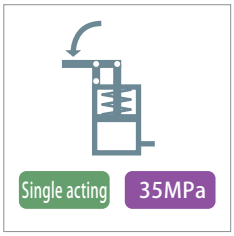
Link clamp

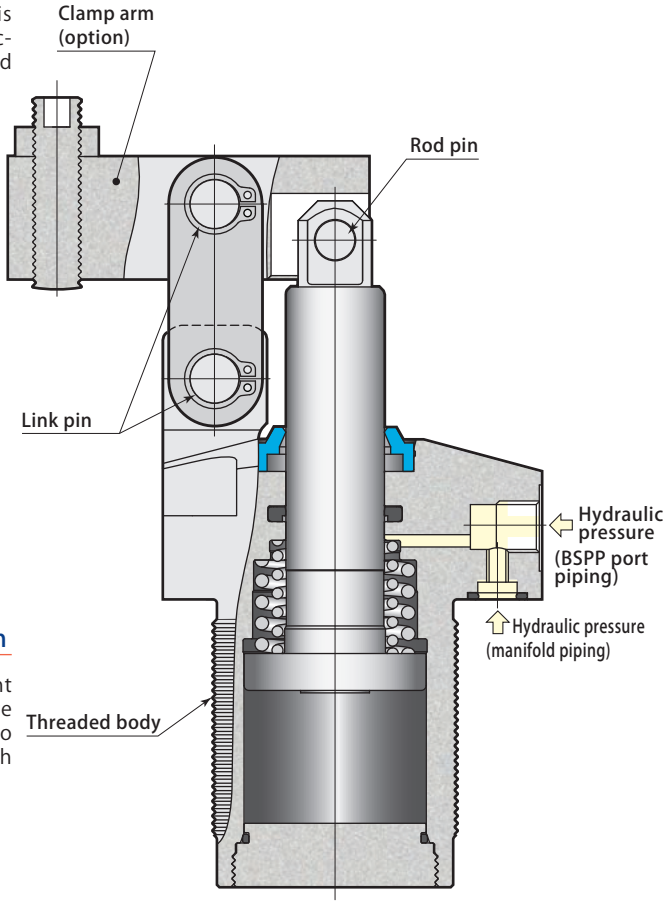
model
CLV



Compact high performance link clamp with high output and high durability

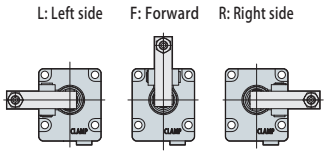
High strength & integrated construction

Compact with higher output is sought through integrated structure of link pin support section and cylinder body.



Three-directional clamp arm

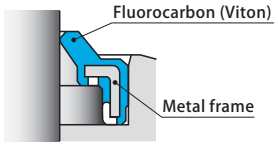
Three types, each with different clamp arm mounting direction, are available.These may be selected to accommodate fixture layout, such as workpiece or hydraulic piping.



Standard and long clamp arms are available as optional components.
Refer to **page → 403**

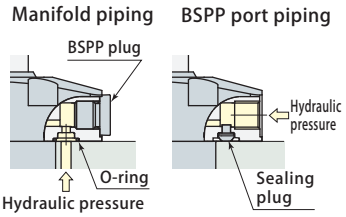
High pressure coolant & metal chip countermeasure

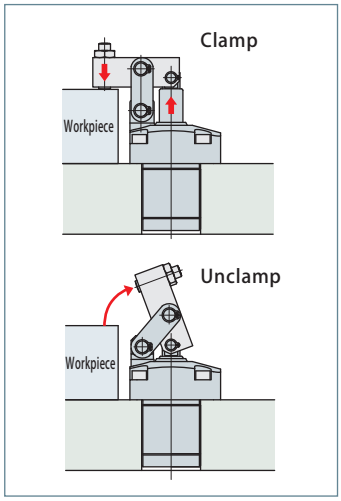
Special scraper prevents intrusion of high pressure coolant and metal chips into cylinder.



2-way hydraulic piping

BSPP piping connection port and manifold piping connection port are available.





Specifications

Model			CLV06	CLV10	CLV16	CLV25
Cylinder force (hydraulic pressure 35 MPa)		(kN)	7.0	11.0	17.2	24.7
Return spring force	Clamping position (Fs)	(kN)	0.26	0.45	0.52	0.75
	Unclamping position	(kN)	0.13	0.19	0.30	0.40
Clamping force *1	Hydraulic pressure 35 MPa	(kN)	4.4	7.3	11.7	16.2
	Hydraulic pressure 25 MPa	(kN)	3.1	5.1	8.3	11.4
	Hydraulic pressure 15 MPa	(kN)	1.8	2.9	4.8	6.7
Standard clamp arm length (LH)		(mm)	50	56.5	69.5	87.5
Rod diameter		(mm)	16	20	25	30
Effective area (clamp)		(cm^2)	2.01	3.14	4.91	7.07
Full stroke		(mm)	26	29.5	36	45
Clamp stroke		(mm)	23	26.5	33	42
Stroke margin		(mm)	3	3	3	3
Max. oil flow rate		(ℓ /min)	5.2	9.3	17.7	31.8
Cylinder capacity		(cm^3)	0.54	1.00	1.93	3.55
Recommended piping inner diameter *2		(mm)	4	4	6	6
Max. allowable mass of clamp arm *3		(kg)	0.4	0.7	1.2	2.3
Mass		(kg)	1.6	2.3	4.4	7.4

Working pressure range: 3.5 ~ 35 MPa Proof pressure: 52.5 MPa Operating temperature: 0 ~ 70° C

Fluid used: General mineral based hydraulic oil (ISO-VG32 equivalent)

*1: Clamping force at time standard clamp arm is mounted. (refer to section on G1 series on **page → 403**)
Clamping force varies depending on clamp arm length. Refer to performance table (**page → 399**), performance diagram (**page → 400**) for details.

*2: Care must be taken when numerous clamps are used or when hydraulic piping is long.

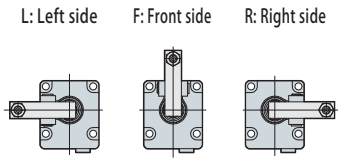
*3: This is clamp arm mass when shape of standard clamp arm is retained but length only has been extended.

Fluorocarbon has been adopted for seal sections where cutting fluid is applied, as a measure for the use of chlorine-based cutting fluid (this is not thermal resistant specification).

Model designation

CLV①-② (Example: CLV16-F)

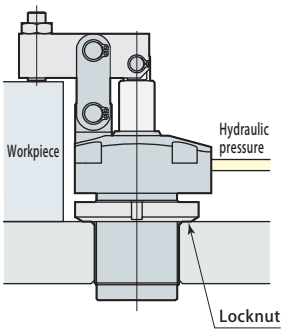
	① Size (refer to specification table)		② Clamp arm mounting direction
CLV	06 10 16 25	–	**L :** Left side **F :** Front side **R:** Right side



Piping method

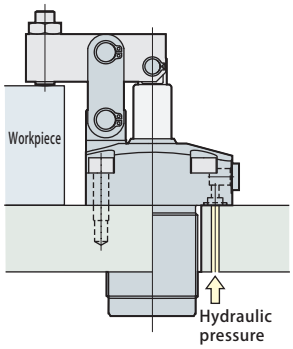
BSPP port piping

Mounting: Threaded body + locknut

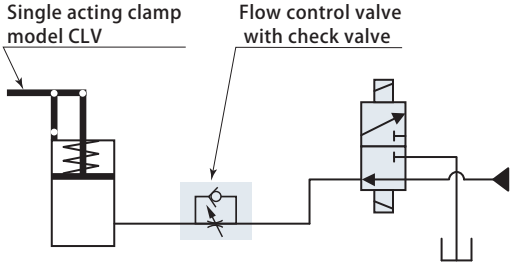


Manifold piping

Mounting: Upper flange + mounting screw



Hydraulic circuit diagram (reference)



Use flow control valve for meter-in control.

Flow control valve model VCH can not be mounted.

Performance table

Clamping force varies depending on clamp arm length and hydraulic pressure.
Select an appropriate clamp model based on considerations for clamp arm length, working hydraulic pressure and mounting dimensions.
(Refer to next page for details on values that do not appear on performance table.)

Note: With link clamps, force acting on link mechanism becomes larger as arm becomes shorter. Do not use the product in the nonusable range.

How to read performance table (Example 1)

For clamp arm length (LH) of 60 mm and where clamping force of 3.0 kN or more is necessary, the working hydraulic pressure for each model is:

35 MPa for CLV06
20 MPa for CLV10
10 MPa for CLV16
5 MPa for CLV25

How to read performance table (Example 2)

When working hydraulic pressure is 35 MPa with CLV10, clamping force necessary for clamp arm length (LH) is:

1.7 kN for LH = 160 mm
4.2 kN for LH = 80 mm
9.1 kN for LH = 50 mm
Not usable with LH = 40mm

F: Clamping force (kN) P: Working pressure (MPa) LH: Clamp arm length (mm)

CLV 06

$F = \frac{3.80 \times P - 4.91}{LH - 21.0}$ indicates nonusable range

Hydraulic pressure (MPa)	Cylinder force (kN)	Clamping force (kN) Clamp arm length LH (mm) 35	45	50	60	80	100	120	Min. arm length min. LH (mm)
35	7.0		5.3	4.4	3.3	2.2	1.6	1.3	37.5
30	6.0	7.8	4.5	3.8	2.8	1.8	1.4	1.1	35
25	5.0	6.4	3.8	3.1	2.3	1.5	1.1	0.9	↑
20	4.0	5.1	3.0	2.5	1.8	1.2	0.9	0.7	↑
15	3.0	3.7	2.2	1.8	1.3	0.9	0.7	0.5	↑
10	2.0	2.4	1.4	1.1	0.8	0.6	0.4	0.3	↑
5	1.0	1.0	0.6	0.5	0.4	0.2	0.2	0.1	↑
3.5	0.7	0.6	0.3	0.3	0.2	0.1	0.1	0.1	35
Max. working pressure (MPa)		32.4	35	35	35	35	35	35	

CLV 10

$F = \frac{6.93 \times P - 9.92}{LH - 24.5}$ indicates nonusable range

Hydraulic pressure (MPa)	Cylinder force (kN)	Clamping force (kN) Clamp arm length LH (mm) 40	50	56.5	60	80	100	120	140	160	Min. arm length min. LH (mm)
35	11.0		9.1	7.3	6.6	4.2	3.1	2.4	2.0	1.7	44
30	9.4	12.8	7.8	6.2	5.6	3.6	2.6	2.1	1.7	1.5	40
25	7.9	10.5	6.4	5.1	4.6	2.9	2.2	1.7	1.4	1.2	↑
20	6.3	8.3	5.0	4.0	3.6	2.3	1.7	1.3	1.1	0.9	↑
15	4.7	6.1	3.7	2.9	2.6	1.7	1.2	1.0	0.8	0.7	↑
10	3.1	3.8	2.3	1.9	1.7	1.1	0.8	0.6	0.5	0.4	↑
5	1.6	1.6	1.0	0.8	0.7	0.4	0.3	0.3	0.2	0.2	↑
3.5	1.1	0.9	0.6	0.4	0.4	0.3	0.2	0.2	0.1	0.1	40
Max. working pressure (MPa)		31.0	35	35	35	35	35	35	35	35	

CLV 16

$F = \frac{13.47 \times P - 14.27}{LH - 30.5}$ indicates nonusable range

Hydraulic pressure (MPa)	Cylinder force (kN)	Clamping force (kN) Clamp arm length LH (mm) 50	60	69.5	80	100	120	140	160	180	Min. arm length min. LH (mm)
35	17.2		15.5	11.7	9.2	6.6	5.1	4.2	3.5	3.1	53.5
30	14.7	20.0	13.2	10.0	7.9	5.6	4.4	3.6	3.0	2.6	50
25	12.3	16.5	10.9	8.3	6.5	4.6	3.6	2.9	2.5	2.2	↑
20	9.8	13.1	8.6	6.5	5.2	3.7	2.9	2.3	2.0	1.7	↑
15	7.4	9.6	6.4	4.8	3.8	2.7	2.1	1.7	1.5	1.3	↑
10	4.9	6.2	4.1	3.1	2.4	1.7	1.3	1.1	0.9	0.8	↑
5	2.5	2.7	1.8	1.4	1.1	0.8	0.6	0.5	0.4	0.4	↑
3.5	1.7	1.7	1.1	0.8	0.7	0.5	0.4	0.3	0.3	0.2	50
Max. working pressure (MPa)		32.1	35	35	35	35	35	35	35	35	

CLV 25

$F = \frac{23.86 \times P - 25.31}{LH - 37.5}$ indicates nonusable range

Hydraulic pressure (MPa)	Cylinder force (kN)	Clamping force (kN) Clamp arm length LH (mm) 60	65	87.5	100	120	140	160	180	200	Min. arm length min. LH (mm)
35	24.7	36.0	29.4	16.2	13.0	9.8	7.9	6.6	5.7	5.0	60
30	21.2	30.7	25.1	13.8	11.0	8.4	6.7	5.6	4.8	4.2	↑
25	17.7	25.4	20.8	11.4	9.1	6.9	5.6	4.7	4.0	3.5	↑
20	14.1	20.1	16.4	9.0	7.2	5.5	4.4	3.7	3.2	2.8	↑
15	10.6	14.8	12.1	6.7	5.3	4.0	3.2	2.7	2.3	2.0	↑
10	7.1	9.5	7.8	4.3	3.4	2.6	2.1	1.7	1.5	1.3	↑
5	3.5	4.2	3.4	1.9	1.5	1.1	0.9	0.8	0.7	0.6	↑
3.5	2.5	2.6	2.1	1.2	0.9	0.7	0.6	0.5	0.4	0.4	60
Max. working pressure (MPa)		35	35	35	35	35	35	35	35	35	

Performance diagram

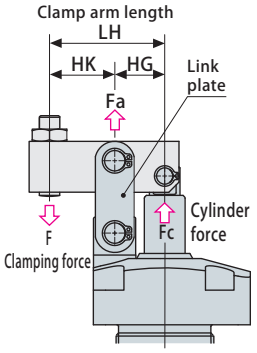
1. Clamping force varies depending on clamp arm length and hydraulic pressure. Use following clamping force calculation formula to obtain clamping force.

Clamping force calculation formula	$F = (Fc\text{-}Fs) \times \frac{HG}{(LH - HG)} \times \eta$

2. When using clamp arm with HK dimension that is shorter than those shown in table to the right, determine maximum working hydraulic pressure using hydraulic pressure calculation formula below. Force that applies on link mechanism becomes greater as HK dimension becomes shorter. Exceeding maximum allowable load Fa will result in excessive load on link mechanism, leading to malfunction.

Hydraulic pressure calculation formula	$Pa \leq \left(\frac{Fa \times (LH - HG)}{HG \times \eta + LH - HG} + Fs \right) \frac{10}{A}$

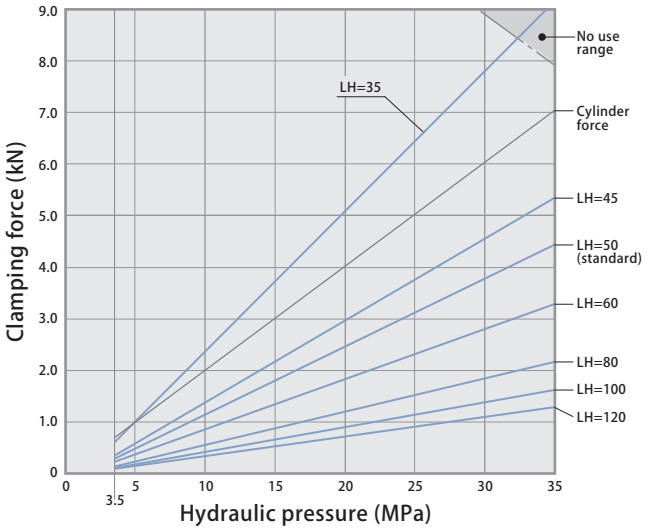
F : Clamping force kN
Fc : Cylinder force kN (refer to performance diagram)
LH=HG+HK : Clamp arm length mm (refer to diagram on right)
η : Output efficiency (0.9)
Pa : Max. working pressure MPa
Fa : Link section max. allowable load kN (refer to table below)
A : Effective area (clamp) cm^2 (refer to specification table)
Fs : Return spring force kN (refer to specification table)



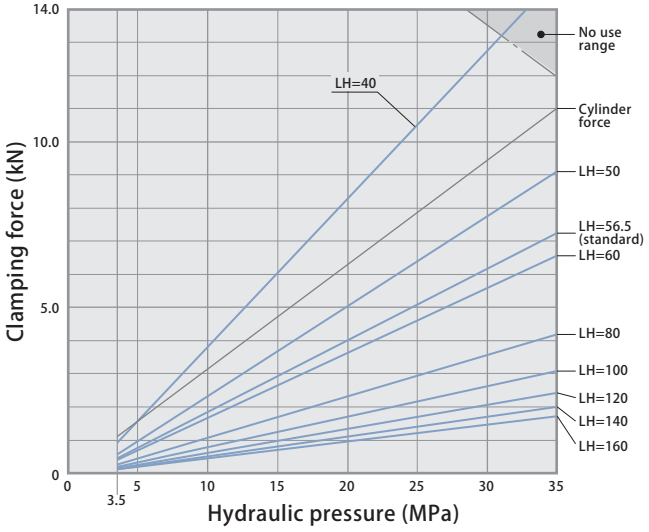
Model	CLV06	CLV10	CLV16	CLV25
HG (mm)	21	24.5	30.5	37.5
LH* (mm)	50	56.5	69.5	87.5
Fa (kN)	14.7	22.5	36.7	59.6

*: Standard clamp arm length.

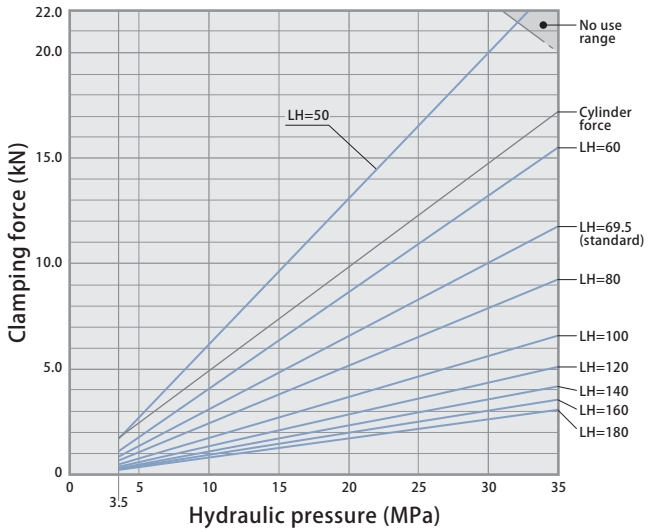
CLV 06



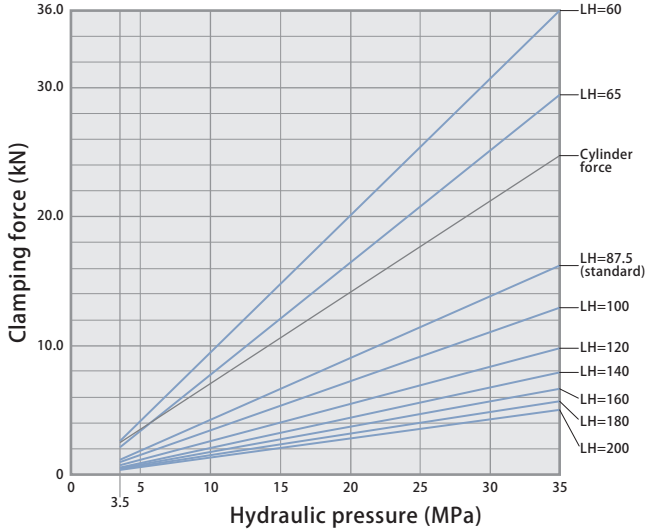
CLV 10



CLV 16

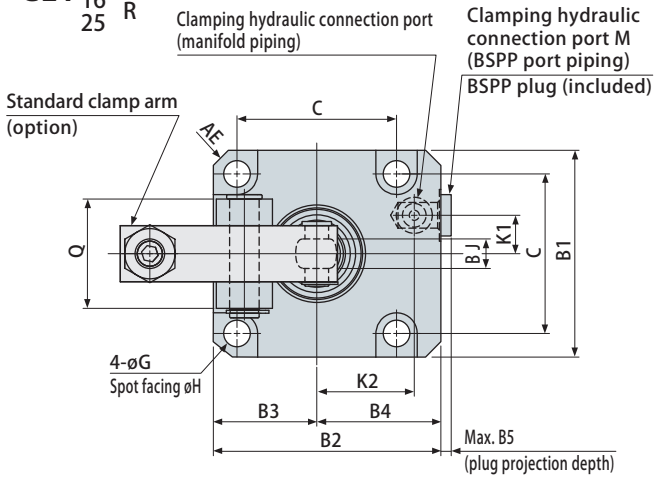


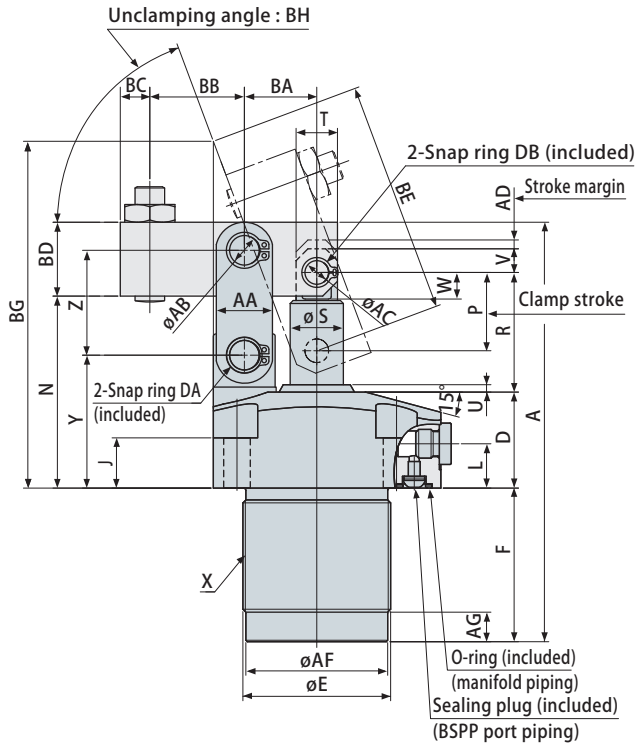
CLV 25



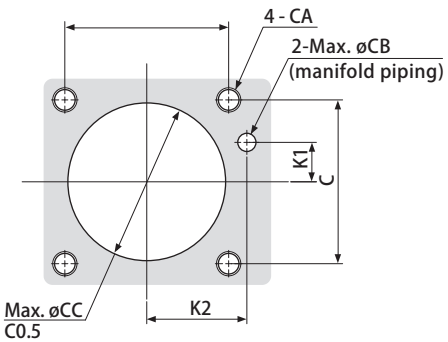
Dimensions

CLV 06 10 16 25 L F R





Mounting details



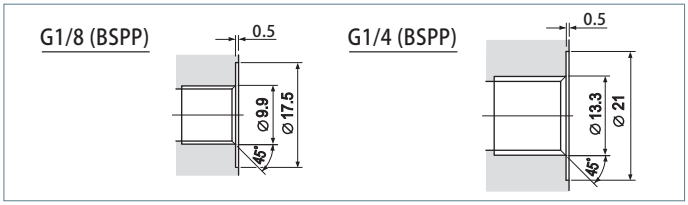
Note 1. Diagram above represents external contour of CLV□-F. CLV□- L and CLV□-R differ only in terms of mounting direction of clamp arm and otherwise all dimensions are identical to those of CLV□-F.

2. The mounting surface finish must be no rougher than Rz 6.3 (ISO4287:1997) for manifold piping.

3. Mounting screws and locknuts are not included.

(mm)

Model	CLV06-L/F/R	CLV10-L/F/R	CLV16-L/F/R	CLV25-L/F/R
A	130.5	148.5	181.5	220.5
B1	60	70	88	108
B2	69	77	96	110
B3	30	35	43	54
B4	39	42	53	56
B5	3.8	3.8	4.8	4.8
C	47	54	65	85
D	31	32.5	40	47
E	$45^{0}_{-0.2}$	$50^{0}_{-0.2}$	$60^{0}_{-0.2}$	$70^{0}_{-0.2}$
F	51	58.5	70.5	86.5
G	6.8	9	11	14
H	11	14	17.5	20
J	17	17	20	21
K1	11.5	13	15	20
K2	30	33	40	43
L	15	15	17	17
M *1	G1/8	G1/8	G1/4	G1/4
N	59.5	65	80	96
P	23	26.5	33	42
Q	28	37	46	56
R	34.5	40.5	49	61.5
S	14	18	22.4	28
T	12	15	20	26
U	2	2.5	2.5	2.5
V	6	8	11	13
W	7	9	10.8	14.5
X	M45×1.5	M50×1.5	M60×2	M70×2
Y	41.5±0.1	45	54.5	65
Z	30	35.5	44	53
O-ring *2	P9	P9	P9	P9
AA	15	19	25	32
AB	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$14^{+0.018}_{0}$	$16^{+0.018}_{0}$
AC	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$12^{+0.018}_{0}$	$14^{+0.018}_{0}$
AD	3	3	3	3
AE	R5	R6	R7	R10
AF	43	48	57.5	67.5
AG	10	10	12	12
BA	21	24.5	30.5	37.5
BB	29	32	39	50
BC	8	10	11	15
BD	20	25	31	38
BE	71.7	78.7	98.2	133.5
BG	107.9	117.4	144.7	189.2
BH	About 70°	About 70°	About 69°	About 72°
BJ *3	$8^{-0.1}_{-0.2}$	$10^{-0.1}_{-0.2}$	$11^{-0.1}_{-0.2}$	$16^{-0.1}_{-0.2}$
CA	M6	M8	M10	M12
CB	7	7	7	7
CC	47	52	62	72
DA *4	STW-6	STW-8	STW-12	STW-14
DB *4	STW-8	STW-10	STW-14	STW-16

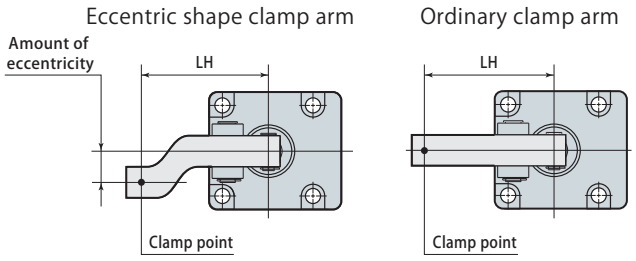


*1: Refer to page→429 for details on BSPP port piping flareless fitting.
*2: Material used for O-ring is fluorocarbon (with hardness Hs90).
*3: Dimensions of area across flats at tip section of piston rod are shown.
*4: Snap ring is made by Ochiai corporation.

Allowable eccentricity of clamp arm

An eccentric shape clamp arm as shown in diagram on right can be used with link clamp model CLV, if it is not possible to set clamp point at tip section of clamp arm in alignment with center line of piston rod and clamp arm.

Amount of eccentricity, however, must be within allowable eccentricity shown below. Using a clamp arm that exceeds allowable eccentricity results in significant eccentric load on link mechanism and piston rod, leading to malfunction.



CLV06

▒ indicates nonusable range

Hydraulic pressure (MPa)	Allowable eccentricity: Clamp arm length LH (mm)								
	35	45	50	60	70	80	90	100	120
35		8	8	8	8	8	8	8	8
30	8	12	13	15	17	19	21	23	26
25	12	25	28	36	43	50	57	65	79
20	19	44	52	67	80	80	80	80	80
15	33	67	80	80	↑	↑	↑	↑	↑
10	62	80	↑	↑	↑	↑	↑	↑	↑
5	80	80	80	80	80	80	80	80	80

CLV10

▒ indicates nonusable range

Hydraulic pressure (MPa)	Allowable eccentricity: Clamp arm length LH (mm)								
	40	50	56.5	60	80	100	120	140	160
35		12	18	19	24	30	35	41	46
30	9	19	28	34	53	69	85	95	95
25	10	28	40	47	83	95	95	↑	↑
20	18	42	58	67	95	↑	↑	↑	↑
15	33	67	89	95	↑	↑	↑	↑	↑
10	66	95	95	↑	↑	↑	↑	↑	↑
5	95	95	95	95	95	95	95	95	95

CLV16

▒ indicates nonusable range

Hydraulic pressure (MPa)	Allowable eccentricity: Clamp arm length LH (mm)								
	50	60	69.5	80	100	120	140	160	180
35		11	16	27	47	67	87	108	110
30	11	17	30	45	72	100	110	110	↑
25	14	33	51	71	110	110	↑	↑	↑
20	29	56	82	110	↑	↑	↑	↑	↑
15	56	97	110	↑	↑	↑	↑	↑	↑
10	110	110	↑	↑	↑	↑	↑	↑	↑
5	110	110	110	110	110	110	110	110	110

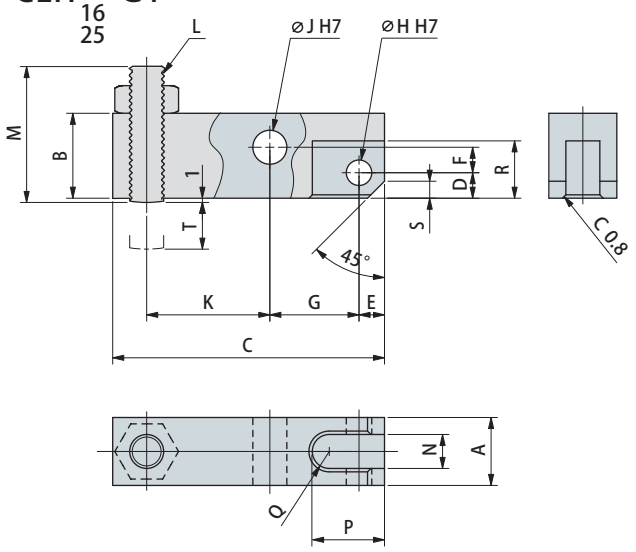
CLV25

▒ indicates nonusable range

Hydraulic pressure (MPa)	Allowable eccentricity: Clamp arm length LH (mm)								
	60	65	87.5	100	120	140	160	180	200
35	16	16	52	72	104	136	160	160	160
30	16	24	68	92	130	160	↑	↑	↑
25	25	37	91	121	160	↑	↑	↑	↑
20	41	56	126	160	↑	↑	↑	↑	↑
15	68	90	160	↑	↑	↑	↑	↑	↑
10	126	160	↑	↑	↑	↑	↑	↑	↑
5	160	160	160	160	160	160	160	160	160

Standard clamp arm

CLH 04 06 10 16 25 -G1



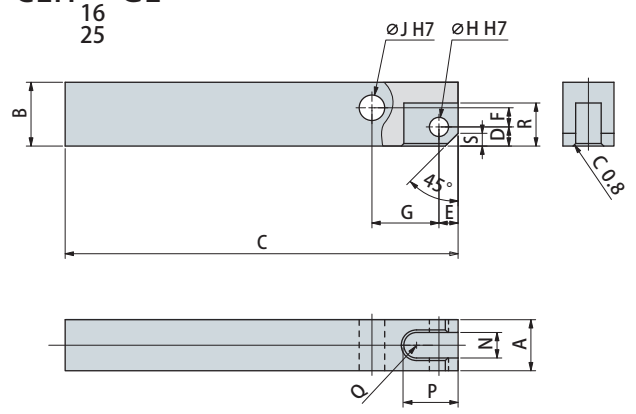
Material: S45C (Refining HB201 ~ 269)

(mm)

Clamp arm models	CLH04-G1	CLH06-G1	CLH10-G1	CLH16-G1	CLH25-G1
A	$12^{0}_{-0.1}$	$16^{0}_{-0.1}$	$19^{0}_{-0.1}$	$22^{0}_{-0.1}$	$32^{0}_{-0.1}$
B	16	20	25	31	38
C	54	54	73.5	90.5	115.5
D	6	6	8	9	12.5
E	6	6	7	10	13
F	3.5	6	7.5	9.5	9.5
G	18.5	21	24.5	30.5	37.5
H	$6^{+0.012}_{0}$	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$12^{+0.018}_{0}$	$14^{+0.018}_{0}$
J	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$14^{+0.018}_{0}$	$16^{+0.018}_{0}$
K	23.5	29	32	39	50
L	M6	M8	M10	M12	M16
M	26	32	39	48	58
N	$6^{+0.1}_{0}$	$8^{+0.1}_{0}$	$10^{+0.1}_{0}$	$11^{+0.1}_{0}$	$16^{+0.1}_{0}$
P	14	17	20	26.5	36
Q	R3	R4	R5	R5.5	R8
R	13.5	13.5	17.5	22	28
S	4	4	5	7	8
T (adjustment amount)	9	11	13	16	19
Arm mass	0.10 kg	0.14 kg	0.24 kg	0.41 kg	0.98 kg
Clamp models	CLW04	CLW06 CLV06	CLW10 CLV10	CLW16 CLV16	CLW25 CLV25

Long clamp arm

CLH 04 06 10 16 25 -GL



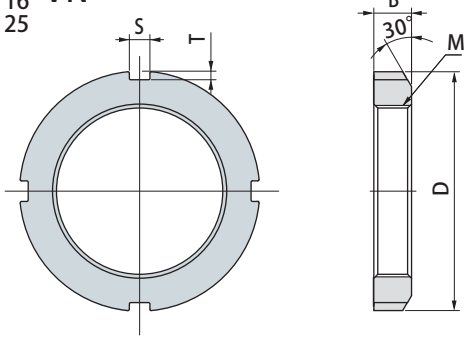
Material: S45C (Refining HB201 ~ 269)

(mm)

Clamp arm models	CLH04-GL	CLH06-GL	CLH10-GL	CLH16-GL	CLH25-GL
A	$12^{0}_{-0.1}$	$16^{0}_{-0.1}$	$19^{0}_{-0.1}$	$22^{0}_{-0.1}$	$32^{0}_{-0.1}$
B	16	20	25	31	38
C	135	135	180	200	230
D	6	6	8	9	12.5
E	6	6	7	10	13
F	3.5	6	7.5	9.5	9.5
G	18.5	21	24.5	30.5	37.5
H	$6^{+0.012}_{0}$	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$12^{+0.018}_{0}$	$14^{+0.018}_{0}$
J	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$14^{+0.018}_{0}$	$16^{+0.018}_{0}$
N	$6^{+0.1}_{0}$	$8^{+0.1}_{0}$	$10^{+0.1}_{0}$	$11^{+0.1}_{0}$	$16^{+0.1}_{0}$
P	14	17	20	26.5	36
Q	R3	R4	R5	R5.5	R8
R	13.5	13.5	17.5	22	28
S	4	4	5	7	8
Arm mass	0.20 kg	0.31 kg	0.62 kg	0.96 kg	1.95 kg
Clamp models	CLW04	CLW06 CLV06	CLW10 CLV10	CLW16 CLV16	CLW25 CLV25

Locknut

CLH 06 10 16 25 -VN

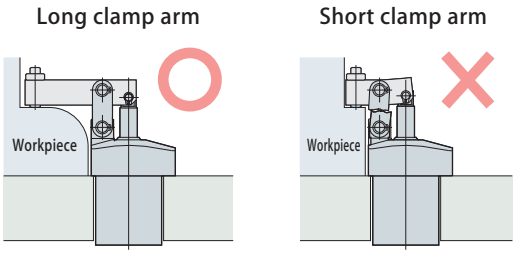


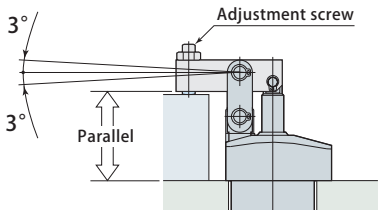
(mm)

Locknut models	CLH06-VN	CLH10-VN	CLH16-VN	CLH25-VN
M	M45×1.5	M50×1.5	M60×2	M70×2
D	65	70	80	92
B	10	11	11	12
S	6	6	7	8
T	2.5	2.5	3	3.5
Clamp models	CLW06 CLV06	CLW10 CLV10	CLW16 CLV16	CLW25 CLV25

1. With link clamps, force acting on link mechanism becomes larger as clamp arm becomes shorter. Exceeding maximum allowable load for link mechanism will lead to malfunction. Depending on clamp arm length, it would be necessary to lower clamping force (hydraulic pressure). Use appropriate clamping force that is suitable for clamp arm length, by referring to performance table and performance diagram (refer to **pages → 393 and 394** for CLW series, **pages → 399 and 400** for CLV series).

2. Determine height and mount clamp, ensuring that clamp arm becomes parallel to mounting surface when workpiece is clamped (Allowable angle ±3°). Adjustment screw at tip section may be used for adjustment when using standard clamp arm.





Mounting of clamp and work support

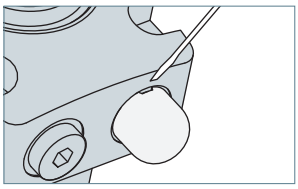
Use screws with strength class of 12.9 for mounting clamp and work support and be sure to apply specified torque for tightening, by referring to recommended tightening torque of mounting screws indicated below.

Recommended tightening torque of mounting screws (strength class 12.9)

Mounting screw size	Tightening torque
M4 × 0.7	2.8 N·m
M5 ×0.8	7 N·m
M6 ×1	11 N·m
M8 ×1.25	25 N·m
M10×1.5	49 N·m
M12×1.75	60 N·m

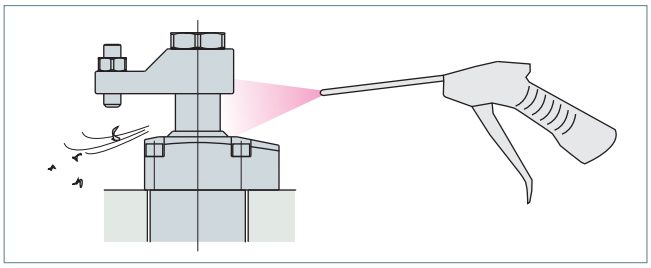
Mounting & dismounting of optional parts

1. When mounting or dismounting a flow control valve or air bleeding valve, be sure to set pressure within hydraulic circuit to 0 MPa before starting.
2. When mounting a flow control valve or air bleeding valve, be sure to tighten it with the specified tightening torque (refer to **pages→359 and 360** for recommended tightening torque).
3. When mounting a coolant cap (resin : POM), firmly press the body of cover. If it is not mounting properly, use a plastic mallet to tap it into place.
4. When dismounting a coolant cap, use a sharp-pointed tool such as a precision screw driver by hooking the notched portion.



Caution in use of equipment

1. Clamp and work supports have been developed for the purpose of clamping workpiece for machine tools. Do not use them for other purposes.
2. Always protect them with a cover to ensure sliding surfaces are not exposed to weld slags when using them as fixture for welding.
3. Clean sliding surfaces and top part of clamp body with air blowing periodically to ensure smooth operations.



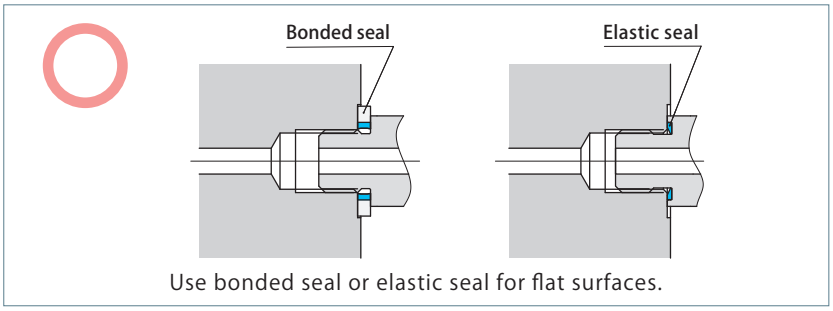
Caution for hydraulic piping

1. Most problems that occur with hydraulic equipment are caused by foreign substances such as metal chips and dust that enter into hydraulic circuits. Refer to "Piping Hydraulic & Pneumatic Equipment-Practical Notes" provided with the product for mounting and hydraulic piping of the product.
2. After performing hydraulic piping, always be sure to bleed out air in the hydraulic circuit. Insufficient bleeding can lead to malfunction.
3. When using multiple clamps, operating speeds and timings vary due to variance in pipe resistance and internal resistance of clamps. Adjust operating speeds and timings using flow control valve.
4. The special scraper has superior scraping capability to remove oil film on the surface of the rod, there are cases where grease and working fluids (oil films) inside the clamp are scraped and expelled to the outside. This may result in accumulation of oil in the external perimeters of piston rod on the upper part of the scraper, but this does not indicate an oil leak.

BSPP port sealing method

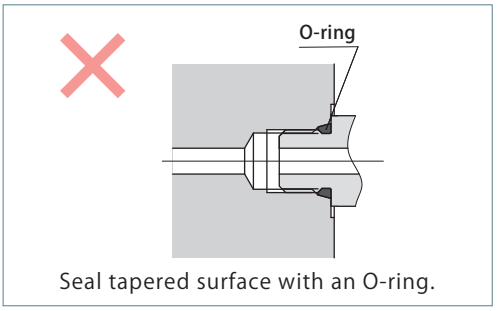
1. "Sealing method for flange surfaces" has been adopted as standard means for this product. Use fittings and connectors of bonded seal or elastic body seal. Do not use fittings of "Sealing method for tapered surfaces" (O-ring seal method).
2. Seal tapes and liquid packing are not necessary. Seal fittings with included with packing.
3. When mounting, clean metal chips and dust off surfaces that will come into contact with packing.

Sealing method for flange surfaces



Use bonded seal or elastic seal for flat surfaces.

Sealing method for tapered surfaces



Seal tapered surface with an O-ring.