamp can be used as the seating surface.

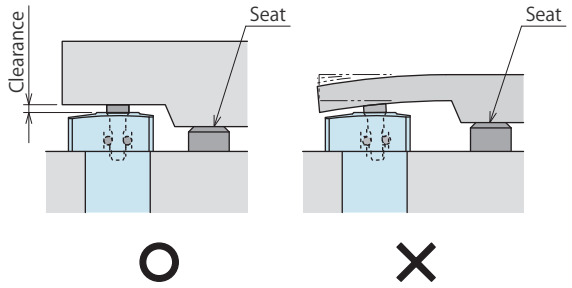


● Refer to the following when installing a separate seating.

① Make sure that no cutting chips or other foreign substance can get inside the clamp.

② When using LZ-FP1 pull bolt, the space between the top of the clamp and the bottom of the work piece must be 0 (firm contact) to 0.3 mm.

③ Thoroughly examine the strength of the work piece.



4) Use a pull bolt with the proper dimensions.

● Failure to do so can lead to clamping failure or damage to the clamp or workpiece.

● If customer makes pull bolt, please refer to outline dimension of LZ-FP1. Dimensions for clamp mounting must be strictly followed.

5) Air Blow

● The air pressure for the air blow should be between 0.4 to 0.5 MPa. Using high air pressure and coolant could lead to malfunction, damage to the clamp or make it difficult to insert the pull bolt.

6) Coolant Contamination

● Accumulated coolant can lead to malfunction or damage to the clamp. In the cases below, where coolant may get inside the clamp, we recommend adding a coolant drain port (D-option).

- There is a gap between the top of the clamp and the work piece.
- Coolant gets sprayed directly on the clamp.
- In the case of unused clamps.

7) Installing of Pull Bolt

● If the pull bolt is not completely inserted it could lead to clamping failure or damage to the pull bolt.
Please refer to the below table about inserting force of pull bolt.
Please design with sleeve return spring force and reaction force by air blow in mind. (We recommend multiplying by 1.5.)

■ Sleeve Return Spring Force and Reaction Force by Air Blow (N)

Air Pressure (MPa) \ Model	FP0390 FQ0360	FP0550 FQ0390	FP0650 FQ0470	FP0750 FQ0550	FP0900 FQ0750
0.3	23	35	48	75	111
0.4	29	44	60	93	141
0.5	34	53	73	112	171

8) Installing a Protective Cover

● When clamps are installed that are not being used during the machining, we recommend installing a protective cover to prevent foreign substance (coolant, cutting chips, etc.) from entering.

Installation Notes

1) Check the Usable Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.1043).

2) Speed Adjustment

- If the clamp operates too fast the parts will wear out and become damaged more quickly leading to equipment failure.
- When first supplying high pressure or high oil flow rate to a new fixture the operating speed can become extremely fast.
- Only adjust the speed after releasing the air from the circuit.
  If air is mixed in the circuit you will not be able to accurately adjust the speed.
- Be sure to adjust flow control valve at a slow oil flow rate.

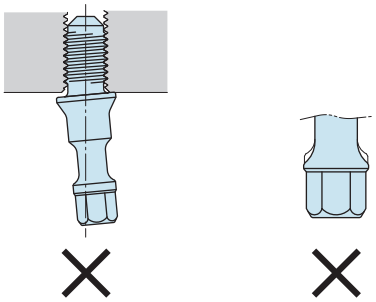
3) Mounting the Unit

- When mounting the product use four hexagon socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the chart below.

Model		Thread Size	Tightening Torque (N·m)
FP	FP0390	M5×0.8	7
	FP0550	M6×1	12
	FP0650	M6×1	12
	FP0750	M8×1.25	25
	FP0900	M10×1.5	50
FQ	FQ0360	M4×0.7	3.5
	FQ0390	M5×0.8	7
	FQ0470	M5×0.8	7
	FQ0550	M6×1	12
	FQ0750	M8×1.25	25

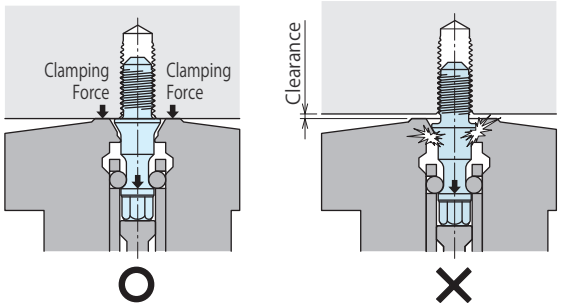
4) Do not use deformed pull bolts.

- If the pull bolt is deformed as shown below it could damage the clamp or pull bolt.



5) Installing of Pull Bolt

- Screw the pull bolt completely.
  If the workpiece is not firmly secured, insufficient clamping force leads to machining error and or damage to the work piece.



- Please tighten the pull bolt with tightening torque shown in the table below.

Pull Bolt Model	Width of Hexagon	Reference to Tightening Torque (N·m)
LZ0390-FP1	5.5	1.25
LZ0550-FP1	8	6.3
LZ0650-FP1	8	6.3
LZ0750-FP1	10	10
LZ0900-FP1	13	25

6) Operate the clamp with the workpiece firmly seated.

- Failure to do so could damage the clamp or pull bolt.
  Insert the pull bolt perpendicular to the clamp.

※ Please refer to P.1043 for common cautions. • Installation Notes • Hydraulic Fluid List • Notes on Hydraulic Cylinder Speed Control Circuit • Notes on Handling • Maintenance/Inspection • Warranty

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.

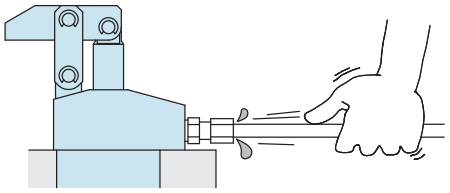
3) Applying Sealing Tape

- Wrap with tape 1 to 2 times following the screw direction.
- Pieces of the sealing tape can lead to oil leakage and malfunction.
- In order to prevent a foreign substance from going into the product during the piping work, it should be carefully cleaned before working.

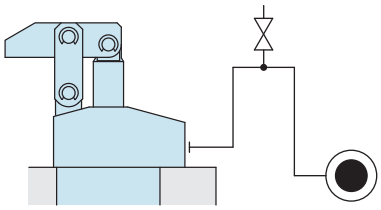
4) Air Bleeding of the Hydraulic Circuit

- 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 Wiggle 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 bleed 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

ISO Viscosity Grade ISO-VG-32

Maker	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	

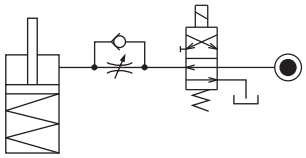
Note As it may be difficult to purchase the products as shown in the table from overseas, please contact the respective manufacturer.

Notes on Hydraulic Cylinder Speed Control Unit

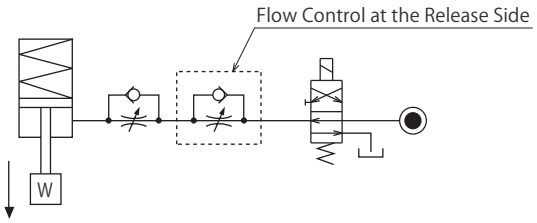
Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

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.



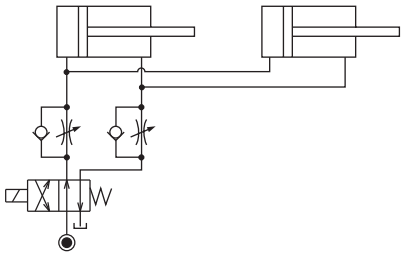
Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)



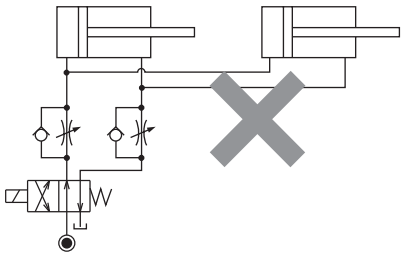
Flow Control Circuit for Double Acting Cylinder

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.47 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)

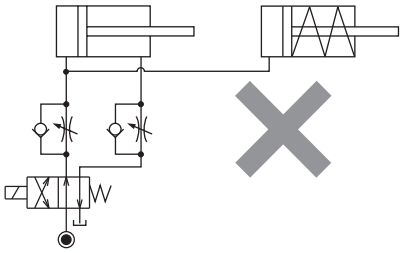


【Meter-in Circuit】(LKE/TMA/TLA must be controlled with meter-in.)



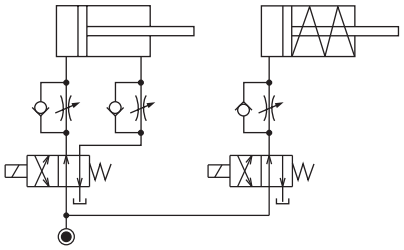
In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

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.

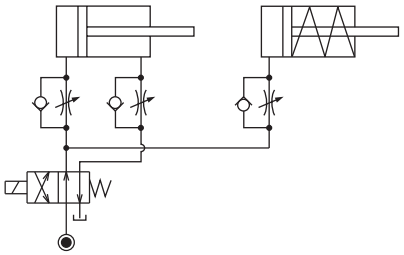


Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.

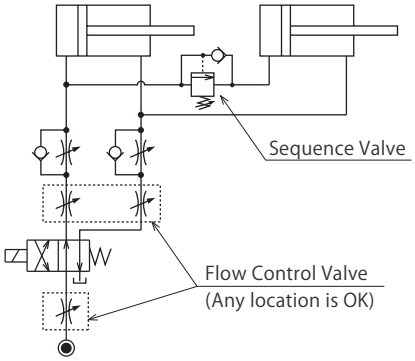
○ Separate the control circuit.



○ 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.



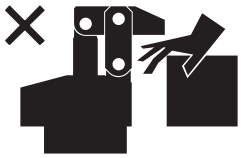
Cautions

Notes on Handling

1) It should be handled by qualified personnel.
- The hydraulic machine and air compressor should be handled and maintained by qualified personnel.

2) Do not handle or remove the machine unless the safety protocols are ensured.
① The machine and equipment can only be inspected or prepared when it is confirmed that the preventive devices are in place.
② Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
③ After stopping the machine, do not remove until the temperature cools down.
④ Make sure there is no abnormality in the bolts and respective parts before restarting the machine or equipment.

3) Do not touch clamps (cylinder) while clamps (cylinder) is working. Otherwise, your hands may be injured due to clinching.

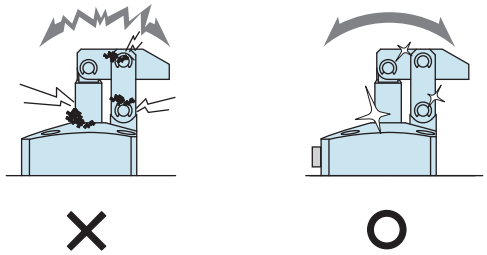


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

Maintenance and Inspection

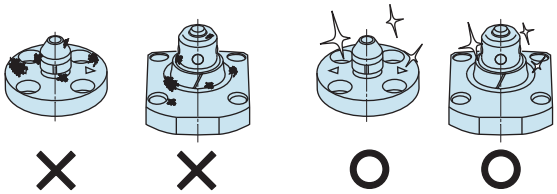
1) Removal of the Machine and Shut-off of Pressure Source
- Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
- Make sure there is no abnormality in the 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 , fluid leakage and air leaks.



3) Please clean out the reference surface regularly (taper reference surface and seating surface) of locating machine .(VS/VT/VL/VM/VJ/VK/WVS/WM/WK/VX/VXF)

- Location products, except VX/VXF model, can remove contaminants with cleaning functions.
  When installing pallets makes sure there is no thick sludge like substances on pallets.
- Continuous use with dirt on components will lead to locating functions not work properly, leaking and malfunction.



4) If disconnecting by couplers on a regular basis, air bleeding should be carried out daily to avoid air mixed in the circuit.

5) Regularly tighten nuts, bolts, pins, cylinders and pipe line to ensure proper use.

6) Make sure the hydraulic fluid has not deteriorated.

7) Make sure there is smooth action and no abnormal 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 handled in 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.

Sales Offices

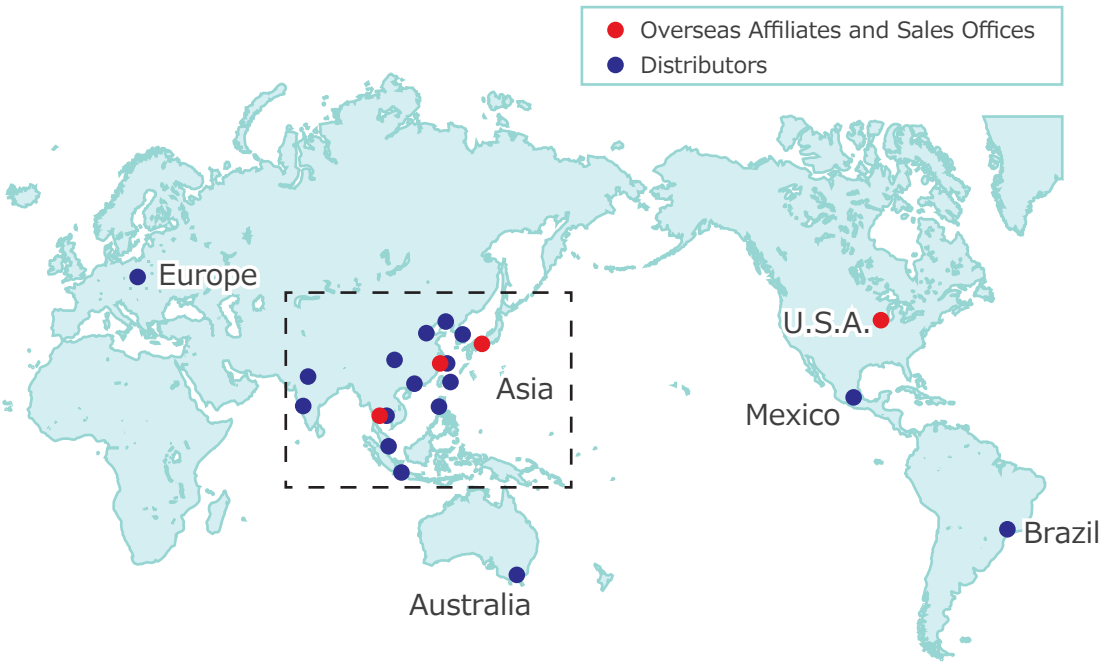
Sales Offices across the World

Japan Overseas Sales	**TEL. +81-78-991-5162**	FAX. +81-78-991-8787 KOSMEK LTD. 1-5, 2-chome, Murotani, Nishi-ku, Kobe-city, Hyogo, Japan 651-2241 〒651-2241　兵庫県神戸市西区室谷2丁目1番5号
USA KOSMEK（USA）LTD.	**TEL. +1-630-241-3465**	FAX. +1-630-241-3834 1441 Branding Avenue, Suite 110, Downers Grove, IL 60515 USA
China KOSMEK（CHINA）LTD. 考世美(上海)貿易有限公司	**TEL.+86-21-54253000**	FAX.+86-21-54253709 21/F, Orient International Technology Building, No.58, Xiangchen Rd, Pudong Shanghai 200122., P.R.China 中国上海市浦东新区向城路58号东方国际科技大厦21F室 200122
Thailand Thailand Representative Office	**TEL. +66-2-715-3450**	FAX. +66-2-715-3453 67 Soi 58, RAMA 9 Rd., Suanluang, Suanluang, Bangkok 10250, Thailand
Taiwan (Taiwan Exclusive Distributor) Full Life Trading Co., Ltd. 盈生貿易有限公司	**TEL. +886-2-82261860**	FAX. +886-2-82261890 16F-4, No.2, Jian Ba Rd., Zhonghe District, New Taipei City Taiwan 23511 台湾新北市中和區建八路2號 16F－4（遠東世紀廣場）
Philippines (Philippines Exclusive Distributor) G.E.T. Inc, Phil.	**TEL.+63-2-310-7286**	FAX. +63-2-310-7286 Victoria Wave Special Economic Zone Mt. Apo Building, Brgy. 186, North Caloocan City, Metro Manila, Philippines 1427
Europe (Europe Exclusive Distributor) KOS-MECH GmbH	**TEL. +43-463-287587-10**	FAX. +43-463-287587-20 Schleppeplatz 2 9020 Klagenfurt Austria
Indonesia (Indonesia Exclusive Distributor) P.T PANDU HYDRO PNEUMATICS	**TEL. +62-21-5818632**	FAX. +62-21-5814857 Ruko Green Garden Blok Z-Ⅱ No.51 Rt.005 Rw.008 Kedoya Utara-Kebon Jeruk Jakarta Barat 11520 Indonesia

Sales Offices in Japan

Head Office Osaka Sales Office Overseas Sales	**TEL.078-991-5115**	FAX.078-991-8787 〒651-2241　兵庫県神戸市西区室谷2丁目1番5号
Tokyo Sales Office	**TEL.048-652-8839**	FAX.048-652-8828 〒331-0815　埼玉県さいたま市北区大成町4丁目81番地
Nagoya Sales Office	**TEL.0566-74-8778**	FAX.0566-74-8808 〒446-0076　愛知県安城市美園町2丁目10番地1
Fukuoka Sales Office	**TEL.092-433-0424**	FAX.092-433-0426 〒812-0006　福岡県福岡市博多区上牟田1丁目8-10-101

Global Network



Asia Detailed Map

KOSMEK
Harmony in Innovation

- FOR FURTHER INFORMATION ON UNLISTED SPECIFICATIONS AND SIZES, PLEASE CALL US.
- SPECIFICATIONS IN THIS CATALOG ARE SUBJECT TO CHANGE WITHOUT NOTICE.

ISO 9001
JQA-QMA10823
KOSMEK HEAD OFFICE
JAB
CM009