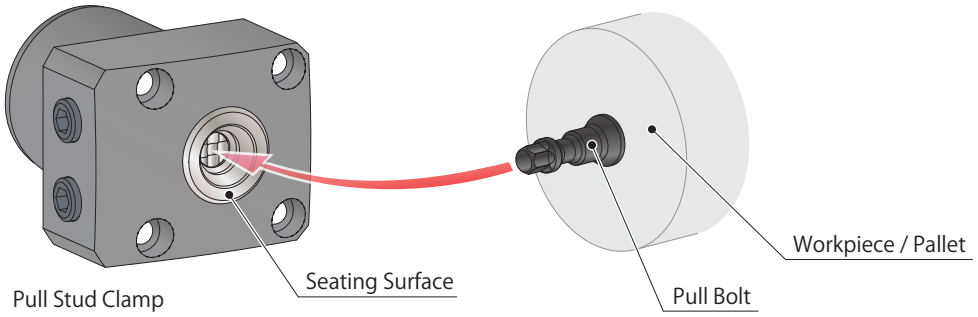
Pull Stud Clamp

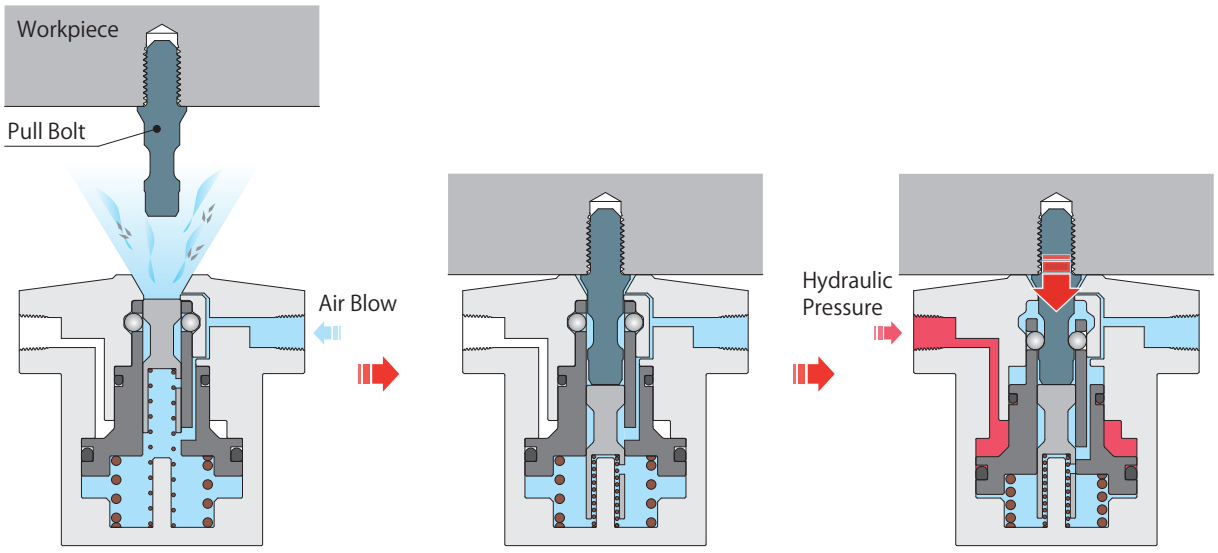
Model FP
Model FQ

The Pulling Clamp using the Pull Bolt for Workpiece Through Hole or Screw Hole

Five-surface machining is possible. Drastically reduce the number of operations needed.

Action Description





Released State

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

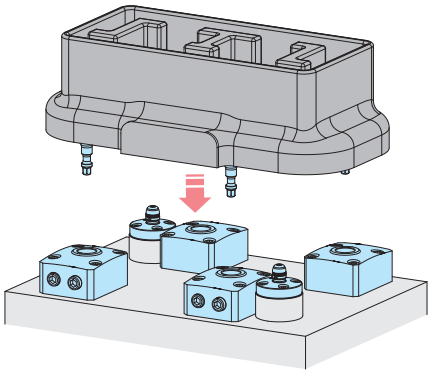
Workpiece Set (Before Clamping)

Locked State

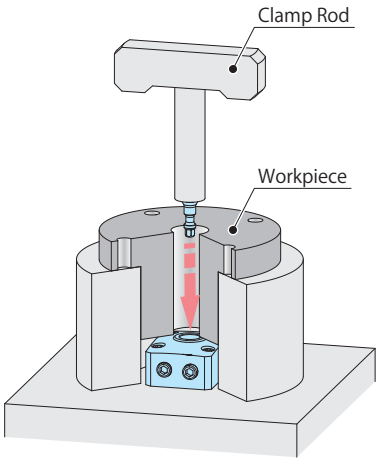
Supply hydraulic pressure to complete the locking operation.

※ This is a simplified drawing. Actual components are different.

Application Examples

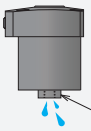


For five-surface machining.
It is difficult to clamp on many surfaces such us curved and slanted surfaces.



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

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

		 Model FP → P.1079	 Model FQ → P.1087
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.1081	External Dimensions → P.1089
Option	With Coolant Discharge Port 	External Dimensions → P.1083	External Dimensions → P.1091
Accessory	Pull Bolt 	LZ-FP1 → P.1085	LZ-FP1 → P.1093

Hydraulic Pull Stud Clamp

Model FP

Low Pressure (1～7MPa)

Single Action

Index

Model No. Indication

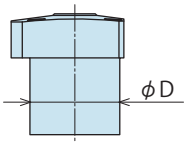
FP 055 0 - G □

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.



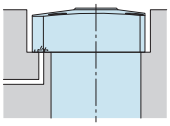
2 Design No.

0 ：Revision Number

3 Piping Method

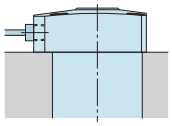
G ：Gasket Option (With R Thread Plug)
S ：Piping Option (Rc Thread Port)

G



Gasket Option
With R Thread Plug

S

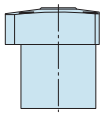


Piping Option
Rc Thread Port
No Gasket Port

4 Option

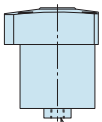
Blank ：None (Standard)
D ：With Coolant Discharge Port

Blank



Standard Model

D

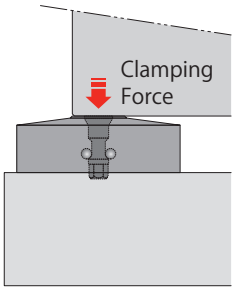


Specifications

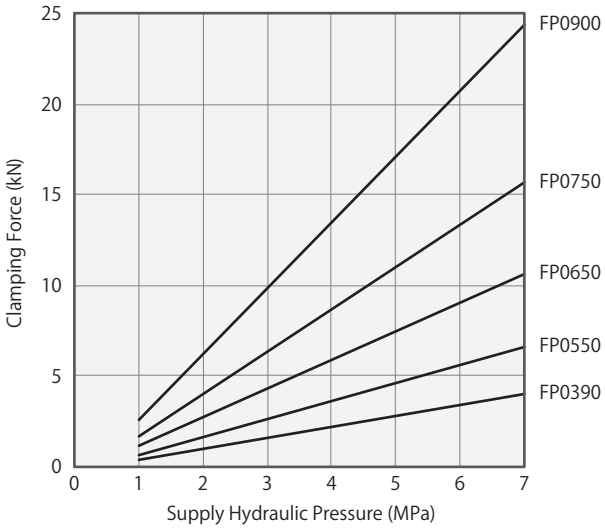
Model No.	FP0390-□□	FP0550-□□	FP0650-□□	FP0750-□□	FP0900-□□
Cylinder Area for Locking cm²	6.0	9.9	15.7	23.3	36.4
Clamping Force (Calculation Formula)※1 kN	F=0.60×P-0.20	F=0.99×P-0.29	F=1.57×P-0.42	F=2.33×P-0.69	F=3.64×P-1.10
Full Stroke mm	6.7	7.5	8.5	10	12
Lock Stroke mm	3.8	5	5.3	7	8.7
Cylinder Capacity (Lock Side) cm³	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				
Weight 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. / 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

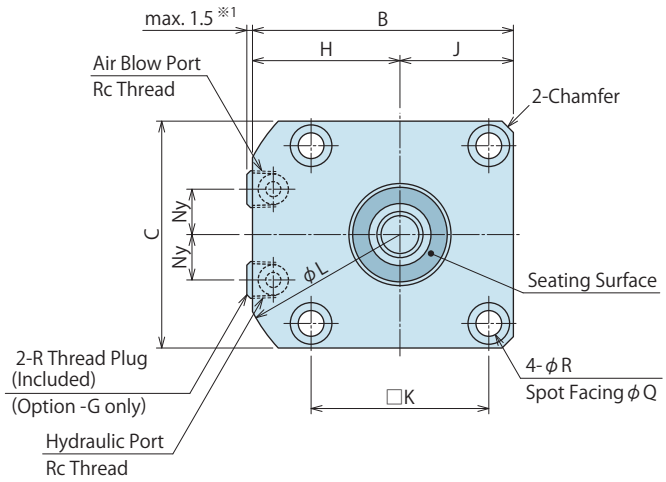


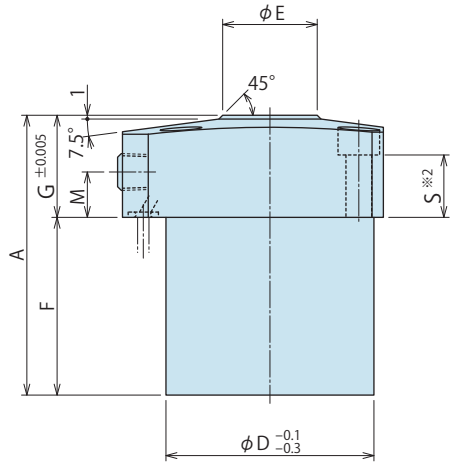
Notes :
1. This performance curve shows Clamping Force (kN) and Supply Hydraulic Pressure (MPa).
2. Clamping force means pulling force onto seating surface.
3. The maximum hydraulic pressure is 7.0 MPa and the minimum is 1.0 MPa.

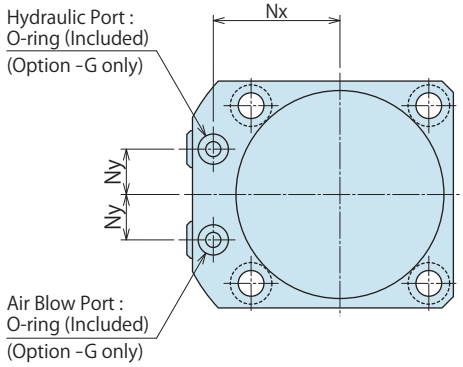
External Dimensions

G：Gasket Option (With R Thread Plug)

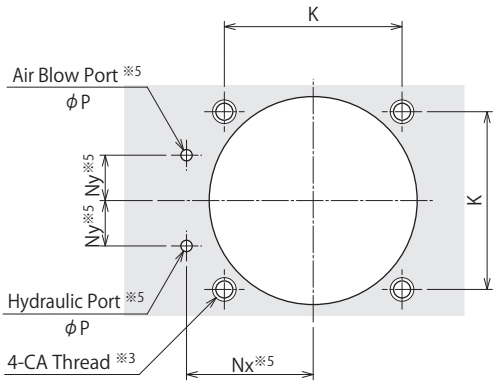
※This drawing indicates FP-G.

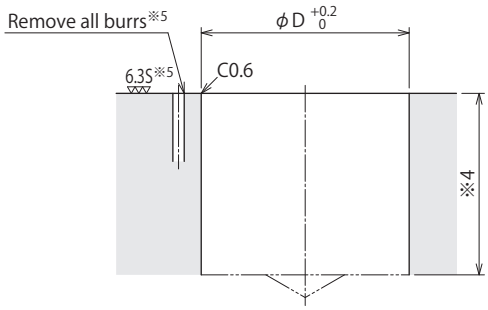






Machining Dimensions of Mounting Area





Notes：

※3. CA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.

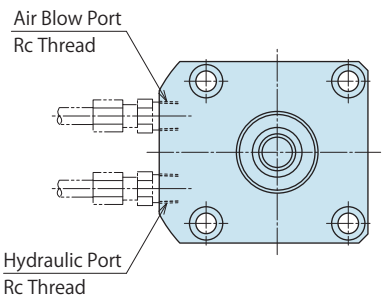
※4. The depth of the body mounting hole ϕD should be decided according to the mounting height referring to dimension 'F'.

※5. The machining dimension is for -G：Gasket option.

Piping Method

S：Rc Thread Piping Option

※This drawing indicates FP-S.



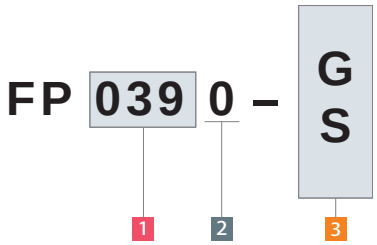
Notes :

※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 referring to dimension 'S'.

1. Pull bolts are not provided.
Prepare pull bolts separately or design them referring to P.1085.

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

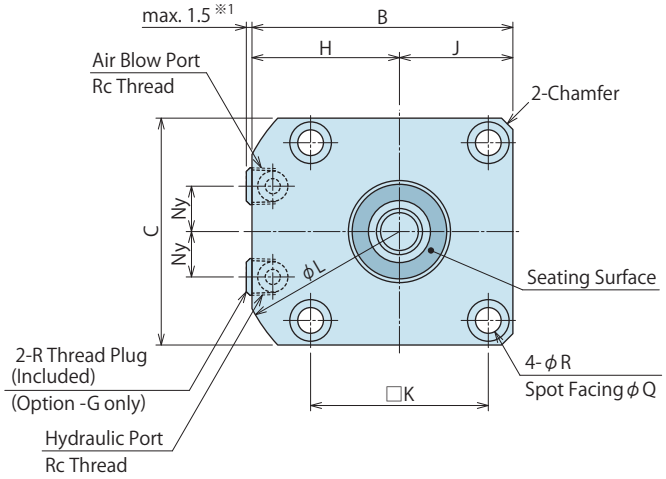
(mm)

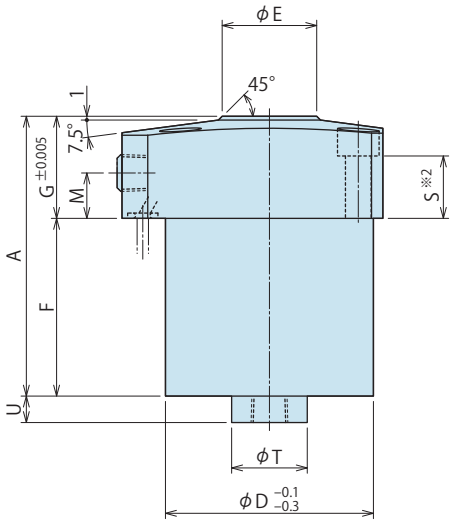
Model No.		FP0390-□	FP0550-□	FP0650-□	FP0750-□	FP0900-□
Full Stroke		6.7	7.5	8.5	10	12
Lock Stroke		3.8	5	5.3	7	8.7
A		65	74	85	100	120
B		54	69	81	92	107
C		45	60	70	80	95
D		39	55	65	75	90
E		20	25	30	38	47.5
F		38	47	57	68	83
G		27	27	28	32	37
H		31.5	39	46	52	59.5
J		22.5	30	35	40	47.5
K		34	47	55	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	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
Air Blow Port	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
O-ring	Option -G	1BP5	1BP5	1BP7	1BP7	1BP7
R Thread Plug	Option -G	R1/8	R1/8	R1/8	R1/4	R1/4

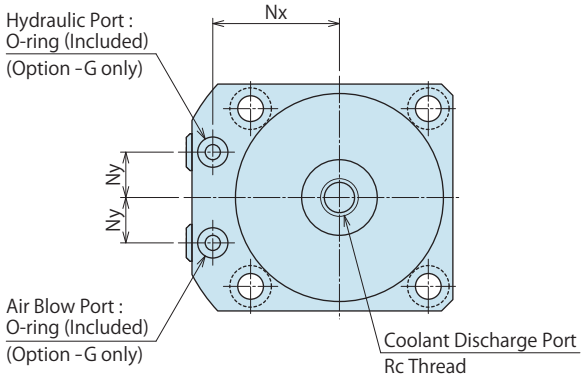
External Dimensions

G：Gasket Option (With R Thread Plug)

※This drawing indicates FP-GD.







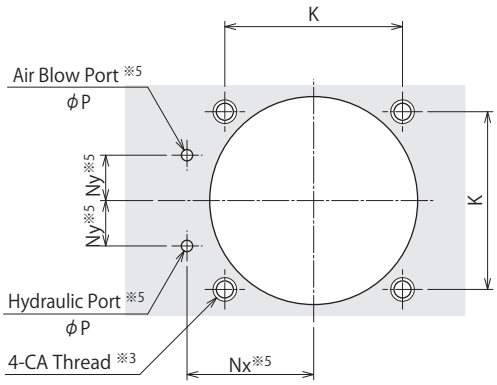
Notes :

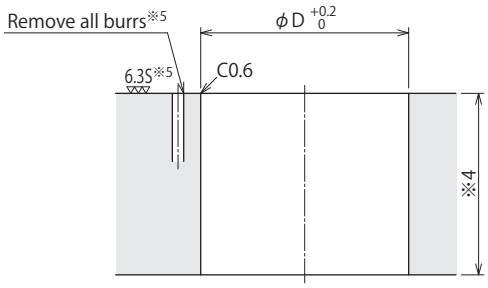
※1. The protrusion of R thread plug is between 0 to 1.5 mm.

※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height referring to dimension 'S'.

1. Pull bolts are not provided.
Prepare pull bolts separately or design them referring to P.1085.

Machining Dimensions of Mounting Area





Notes：

※3. CA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.

※4. The depth of the body mounting hole ϕD should be decided according to the mounting height referring to dimension 'F' and 'U'.

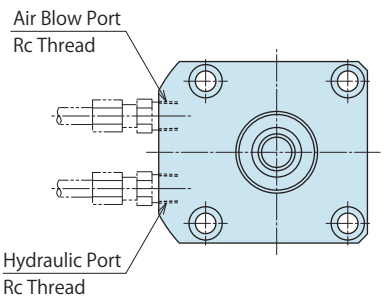
※5. The machining dimension is for -G：Gasket option.

2. Please drain coolant to prevent clogging.

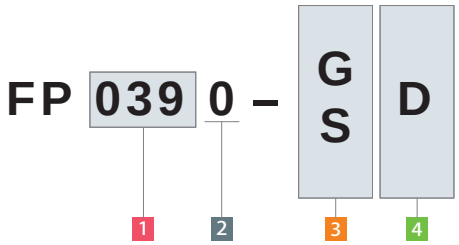
Piping Method

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

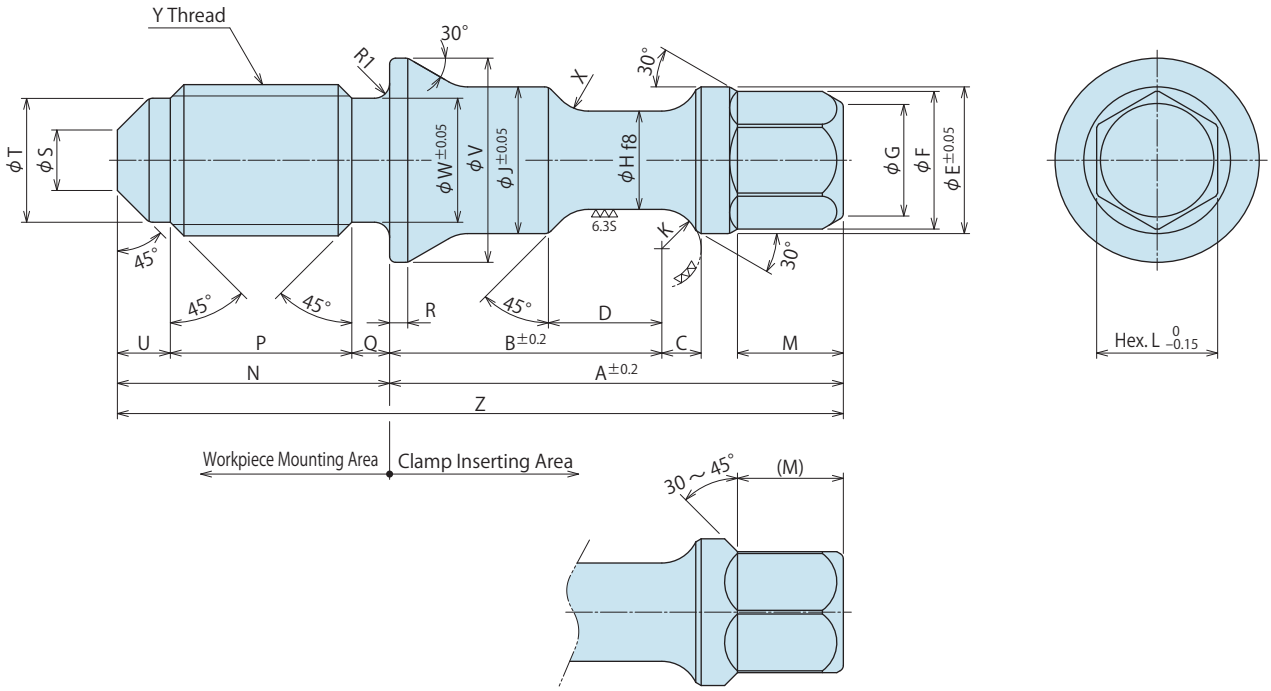
(mm)

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	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
Air Blow Port	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
Coolant Discharge Port	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/4	Rc1/4
O-ring	Option -G	1BP5	1BP5	1BP7	1BP7	1BP7
R Thread Plug	Option -G	R1/8	R1/8	R1/8	R1/4	R1/4

Accessory : 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. Follow the notes below referring to this drawing when designing a pull bolt.
   - 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 table on the right.)

(mm)

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

MEMO

Hydraulic Pull Stud Clamp

Model FQ

High Pressure (1～25MPa)

Single Action

Index

Model No. Indication

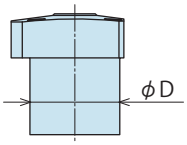
FQ 047 0 - G □

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.



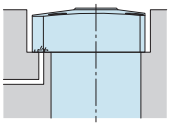
2 Design No.

0 ： Revision Number

3 Piping Method

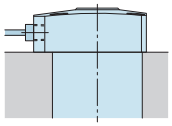
G ： Gasket Option (With R Thread Plug)
S ： Piping Option (Rc Thread Port)

G



Gasket Option
With R Thread Plug

S

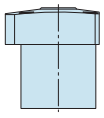


Piping Option
Rc Thread Port
No Gasket Port

4 Option

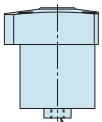
Blank ： None (Standard)
D ： With Coolant Discharge Port

Blank



Standard Model

D

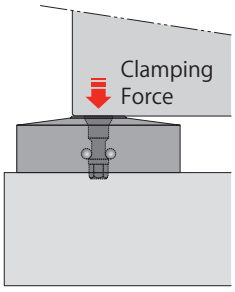


Specifications

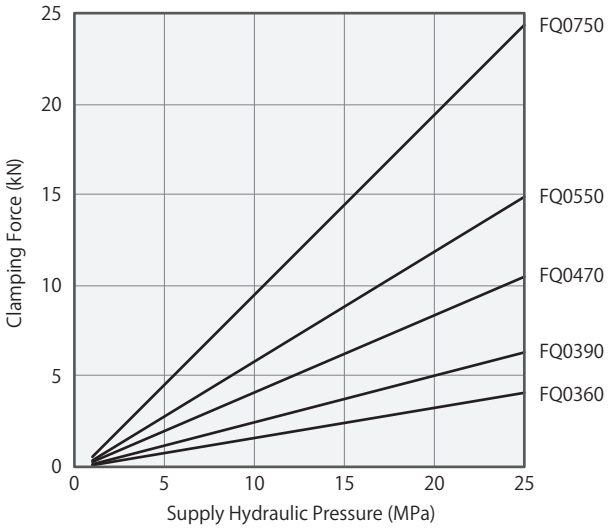
Model No.	FQ0360-□□	FQ0390-□□	FQ0470-□□	FQ0550-□□	FQ0750-□□
Cylinder Area for Locking cm^2	1.8	2.7	4.5	6.4	10.6
Clamping Force (Calculation Formula) ※1 kN	F=0.166×P-0.073	F=0.257×P-0.114	F=0.425×P-0.154	F=0.605×P-0.254	F=0.992×P-0.441
Full Stroke mm	6.7	7.5	8.5	10	12
Lock Stroke mm	3.8	5	5.3	7	8.7
Cylinder Capacity (Lock Side) cm^3	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				
Weight 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. / 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



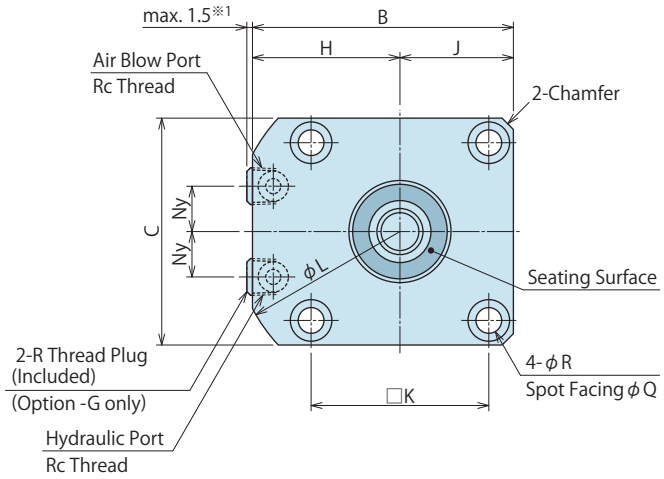
Notes :

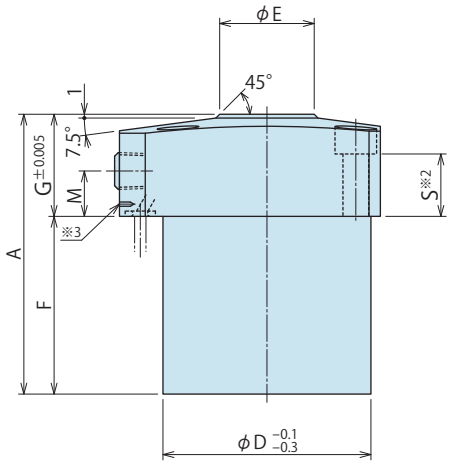
1. This performance curve shows Clamping Force (kN) and Supply Hydraulic Pressure (MPa).
2. Clamping force means pulling force onto seating surface.
3. The maximum hydraulic pressure is 25.0 MPa and the minimum is 1.0 MPa.

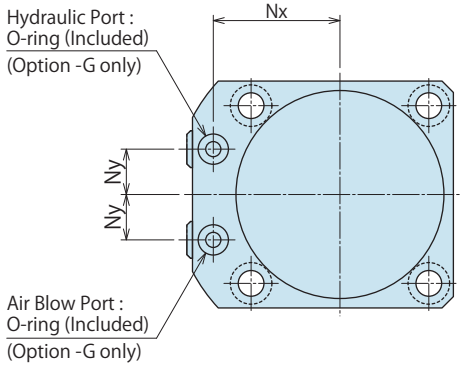
External Dimensions

G：Gasket Option (With R Thread Plug)

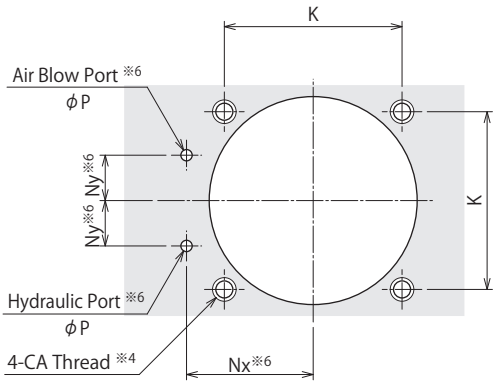
※This drawing indicates FQ-G

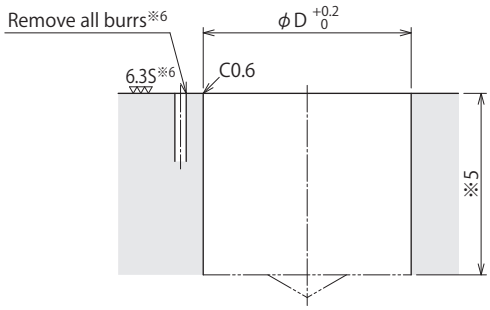






Machining Dimensions of Mounting Area





Notes：

※4. CA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.

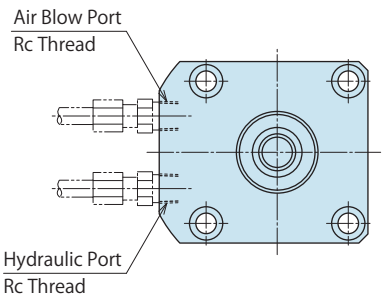
※5. The depth of the body mounting hole ϕD should be decided according to the mounting height referring to dimension 'F'.

※6. The machining dimension is for -G：Gasket option.

Piping Method

S：Rc Thread Piping Option

※This drawing indicates FQ-S.



Notes :

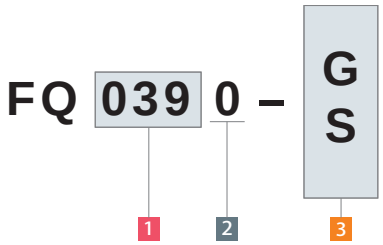
※1. The protrusion of R thread plug is between 0 to 1.5 mm.

※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height referring to dimension 'S'.

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

1. Pull bolts are not provided.
Prepare pull bolts separately or design them referring to P.1093.

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

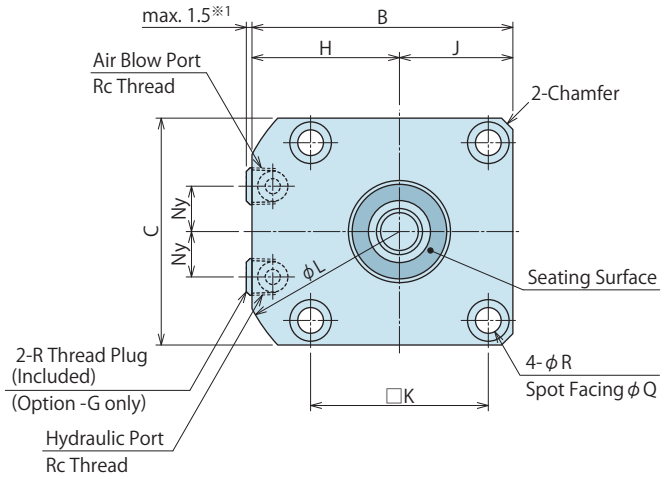
(mm)

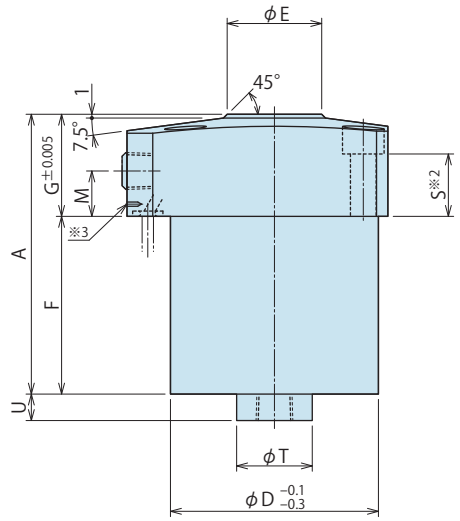
Model No.		FQ0360-□	FQ0390-□	FQ0470-□	FQ0550-□	FQ0750-□
Full Stroke		6.7	7.5	8.5	10	12
Lock Stroke		3.8	5	5.3	7	8.7
A		65	74	85	100	120
B		49	54	61	69	92
C		40	45	51	60	80
D		36	39	47	55	75
E		20	25	30	38	47.5
F		38	47	57	68	83
G		27	27	28	32	37
H		29	31.5	35.5	39	52
J		20	22.5	25.5	30	40
K		31.4	34	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	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
Air Blow Port	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
O-ring	Option -G	1BP5	1BP5	1BP5	1BP5	1BP7
R Thread Plug	Option -G	R1/8	R1/8	R1/8	R1/8	R1/4

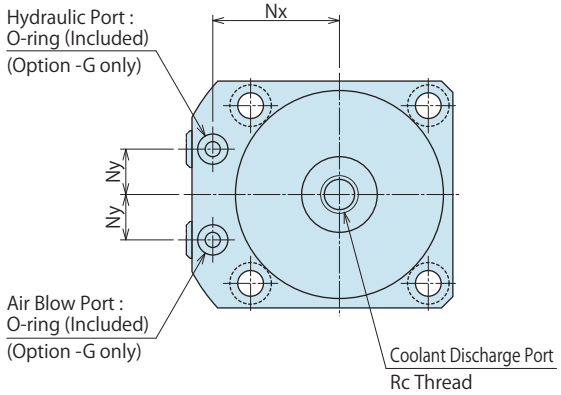
External Dimensions

G：Gasket Option (With R Thread Plug)

※This drawing indicates FQ-GD.







Notes :

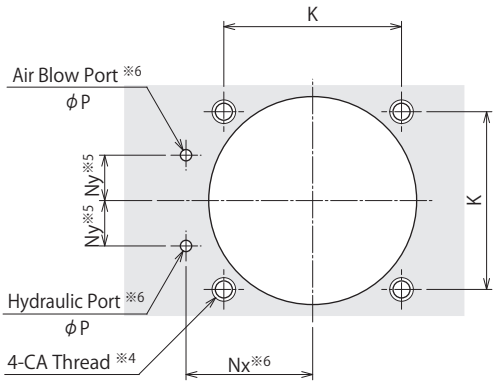
※1. The protrusion of R thread plug is between 0 to 1.5 mm.

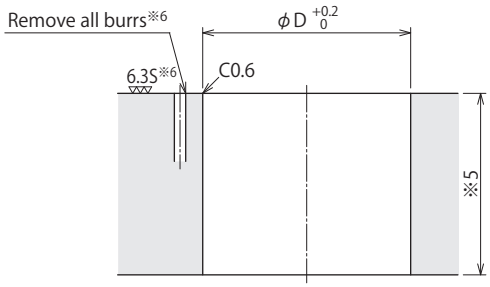
※2. Mounting bolts are not provided.
Prepare mounting bolts according to the mounting height referring to dimension 'S'.

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

1. Pull bolts are not provided.
Prepare pull bolts separately or design them referring to P.1093.

Machining Dimensions of Mounting Area





Notes：

※4. CA 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' and 'U'.

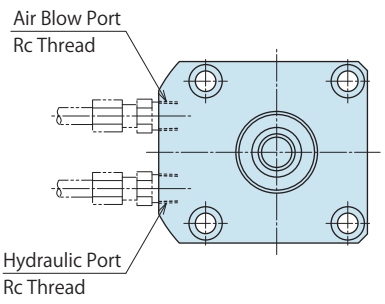
※6. The machining dimension is for -G：Gasket option.

2. Please drain coolant to prevent clogging.

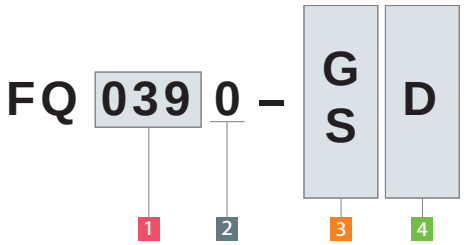
Piping Method

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

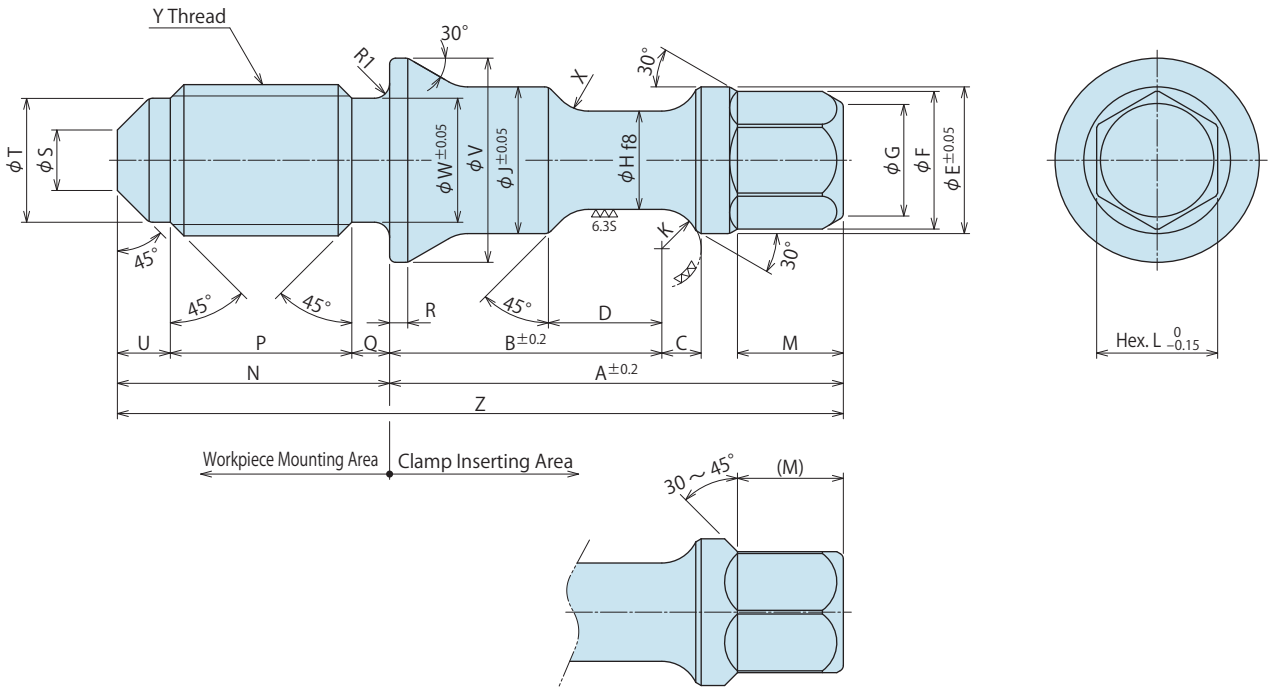
(mm)

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	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
Air Blow Port	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
Coolant Discharge Port	Rc Thread	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/4
O-ring	Option -G	1BP5	1BP5	1BP5	1BP5	1BP7
R Thread Plug	Option -G	R1/8	R1/8	R1/8	R1/8	R1/4

Accessory : 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. Follow the notes below referring to this drawing when designing a pull bolt.
   - 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 table 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

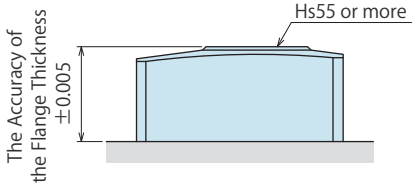
● Please use each product according to the specifications.

2) Notes for Circuit Design

● Please read "Notes on Hydraulic Cylinder Speed Control Unit" for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P.1356)

3) 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.

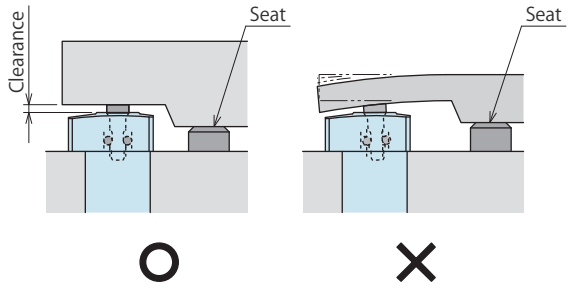


● Refer to the following when installing a separate seating.

① Make sure that no cutting chips or other contaminants enter into the clamp.

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

③ Thoroughly examine the strength of the workpiece.



4) Use a pull bolt with the proper dimensions.

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

● When designing a pull bolt, refer to the external dimensions of LZ-FP1. The dimensions of clamp inserting area must be strictly followed.

5) Air Blow

● The air blow pressure should be between 0.4 to 0.5 MPa.
Using high air pressure and coolant may 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 following cases that coolant may get inside the clamp, we recommend adding a coolant drain port (Option D).

- There is a gap between a clamp top surface and a workpiece.
- Coolant is sprayed directly on a clamp.
- There is a clamp not in use.

7) Installation 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 following table for the force to insert the pull bolt.
Please design with the sleeve return spring force and the 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 contaminants (coolant, cutting chips, etc.).

Installation Notes

1) Check the Usable Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.1355).

2) Speed Adjustment

- If the clamp operates too fast the parts will be worn out leading to premature damage and ultimately complete equipment failure.
- If supplying high pressure or large flow rate pressure at an initial action, the operating speed may become extremely fast.
- 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 flow rate.

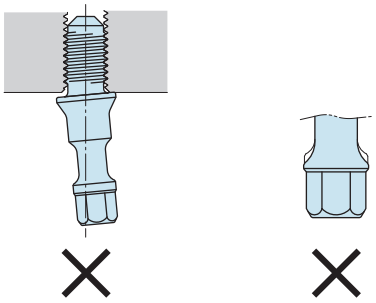
3) Installation of the Product

- When mounting the product use four hexagonal socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the table 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

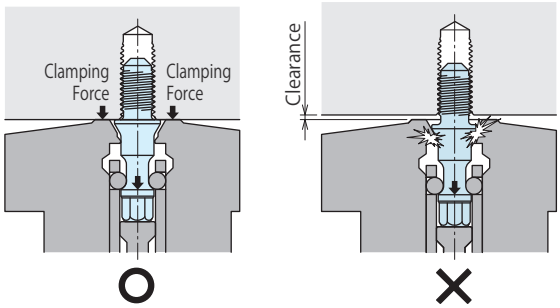
4) Do not use a deformed pull bolt.

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



5) Installation of Pull Bolt

- Please insert the Pull Bolt to the end.
  Otherwise the workpiece will not be secured on the seating surface and the clamping force will be insufficient, causing machining failure and damage to the workpiece.



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

Pull Bolt Model No.	Hexagon Width	Reference : Tightening Torque (N·m)
LZ0390-FP1	5.5	8
LZ0550-FP1	8	16
LZ0650-FP1	8	32
LZ0750-FP1	10	63
LZ0900-FP1	13	100

6) Operate the clamp with the workpiece firmly seated.

- Failure to do so may damage the clamp and/or the pull bolt. Insert the pull bolt perpendicular to the clamp.

※ 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

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.

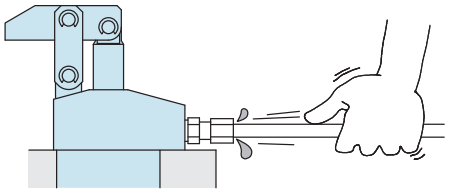
3) Applying Sealing Tape

- 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.

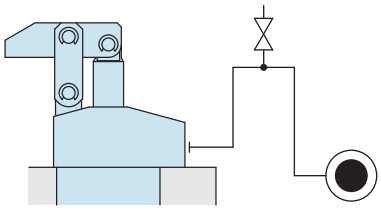
4) Air Bleeding of the Hydraulic Circuit

- 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

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	

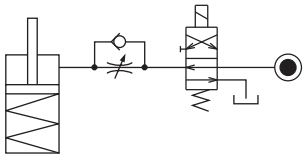
Note : Please contact manufacturers when customers require products in the list above.

Notes on Hydraulic Cylinder Speed Control Unit

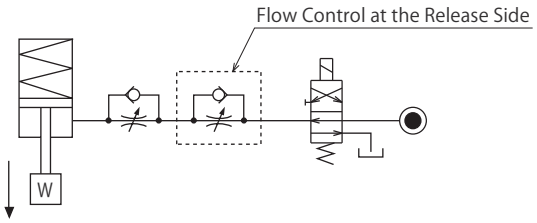
Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

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.



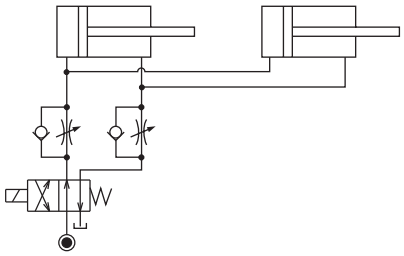
Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)



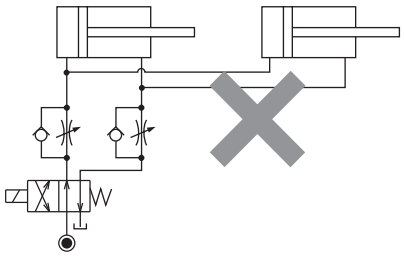
Flow Control Circuit for Double Acting Cylinder

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)

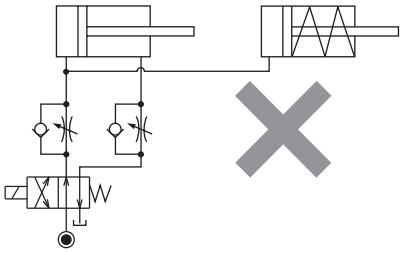


【Meter-in Circuit】(LKE/TMA/TLA must be controlled with meter-in.)



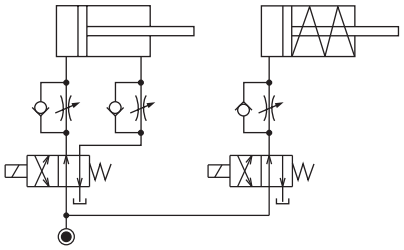
In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

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.

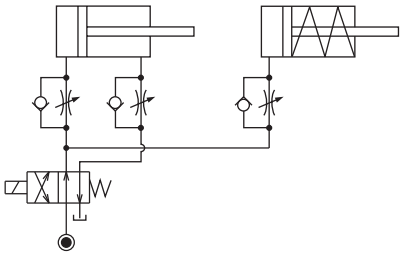


Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.

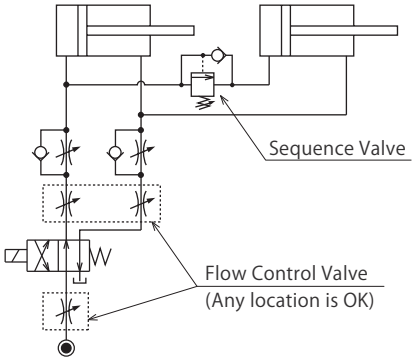
○ Separate the control circuit.



○ 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.



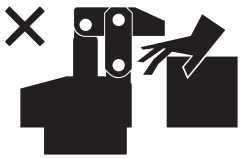
Cautions

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.

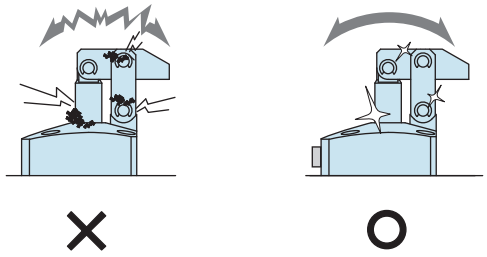


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

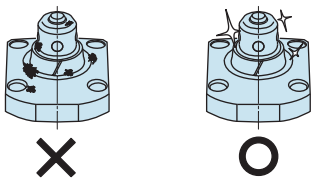
Maintenance and Inspection

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.

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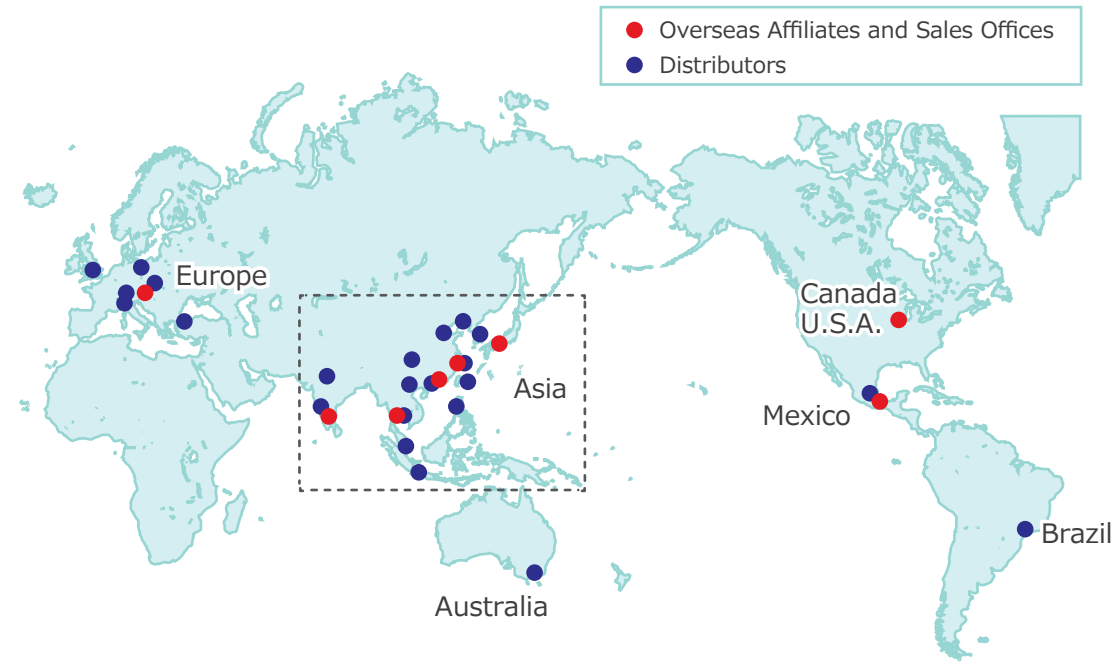
Global Network



Asia Detailed Map

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