7MPa Work clamping system

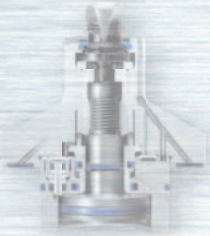
CTU CTT
CLU CLT
CNA CMC CMD
CSU CST CSN CSY CSK
CEK CEA CVH
VCB VCP VHD VRG VEF WPB WPC
HCD HCS HCT X63 WRA WRB

Refer to separate catalog for details.

Expansion clamp

CGC
CGT
CGU
CGE
CGY

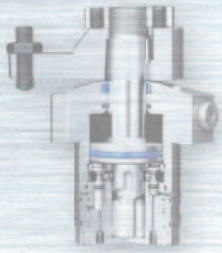
Refer to separate catalog for details.



7MPa Sensing clamp

CTM
CTN
CLM
CLN
CNB

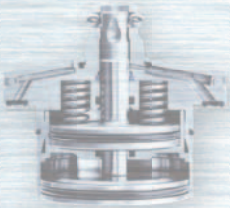
Refer to separate catalog for details.



Pal system

CPC
CPH
CPY
CPK
WVP

Refer to separate catalog for details.



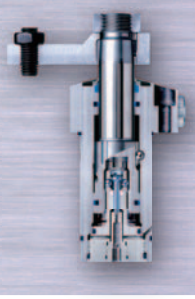
air Work clamping system

CTX
CTY
CLX
CLY
CSS
CSX

Refer to separate catalog for details.

35MPa Work clamping system

CTK CTW CTV
CLW CLV
CSW CSV
WVP
VCB VCP VHD VRG VEF WPC
HCD HCS HCT X63



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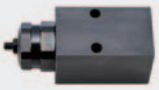

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HCT
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Swing clamp

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			 Upper flange Cartridge Lower flange		 Lower flange Upper flange	
Specifications			35MPa Double acting		35MPa Double acting	35MPa Single acting
Features			Wide varietions of designs Built-in sensor model		Clamp arm, lateral bolting type	
Clamp stroke			Standard	Long stroke	Standard	
Variations	Standard (without sensor)		CTK **Page →12**	CTK-J **Page →30**	CTW **Page →58**	CTV **Page →72**
	Clamp sensor model		CTK-C **Page →38**	—	—	
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Option	Taper sleeve		CTH-KS **Page →42**		—	
	Perfect nut		CTH-KN **Page →43**		—	
	Perfect release nut		CTH-KNR **Page →43**		—	
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Swing clamp

Double acting 35MPa

model CTK

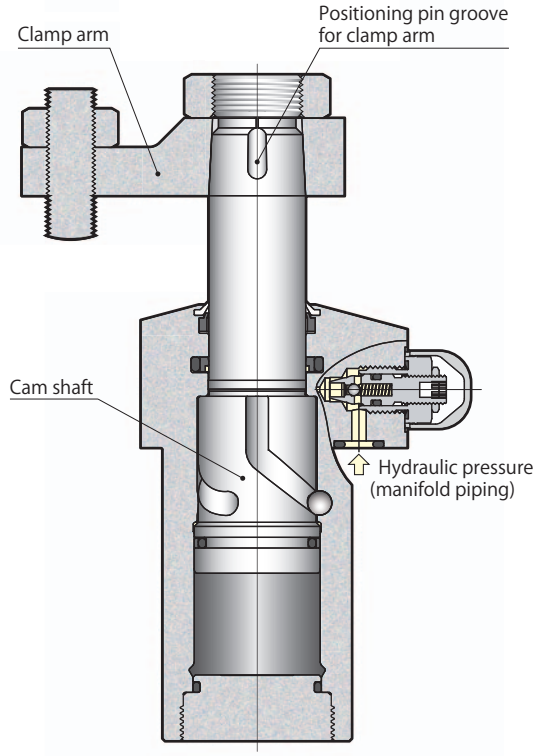
Lower flange
model CTK04B-L

Cartridge
model CTK04N-L

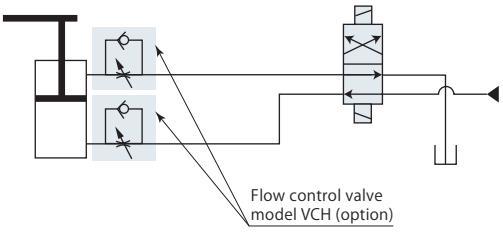
Upper flange
model CTK04U-L

Upper flange

model **CTK□U-□**



Hydraulic circuit diagram



For flow control valve, we recommend the meter-in control. If meter-out control is used, due to the area difference, it will cause back pressure and become high pressure. This can lead to malfunction of the system. Please be aware when designing the circuit.

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Specifications

CTK – Size – Mounting and piping types – Swing direction (when clamping), swing angle

Size: 02, 04, 06, 10, 16

Mounting and piping types:
- **U** : Upper flange
- **B** : Lower flange
- **N** : Cartridge

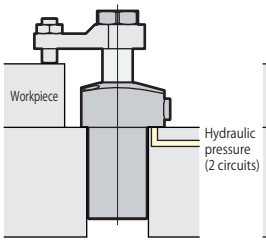
Swing direction (when clamping), swing angle:
- **L** : Counter-clockwise, swing angle 90°
- **L30** : Counter-clockwise, swing angle 30°
- **L45** : Counter-clockwise, swing angle 45°
- **L60** : Counter-clockwise, swing angle 60°
- **R** : Clockwise, swing angle 90°
- **R30** : Clockwise, swing angle 30°
- **R45** : Clockwise, swing angle 45°
- **R60** : Clockwise, swing angle 60°
- **C** : Straight, swing angle 0°

■ indicates made to order.

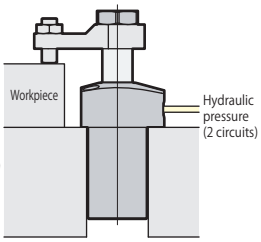
Refer to **pages →24** and **25** for details of pin rod (CTK□□-□P).
Refer to **pages →30** and **31** for details of long stroke of upper flange (CTK□U-□J).
Refer to **pages →32** to **41** for details of sensor model (CTK□U-□C, CTK□U-□B).

Mounting and piping types

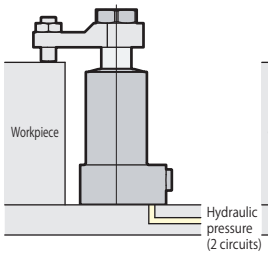
CTK□U-□ Upper flange, manifold piping



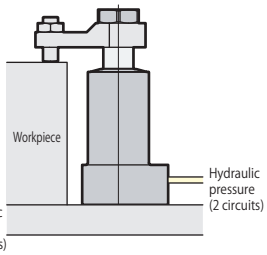
CTK□U-□ Upper flange, G port piping



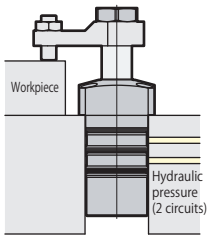
CTK□B-□ Lower flange, manifold piping



CTK□B-□ Lower flange, G port piping



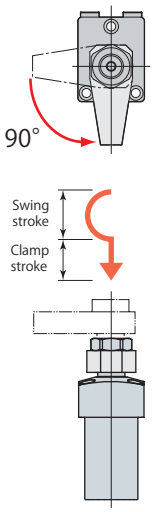
CTK□N-□ Cartridge



Refer to **page →9** for details of piping methods.
Only manifold piping is available for model CTK02.

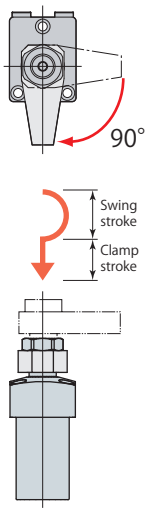
Swing direction (when clamping)

CTK□□-L Counter-clockwise Swing angle 90°



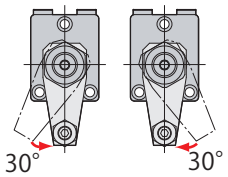
CTK□□-C Straight Swing angle 0°

CTK□□-R Clockwise Swing angle 90°



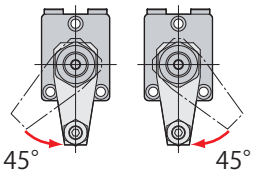
Swing angle

CTK□□-L30 R30 Swing angle 30°



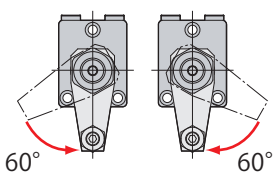
L:Counter-clockwise R:Clockwise

CTK□□-L45 R45 Swing angle 45°



L:Counter-clockwise R:Clockwise

CTK□□-L60 R60 Swing angle 60°



L:Counter-clockwise R:Clockwise

Refer to **pages →26** to **28**, and **31** for details.

CTK□□-□	Swing clamp	35MPa	Double acting

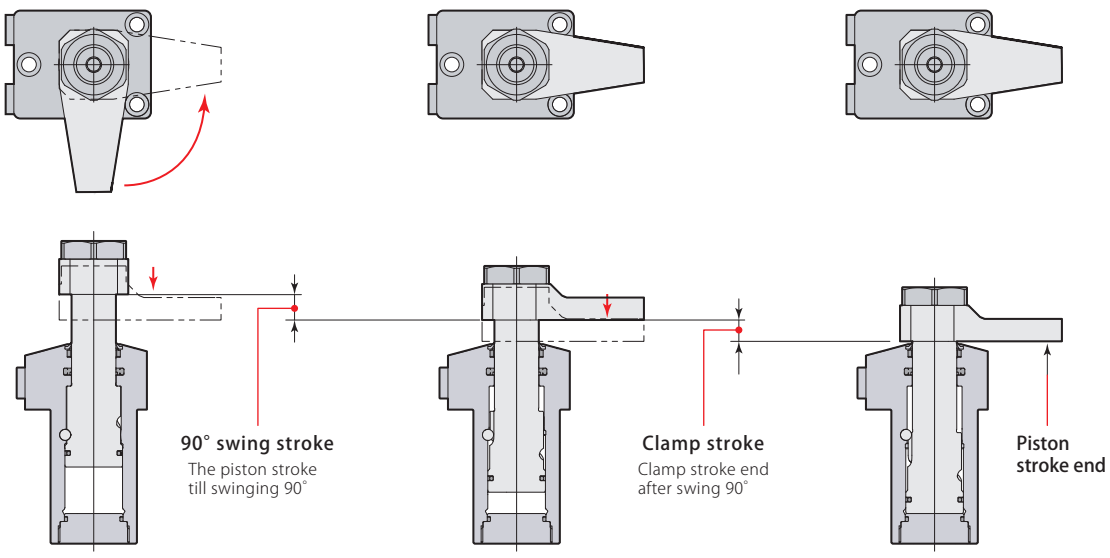
Specifications

Model			CTK02	CTK04	CTK06	CTK10	CTK16
Cylinder force (hydraulic pressure 35MPa)		kN	3.1	5.1	7.6	14.6	20.3
Cylinder inner diameter		mm	16	21	26	34	42
Rod diameter		mm	12	16	20	25	32
Effective area (clamp)		cm^2	0.88	1.45	2.17	4.17	5.81
Swing angle	CTK□□-L, R		90°±3°				
	CTK□□-C		0°				
Positioning pin groove position accuracy			±1°				
Repeated clamp positioning accuracy			±0.5°				
Full stroke		mm	15	17	21	25.5	28.5
90° swing stroke (CTK□□-L, R)		mm	7	9	11	13.5	16.5
Clamp stroke (CTK□□-L, R)		mm	8	8	10	12	12
Cylinder capacity	Clamp	cm^3	1.3	2.5	4.6	10.6	16.6
	Unclamp	cm^3	3.0	5.9	11.1	23.2	39.5
Mass		kg	0.4	0.7	1.1	2.0	3.3
Recommended tightening torque of mounting screws*		N·m	7	7	12	29	57
Recommended tightening torque of nut		N·m	11	26	51	75	130

- Pressure range : 5–35 MPa
- Proof pressure : 52.5 MPa
- Operating temperature : 0–70℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)
- There is no overload protection mechanism.

*: ISO R898 class 12.9

Clamping must be done within the range of clamp stroke.



Manifold piping and G port piping are available.

Two piping methods are available for model CTK□U-□ (upper flange) and model CTK□B-□ (lower flange), manifold piping and G port piping.

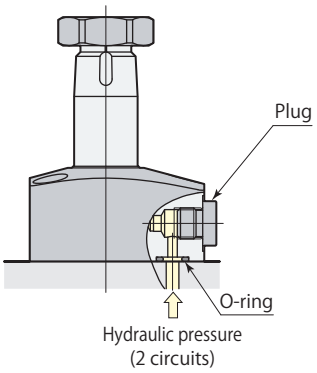
Manifold piping

When choosing manifold piping, a flow control valve (model VCH) and an air bleeding valve (model VCE) are mountable on the G ports of the clamp.
Only manifold piping is available for model CTK02.

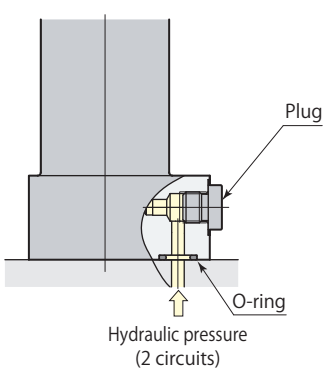
G port piping

Remove plugs when choosing G port piping for model CTK□U-□ (upper flange). (O-ring must be used.)
Remove plugs and O-ring, and mount sealing plug that is included, when choosing G port piping for model CTK□B-□ (lower flange). (Sealing plug is not mounted with shipment.)
The flow control valve and the air bleeding valve should be installed in the middle of oil path.

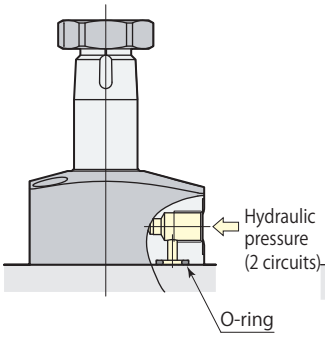
Upper flange manifold piping



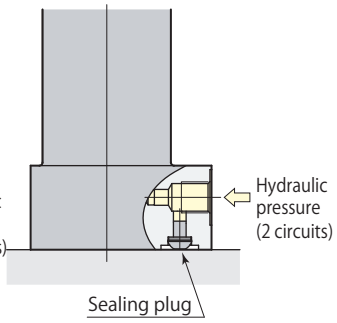
Lower flange manifold piping



Upper flange G port piping



Lower flange G port piping



Flow control valve model VCH

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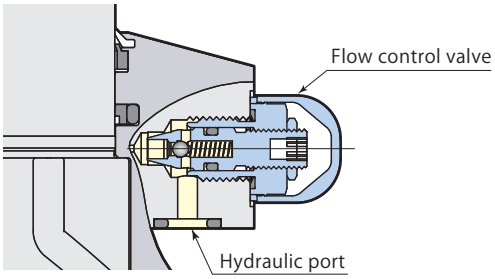

Air bleeding valve model VCE

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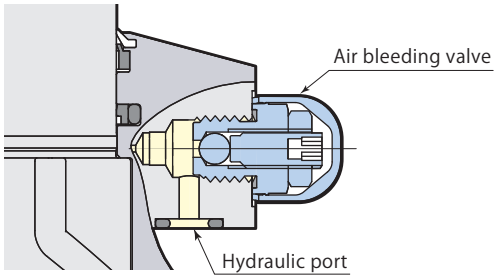
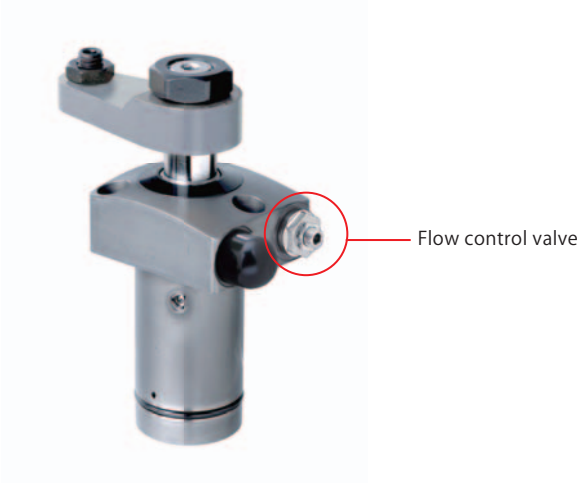
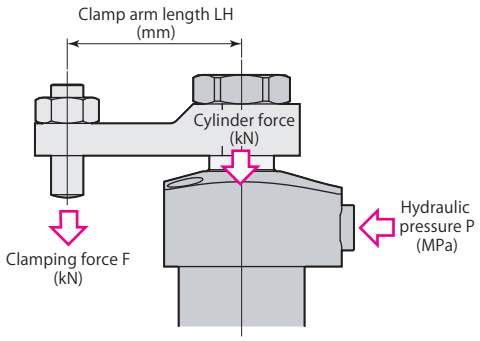




Performance table



Clamping force varies depending on the clamp arm length (LH) and hydraulic pressure (P).

Clamping force calculation formula

F = P/(Coefficient 1 + Coefficient 2 × LH)

F : Clamping force P : Hydraulic pressure LH : Clamp arm length

CTK06 with clamp arm length (LH) = 80 mm at hydraulic pressure of 20 MPa, Clamping force F is calculated by

20/(4.61+0.0185×80) = 3.3 kN

Do not use the clamp in the nonusable range. It may cause damage to the cylinder and rod.

model CTK02 Clamping force F=P/(11.4+0.0625×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm										Max. arm length Max. LH mm
		20	25	30	35	40	45	50	60	70	80	
35	3.1	2.8	2.7									27
30	2.6	2.4	2.3	2.3								32
25	2.2	2.0	1.9	1.9	1.8	1.8	Nonusable range					41
20	1.8	1.6	1.5	1.5	1.5	1.4	1.4	1.4				54
15	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	0.9	82
10	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	↑
5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	82

model CTK04 Clamping force F=P/(6.88+0.0324×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm										Max. arm length Max. LH mm
		25	30	40	50	60	70	80	90	100	120	
35	5.1	4.6	4.5	4.3								40
30	4.4	3.9	3.8	3.7					Nonusable range			49
25	3.6	3.3	3.2	3.1	2.9	2.8						62
20	2.9	2.6	2.5	2.4	2.4	2.3	2.2	2.1				84
15	2.2	2.0	1.9	1.8	1.8	1.7	1.6	1.6	1.5	1.5	1.4	131
10	1.5	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	0.9	↑
5	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	131

model CTK06 Clamping force F=P/(4.61+0.0185×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm										Max. arm length Max. LH mm
		30	40	50	60	70	80	100	120	140	160	
35	7.6	6.8	6.5	6.3								54
30	6.5	5.8	5.6	5.4	5.2							66
25	5.4	4.8	4.7	4.5	4.4	4.2	4.1	Nonusable range				84
20	4.3	3.9	3.7	3.6	3.5	3.4	3.3	3.1				116
15	3.3	2.9	2.8	2.7	2.6	2.5	2.5	2.3	2.2	2.1	2.0	185
10	2.2	1.9	1.9	1.8	1.7	1.7	1.6	1.5	1.5	1.4	1.3	↑
5	1.1	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	185

model CTK10 Clamping force F=P/(2.40+0.00776×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm										Max. arm length Max. LH mm
		35	40	50	60	70	80	100	120	140	160	
35	14.6	13.1	12.9	12.6								52
30	12.5	11.2	11.1	10.8	10.5							63
25	10.4	9.4	9.2	9.0	8.7	8.5	Nonusable range					79
20	8.3	7.5	7.4	7.2	7.0	6.8	6.6	6.3				107
15	6.3	5.6	5.5	5.4	5.2	5.1	5.0	4.7	4.5	4.3	4.1	164
10	4.2	3.7	3.7	3.6	3.5	3.4	3.3	3.1	3.0	2.9	2.7	↑
5	2.1	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.4	1.4	164

model CTK16 Clamping force F=P/(1.72+0.00479×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm										Max. arm length Max. LH mm
		40	50	60	70	80	100	120	140	160	180	
35	20.3	18.3	17.9	17.4	17.0	16.6						83
30	17.4	15.7	15.3	14.9	14.6	14.3	13.6	Nonusable range				101
25	14.5	13.1	12.8	12.5	12.2	11.9	11.4	10.9				131
20	11.6	10.5	10.2	10.0	9.7	9.5	9.1	8.7	8.4	8.0	7.7	182
15	8.7	7.8	7.7	7.5	7.3	7.1	6.8	6.5	6.3	6.0	5.8	297
10	5.8	5.2	5.1	5.0	4.9	4.8	4.5	4.4	4.2	4.0	3.9	↑
5	2.9	2.6	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0	1.9	297

● See the formula shown on **page →24** for clamping force calculation when pin rod type (CTK□□-□P) is selected.

Swing speed adjustment

Swing time is restricted by the mass and length of the clamp arm (moment of inertia) since the 90° swing action impacts the cam shaft.

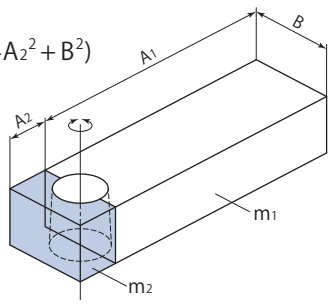
1. Calculate the moment of inertia according to the arm length and mass.
2. Adjust swing speed with flow control valve to ensure that 90° swing time of the clamp arm is greater than the shortest swing time in the graph shown below.

● The cam groove may be damaged in case the swing speed is set at the nonusable range in the graph.

Example of calculation for moment of inertia

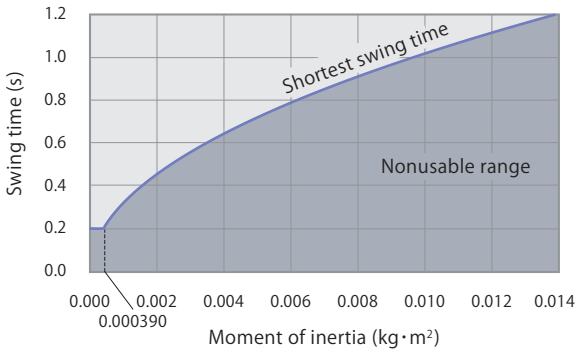
$$I=\frac{1}{12}m_1(4A_1^2+B^2)+\frac{1}{12}m_2(4A_2^2+B^2)$$

I : Moment of inertia (kg·m²)
m : Mass (kg)



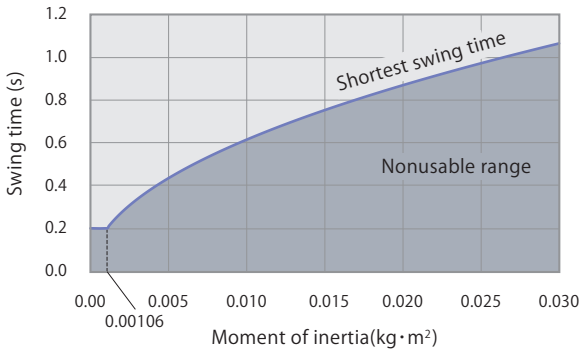
model CTK02

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.00965}}$



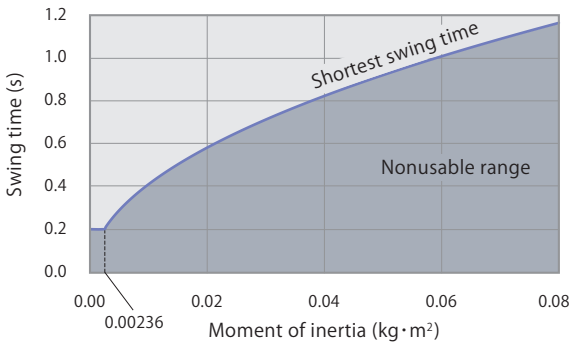
model CTK04

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0265}}$



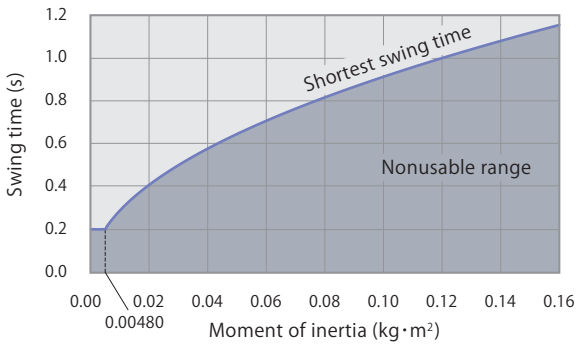
model CTK06

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0590}}$



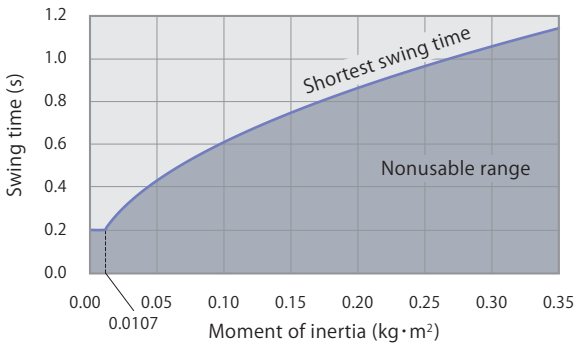
model CTK10

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.120}}$



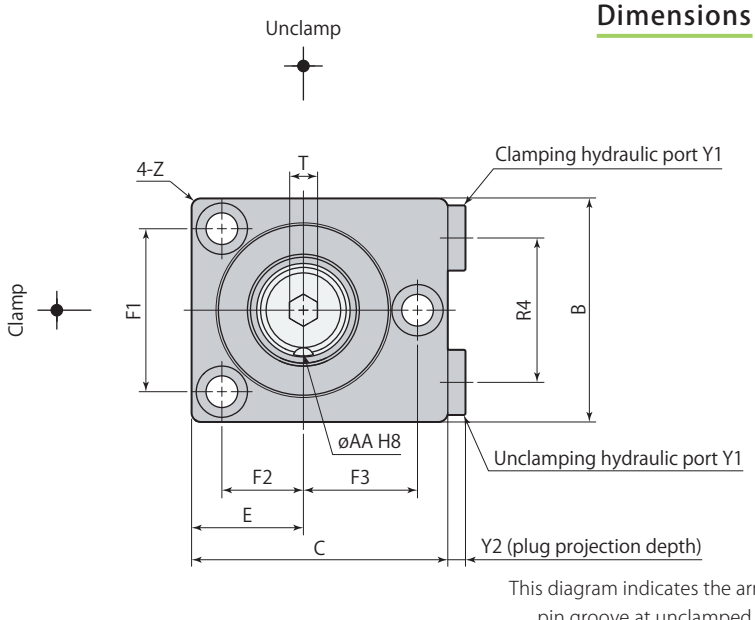
model CTK16

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.268}}$



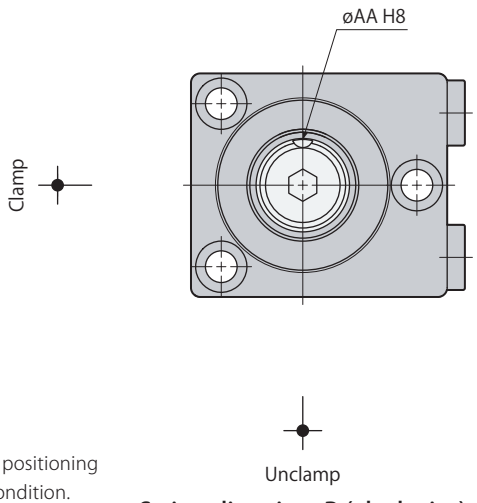
CTK□U-□	Swing clamp Upper flange	35MPa Double acting

Dimensions

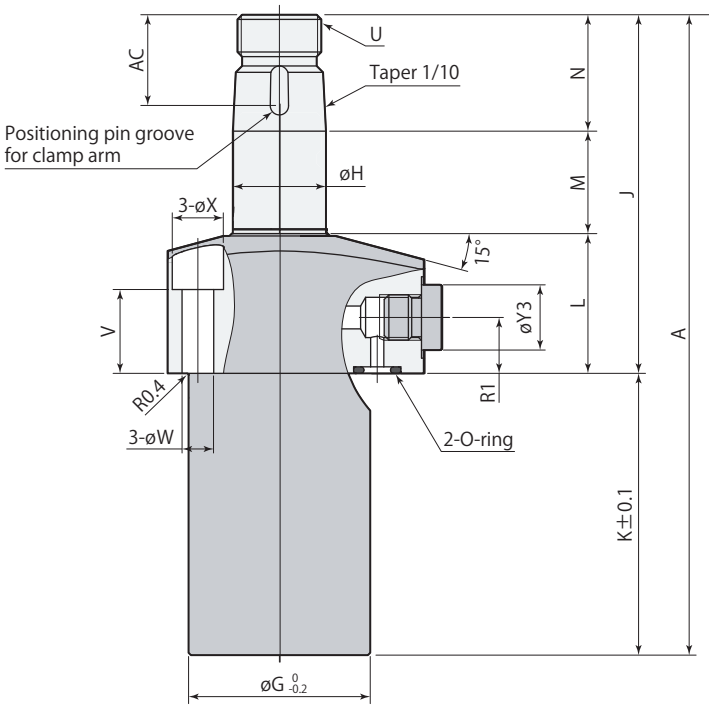


This diagram indicates the arm positioning pin groove at unclamped condition.

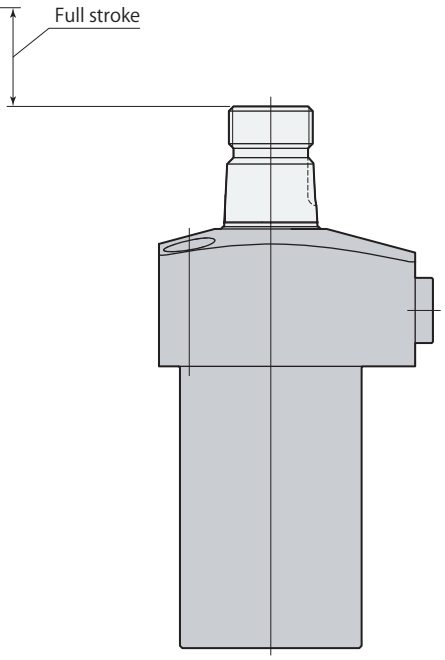
Swing direction L (counter-clockwise)



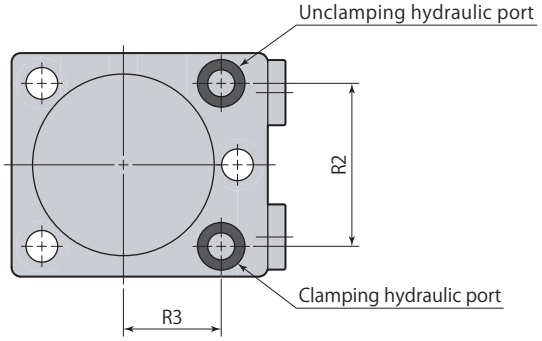
Swing direction R (clockwise)

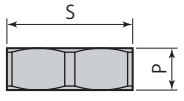


Unclamp



Stroke end





Hex nut for arm mount

- Hex nut for arm mount is included.
- Refer to **page →43** for the details of perfect nut.
- Clamp arm, positioning pin and mounting screws are not included.

mm

Model	CTK02U-□	CTK04U-□	CTK06U-□	CTK10U-□	CTK16U-□
A	103	118	137.5	165	191.5
B	37	43	48	60	74
C	42	50	55	70	85
E	18.5	21.5	24	30	37
F1	26	32	35	44	54
F2	13	16	17.5	22	27
F3	18	22.5	24.5	32	38
øG	27	33	39	48	58
øH	12	16	20	25	32
J	55.5	64	77	89.5	103
K	47.5	54	60.5	75.5	88.5
L	21	24	30	34	37.5
M	16	18	22	26.5	29.5
N	18.5	22	25	29	36
P	6.5	8	9	10	11
R1	–	9.5	12	12.5	14
R2	22	30	35	44	56
R3	17	18.5	21	30	33
R4	–	26	31	40	50
S (nut width across flats)	17	22	27	30	36
T (hex socket)	4	5	6	10	12
U	M10×0.75	M14×1.5	M18×1.5	M22×1.5	M28×1.5
V	11	12	18	18	18
øW	5.5	5.5	6.8	9	11
øX	9.5	9.5	11	14	17.5
Y1*1	–	G1/8	G1/8	G1/8	G1/4
Y2	–	3.8	3.8	3.8	4.8
øY3	–	14	14	14	19
Z	R2	R2	R2	R3	R3
øAA (pin groove diameter)	$2.5^{+0.014}_{0}$	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
AC	13	16.5	19.5	22.5	23.5
Positioning pin (dowel pin)	ø2.5(h8)×6	ø3(h8)×8	ø4(h8)×10	ø5(h8)×12	ø6(h8)×12
O-ring (fluorocarbon hardness Hs90)	P5	P7	P7	P7	P8
Taper sleeve	CTH02-KS	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS
Flow control valve (meter-in)*2	–	VCH01	VCH01	VCH01	VCH02
Air bleeding valve*2	–	VCE01	VCE01	VCE01	VCE02

∗1：There is no piping port on model CTK02 (Manifold piping connection only).

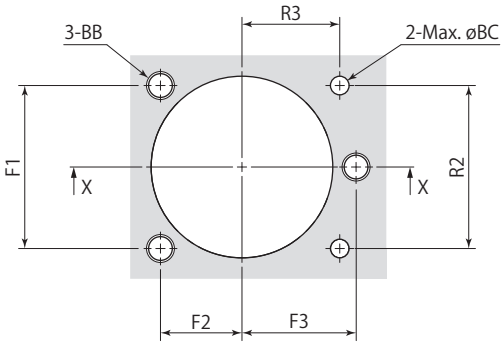
∗2：Select the right model of VCH and VCE according to the size of the clamp.

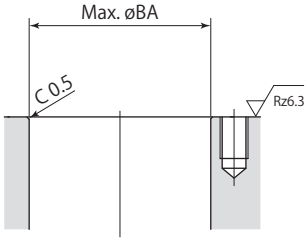
Refer to each page for the details of options.

● Taper sleeve **page →42** ● Flow control valve **page →48** ● Air bleeding valve **page →50**

● CTK□U-C (Straight, swing angle 0°) is made to order.

Mounting details





X-X

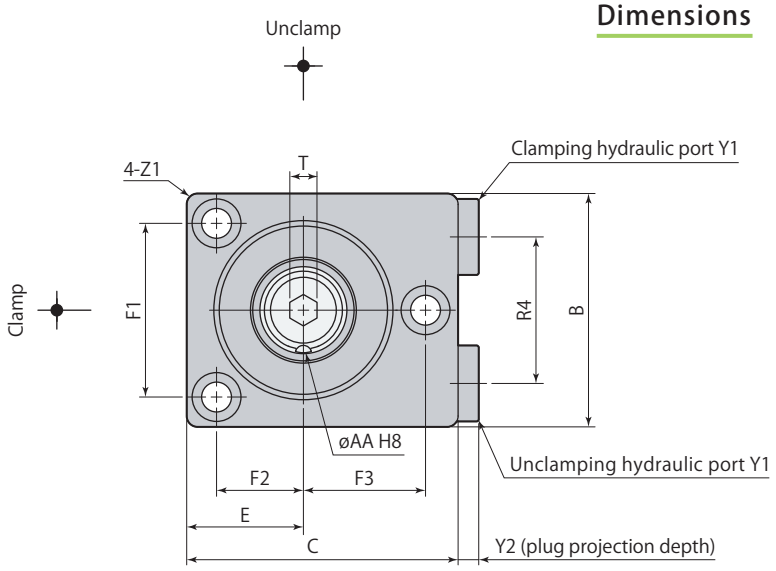
Rz: ISO4287(1997)

mm

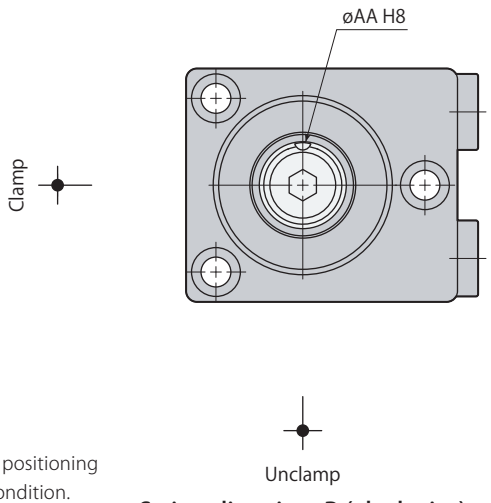
Model	CTK02U-□	CTK04U-□	CTK06U-□	CTK10U-□	CTK16U-□
F1	26	32	35	44	54
F2	13	16	17.5	22	27
F3	18	22.5	24.5	32	38
R2	22	30	35	44	56
R3	17	18.5	21	30	33
øBA	28	34	40	49	59
BB	M5	M5	M6	M8	M10
øBC	3	5	5	5	6

CTK□B-□	Swing clamp Lower flange	35MPa	Double acting

Dimensions

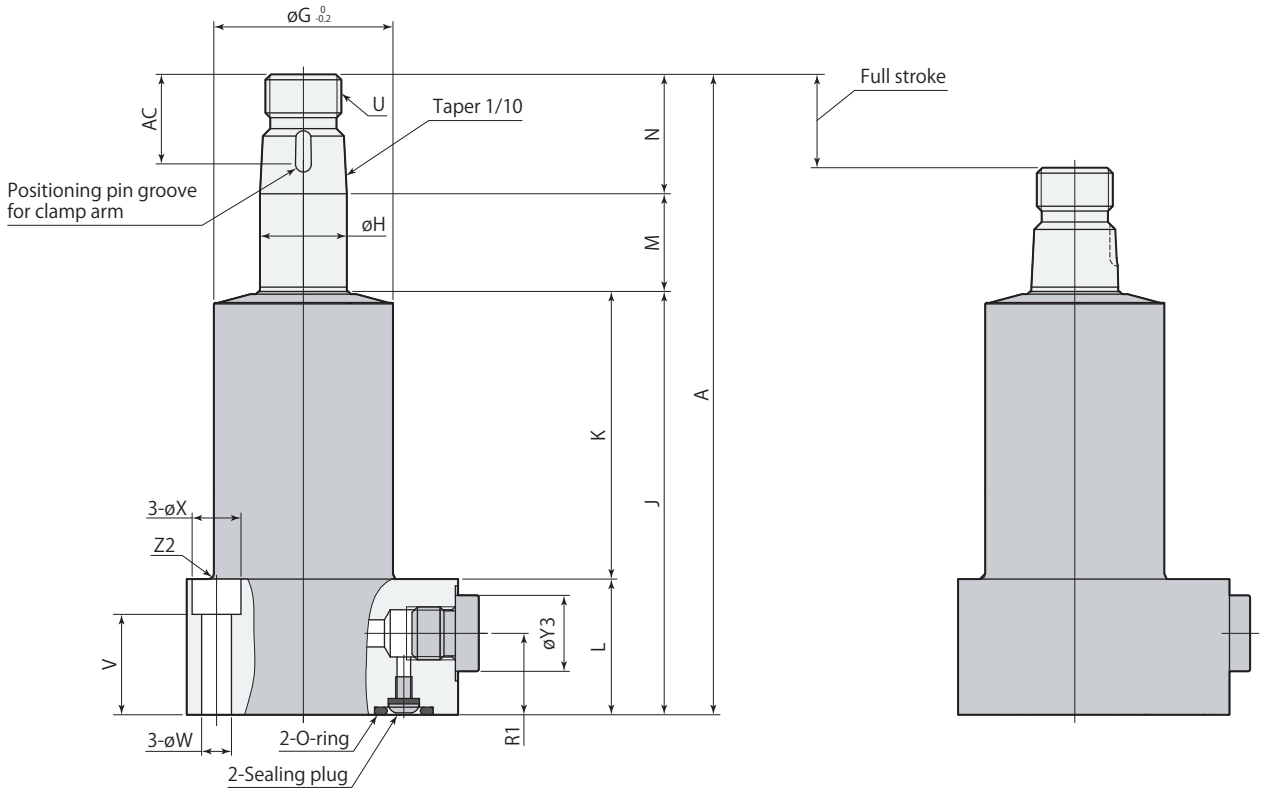


This diagram indicates the arm positioning pin groove at unclamped condition.



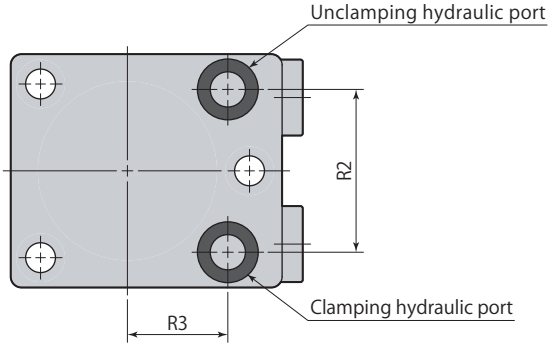
Swing direction L (counter-clockwise)

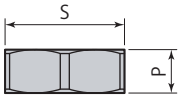
Swing direction R (clockwise)



Unclamp

Stroke end





Hex nut for arm mount

- Hex nut for arm mount is included.
- Refer to **page →43** for the details of perfect nut.
- Clamp arm, positioning pin and mounting screws are not included.

mm

Model	CTK02B-□	CTK04B-□	CTK06B-□	CTK10B-□	CTK16B-□
A	103	118	137.5	165	191.5
B	38	43	52	63	77
C	43	50	57	70	86.5
E	18.5	21.5	24	30	37
F1	27	32	39	47	57
F2	13	16	17.5	22	27
F3	19	22.5	26.5	32	39.5
øG	27.5	33	40.5	49	60
øH	12	16	20	25	32
J	68.5	78	90.5	109.5	126
K	50.5	53	64	82.5	93
L	18	25	26.5	27	33
M	16	18	22	26.5	29.5
N	18.5	22	25	29	36
P	6.5	8	9	10	11
R1	–	15	16.5	17	22
R2	22	30	35	44	56
R3	18	18.5	23	30	34.5
R4	–	27	32	40	50
S (nut width across flats)	17	22	27	30	36
T (hex socket)	4	5	6	10	12
U	M10×0.75	M14×1.5	M18×1.5	M22×1.5	M28×1.5
V	12	18.5	18.5	16	20
øW	5.5	5.5	6.8	9	11
øX	9	9	11	14	17.5
Y1*1	–	G1/8	G1/8	G1/8	G1/4
Y2	–	3.8	3.8	3.8	4.8
øY3	–	14	14	14	19
Z1	R2	R2	R2	R3	R3
Z2	R1	R1	R1	R1	R2
øAA (pin groove diameter)	$2.5^{+0.014}_{0}$	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
AC	13	16.5	19.5	22.5	23.5
Positioning pin (dowel pin)	ø2.5(h8)×6	ø3(h8)×8	ø4(h8)×10	ø5(h8)×12	ø6(h8)×12
O-ring (fluorocarbon hardness Hs90)	P5	P8	P9	P9	P9
Taper sleeve	CTH02-KS	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS
Flow control valve (meter-in)*2	–	VCH01	VCH01	VCH01	VCH02
Air bleeding valve*2	–	VCE01	VCE01	VCE01	VCE02

∗1：There is no piping port on model CTK02 (Manifold piping connection only).

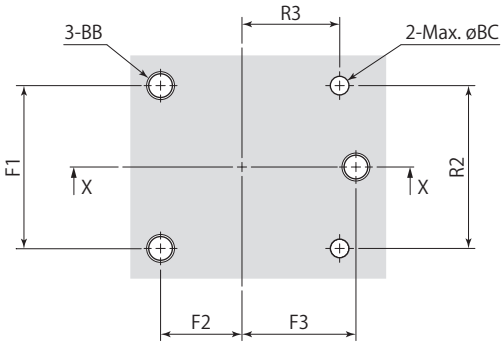
∗2：Select the right model of VCH and VCE according to the size of the clamp.

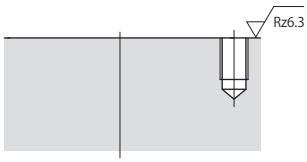
Refer to each page for the details of options.

● Taper sleeve **page →42** ● Flow control valve **page →48** ● Air bleeding valve **page →50**

● CTK□B-C (Straight, swing angle 0°) is made to order.

Mounting details





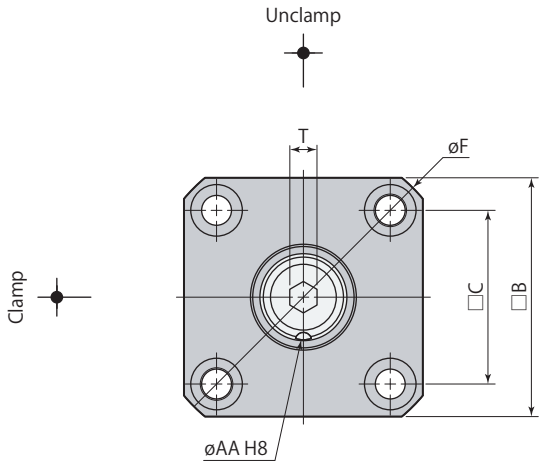
X-X

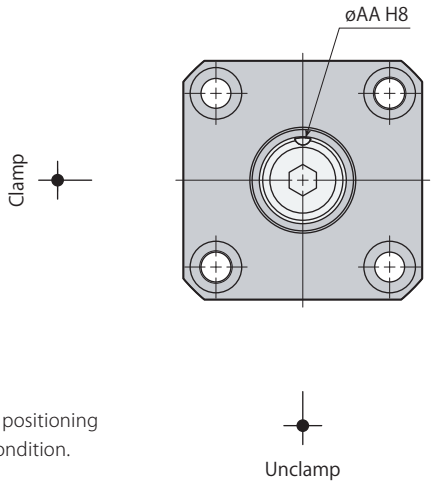
Rz: ISO4287(1997)

mm

Model	CTK02B-□	CTK04B-□	CTK06B-□	CTK10B-□	CTK16B-□
F1	27	32	39	47	57
F2	13	16	17.5	22	27
F3	19	22.5	26.5	32	39.5
R2	22	30	35	44	56
R3	18	18.5	23	30	34.5
BB	M5	M5	M6	M8	M10
øBC	3	6	7	7	7

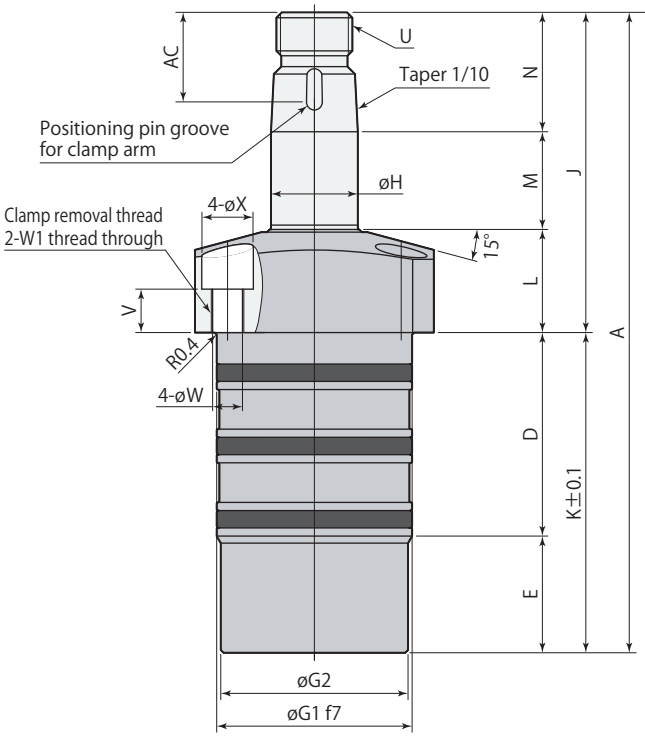
Dimensions



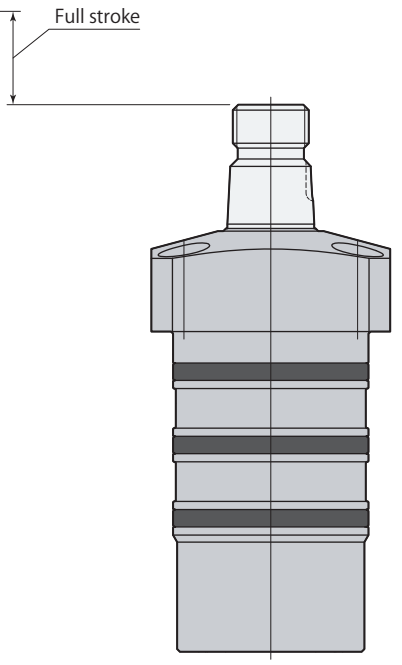


This diagram indicates the arm positioning pin groove at unclamped condition.

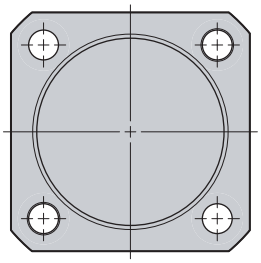
Swing direction L (counter-clockwise)



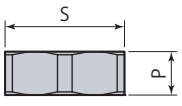
Swing direction R (clockwise)



Unclamp



Stroke end



Hex nut for arm mount

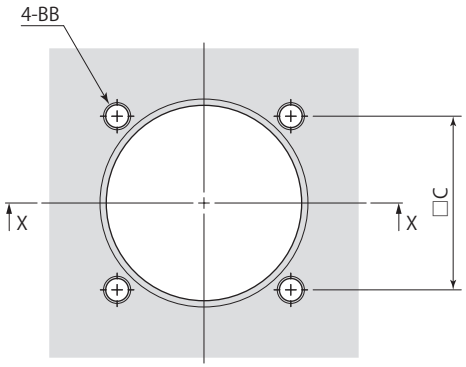
- Hex nut for arm mount is included.
- Refer to **page →43** for the details of perfect nut.
- Clamp arm, positioning pin and mounting screws are not included.

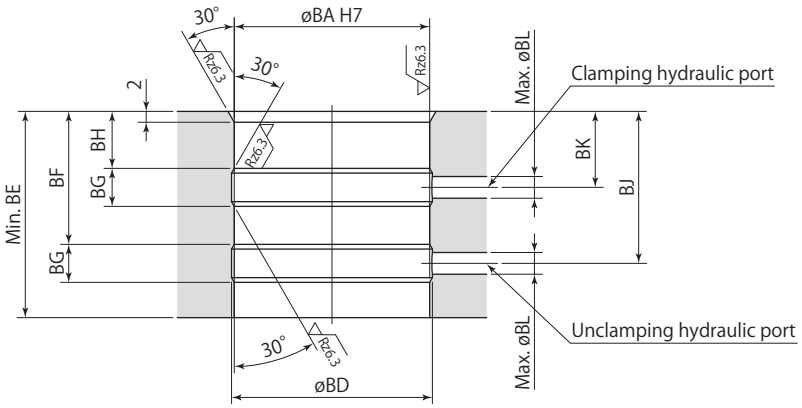
mm

Model	CTK02N-□	CTK04N-□	CTK06N-□	CTK10N-□	CTK16N-□
A	103	118	137.5	165	191.5
B	39	44	50	62	75
C	28	32	37	46	55
D	34.5	37.5	39.5	49.5	54.5
E	17	21.5	27	33	42.5
øF	51	57	66	82	98
øG1	$30^{-0.020}_{-0.041}$	$36^{-0.025}_{-0.050}$	$42^{-0.025}_{-0.050}$	$51^{-0.030}_{-0.060}$	$61^{-0.030}_{-0.060}$
øG2	29	34.5	40.5	49.5	59.5
H	12	16	20	25	32
J	51.5	59	71	82.5	94.5
K	51.5	59	66.5	82.5	97
L	17	19	24	27	29
M	16	18	22	26.5	29.5
N	18.5	22	25	29	36
P	6.5	8	9	10	11
S (nut width across flats)	17	22	27	30	36
T (hex socket)	4	5	6	10	12
U	M10×0.75	M14×1.5	M18×1.5	M22×1.5	M28×1.5
V	6	8	11.5	10	9.5
øW	5.5	5.5	6.8	9	11
W1	M6×1.0	M6×1.0	M8×1.25	M10×1.5	M12×1.75
øX	9.5	9.5	11	14	17.5
øAA (pin groove diameter)	$2.5^{+0.014}_{0}$	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
AC	13	16.5	19.5	22.5	23.5
Positioning pin (dowel pin)	ø2.5(h8)×6	ø3(h8)×8	ø4(h8)×10	ø5(h8)×12	ø6(h8)×12
Taper sleeve	CTH02-KS	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS

- Refer to **page →42** for the details of taper sleeve.
- When removing clamp from mounting hole, use removal tap hole. (Refer to **page →46** for caution in use.)
- CTK□N-□ (Cartridge) is made to order.

Mounting details





X-X

Rz: ISO4287(1997)

mm

Model	CTK02N-□	CTK04N-□	CTK06N-□	CTK10N-□	CTK16N-□
C	28	32	37	46	55
øBA	30 $^{+0.021}_{0}$	36 $^{+0.025}_{0}$	42 $^{+0.025}_{0}$	51 $^{+0.030}_{0}$	61 $^{+0.030}_{0}$
BB	M5	M5	M6	M8	M10
øBD	31	37	43	52	62
BE	35	38	40	50	55
BF	22.5	24.5	26.5	33.5	38.5
BG	6	7	7	10	10
BH	10	10.5	13	16.5	21.5
BJ	25.5±0.5	28±0.5	30±0.5	38.5±1	43.5±1
BK	13±0.5	14±0.5	16.5±0.5	21.5±1	26.5±1
øBL	3	4	4	6	6

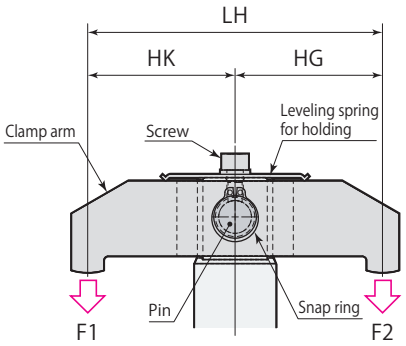
CTK□□-□P	Swing clamp Pin rod	35MPa	Double acting

Specifications

CTK — Size: 02, 04, 06, 10, 16 — Mounting and piping types: U : Upper flange; B : Lower flange; N : Cartridge — Swing direction (when clamping): L : Counter-clockwise; R : Clockwise — P : Pin rod

indicates made to order.

Usage example



Clamping performance

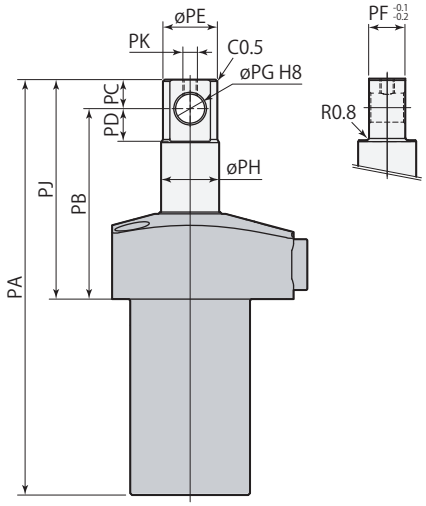
Clamping force calculation formula
$F1 = \frac{HG}{LH} \times n \times P$
$F2 = \frac{HK}{LH} \times n \times P$

F1, F2=Clamping force (kN),
n=Coefficient (refer to right table),
P=Hydraulic pressure (MPa),
HG, HK=Distance from center of piston to clamping point (mm), LH=(mm)

Model	Coefficient *n*
CTK02□-□P	0.088
CTK04□-□P	0.145
CTK06□-□P	0.217
CTK10□-□P	0.417
CTK16□-□P	0.581

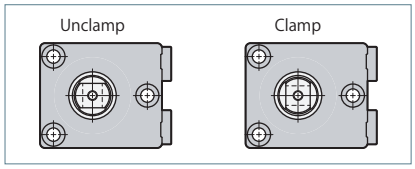
- Clamp arm, pin and snap ring are not included. Customers must arrange for them.
- Thread at top portion of the rod is for attaching a leveling spring. Screw and leveling spring are not included.

Upper flange, pin rod



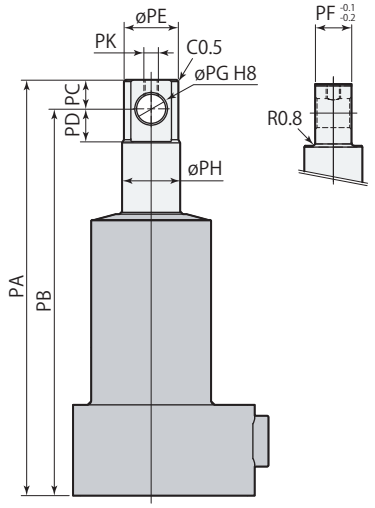
mm

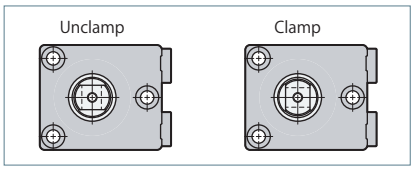
Model	CTK02U-□P	CTK04U-□P	CTK06U-□P	CTK10U-□P	CTK16U-□P
PA	99	114.5	135	166.5	190
PB	45.5	52.5	64.5	77	85.5
PC	6	8	10	14	16
PD	7	9	11	15	17
øPE	11	15	19	24	30
PF	7.5	10	12	18	20
øPG	6 $^{+0.018}_{0}$	8 $^{+0.022}_{0}$	10 $^{+0.022}_{0}$	14 $^{+0.027}_{0}$	16 $^{+0.027}_{0}$
øPH	12	16	20	25	32
PJ	51.5	60.5	74.5	91	101.5
PK	M3×0.5	M4×0.7	M5×0.8	M6×1.0	M8×1.25
Mass	0.4 kg	0.7 kg	1.1 kg	1.9 kg	3.3 kg



- This diagram indicates unclamped condition. Direction of pin hole will be hydraulic port side at the time of clamping.
- Refer to specifications (**page →8**), dimensions (**page →12**) for specifications and dimensions of products that are not listed on this diagram.

Lower flange, pin rod



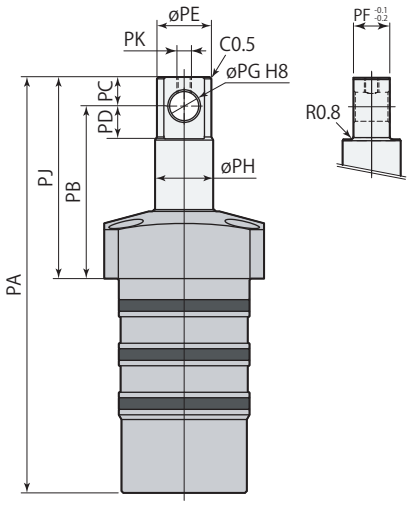


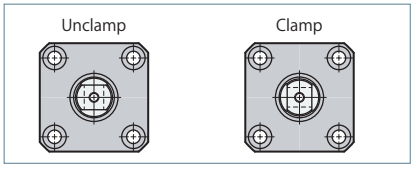
mm

Model	CTK02B-□P	CTK04B-□P	CTK06B-□P	CTK10B-□P	CTK16B-□P
PA	99	114.5	135	166.5	190
PB	93	106.5	125	152.5	174
PC	6	8	10	14	16
PD	7	9	11	15	17
øPE	11	15	19	24	30
PF	7.5	10	12	18	20
øPG	6 $^{+0.018}_{0}$	8 $^{+0.022}_{0}$	10 $^{+0.022}_{0}$	14 $^{+0.027}_{0}$	16 $^{+0.027}_{0}$
øPH	12	16	20	25	32
PK	M3×0.5	M4×0.7	M5×0.8	M6×1.0	M8×1.25
Mass	0.4 kg	0.7 kg	1.1 kg	1.9 kg	3.3 kg

- This diagram indicates unclamped condition. Direction of pin hole will be hydraulic port side at the time of clamping.
- Refer to specifications (**page →8**), dimensions (**page →16**) for specifications and dimensions of products that are not listed on this diagram.

Cartridge, pin rod





mm

Model	CTK02N-□P	CTK04N-□P	CTK06N-□P	CTK10N-□P	CTK16N-□P
PA	99	114.5	135	166.5	190
PB	41.5	47.5	58.5	70	77
PC	6	8	10	14	16
PD	7	9	11	15	17
øPE	11	15	19	24	30
PF	7.5	10	12	18	20
øPG	6 $^{+0.018}_{0}$	8 $^{+0.022}_{0}$	10 $^{+0.022}_{0}$	14 $^{+0.027}_{0}$	16 $^{+0.027}_{0}$
øPH	12	16	20	25	32
PJ	47.5	55.5	68.5	84	93
PK	M3×0.5	M4×0.7	M5×0.8	M6×1.0	M8×1.25
Mass	0.4 kg	0.7 kg	1.1 kg	1.9 kg	3.3 kg

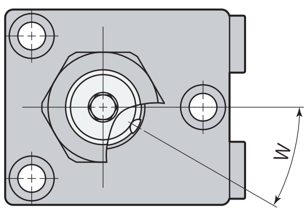
- Refer to specifications (**page →8**), dimensions (**page →20**) for specifications and dimensions of products that are not listed on this diagram.

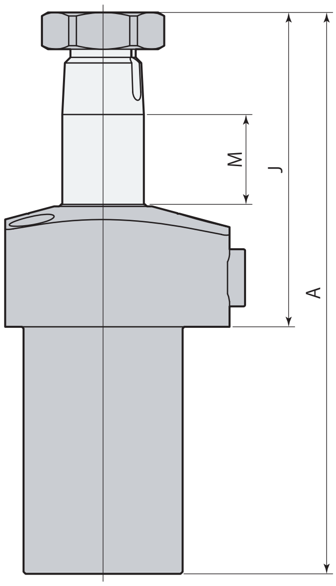
Specifications

	Size	Mounting and piping types		Swing direction (when clamping), swing angle
CTK	02 04 06 10 16	U : Upper flange	–	L30 : Counter-clockwise, swing angle 30° L45 : Counter-clockwise, swing angle 45° L60 : Counter-clockwise, swing angle 60° R30 : Clockwise, swing angle 30° R45 : Clockwise, swing angle 45° R60 : Clockwise, swing angle 60°

▇ indicates made to order.

Upper flange, swing angle 30˚, 45˚, 60˚





mm

Model		CTK02U-□30	CTK04U-□30	CTK06U-□30	CTK10U-□30	CTK16U-□30
W (swing angle)		30°±5°				
Full stroke		11.5	12.5	15.5	18.8	20.3
Swing stroke		3.5	4.5	5.5	6.8	8.3
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.0 cm^3	1.8 cm^3	3.4 cm^3	7.8 cm^3	11.8 cm^3
	Unclamp	2.3 cm^3	4.3 cm^3	8.2 cm^3	17.0 cm^3	28.1 cm^3
A		99.5	113.5	132	158.3	183.3
J		52	59.5	71.5	82.8	94.8
M		12.5	13.5	16.5	19.8	21.3

mm

Model		CTK02U-□45	CTK04U-□45	CTK06U-□45	CTK10U-□45	CTK16U-□45
W (swing angle)		45°±5°				
Full stroke		12.4	13.6	16.9	20.4	22.3
Swing stroke		4.4	5.6	6.9	8.4	10.3
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.1 cm^3	2.0 cm^3	3.7 cm^3	8.5 cm^3	13.0 cm^3
	Unclamp	2.5 cm^3	4.7 cm^3	9.0 cm^3	18.6 cm^3	30.9 cm^3
A		100.4	114.6	133.4	159.9	185.3
J		52.9	60.6	72.9	84.4	96.8
M		13.4	14.6	17.9	21.4	23.3

mm

Model		CTK02U-□60	CTK04U-□60	CTK06U-□60	CTK10U-□60	CTK16U-□60
W (swing angle)		60°±5°				
Full stroke		13.3	14.8	18.3	22.1	24.4
Swing stroke		5.3	6.8	8.3	10.1	12.4
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.2 cm^3	2.1 cm^3	4.0 cm^3	9.2 cm^3	14.2 cm^3
	Unclamp	2.7 cm^3	5.1 cm^3	9.7 cm^3	20.1 cm^3	33.8 cm^3
A		101.3	115.8	134.8	161.6	187.4
J		53.8	61.8	74.3	86.1	98.9
M		14.3	15.8	19.3	23.1	25.4

● This diagram indicates unclamped condition.

● Refer to specifications (**page →8**), dimensions (**page →12**) for specifications and dimensions of products that are not listed on this diagram.

Specifications

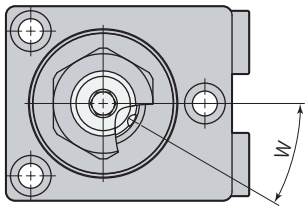
CTK [Size: 02 / 04 / 06 / 10 / 16] [B : Lower flange] –

Swing direction (when clamping), swing angle

- **L30** : Counter-clockwise, swing angle 30°
- **L45** : Counter-clockwise, swing angle 45°
- **L60** : Counter-clockwise, swing angle 60°
- **R30** : Clockwise, swing angle 30°
- **R45** : Clockwise, swing angle 45°
- **R60** : Clockwise, swing angle 60°

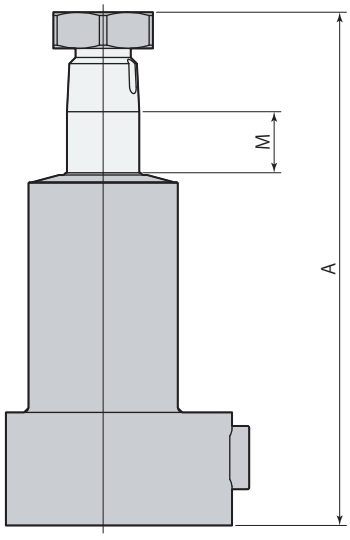
■ indicates made to order.

Lower flange, swing angle 30˚, 45˚, 60˚



mm

Model		CTK02B-□30	CTK04B-□30	CTK06B-□30	CTK10B-□30	CTK16B-□30
W (swing angle)		30°±5°				
Full stroke		11.5	12.5	15.5	18.8	20.3
Swing stroke		3.5	4.5	5.5	6.8	8.3
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.0 cm³	1.8 cm³	3.4 cm³	7.8 cm³	11.8 cm³
	Unclamp	2.3 cm³	4.3 cm³	8.2 cm³	17.0 cm³	28.1 cm³
A		99.5	113.5	132	158.3	183.3
M		12.5	13.5	16.5	19.8	21.3



mm

Model		CTK02B-□45	CTK04B-□45	CTK06B-□45	CTK10B-□45	CTK16B-□45
W (swing angle)		45°±5°				
Full stroke		12.4	13.6	16.9	20.4	22.3
Swing stroke		4.4	5.6	6.9	8.4	10.3
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.1 cm³	2.0 cm³	3.7 cm³	8.5 cm³	13.0 cm³
	Unclamp	2.5 cm³	4.7 cm³	9.0 cm³	18.6 cm³	30.9 cm³
A		100.4	114.6	133.4	159.9	185.3
M		13.4	14.6	17.9	21.4	23.3

mm

Model		CTK02B-□60	CTK04B-□60	CTK06B-□60	CTK10B-□60	CTK16B-□60
W (swing angle)		60°±5°				
Full stroke		13.3	14.8	18.3	22.1	24.4
Swing stroke		5.3	6.8	8.3	10.1	12.4
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.2 cm³	2.1 cm³	4.0 cm³	9.2 cm³	14.2 cm³
	Unclamp	2.7 cm³	5.1 cm³	9.7 cm³	20.1 cm³	33.8 cm³
A		101.3	115.8	134.8	161.6	187.4
M		14.3	15.8	19.3	23.1	25.4

- This diagram indicates unclamped condition.
- Refer to specifications (**page →8**), dimensions (**page →16**) for specifications and dimensions of products that are not listed on this diagram.

Specifications

Size: 02 / 04 / 06 / 10 / 16

Mounting and piping types: N : Cartridge

Swing direction (when clamping), swing angle:

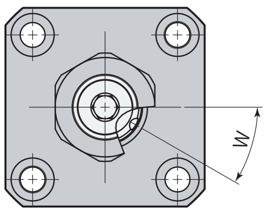
CTK [Size] N – [Swing direction, swing angle]

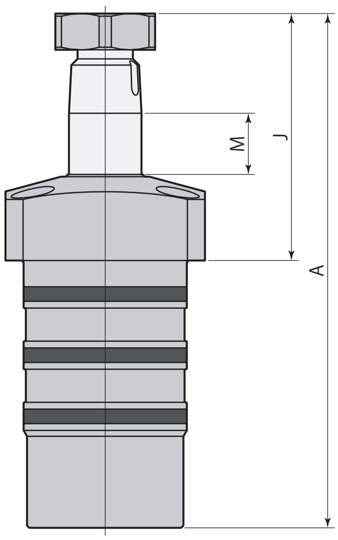
- L30 : Counter-clockwise, swing angle 30°
- L45 : Counter-clockwise, swing angle 45°
- L60 : Counter-clockwise, swing angle 60°

- R30 : Clockwise, swing angle 30°
- R45 : Clockwise, swing angle 45°
- R60 : Clockwise, swing angle 60°

[gray box] indicates made to order.

Cartridge, swing angle 30˚, 45˚, 60˚





mm

Model		CTK02N-□30	CTK04N-□30	CTK06N-□30	CTK10N-□30	CTK16N-□30
W (swing angle)		30°±5°				
Full stroke		11.5	12.5	15.5	18.8	20.3
Swing stroke		3.5	4.5	5.5	6.8	8.3
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.0 cm^3	1.8 cm^3	3.4 cm^3	7.8 cm^3	11.8 cm^3
	Unclamp	2.3 cm^3	4.3 cm^3	8.2 cm^3	17.0 cm^3	28.1 cm^3
A		99.5	113.5	132	158.3	183.3
J		48	54.5	65.5	75.8	86.3
M		12.5	13.5	16.5	19.8	21.3

mm

Model		CTK02N-□45	CTK04N-□45	CTK06N-□45	CTK10N-□45	CTK16N-□45
W (swing angle)		45°±5°				
Full stroke		12.4	13.6	16.9	20.4	22.3
Swing stroke		4.4	5.6	6.9	8.4	10.3
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.1 cm^3	2.0 cm^3	3.7 cm^3	8.5 cm^3	13.0 cm^3
	Unclamp	2.5 cm^3	4.7 cm^3	9.0 cm^3	18.6 cm^3	30.9 cm^3
A		100.4	114.6	133.4	159.9	185.3
J		48.9	55.6	66.9	77.4	88.3
M		13.4	14.6	17.9	21.4	23.3

mm

Model		CTK02N-□60	CTK04N-□60	CTK06N-□60	CTK10N-□60	CTK16N-□60
W (swing angle)		60°±5°				
Full stroke		13.3	14.8	18.3	22.1	24.4
Swing stroke		5.3	6.8	8.3	10.1	12.4
Clamp stroke		8	8	10	12	12
Cylinder capacity	Clamp	1.2 cm^3	2.1 cm^3	4.0 cm^3	9.2 cm^3	14.2 cm^3
	Unclamp	2.7 cm^3	5.1 cm^3	9.7 cm^3	20.1 cm^3	33.8 cm^3
A		101.3	115.8	134.8	161.6	187.4
J		49.8	56.8	68.3	79.1	90.4
M		14.3	15.8	19.3	23.1	25.4

- This diagram indicates unclamped condition.
- Refer to specifications (**page →8**), dimensions (**page →20**) for specifications and dimensions of products that are not listed on this diagram.

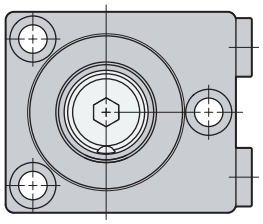
CTK□U-□J	Swing clamp Long stroke Upper flange	35MPa	Double acting

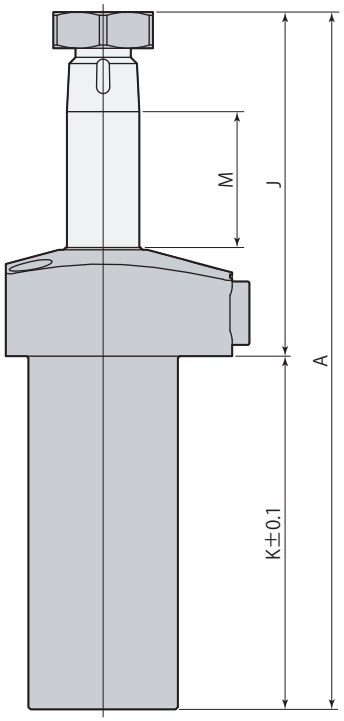
Specifications

CTK [Size: 02 / 04 / 06 / 10 / 16] [Mounting and piping types: U : Upper flange] – [Swing direction (when clamping), clamp stroke: LJ : Counter-clockwise, long stroke; RJ : Clockwise, long stroke; CJ : Straight, long stroke]

■ indicates made to order.

Upper flange, long stroke





mm

Model		CTK02U-□J	CTK04U-□J	CTK06U-□J	CTK10U-□J	CTK16U-□J
Swing angle	CTK□U-LJ, RJ	90°±3°				
	CTK□U-CJ	0°				
Full stroke		27	29	36	43.5	46.5
Swing stroke (CTK□U-LJ, RJ)		7	9	11	13.5	16.5
Clamp stroke (CTK□U-LJ, RJ)		20	20	25	30	30
Cylinder capacity	Clamp	2.4 cm³	4.2 cm³	7.8 cm³	18.1 cm³	27.0 cm³
	Unclamp	5.4 cm³	10.0 cm³	19.1 cm³	39.5 cm³	64.4 cm³
A		139	154	182.5	219	245.5
J		67.5	76	92	107.5	121
K		71.5	78	90.5	111.5	124.5
M		28	30	37	44.5	47.5
Mass		0.5 kg	0.9 kg	1.4 kg	2.4 kg	4.1 kg

- This diagram indicates unclamped condition.
- Refer to specifications (**page →8**), dimensions (**page →12**) for specifications and dimensions of products that are not listed on this diagram.

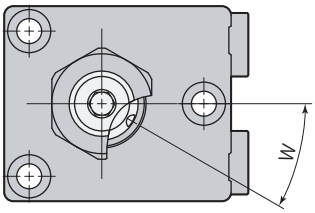
Specifications

	Size	Mounting and piping types		Swing direction (when clamping), clamp stroke, swing angle
CTK	02 04 06 10 16	U	: Upper flange	–

- LJ30 : Counter-clockwise, long stroke, swing angle 30°
- LJ45 : Counter-clockwise, long stroke, swing angle 45°
- LJ60 : Counter-clockwise, long stroke, swing angle 60°
- RJ30 : Clockwise, long stroke, swing angle 30°
- RJ45 : Clockwise, long stroke, swing angle 45°
- RJ60 : Clockwise, long stroke, swing angle 60°

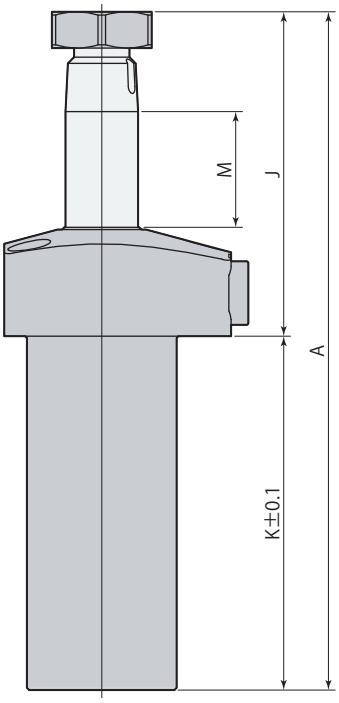
indicates made to order.

Upper flange, long stroke, swing angle 30°, 45°, 60°



mm

Model		CTK02U-□J30	CTK04U-□J30	CTK06U-□J30	CTK10U-□J30	CTK16U-□J30
W (swing angle)		30°±5°				
Full stroke		23.5	24.5	30.5	36.8	38.3
Swing stroke		3.5	4.5	5.5	6.8	8.3
Clamp stroke		20	20	25	30	30
Cylinder capacity	Clamp	2.1 cm³	3.6 cm³	6.6 cm³	15.3 cm³	22.3 cm³
	Unclamp	4.7 cm³	8.5 cm³	16.2 cm³	33.4 cm³	53.1 cm³
A		135.5	149.5	177	212.3	237.3
J		64	71.5	86.5	100.8	112.8
K		71.5	78	90.5	111.5	124.5
M		24.5	25.5	31.5	37.8	39.3



mm

Model		CTK02U-□J45	CTK04U-□J45	CTK06U-□J45	CTK10U-□J45	CTK16U-□J45
W (swing angle)		45°±5°				
Full stroke		24.4	25.6	31.9	38.4	40.3
Swing stroke		4.4	5.6	6.9	8.4	10.3
Clamp stroke		20	20	25	30	30
Cylinder capacity	Clamp	2.1 cm³	3.7 cm³	6.9 cm³	16.0 cm³	23.4 cm³
	Unclamp	4.9 cm³	8.9 cm³	16.9 cm³	34.9 cm³	55.8 cm³
A		136.4	150.6	178.4	213.9	239.3
J		64.9	72.6	87.9	102.4	114.8
K		71.5	78	90.5	111.5	124.5
M		25.4	26.6	32.9	39.4	41.3

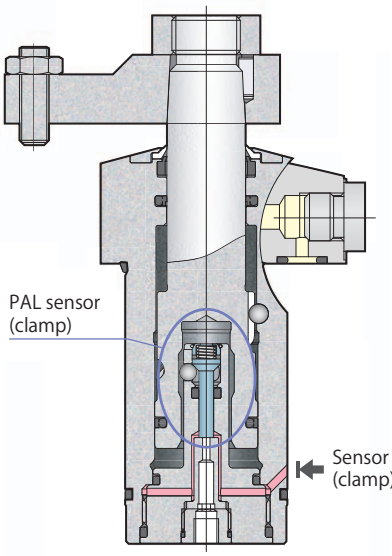
mm

Model		CTK02U-□J60	CTK04U-□J60	CTK06U-□J60	CTK10U-□J60	CTK16U-□J60
W (swing angle)		60°±5°				
Full stroke		25.3	26.8	33.3	40.1	42.4
Swing stroke		5.3	6.8	8.3	10.1	12.4
Clamp stroke		20	20	25	30	30
Cylinder capacity	Clamp	2.2 cm³	3.9 cm³	7.2 cm³	16.7 cm³	24.6 cm³
	Unclamp	5.1 cm³	9.3 cm³	17.7 cm³	36.4 cm³	58.7 cm³
A		137.3	151.8	179.8	215.6	241.4
J		65.8	73.8	89.3	104.1	116.9
K		71.5	78	90.5	111.5	124.5
M		26.3	27.8	34.3	41.1	43.4

- This diagram indicates unclamped condition.
- Refer to specifications (**page →8**), dimensions (**page →12**) for specifications and dimensions of products that are not listed on this diagram.

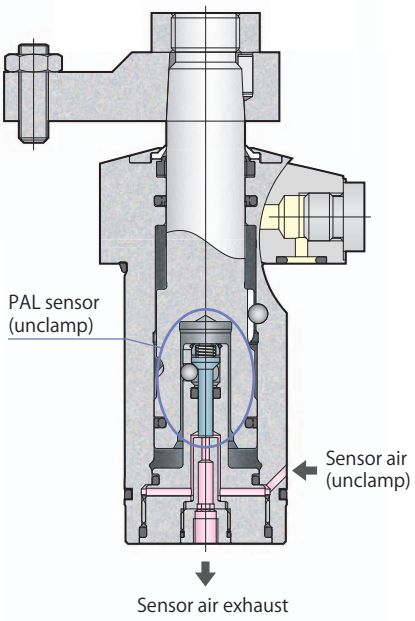
Clamp sensor model C

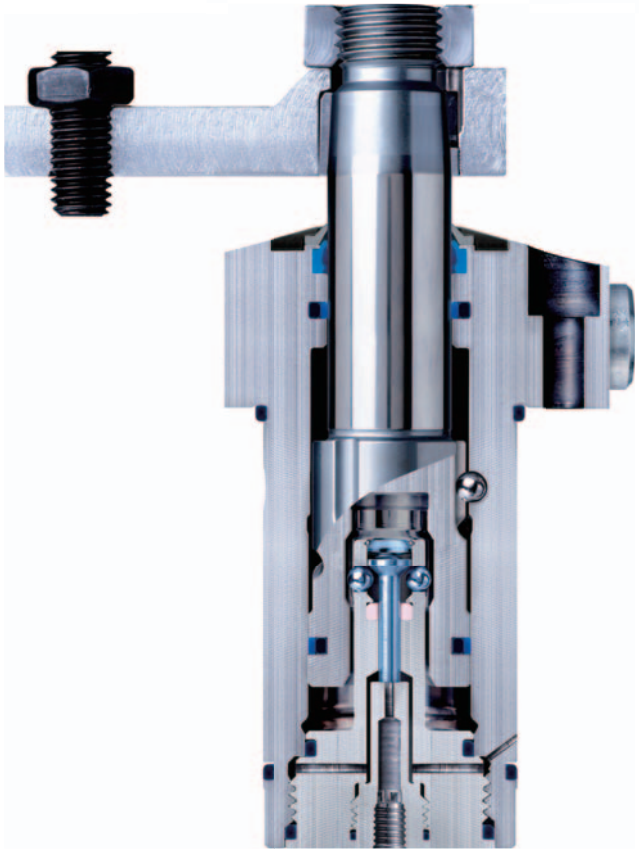
model CTK□U-□C PAT.



Unclamp sensor model B

model CTK□U-□B PAT.





model CTK04U-□C

Specifications page → 33
Sensor page → 34
Dimensions page → 38
Mounting details page → 40

Specifications

CTK **Size** 04 / 06 / 10 / 16 — **U** : Upper flange —

Swing direction (when clamping)

L : Counter-clockwise

R : Clockwise

C : Clamp sensor model
Clamp, Over clamp stroke (Incomplete clamp) detection

B : Unclamp sensor model

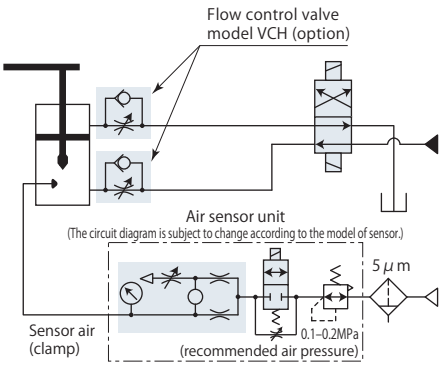
Model			CTK04U-□□	CTK06U-□□	CTK10U-□□	CTK16U-□□
Cylinder force (hydraulic pressure 35MPa)		kN	5.1	7.6	14.6	20.3
Cylinder inner diameter		mm	21	26	34	42
Rod diameter		mm	16	20	25	32
Effective area (clamp)		cm^2	1.45	2.17	4.17	5.81
Swing angle			90° ±3°			
Positioning pin groove position accuracy			±1°			
Repeated clamp positioning accuracy			±0.5°			
Full stroke	CTK□U-□C	mm	17.5	21.5	26	29
	CTK□U-□B	mm	17	21	25.5	28.5
90° swing stroke		mm	9	11	13.5	16.5
Clamp stroke		mm	8	10	12	12
Over clamp stroke (CTK□U-□C)		mm	0.5	0.5	0.5	0.5
Cylinder capacity (CTK□U-□C)	Clamp	cm^3	2.5	4.7	10.8	16.9
	Unclamp	cm^3	6.1	11.4	23.6	40.2
Cylinder capacity (CTK□U-□B)	Clamp	cm^3	2.5	4.6	10.6	16.6
	Unclamp	cm^3	5.9	11.1	23.2	39.5
Mass		kg	0.7	1.1	2.0	3.4
Recommended tightening torque of mounting screws*		N·m	7	12	29	57
Recommended tightening torque of nut		N·m	26	51	75	130

- Pressure range : 5–35 MPa
- Proof pressure : 52.5 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)
- There is no overload protection mechanism.
- Refer to Performance table (**page →10**), Swing speed adjustment (**page →11**).

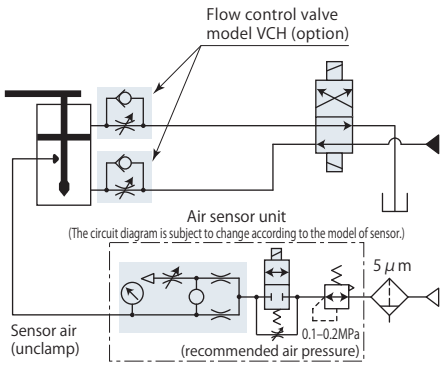
∗ : ISO R898 class 12.9

Hydraulic and pneumatic circuit diagram

model **CTK□U-□C**

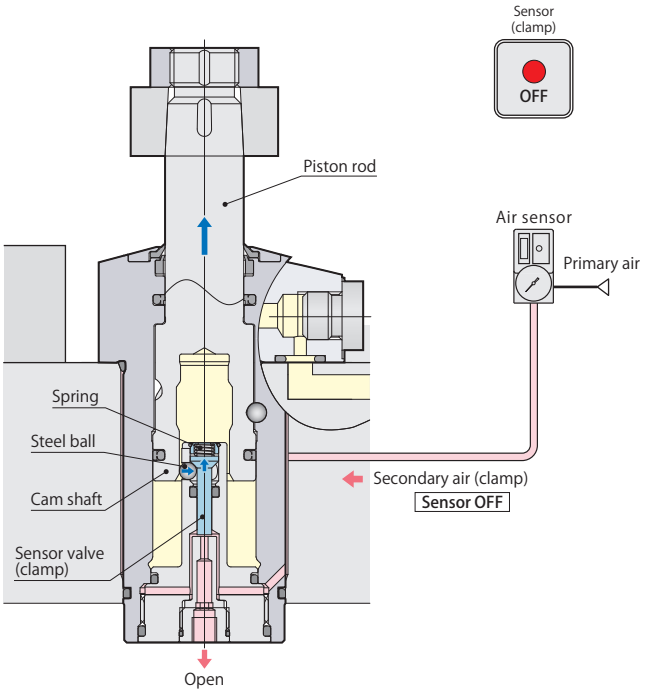


model **CTK□U-□B**



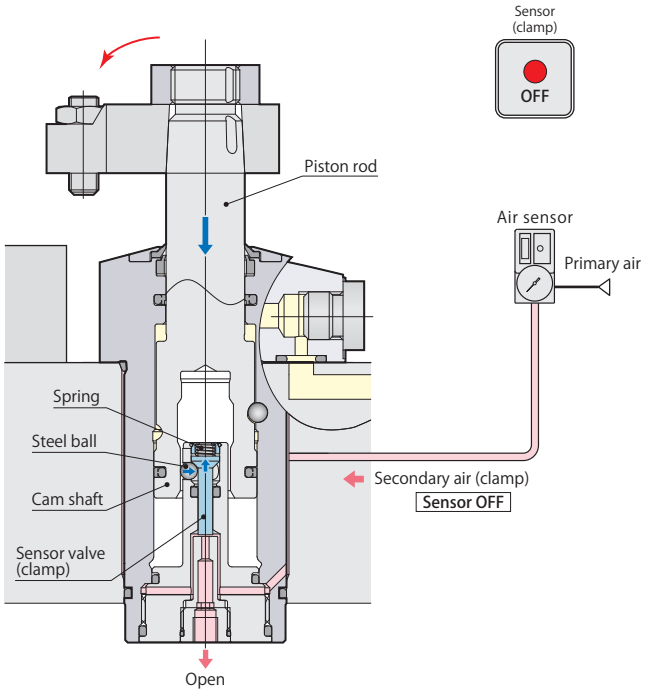
Clamp, Over clamp stroke detection signal

Unclamp



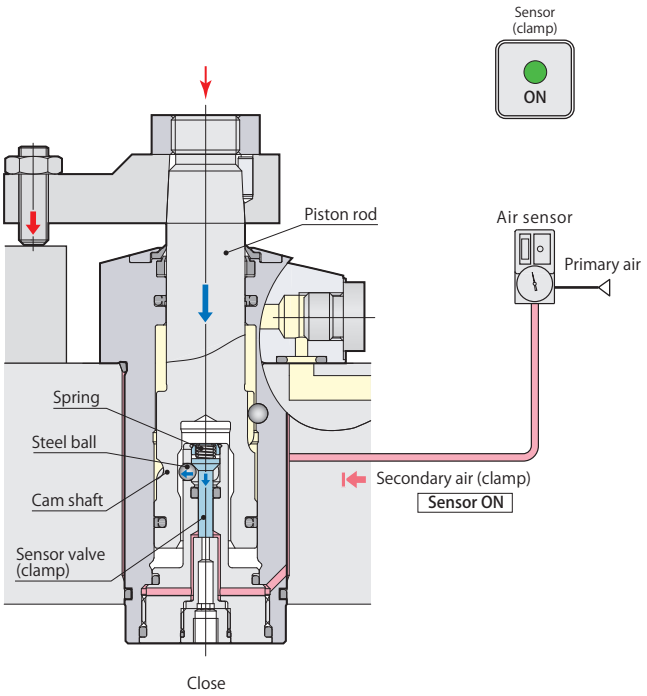
Sensor signal (clamp)	OFF	Unclamp

In the middle of swing stroke



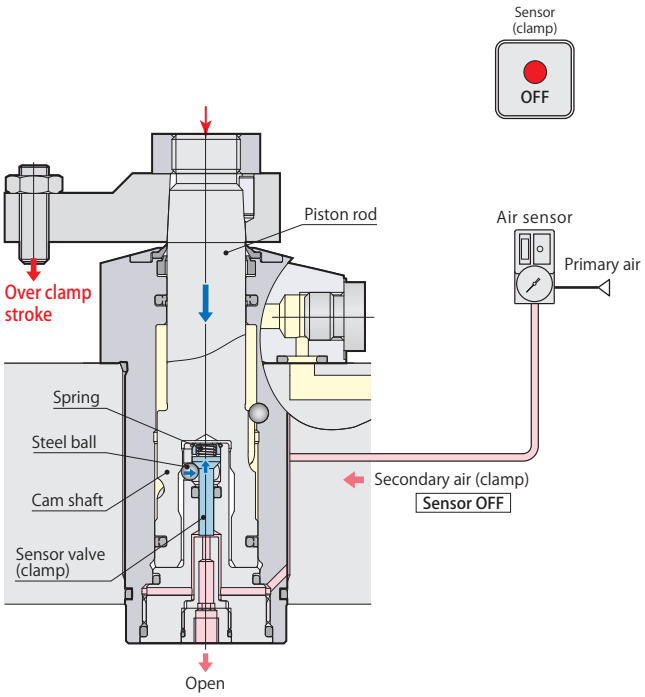
Sensor signal (clamp)	OFF	In the middle of swing stroke

Clamp detection



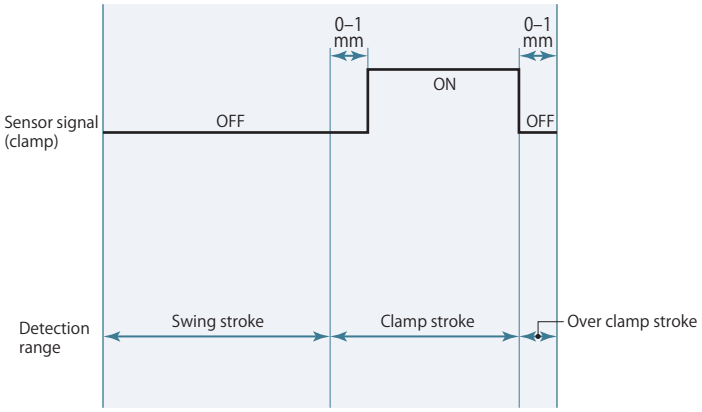
Sensor signal (clamp)	ON	Clamp

Over clamp stroke (Incomplete clamp) detection



Sensor signal (clamp)	OFF	Over clamp stroke (Incomplete clamp)

Air sensor triggering point



- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

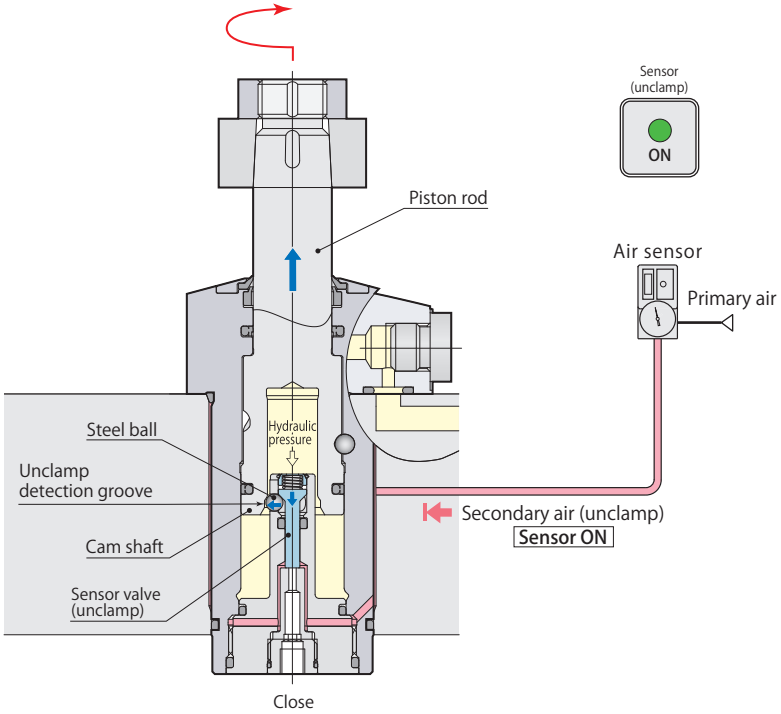
Air sensor unit recommended condition of use

Supplier and model	ISA3-F/G series manufactured by SMC
	GPS2-05, GPS3-E series manufactured by CKD
Air supply pressure	0.1–0.2 MPa
Inner diameter of piping	ø4 mm (ISA3-F：ø2.5 mm)
Overall piping length	5 m or less

- Supply the dry and filtered air. Particulate size 5 μm or less is recommended.
- Use a solenoid valve with needle for air sensor unit and control it supplying air all the time in order to eliminate intrusion of chips or coolant.
- There is a case that air sensing cannot be successfully made as designed when it is used out of the above usage. Contact Technical service center for more details.

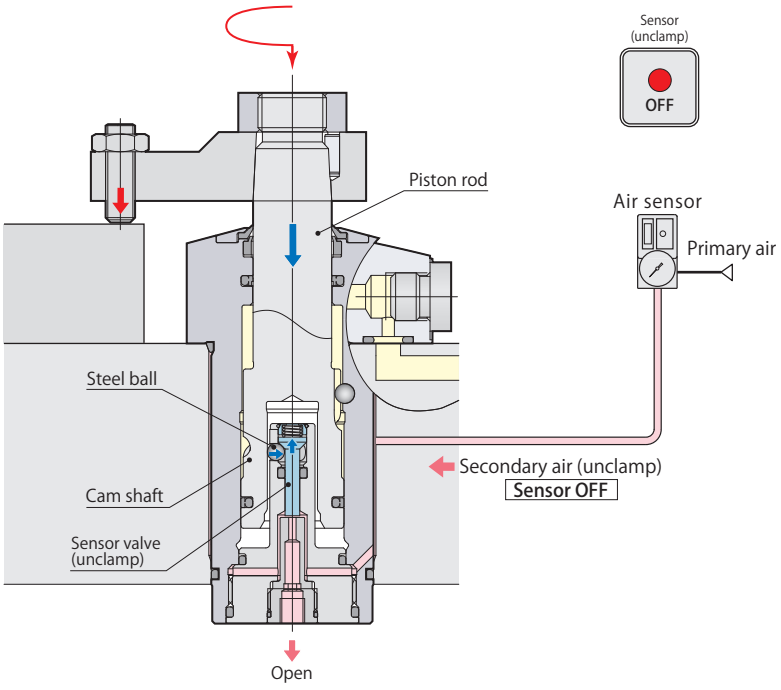
Unclamp detection signal

Unclamp detection



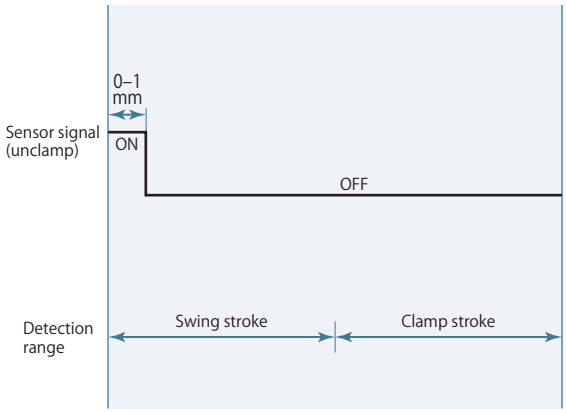
Sensor signal (unclamp)	ON	Unclamp

In the middle of stroke



Sensor signal (unclamp)	OFF	Clamp, In the middle of stroke

Air sensor triggering point



- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

Air sensor unit recommended condition of use

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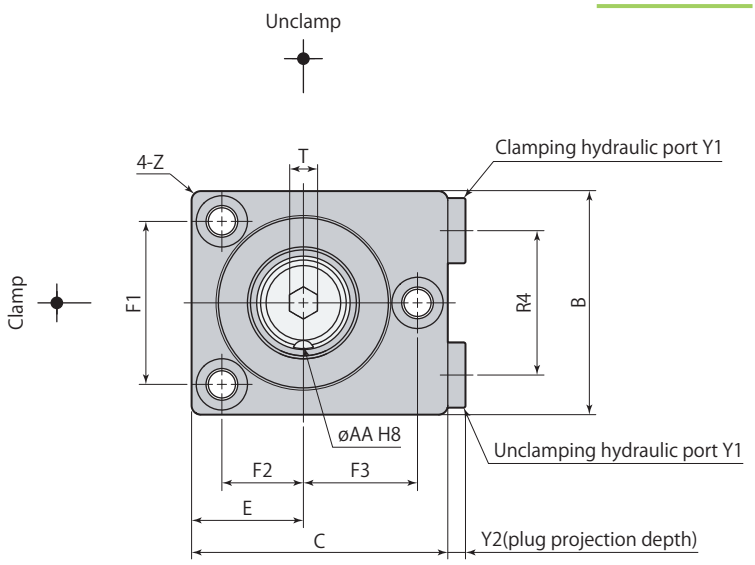
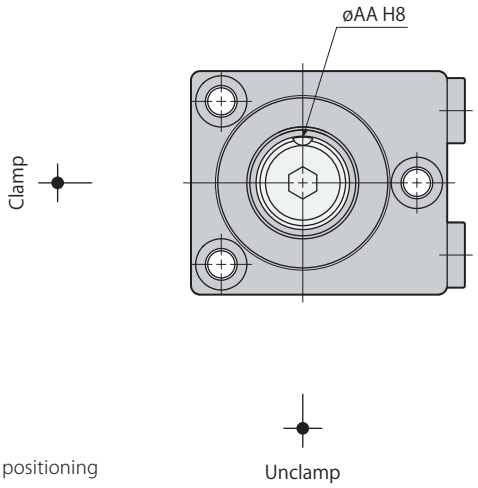
Inner diameter of piping	ø4 mm (ISA3-F：ø2.5 mm)
Overall piping length	5 m or less

- Supply the dry and filtered air. Particulate size 5 μm or less is recommended.
- Use a solenoid valve with needle for air sensor unit and control it supplying air all the time in order to eliminate intrusion of chips or coolant.
- There is a case that air sensing cannot be successfully made as designed when it is used out of the above usage. Contact Technical service center for more details.

Dimensions

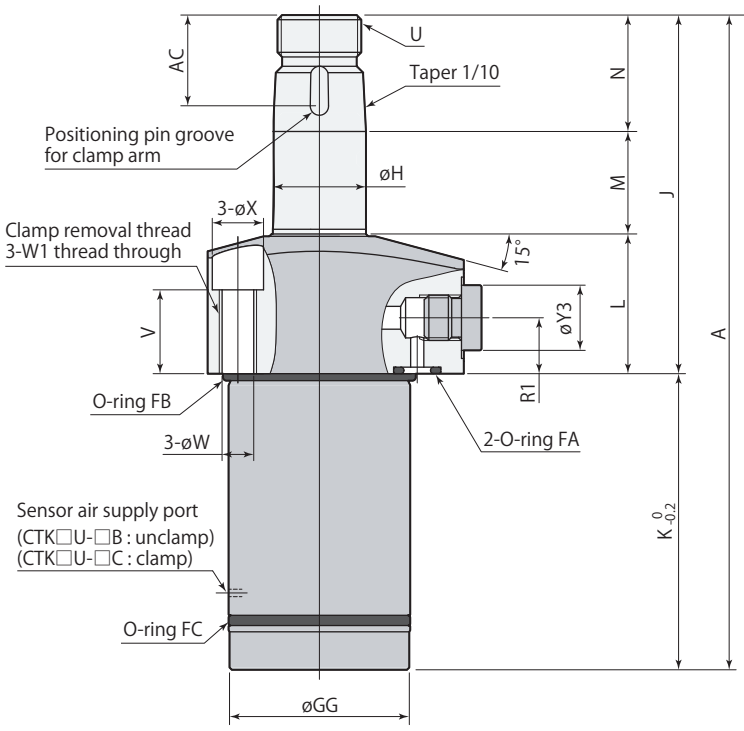


This diagram indicates the arm positioning pin groove at unclamped condition.

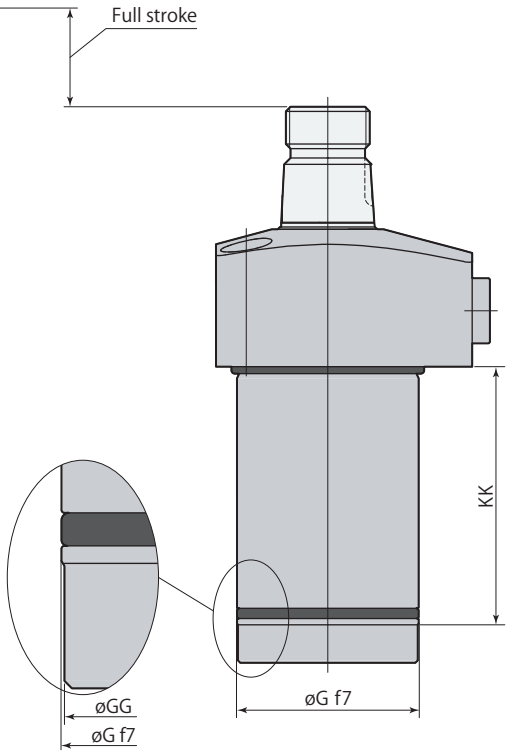


Swing direction L (counter-clockwise)

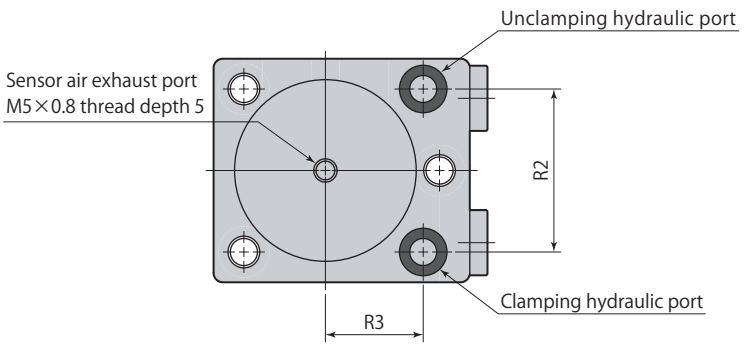
Swing direction R (clockwise)

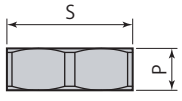


Unclamp



Stroke end





Hex nut for arm mount

- Hex nut for arm mount is included.
- Clamp arm, positioning pin and mounting screws are not included.
- Remove plugs when choosing G port piping. O-ring must be used.

mm

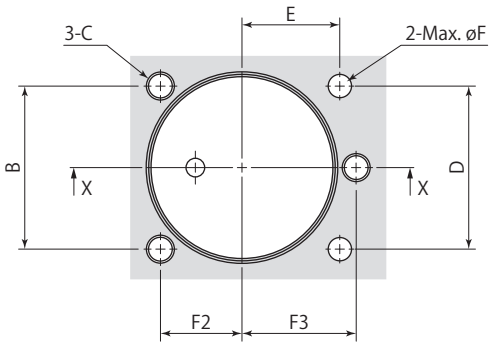
Model	CTK04U-□□	CTK06U-□□	CTK10U-□□	CTK16U-□□
A	121	140.5	168	194.5
B	43	48	60	74
C	50	55	70	85
E	21.5	24	30	37
F1	32	35	44	54
F2	16	17.5	22	27
F3	22.5	24.5	32	38
øG	$33^{-0.025}_{-0.050}$	$39^{-0.025}_{-0.050}$	$48^{-0.025}_{-0.050}$	$58^{-0.030}_{-0.060}$
øGG	32.6	38.6	47.6	57.6
øH	16	20	25	32
J	64	77	89.5	100
K	57	63.5	78.5	91.5
KK	49	55	69	78
L	24	30	34	37.5
M	18	22	26.5	29.5
N	22	25	29	36
P	8	9	10	11
R1	9.5	12	12.5	14
R2	30	35	44	56
R3	18.5	21	30	33
R4	26	31	40	50
S (nut width across flats)	22	27	30	36
T (hex socket)	5	6	10	12
U	M14×1.5	M18×1.5	M22×1.5	M28×1.5
V	12	18	18	18
øW	5.5	6.8	9	11
W1	M6×1	M8×1.25	M10×1.5	M12×1.75
øX	9.5	11	14	17.5
Y1	G1/8	G1/8	G1/8	G1/4
Y2	3.8	3.8	3.8	4.8
øY3	14	14	14	19
Z	R2	R2	R3	R3
øAA (pin groove diameter)	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
AC	16.5	19.5	22.5	23.5
Positioning pin (dowel pin)	ø3(h8)×8	ø4(h8)×10	ø5(h8)×12	ø6(h8)×12
O-ring FA (fluorocarbon hardness Hs90)	P7	P7	P7	P8
O-ring FB (fluorocarbon hardness Hs70)	AS568-026	AS568-029	AS568-031	AS568-035
O-ring FC (fluorocarbon hardness Hs70)	AS568-025	AS568-028	AS568-031	AS568-034
Taper sleeve	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS
Flow control valve (meter-in)*	VCH01	VCH01	VCH01	VCH02
Air bleeding valve*	VCE01	VCE01	VCE01	VCE02

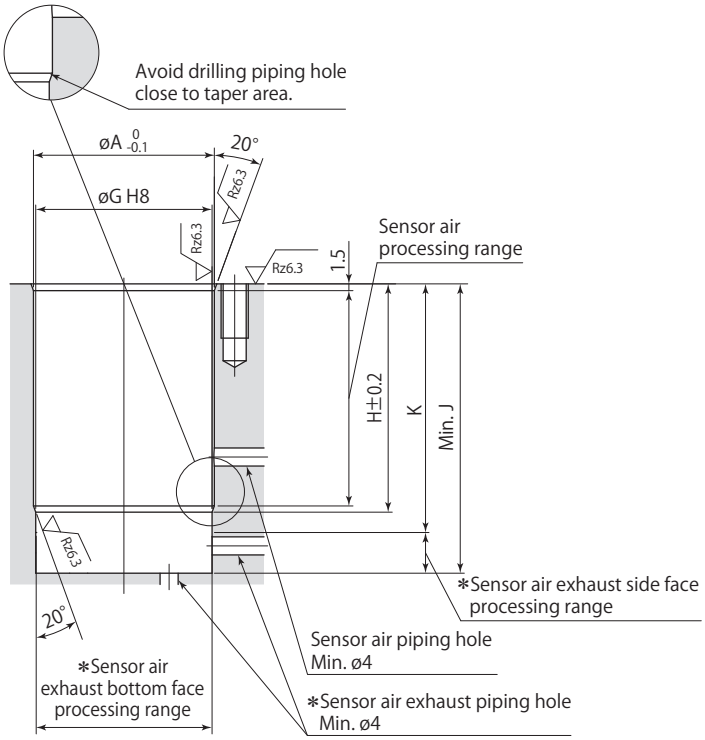
∗: Select the right model of VCH and VCE according to the size of the clamp.

Refer to each page for the details of options.

● Taper sleeve **page →42** ● Flow control valve **page →48** ● Air bleeding valve **page →50**

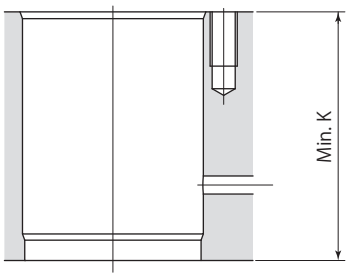
Mounting details





In blind hole X-X

Rz: ISO4287(1997)



In through hole X-X

*: Sensor air exhaust piping hole must be made on either side or bottom face.

- Apply an appropriate amount of grease to the chamfer and the bore when mounting.
  Excessive grease may be a blockage in the air passage, causing malfunction of the sensor.
- The 20° taper machining must be provided to avoid the damage of the O-ring.
  Ensure that there are no interference on taper area when drilling the hole for sensor air.

Mounting details

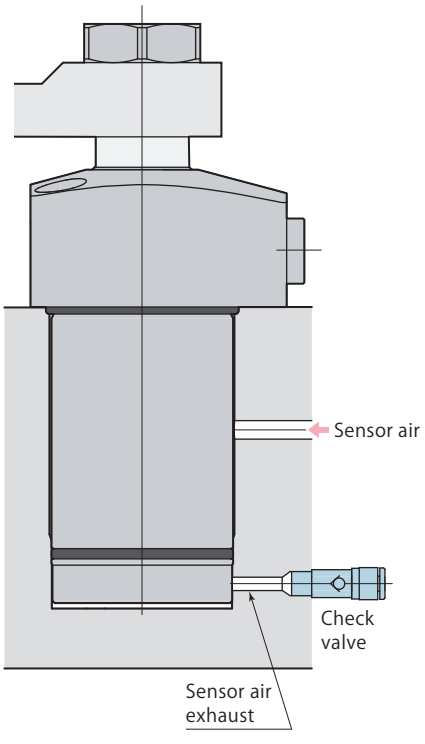
mm

Model	CTK04U-□□	CTK06U-□□	CTK10U-□□	CTK16U-□□
øA	34	40	49	59
B	32	35	44	54
C	M5	M6	M8	M10
D	30	35	44	56
E	18.5	21	30	33
øF	5	5	5	6
F2	16	17.5	22	27
F3	22.5	24.5	32	38
øG	$33^{+0.039}_{0}$	$39^{+0.039}_{0}$	$48^{+0.039}_{0}$	$58^{+0.046}_{0}$
H	44.5	50.5	64.5	73.5
J	57.5	64	79	92
K	49	55	69	78

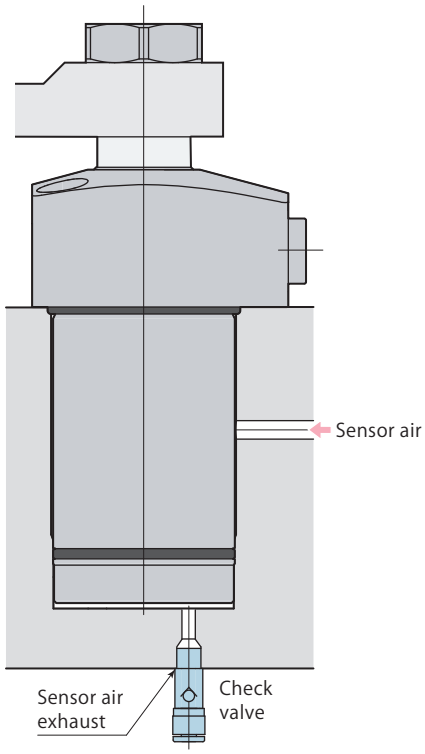
Caution for piping

Refer to the diagram shown below for the sensor air exhaust port.

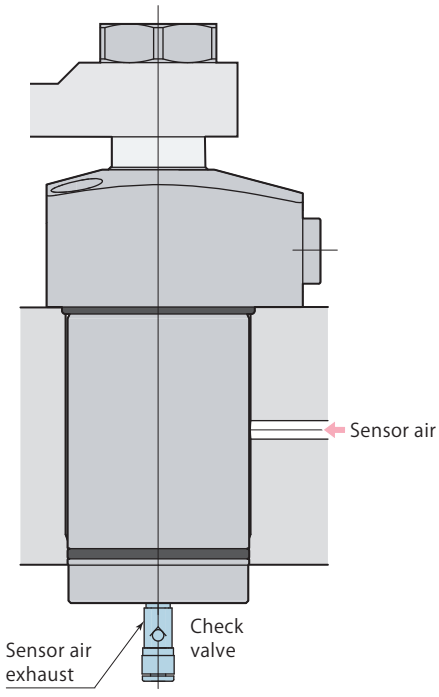
Mounting in blind hole
(Sensor air exhaust：side face)



Mounting in blind hole
(Sensor air exhaust：bottom face)



Mounting in through hole



● Use a check valve with cracking pressure of 0.005 MPa or less if there is a risk of metal chips or coolant intrusion.
Recommended check valve：AKH or AKB series manufactured by SMC.

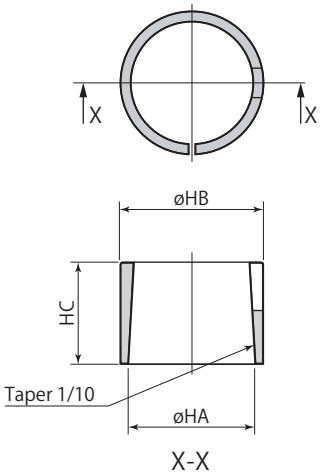
Specifications

Size / Option code

CTH — 02 / 04 / 06 / 10 / 16 — KS : Taper sleeve; KN : Perfect nut; KNR : Perfect release nut

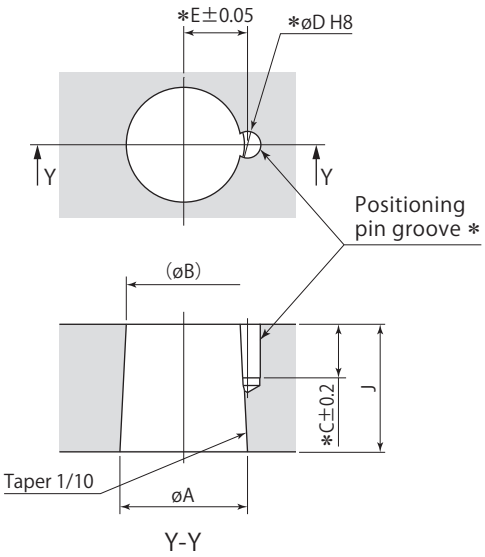
Taper sleeve and perfect release nut can not be combined.
indicates made to order.

Taper sleeve

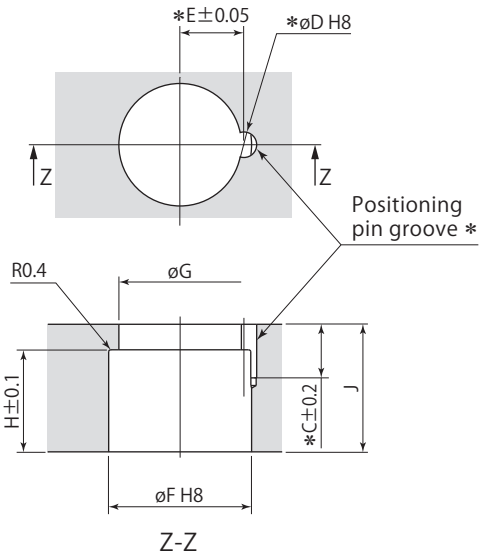


Clamp arm mounting details

Not using taper sleeve



Using taper sleeve

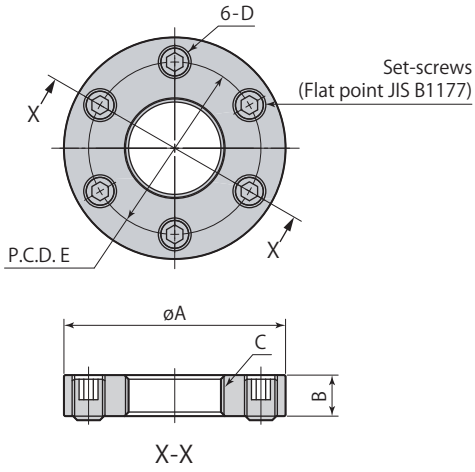


∗ : No need to machine the pin groove (C, øD, E) unless positioning pin is used for the arm.
The positioning pin enables a clamp arm to locate on the clamp firmly and easily.

mm

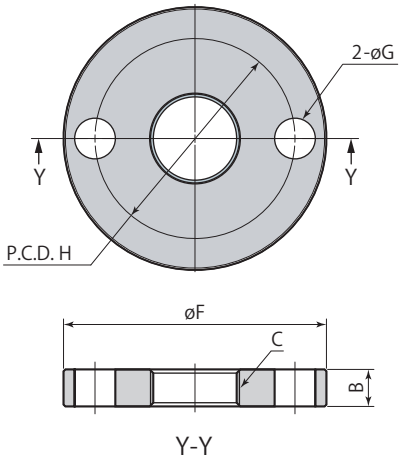
Taper sleeve	CTH02-KS	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS
Applicable swing clamp	CTK02	CTK04	CTK06	CTK10	CTK16
øHA	12	16	20	25	32
øHB	14	18	22	28	36
HC	9.5	11	13	16	22
øA	$12^{-0.016}_{-0.034}$	$16^{-0.016}_{-0.034}$	$20^{-0.020}_{-0.041}$	$25^{-0.020}_{-0.041}$	$32^{-0.025}_{-0.050}$
øB	10.8	14.6	18.4	23.1	29.5
C	6.5	8.5	10.5	12.5	12.5
øD (pin groove diameter)	$2.5^{+0.014}_{0}$	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
E	6.05	8.1	10.1	12.6	16.1
øF	$14^{+0.027}_{0}$	$18^{+0.027}_{0}$	$22^{+0.033}_{0}$	$28^{+0.033}_{0}$	$36^{+0.039}_{0}$
øG	11.5	15	19	23.5	30
H	9.5	11	13	16	22
J	12	14	16	19	25

Perfect nut



X-X

Perfect release nut



Y-Y

Perfect nut and perfect release nut are not included with swing clamp. Place an order by specifying following models.

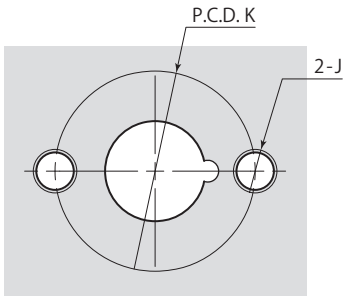
mm

Perfect nut		CTH02-KN	CTH04-KN	CTH06-KN	CTH10-KN	CTH16-KN
Perfect release nut		CTH02-KNR	CTH04-KNR	CTH06-KNR	CTH10-KNR	CTH16-KNR
Applicable swing clamp		CTK02	CTK04	CTK06	CTK10	CTK16
Set-screw	Size	M4×0.7 length 6	M5×0.8 length 8	M6×1 length 8	M8×1.25 length 8	M8×1.25 length 8
	Recommended tightening torque	0.8 N·m	2 N·m	3 N·m	6 N·m	7 N·m
Recommended draw screw		M5×0.8	M6×1	M8×1.25	M10×1.5	M10×1.5
øA		23	30	36	48	55
B		6.5	8	9	10	11
C		M10×0.75	M14×1.5	M18×1.5	M22×1.5	M28×1.5
D		M4×0.7	M5×0.8	M6×1	M8×1.25	M8×1.25
E		17	22	26.5	35	42
øF		33	40	50	62	70
øG		5.5	6.8	9	11	11
H		23	29	36	45	52
Mass	Perfect nut	0.02 kg	0.04 kg	0.06 kg	0.12 kg	0.16 kg
	Perfect release nut	0.04 kg	0.07 kg	0.12 kg	0.21 kg	0.28 kg

● Draw screws are not included with perfect release nut.

Clamp arm details

(Using perfect release nut)



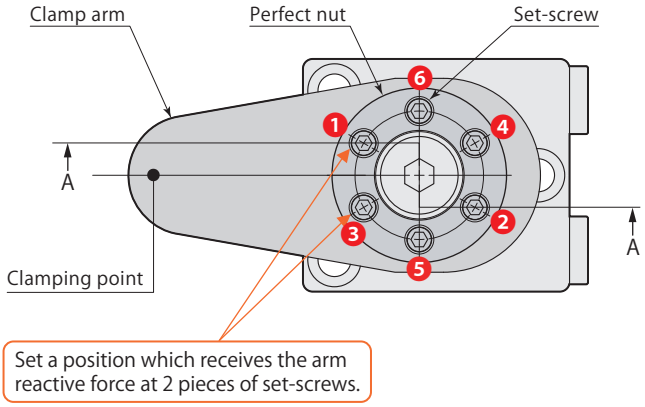
mm

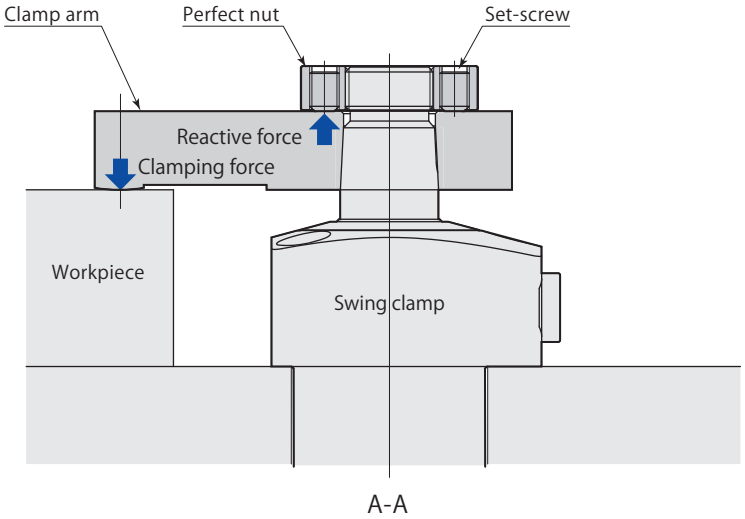
Applicable swing clamp	CTK02	CTK04	CTK06	CTK10	CTK16
J	M5	M6	M8	M10	M10
K	23	29	36	45	52

● For the finished dimensions of clamp arm in those portions other than the perfect release nut using part, refer to **page →42**.

Perfect nut (Arm mounting guide)

1. Set clamp arm and turn perfect nut as tight as it gets manually.
2. Turn back perfect nut to the position where two set-screws hold against reactive force of arm, as shown in diagram below.
3. Tighten set-screws with recommended torque in order of ❶ to ❻ in diagram below.
4. Once set-screws are tightened to ❻ , ❶ becomes loose, so retighten in sequence of ❶ to ❻ again.
5. Repeat tightening of set-screws ❶ to ❻ six times.
6. Repeat clamping and unclamping of workpiece five times (this operation allows taper section to become accustomed to use).
7. Return to unclamped condition and then retighten set-screws in order of ❶ to ❻.
   Once tightening in sequence of ❶ to ❻ is repeated three times, all set-screws will be fixed and clamp arm is completely mounted.



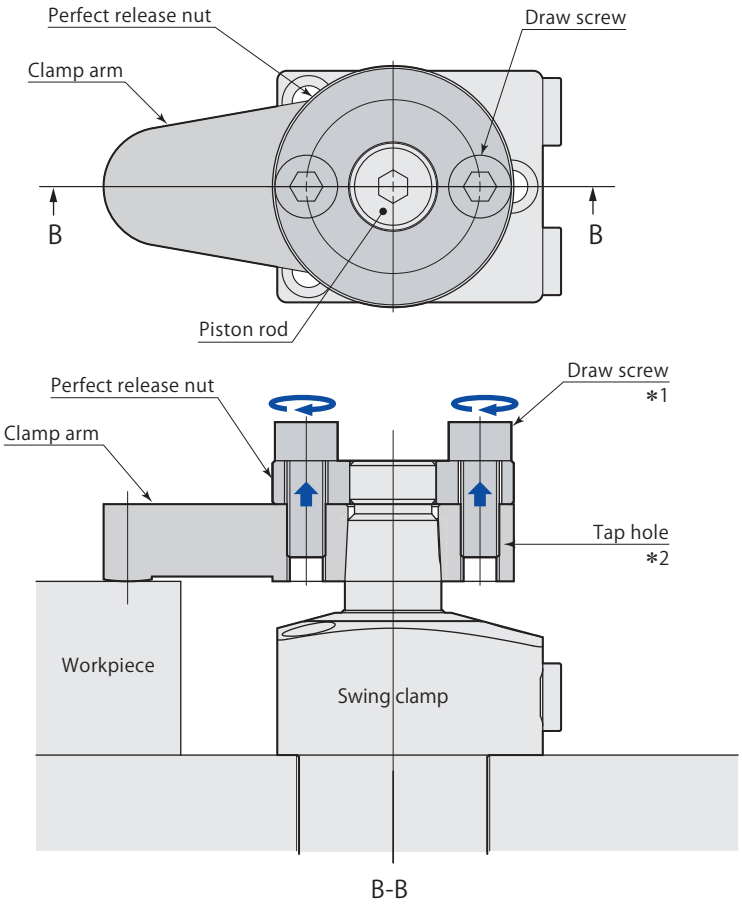


A-A

- The clamp arm may bite at the taper of the clamp rod and it will cause the demount failure if the set screw is tightened with excessive force. Be sure to use recommended torque when tightening.
- More secure tightening can be accomplished by applying some thread adhesive on set-screws.
  Recommended adhesive: LOCTITE 243 (medium strength type)

Perfect release nut (Arm dismounting guide)

1. Loosen all set-screws of perfect nut and dismount perfect nut from piston rod.
2. Mount perfect release nut and turn it until clamp arm comes into contact.
3. Turn perfect release nut back one or two more times, align the nut hole with tap hole of clamp arm and then mount the draw screws.
4. Once draw screws are tightened, clamp arm can be pulled off piston rod.

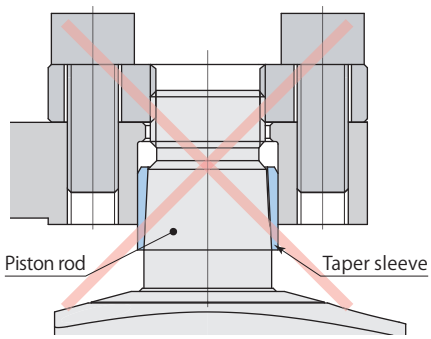


*1 : Turn draw screws as a pair, alternately turning 45° to 90° at a time to tighten them evenly. Some movement is felt in hand as clamp arm comes off, but there is no danger involved in this procedure.

*2 : Tap holes for draw screws are needed on clamp arm in order to use perfect release nut. Refer to clamp arm details on **page →43** for details on tap holes.

Caution in use

In the event that a clamp arm is used with taper sleeve, the perfect release nut cannot remove the clamp arm due to the taper sleeve remaining on the piston rod. (When using a taper sleeve, please use a gear puller (or similar) to remove clamp arm.)
To be able to easily remove clamp arms using the perfect release nut, drill a 1/10 taper hole into the clamp arm. (Clamp arm mounting details refer to **page →42**)



Mounting & dismounting of clamp arm

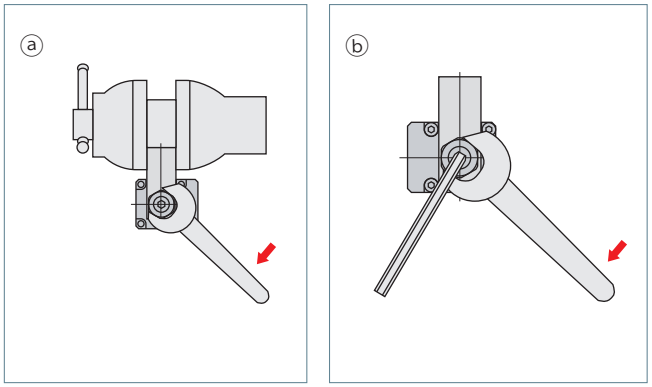
- Swing clamp may be damaged if excessive torque is applied to piston rod, since structure is intended for swinging using cam mechanism with lead grooves. Follow instructions shown below to prevent excessive torque from being applied on piston rod when mounting or dismounting clamp arm.
- Be sure to tighten the locknut with recommended tightening torque. If the tightening torque is insufficient, clamp arm may slip during operation.

Model		CTK02	CTK04	CTK06	CTK10	CTK16
Recommended tightening torque of locknut	N·m	11	26	51	75	130

Mounting of clamp arm

ⓐ Fix the clamp arm in a vise, then set the clamp body and clamp arm at the desired orientation, and tighten locknut with a wrench.

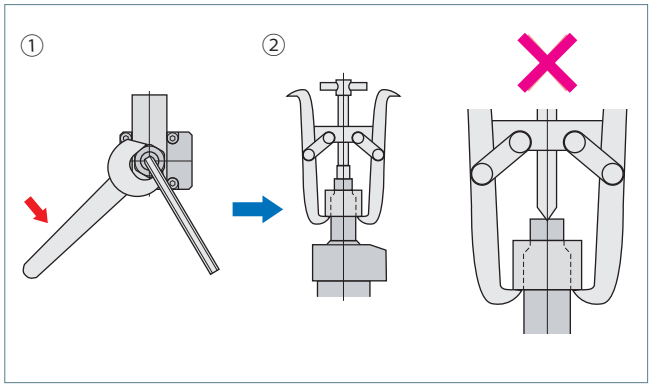
ⓑ For clamps that are mounted on jig, set clamp arm at desired orientation as shown in diagram below. Insert a hex wrench to hex socket at tip section of piston rod to hold it and tighten locknut with a wrench.



Dismounting of clamp arm

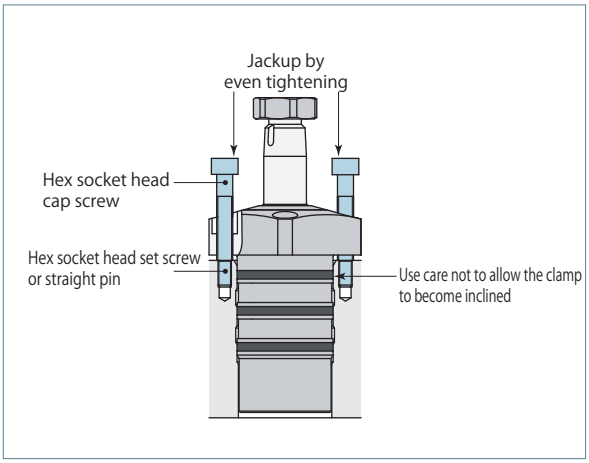
① Insert hex wrench to hex socket at tip section of piston rod to ensure that piston rod is held in place, then loosen locknut with wrench.

② After dismounting the locknut, pull out clamp arm using gear puller. A flat saddle type of gear puller should be used when removing an arm not to enlarge the hole on the tip of the piston rod. In addition, be careful not to rotate the rod when removing the arm.



Dismounting of model CTK□N (Cartrige)

1. Check that the hydraulic pressure is set at zero (0).
2. Remove mounting screws.
3. For protection of the mounting surfaces, install the hex socket head set screw or straight pin.
4. Using removal tap hole in the clamp, lift the clamp up with two screws for proper dismounting. In this step, use care not to allow the clamp to become inclined.



VCH□	Flow control valve	Option

Specifications

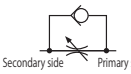
Body color : Silver

G port size

VCH **01** : G1/8
VCH **02** : G1/4

Control method

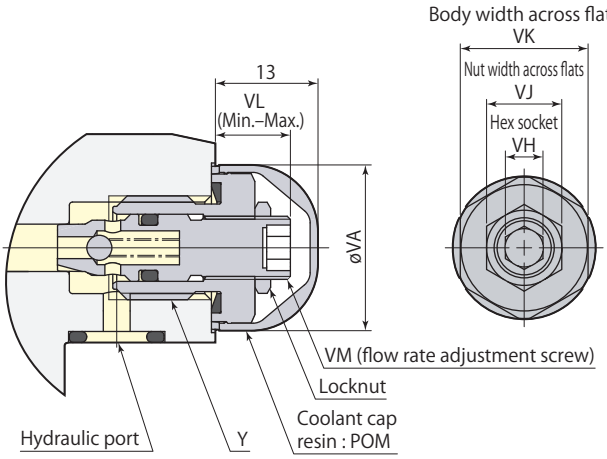
(Nil) : Meter-in



Model		VCH01	VCH02
G port size		G1/8	G1/4
Cracking pressure	MPa	0.04	
Orifice area	mm^2	3.1	6.2
Recommended tightening torque	N·m	10	30
Mass	kg	0.06	0.07

- Pressure range : 1–50 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)

Dimensions



mm

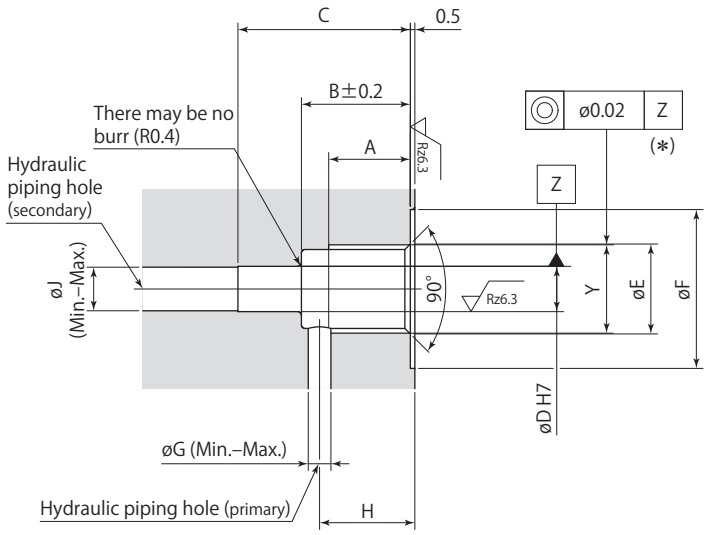
Model	VCH01	VCH02
Y	G1/8	G1/4
øVA	16	21
VH	3	5
VJ	8	10
VK	12	17
VL	7–11	7.5–11.5
Adjustment screw number of turns	5.3 rotations	5.3 rotations
VM	M6×0.75	M8×0.75

- Use a closed wrench or socket wrench for mounting and dismounting.
- Flow control valve can be mounted on hydraulic port (G port) when manifold piping.
- Adjust flow rate without hydraulic pressure. Conducting adjustments with hydraulic pressure may result in damaging seal.
- VCH is shipped with the valve fully open. Adjust the flow rate by loosening the screws after it is screwed in to close totally. Tighten the locknut after adjustment is completed.

Applicable clamp

Model	VCH01	VCH02
Swing clamp (double acting)	CTK04U, 06U, 10U CTK04B, 06B, 10B	CTK16U CTK16B
Link clamp (double acting)	CLW04-N, 06-N, 10-N	CLW16-N, 25-N
Link clamp (single acting)	CLV06-N, 10-N	CLV16-N, 25-N

Mounting details



Rz: ISO4287(1997)

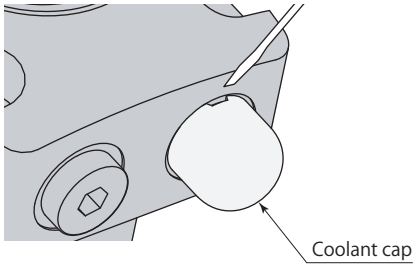
mm

Model	VCH01	VCH02
A	9	13
B	13	18
C	17.5	22.5
øD	$5^{+0.012}_{0}$	$6^{+0.012}_{0}$
øE	9.9	13.3
øF	17.5	21.5
øG	2.5–3	3.5–5
H	9.5–11.5	14.5–15.5
øJ	2.5–5	3.5–6
Y	G1/8	G1/4

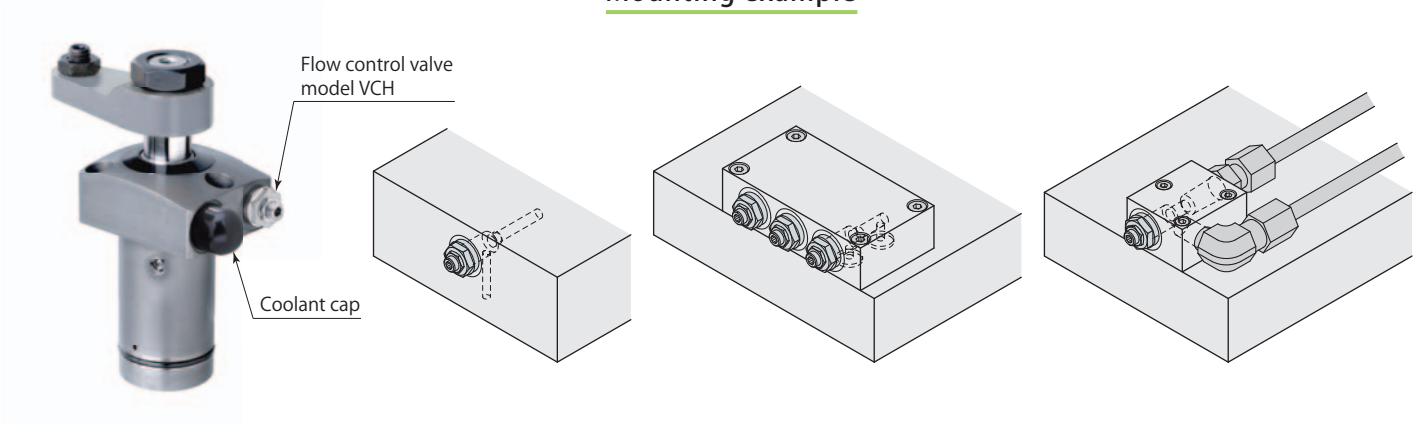
∗: Concentricity is required when machining øD and Y-portion thread. Misalignment or machining defect may cause the trouble of installation and adjusting flow rate.

Mounting & dismounting of flow control valve, air bleeding valve

- 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.
- When mounting a flow control valve or air bleeding valve, be sure to tighten it with the recommended tightening torque.
- 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.
- When dismounting a coolant cap, use a sharp-pointed tool such as a precision screw driver by hooking the notched portion.



Mounting example



Cylinder mounting | Pallet mounting | Block mounting ① | Block mounting ②

VCE□	Air bleeding valve	Option

Specifications

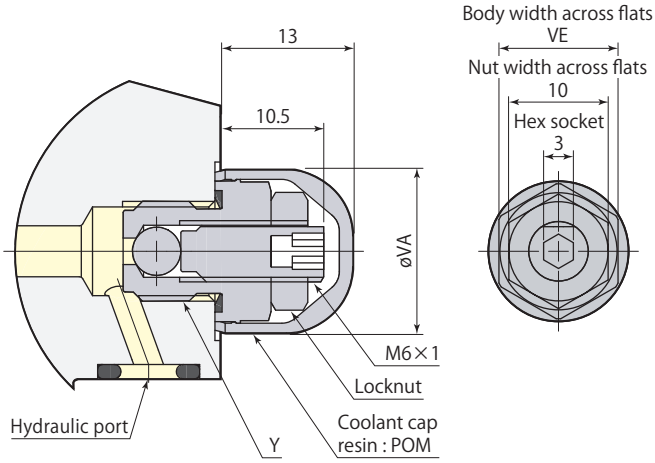
G port size

VCE **01** : G1/8

VCE **02** : G1/4

Model		VCE01	VCE02
G port size		G1/8	G1/4
Recommended tightening torque	N·m	10	30
Mass	kg	0.017	0.029
Pressure range	MPa	0–50	
Operating temperature	°C	0–70	
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)	

Dimensions

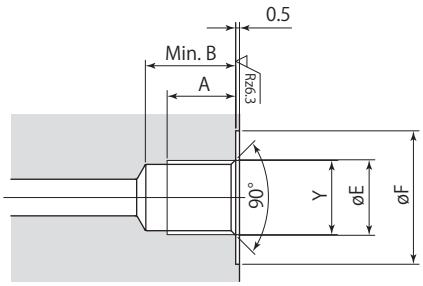


mm

Model	VCE01	VCE02
A	9	13
B	10	14
øE	9.9	13.3
øF	17.5	21.5
Y	G1/8	G1/4
øVA	16	21
VE	12	17

- Use a closed wrench or socket wrench for mounting and dismounting.
- Air bleeding valve can be mounted on hydraulic port (G port) when manifold piping.

Mounting details



Rz: ISO4287(1997)

Applicable clamp and work support

Model	VCE01	VCE02
Swing clamp (double acting)	CTK04U, 06U, 10U CTK04B, 06B, 10B CTW06, 10	CTK16U CTK16B CTW16, 25
Swing clamp (single acting)	CTV06, 10	CTV16, 25
Link clamp (double acting)	CLW04, 06, 10	CLW16, 25
Link clamp (single acting)	CLV06, 10	CLV16, 25
Work support	CSP-M-N (CSW, CSV)	–

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Double acting Swing clamp **CTW**

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Upper flange **CTW□U** Dimensions ····· **58**

Lower flange **CTW□B** Dimensions ····· **62**

Swing angle 30°, 45°, 60° **CTW-N** Dimensions ····· **66**

Single acting Swing clamp **CTV**

Structure, Hydraulic circuit diagram ····· **68**

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Upper flange **CTV□U** Dimensions ····· **72**

Lower flange **CTV□B** Dimensions ····· **76**

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Option

Clamp arm **CTH-W1/W2/WL** ····· **82**

Screw **CTH-VB** ····· **82**

Caution in use ····· **83**

Swing clamp

35MPa

Double acting
model **CTW**

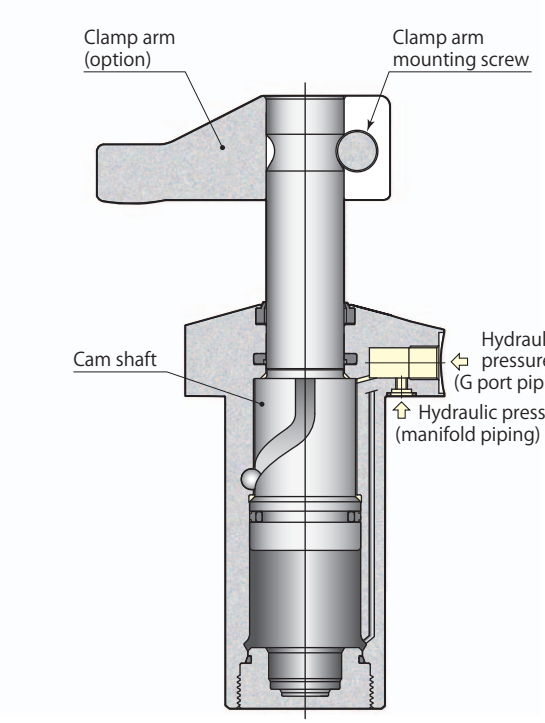
Single acting
model **CTV**

Double acting
Lower flange
model CTW06B-L

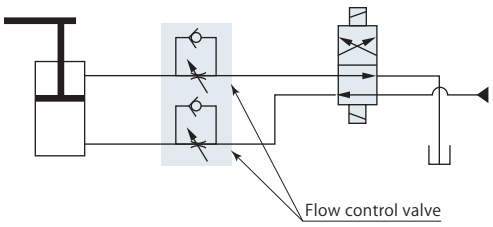
Single acting
Upper flange
model CTV06U-L

Upper flange

model **CTW□U-□**



Hydraulic circuit diagram



For flow control valve, we recommend the meter-in control. If meter-out control is used, due to the area difference, it will cause back pressure and become high pressure. This can lead to malfunction of the system. Please be aware when designing the circuit.

Flow control valve model VCH can not be mounted.

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Upper flange page → 58
Lower flange page → 62
Swing angle 30°, 45°, 60° page → 66

Specifications

CTW – [Size] – [Mounting and piping types] – [Swing direction (when clamping), swing angle]

Size: 06, 10, 16, 25

Mounting and piping types:
- U : Upper flange
- B : Lower flange

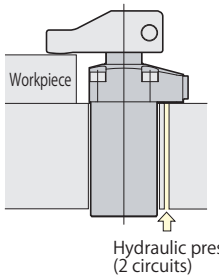
Swing direction (when clamping), swing angle:
- L : Counter-clockwise, swing angle 90°
- LN30 : Counter-clockwise, swing angle 30°
- LN45 : Counter-clockwise, swing angle 45°
- LN60 : Counter-clockwise, swing angle 60°
- R : Clockwise, swing angle 90°
- RN30 : Clockwise, swing angle 30°
- RN45 : Clockwise, swing angle 45°
- RN60 : Clockwise, swing angle 60°
- C : Straight, swing angle 0°

■ indicates made to order.

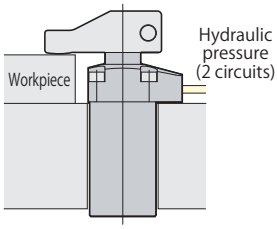
Mounting and piping types

CTW□U-□

Upper flange manifold piping

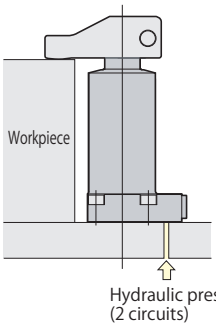


Upper flange G port piping

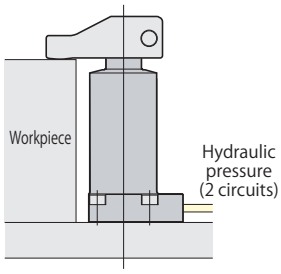


CTW□B-□

Lower flange manifold piping



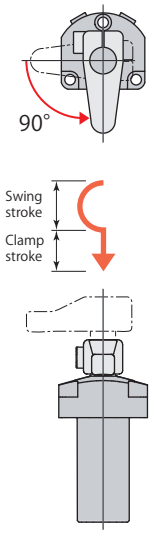
Lower flange G port piping



Swing direction (when clamping)

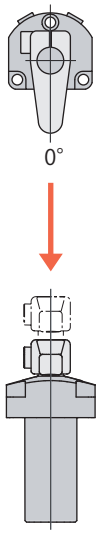
CTW□□-L

Counter-clockwise
Swing angle 90°



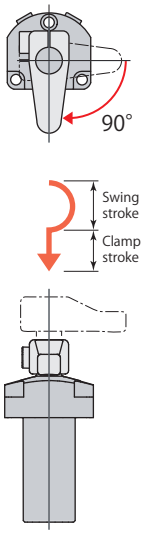
CTW□□-C

Straight
Swing angle 0°



CTW□□-R

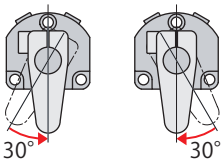
Clockwise
Swing angle 90°



Swing angle

CTW□□- LN30 RN30

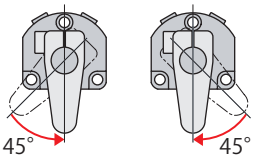
Swing angle 30°



L:Counter-clockwise　R:Clockwise

CTW□□- LN45 RN45

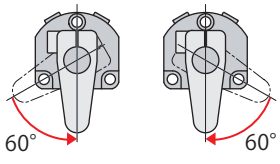
Swing angle 45°



L:Counter-clockwise　R:Clockwise

CTW□□- LN60 RN60

Swing angle 60°



L:Counter-clockwise　R:Clockwise

Refer to **pages →66** and **67** for details.

CTW□□-□	Swing clamp	35MPa	Double acting

Specifications

Model			CTW06	CTW10	CTW16	CTW25
Cylinder force (hydraulic pressure 35MPa)		kN	6.3	14.3	19.2	26.3
Clamping force*1	Hydraulic pressure 35MPa	kN	5.4	12.4	16.6	22.9
	Hydraulic pressure 25MPa	kN	3.9	8.8	11.9	16.3
	Hydraulic pressure 15MPa	kN	2.3	5.3	7.1	9.8
Standard clamp arm length		mm	40	50	57	65
Cylinder inner diameter		mm	22	32	40	44.5
Rod diameter		mm	16	22.4	30	32
Effective area (clamp)		cm^2	1.79	4.10	5.50	7.51
Swing angle	CTW□□-L, R		90°±3°			
	CTW□□-C		0°			
Repeated clamp positioning accuracy			±0.5°			
Full stroke		mm	22	28	32	40
90° swing stroke (CTW□□-L, R)		mm	12	15	18	24
Clamp stroke (CTW□□-L, R)		mm	10	13	14	16
Max. swing torque*2		N·m	0.35	0.97	1.51	2.10
Max. oil flow rate	Clamp	L/min	0.43	1.23	1.48	2.70
	Unclamp	L/min	0.91	2.41	3.39	5.60
Cylinder capacity	Clamp	cm^3	3.9	11.5	17.6	30.0
	Unclamp	cm^3	8.4	22.5	40.2	62.2
Recommended tightening torque of mounting screws*3		N·m	12	29	29	29

- Pressure range : 3.5–35 MPa
- Proof pressure : 52.5 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

*1 : Clamping force at time standard clamp arm is mounted (refer to section on W1, W2 series on **page →82**).
Clamping force varies depending on clamp arm length. Refer to performance table (**page →57**) for details.

*2 : This is the limit value for lifting arm at 3.5 MPa when mounted vertically.

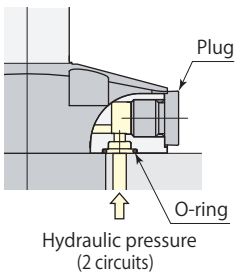
*3 : ISO R898 class 12.9

Manifold piping and G port piping are available.

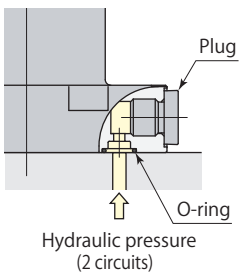
Manifold piping

Remove sealing plugs when using manifold piping. An air bleeding valve (model VCE) is mountable on the G port of the clamp.

Upper flange



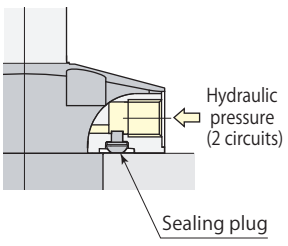
Lower flange



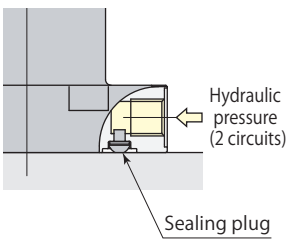
G port piping

Remove plugs and O-ring when choosing G port piping. The flow control valve and the air bleeding valve should be installed in the middle of oil path.

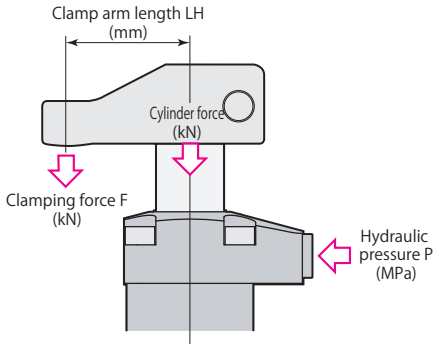
Upper flange



Lower flange



Performance table



Clamping force varies depending on the clamp arm length (LH) and hydraulic pressure (P).

Clamping force calculation formula

F = P/(Coefficient 1 + Coefficient 2 × LH)

F : Clamping force P : Hydraulic pressure LH : Clamp arm length

CTW10 with clamp arm length (LH) = 60 mm at hydraulic pressure of 20 MPa, Clamping force F is calculated by

20/(2.44+0.00773×60)=6.9 kN

Do not use the clamp in the nonusable range. It may cause damage to the cylinder and rod.

model CTW06 Clamping force F=P/(5.58+0.0224×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm					Max. arm length Max. LH mm
		40	60	80	100	120	
35	6.3	5.4					42
30	5.4	4.6					51
25	4.5	3.9	3.6	Nonusable range			64
20	3.6	3.1	2.9	2.7			85
15	2.7	2.3	2.2	2.0	1.9	1.8	127
10	1.8	1.5	1.4	1.4	1.3	1.2	200
5	0.9	0.8	0.7	0.7	0.6	0.6	↑
3.5	0.6	0.5	0.5	0.5	0.4	0.4	200

model CTW10 Clamping force F=P/(2.44+0.00773×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm					Max. arm length Max. LH mm
		50	60	80	100	120	
35	14.3	12.4					52
30	12.3	10.6	10.3	Nonusable range			62
25	10.2	8.8	8.6				77
20	8.2	7.1	6.9	6.5	6.2		103
15	6.1	5.3	5.2	4.9	4.7	4.5	154
10	4.1	3.5	3.4	3.3	3.1	3.0	240
5	2.0	1.8	1.7	1.6	1.6	1.5	↑
3.5	1.4	1.2	1.2	1.1	1.1	1.0	240

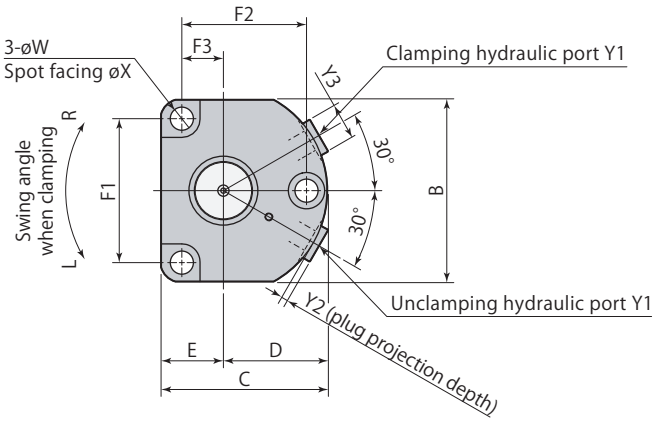
model CTW16 Clamping force F=P/(1.82+0.00506×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm					Max. arm length Max. LH mm
		57	80	100	120	140	
35	19.2	16.6					57
30	16.5	14.2					62
25	13.7	11.9	Nonusable range				77
20	11.0	9.5	9.0	8.6			102
15	8.2	7.1	6.7	6.4	6.2	5.9	150
10	5.5	4.7	4.5	4.3	4.1	4.0	255
5	2.7	2.4	2.2	2.1	2.1	2.0	↑
3.5	1.9	1.7	1.6	1.5	1.4	1.4	255

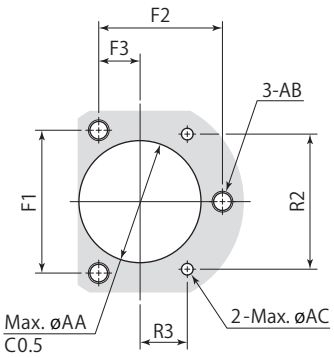
model CTW25 Clamping force F=P/(1.33+0.00310×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm						Max. arm length Max. LH mm
		65	80	100	120	140	160	
35	26.3	22.9						65
30	22.6	19.6						72
25	18.8	16.3	15.8	Nonusable range				90
20	15.0	13.1	12.7	12.2				119
15	11.3	9.8	9.5	9.1	8.8	8.5	8.2	174
10	7.5	6.5	6.3	6.1	5.9	5.7	5.5	270
5	3.8	3.3	3.2	3.0	2.9	2.8	2.7	↑
3.5	2.6	2.3	2.2	2.1	2.1	2.0	1.9	270

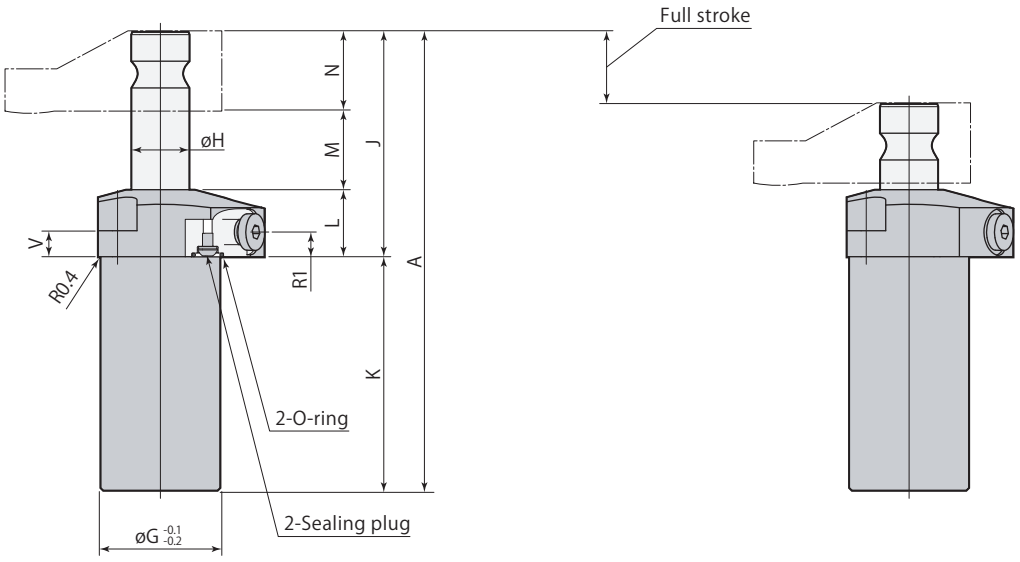
Dimensions



Mounting details

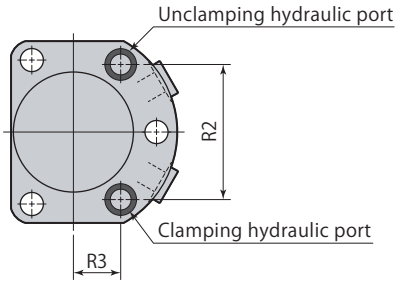


The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp

Stroke end



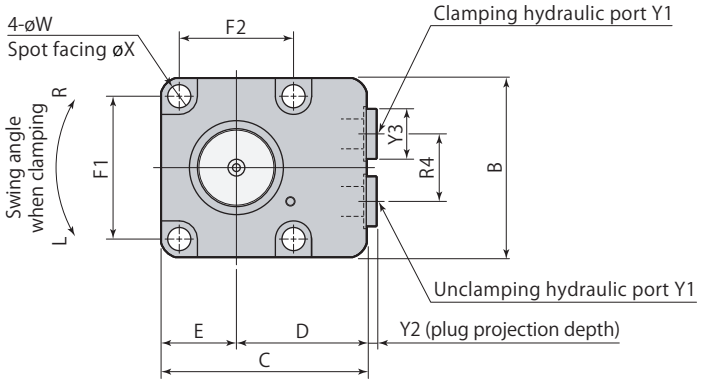
mm

Model	CTW06U-□	CTW10U-□
A	137	176.5
B	56	70
C	50.5	64
D	32.5	40
E	18	24
F1	43.3	55
F2	37.5	47.6
F3	12.5	15.9
øG	33	46
øH	16	22.4
J	71	86.5
K	66	90
L	26	26
M	24	30.5
N	21	30
R1	9.5	9.5
R2	41	52
R3	14.3	18.2
V	13	10
øW	7	8.9
øX	11	14
Y1	G1/8	G1/8
Y2	2.8	2.8
Y3	14	14
O-ring (fluorocarbon hardness Hs90)	P9	P9
øAA	34	47
AB	M6	M8
øAC	7	7
Mass	0.7 kg	1.6 kg
Air bleeding valve	VCE01	VCE01

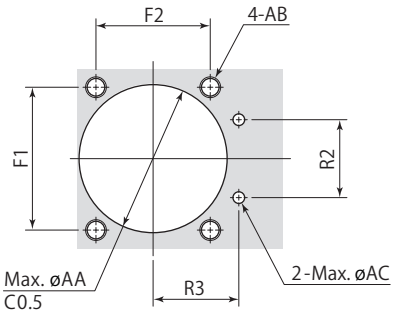
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- CTW□U-C (Straight, swing angle 0°) is made to order.

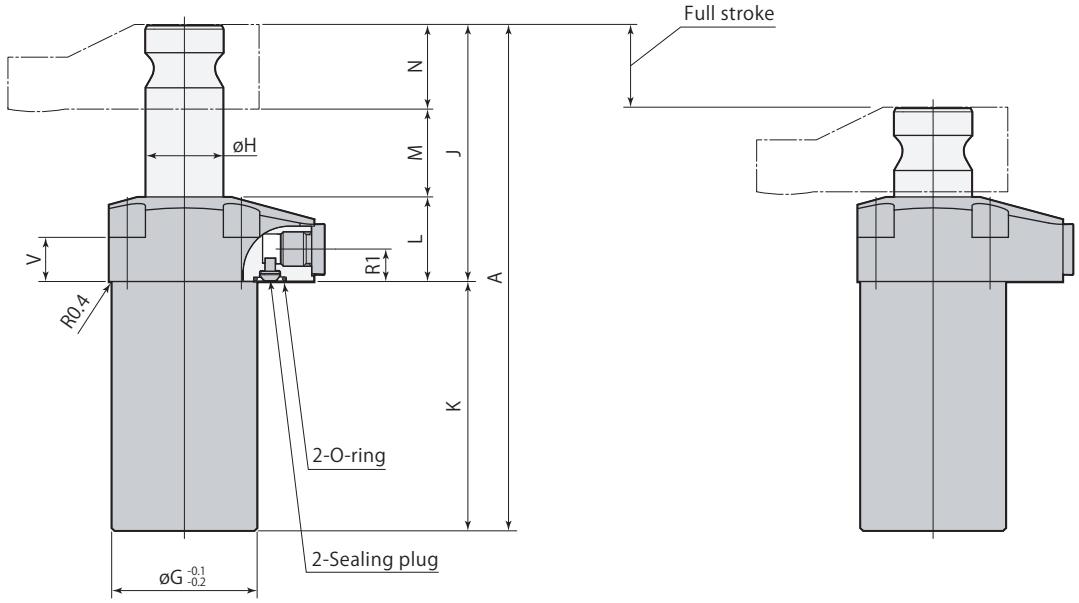
Dimensions



Mounting details

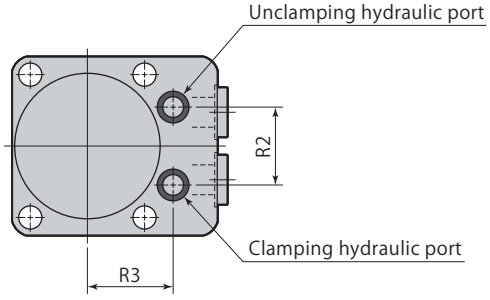


The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp

Stroke end



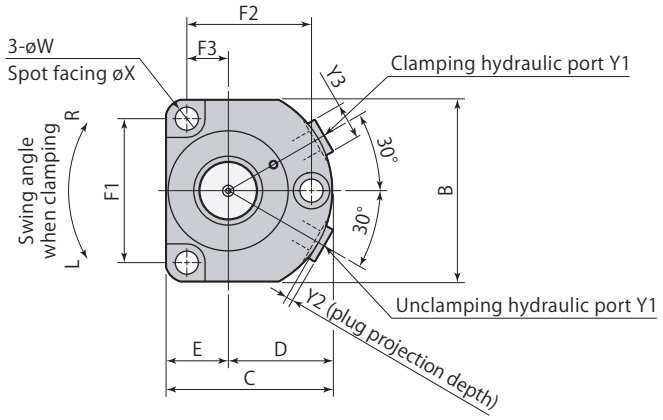
mm

Model	CTW16U-□	CTW25U-□
A	195	226
B	69	69
C	79	87.5
D	50	53
E	29	34.5
F1	55	55
F2	44	55
øG	56	61.5
øH	30	32
J	99	110
K	96	116
L	32	32.5
M	35	42.5
N	32	35
R1	12.5	12.5
R2	30	30
R3	33	36
R4	26	26
V	17	17
øW	8.9	8.9
øX	14	14
Y1	G1/4	G1/4
Y2	4.3	4.3
Y3	19	19
O-ring (fluorocarbon hardness Hs90)	P9	P9
øAA	57	62.5
AB	M8	M8
øAC	7	7
Mass	2.6 kg	3.4 kg
Air bleeding valve	VCE02	VCE02

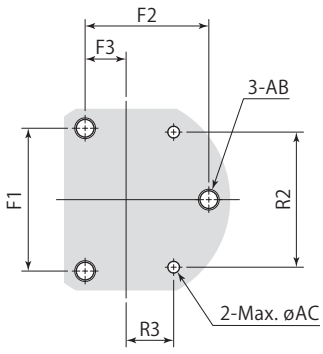
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- CTW□U-C (Straight, swing angle 0°) is made to order.

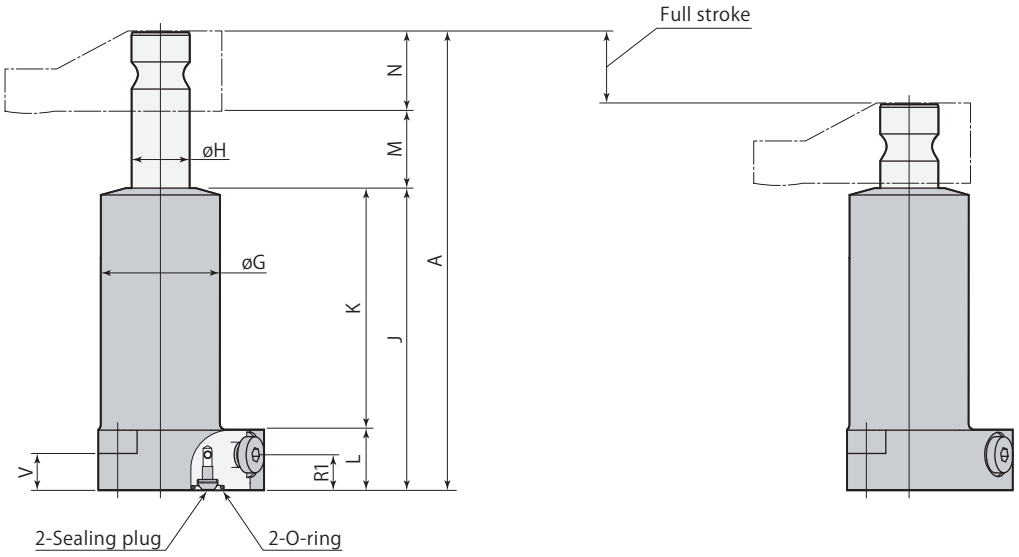
Dimensions



Mounting details

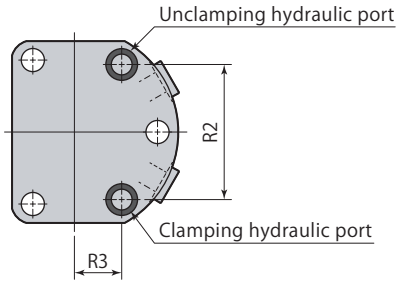


The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp

Stroke end



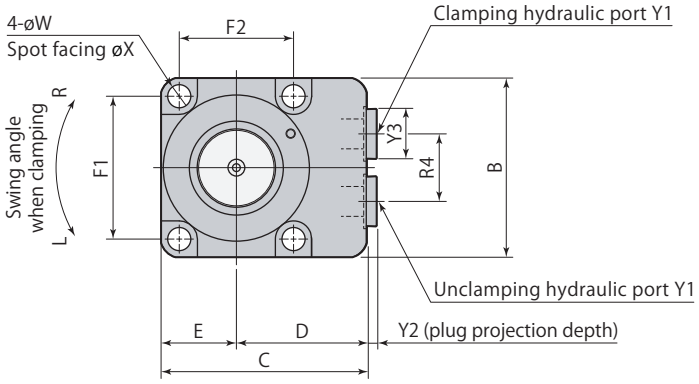
mm

Model	CTW06B-□	CTW10B-□
A	137	176.5
B	56	70
C	50.5	64
D	32.5	40
E	18	24
F1	43.3	55
F2	37.5	47.6
F3	12.5	15.9
øG	35	46
øH	16	22.4
J	92	116
K	69	93
L	23	23
M	24	30.5
N	21	30
R1	13.5	13.5
R2	41	52
R3	14.3	18.2
V	16	14
øW	7	8.9
øX	11	14
Y1	G1/8	G1/8
Y2	2.8	2.8
Y3	14	14
O-ring (fluorocarbon hardness Hs90)	P9	P9
AB	M6	M8
øAC	7	7
Mass	0.8 kg	1.6 kg
Air bleeding valve	VCE01	VCE01

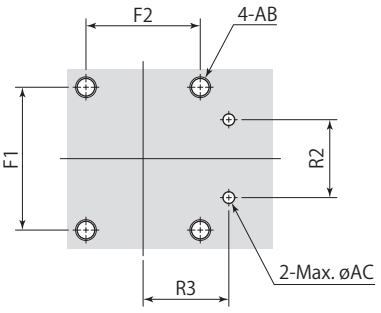
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- CTW□B-C (Straight, swing angle 0°) is made to order.

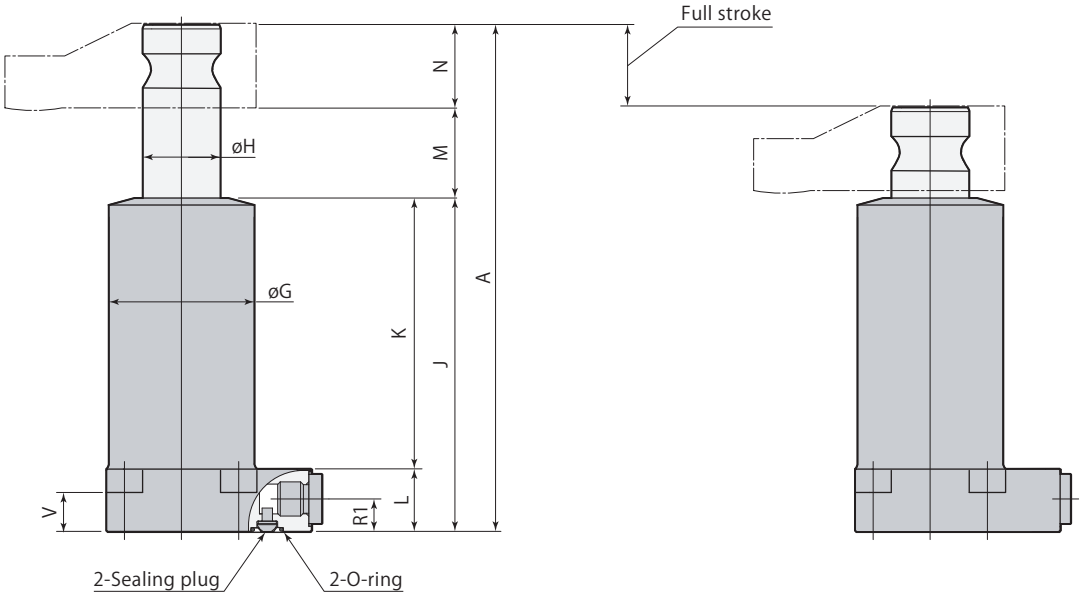
Dimensions



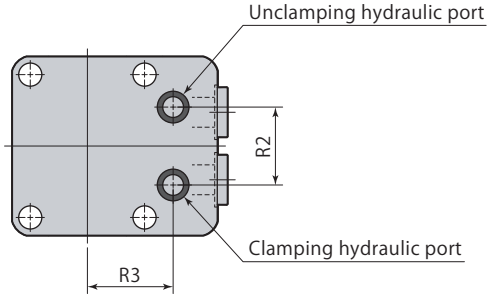
Mounting details



The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp



Stroke end

mm

Model	CTW16B-□	CTW25B-□
A	195	226
B	69	69
C	79	87.5
D	50	53
E	29	34.5
F1	55	55
F2	44	55
øG	56	61.5
øH	30	32
J	128	148.5
K	104	124.5
L	24	24
M	35	42.5
N	32	35
R1	12.5	12.5
R2	30	30
R3	33	36
R4	26	26
V	15	15
øW	8.9	8.9
øX	14	14
Y1	G1/4	G1/4
Y2	4.3	4.3
Y3	19	19
O-ring (fluorocarbon hardness Hs90)	P9	P9
AB	M8	M8
øAC	7	7
Mass	2.6 kg	3.3 kg
Air bleeding valve	VCE02	VCE02

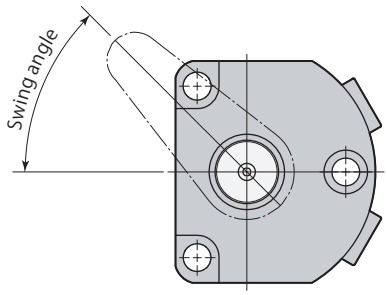
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- CTW□B-C (Straight, swing angle 0°) is made to order.

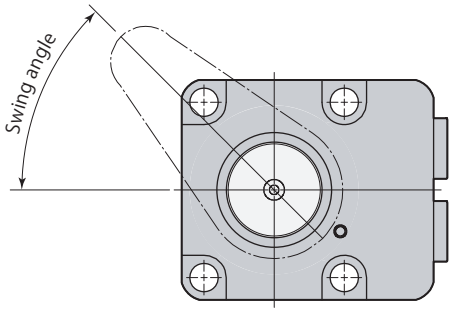
CTW□U-□N□	Swing clamp Swing angle 30°, 45°, 60°	35MPa	Double acting

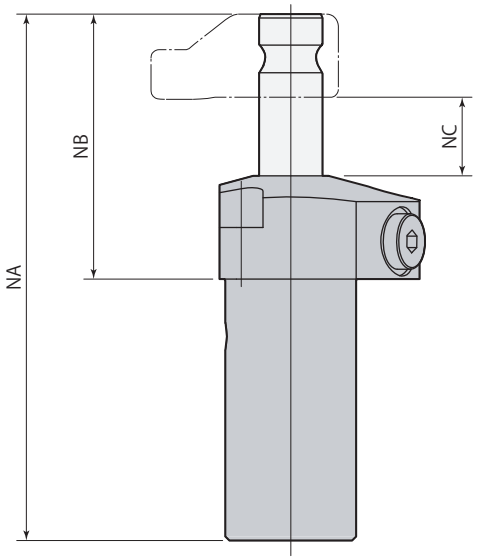
Dimensions

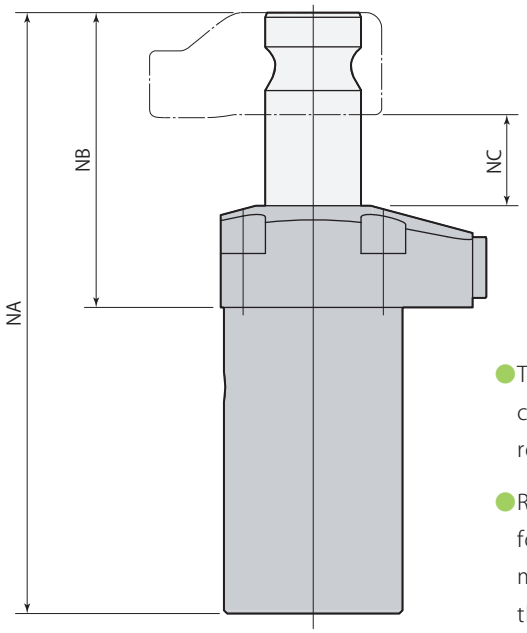
CTW06, 10 U-□
N30, N45, N60



CTW16, 25 U-□
N30, N45, N60







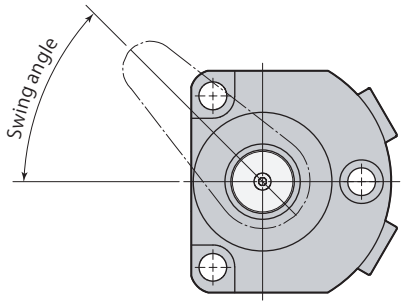
- This diagram indicates unclamped condition of swing direction L (counter-clockwise).
- Refer to **pages →58** to **61** for other specifications and dimensions that are not shown in the diagram.
- This product is made to order.

mm

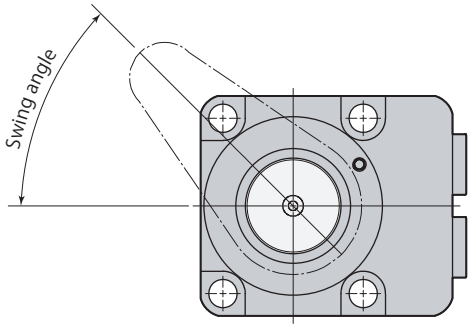
Model		CTW06U-□N□			CTW10U-□N□			CTW16U-□N□			CTW25U-□N□		
Swing angle		30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°
Full stroke		16.5	17.9	19.3	20.7	22.5	24.3	23.3	25.5	27.6	28.0	31.0	34.0
Swing stroke		6.5	7.9	9.3	7.7	9.5	11.3	9.3	11.5	13.6	12.0	15.0	18.0
Clamp stroke		10			13			14			16		
Cylinder capacity (cm³)	Clamp	3.0	3.2	3.5	8.5	9.2	10.0	12.8	14.0	15.2	21.0	23.3	25.5
	Unclamp	6.3	6.8	7.3	16.6	18.1	19.5	29.3	32.0	34.7	43.5	48.2	52.9
NA		131.5	132.9	134.3	169.2	171.0	172.8	186.3	188.5	190.6	214.0	217.0	220.0
NB		65.5	66.9	68.3	79.2	81.0	82.8	90.3	92.5	94.6	98.0	101.0	104.0
NC		18.5	19.9	21.3	23.2	25.0	26.8	26.3	28.5	30.6	30.5	33.5	36.5

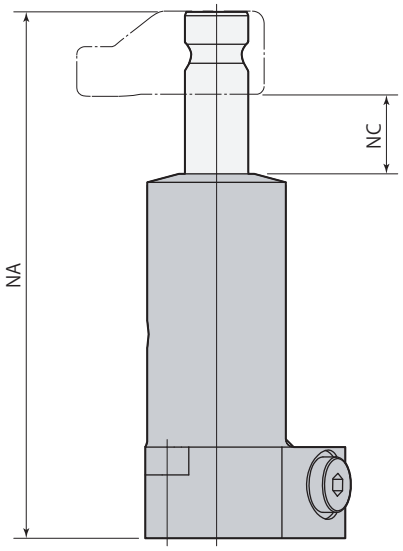
Dimensions

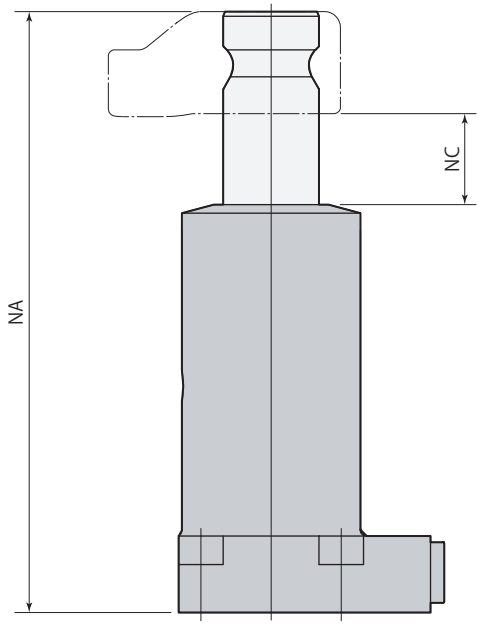
CTW06, 10 B-□
N30, N45, N60



CTW16, 25 B-□
N30, N45, N60







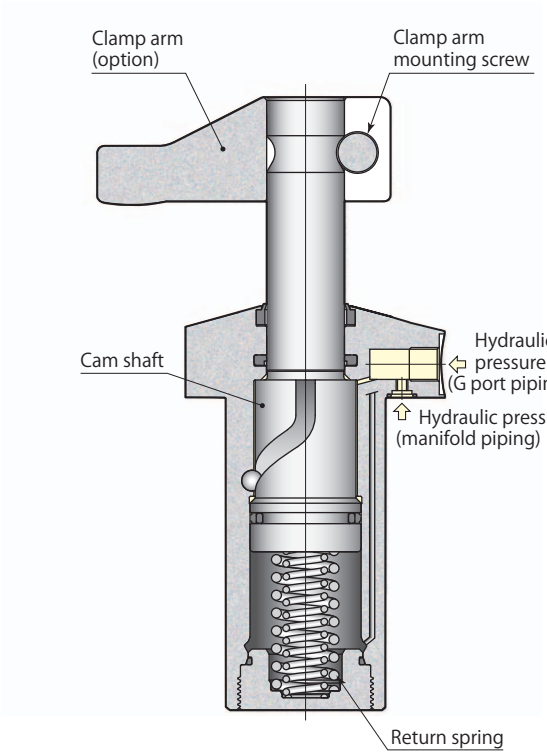
- This diagram indicates unclamped condition of swing direction L (counter-clockwise).
- Refer to **pages →62** to **65** for other specifications and dimensions that are not shown in the diagram.
- This product is made to order.

mm

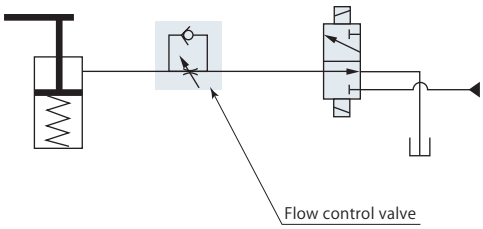
Model		CTW06B-□N□			CTW10B-□N□			CTW16B-□N□			CTW25B-□N□		
Swing angle		30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°
Full stroke		16.5	17.9	19.3	20.7	22.5	24.3	23.3	25.5	27.6	28.0	31.0	34.0
Swing stroke		6.5	7.9	9.3	7.7	9.5	11.3	9.3	11.5	13.6	12.0	15.0	18.0
Clamp stroke		10			13			14			16		
Cylinder capacity (cm³)	Clamp	3.0	3.2	3.5	8.5	9.2	10.0	12.8	14.0	15.2	21.0	23.3	25.5
	Unclamp	6.3	6.8	7.3	16.6	18.1	19.5	29.3	32.0	34.73	43.5	48.2	52.9
NA		131.5	132.9	134.3	169.2	171.0	172.8	186.3	188.5	190.6	214.0	217.0	220.0
NC		18.5	19.9	21.3	23.2	25.0	26.8	26.3	28.5	30.6	30.5	33.5	36.5

Upper flange

model **CTV□U-□**



Hydraulic circuit diagram



Use flow control valve for meter-in control.
Flow control valve model VCH can not be mounted.

Specifications page → 70
Upper flange page → 72
Lower flange page → 76
Swing angle 30°, 45°, 60° page → 80

Specifications

CTV – [Size] [Mounting and piping types] [Swing direction (when clamping), swing angle]

Size: 06, 10, 16, 25

Mounting and piping types:
- U : Upper flange
- B : Lower flange

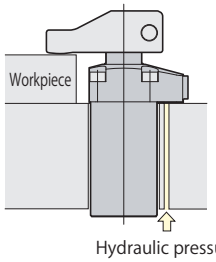
Swing direction (when clamping), swing angle:
- L : Counter-clockwise, swing angle 90°
- LN30 : Counter-clockwise, swing angle 30°
- LN45 : Counter-clockwise, swing angle 45°
- LN60 : Counter-clockwise, swing angle 60°
- R : Clockwise, swing angle 90°
- RN30 : Clockwise, swing angle 30°
- RN45 : Clockwise, swing angle 45°
- RN60 : Clockwise, swing angle 60°
- C : Straight, swing angle 0°

■ indicates made to order.

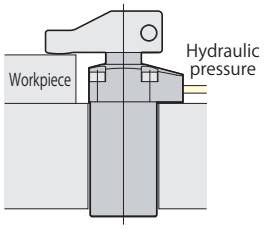
Mounting and piping types

CTV□U-□

Upper flange manifold piping

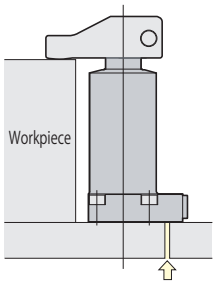


Upper flange G port piping

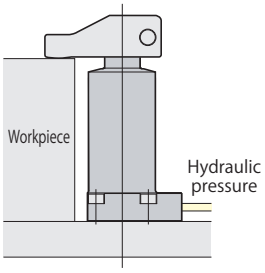


CTV□B-□

Lower flange manifold piping



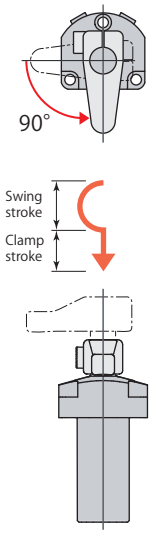
Lower flange G port piping



Swing direction (when clamping)

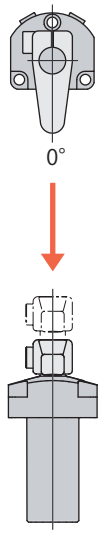
CTV□□-L

Counter-clockwise
Swing angle 90°



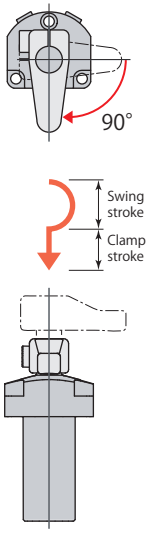
CTV□□-C

Straight
Swing angle 0°



CTV□□-R

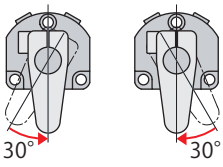
Clockwise
Swing angle 90°



Swing angle

CTV□□- LN30 RN30

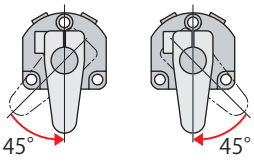
Swing angle 30°



L:Counter-clockwise　R:Clockwise

CTV□□- LN45 RN45

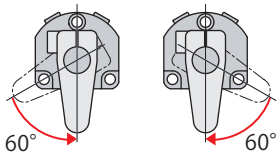
Swing angle 45°



L:Counter-clockwise　R:Clockwise

CTV□□- LN60 RN60

Swing angle 60°



L:Counter-clockwise　R:Clockwise

Refer to **pages →80** and **81** for details.

Specifications

Model			CTV06	CTV10	CTV16	CTV25
Cylinder force (hydraulic pressure 35MPa)*1		kN	6.0	13.7	18.4	25.1
Clamping force*1*2	Hydraulic pressure 35MPa	kN	5.2	11.8	15.9	21.8
	Hydraulic pressure 25MPa	kN	3.6	8.3	11.1	15.3
	Hydraulic pressure 15MPa	kN	2.1	4.7	6.4	8.8
Standard clamp arm length		mm	40	50	57	65
Cylinder inner diameter		mm	22	32	40	44.5
Rod diameter		mm	16	22.4	30	32
Effective area (clamp)		cm^2	1.79	4.10	5.50	7.51
Swing angle	CTV□□-L, R		90°±3°			
	CTV□□-C		0°			
Repeated clamp positioning accuracy			±0.5°			
Full stroke		mm	22	28	32	40
90° swing stroke (CTV□□-L, R)		mm	12	15	18	24
Clamp stroke (CTV□□-L, R)		mm	10	13	14	16
Max. swing torque*3		N·m	0.35	0.97	1.51	2.10
Max. oil flow rate		L/min	0.43	1.23	1.48	2.70
Cylinder capacity		cm^3	3.9	11.5	17.6	30.0
Recommended tightening torque of mounting screws*4		N·m	12	29	29	29

- Pressure range：3.5–35 MPa
- Proof pressure：52.5 MPa
- Operating temperature：0–70 ℃
- Fluid used：General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

*1：This is value for central position of clamp stroke.

*2：Clamping force at time standard clamp arm is mounted (refer to section on W1, W2 series on **page →82**).
Clamping force varies depending on clamp arm length. Refer to performance table (**page →71**) for details.

*3：This is the limit value for lifting arm at 3.5 MPa when mounted vertically.

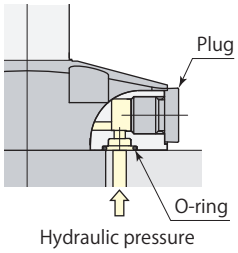
*4：ISO R898 class 12.9

Manifold piping and G port piping are available.

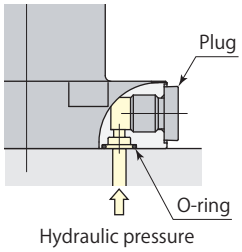
Manifold piping

Remove sealing plug when using manifold piping. An air bleeding valve (model VCE) is mountable on the G port of the clamp.

Upper flange



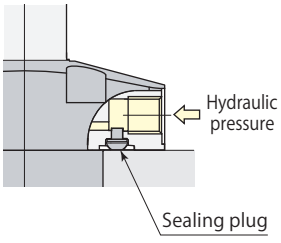
Lower flange



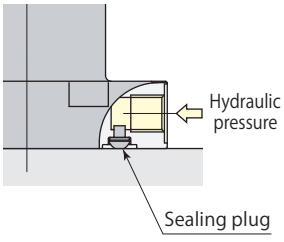
G port piping

Remove plug and O-ring when choosing G port piping. The flow control valve and the air bleeding valve should be installed in the middle of oil path.

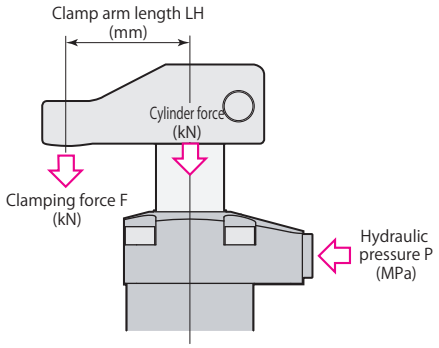
Upper flange



Lower flange



Performance table



Clamping force varies depending on the clamp arm length (LH) and hydraulic pressure (P).

Clamping force calculation formula

F＝(P-Coefficient 1)/(Coefficient 2+Coefficient 3×LH)

F:Clamping force　P:Hydraulic pressure　LH:Clamp arm length

CTV10 with clamp arm length (LH) = 60 mm at hydraulic pressure of 20 MPa, Clamping force F is calculated by

(20-1.65)/(2.44+0.00773×60)=6.3 kN

Do not use the clamp in the nonusable range. It may cause damage to the cylinder and rod.

model CTV06　Clamping force　F=(P-1.43)/(5.58+0.0224×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm					Max. arm length Max. LH mm
		40	60	80	100	120	
35	6.0	5.2					44
30	5.1	4.4		Nonusable range			54
25	4.2	3.6	3.4				68
20	3.3	2.9	2.7	2.5			93
15	2.4	2.1	2.0	1.8	1.7	1.6	148
10	1.5	1.3	1.2	1.2	1.1	1.0	200
5	0.6	0.6	0.5	0.5	0.5	0.4	↑
3.5	0.4	0.3	0.3	0.3	0.3	0.3	200

model CTV10　Clamping force　F=(P-1.65)/(2.44+0.00773×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm					Max. arm length Max. LH mm
		50	60	80	100	120	
35	13.7	11.8					55
30	11.6	10.0	9.8	Nonusable range			66
25	9.6	8.3	8.0	7.6			84
20	7.5	6.5	6.3	6.0	5.7		115
15	5.5	4.7	4.6	4.4	4.2	4.0	184
10	3.4	3.0	2.9	2.7	2.6	2.5	240
5	1.4	1.2	1.2	1.1	1.0	1.0	↑
3.5	0.8	0.7	0.6	0.6	0.6	0.5	240

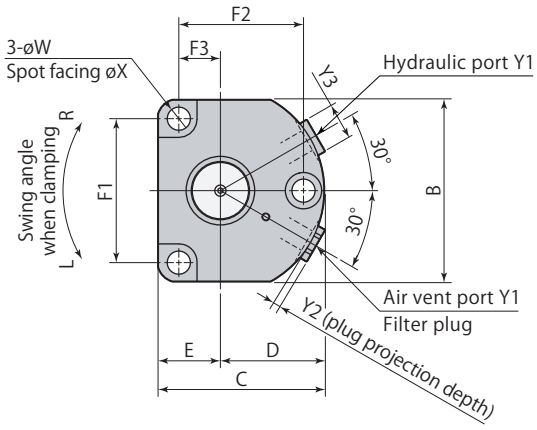
model CTV16　Clamping force　F=(P-1.55)/(1.82+0.00506×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm					Max. arm length Max. LH mm
		57	80	100	120	140	
35	18.4	15.9					57
30	15.6	13.5		Nonusable range			66
25	12.9	11.1	10.5				83
20	10.1	8.8	8.3	7.9			113
15	7.4	6.4	6.0	5.8	5.5	5.3	175
10	4.6	4.0	3.8	3.6	3.5	3.3	255
5	1.9	1.6	1.6	1.5	1.4	1.4	↑
3.5	1.1	0.9	0.9	0.8	0.8	0.8	255

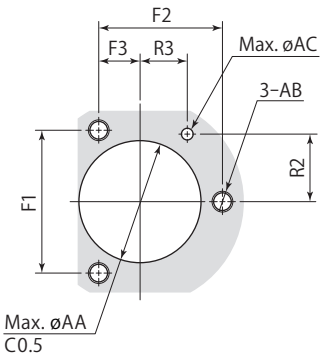
model CTV25　Clamping force　F=(P-1.59)/(1.33+0.00310×LH)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN / Clamp arm length LH mm						Max. arm length Max. LH mm
		65	80	100	120	140	160	
35	25.1	21.8						65
30	21.4	18.6			Nonusable range			77
25	17.6	15.3	14.8					97
20	13.8	12.0	11.7	11.2	10.8			131
15	10.1	8.8	8.5	8.2	7.9	7.6	7.3	203
10	6.3	5.5	5.3	5.1	4.9	4.8	4.6	270
5	2.6	2.2	2.2	2.1	2.0	1.9	1.9	↑
3.5	1.4	1.2	1.2	1.2	1.1	1.1	1.0	270

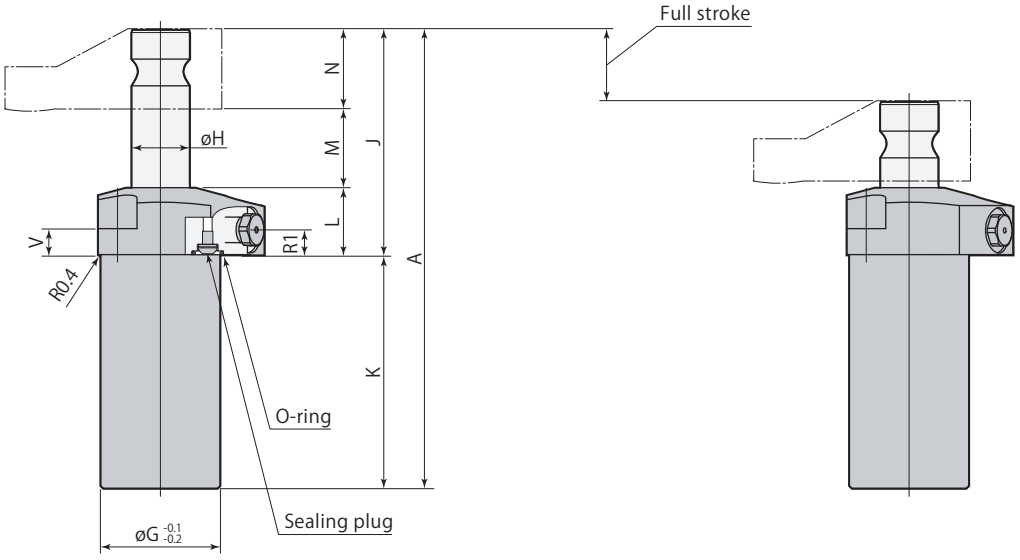
Dimensions



Mounting details

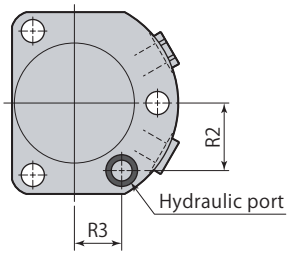


The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp

Stroke end



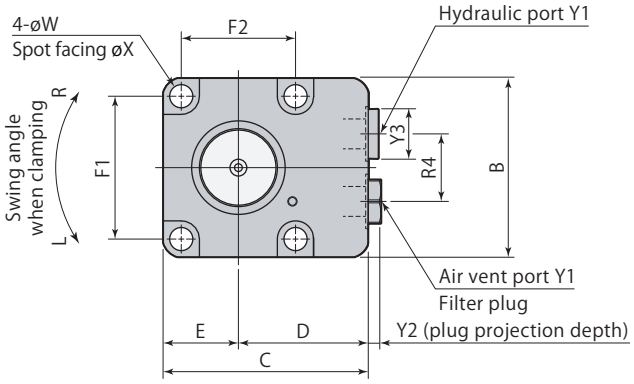
mm

Model	CTV06U-□	CTV10U-□
A	137	176.5
B	56	70
C	50.5	64
D	32.5	40
E	18	24
F1	43.3	55
F2	37.5	47.5
F3	12.5	15.9
øG	33	46
øH	16	22.4
J	71	86.5
K	66	90
L	26	26
M	24	30.5
N	21	30
R1	9.5	9.5
R2	20.5	26
R3	14.3	18.2
V	13	10
øW	7	8.9
øX	11	14
Y1	G1/8	G1/8
Y2	2.8	2.8
Y3	14	14
O-ring (fluorocarbon hardness Hs90)	P9	P9
øAA	34	47
AB	M6	M8
øAC	7	7
Mass	0.8 kg	1.6 kg
Air bleeding valve	VCE01	VCE01

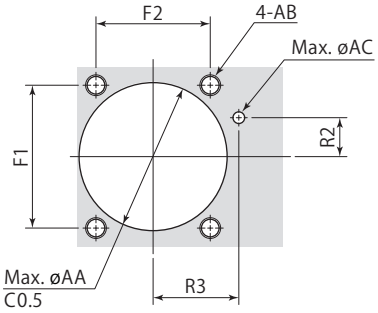
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- Air vent must be opened to atmosphere. Provide the piping if there is a risk of coolant or metal chips intrusion.
- CTV□U-C (Straight, swing angle 0°) is made to order.

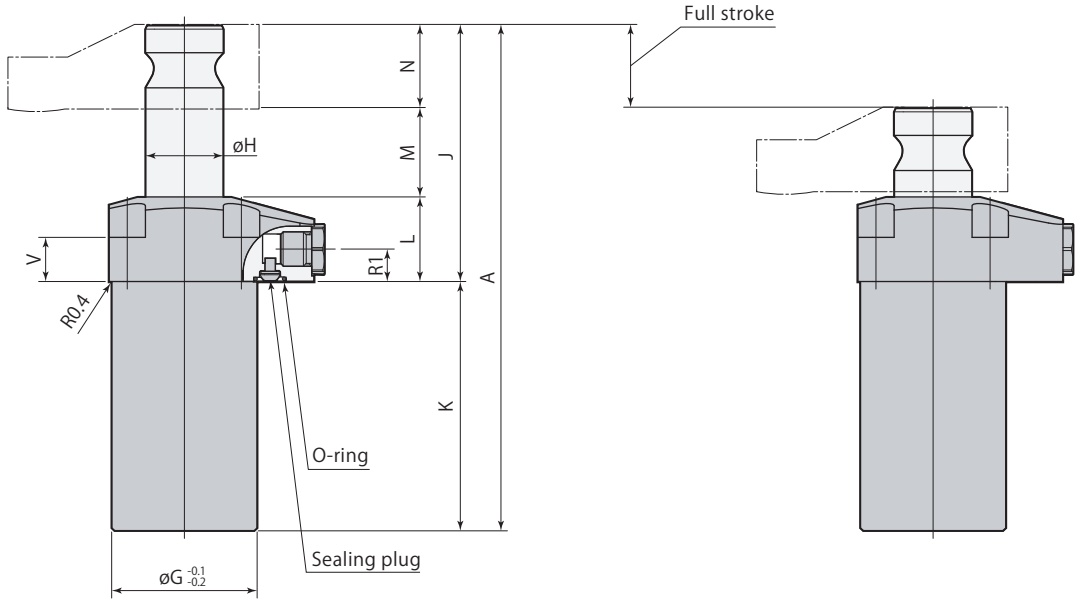
Dimensions



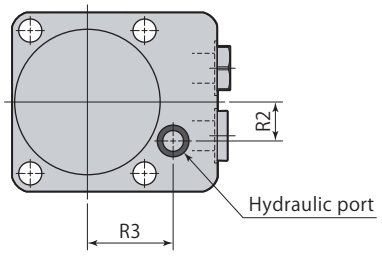
Mounting details



The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp



Stroke end

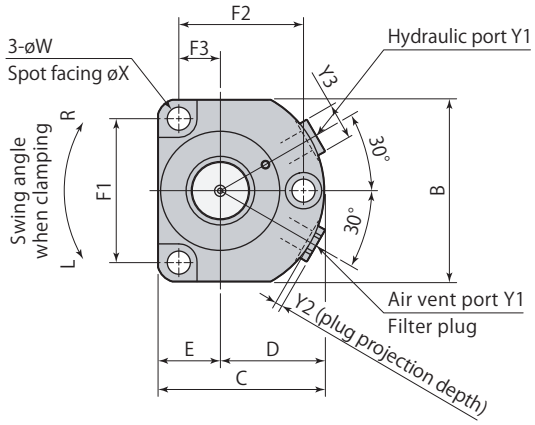
mm

Model	CTV16U-□	CTV25U-□
A	195	226
B	69	69
C	79	87.5
D	50	53
E	29	34.5
F1	55	55
F2	44	55
øG	56	61.5
øH	30	32
J	99	110
K	96	116
L	32	32.5
M	35	42.5
N	32	35
R1	12.5	12.5
R2	15	15
R3	33	36
R4	26	26
V	17	17
øW	8.9	8.9
øX	14	14
Y1	G1/4	G1/4
Y2	4.3	4.3
Y3	19	19
O-ring (fluorocarbon hardness Hs90)	P9	P9
øAA	57	62.5
AB	M8	M8
øAC	7	7
Mass	2.6 kg	3.4 kg
Air bleeding valve	VCE02	VCE02

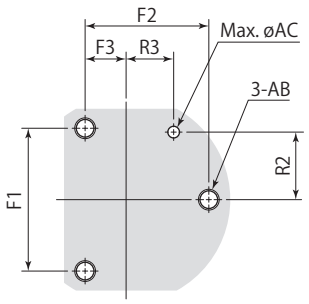
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- Air vent must be opened to atmosphere. Provide the piping if there is a risk of coolant or metal chips intrusion.
- CTV□U-C (Straight, swing angle 0°) is made to order.

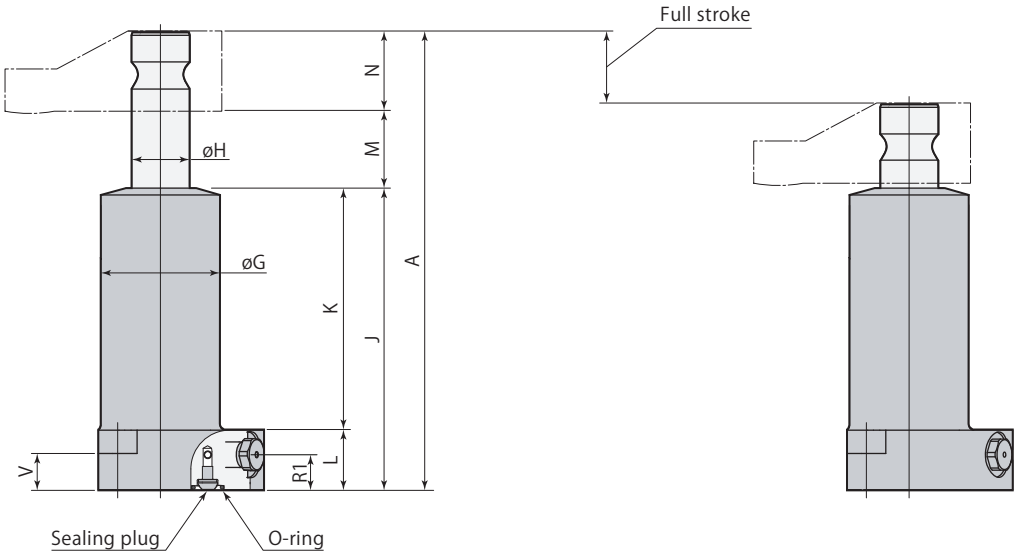
Dimensions



Mounting details

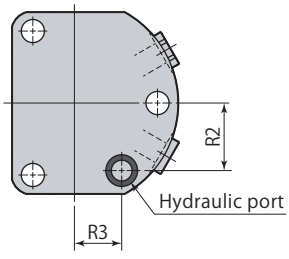


The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp

Stroke end



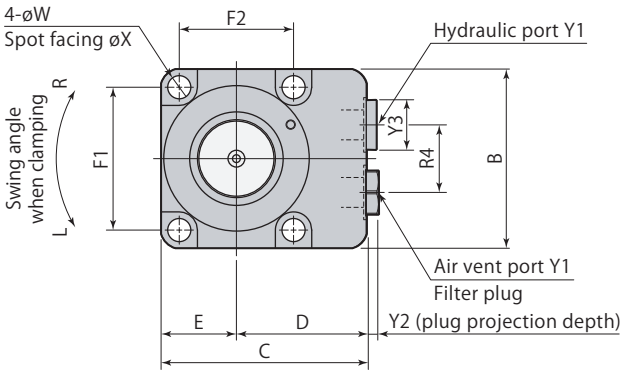
mm

Model	CTV06B-□	CTV10B-□
A	137	176.5
B	56	70
C	50.5	64
D	32.5	40
E	18	24
F1	43.3	55
F2	37.5	47.6
F3	12.5	15.9
øG	35	46
øH	16	22.4
J	92	116
K	69	93
L	23	23
M	24	30.5
N	21	30
R1	13.5	13.5
R2	20.5	26
R3	14.3	18.2
V	16	14
øW	7	8.9
øX	11	14
Y1	G1/8	G1/8
Y2	2.8	2.8
Y3	14	14
O-ring (fluorocarbon hardness Hs90)	P9	P9
AB	M6	M8
øAC	7	7
Mass	0.8 kg	1.7 kg
Air bleeding valve	VCE01	VCE01

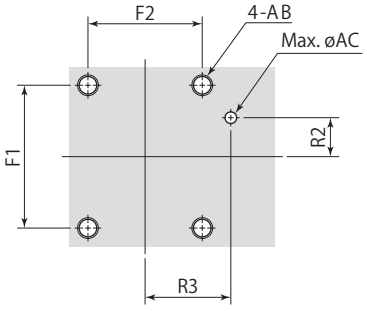
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- Air vent must be opened to atmosphere. Provide the piping if there is a risk of coolant or metal chips intrusion.
- CTV□B-C (Straight, swing angle 0°) is made to order.

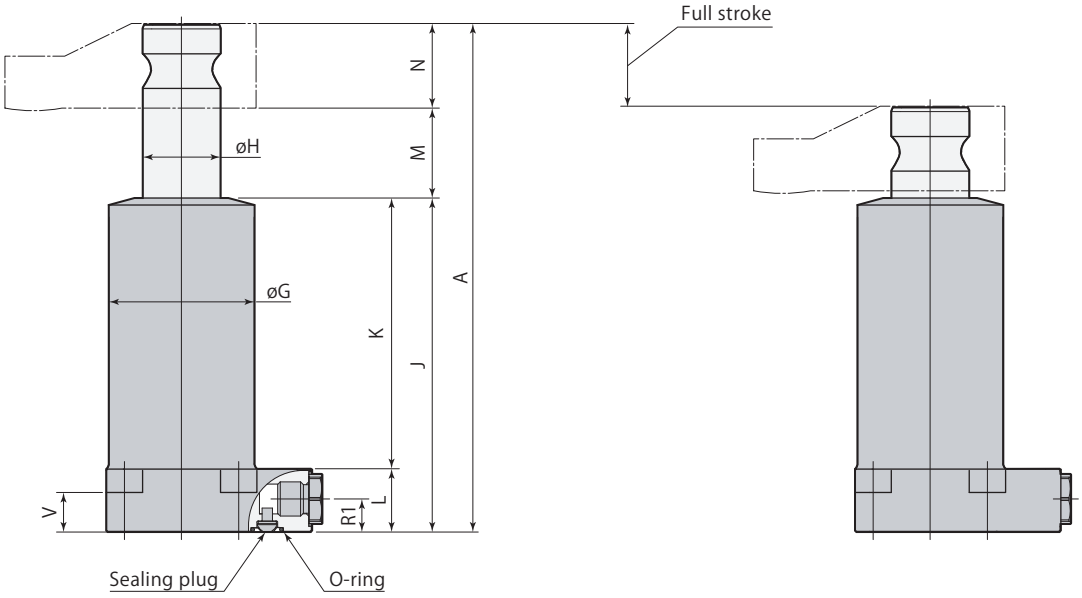
Dimensions



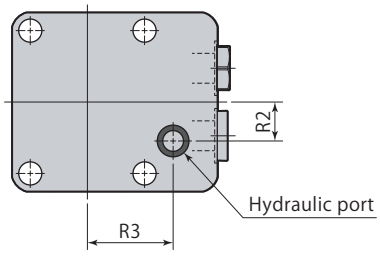
Mounting details



The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



Unclamp



Stroke end

mm

Model	CTV16B-□	CTV25B-□
A	195	226
B	69	69
C	79	87.5
D	50	53
E	29	34.5
F1	55	55
F2	44	55
øG	56	61.5
øH	30	32
J	128	148.5
K	104	124.5
L	24	24
M	35	42.5
N	32	35
R1	12.5	12.5
R2	15	15
R3	33	36
R4	26	26
V	15	15
øW	8.9	8.9
øX	14	14
Y1	G1/4	G1/4
Y2	4.3	4.3
Y3	19	19
O-ring (fluorocarbon hardness Hs90)	P9	P9
AB	M8	M8
øAC	7	7
Mass	2.7 kg	3.5 kg
Air bleeding valve	VCE02	VCE02

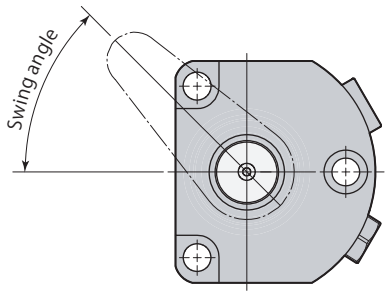
Refer to each page for the details of options.

- Clamp arm **page →82**
- Air bleeding valve **page →50**
- Clamp arm and mounting screws are not included.
- Air vent must be opened to atmosphere. Provide the piping if there is a risk of coolant or metal chips intrusion.
- CTV□B-C (Straight, swing angle 0°) is made to order.

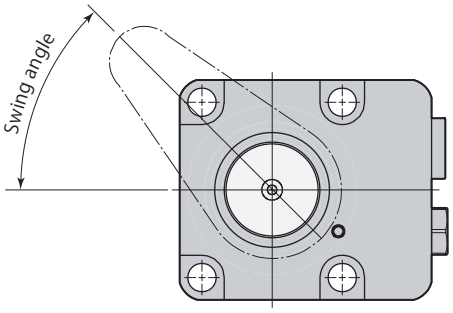
CTV□U-□N□	Single acting Swing clamp Swing angle 30°, 45°, 60°	35MPa	Single acting

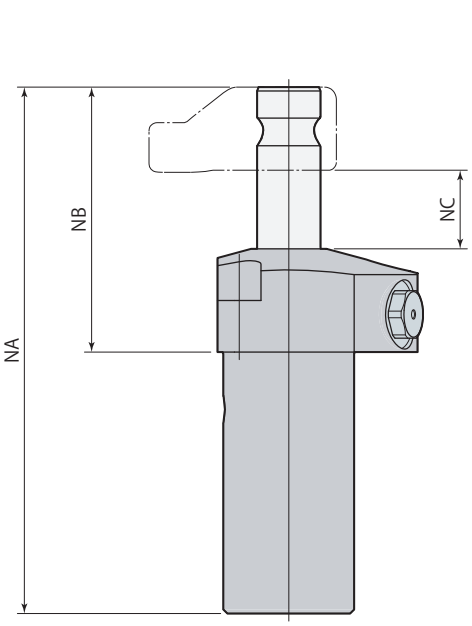
Dimensions

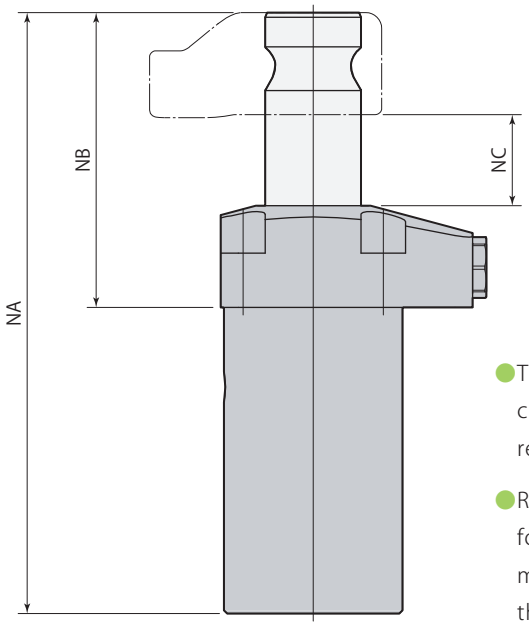
CTV06, 10 U-□
N30, N45, N60



CTV16, 25 U-□
N30, N45, N60







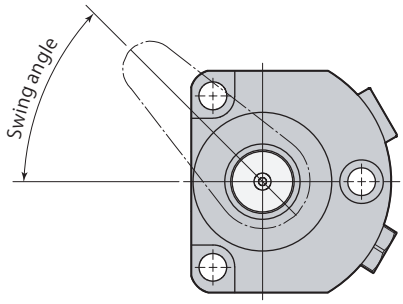
- This diagram indicates unclamped condition of swing direction L (counter-clockwise).
- Refer to **pages →72** to **75** for other specifications and dimensions that are not shown in the diagram.
- This product is made to order.

mm

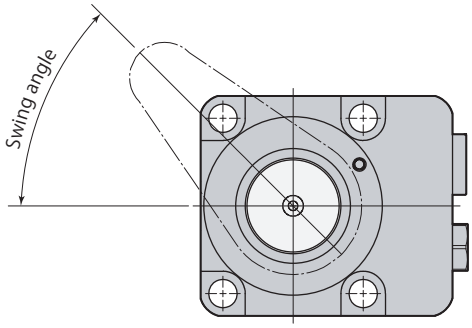
Model	CTV06U-□N□			CTV10U-□N□			CTV16U-□N□			CTV25U-□N□		
Swing angle	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°
Full stroke	16.5	17.9	19.3	20.7	22.5	24.3	23.3	25.5	27.6	28.0	31.0	34.0
Swing stroke	6.5	7.9	9.3	7.7	9.5	11.3	9.3	11.5	13.6	12.0	15.0	18.0
Clamp stroke	10			13			14			16		
Cylinder capacity (cm³)	3.0	3.2	3.5	8.5	9.2	10.0	12.8	14.0	15.2	21.0	23.3	25.5
NA	131.5	132.9	134.3	169.2	171.0	172.8	186.3	188.5	190.6	214.0	217.0	220.0
NB	65.5	66.9	68.3	79.2	81.0	82.8	90.3	92.5	94.6	98.0	101.0	104.0
NC	18.5	19.9	21.3	23.2	25.0	26.8	26.3	28.5	30.6	30.5	33.5	36.5

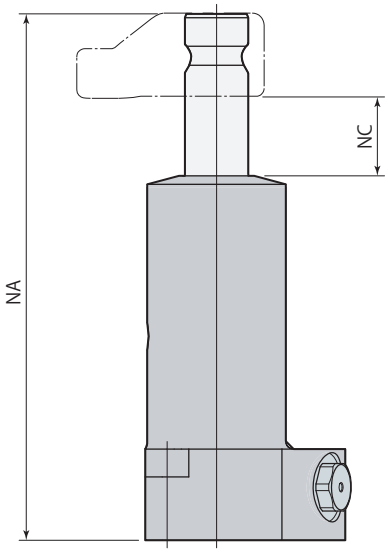
Dimensions

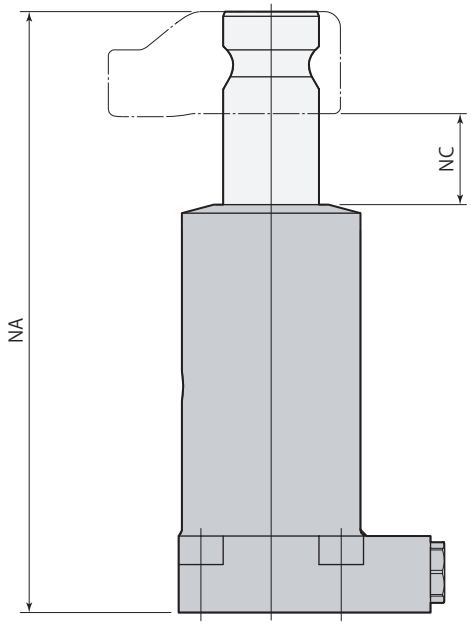
CTV06, 10 B-□
N30, N45, N60



CTV16, 25 B-□
N30, N45, N60





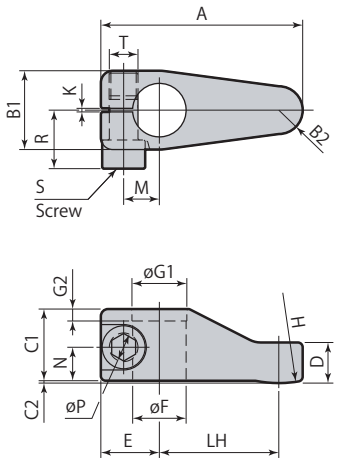


- This diagram indicates unclamped condition of swing direction L (counter-clockwise).
- Refer to **pages →76** to **79** for other specifications and dimensions that are not shown in the diagram.
- This product is made to order.

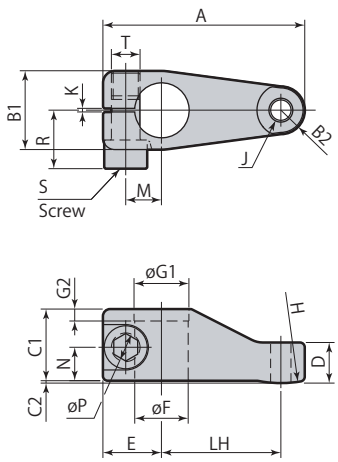
mm

Model	CTV06B-□N□			CTV10B-□N□			CTV16B-□N□			CTV25B-□N□		
Swing angle	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°	30°±5°	45°±5°	60°±5°
Full stroke	16.5	17.9	19.3	20.7	22.5	24.3	23.3	25.5	27.6	28.0	31.0	34.0
Swing stroke	6.5	7.9	9.3	7.7	9.5	11.3	9.3	11.5	13.6	12.0	15.0	18.0
Clamp stroke	10			13			14			16		
Cylinder capacity (cm³)	3.0	3.2	3.5	8.5	9.2	10.0	12.8	14.0	15.2	21.0	23.3	25.5
NA	131.5	132.9	134.3	169.2	171.0	172.8	186.3	188.5	190.6	214.0	217.0	220.0
NC	18.5	19.9	21.3	23.2	25.0	26.8	26.3	28.5	30.6	30.5	33.5	36.5

W1 Clamp arm



W2 Clamp arm

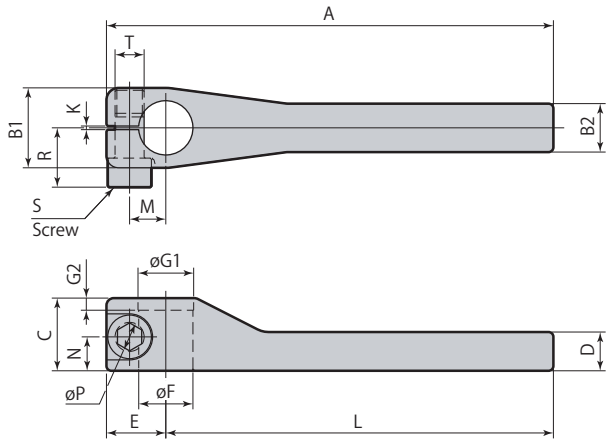


Material : SCM440 (Refining HB285–344)

mm

Clamp arm	CTH06-W□	CTH10-W□	CTH16-W□	CTH25-W□
A	64.5	84.5	98	113
B1	24	33	43	49
B2	7	10	11	15
C1	21	30	32	35
C2	0.5	1	1	1.5
D	12.5	17	21	21.5
E	17.5	24.5	30	33
øF	16 $^{+0.003}_{-0.015}$	22.4 $^{+0.004}_{-0.017}$	30 $^{+0.004}_{-0.017}$	32 $^{+0.005}_{-0.020}$
øG1	–	23	–	33
G2	–	5	–	6
H	50	50	60	75
J	M8×1.25	M10×1.5	M10×1.5	M12×1.75
K	2	2	2	2
LH	40	50	57	65
M	10.5±0.1	15±0.1	19±0.1	20.5±0.1
N	10	14	15	16
øP	8 $^{+0.015}_{0}$	12 $^{+0.018}_{0}$	14 $^{+0.018}_{0}$	16 $^{+0.018}_{0}$
R	16.5	24.5	29.5	34.5
S (screw)	CTH06-VB	CTH10-VB	CTH16-VB	CTH25-VB
T	M8×1.0	M12×1.5	M14×1.5	M16×1.5
Mass	0.13 kg	0.33 kg	0.52 kg	0.78 kg
Swing clamp	CTW06 CTV06	CTW10 CTV10	CTW16 CTV16	CTW25 CTV25

WL Clamp arm

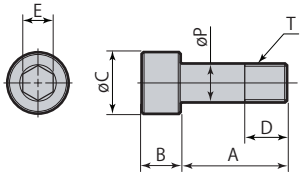


Material : SCM440 (Refining HB285–344)

mm

Clamp arm	CTH06-WL	CTH10-WL	CTH16-WL	CTH25-WL
A	152.5	184.5	200	213
B1	24	33	43	49
B2	14	20	22	30
C	21	30	32	35
D	12	16	20	20
E	17.5	24.5	30	33
øF	16 $^{+0.003}_{-0.015}$	22.4 $^{+0.004}_{-0.017}$	30 $^{+0.004}_{-0.017}$	32 $^{+0.005}_{-0.020}$
øG1	–	23	–	33
G2	–	5	–	6
K	2	2	2	2
L	135	160	170	180
M	10.5±0.1	15±0.1	19±0.1	20.5±0.1
N	10	14	15	16
øP	8 $^{+0.015}_{0}$	12 $^{+0.018}_{0}$	14 $^{+0.018}_{0}$	16 $^{+0.018}_{0}$
R	16.5	24.5	29.5	34.5
S (screw)	CTH06-VB	CTH10-VB	CTH16-VB	CTH25-VB
T	M8×1.0	M12×1.5	M14×1.5	M16×1.5
Mass	0.24 kg	0.58 kg	0.87 kg	1.25 kg
Swing clamp	CTW06 CTV06	CTW10 CTV10	CTW16 CTV16	CTW25 CTV25

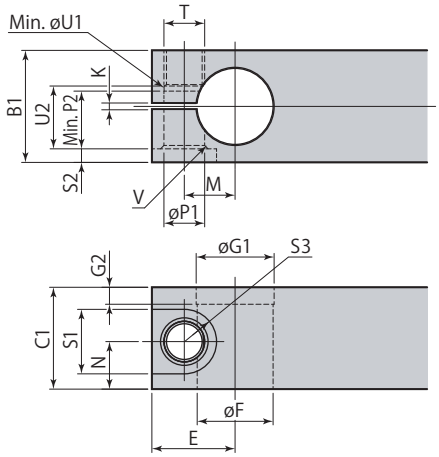
Screw

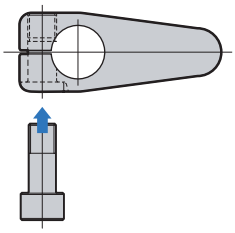


mm

Screw	CTH06-VB	CTH10-VB	CTH16-VB	CTH25-VB
A	20	28	35	41
B	8	12	14	16
øC	13	18	21	24
D	9	11	13	15
E	6	10	12	14
øP	8 $^{-0.01}_{-0.05}$	12 $^{-0.01}_{-0.05}$	14 $^{-0.01}_{-0.05}$	16 $^{-0.01}_{-0.05}$
T	M8×1.0	M12×1.5	M14×1.5	M16×1.5
Swing clamp	CTW06 CTV06	CTW10 CTV10	CTW16 CTV16	CTW25 CTV25

Clamp arm is not included. Manufacture a clamp arm with the dimensions shown in the table below.





● Install mounting screws for arm from direction shown in left diagram viewed from top. Installation from the opposite direction can cause loosened screws and resultant broken rod.

mm

Swing clamp	CTW06 CTV06	CTW10 CTV10	CTW16 CTV16	CTW25 CTV25
B1	24	33	43	49
C1	21	30	32	35
E	17.5	24.5	30	33
øF	16 $^{+0.003}_{-0.015}$	22.4 $^{+0.004}_{-0.017}$	30 $^{+0.004}_{-0.017}$	32 $^{+0.005}_{-0.020}$
øG1	–	23	–	33
G2	–	5	–	6
K	2	2	2	2
M	10.5±0.1	15±0.1	19±0.1	20.5±0.1
N	10	14	15	16
øP1	8 $^{+0.015}_{0}$	12 $^{+0.018}_{0}$	14 $^{+0.018}_{0}$	16 $^{+0.018}_{0}$
P2	11	17	22	26
S1	14	19	22	25
S2	3.5	4	6	6
S3	7	9.5	11	12.5
T	M8×1.0	M12×1.5	M14×1.5	M16×1.5
øU1	7.9	11.9	13.9	15.9
U2	12.5	18.5	23.5	27.5
V	C1	C1	C1.5	C1.5

Caution in use

Mounting & dismounting of clamp arm

Swing clamp may be damaged if excessive torque is applied to piston rod, since structure is intended for swinging using cam mechanism with lead grooves.

Loosen screw (CTH□-VB) before mounting or dismounting clamp arm, or adjusting position of clamp arm, to prevent excessive rotating torque from being applied on piston rod.

Refer to table below for screw tightening torque.

Swing clamp	Thread size	Tightening torque
CTW06, CTV06	M 8	30 N·m
CTW10, CTV10	M12	100 N·m
CTW16, CTV16	M14	150 N·m
CTW25, CTV25	M16	240 N·m

Swing speed adjustment

Too fast swinging speed of clamp arm can cause malfunction. Adjust speed using flow control valve with check valve to set the swing time equal to or higher than the shortest swing time shown in the table below. Clamp stroke (perpendicular descend) time is not included in 90° swing time.

Swing clamp	Shortest swing time	Max. flow rate	
		Clamping side	Unclamping side
CTW06, CTV06	0.3 s	0.43 L/min	0.91 L/min*
CTW10, CTV10	0.3 s	1.23 L/min	2.41 L/min*
CTW16, CTV16	0.4 s	1.48 L/min	3.39 L/min*
CTW25, CTV25	0.4 s	2.70 L/min	5.60 L/min*

*: Only for the double-acting model CTW

Moment of inertia for clamp arm

Too large moment of inertia for clamp arm can also cause malfunction. When fabricating the clamp arm, determine a proper shape which provides moment of inertia smaller than the maximum moment of inertia shown in the table below.

Swing clamp	Max. moment of inertia
CTW06, CTV06	1.6×10^{-3} kg·m²
CTW10, CTV10	5.1×10^{-3} kg·m²
CTW16, CTV16	8.5×10^{-3} kg·m²
CTW25, CTV25	1.4×10^{-2} kg·m²

Moment of inertia for option clamp arm (reference)

Clamp arm models		Moment of inertia
Standard type	CTH06-W1, CTH06-W2	6.1×10^{-5} kg·m²
	CTH10-W1, CTH10-W2	2.6×10^{-4} kg·m²
	CTH16-W1, CTH16-W2	5.5×10^{-4} kg·m²
	CTH25-W1, CTH25-W2	1.14×10^{-3} kg·m²
Long type	CTH06-WL	1.1×10^{-3} kg·m²
	CTH10-WL	3.5×10^{-3} kg·m²
	CTH16-WL	5.8×10^{-3} kg·m²
	CTH25-WL	9.5×10^{-3} kg·m²

Link clamp

		model CLW Page →86	model CLV Page →86
			
Specifications		35MPa Double acting	35MPa Single acting
Features		Low profiled cylinder Built-in sensor model	Low profiled cylinder Built-in sensor model
Variations	Compact model (without sensor) 	CLW-N **Page →92**	CLV-N **Page →102**
Option	Flow control valve 	VCH **Page →108**	
	Air bleeding valve 	VCE **Page →110**	

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Double acting Compact model **CLW**

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- Specifications, Piping ····· **89**
- Performance diagram, Performance table ····· **90**
- Dimensions ····· **92**
- Clamp arm mounting details ····· **95**
- Clamp arm allowable eccentricity ····· **96**
- Caution in use ····· **97**

Single acting Compact model **CLV**

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Flow control valve **VCH** ····· **108**

Air bleeding valve **VCE** ····· **110**

Link clamp

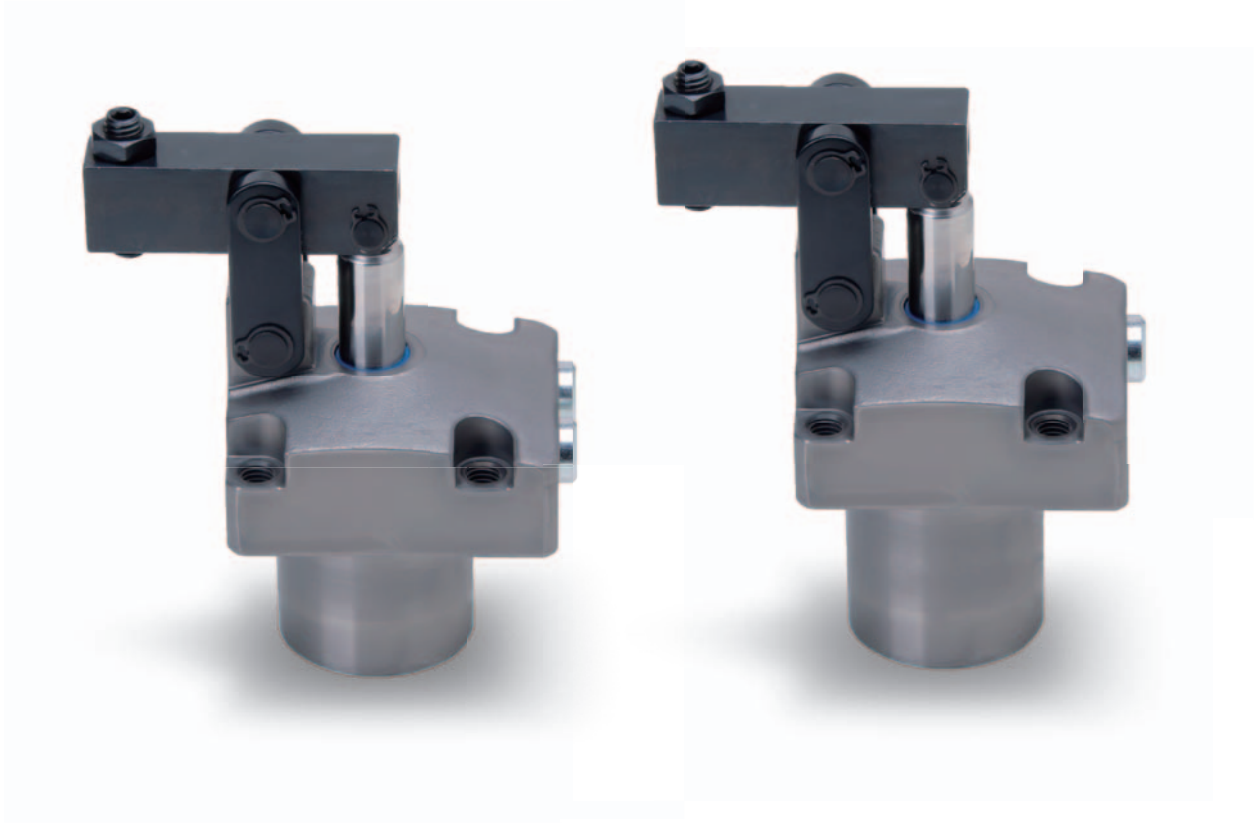
35MPa

Double acting

model **CLW**

Single acting

model **CLV**

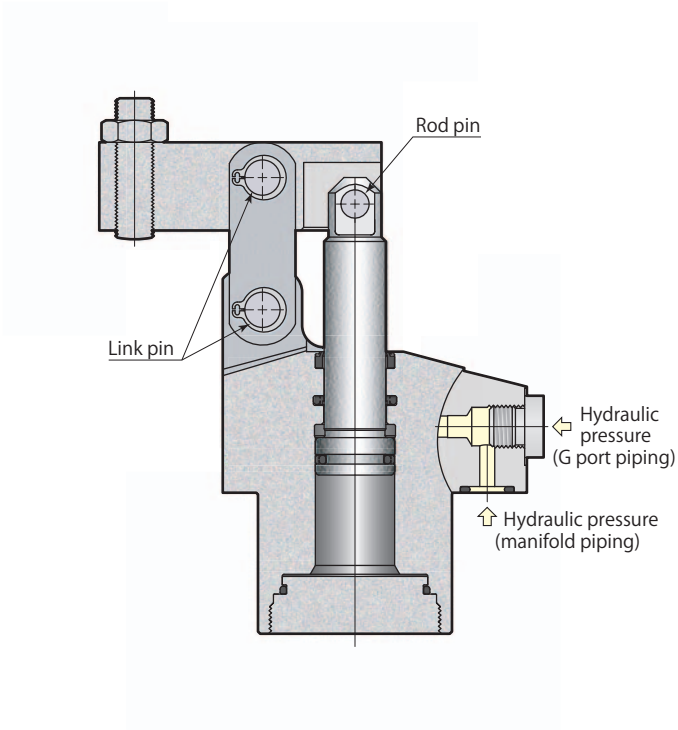


Double acting
model CLW06-FN

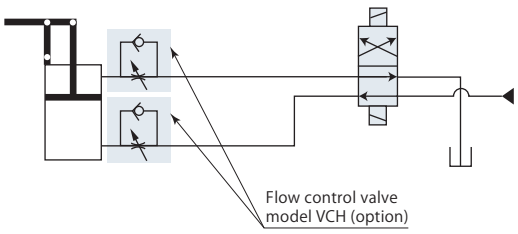
Single acting
model CLV06-FN

Compact model

model **CLW□-□N**



Hydraulic circuit diagram



For flow control valve, we recommend the meter-in control. If meter-out control is used, due to the area difference, it will cause back pressure and become high pressure. This can lead to malfunction of the system. Please be aware when designing the circuit.

Specifications page → 89
Dimentions page → 92
Mounting details page → 94

Specifications

Size / Clamp arm mounting direction

CLW — 04 / 06 / 10 / 16 / 25 — L : Left side / F : Front side / R : Right side — N : Compact model

Model			CLW04	CLW06	CLW10	CLW16	CLW25
Cylinder force (hydraulic pressure 35MPa)		kN	5.4	8.9	13.3	21.6	35.6
Cylinder inner diameter		mm	14	18	22	28	36
Rod diameter		mm	12	14	18	22.4	28
Effective area (clamp)		cm^2	1.5	2.5	3.8	6.2	10.2
Full stroke		mm	23.5	26	29.5	36	45
Clamp stroke*1		mm	20.5	23	26.5	33	42
Safety stroke		mm	3	3	3	3	3
Max. oil flow rate		L/min	0.38	0.69	1.18	2.39	5.08
Cylinder capacity	Clamp	cm^3	3.6	6.6	11.2	22.2	45.8
	Unclamp	cm^3	1.0	2.6	3.7	8.0	18.1
Mass		kg	0.9	1.3	1.9	3.5	5.7
Recommended tightening torque of mounting screws*2		N·m	7	12	29	57	100

- Pressure range : 1–35 MPa (model CLW04 : 3–35 MPa)
- Proof pressure : 52.5 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

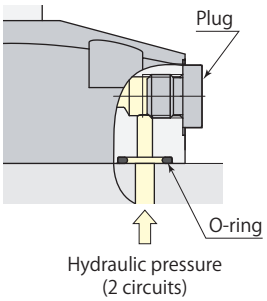
*1 : Indicates a distance from unclamping position to clamping point.

*2 : ISO R898 class 12.9

Manifold piping and G port piping are available.

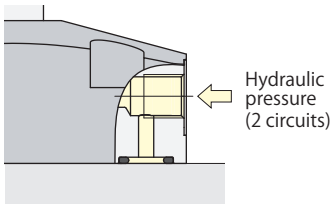
Manifold piping

When choosing manifold piping, a flow control valve (model VCH) and an air bleeding valve (model VCE) are mountable on the G ports of the clamp.

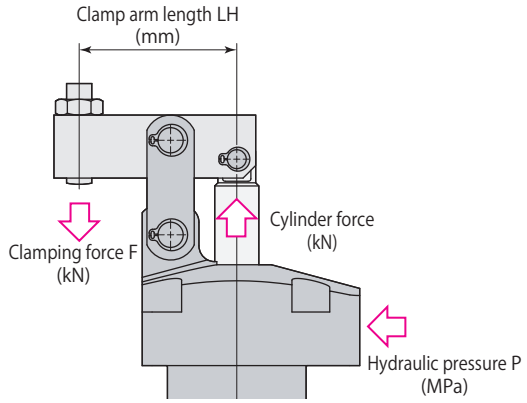


G port piping

Remove plugs when choosing G port piping. (O-ring must be used.) The flow control valve and the air bleeding valve should be installed in the middle of oil path.



Performance diagram



Clamping force varies depending on the clamp arm length (LH) and hydraulic pressure (P).

Clamping force calculation formula

F = Coefficient 1 × P/(LH - Coefficient 2)

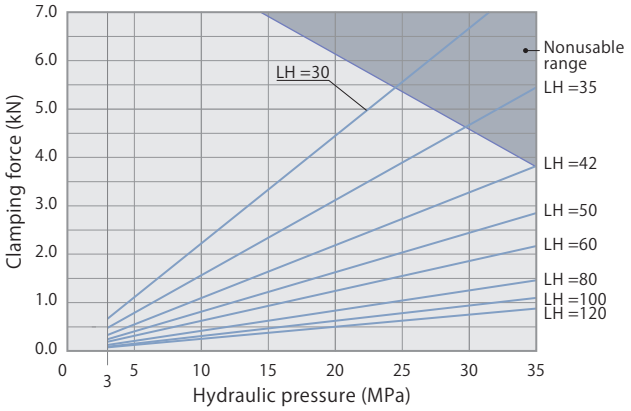
F : Clamping force P : Hydraulic pressure LH : Clamp arm length

CLW10 with clamp arm length (LH) = 50 mm at hydraulic pressure of 25 MPa, Clamping force F is calculated by

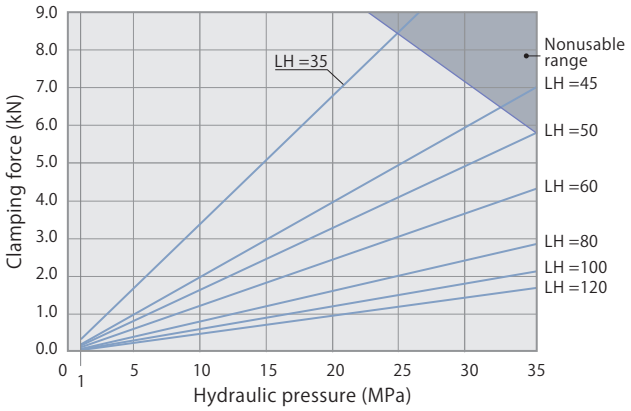
8.38×25/(50-24.5)=8.2 kN

Do not use the clamp in the nonusable range. It may cause damage to the cylinder and rod.

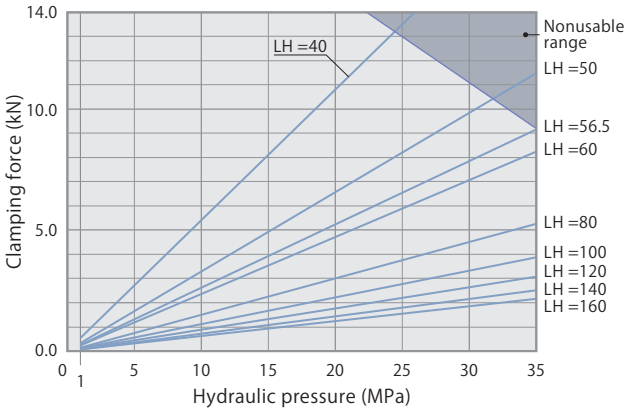
model CLW04



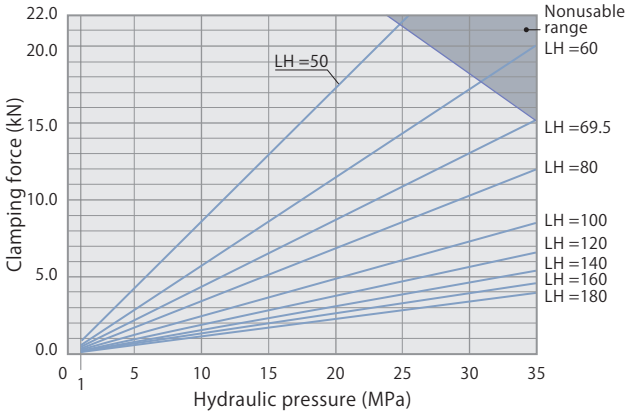
model CLW06



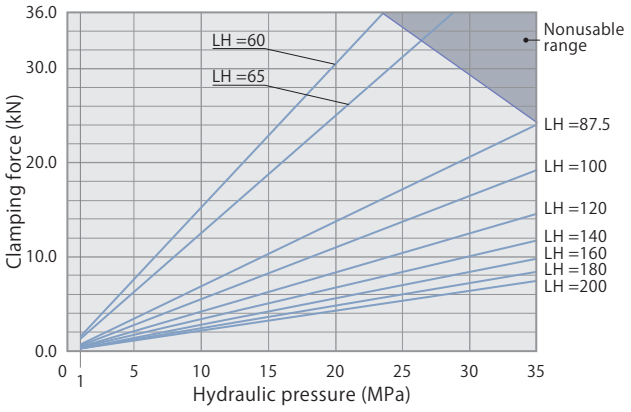
model CLW10



model CLW16



model CLW25



Performance table

model CLW04 — Clamping force F=2.56×P/(LH-18.5)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm								Min. arm length Min. LH mm
		30	35	42	50	60	80	100	120	
35	5.4			3.8	2.8	2.2	1.5	1.1	0.9	42
30	4.6			3.3	2.4	1.9	1.2	0.9	0.8	35.3
25	3.9		3.9	2.7	2.0	1.5	1.0	0.8	0.6	30.5
20	3.1	4.5	3.1	2.2	1.6	1.2	0.8	0.6	0.5	30
15	2.3	3.3	2.3	1.6	1.2	0.9	0.6	0.5	0.4	↑
10	1.5	2.2	1.6	1.1	0.8	0.6	0.4	0.3	0.3	↑
5	0.8	1.1	0.8	0.5	0.4	0.3	0.2	0.2	0.1	↑
3	0.5	0.7	0.5	0.3	0.2	0.2	0.1	0.1	0.1	30
Max. pressure MPa		24.4	29.7	35	35	35	35	35	35	

indicates nonusable range

model CLW06 — Clamping force F=4.81×P/(LH-21.0)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm							Min. arm length Min. LH mm
		35	45	50	60	80	100	120	
35	8.9			5.8	4.3	2.9	2.1	1.7	50
30	7.6		6.0	5.0	3.7	2.4	1.8	1.5	41.5
25	6.4		5.0	4.1	3.1	2.0	1.5	1.2	35.5
20	5.1	6.9	4.0	3.3	2.5	1.6	1.2	1.0	35
15	3.8	5.2	3.0	2.5	1.9	1.2	0.9	0.7	↑
10	2.5	3.4	2.0	1.7	1.2	0.8	0.6	0.5	↑
5	1.3	1.7	1.0	0.8	0.6	0.4	0.3	0.2	↑
1	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	35
Max. pressure MPa		24.6	32.3	35	35	35	35	35	

indicates nonusable range

model CLW10 — Clamping force F=8.38×P/(LH-24.5)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm									Min. arm length Min. LH mm
		40	50	56.5	60	80	100	120	140	160	
35	13.3			9.2	8.3	5.3	3.9	3.1	2.5	2.2	56.5
30	11.4		9.9	7.9	7.1	4.5	3.3	2.6	2.2	1.9	47
25	9.5		8.2	6.5	5.9	3.8	2.8	2.2	1.8	1.5	40.5
20	7.6	10.8	6.6	5.2	4.7	3.0	2.2	1.8	1.5	1.2	40
15	5.7	8.1	4.9	3.9	3.5	2.3	1.7	1.3	1.1	0.9	↑
10	3.8	5.4	3.3	2.6	2.4	1.5	1.1	0.9	0.7	0.6	↑
5	1.9	2.7	1.6	1.3	1.2	0.8	0.6	0.4	0.4	0.3	↑
1	0.4	0.5	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	40
Max. pressure MPa		24.4	31.7	35	35	35	35	35	35	35	

indicates nonusable range

model CLW16 — Clamping force F=16.90×P/(LH-30.5)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm									Min. arm length Min. LH mm
		50	60	69.5	80	100	120	140	160	180	
35	21.6			15.2	11.9	8.5	6.6	5.4	4.6	4.0	69.5
30	18.5		17.2	13.0	10.2	7.3	5.7	4.6	3.9	3.4	58.5
25	15.4		14.3	10.8	8.5	6.1	4.7	3.9	3.3	2.8	50.5
20	12.3	17.3	11.5	8.7	6.8	4.9	3.8	3.1	2.6	2.3	50
15	9.2	13.0	8.6	6.5	5.1	3.6	2.8	2.3	2.0	1.7	↑
10	6.2	8.7	5.7	4.3	3.4	2.4	1.9	1.5	1.3	1.1	↑
5	3.1	4.3	2.9	2.2	1.7	1.2	0.9	0.8	0.7	0.6	↑
1	0.6	0.9	0.6	0.4	0.3	0.2	0.2	0.2	0.1	0.1	50
Max. pressure MPa		24.8	30.9	35	35	35	35	35	35	35	

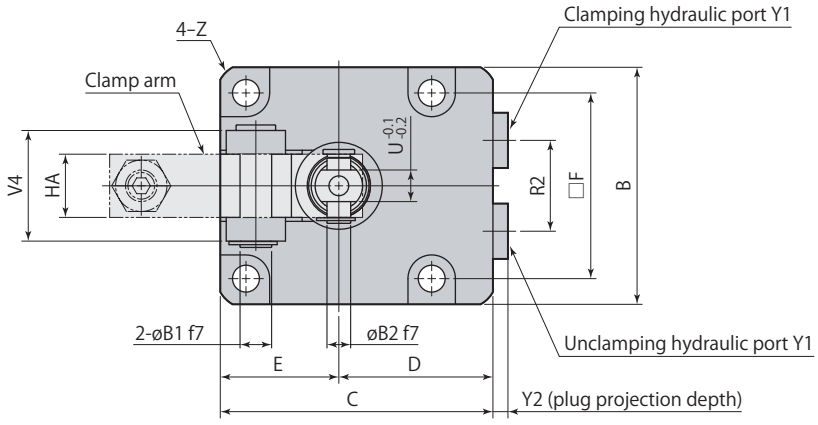
indicates nonusable range

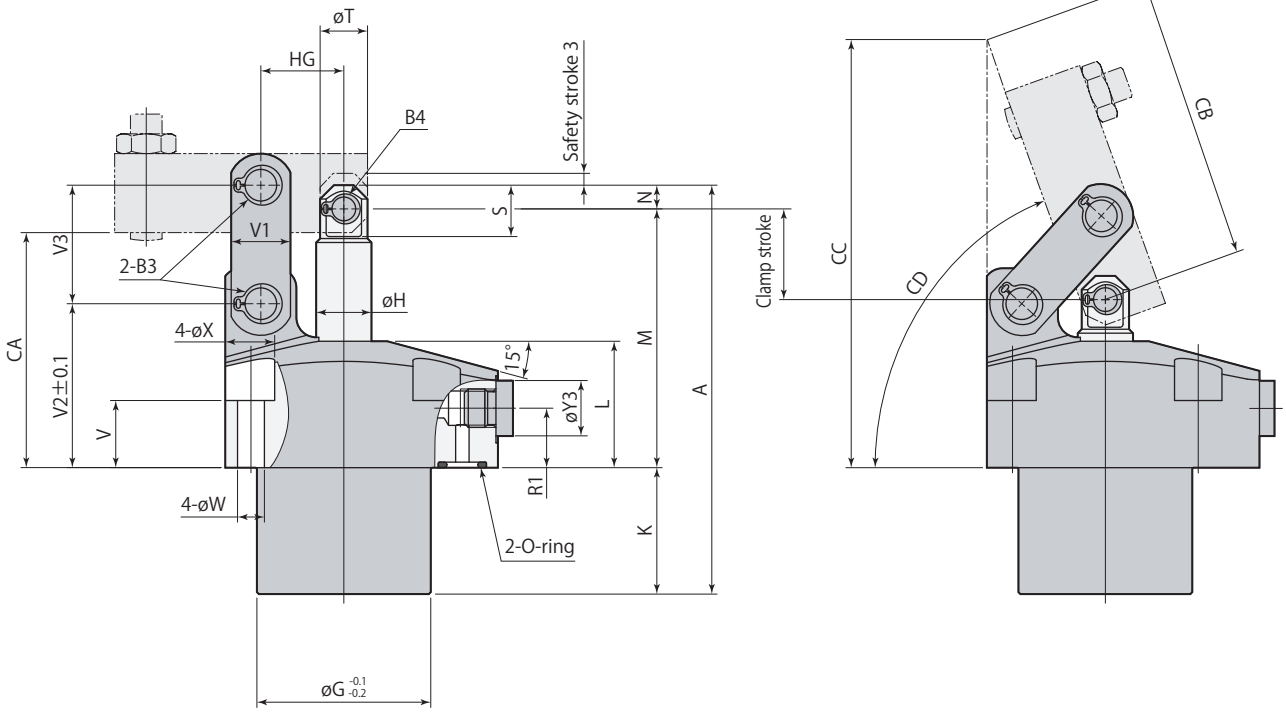
model CLW25 — Clamping force F=34.35×P/(LH-37.5)

Hydraulic pressure MPa	Cylinder force kN	Clamping force kN — Clamp arm length LH mm									Min. arm length Min. LH mm
		60	65	87.5	100	120	140	160	180	200	
35	35.6			24.0	19.2	14.6	11.7	9.8	8.4	7.4	87.5
30	30.5			20.6	16.5	12.5	10.1	8.4	7.2	6.3	73
25	25.5		31.2	17.2	13.7	10.4	8.4	7.0	6.0	5.3	62.5
20	20.4	30.5	25.0	13.7	11.0	8.3	6.7	5.6	4.8	4.2	60
15	15.3	22.9	18.7	10.3	8.2	6.2	5.0	4.2	3.6	3.2	↑
10	10.2	15.3	12.5	6.9	5.5	4.2	3.4	2.8	2.4	2.1	↑
5	5.1	7.6	6.2	3.4	2.7	2.1	1.7	1.4	1.2	1.1	↑
1	1.0	1.5	1.2	0.7	0.5	0.4	0.3	0.3	0.2	0.2	60
Max. pressure MPa		23.5	26.3	35	35	35	35	35	35	35	

indicates nonusable range

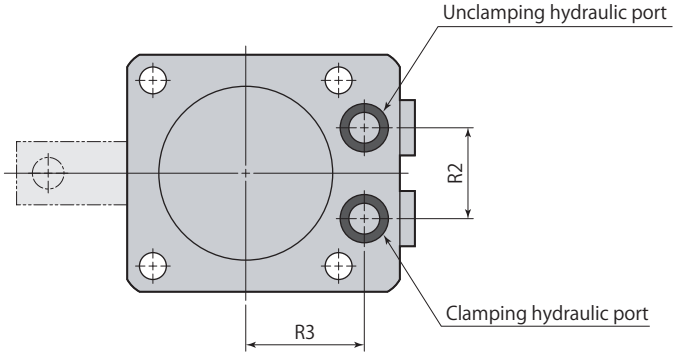
Dimensions





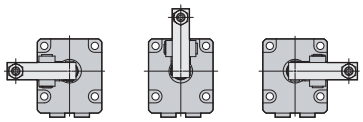
Clamp

Unclamp



- This diagram represents external contour of CLW□-FN. CLW□-LN and CLW□-RN differ only in terms of mounting direction of clamp arm and otherwise all dimensions are identical to those of CLW□-FN.

L:Left side F:Front side R:Right side



- Clamp arm and mounting screws are not included.

mm

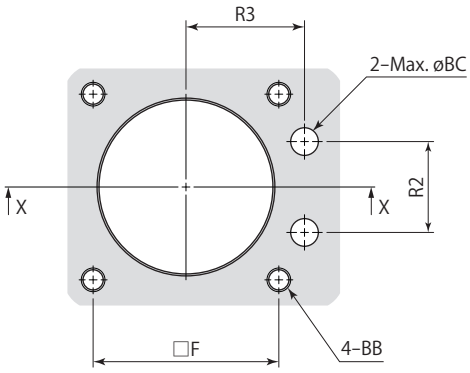
Model	CLW04-□N	CLW06-□N	CLW10-□N	CLW16-□N	CLW25-□N
A	96	103.5	116.5	143.5	171.5
B	50	60	70	86	108
C	60	69	77	96	110
D	35	39	42	53	56
E	25	30	35	43	54
F	40	47	54	65	85
øG	35	44	48	58	66
øH	12	14	18	22.4	28
K	31.5	32	35.5	43.5	50
L	27.7	32	33.5	41	47
M	58.5	65.5	73	89	108.5
N	6	6	8	11	13
R1	12.5	15	15	17	21
R2	22	23	26	30	40
R3	27.5	30	33	40	43
S	13	13	17	21.8	27.5
øT	10	12	15	20	26
U (width across flats)	6	8	10	11	16
V	17	17	17	20	21
V1	13	15	19	25	32
V2	36	41.5	45	54.5	65
V3	26	30	35.5	44	53
V4	21	28	37	46	56
øW	5.5	6.8	9	11	14
øX	10	12	15	18.5	20.5
Y1	G1/8	G1/8	G1/8	G1/4	G1/4
Y2	3.8	3.8	3.8	4.8	4.8
Y3	14	14	14	19	19
Z	C2.5	C2.5	C3	C3.5	C5.5
øB1	$6^{-0.010}_{-0.022}$	$8^{-0.013}_{-0.028}$	$10^{-0.013}_{-0.028}$	$14^{-0.016}_{-0.034}$	$16^{-0.016}_{-0.034}$
øB2	$6^{-0.010}_{-0.022}$	$6^{-0.010}_{-0.022}$	$8^{-0.013}_{-0.028}$	$12^{-0.016}_{-0.034}$	$14^{-0.016}_{-0.034}$
B3 (snap ring)*1	STW-6	STW-8	STW-10	STW-14	STW-16
B4 (snap ring)*1	STW-6	STW-6	STW-8	STW-12	STW-14
CA	52.5	59.5	65	80	96
CB	59.6	71.7	78.7	98.2	133.5
CC	92.5	107.9	117.4	144.7	189.2
CD	About 71°	About 70°	About 70°	About 69°	About 72°
HA	12	16	19	22	32
HG	18.5	21	24.5	30.5	37.5
O-ring (fluorocarbon hardness Hs90)	P9	P9	P9	P9	P9
Flow control valve (meter-in)*2	VCH01	VCH01	VCH01	VCH02	VCH02
Air bleeding valve*2	VCE01	VCE01	VCE01	VCE02	VCE02

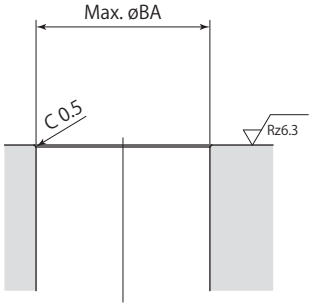
∗1：Snap ring is made by Ochiai Corporation.

∗2：Select the right model of VCH and VCE according to the size of the clamp.

Refer to each page for the details of options. ● Flow control valve **page →108** ● Air bleeding valve **page →110**

Mounting details





X-X

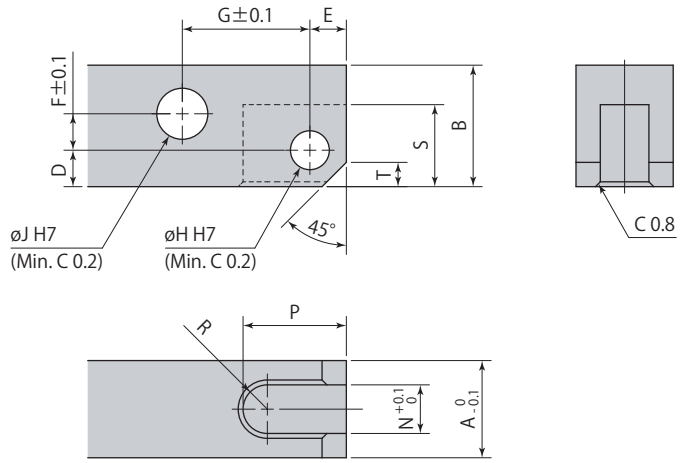
Rz: ISO4287(1997)

mm

Model	CLW04-□N	CLW06-□N	CLW10-□N	CLW16-□N	CLW25-□N
F	40	47	54	65	85
R2	22	23	26	30	40
R3	27.5	30	33	40	43
øBA	36	47	52	62	72
BB	M5	M6	M8	M10	M12
øBC	7	7	7	7	7

Clamp arm mounting details

Clamp arm is not included. Manufacture a clamp arm with the dimensions shown in the table below.



Recommended material：S45C (HB167–229)

mm

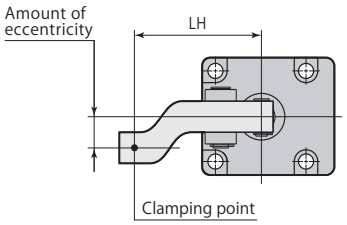
Link clamp	CLW04-□N	CLW06-□N	CLW10-□N	CLW16-□N	CLW25-□N
A	12	16	19	22	32
B	16	20	25	31	38
D	6	6	8	9	12.5
E	6	6	7	10	13
F	3.5	6	7.5	9.5	9.5
G	18.5	21	24.5	30.5	37.5
øH	$6^{+0.012}_{0}$	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$12^{+0.018}_{0}$	$14^{+0.018}_{0}$
øJ	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$14^{+0.018}_{0}$	$16^{+0.018}_{0}$
N	6	8	10	11	16
P	17	17	20	26.5	36
R	R3	R4	R5	R5.5	R8
S	13.5	13.5	17.5	22	28
T	4	4	5	7	8

● When mounting the clamp arm, use included pins and snap rings.

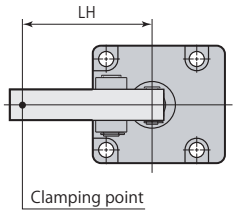
Allowable eccentricity of clamp arm

An eccentric shape clamp arm, as shown in diagram on right can be used with link clamp model CLW, if it is not possible to set clamping 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.

Eccentric shape clamp arm



Ordinary clamp arm



model CLW04 indicates nonusable range

Hydraulic pressure MPa	Allowable eccentricity mm / Clamp arm length LH mm								
	30	35	42	50	60	70	80	100	120
35					7	11	16	24	33
30				9	15	22	28	41	53
25			6	18	27	36	45	60	60
20		6	18	27	39	52	60	↑	↑
15	8	17	29	42	59	60	↑	↑	↑
10	19	32	51	60	60	↑	↑	↑	↑
5	52	60	60	60	60	60	60	60	60

model CLW06 indicates nonusable range

Hydraulic pressure MPa	Allowable eccentricity mm / Clamp arm length LH mm								
	35	45	50	60	70	80	90	100	120
35			8	8	8	8	8	8	8
30		8	8	8	8	8	8	8	8
25		8	8	8	8	8	8	8	8
20	10	20	23	28	33	38	44	49	60
15	19	43	50	65	80	80	80	80	80
10	37	74	80	80	↑	↑	↑	↑	↑
5	80	80	80	80	80	80	80	80	80

model CLW10 indicates nonusable range

Hydraulic pressure MPa	Allowable eccentricity mm / Clamp arm length LH mm								
	40	50	56.5	60	80	100	120	140	160
35			9	9	9	9	9	9	9
30		9	11	11	12	13	14	15	16
25		16	25	30	42	54	66	78	90
20	9	27	38	45	80	95	95	95	95
15	19	44	60	69	95	↑	↑	↑	↑
10	40	79	95	95	↑	↑	↑	↑	↑
5	95	95	95	95	95	95	95	95	95

model CLW16 indicates nonusable range

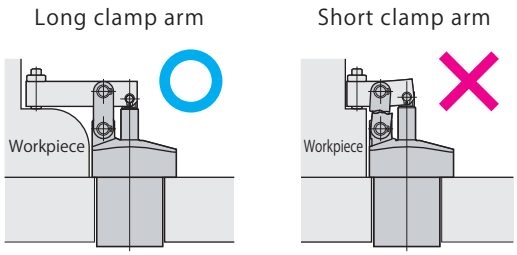
Hydraulic pressure MPa	Allowable eccentricity mm / Clamp arm length LH mm								
	50	60	69.5	80	100	120	140	160	180
35			11	11	13	24	34	45	56
30		11	11	16	32	48	65	81	96
25		12	23	35	59	83	107	110	110
20	11	29	46	64	99	110	110	↑	↑
15	30	57	83	110	110	↑	↑	↑	↑
10	67	110	110	↑	↑	↑	↑	↑	↑
5	110	110	110	110	110	110	110	110	110

model CLW25 indicates nonusable range

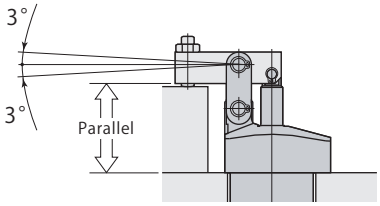
Hydraulic pressure MPa	Allowable eccentricity mm / Clamp arm length LH mm								
	60	65	87.5	100	120	140	160	180	200
35			21	27	30	34	37	41	44
30			31	46	70	83	97	110	123
25		16	46	65	95	125	154	160	160
20	16	25	68	92	131	160	160	↑	↑
15	32	45	105	139	160	↑	↑	↑	↑
10	65	86	160	160	↑	↑	↑	↑	↑
5	160	160	160	160	160	160	160	160	160

Caution in use

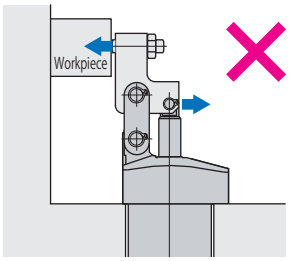
- With link clamps, force acting on link mechanism becomes larger as clamp arm becomes shorter. Exceeding maximum allowable load for link mechanism will lead to malfunction. Depending on clamp arm length, it would be necessary to lower clamping force (hydraulic pressure). Use a clamp at appropriate clamping force that is suitable for clamp arm length, referring to performance diagram and table.



- Determine height and mount clamp, ensuring that clamp arm becomes parallel to clamping surface and mounting surface when workpiece is clamped (allowable angle ±3°).

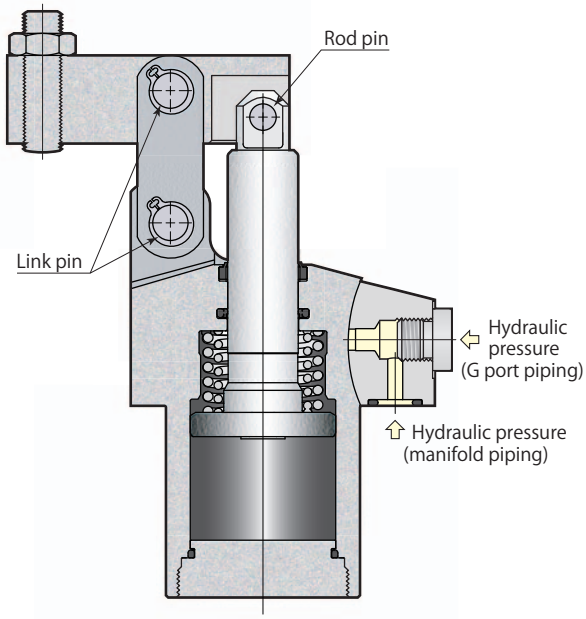


- Using a method such as that shown in the diagram on the right will apply a transverse force on the piston rod and cause the piston rod to break. Please avoid the usage that may apply a non-axial force to the piston rod.

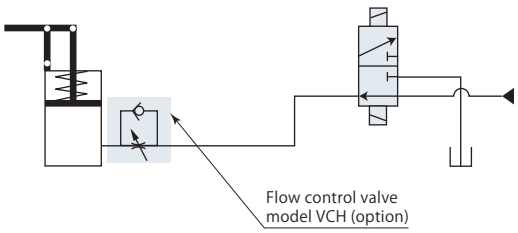


Compact model

model **CLV□-□N**



Hydraulic circuit diagram



Use flow control valve for meter-in control.

Specifications page → 99
Dimentions page → 102
Mounting details page → 104

Specifications

Size / Clamp arm mounting direction

CLV — 06 / 10 / 16 / 25 — L : Left side / F : Front side / R : Right side — N : Compact model

Model			CLV06	CLV10	CLV16	CLV25
Cylinder force (hydraulic pressure 35MPa)*1		kN	6.8	10.5	16.7	24.0
Rod diameter		mm	16	20	25	30
Effective area (clamp)		cm^2	2.0	3.1	4.9	7.1
Full stroke		mm	26	29.5	36	45
Clamp stroke*2		mm	23	26.5	33	42
Safety stroke		mm	3	3	3	3
Max. oil flow rate		L/min	0.54	1.00	1.93	3.55
Cylinder capacity		cm^3	5.2	9.3	17.7	31.8
Return spring force	Clamp	kN	0.26	0.45	0.52	0.75
	Unclamp	kN	0.12	0.19	0.30	0.40
Recommended piping inner diameter*3		mm	ø4	ø4	ø6	ø6
Max. allowable mass of clamp arm*4		kg	0.4	0.7	1.2	2.3
Mass		kg	1.4	2.0	3.6	5.9
Recommended tightening torque of mounting screws*5		N·m	12	29	57	100

- Pressure range : 3.5–35 MPa
- Proof pressure : 52.5 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

*1 : This is value for clamping position. *2 : Indicates a distance from unclamping position to clamping point.

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

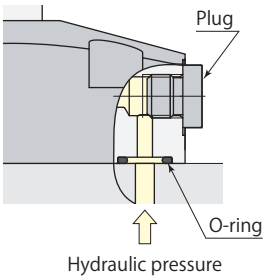
*4 : This is clamp arm mass when shape of clamp arm being described in Dimensions is retained but length only has been extended.

*5 : ISO R898 class 12.9

Manifold piping and G port piping are available.

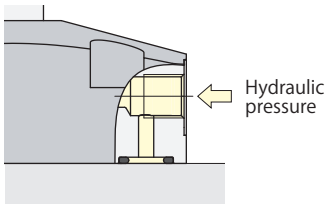
Manifold piping

When choosing manifold piping, a flow control valve (model VCH) and an air bleeding valve (model VCE) are mountable on the G ports of the clamp.

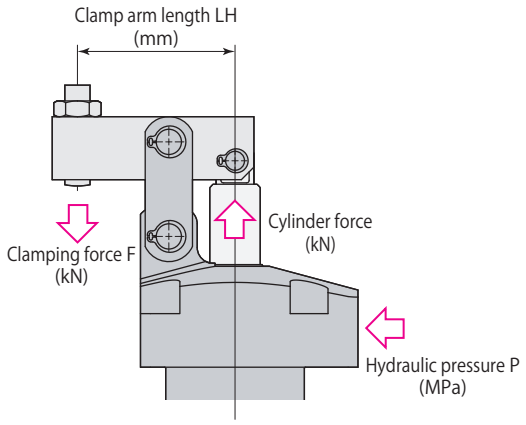


G port piping

Remove plug when choosing G port piping. (O-ring must be used.) The flow control valve and the air bleeding valve should be installed in the middle of oil path.



Performance diagram



Clamping force varies depending on the clamp arm length (LH) and hydraulic pressure (P).

Clamping force calculation formula

F = (Coefficient 1 × P - Coefficient 2)/(LH - Coefficient 3)

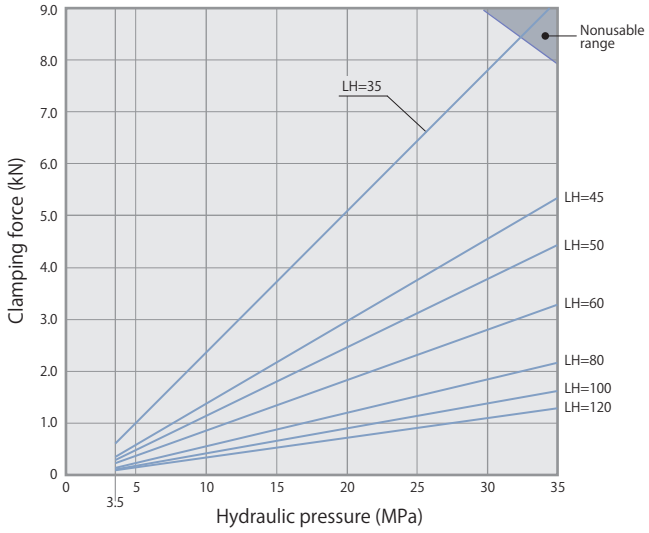
F : Clamping force P : Hydraulic pressure LH : Clamp arm length

CLV10 with clamp arm length (LH) = 50 mm at hydraulic pressure of 35 MPa, Clamping force F is calculated by

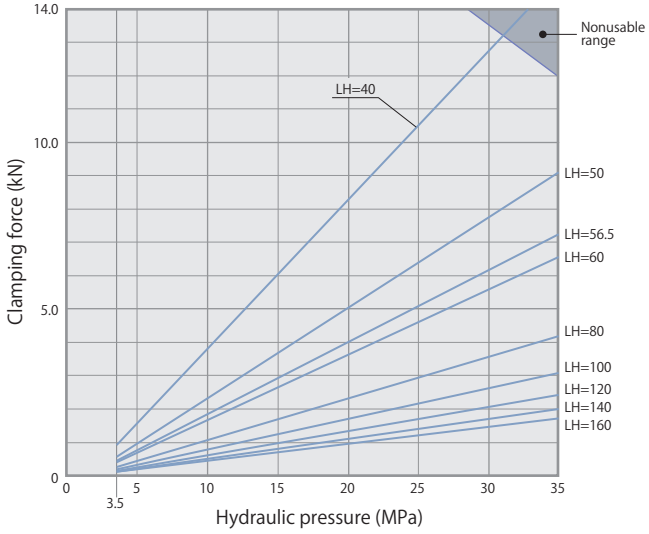
(6.93 × 35-9.92)/(50-24.5) = 9.1 kN

Do not use the clamp in the nonusable range. It may cause damage to the cylinder and rod.

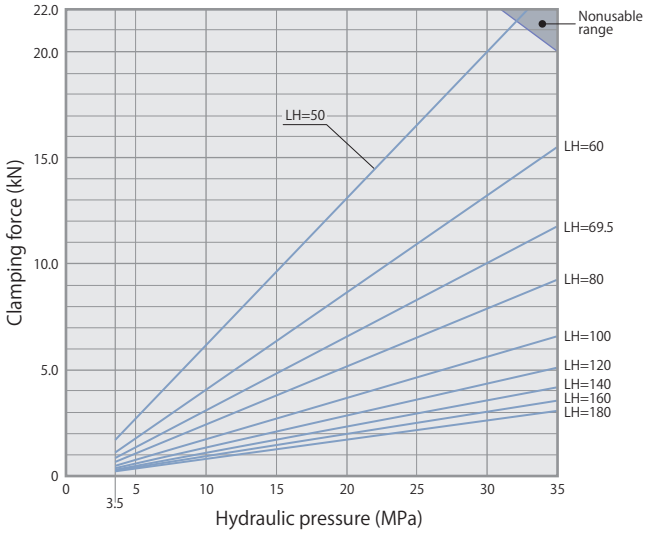
model CLV06



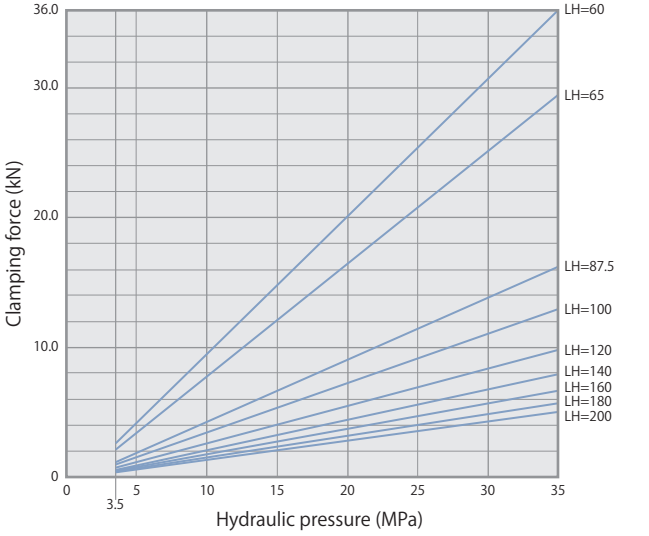
model CLV10



model CLV16



model CLV25



Performance table

model CLV06 Clamping force F=(3.80×P-4.91)/(LH-21.0)

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	6.8		5.3	4.4	3.3	2.2	1.6	1.3	37.5
30	5.8	7.8	4.5	3.8	2.8	1.8	1.4	1.1	35
25	4.8	6.4	3.8	3.1	2.3	1.5	1.1	0.9	↑
20	3.8	5.1	3.0	2.5	1.8	1.2	0.9	0.7	↑
15	2.8	3.7	2.2	1.8	1.3	0.9	0.7	0.5	↑
10	1.8	2.4	1.4	1.1	0.8	0.6	0.4	0.3	↑
5	0.7	1.0	0.6	0.5	0.4	0.2	0.2	0.1	↑
3.5	0.4	0.6	0.3	0.3	0.2	0.1	0.1	0.1	35
Max. pressure MPa		32.4	35	35	35	35	35	35	

indicates nonusable range

model CLV10 Clamping force F=(6.93×P-9.92)/(LH-24.5)

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	10.5		9.1	7.3	6.6	4.2	3.1	2.4	2.0	1.7	44
30	9.0	12.8	7.8	6.2	5.6	3.6	2.6	2.1	1.7	1.5	40
25	7.4	10.5	6.4	5.1	4.6	2.9	2.2	1.7	1.4	1.2	↑
20	5.8	8.3	5.0	4.0	3.6	2.3	1.7	1.3	1.1	0.9	↑
15	4.3	6.1	3.7	2.9	2.6	1.7	1.2	1.0	0.8	0.7	↑
10	2.7	3.8	2.3	1.9	1.7	1.1	0.8	0.6	0.5	0.4	↑
5	1.1	1.6	1.0	0.8	0.7	0.4	0.3	0.3	0.2	0.2	↑
3.5	0.6	0.9	0.6	0.4	0.4	0.3	0.2	0.2	0.1	0.1	40
Max. pressure MPa		31.0	35	35	35	35	35	35	35	35	

indicates nonusable range

model CLV16 Clamping force F=(13.47×P-14.27)/(LH-30.5)

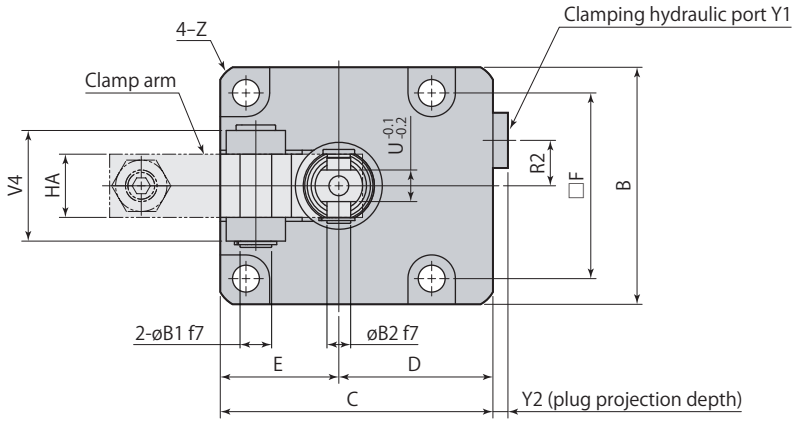
Hydraulic pressure MPa	Cylinder force kN	Clamping force kN (Clamp arm length LH mm) 50	60	69.5	80	100	120	140	160	180	Min. arm length Min. LH mm
35	16.7		15.5	11.7	9.2	6.6	5.1	4.2	3.5	3.1	53.5
30	14.2	20.0	13.2	10.0	7.9	5.6	4.4	3.6	3.0	2.6	50
25	11.8	16.5	10.9	8.3	6.5	4.6	3.6	2.9	2.5	2.2	↑
20	9.3	13.1	8.6	6.5	5.2	3.7	2.9	2.3	2.0	1.7	↑
15	6.8	9.6	6.4	4.8	3.8	2.7	2.1	1.7	1.5	1.3	↑
10	4.4	6.2	4.1	3.1	2.4	1.7	1.3	1.1	0.9	0.8	↑
5	1.9	2.7	1.8	1.4	1.1	0.8	0.6	0.5	0.4	0.4	↑
3.5	1.2	1.7	1.1	0.8	0.7	0.5	0.4	0.3	0.3	0.2	50
Max. pressure MPa		32.1	35	35	35	35	35	35	35	35	

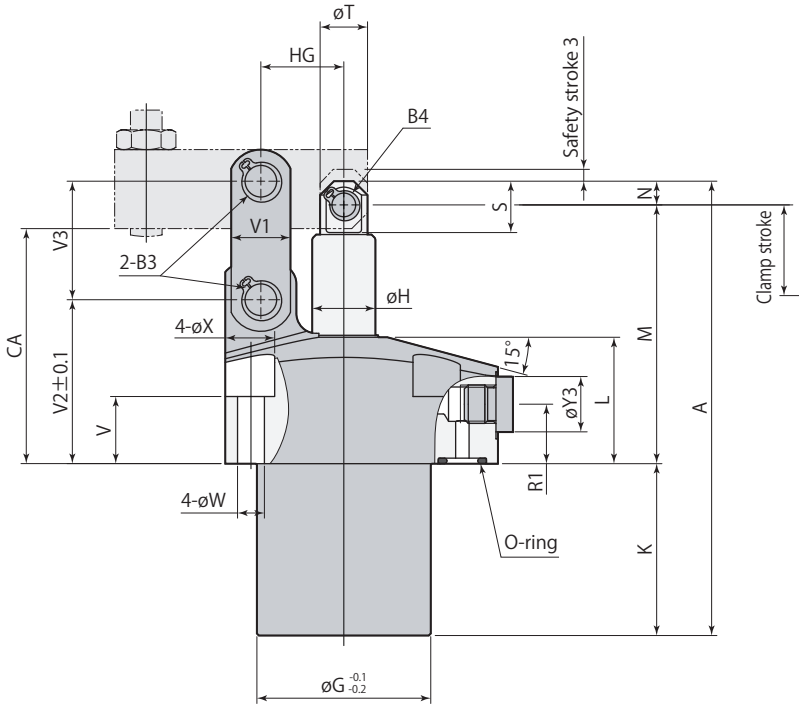
indicates nonusable range

model CLV25 Clamping force F=(23.86×P-25.31)/(LH-37.5)

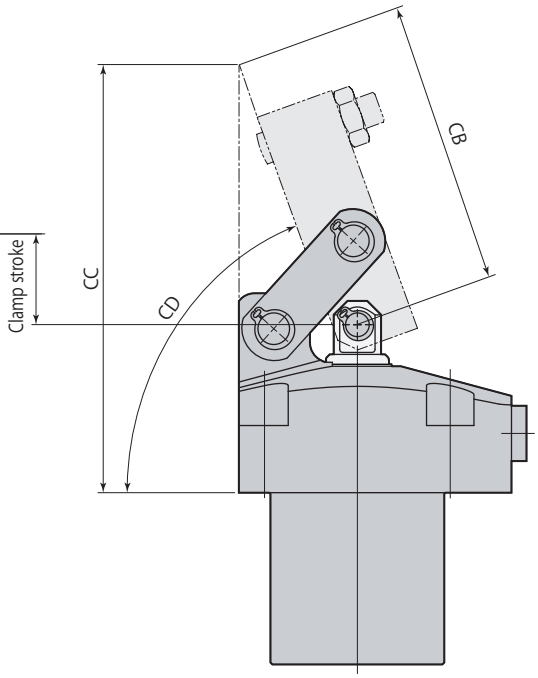
Hydraulic pressure MPa	Cylinder force kN	Clamping force kN (Clamp arm length LH mm) 60	65	87.5	100	120	140	160	180	200	Min. arm length Min. LH mm
35	24.0	36.0	29.4	16.2	13.0	9.8	7.9	6.6	5.7	5.0	60
30	20.5	30.7	25.1	13.8	11.0	8.4	6.7	5.6	4.8	4.2	↑
25	16.9	25.4	20.8	11.4	9.1	6.9	5.6	4.7	4.0	3.5	↑
20	13.4	20.1	16.4	9.0	7.2	5.5	4.4	3.7	3.2	2.8	↑
15	9.9	14.8	12.1	6.7	5.3	4.0	3.2	2.7	2.3	2.0	↑
10	6.3	9.5	7.8	4.3	3.4	2.6	2.1	1.7	1.5	1.3	↑
5	2.8	4.2	3.4	1.9	1.5	1.1	0.9	0.8	0.7	0.6	↑
3.5	1.7	2.6	2.1	1.2	0.9	0.7	0.6	0.5	0.4	0.4	60
Max. pressure MPa		35	35	35	35	35	35	35	35	35	

Dimensions

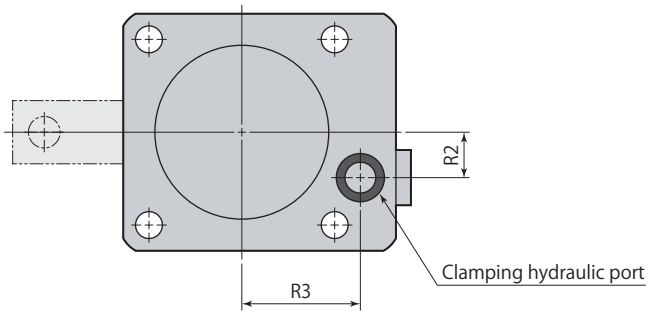




Clamp

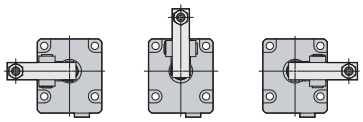


Unclamp



- This diagram represents external contour of CLV□-FN. CLV□-LN and CLV□-RN differ only in terms of mounting direction of clamp arm and otherwise all dimensions are identical to those of CLV□-FN.

L:Left side F:Front side R:Right side



- Clamp arm and mounting screws are not included.

mm

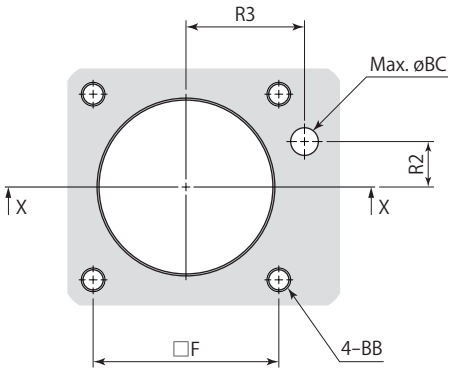
Model	CLV06-□N	CLV10-□N	CLV16-□N	CLV25-□N
A	115	134	160	190.5
B	60	70	86	108
C	69	77	96	110
D	39	42	53	56
E	30	35	43	54
F	47	54	65	85
øG	44	48	58	66
øH	16	20	25	30
K	43.5	53	60	69
L	32	33.5	41	47
M	65.5	73	89	108.5
N	6	8	11	13
R1	15	15	17	21
R2	11.5	13	15	20
R3	30	33	40	43
S	13	17	21.8	27.5
øT	12	15	20	26
U (width across flats)	8	10	11	16
V	17	17	20	21
V1	15	19	25	32
V2	41.5	45	54.5	65
V3	30	35.5	44	53
V4	28	37	46	56
øW	6.8	9	11	14
øX	12	15	18.5	20.5
Y1	G1/8	G1/8	G1/4	G1/4
Y2	3.8	3.8	4.8	4.8
Y3	14	14	19	19
Z	C2.5	C3	C3.5	C5.5
øB1	$8^{-0.013}_{-0.028}$	$10^{-0.013}_{-0.028}$	$14^{-0.016}_{-0.034}$	$16^{-0.016}_{-0.034}$
øB2	$6^{-0.010}_{-0.022}$	$8^{-0.013}_{-0.028}$	$12^{-0.016}_{-0.034}$	$14^{-0.016}_{-0.034}$
B3 (snap ring)*1	STW-8	STW-10	STW-14	STW-16
B4 (snap ring)*1	STW-6	STW-8	STW-12	STW-14
CA	59.5	65	80	96
CB	71.7	78.7	98.2	133.5
CC	107.9	117.4	144.7	189.2
CD	About 70°	About 70°	About 69°	About 72°
HA	16	19	22	32
HG	21	24.5	30.5	37.5
O-ring (fluorocarbon hardness Hs90)	P9	P9	P9	P9
Flow control valve (meter-in)*2	VCH01	VCH01	VCH02	VCH02
Air bleeding valve*2	VCE01	VCE01	VCE02	VCE02

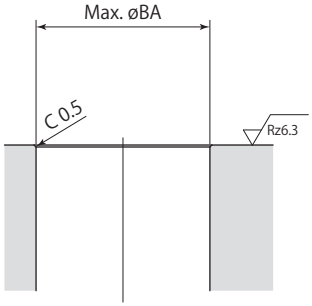
∗1：Snap ring is made by Ochiai Corporation.

∗2：Select the right model of VCH and VCE according to the size of the clamp.

Refer to each page for the details of options. ● Flow control valve **page →108** ● Air bleeding valve **page →110**

Mounting details





X-X

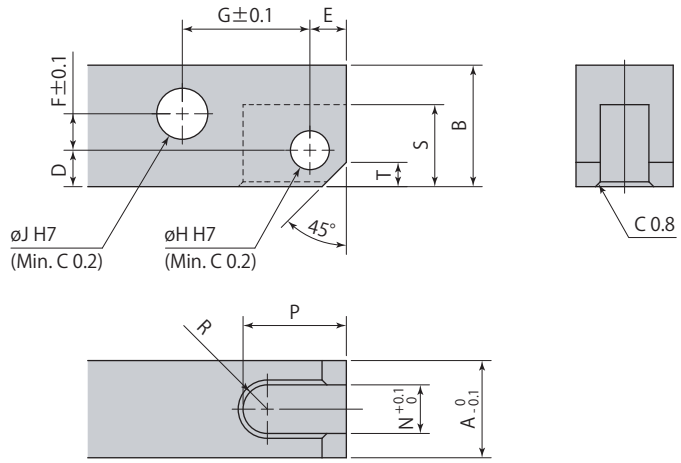
Rz: ISO4287(1997)

mm

Model	CLV06-□N	CLV10-□N	CLV16-□N	CLV25-□N
F	47	54	65	85
R2	11.5	13	15	20
R3	30	33	40	43
øBA	47	52	62	72
BB	M6	M8	M10	M12
øBC	7	7	7	7

Clamp arm mounting details

Clamp arm is not included. Manufacture a clamp arm with the dimensions shown in the table below.



Recommended material：S45C (HB167–229)

mm

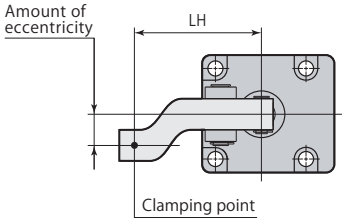
Link clamp	CLV06-□N	CLV10-□N	CLV16-□N	CLV25-□N
A	16	19	22	32
B	20	25	31	38
D	6	8	9	12.5
E	6	7	10	13
F	6	7.5	9.5	9.5
G	21	24.5	30.5	37.5
øH	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$12^{+0.018}_{0}$	$14^{+0.018}_{0}$
øJ	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$14^{+0.018}_{0}$	$16^{+0.018}_{0}$
N	8	10	11	16
P	17	20	26.5	36
R	R4	R5	R5.5	R8
S	13.5	17.5	22	28
T	4	5	7	8

● When mounting the clamp arm, use included pins and snap rings.

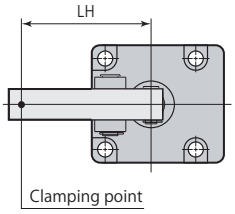
Allowable eccentricity of clamp arm

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 clamping 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.

Eccentric shape clamp arm



Ordinary clamp arm



model CLV06 indicates nonusable range

Hydraulic pressure MPa	Allowable eccentricity mm								
	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

model CLV10 indicates nonusable range

Hydraulic pressure MPa	Allowable eccentricity mm								
	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

model CLV16 indicates nonusable range

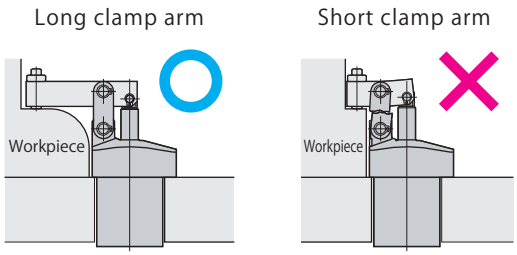
Hydraulic pressure MPa	Allowable eccentricity mm								
	Clamp arm length LH mm								
	50	60	69.5	80	100	120	140	160	180
35		11	16	27	47	67	87	108	110
30	11	17	30	45	72	100	110	110	↑
25	14	33	51	71	110	110	↑	↑	↑
20	29	56	82	110	↑	↑	↑	↑	↑
15	56	97	110	↑	↑	↑	↑	↑	↑
10	110	110	↑	↑	↑	↑	↑	↑	↑
5	110	110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

model CLV25

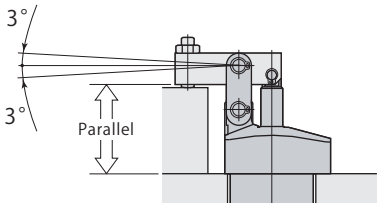
Hydraulic pressure MPa	Allowable eccentricity mm								
	Clamp arm length LH mm								
	60	65	87.5	100	120	140	160	180	200
35	16	16	52	72	104	136	160	160	160
30	16	24	68	92	130	160	↑	↑	↑
25	25	37	91	121	160	↑	↑	↑	↑
20	41	56	126	160	↑	↑	↑	↑	↑
15	68	90	160	↑	↑	↑	↑	↑	↑
10	126	160	↑	↑	↑	↑	↑	↑	↑
5	160	160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

Caution in use

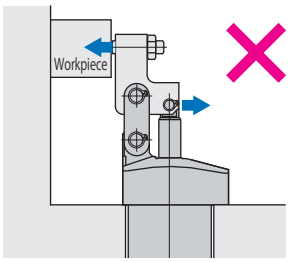
- With link clamps, force acting on link mechanism becomes larger as clamp arm becomes shorter. Exceeding maximum allowable load for link mechanism will lead to malfunction. Depending on clamp arm length, it would be necessary to lower clamping force (hydraulic pressure). Use a clamp at appropriate clamping force that is suitable for clamp arm length, referring to performance diagram and table.



- Determine height and mount clamp, ensuring that clamp arm becomes parallel to clamping surface and mounting surface when workpiece is clamped (allowable angle ±3°).



- Using a method such as that shown in the diagram on the right will apply a transverse force on the piston rod and cause the piston rod to break. Please avoid the usage that may apply a non-axial force to the piston rod.



Specifications

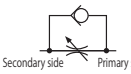
Body color : Silver

G port size

VCH **01** : G1/8
VCH **02** : G1/4

Control method

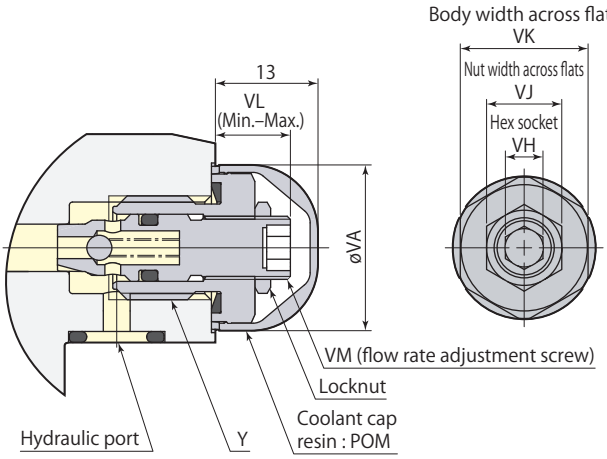
(Nil) : Meter-in



Model		VCH01	VCH02
G port size		G1/8	G1/4
Cracking pressure	MPa	0.04	
Orifice area	mm^2	3.1	6.2
Recommended tightening torque	N·m	10	30
Mass	kg	0.06	0.07

- Pressure range : 1–50 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)

Dimensions



mm

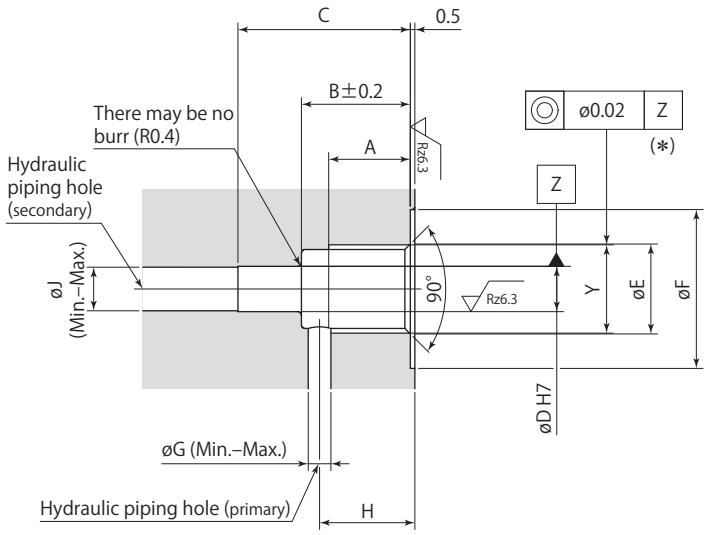
Model	VCH01	VCH02
Y	G1/8	G1/4
øVA	16	21
VH	3	5
VJ	8	10
VK	12	17
VL	7–11	7.5–11.5
Adjustment screw number of turns	5.3 rotations	5.3 rotations
VM	M6×0.75	M8×0.75

- Use a closed wrench or socket wrench for mounting and dismounting.
- Flow control valve can be mounted on hydraulic port (G port) when manifold piping.
- Adjust flow rate without hydraulic pressure. Conducting adjustments with hydraulic pressure may result in damaging seal.
- VCH is shipped with the valve fully open. Adjust the flow rate by loosening the screws after it is screwed in to close totally. Tighten the locknut after adjustment is completed.

Applicable clamp

Model	VCH01	VCH02
Swing clamp (double acting)	CTK04U, 06U, 10U CTK04B, 06B, 10B	CTK16U CTK16B
Link clamp (double acting)	CLW04-N, 06-N, 10-N	CLW16-N, 25-N
Link clamp (single acting)	CLV06-N, 10-N	CLV16-N, 25-N

Mounting details



Rz: ISO4287(1997)

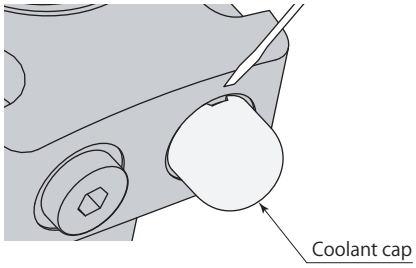
mm

Model	VCH01	VCH02
A	9	13
B	13	18
C	17.5	22.5
øD	$5^{+0.012}_{0}$	$6^{+0.012}_{0}$
øE	9.9	13.3
øF	17.5	21.5
øG	2.5–3	3.5–5
H	9.5–11.5	14.5–15.5
øJ	2.5–5	3.5–6
Y	G1/8	G1/4

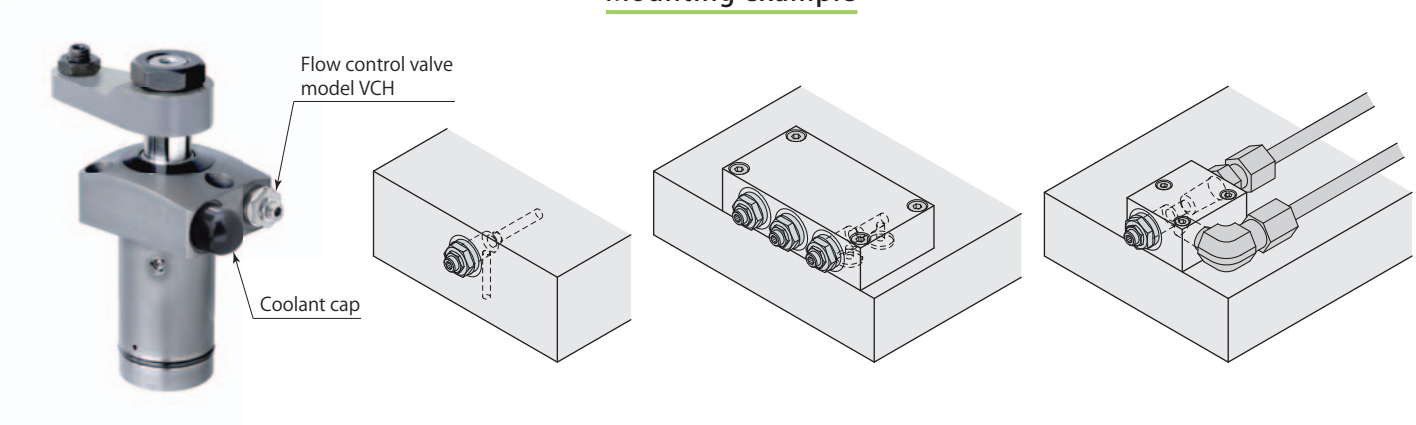
∗: Concentricity is required when machining øD and Y-portion thread. Misalignment or machining defect may cause the trouble of installation and adjusting flow rate.

Mounting & dismounting of flow control valve, air bleeding valve

- 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.
- When mounting a flow control valve or air bleeding valve, be sure to tighten it with the recommended tightening torque.
- 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.
- When dismounting a coolant cap, use a sharp-pointed tool such as a precision screw driver by hooking the notched portion.



Mounting example



Cylinder mounting | Pallet mounting | Block mounting ① | Block mounting ②

Specifications

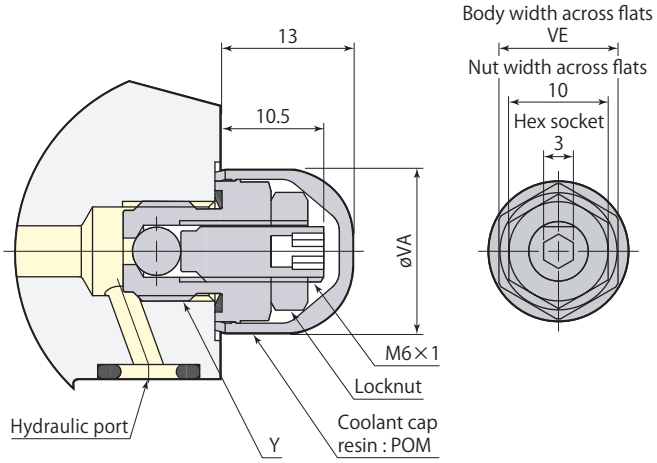
G port size

VCE **01** : G1/8

VCE **02** : G1/4

Model		VCE01	VCE02
G port size		G1/8	G1/4
Recommended tightening torque	N·m	10	30
Mass	kg	0.017	0.029
Pressure range	MPa	0–50	
Operating temperature	°C	0–70	
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)	

Dimensions

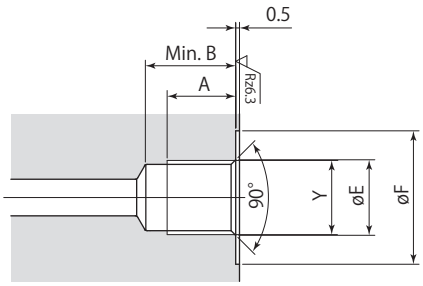


mm

Model	VCE01	VCE02
A	9	13
B	10	14
øE	9.9	13.3
øF	17.5	21.5
Y	G1/8	G1/4
øVA	16	21
VE	12	17

- Use a closed wrench or socket wrench for mounting and dismounting.
- Air bleeding valve can be mounted on hydraulic port (G port) when manifold piping.

Mounting details



Rz: ISO4287(1997)

Applicable clamp and work support

Model	VCE01	VCE02
Swing clamp (double acting)	CTK04U, 06U, 10U CTK04B, 06B, 10B CTW06, 10	CTK16U CTK16B CTW16, 25
Swing clamp (single acting)	CTV06, 10	CTV16, 25
Link clamp (double acting)	CLW04, 06, 10	CLW16, 25
Link clamp (single acting)	CLV06, 10	CLV16, 25
Work support	CSP-M-N (CSW, CSV)	–

Work support

			model CSW Page →114		model CSV Page →114
					
Specifications			35MPa Hydraulic lift		35MPa Spring lift
Features			Threaded body Standard model	Threaded body Long stroke	Threaded body Standard model
Variations	Standard		CSW **Page →118**	CSW06M-D **Page →118**	CSV **Page →130**
	Double acting ∗		CSW-D **Page →124**	CSW-D06M-D **Page →124**	—
Option	Flange		CSP-N **Page →134**		
	Piping cap		CSP-Q **Page →136**		
	Locknut		CSP-L **Page →136**		
	Chip cover		CSP-J **Page →136**		

∗:Flange & piping cap (option) can not be mounted on double acting work support.

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Double acting Hydraulic lift **CSW-D**

Structure, Hydraulic and pneumatic circuit diagram **122**
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Spring lift **CSV**

Structure, Hydraulic and pneumatic circuit diagram **128**
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Option

Flange **CSP-N** **134**
Piping cap **CSP-Q** **136**
Locknut **CSP-L** **136**
Chip cover **CSP-J** **136**

Work support

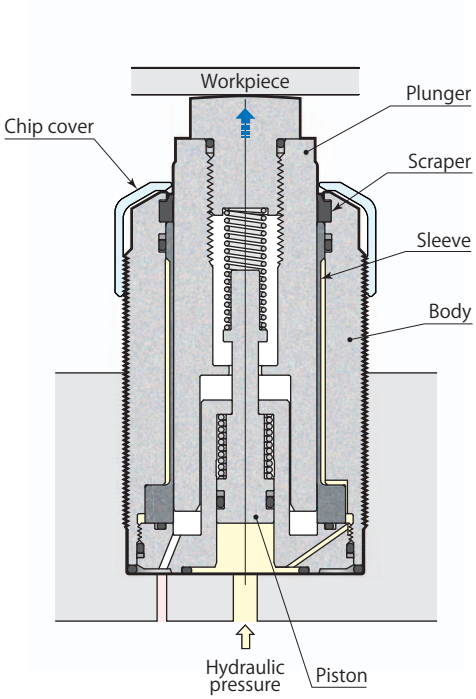
35MPa

Hydraulic lift
model **CSW**

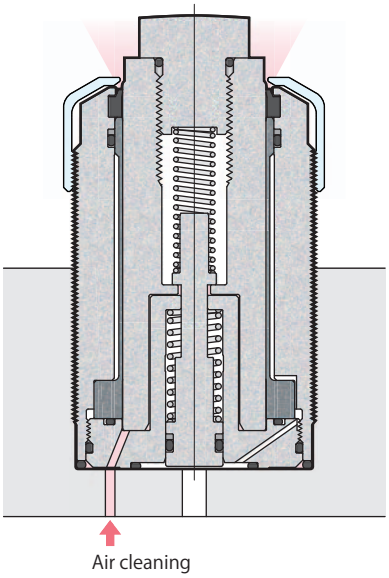
Spring lift
model **CSV**

Hydraulic lift

model **CSW□M-□**

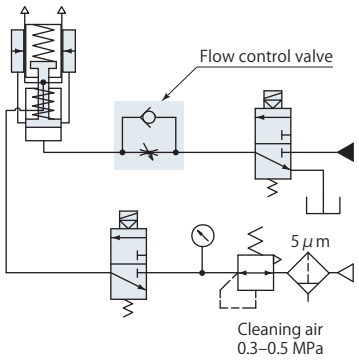


Lock



Unlock

Hydraulic and pneumatic circuit diagram



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Hydraulic pressure & support force	page → 117
Applied load & deformation	page → 117
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Mounting details	page → 118

Specifications

Size: 06 / 10 / 16 / 25

Plunger stroke:

CSW [06 / 10 / 16 / 25] M – [L / D]

- L : Standard stroke
- D : Long stroke (only for CSW06)

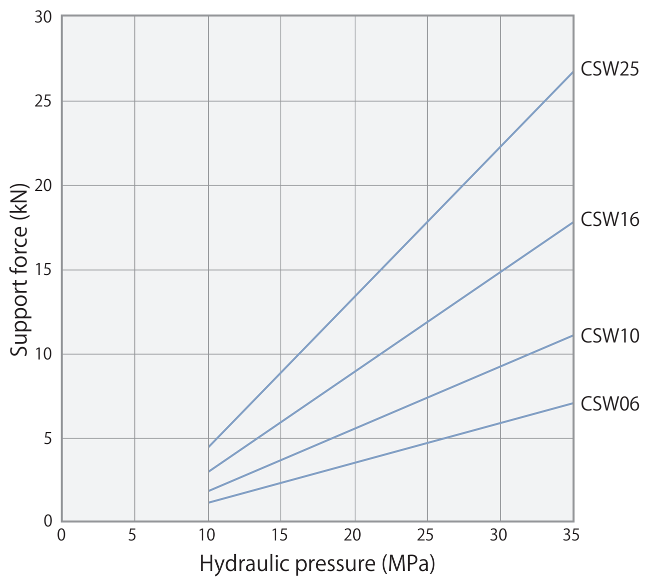
Model		CSW06M-L	CSW06M-D	CSW10M-L	CSW16M-L	CSW25M-L
		8 mm stroke	15 mm stroke			
Support force (hydraulic pressure 35MPa)*1	kN	7.1		11.1	17.8	26.7
Cylinder capacity	cm^3	1.5	2.0	2.9	5.5	5.7
Lift spring force*2	N	6–11	4–11	10–16	16–29	25–45
Plunger stroke	mm	8	15	10	10	13
Max. allowable mass of head cap	kg	0.1		0.1	0.2	0.2
Mass	kg	0.29	0.33	0.43	1.03	1.89
Recommended tightening torque of body	N·m	35	35	60	130	250

- Pressure range：10–35 MPa
- Proof pressure：52.5 MPa
- Max. allowable back pressure：0.05 MPa
- Operating temperature：0–70℃
- Fluid used：General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

＊1：When work support and clamp are used facing each other, work support and clamp must be selected in such a way that the support force is 1.5 times the applied load (clamping force + machining force).

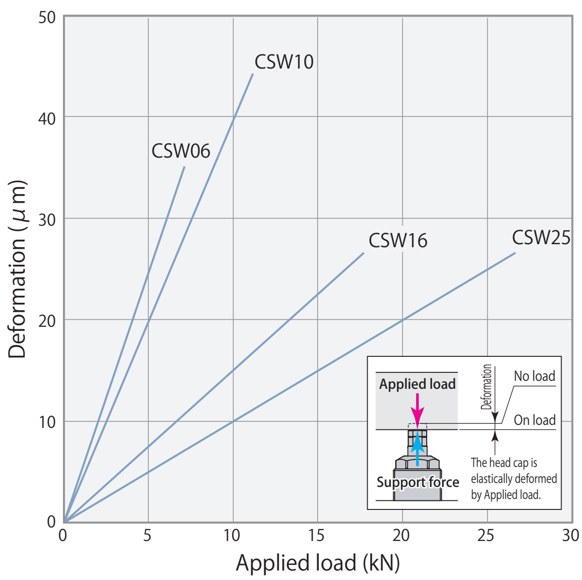
＊2：Figures are for "upper end to lower end" of plunger action.

Hydraulic pressure & support force



Hydraulic pressure MPa	Support force kN			
	CSW06	CSW10	CSW16	CSW25
10	1.2	1.9	3.0	4.5
15	2.3	3.7	6.0	8.9
20	3.5	5.6	8.9	13.4
25	4.7	7.4	11.9	17.8
30	5.9	9.3	14.8	22.3
35	7.1	11.1	17.8	26.7

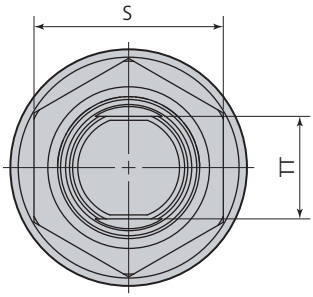
Applied load & deformation



Applied load kN	Deformation μm			
	CSW06	CSW10	CSW16	CSW25
0	0	0	0	0
5	25	20	7.5	5
10	Nonusable range	40	15	10
15	Nonusable range	Nonusable range	22.5	15
20	Nonusable range	Nonusable range	Nonusable range	20
25	Nonusable range	Nonusable range	Nonusable range	25
30	Nonusable range	Nonusable range	Nonusable range	Nonusable range

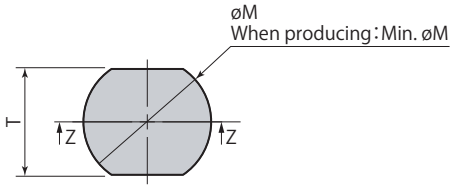
Held with hydraulic pressure of 35 MPa.

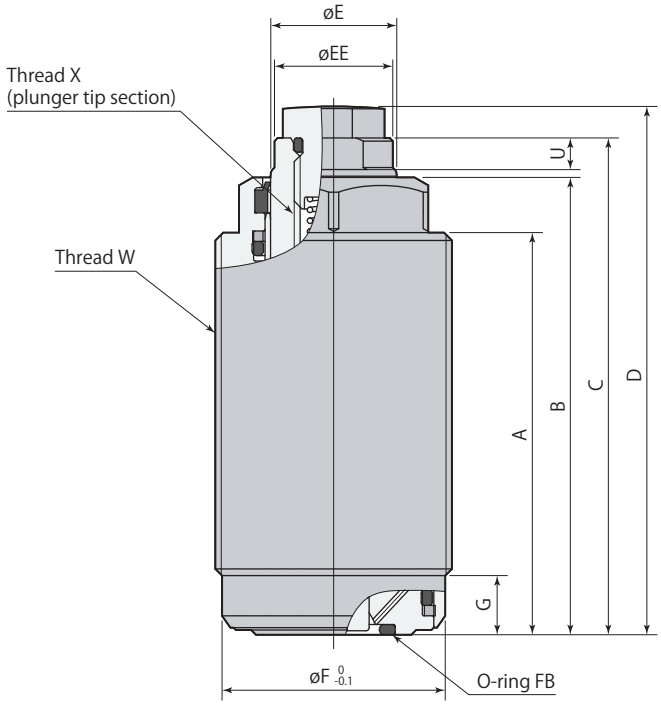
Dimensions

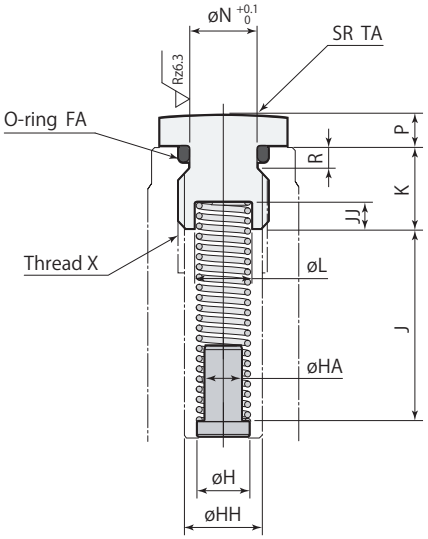


Head cap details

Hardness：HRC52

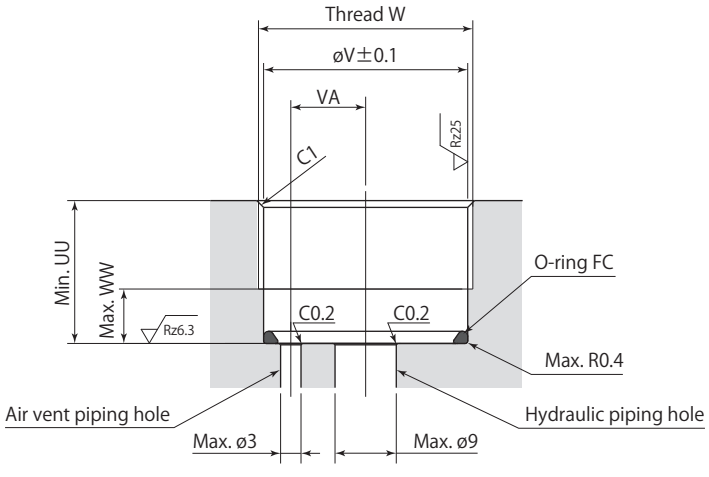






Z-Z

Mounting details



Rz: ISO4287(1997)

- When fixing the hexagon part of body with a vise, etc., make sure the tightening force is 2.5 kN or less.
- Always attach head cap (lift spring cannot be retained). When fabricating head cap, ensure that O-ring slot, spring spot facing and guide are made by referring to head cap details. Be sure to always use O-ring.
- When fabricating a lift spring, determine dimensions by referring to head cap details. Furthermore, rustproofing must be implemented (however, there is no guarantee for operation).
- Install O-ring FC at the bottom of the hole. The O-ring FC is packed with a work support.
- This diagram indicates a situation where head cap has been fitted into plunger with no pressure applied.

mm

Model	CSW06M-L	CSW06M-D	CSW10M-L	CSW16M-L	CSW25M-L
A	51	58	58	59.5	68.5
B	58	65	67	71.8	82
C	63	70	73	78	89
D	67	74	77	84	96
øE	16	16	20	30	40
øEE	15	15	19	29	39
øF	28.3	28.3	33.2	48.2	63.2
G	7.5	7.5	7.5	7.5	8
øH	7	7	7	8.5	10
øHA	5	5	5	6	7.5
øHH	8.5	8.5	10.3	14	14
J	20.5	21.3	25.5	25	32.5
JJ	1.5	1.5	3.5	1.5	1.5
K	9	9	11	12	11
øL	7.4	7.4	7.6	9.2	11.2
øM	12.9	12.9	16.9	23	30
Min. øM	12.5	12.5	16	21	21
øN	7.8	7.8	8.9	13.3	13.3
P	4	4	4	6	7
R	1.9	1.9	3	2.4	2.4
S	24	24	30	41	55
T (width across flats)	12	12	14	19	24
TA	70	70	90	110	140
TT (plunger width across flats)	13	13	17	24	32
U	4	4	5	5	5.7
UU	15.5	15.5	15.5	15.5	20
øV	28.5	28.5	33.5	48.5	63.5
VA	11	11	12	18	23.5
W	M30×1.5	M30×1.5	M35×1.5	M50×1.5	M65×1.5
WW	6.5	6.5	6.5	6.5	7
X (recommended tightening torque)	M10×1.5 depth 13 (30 N·m)	M10×1.5 depth 13 (30 N·m)	M12×1.75 depth 16 (50 N·m)	M16×2 depth 20 (100 N·m)	M16×2 depth 20 (100 N·m)
O-ring FA (fluorocarbon hardness Hs70)	S8	S8	P9	AS568-014	AS568-014
O-ring FB (fluorocarbon hardness Hs90)	AS568-014	AS568-014	AS568-015	AS568-019	AS568-022
O-ring FC (fluorocarbon hardness Hs90)	AS568-022	AS568-022	AS568-025	S45	AS568-036

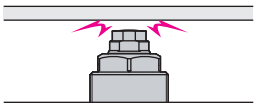
Caution in use

- The lift spring in the plunger may push the workpiece upward if it is light weight and seating detection cannot be complete. Review the weight of workpiece or lift spring force and make it appropriate to seat the workpiece perfectly and acutate the work support.

- Set the plunger lifting time to 0.2 seconds or longer by adjusting the flow control valve with check valve (meter-in). Reasonable plunger ascending speed can prevent the parts from breakage also curbs plunger contact false. Use a flow control valve with cracking pressure of 0.05MPa or less, in order to shorten plunger descending speed.

  If the plunger ascends to reach a workpiece too fast, it rebounds after hitting the workpice and will create a small clearance between the two. The clearance may cause a supporting fault of the workpiece.

  Rebound and clearance



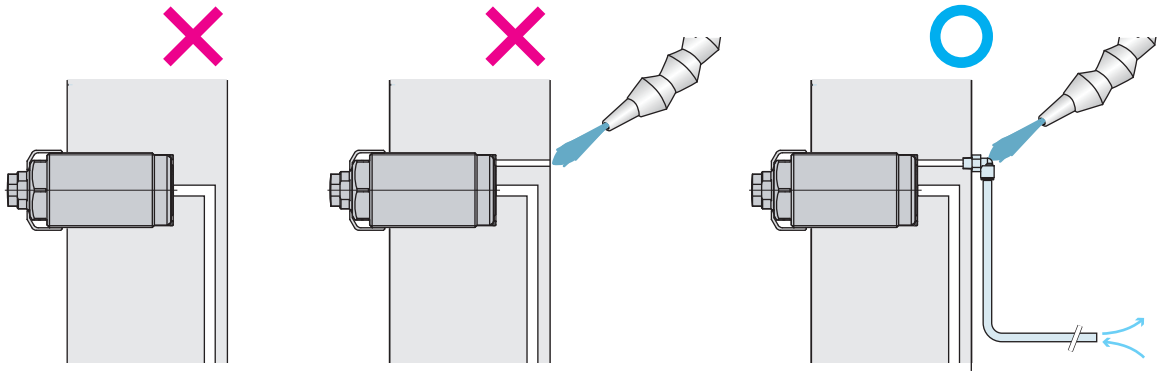
- Avoid following usages. These may cause sleeve deformation that could lead to malfunction of plunger or decreased support force.

  ×Applying eccentric load on plunger.

  ×Applying load that exceeds rated support force.

  ×Rotating plunger when locked.

- Air vent must be opened to atmosphere. Any blockage on the vent results in malfunction. Provide the piping if there is a risk of coolant or metal chips intrusion. Allowing intrusion of cutting fluid may cause rusting and other problems.

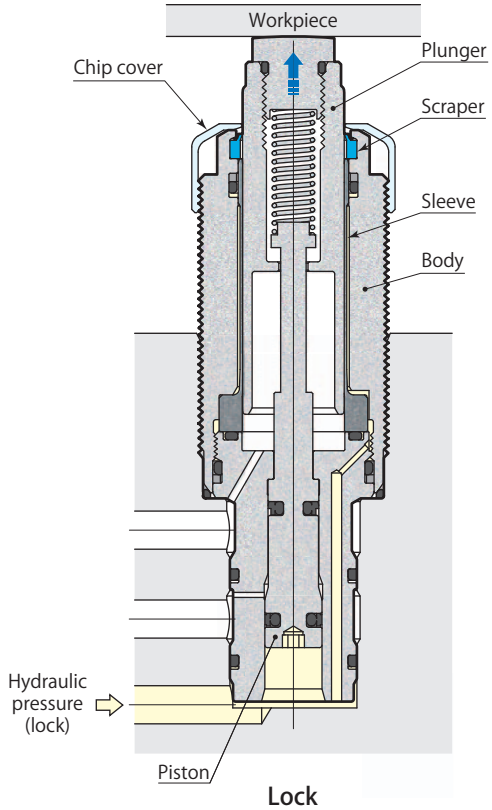


Air vent is blocked | Cutting fluid intrusion from air vent | Piping to metal chips or coolant free area

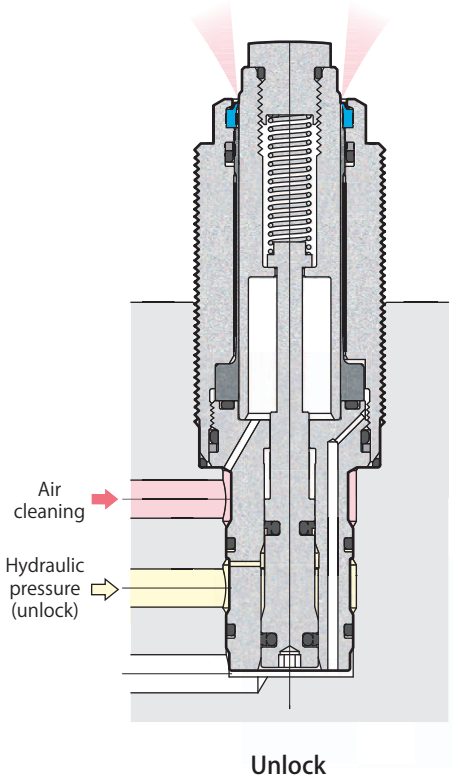
- Air (oil free) must be fed through a 5 μm filter that is connected to an air vent port for air cleaning. Perform air cleaning only when replacing workpiece. Plunger will rise during air cleaning.

Double acting

model **CSW-D□M-□**

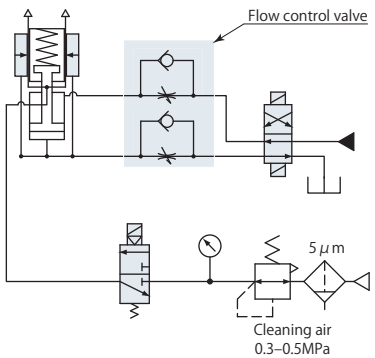


Lock



Unlock

Hydraulic and pneumatic circuit diagram



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Hydraulic pressure & support force	page → 123
Applied load & deformation	page → 123
Dimensions	page → 124
Mounting details	page → 124

Specifications

Size: 06 / 10 / 16 / 25 — Plunger stroke

CSW－D [06 / 10 / 16 / 25] M － [L / D]

- L : Standard stroke
- D : Long stroke (only for CSW-D06)

(grey box) indicates made to order.

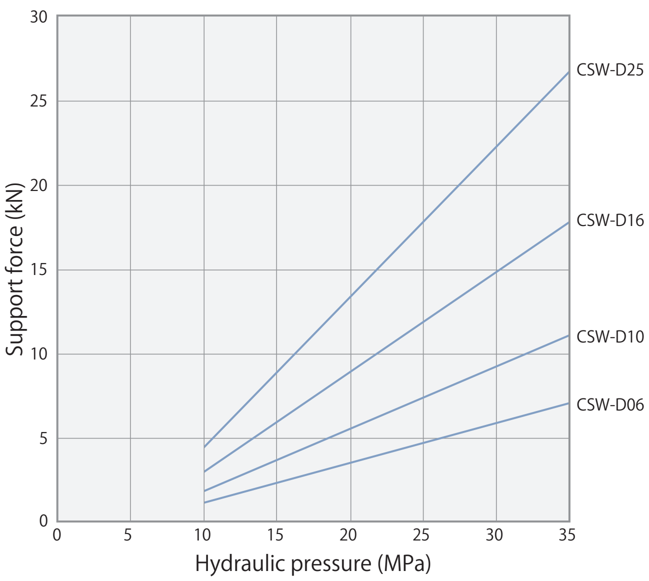
Model		CSW-D06M-L 8 mm stroke	CSW-D06M-D 15 mm stroke	CSW-D10M-L	CSW-D16M-L	CSW-D25M-L
Support force (hydraulic pressure 35MPa)*1	kN	7.1		11.1	17.8	26.7
Cylinder capacity	cm^3	1.5	2.0	2.9	5.5	5.7
Lift spring force*2	N	6–11	4–11	10–16	16–29	25–45
Plunger stroke	mm	8	15	10	10	13
Max. allowable mass of head cap	kg	0.1		0.1	0.2	0.2
Mass	kg	0.30	0.34	0.47	1.00	2.01
Recommended tightening torque of body	N・m	35	35	60	130	250

- Pressure range：10–35 MPa
- Proof pressure：52.5 MPa
- Max. allowable back pressure：0.05 MPa
- Operating temperature：0–70℃
- Fluid used：General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

＊1：When work support and clamp are used facing each other, work support and clamp must be selected in such a way that the support force is 1.5 times the applied load (clamping force + machining force).

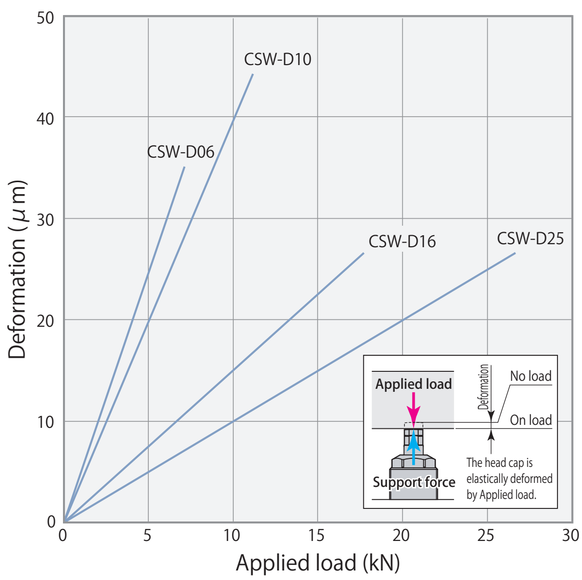
＊2：Figures are for "upper end to lower end" of plunger action.

Hydraulic pressure & support force



Hydraulic pressure MPa	Support force kN			
	CSW-D06	CSW-D10	CSW-D16	CSW-D25
10	1.2	1.9	3.0	4.5
15	2.3	3.7	6.0	8.9
20	3.5	5.6	8.9	13.4
25	4.7	7.4	11.9	17.8
30	5.9	9.3	14.8	22.3
35	7.1	11.1	17.8	26.7

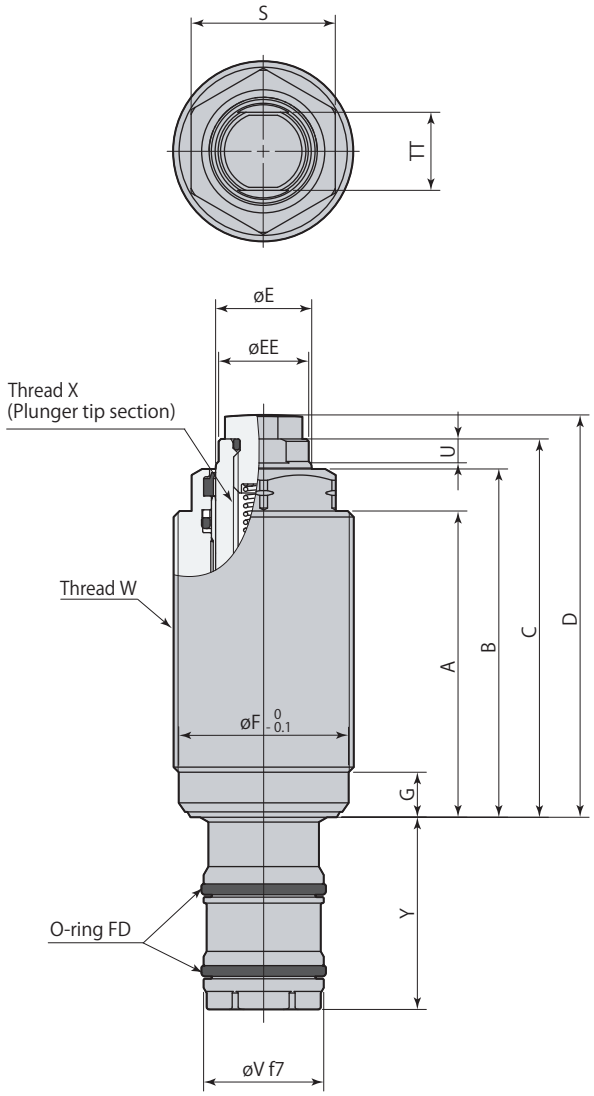
Applied load & deformation



Applied load kN	Deformation μm			
	CSW-D06	CSW-D10	CSW-D16	CSW-D25
0	0	0	0	0
5	25	20	7.5	5
10		40	15	10
15			22.5	15
20		Nonusable range		20
25				25
30				

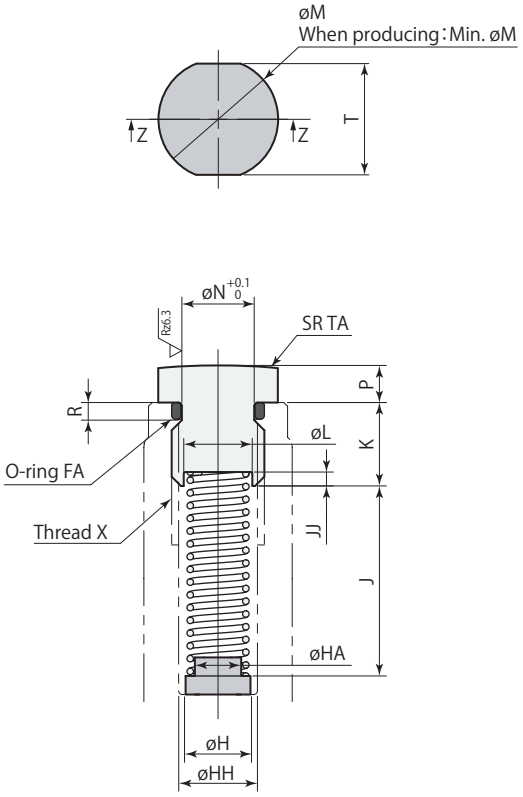
Held with hydraulic pressure of 35 MPa.

Dimensions



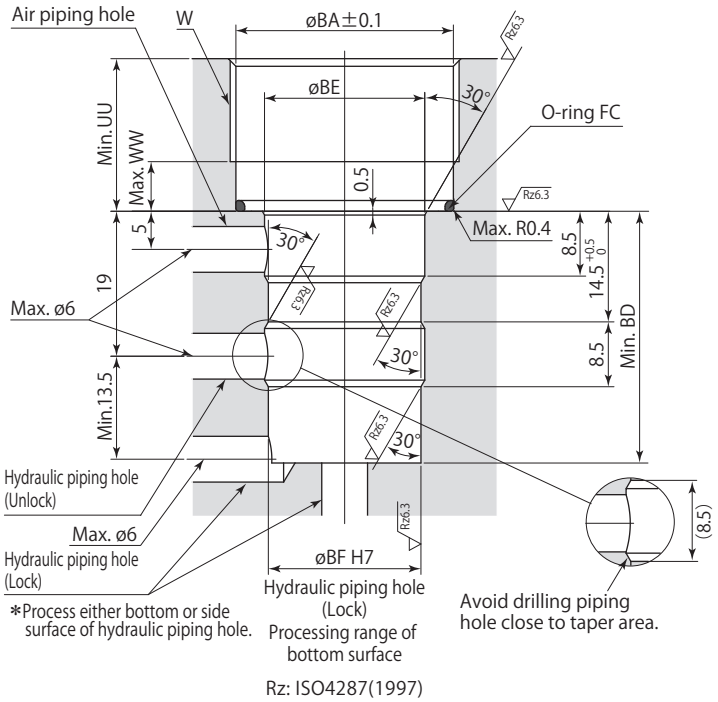
Head cap details

Hardness：HRC52



Z-Z

Mounting details



Rz: ISO4287(1997)

- When fixing the hexagon part of body with a vise, etc., make sure the tightening force is 2.5 kN or less.
- Always attach head cap (lift spring cannot be retained). When fabricating head cap, ensure that O-ring slot, spring spot facing and guide are made by referring to head cap details. Be sure to always use O-ring.
- When fabricating a lift spring, determine dimensions by referring to head cap details. Furthermore, rustproofing must be implemented (however, there is no guarantee for operation).
- Install O-ring FC at the bottom of the hole. The O-ring FC is packed with a work support.
- This diagram indicates a situation where head cap has been fitted into plunger with no pressure applied.

mm

Model	CSW-D06M-L	CSW-D06M-D	CSW-D10M-L	CSW-D16M-L	CSW-D25M-L
A	51	58	58	59.5	68.5
B	58	65	67	71.8	82
C	63	70	73	78	89
D	67	74	77	84	96
øE	16	16	20	30	40
øEE	15	15	19	29	39
øF	28.3	28.3	33.2	48.2	63.2
G	7.5	7.5	7.5	7.5	8
øH	7	7	7	8.5	10
øHA	5	5	5	6	7.5
øHH	8.5	8.5	10.3	14	14
J	20.5	21.3	25.5	25	32.5
JJ	1.5	1.5	3.5	1.5	1.5
K	9	9	11	12	11
øL	7.4	7.4	7.6	9.2	11.2
øM	12.9	12.9	16.9	23	30
Min. øM	12.5	12.5	16	21	21
øN	7.8	7.8	8.9	13.3	13.3
P	4	4	4	6	7
R	1.9	1.9	3	2.4	2.4
S	24	24	30	41	55
T (width across flats)	12	12	14	19	24
TA	70	70	90	110	140
TT (plunger width across flats)	13	13	17	24	32
U	4	4	5	5	5.7
UU	15.5	15.5	15.5	15.5	20
øV	$20^{-0.020}_{-0.041}$	$20^{-0.020}_{-0.041}$	$22^{-0.020}_{-0.041}$	$27^{-0.020}_{-0.041}$	$30^{-0.020}_{-0.041}$
W	M30×1.5	M30×1.5	M35×1.5	M50×1.5	M65×1.5
WW	6.5	6.5	6.5	6.5	7
X (recommended tightening torque)	M10×1.5 depth 13 (30 N·m)	M10×1.5 depth 13 (30 N·m)	M12×1.75 depth 16 (50 N·m)	M16×2 depth 20 (100 N·m)	M16×2 depth 20 (100 N·m)
Y	32	33	34	35	38
O-ring FA (fluorocarbon hardness Hs70)	S8	S8	P9	AS568-014	AS568-014
O-ring FC (fluorocarbon hardness Hs90)	AS568-022	AS568-022	AS568-025	S45	AS568-036
O-ring FD (Urethane hardness Hs90)	AS568-017	AS568-017	AS568-018	AS568-021	AS568-023
BA	28.5	28.5	33.5	48.5	63.5
BD	33	34	35	36	39
BE	21	21	23	28	31
BF	$20^{+0.021}_{0}$	$20^{+0.021}_{0}$	$22^{+0.021}_{0}$	$27^{+0.021}_{0}$	$30^{+0.021}_{0}$

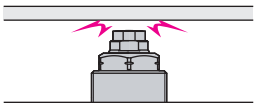
Caution in use

- The lift spring in the plunger may push the workpiece upward if it is light weight and seating detection cannot be complete. Review the weight of workpiece or lift spring force and make it appropriate to seat the workpiece perfectly and acutate the work support.

- Set the plunger lifting time to 0.2 seconds or longer by adjusting the flow control valve with check valve (meter-in). Reasonable plunger ascending speed can prevent the parts from breakage also curbs plunger contact false. Use a flow control valve with cracking pressure of 0.05MPa or less, in order to shorten plunger descending speed.

  If the plunger ascends to reach a workpiece too fast, it rebounds after hitting the workpice and will create a small clearance between the two. The clearance may cause a supporting fault of the workpiece.

  Rebound and clearance



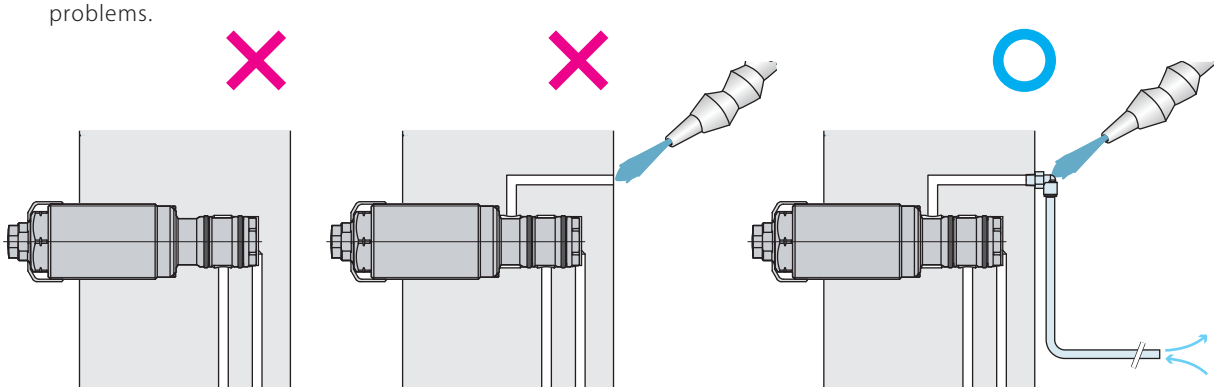
- Avoid following usages. These may cause sleeve deformation that could lead to malfunction of plunger or decreased support force.

  ×Applying eccentric load on plunger.

  ×Applying load that exceeds rated support force.

  ×Rotating plunger when locked.

- Air vent must be opened to atmosphere. Any blockage on the vent results in malfunction. Provide the piping if there is a risk of coolant or metal chips intrusion. Allowing intrusion of cutting fluid may cause rusting and other problems.

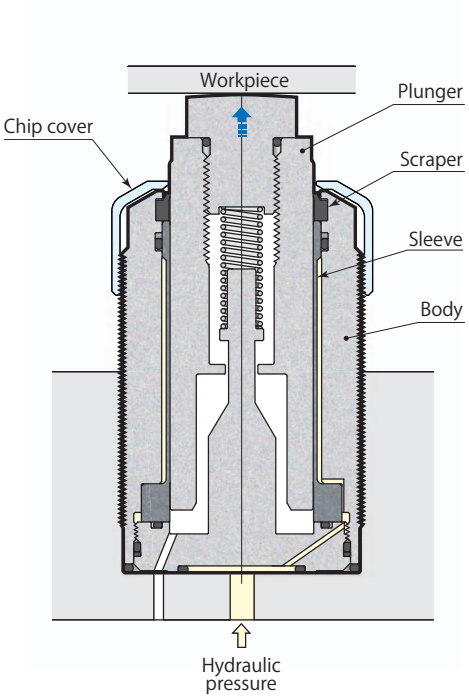


Air vent is blocked | Cutting fluid intrusion from air vent | Piping to metal chips or coolant free area

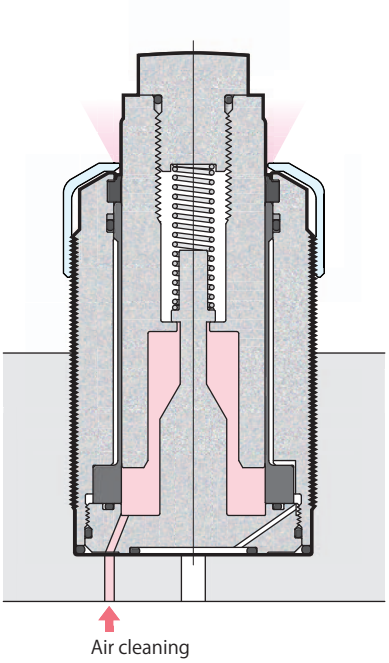
- Air (oil free) must be fed through a 5 μm filter that is connected to an air vent port for air cleaning. Perform air cleaning only when replacing workpiece. Plunger will rise during air cleaning.

Spring lift

model CSV□M-L

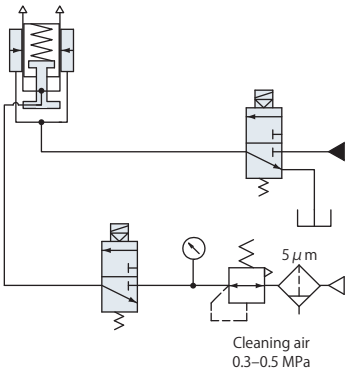


Lock



Unlock

Hydraulic and pneumatic circuit diagram



Specifications	page → 129
Hydraulic pressure & support force	page → 129
Applied load & deformation	page → 129
Dimensions	page → 130
Mounting details	page → 130

Specifications

	Size		Plunger stroke	
CSV	06 / 10 / 16 / 25	M –	L	: Standard stroke

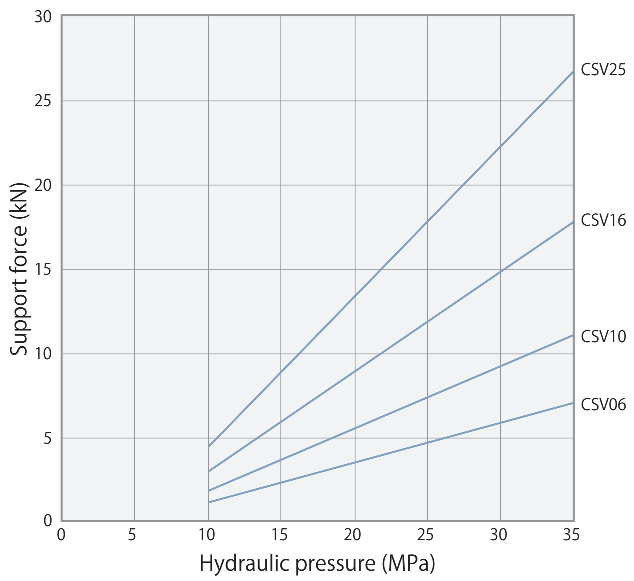
Model		CSV06M-L	CSV10M-L	CSV16M-L	CSV25M-L
Support force (hydraulic pressure 35MPa)*1	kN	7.1	11.1	17.8	26.7
Cylinder capacity	cm^3	1.5	2.9	5.5	5.7
Lift spring force*2	N	6–11	10–16	16–29	25–45
Plunger stroke	mm	8	10	10	13
Max. allowable mass of head cap	kg	0.1	0.1	0.2	0.2
Mass	kg	0.28	0.42	1.02	1.90
Recommended tightening torque of body	N・m	35	60	130	250

- Pressure range：10–35 MPa
- Proof pressure：52.5 MPa
- Operating temperature：0–70℃
- Fluid used：General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

＊1：When work support and clamp are used facing each other, work support and clamp must be selected in such a way that the support force is 1.5 times the applied load (clamping force + machining force).

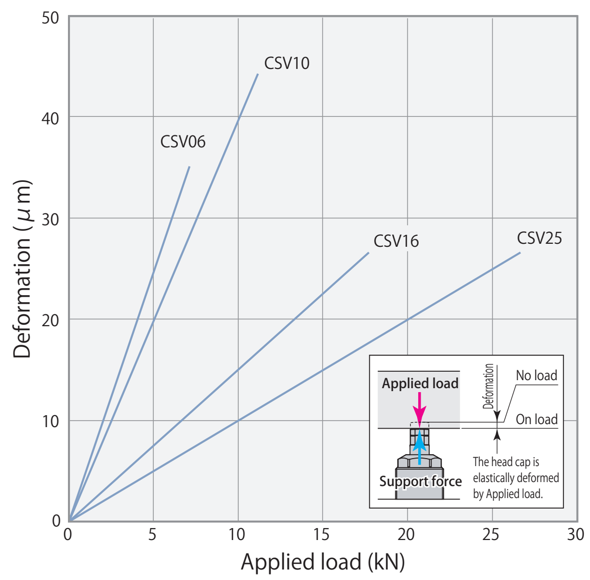
＊2：Figures are for "upper end to lower end" of plunger action.

Hydraulic pressure & support force



Hydraulic pressure MPa	Support force kN			
	CSV06	CSV10	CSV16	CSV25
10	1.2	1.9	3.0	4.5
15	2.3	3.7	6.0	8.9
20	3.5	5.6	8.9	13.4
25	4.7	7.4	11.9	17.8
30	5.9	9.3	14.8	22.3
35	7.1	11.1	17.8	26.7

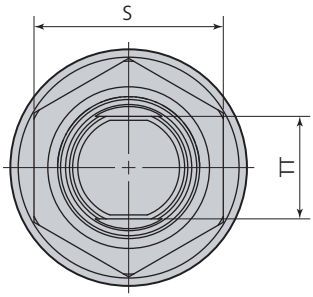
Applied load & deformation



Applied load kN	Deformation μm			
	CSV06	CSV10	CSV16	CSV25
0	0	0	0	0
5	25	20	7.5	5
10		40	15	10
15			22.5	15
20		Nonusable range		20
25				25
30				

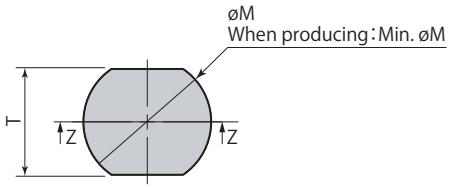
Held with hydraulic pressure of 35 MPa.

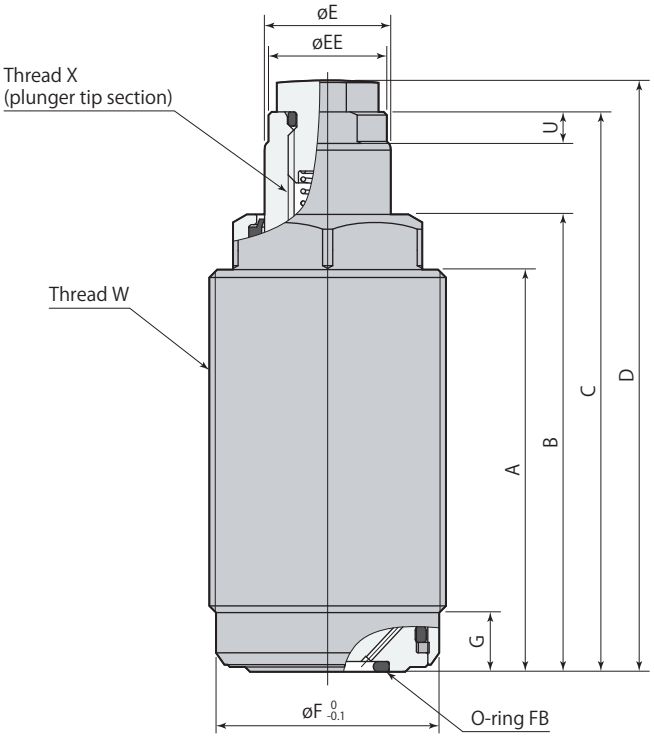
Dimensions

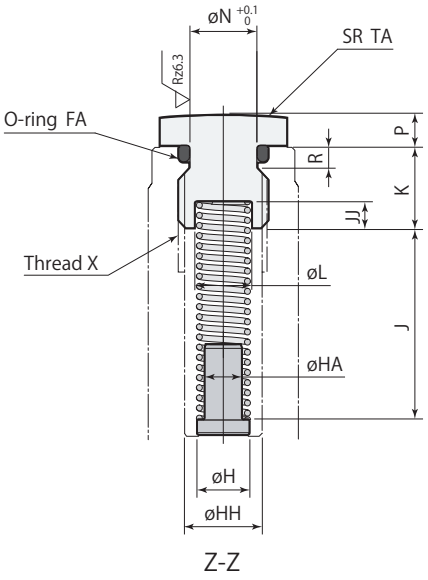


Head cap details

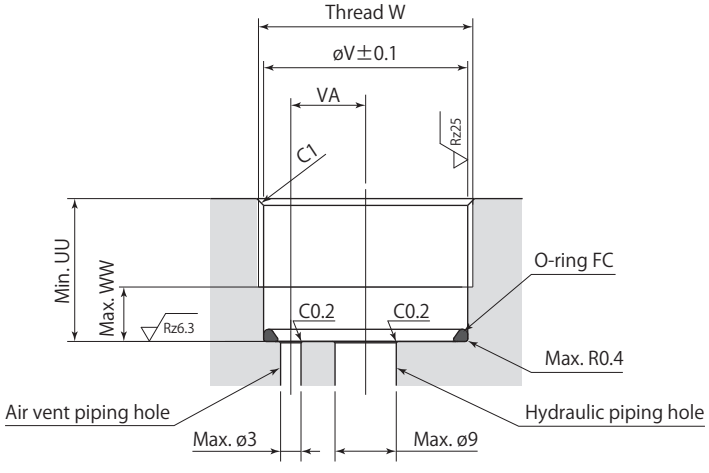
Hardness：HRC52







Mounting details



Rz: ISO4287(1997)

- When fixing the hexagon part of body with a vise, etc., make sure the tightening force is 2.5 kN or less.
- Always attach head cap (lift spring cannot be retained). When fabricating head cap, ensure that O-ring slot, spring spot facing and guide are made by referring to head cap details. Be sure to always use O-ring.
- When fabricating a lift spring, determine dimensions by referring to head cap details. Furthermore, rustproofing must be implemented (however, there is no guarantee for operation).
- Install O-ring FC at the bottom of the hole. The O-ring FC is packed with a work support.
- This diagram indicates a situation where head cap has been fitted into plunger with no pressure applied.

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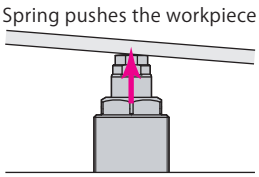
Model	CSV06M-L	CSV10M-L	CSV16M-L	CSV25M-L
A	51	58	59.5	68.5
B	58	67	71.8	82
C	71	83	88	102
D	75	87	94	109
øE	16	20	30	40
øEE	15	19	29	39
øF	28.3	33.2	48.2	63.2
G	7.5	7.5	7.5	8
øH	7	7	8.5	10
øHA	5	5	6	7.5
øHH	8.5	10.3	14	14
J	20.5	25.5	25	32.5
JJ	1.5	3.5	1.5	1.5
K	9	11	12	11
øL	7.4	7.6	9.2	11.2
øM	12.9	16.9	23	30
Min. øM	12.5	16	21	21
øN	7.8	8.9	13.3	13.3
P	4	4	6	7
R	1.9	3	2.4	2.4
S	24	30	41	55
T (width across flats)	12	14	19	24
TA	70	90	110	140
TT (plunger width across flats)	13	17	24	32
U	4	5	5	5.7
UU	15.5	15.5	15.5	20
øV	28.5	33.5	48.5	63.5
VA	11	12	18	23.5
W	M30×1.5	M35×1.5	M50×1.5	M65×1.5
WW	6.5	6.5	6.5	7
X (recommended tightening torque)	M10×1.5 depth 13 (30 N·m)	M12×1.75 depth 16 (50 N·m)	M16×2 depth 20 (100 N·m)	M16×2 depth 20 (100 N·m)
O-ring FA (fluorocarbon hardness Hs70)	S8	P9	AS568-014	AS568-014
O-ring FB (fluorocarbon hardness Hs90)	AS568-014	AS568-015	AS568-019	AS568-022
O-ring FC (fluorocarbon hardness Hs90)	AS568-022	AS568-025	S45	AS568-036

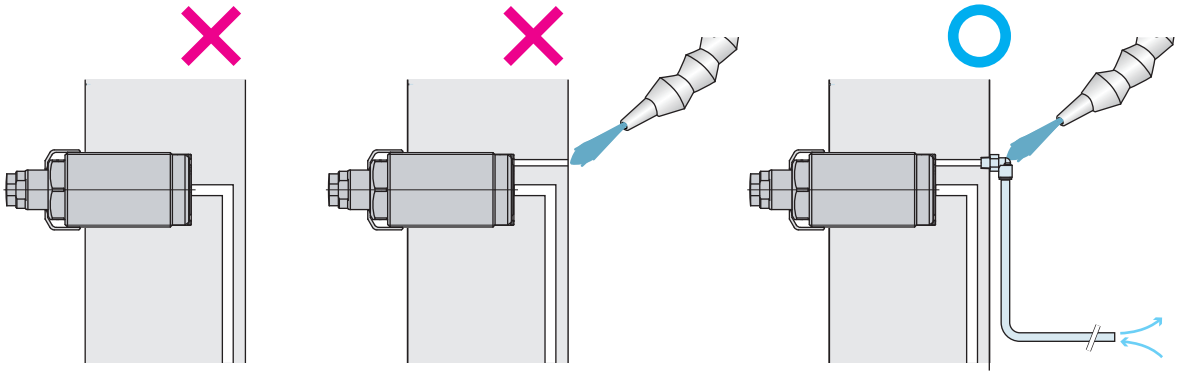
Caution in use

- If the workpiece is light weight, the plunger cannot be pressed down by the weight of workpiece and seating detection cannot be complete. Review the weight of workpiece or lift spring force to make the workpiece seat perfectly, and lock the work support.



- Avoid following usages. These may cause sleeve deformation that could lead to malfunction of plunger or decreased support force.
  - ×Applying eccentric load on plunger.
  - ×Applying load that exceeds rated support force.
  - ×Rotating plunger when locked.

- Air vent must be opened to atmosphere. Any blockage on the vent results in malfunction. Provide the piping if there is a risk of coolant or metal chips intrusion. Allowing intrusion of cutting fluid may cause rusting and other problems.

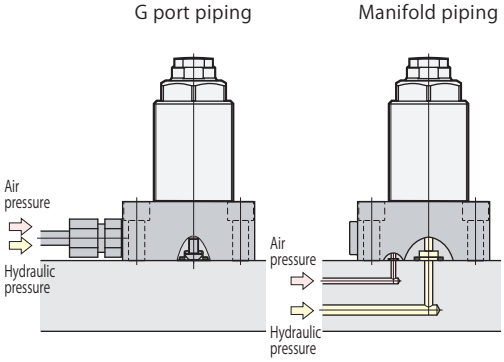


- Air (oil free) must be fed through a 5 μm filter that is connected to an air vent port for air cleaning. Perform air cleaning only when replacing workpiece.

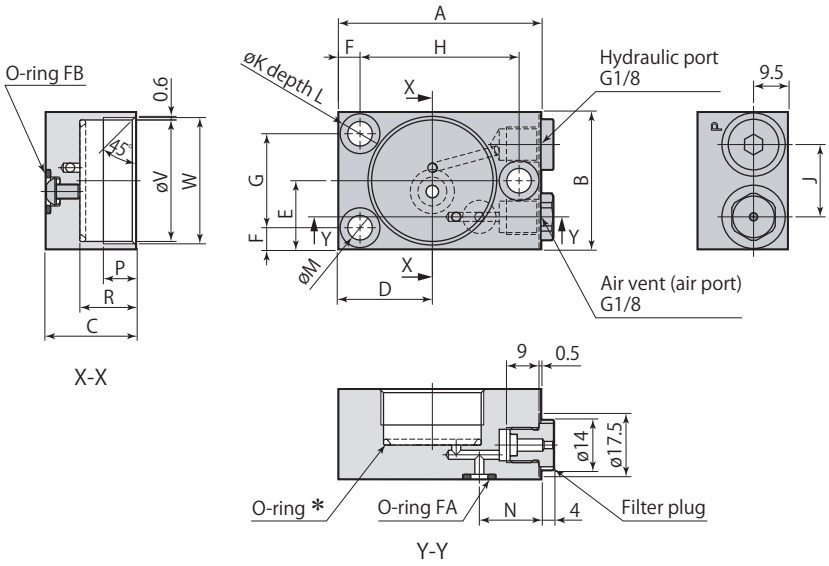
Specifications

	Size		Option code		
CSP	06 / 10 / 16 / 25	M –	N	: Flange	page →134
			Q	: Piping cap	page →136
			L	: Locknut	page →136
			J	: Chip cover	page →136

Flange



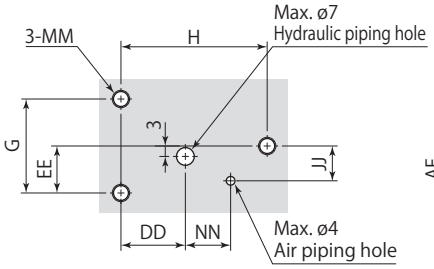
Flange is available for G port piping and manifold piping.



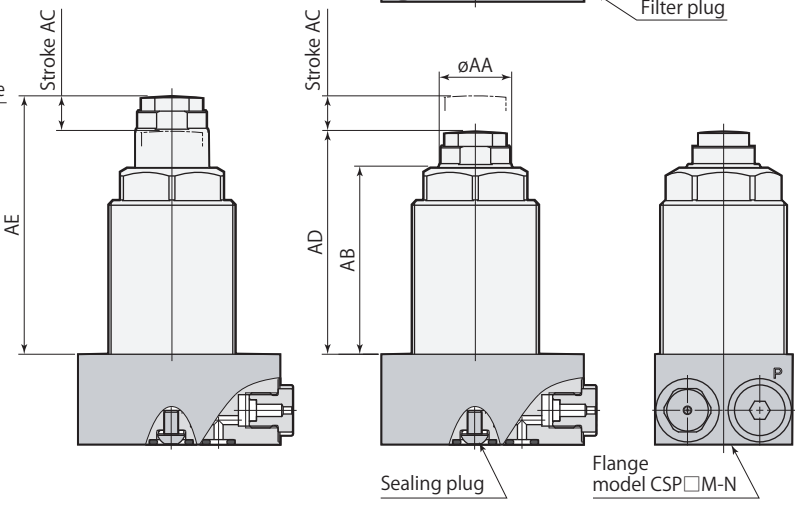
✻ : Install O-ring in the same way even when a flange is used for mounting.
The O-ring is included in the package of the work support.

Work support mounting dimensions

Mounting details



The mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997) for manifold piping.



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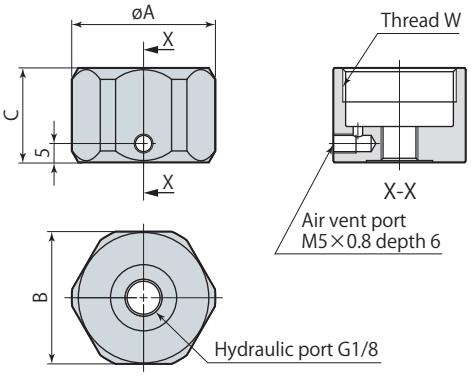
Flange	CSP06M-N		CSP10M-N	CSP16M-N	CSP25M-N
Work support	CSW06M-L CSV06M-L	CSW06M-D	CSW10M-L CSV10M-L	CSW16M-L CSV16M-L	CSW25M-L CSV25M-L
A	49	49	56	66.5	83.5
B	38	38	38	60	75
C	25	25	25	25	30
D	21	21	26	29	36
E	19	19	19	30	37.5
F	5	5	6	6	8
G	28	28	26	48	59
H	37.5	37.5	44	54.5	68
J	20	20	20	24	30
K	9.5	9.5	11	11	14
L	6.5	6.5	8	8	11
M	5.5	5.5	6.8	6.8	8.5
N	16	16	17	22	25
P	9	9	9	9	12
R	15.5	15.5	15.5	15.5	20
øV	28.5	28.5	33.5	48.5	63.5
W	M30×1.5	M30×1.5	M35×1.5	M50×1.5	M65×1.5
O-ring FA (fluorocarbon hardness Hs70)	P6	P6	P6	P6	P6
O-ring FB (fluorocarbon hardness Hs90)	P9	P9	P9	P9	P9
øAA	16	16	20	30	40
AB	42.5	49.5	51.5	56.3	62
AC	8	15	10	10	13
AD	51.5	58.5	61.5	68.5	76
AE	59.5	–	71.5	78.5	89
DD	16	16	20	23	28
EE	14	14	13	24	29.5
JJ	10	10	10	12	15
MM	M5	M5	M6	M6	M8
NN	12	12	13	15.5	22.5

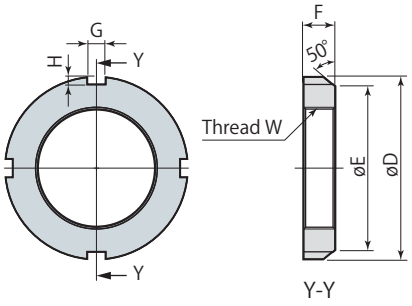
- Remove the plug of fitting port to be used when mounting.
- Mounting screws are not included.
- If the air vent is directly subjected to the coolant, extend the piping to a location that is not subjected to the coolant and make the air vent open to atmosphere.

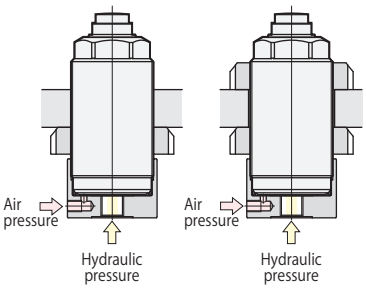
Piping cap, locknut

Piping cap

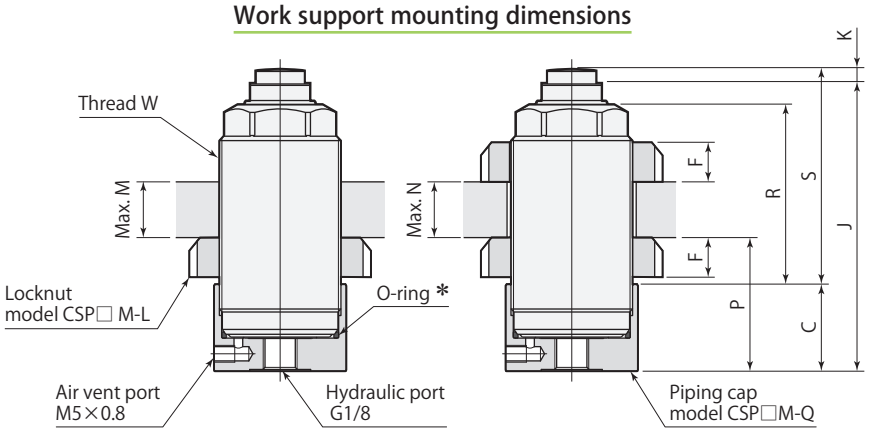


Locknut





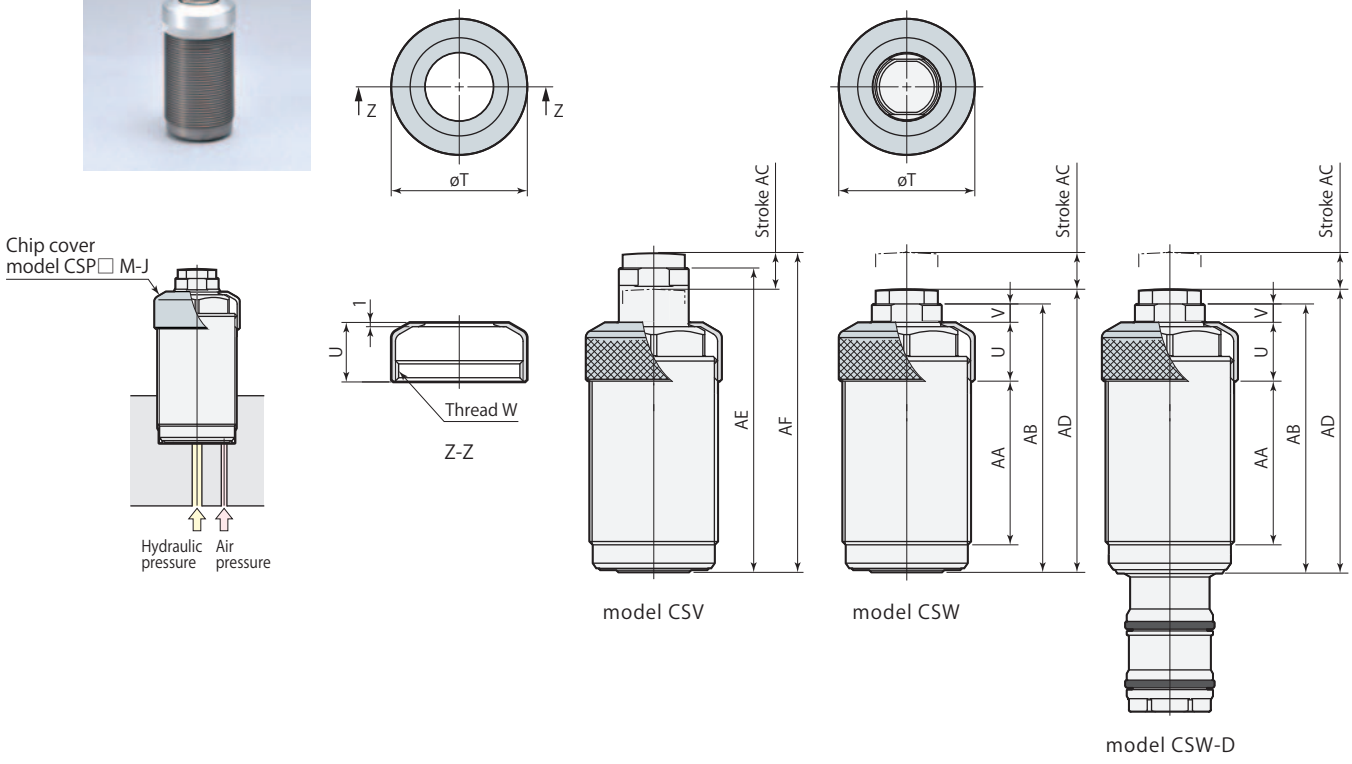
Work support mounting dimensions



*: Install O-ring in the same way even when a piping cap is used for mounting.
The O-ring is included in the package of the work support.

Chip cover

Work support mounting dimensions



mm

Piping cap	CSP06M-Q		CSP10M-Q	CSP16M-Q	CSP25M-Q
Locknut	CSP06M-L		CSP10M-L	CSP16M-L	CSP25M-L
Work support	CSW06M-L CSV06M-L	CSW06M-D	CSW10M-L CSV10M-L	CSW16M-L CSV16M-L	CSW25M-L CSV25M-L
øA	38	38	41	60	76
B	35	35	38	55	70
C	25	25	25	25	28.5
øD	45	45	52	70	85
øE	38	38	44	61	79
F	7	7	8	11	12
G	5	5	5	6	7
H	2	2	2	2.5	3
J*	72.5	79.5	82.5	87.5	98.5
K	4	4	4	6	7
M	26.5	33.5	32.5	30.9	35
N	19.5	26.5	24.5	19.9	23
P	33	33	34	37	41.5
R	42.5	49.5	51.5	56.3	63
S*	51.5	58.5	61.5	68.5	77
W	M30×1.5	M30×1.5	M35×1.5	M50×1.5	M65×1.5

∗: Stroke length to be added on J and S dimension when mounting on model CSV.

mm

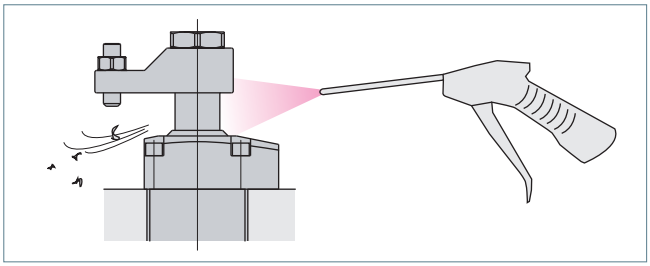
Chip cover	CSP06M-J		CSP10M-J	CSP16M-J	CSP25M-J
Work support	CSW06M-L CSW-D06M-L CSV06M-L	CSW06M-D CSW-D06M-D	CSW10M-L CSW-D10M-L CSV10M-L	CSW16M-L CSW-D16M-L CSV16M-L	CSW25M-L CSW-D25M-L CSV25M-L
øT	32	32	37	52	68
U	14	14	16	20	21
V	4	4	5	5.2	6
W	M30×1.5	M30×1.5	M35×1.5	M50×1.5	M65×1.5
AA	37.5	44.5	44.5	45.3	54
AB	63	70	73	78	89
AC	8	15	10	10	13
AD	67	74	77	84	96
AE	71	–	83	88	102
AF	75	–	87	94	109

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 jig 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.

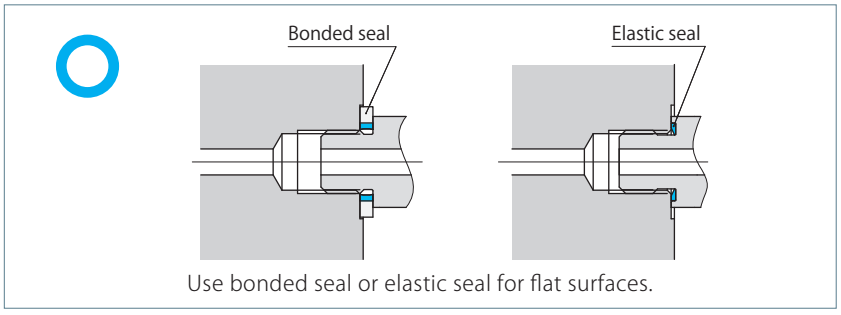
G port sealing method

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 are included with packing.

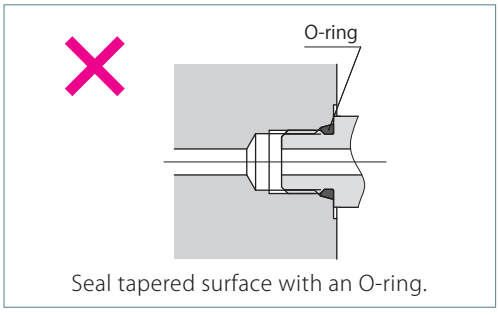
3. When mounting, clean metal chips and dust off surfaces that will come into contact with packing.

Sealing method for flange surfaces



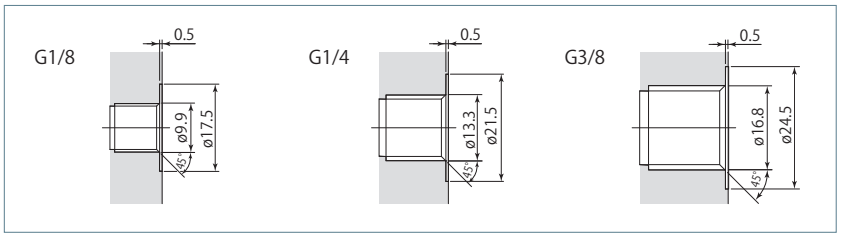
Use bonded seal or elastic seal for flat surfaces.

Sealing method for tapered surfaces



Seal tapered surface with an O-ring.

G port details



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Non-leak coupler

Hydraulic pressure 35MPa **WVP-2H** Specifications, Dimensions ····· **142**

Hydraulic pressure 35MPa **WVP-2S** Specifications, Dimensions ····· **144**

Non-leak coupler

35MPa

model WVP

model WVP-2HPH

model WVP-2HSH

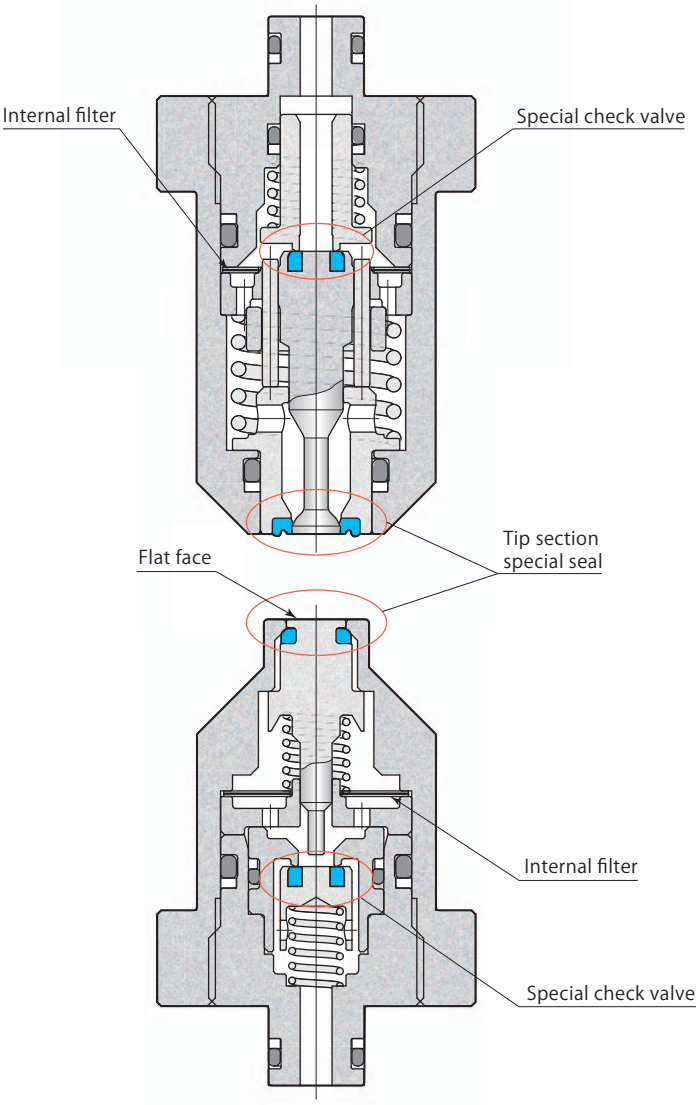
model WVP-2SPH

model WVP-2SSH

Special seal mechanism ensures leak of operating oil is zero for connecting and disconnecting

35 MPa Non-leak coupler socket
model **WVP-2HSH**

35 MPa Non-leak coupler plug
model **WVP-2HPH**



Spill amount (liquid drip amount per connection or disconnection) 0.01 mL or less

- Special seal installed on the tip of coupler socket and coupler plug can minimize the intrusion of air and spill of working fluid during connection and disconnection, furthermore, it prevents corruption of coolant by being miscible with spilled working fluid and air contamination of clamp circuit.
- Model WVP-2H incorporates filter and protects internal check valves and clamps from foreign substances.
- Connection and disconnection, which had been difficult to perform with conventional couplers while hydraulic pressure is applied, can be performed smoothly.
- Pressure in the circuit is retained for a long time after disconnection of coupler.

Specifications

Pressure range	7–35 MPa	Circuit symbol
Proof pressure	52.5 MPa	
Orifice area	12.5 mm²	
Fluid used	General mineral based hydraulic oil (ISO-VG32 equivalent)	
Allowable eccentricity	±0.4 mm	Plug hydraulic pressure source 35MPa
Allowable inclination	0.2° or less	Connect/disconnect under pressure : Capable
Reactive force*	154 N per 1 MPa fluid pressure	
	Max. spring force for no pressure 157 N	
Operating temperature	0–70 ℃	
Mass	WVP-2HSH : 310g WVP-2HPH : 260g WVP-2HDH : 230g	

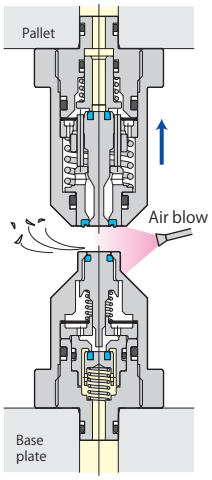
∗ : Reactive force (N) = Fluid pressure (MPa) ×154+157

- Supply operating oil from plug.
- Mixed use with model WVP-2S□H is not possible.

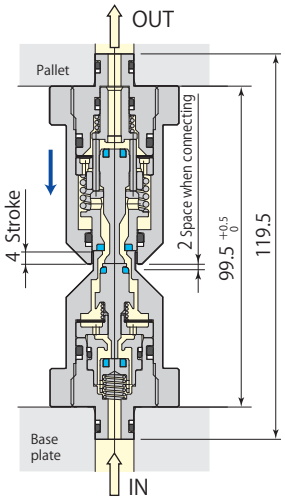
Non-leak coupler fixed

Coupler lower section hydraulic pressure supply

Disconnected condition

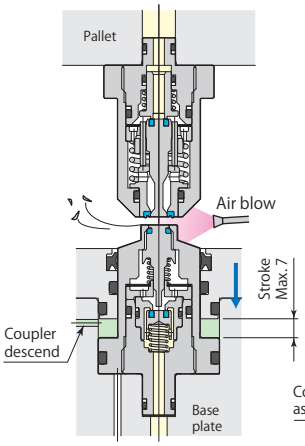


Connected condition

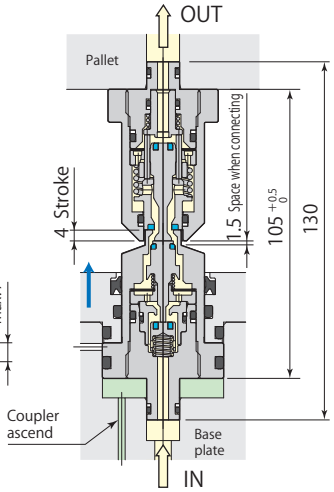


Non-leak coupler float

Disconnected condition

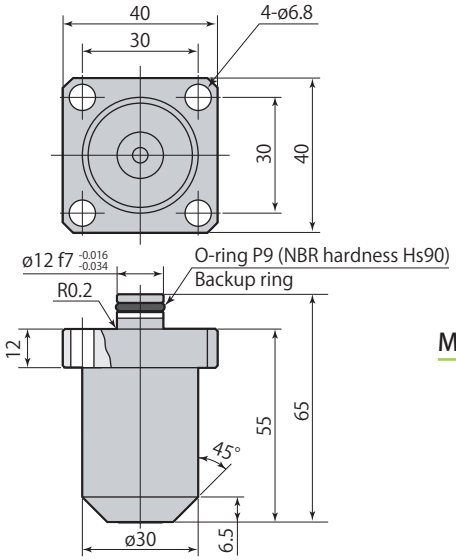


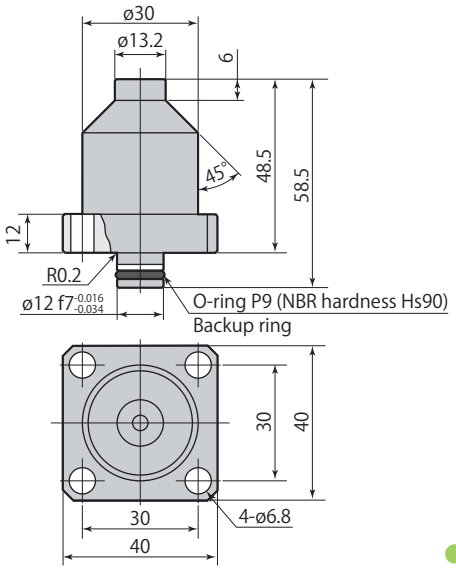
Connected condition



Dimensions

WVP-2HSH socket (fixed)

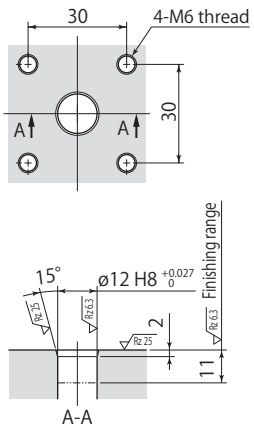




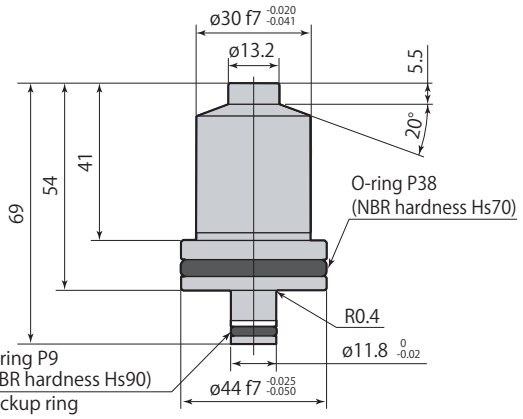
WVP-2HPH plug (fixed)

Mounting details

WVP-2HSH
WVP-2HPH

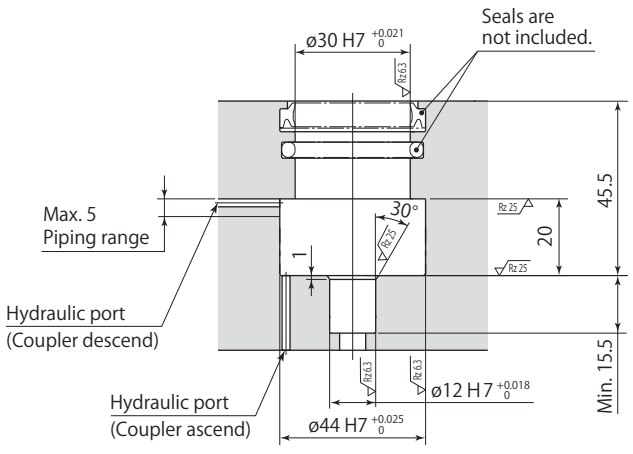


WVP-2HDH plug (floating)



Mounting details

WVP-2HDH



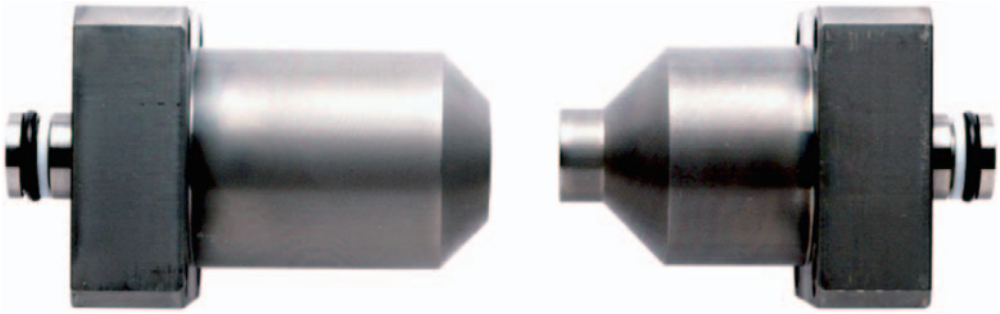
● Mounting screws are not included.

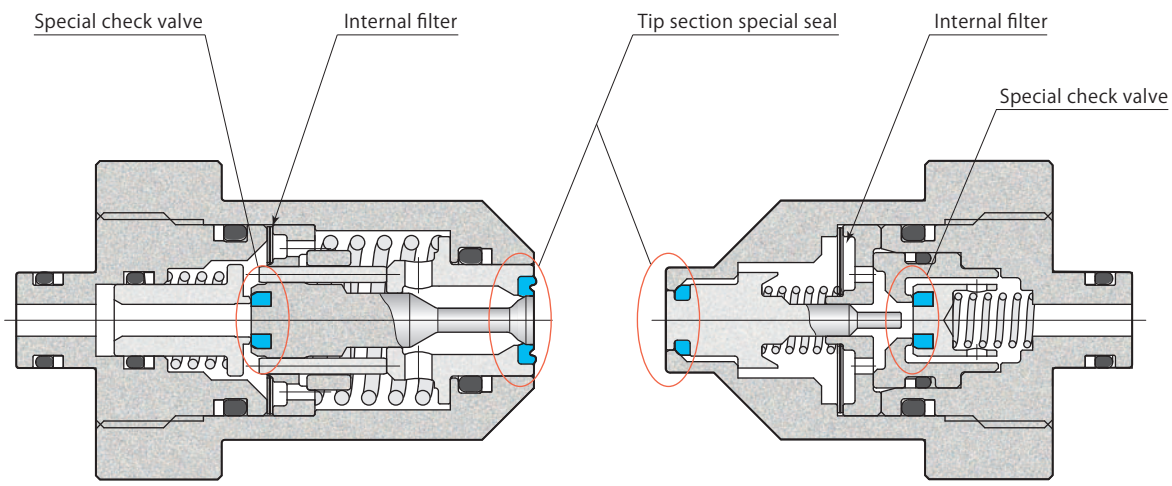
Rz: ISO4287(1997)

Special seal mechanism ensures leak of operating oil is zero for connecting and disconnecting

35 MPa Non-leak coupler socket
model **WVP-2SSH**

35 MPa Non-leak coupler plug
model **WVP-2SPH**





Spill amount (liquid drip amount per connection or disconnection) 0.01 mL or less

- Special seal installed on the tip of coupler socket and coupler plug can minimize the intrusion of air and spill of working fluid during connection and disconnection, furthermore, it prevents corruption of coolant by being miscible with spilled working fluid and air contamination of clamp circuit.
- Model WVP-2S incorporates filter and protects internal check valves and clamps from foreign substances.
- Connection and disconnection, which had been difficult to perform with conventional couplers while hydraulic pressure is applied, can be performed smoothly.
- Pressure in the circuit is retained for a long time after disconnection of coupler.
- Jig pallet fabrication cost is kept low by using an economically priced plug for coupler of pallet.

Specifications

Pressure range	7–35 MPa	Circuit symbol
Proof pressure	52.5 MPa	
Orifice area	12.5 mm²	
Fluid used	General mineral based hydraulic oil (ISO-VG32 equivalent)	Socket hydraulic pressure source 35MPa
Allowable eccentricity	±0.4 mm	Connect/disconnect under pressure : Capable
Allowable inclination	0.2° or less	
Reactive force*	154 N per 1 MPa fluid pressure	
	Max. spring force for no pressure 162 N	
Operating temperature	0–70 ℃	
Mass	WVP-2SSH : 330g WVP-2SPH : 270g	

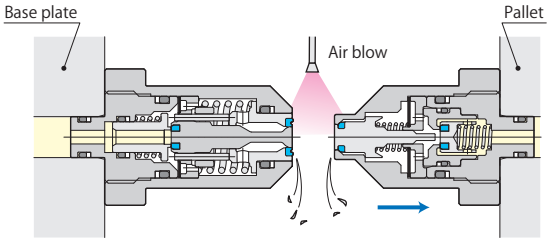
∗ : Reactive force (N) = Fluid pressure (MPa) ×154+162

- Supply operating oil from socket.
- Mixed use with model WVP-2H□H is not possible.

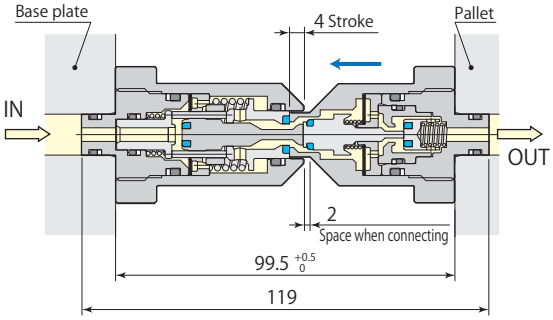
Non-leak coupler fixed

Horizontal mounting of coupler

Disconnected condition



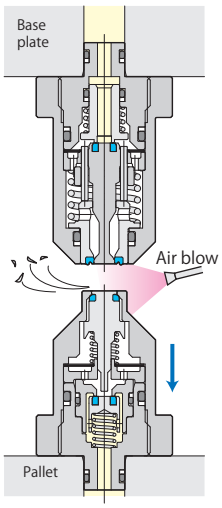
Connected condition



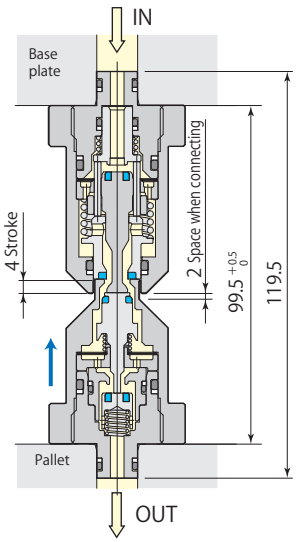
Non-leak coupler fixed

Coupler upper section hydraulic pressure supply

Disconnected condition



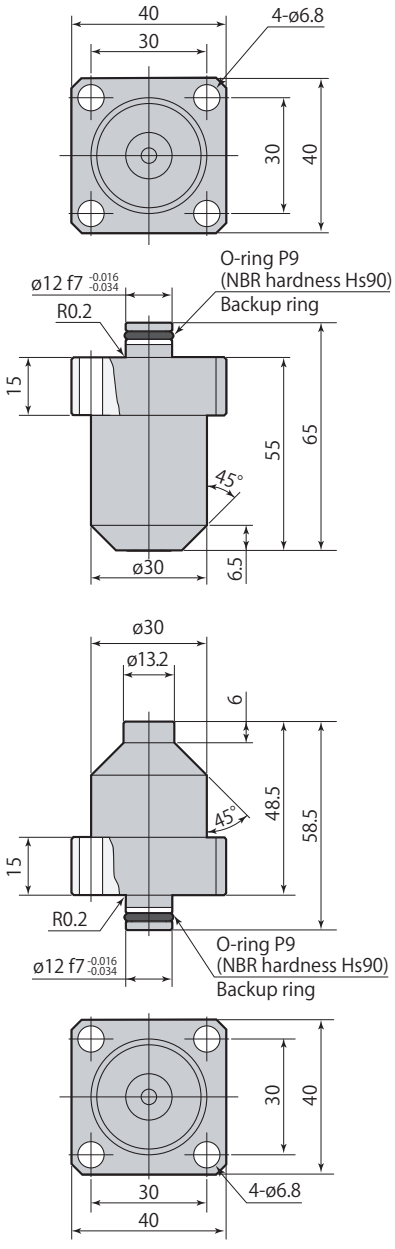
Connected condition



● Perform installation with plug below so metal chips are less likely to adhere and air blowing can be performed properly.

Dimensions

WVP-2SSH socket (fixed)

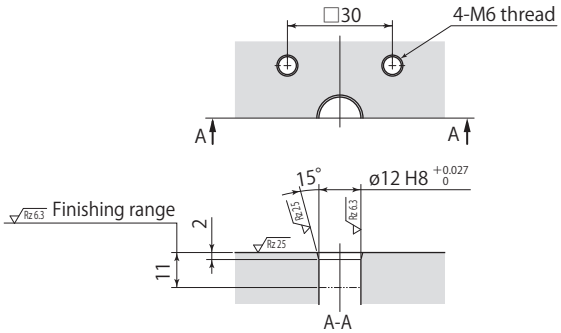


WVP-2SPH plug (fixed)

● Mounting screws are not included.

Mounting details

WVP-2SSH, WVP-2SPH



Rz: ISO4287(1997)

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Valve, Accumulator Structure, Specifications, Dimensions

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- Coupling valve Single acting **VHD-H** ····· **160**
- Reducing valve **VRG-M/H** ····· **162**
- Sequence valve **VEF-M/H** ····· **164**
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Control unit Hydraulic and pneumatic circuit diagram, Specifications, Dimensions

- Double acting, Manual operated **HCD-W** ····· **168**
- Single acting, Manual operated **HCD-S** ····· **169**
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Pascal pump **X63** Specifications, Performance diagram ····· **173**

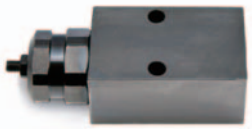
Control system

30MPa

Accumulator
model WPC40

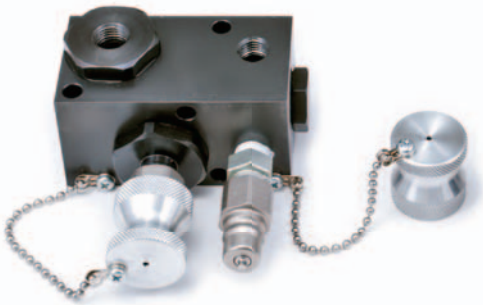
Accumulator
model WPC13

Reducing valve
model VRG-G



Sequence valve
model VEF

Reducing valve
model VRG-T



Coupling valve
model VCB

Pilot check valve
model VCP

Coupling valve
model VHD

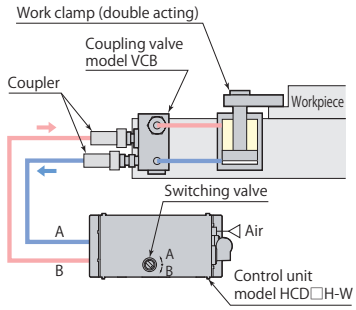
Double acting clamp is controlled and operated with control unit model **HCD□H-W** and coupling valve model **VCB**.

Control unit **model HCD□H-W**
Page →168

Coupling valve **model VCB**
Pages →156, 157

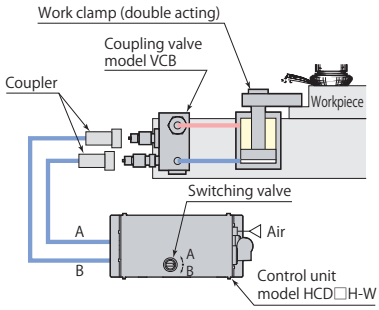
Control unit (HCD□H-W) converts air pressure to hydraulic pressure by actuation of air driven Pascal pump. Once circuit pressure is attained to the set pressure, it stops pumping then keeps the hydraulic pressure.
Coupling valve (VCB) is placed between a control unit and double acting clamps, and it allows to disconnect the control unit from the valve by means of hydraulic coupler. Built-in check valve in coupling valve can positively seal the pressure.

Clamping operation



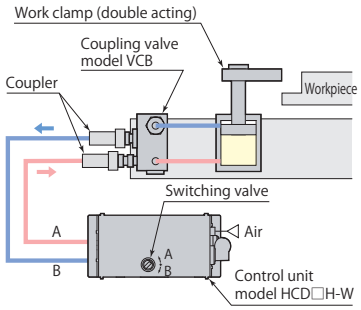
After coupler is connected, workpiece is clamped by aligning switching valve of control unit to B hydraulic port (clamping circuit).

Hydraulic pressure source disengagement (during processing)

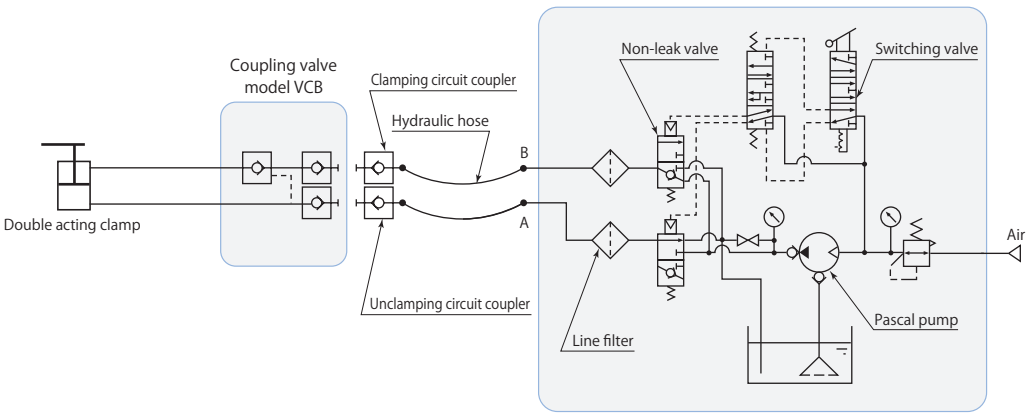


Coupler is released by aligning switching valve of control unit to center position after workpiece clamping is completed.

Unclamping operation



After coupler is connected, workpiece is taken out by unclamping, which is made possible by aligning switching valve of control unit to A hydraulic port (unclamping circuit).

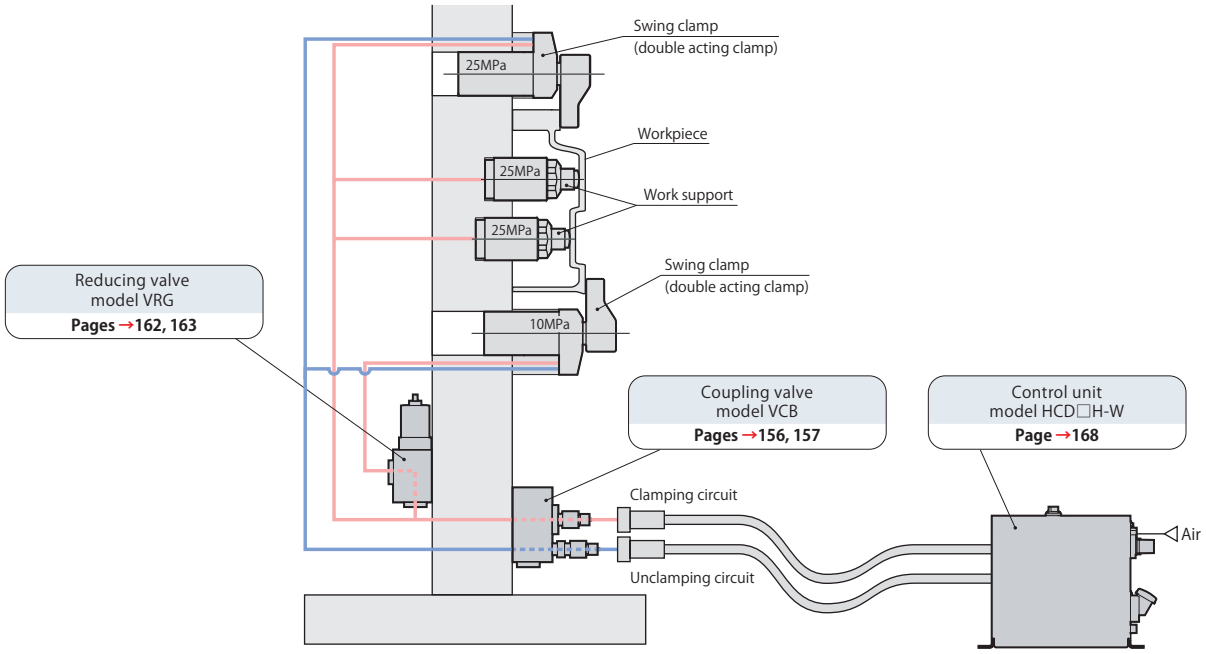


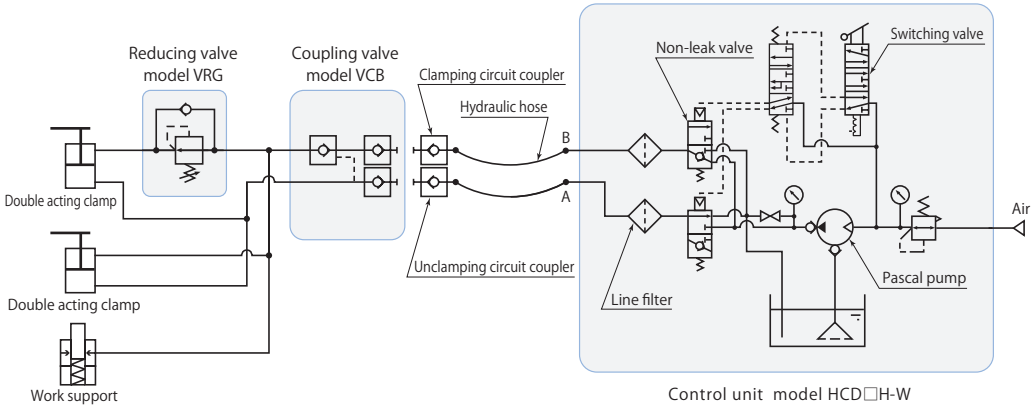
Control unit model HCD□H-W

Since Pascal pump does not raise oil temperature like electrical pumps, it does not trigger pressure drop (reduction in clamping force) after clamping due to difference between ambient temperature and oil temperature. Fluctuation of pressure due to changes in ambient temperature, however, does occur. (This fluctuation presents minimal problems with ordinary cutting processes. Inquire for details.)

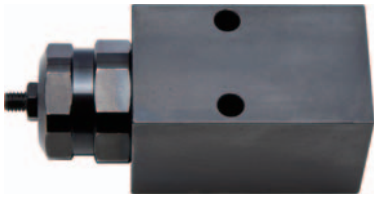
Reducing valve model **VRG**
Pages →162, 163

Internal hydraulic pressure of circuit can be partially reduced.
(Example) For work support 25 MPa (primary pressure)
pressure of work clamp is reduced to 10 MPa.



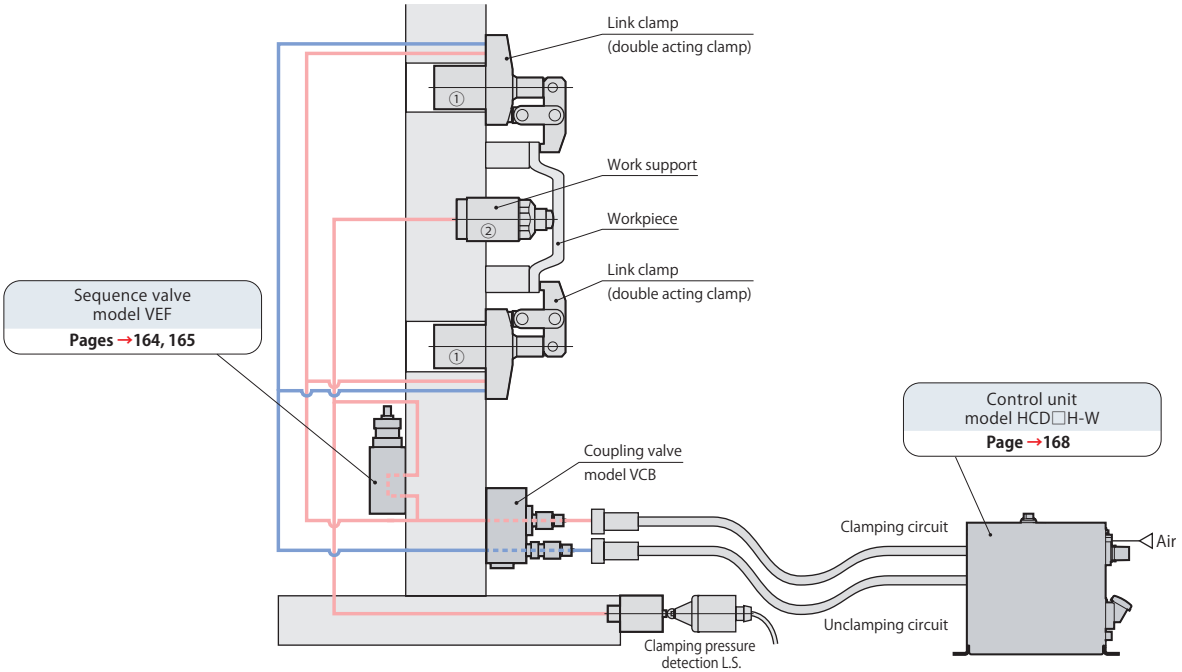


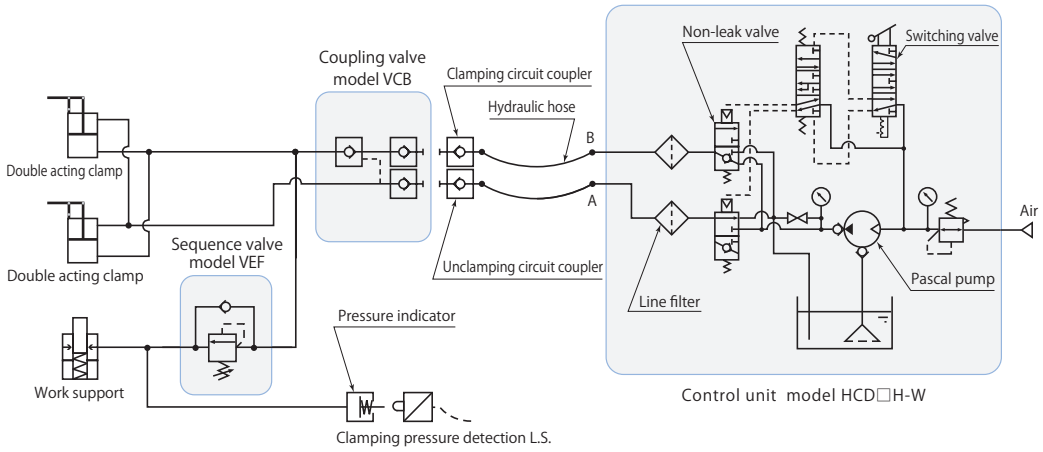
Control unit model HCD□H-W



Sequence valve **model VEF**
Pages →164, 165

Clamps are sequentially operated through same circuit.
(Example) ① After clamping operation of work clamp
② Work support operation locked.



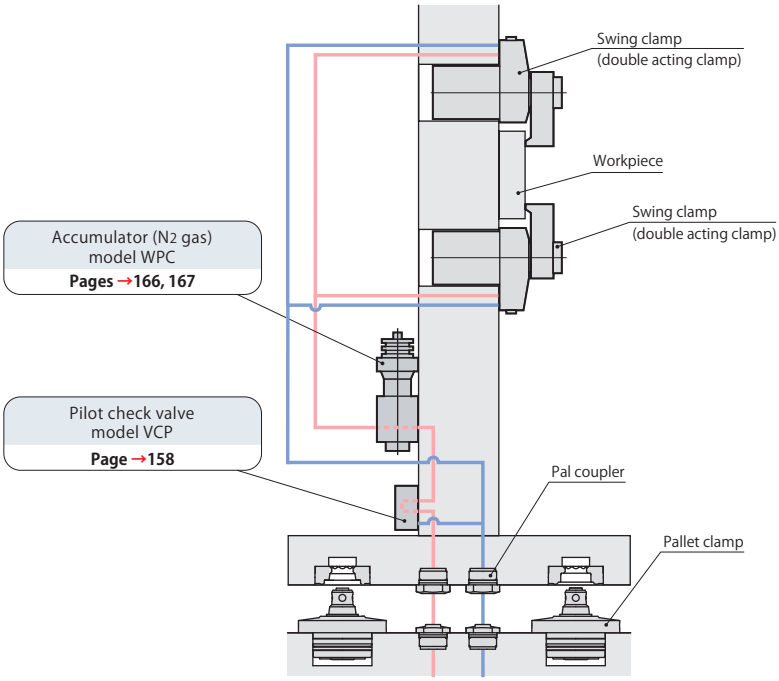


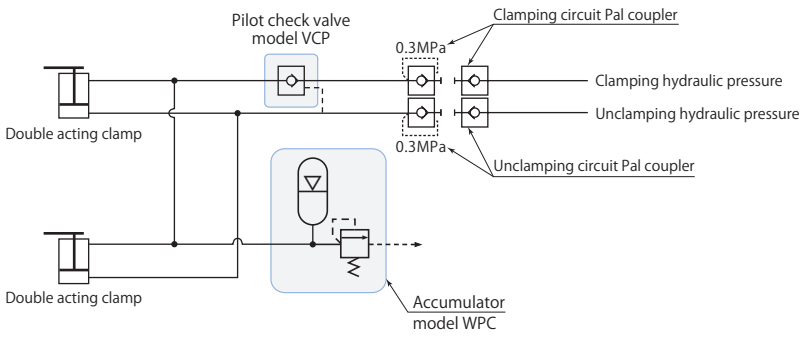
Pilot check valve model **VCP**
Page →158

Accumulator model **WPC**
Pages →166, 167

It ensures the clamp circuit pressure positively retained even when hydraulic unit provides zero pressure or pressure line is cut off, which can prevent the workpiece fall or accident due to the clamp loose.

After hydraulic pressure source has been disengaged, circuit pressure fluctuation due to temperature changes is suppressed.





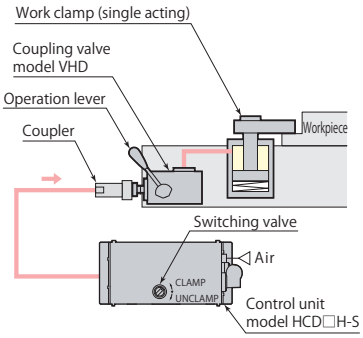
Single acting clamp is controlled and operated with control unit model **HCD□H-S** and coupling valve model **VHD**.

Control unit model **HCD□H-S**
Page →169

Coupling valve model **VHD**
Pages →160, 161

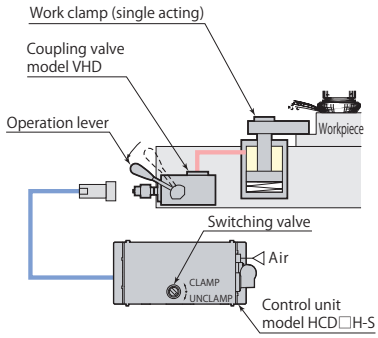
Control unit (HCD□H-S) converts air pressure to hydraulic pressure by actuation of air driven Pascal pump. Once circuit pressure is attained to the set pressure, it stops pumping then keeps the hydraulic pressure.
Coupling valve (VHD) is placed between a control unit and single acting clamps, and it allows to disconnect the control unit from the valve by means of hydraulic coupler. Built-in check valve in coupling valve can positively seal the pressure.

Clamping operation



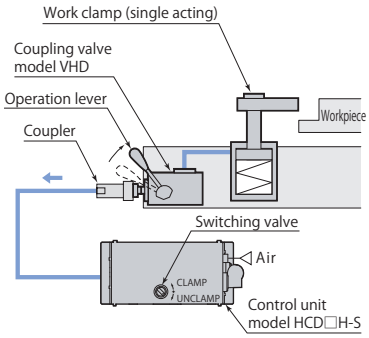
After coupler is connected, workpiece is clamped by aligning switching valve of control unit to clamping circuit.

Hydraulic pressure source disengagement (during processing)

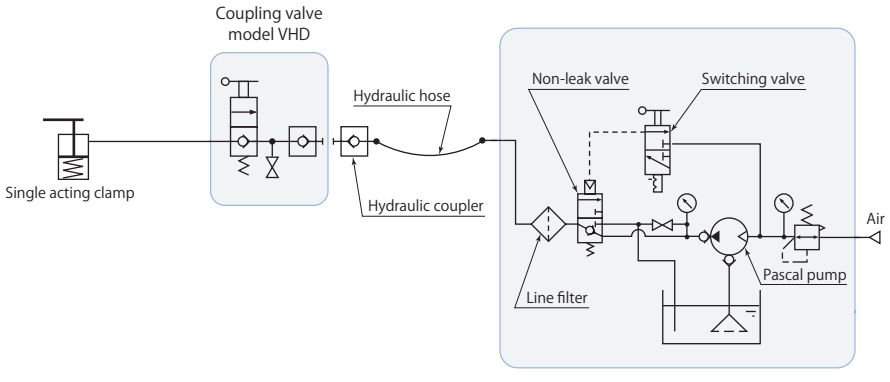


Coupler is released by positioning operation lever of coupling valve to clamping side and aligning switching valve of control unit with unclamping.

Unclamping operation



Workpiece is taken out after coupler is connected, by positioning operation lever of coupling valve to unclamping side, to unclamp.



Control unit model HCD□H-S

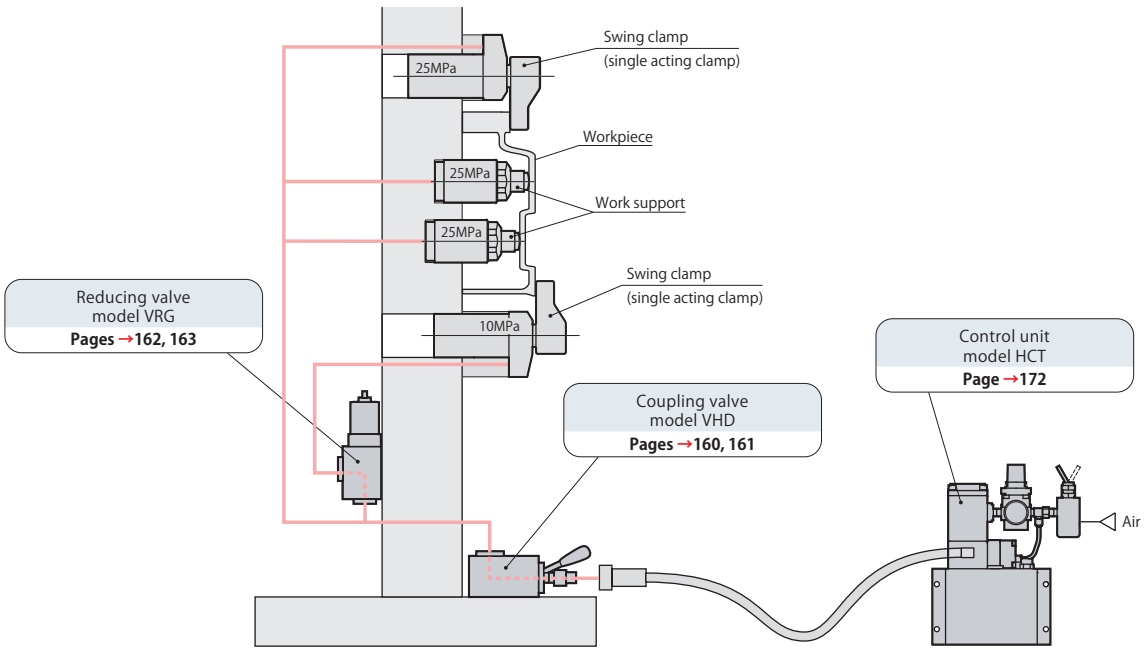
Since Pascal pump does not raise oil temperature like electrical pumps, it does not trigger pressure drop (reduction in clamping force) after clamping due to difference between ambient temperature and oil temperature. Fluctuation of pressure due to changes in ambient temperature, however, does occur. (This fluctuation presents minimal problems with ordinary cutting processes. Inquire for details.)

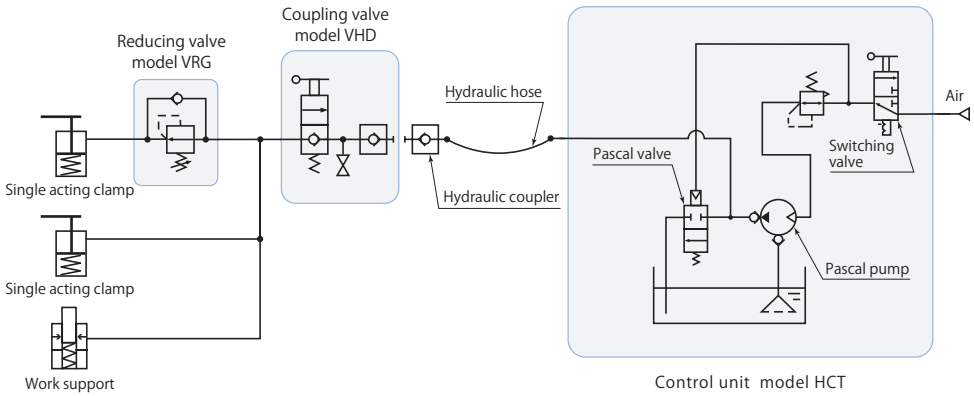
Control unit model **HCT-□**
Page →172

Compact hydraulic control unit for air drive and manual operations. Control unit (HCT-□) converts air pressure to hydraulic pressure by actuation of air driven Pascal pump. Once circuit pressure is attained to the set pressure, it stops pumping then keeps the hydraulic pressure.

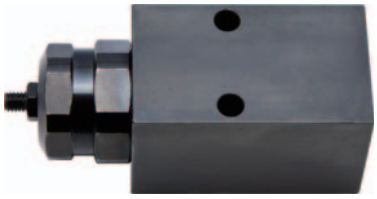
Reducing valve model **VRG**
Pages →162, 163

Internal hydraulic pressure of circuit can be partially reduced.
(Example) For work support 25 MPa (primary pressure)
pressure of work clamp is reduced to 10 MPa.



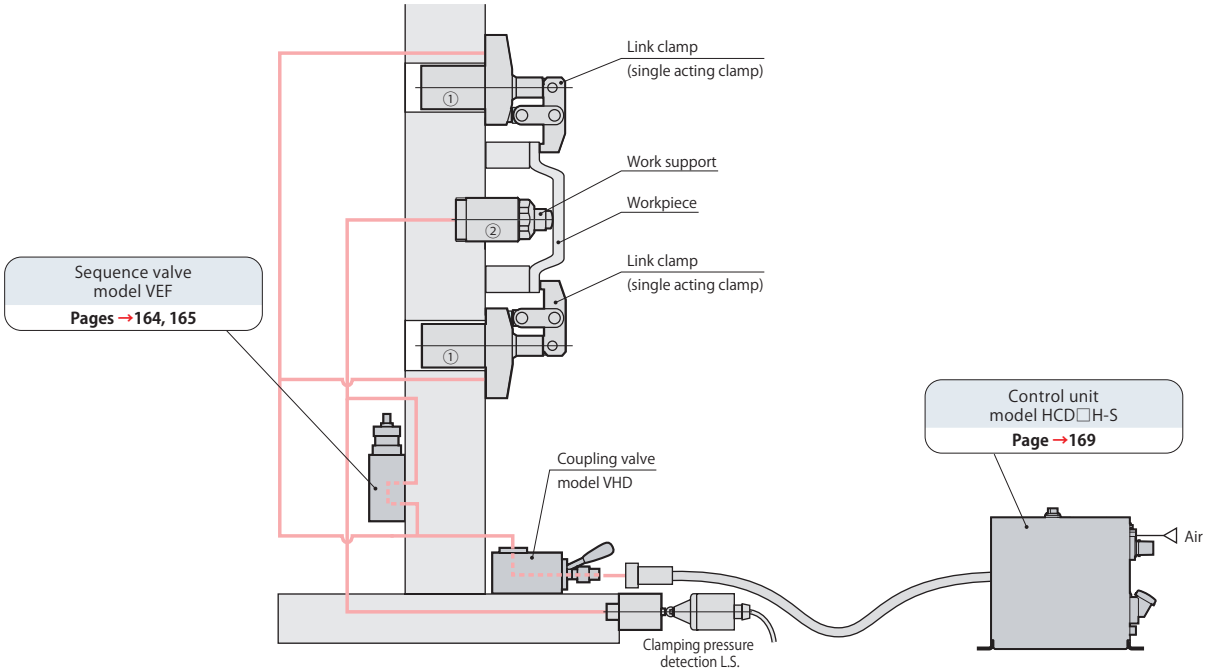


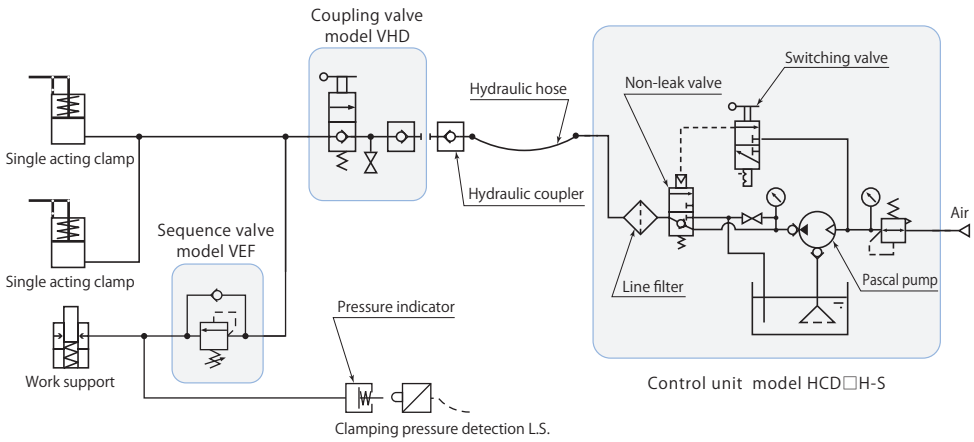
Control unit model HCT



Sequence valve model **VEF**
Pages →164, 165

Clamps are sequentially operated through same circuit.
(Example) ① After clamping operation of work clamp
② Work support operation locked.

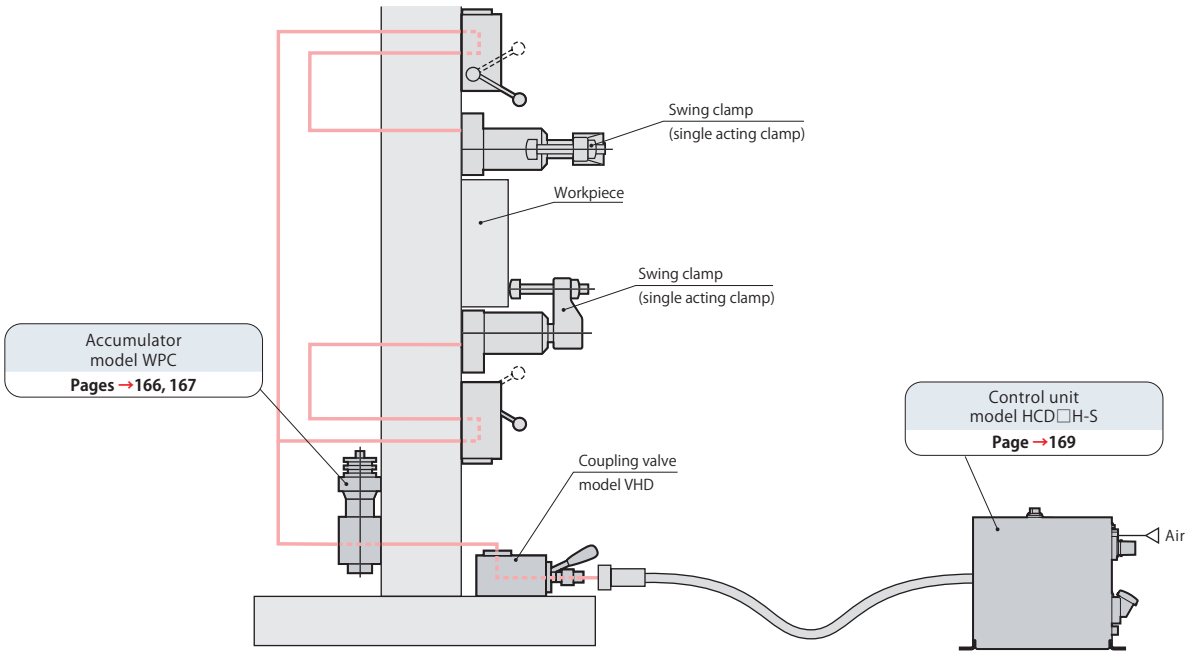


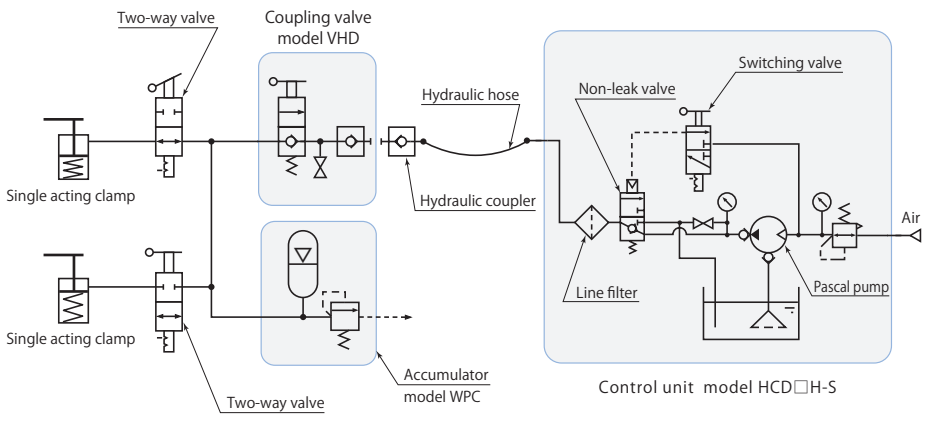


Control unit model HCD□H-S

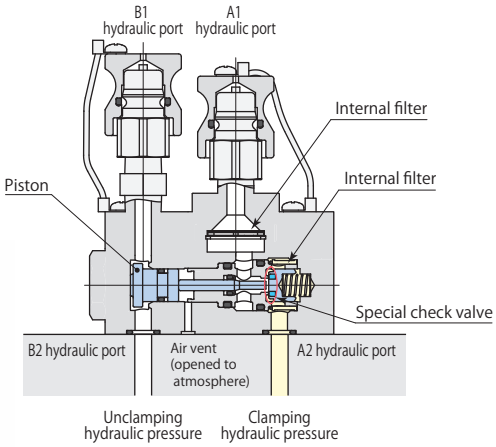
Accumulator model **WPC**
Pages →166, 167

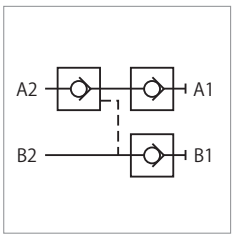
After hydraulic pressure source has been disengaged, circuit pressure fluctuation due to temperature changes is suppressed.





Coupling valve model **VCB**





This is a non-leak valve, with which coupling of double acting clamp can be performed easily and clamping circuit pressure can be retained over a long period of time after disengagement of hydraulic pressure source.

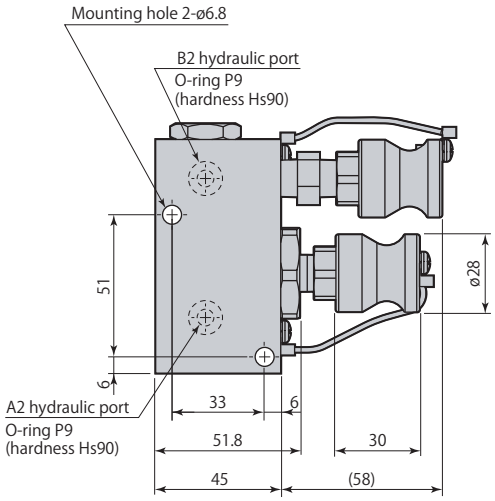
Specifications

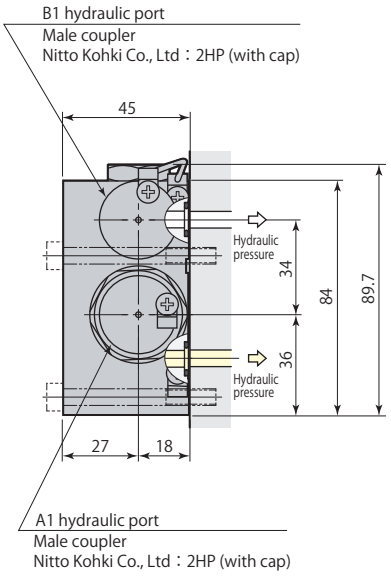
Model		VCB-HGB	VCB-HGS	VCB-HT
Mounting, piping methods		Manifold, GB mounting	Manifold, GS mounting	Piping mounting
Pressure range	MPa	7–30		
Proof pressure	MPa	37.5		
Min. pilot pressure (open valve)	MPa	0.3 + 0.23 × secondary side pressure		
Orifice area	mm^2	14.2		
Operating temperature	℃	0–70		
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)		
Mass	kg	1.4		

● There is also a type that adopts fluorocarbon 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 VCB-□□-V).

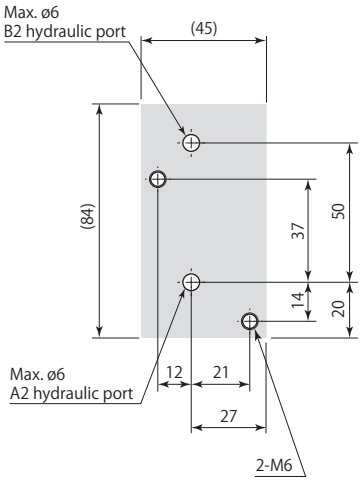
Dimensions

VCB-HGB Manifold, GB mounting ＊With internal filter (A1 & A2 hydraulic ports)





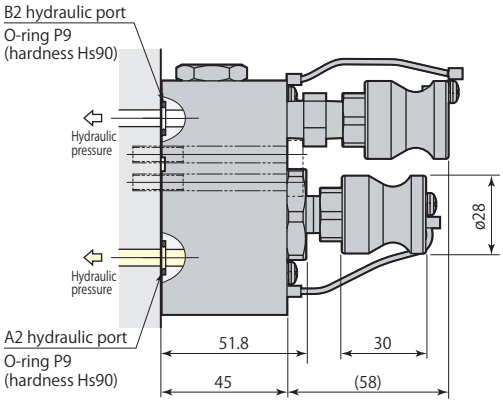
Mounting details

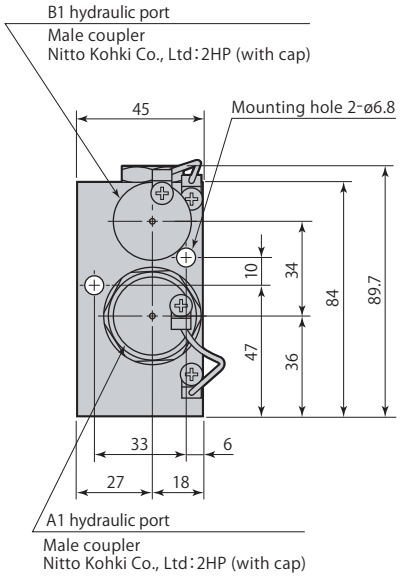


For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

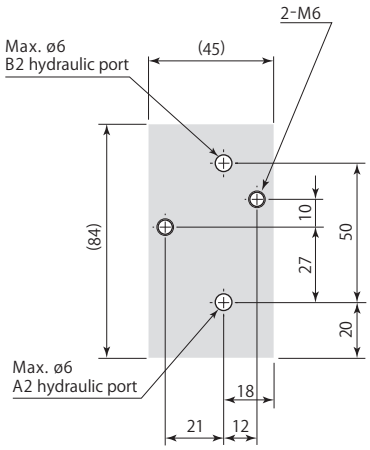
Dimensions

VCB-HGS Manifold, GS mounting ＊With internal filter (A1 & A2 hydraulic ports)



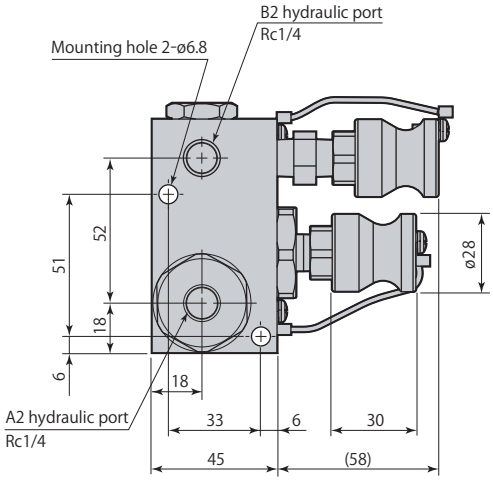


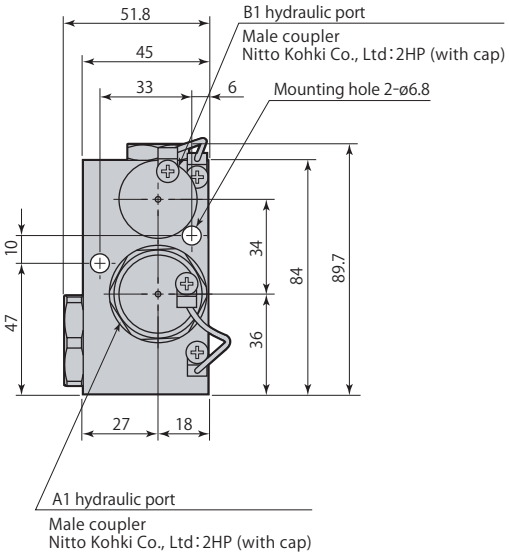
Mounting details



For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

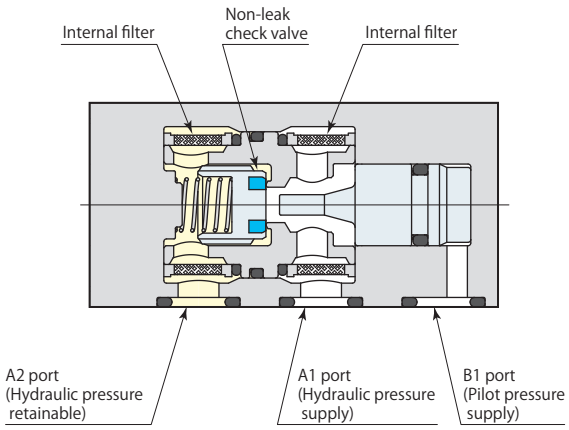
VCB-HT Piping mounting ＊With internal filter (A1 & A2 hydraulic ports)

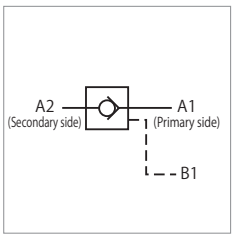




● Female coupler (Nitto Kohki Co., Ltd：2HS) and mounting screws are not included.

Pilot check valve model **VCP**





This is a non-leak pilot check valve, with which clamping circuit pressure can be retained over a long period of time after disengagement of hydraulic pressure source.

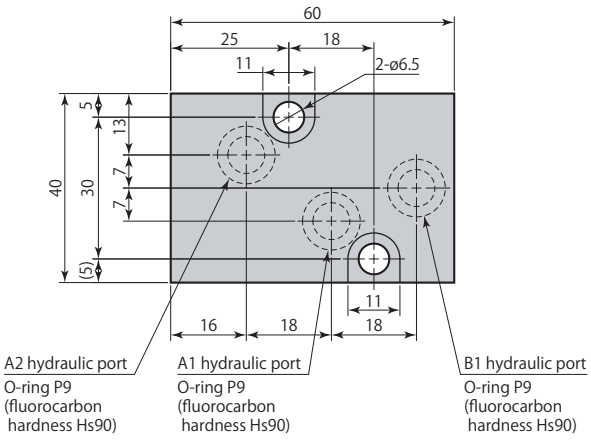
Specifications

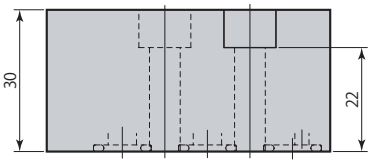
Model		VCP-HG
Mounting, piping methods		Manifold mounting
Pressure range	MPa	7–30
Proof pressure	MPa	37.5
Cracking pressure	MPa	0.019
Min. pilot pressure (open valve)	MPa	0.01 + 0.24 × A2 hydraulic port (secondary side) pressure
Orifice area	mm^2	14.2
Operating temperature	℃	0–70
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)
Mass	kg	0.5

● 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).

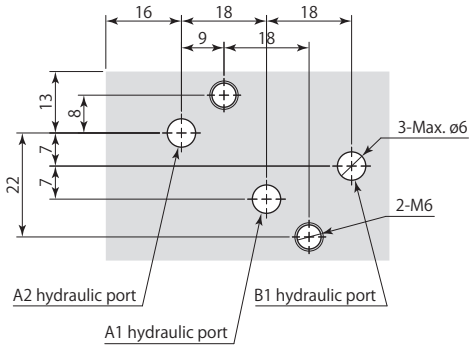
Dimensions

VCP-HG Manifold mounting ＊With internal filter (A1 & A2 hydraulic ports)





Mounting details

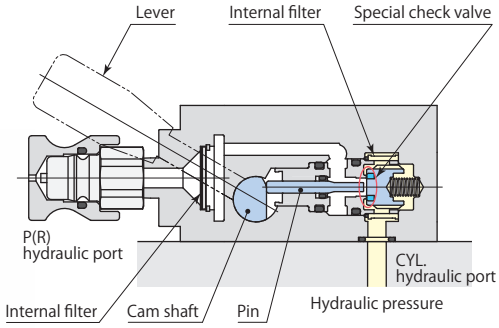


For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

● Mounting screws are not included.

● This valve cannot be used in the circuit which pressure is applied to both of A1 and B1 port.

Coupling valve model **VHD**



This is a non-leak valve, with which coupling of single acting clamp can be performed easily and clamping circuit pressure can be retained over a long period of time after disengagement of hydraulic pressure source.

Specifications

	Mounting, piping methods	Lever action	Lever mounting	Option
VHD-H –	GB : Manifold, GB mounting	(Nil) : Clamping position keeping type	(Nil) : Standard	(Nil) : NBR
	GS : Manifold, GS mounting	D : Detent type	K : Opposite side	V* : Fluorocarbon
	T : Piping			

indicates made to order.

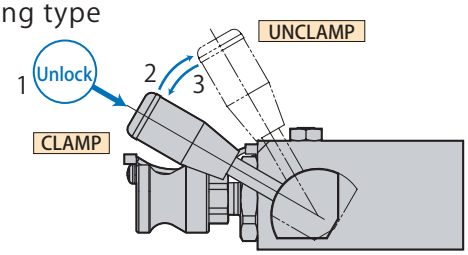
*: Fluorocarbon has been adopted for seal sections where cutting fluid is applied, as a measure for the use of chlorine-based cutting fluid (this is not thermal resistant specification).

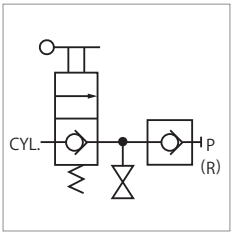
Model		VHD-HGB	VHD-HGS	VHD-HT
Pressure range	MPa	7–30		
Proof pressure	MPa	37.5		
Cracking pressure	MPa	0.017		
Orifice area	mm²	21.0		
Operating temperature	℃	0–70		
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)		
Mass	kg	1.4		

Lever operation

VHD-H□-□□ Clamping position keeping type

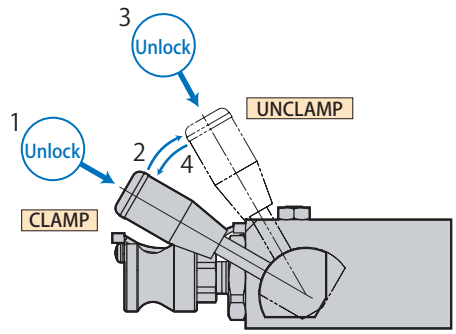
From the clamping position
1. Push the lever lock is released.
2. Unclamp causing the lever.
3. Return to the clamping position when you take your hand off the lever.

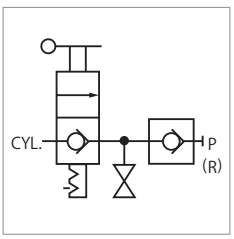




VHD-H□-D□□ Detent type

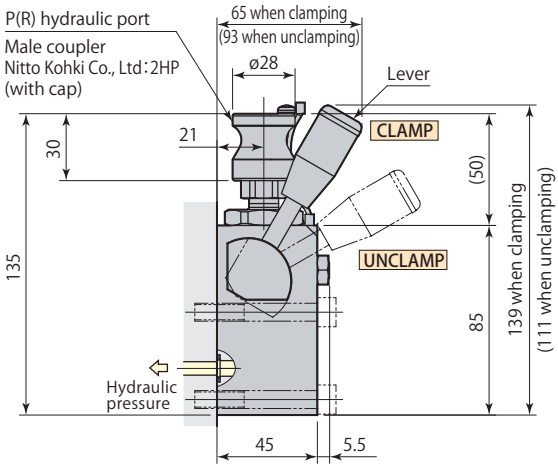
From the clamping position
1. Push the lever lock is released.
2. Unclamp and lock causing the lever.
3. When the clamp, push the lever to unlock.
4. Clamp and lock the lever back.

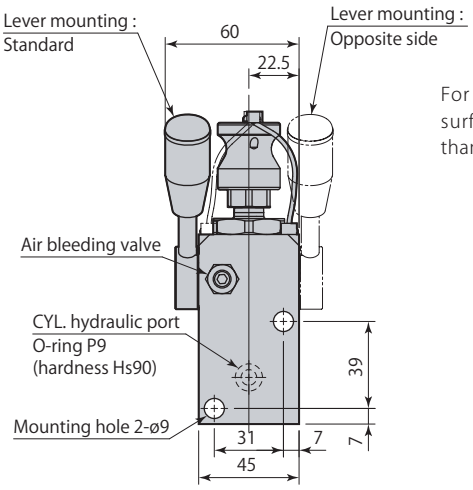




Dimensions

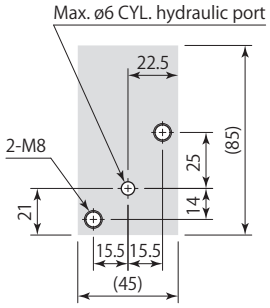
VHD-HGB-□□□ Manifold, GB mounting ＊With internal filter (P & CYL. hydraulic ports)



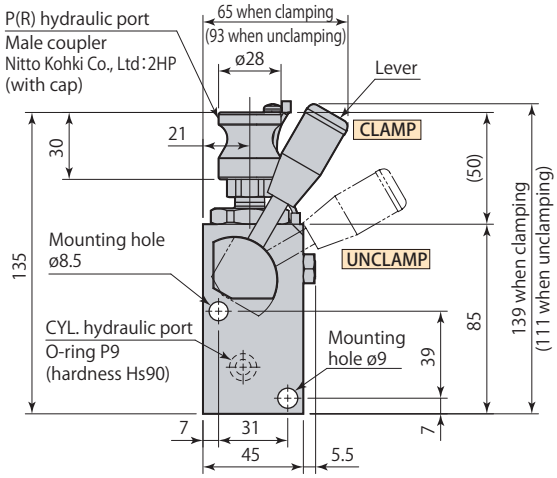


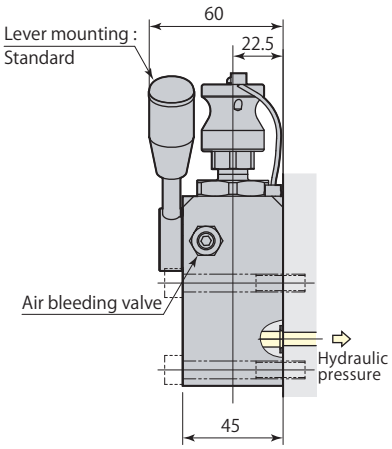
Mounting details

For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).



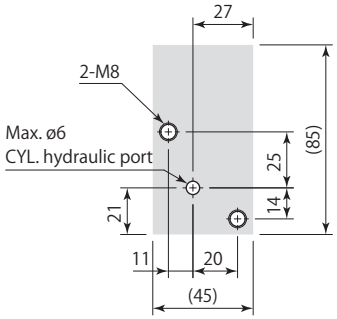
VHD-HGS-□□ Manifold, GS mounting ＊With internal filter (P & CYL. hydraulic ports) Opposite side lever not available



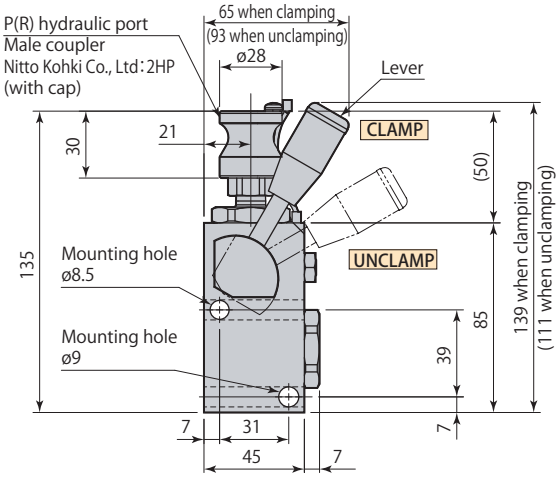


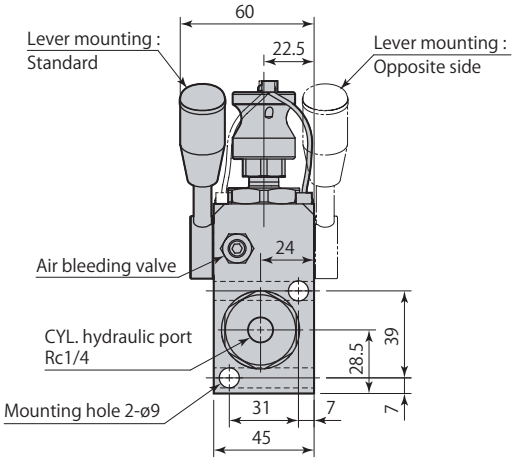
Mounting details

For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).



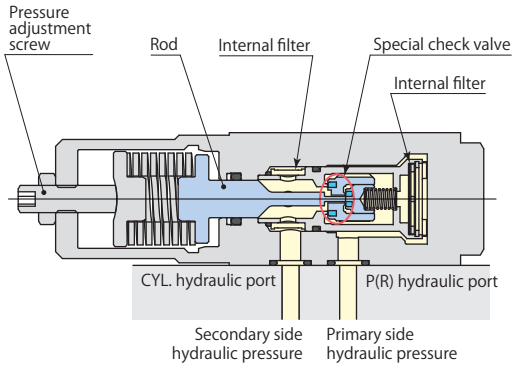
VHD-HT-□□□ Piping mounting ＊With internal filter (P & CYL. hydraulic ports)

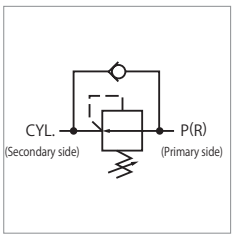




● Female coupler (Nitto Kohki Co., Ltd：2HS) and mounting screws are not included.

Reducing valve model **VRG**





Internal hydraulic pressure of circuit can be partially reduced.
This is a non-leak type that requires no drain.

Specifications

Model		VRG-MG	VRG-MT	VRG-MS	VRG-HG	VRG-HT	VRG-HS
Mounting, piping methods		Manifold	Piping	VHD linking	Manifold	Piping	VHD linking
Primary side hydraulic pressure range	MPa	7–30			10–30		
Secondary side hydraulic pressure range	MPa	1–20			7–27		
Allowable min. differential pressure*	MPa	3					
Proof pressure	MPa	37.5					
Pressure change per revolution	MPa/rev	3.9			6.2		
Orifice area	mm^2	28.1					
Operating temperature	℃	0–70					
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)					
Mass	kg	1.0 (0.9 only for manifold type)					

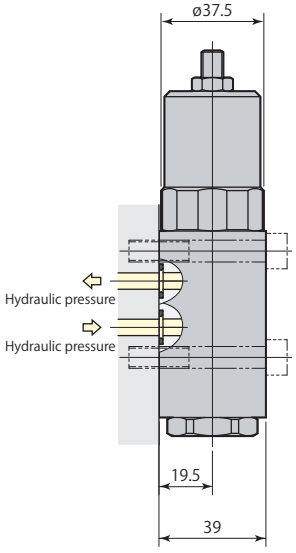
- Fluorocarbon has been adopted for seal sections where cutting fluid is applied, as a measure for the use of chlorine-based cutting fluid (this is not thermal resistant specification).
- Avoid overpressure to CYL. hydraulic port of the valve if there is a risk of back pressure in secondary circuit.

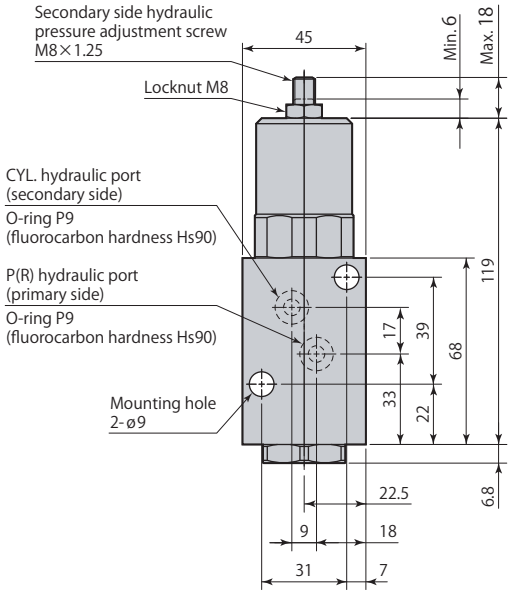
∗: The setting should be performed so that the differential pressure between primary side hydraulic pressure and secondary side hydraulic pressure may exceed 3 MPa. (Example: When VRG-H, if primary side hydraulic pressure is 25 MPa, secondary side hydraulic pressure should be from 7 to 22 MPa.)

indicates made to order.

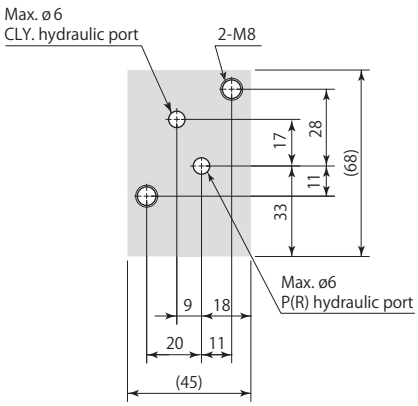
Dimensions

VRG-□G Manifold mounting ∗With internal filter (P & CYL. hydraulic ports)





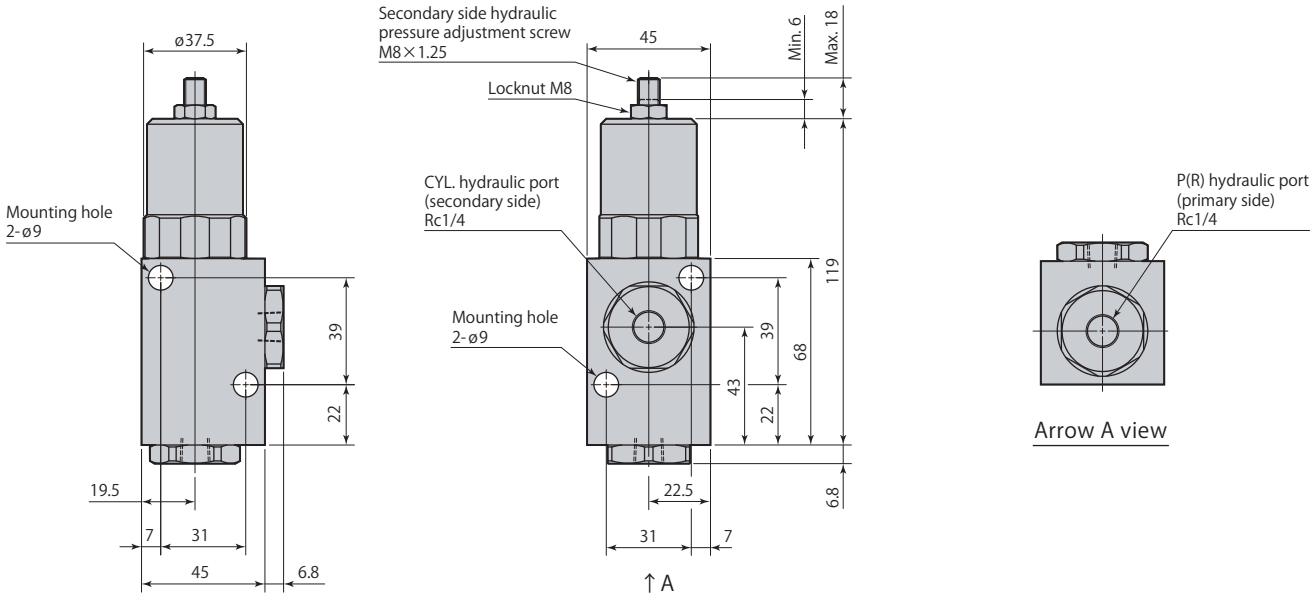
Mounting details



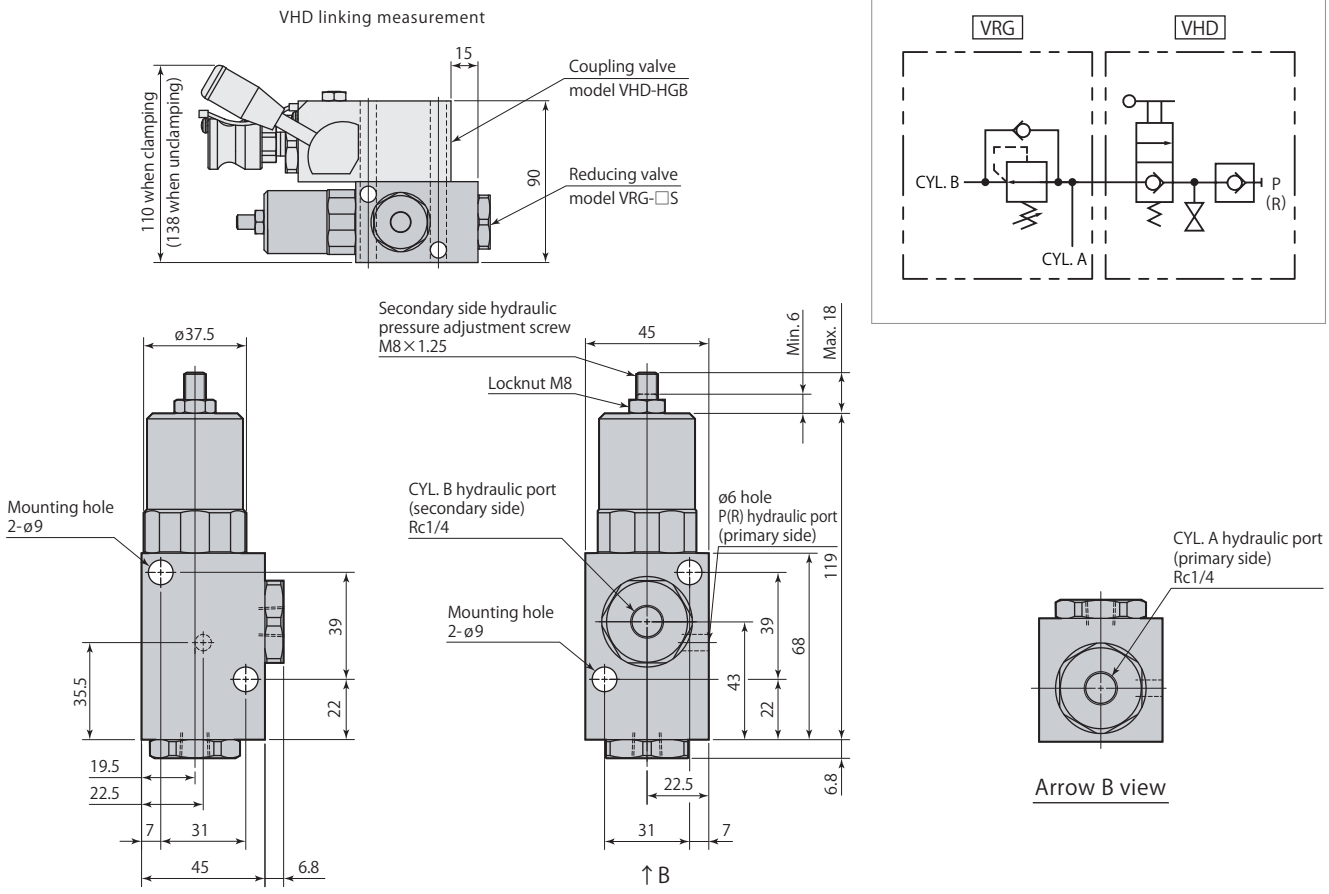
For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

Dimensions

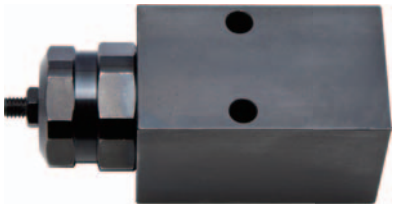
VRG-□T Piping mounting ＊With internal filter (P & CYL. hydraulic ports)

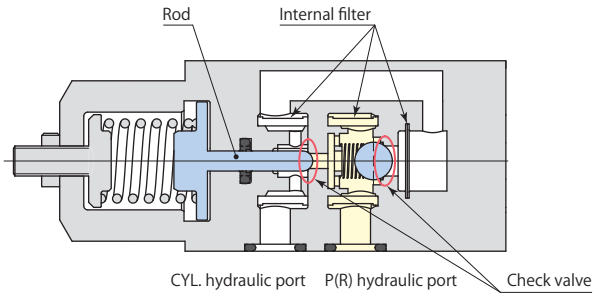


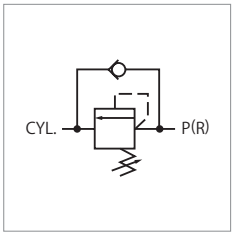
VRG-□S VHD linking ＊With internal filter (P & CYL. hydraulic ports)



- Structure is such that when pressure on secondary side (low pressure side) drops due to temperature change or oil leak, flow channel to primary side (high pressure side) is opened to replenish oil until pressure reaches set pressure.
- Pressure is not supplemented when primary side is separated from hydraulic pressure source.
- Mounting screws are not included.







Clamps are sequentially operated through same circuit.

Sequence valve model **VEF**

Specifications

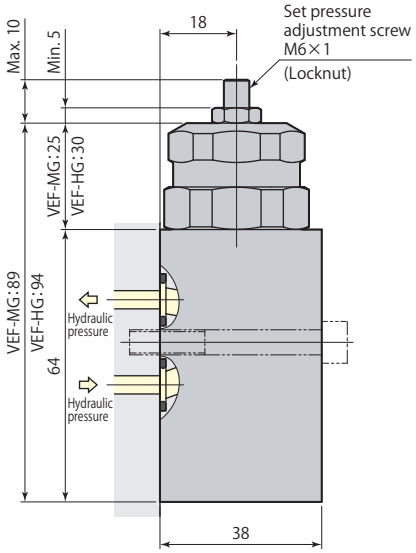
Model		VEF-MG	VEF-MT	VEF-HG	VEF-HT
Mounting, piping methods		Manifold mounting	Piping mounting	Manifold mounting	Piping mounting
Pressure range	MPa	2–30			
Allowable min. differential pressure*	MPa	1			
Set hydraulic pressure range	MPa	6–11		11–20	
Proof pressure	MPa	37.5			
Cracking pressure	MPa	0.01			
Pressure change per revolution	MPa/rev	1		1.4	
Orifice area	mm^2	P → CYL. 7.1 CYL. → R 28.3			
Operating temperature	℃	0–70			
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)			
Mass	kg	G : 0.8 T : 1.0			

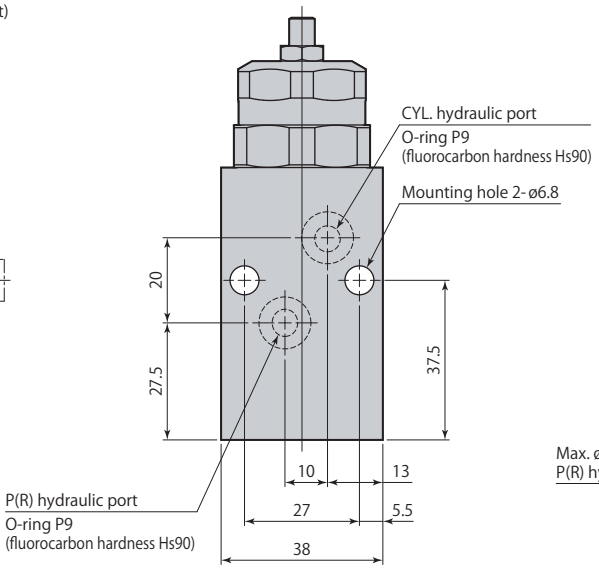
● Fluorocarbon has been adopted for seal sections where cutting fluid is applied, as a measure for the use of chlorine-based cutting fluid (this is not thermal resistant specification).

∗ : The setting should be performed so that the differential pressure between working pressure and set hydraulic pressure may exceed 1 MPa. (Example : When VEF-H, if working pressure is 15 MPa, set hydraulic pressure should be from 11 to 14 MPa.)

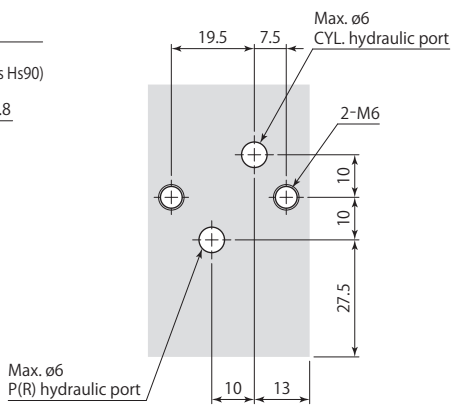
Dimensions

VEF-□G Manifold mounting ∗With internal filter (P & CYL. hydraulic ports)





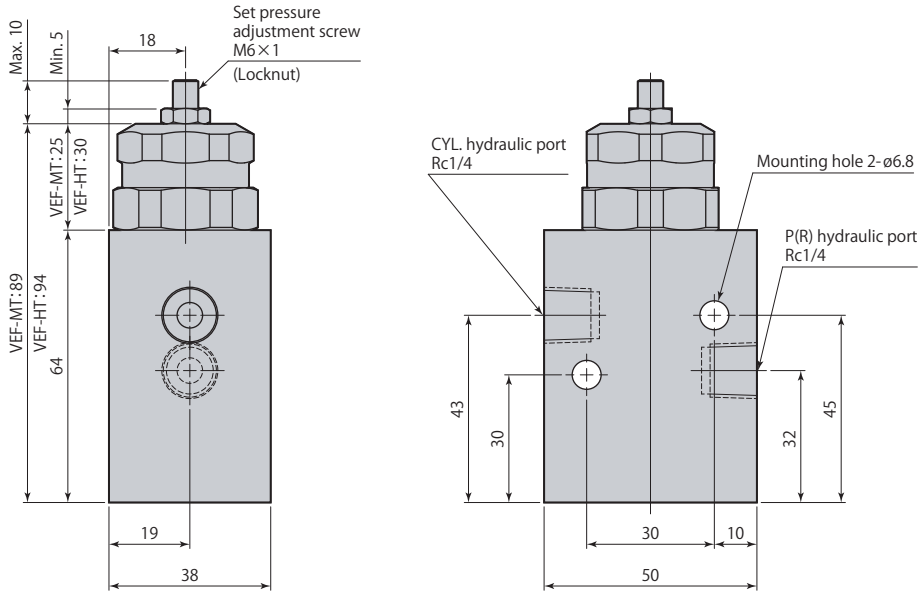
Mounting details



For manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

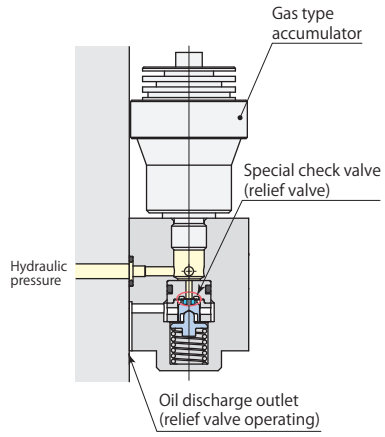
Dimensions

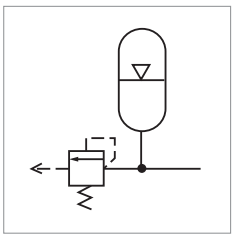
VEF-□T Piping mounting ＊With internal filter (P & CYL. hydraulic ports)



- The sequence valve may open by lower pressure than the set value when a large volume of oil flow is applied. It is due to the surge pressure caused by an oil hammer phenomenon. Use VEF with a flow control valve installing at primary side to adjust the flow rate.
- The sequence effect may not be achievable due to a back pressure in case the hydraulic circuit would be built by meter-out control or would generate pipe resistance.
- Mounting screws are not included.

Accumulator model **WPC**





N2 pressure type accumulator.
Equipped with a relief valve for preventing breakdown of device in case of problems with circuit pressure (high pressure).

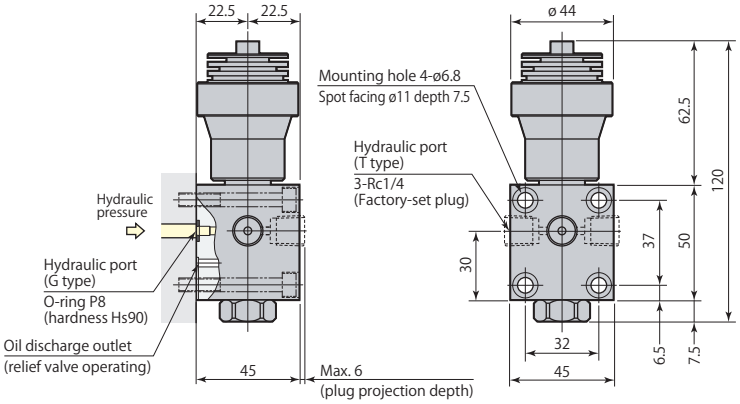
Specifications

Model		WPC13H-G Gas pressure*	WPC13H-T Gas pressure*	WPC40H-G Gas pressure*	WPC40H-T Gas pressure*
Mounting, piping methods		Manifold mounting	Piping mounting	Manifold mounting	Piping mounting
Pressure range	MPa	Refer to **page →167** for characteristic line diagram.			
Gas capacity	cm^3	13		40	
Oil capacity	cm^3	10		30	
Mass	kg	1.1		1.6	

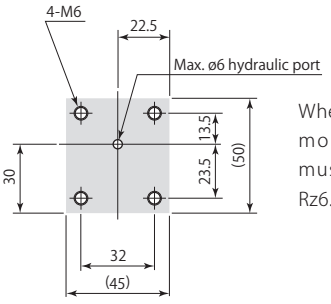
● Proof pressure : 37.5 MPa ● Operating temperature : 0–60°C ● Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)
● There is also a type that adopts fluorocarbon for seal sections where cutting fluid is applied, as a measure for the use of chlorine-based cutting fluid (this is not thermal resistant specification. Model designation WPC□H-□□-V).
*: Initially filled gas pressure can be set in range of 7 MPa to 25 MPa with 1 MPa increment. Specify gas pressure when ordering.
Example : WPC13H-T10 (gas pressure 10 MPa)

Dimensions

WPC13H-□□ *No internal filter

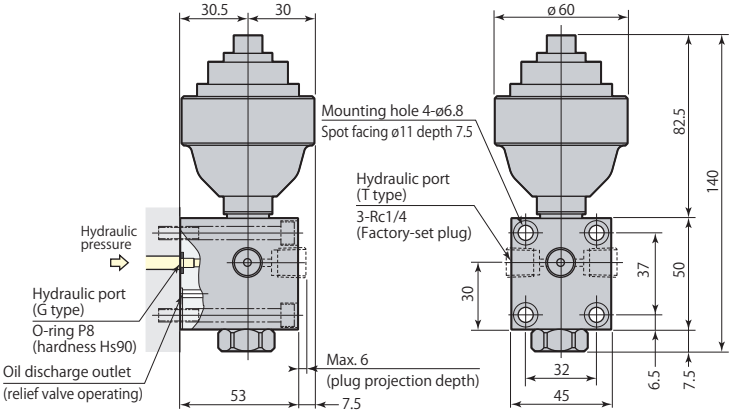


Mounting details

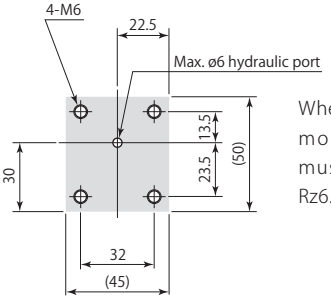


When manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

WPC40H-□□ *No internal filter



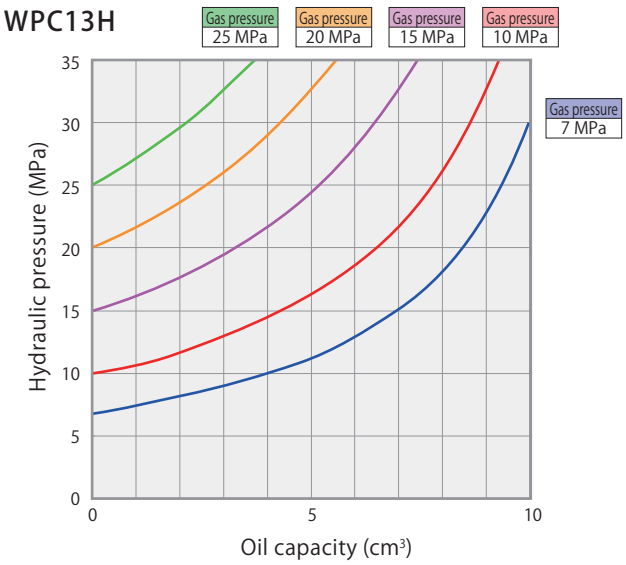
Mounting details

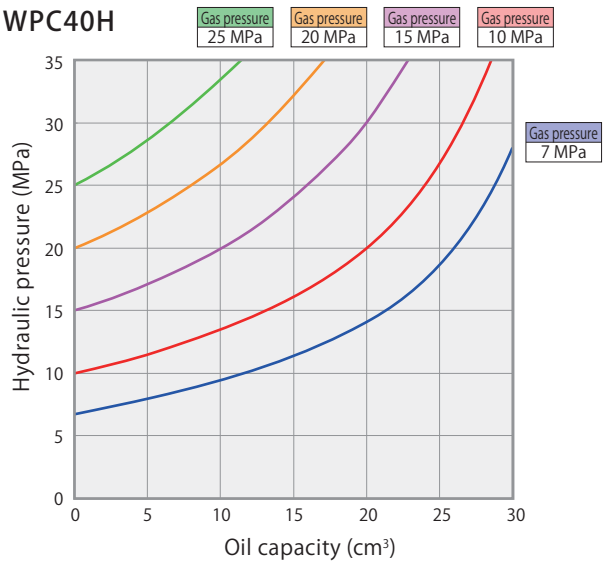


When manifold piping, the mounting surface finish must be no rougher than Rz6.3 (ISO4287:1997).

● Mounting screws are not included.

Characteristic line diagram





This characteristic line diagram represents theoretical values.

Model selection example

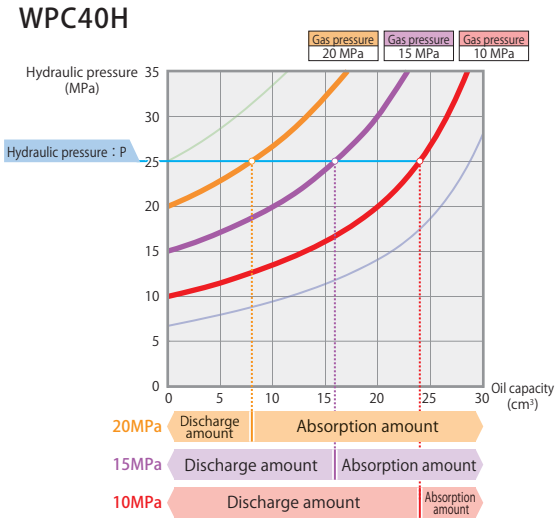
Condition (estimated temperature drop : 20℃)

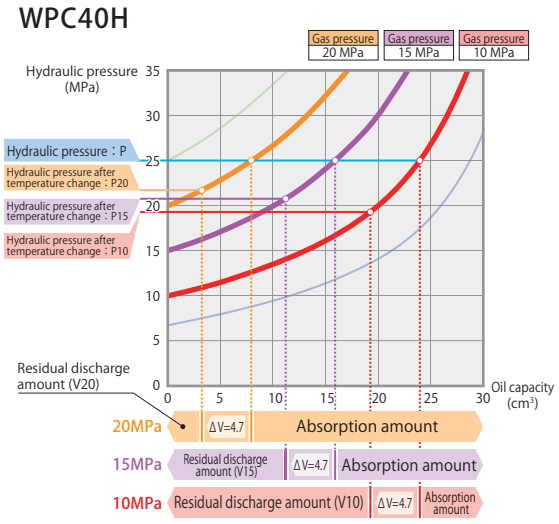
Working clamp	CLW16×8 pieces	Piping	Inner diameter ø6×0.5 m×8 pieces
Hydraulic pressure:P	25 MPa	Valve & hydraulic pressure equipment	VCB : 1 piece, VRG : 2 pieces

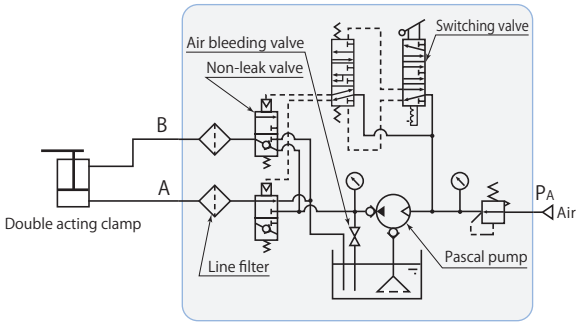
Selection procedure

1. Calculation of circuit capacity
   Clamping capacity : $\underset{\text{Pressure bearing area}}{6.16}\times\underset{\text{Stroke}}{3.3}\times\underset{\text{Qty}}{8}=163\ cm^3$
   Piping capacity : $0.283\times50\times8=113\ cm^3$
   Valve & hydraulic equipment capacity : $8\times3=24\ cm^3$
   (Perform calculation with capacity of 8 cm^3 for each of valves and hydraulic equipment in hydraulic circuit, when using Pascal product.)
   Circuit capacity : $163+113+24=300\ cm^3$
2. Selection of oil capacity
   Select the equipment having oil capacity capable of keeping volumetric change. Volumetric change is obtained by using formula shown below.
   $\Delta V=V\times\Delta T\times\alpha$ ΔV : Volumetric change (cm^3) V : Circuit capacity (cm^3)
   ΔT : Temperature change (℃) α : Thermal expansion coefficient (7.8×10^{-4})
   $\Delta V=300\times20\times7.8\times10^{-4}=4.7\ cm^3$
   Here, WPC40H is selected as an example (∗1).
3. Selection of gas pressure
   Select the pressure whose oil discharge amount (∗2) under hydraulic pressure satisfies ΔV calculated in step 2. Read off characteristic line diagram.
   If the hydraulic pressure of the clamping circuit is 25 MPa, select gas pressure 10 MPa, 15 MPa, or 20 MPa.
4. Verification of hydraulic pressure and residual discharge amount (∗2) after temperature change
   Select the one whose hydraulic pressure drop after temperature change is low and residual discharge amount (∗2) satisfies the marginal oil amount (∗3). Read off characteristic line diagram.
   The hydraulic pressure after temperature change drops to 19.3 MPa with 10 MPa gas pressure (P10), to 21 MPa with 15 MPa gas pressure (P15), and to 22 MPa with 20 MPa gas pressure (P20), respectively.
   The residual oil discharge amount (∗2) is 19.3 cm^3 for 10 MPa gas pressure (V10), 11.3 cm^3 for 15 MPa (V15), and 3.3 cm^3 for 20 MPa (V20), respectively.
   Here, select WPC40H-□20 whose pressure drop is low.
5. Select piping method.

∗1 : WPC13H is also available. Likewise, select appropriate one in consideration of steps 3 and 4.
∗2 : For when the temperature decreases. If the temperature increases, check the absorption amount.
∗3 : Allow adequate margin for residual discharge amount after temperature change, as there may be margin of error with gas filling pressure. Marginal oil amount : About 2.0 cm^3







Control unit model **HCD□H-W**

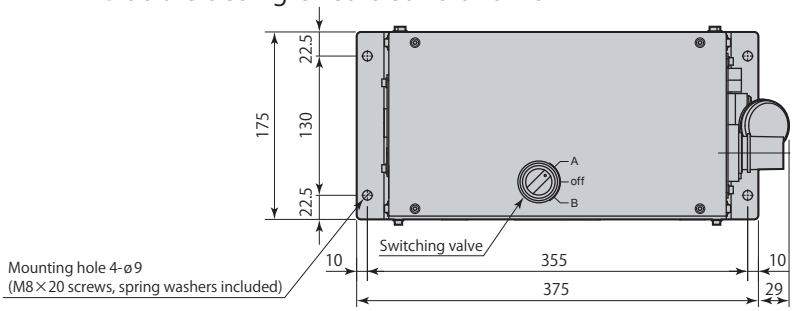
This is a hydraulic control unit that is air driven and manually operated, combining non-leak valve with non-leak feature (zero oil leaks), which is essential for hydraulic clamps, and Pascal pump. Since two hydraulic circuits can be operated and controlled alternatingly, it is best suited hydraulic pressure source for double acting clamps.
Pascal pump stops pumping once circuit pressure has been attained and retains the pressure. Furthermore, since there is hardly any temperature fluctuation of working fluid, there is no need for any auxiliary pressure equipment.

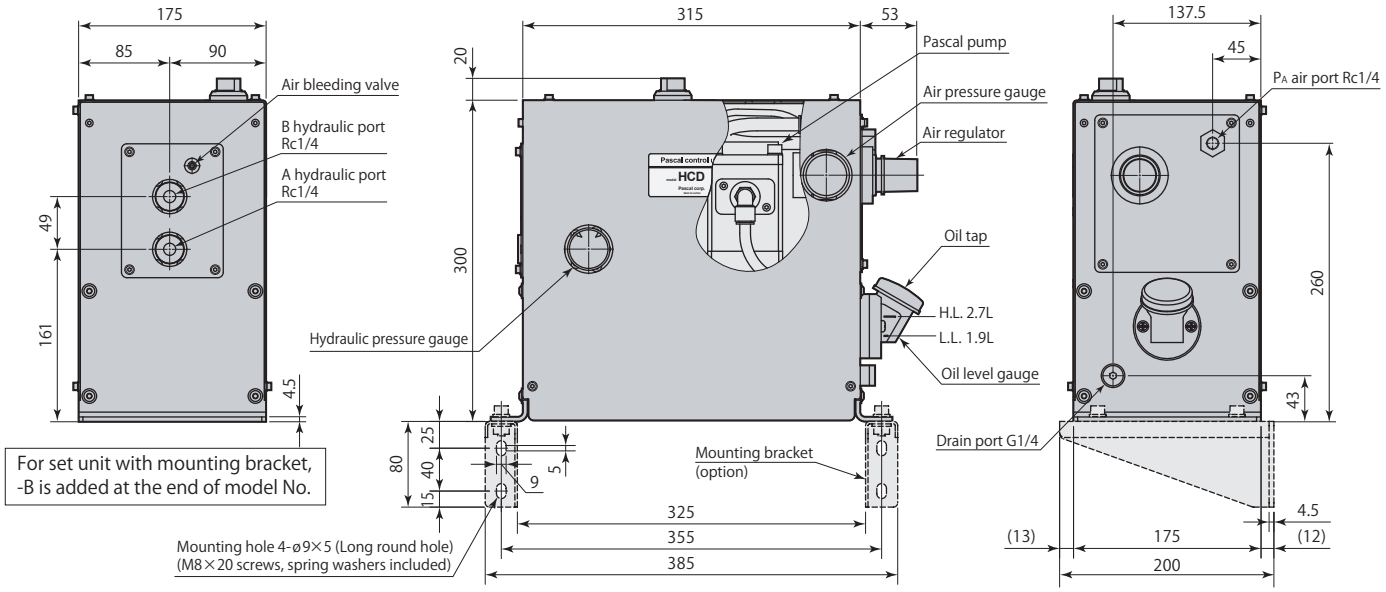
Model		HCD2H-W	HCD3H-W
Pascal pump		X6308U-C	X6310U-C
Discharge oil pressure*1	MPa	8.7–26.1	5.55–16.65
Set air pressure	MPa	0.2–0.5	
Unloaded oil discharge amount	L/min	Refer to **page →173** for performance diagram.	
Tank capacity*2	L	H.L. 2.7 L.L. 1.9	
Operating temperature	°C	5–60	
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)	
Mass	kg	23	

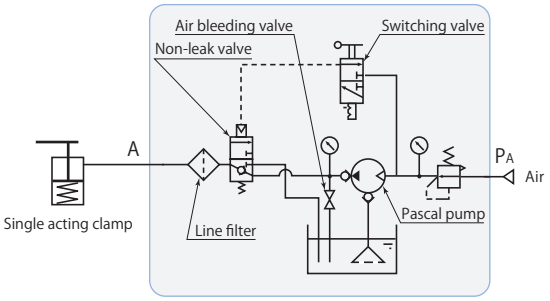
*1: Ask for consultation on specifications that exceed discharge oil pressure range.
*2: Oil level in the tank should be always between H.L. and L.L. of the gauge.

Dimensions

HCD□H-W Double acting circuit control unit







Control unit model **HCD□H-S**

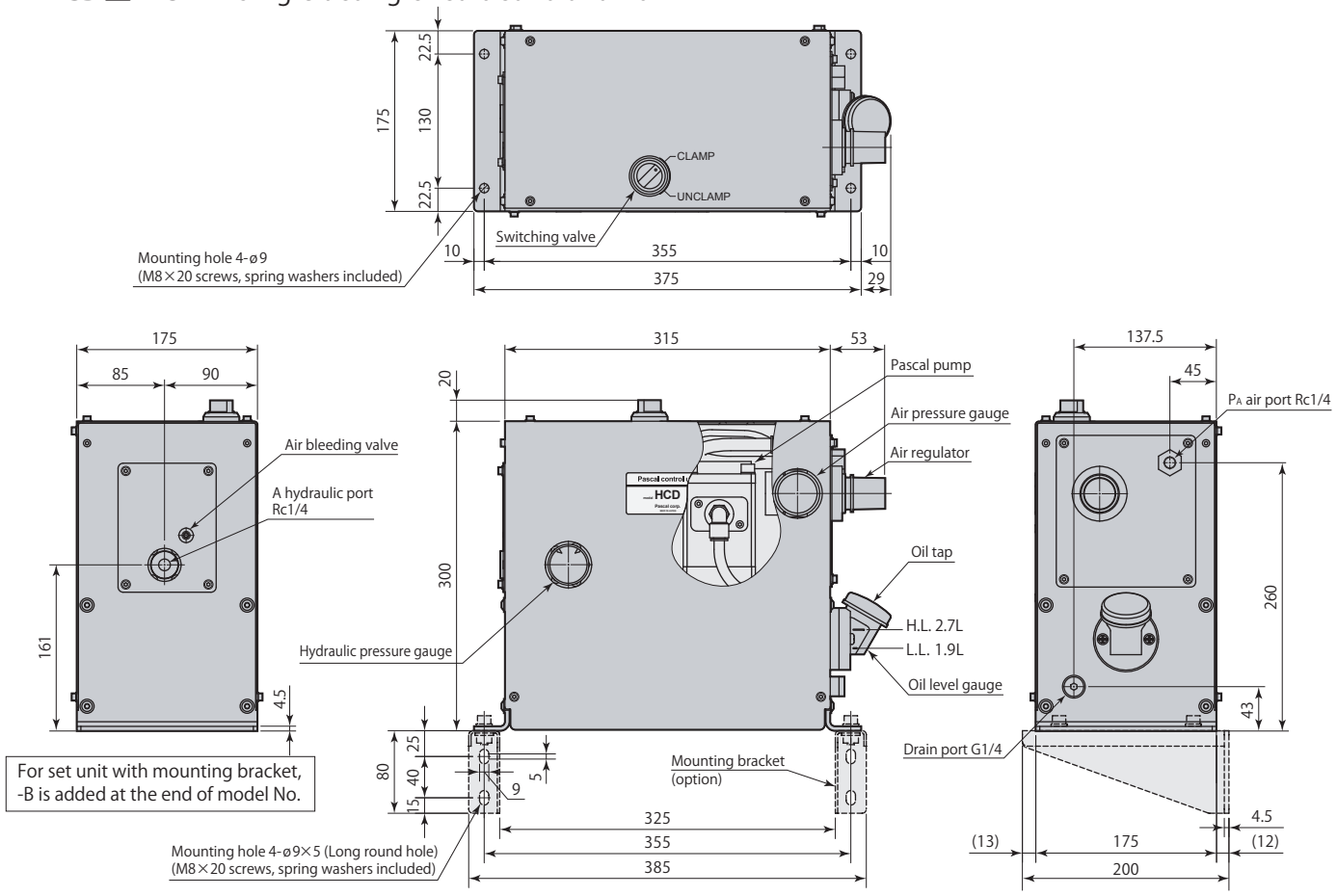
This is a hydraulic control unit that is air driven and manually operated, combining non-leak valve with non-leak feature (zero oil leaks), which is essential for hydraulic clamps, and Pascal pump.
Pascal pump stops pumping once circuit pressure has been attained and retains the pressure. Furthermore, since there is hardly any temperature fluctuation of working fluid, there is no need for any auxiliary pressure equipment.

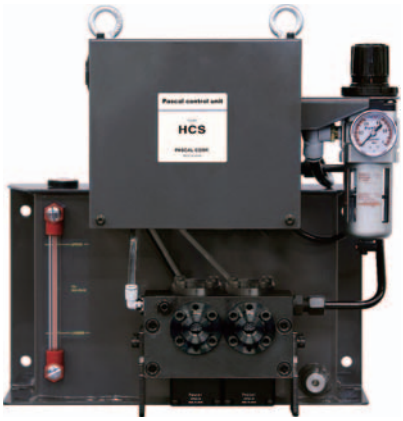
Model		HCD2H-S	HCD3H-S
Pascal pump		X6308U-C	X6310U-C
Discharge oil pressure*1	MPa	8.7–26.1	5.55–16.65
Set air pressure	MPa	0.2–0.5	
Unloaded oil discharge amount	L/min	Refer to **page →173** for performance diagram.	
Tank capacity*2	L	H.L. 2.7 L.L. 1.9	
Operating temperature	°C	5–60	
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)	
Mass	kg	21	

*1: Ask for consultation on specifications that exceed discharge oil pressure range.
*2: Oil level in the tank should be always between H.L. and L.L. of the gauge.

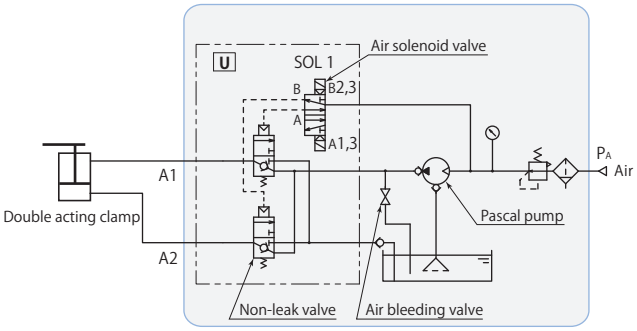
Dimensions

HCD□H-S Single acting circuit control unit





Control unit model **HCSD-H□U**



This is a hydraulic control unit that is air driven and solenoidal operated, combining non-leak valve with non-leak feature (zero oil leaks), which is essential for hydraulic clamps, and Pascal pump. Since two hydraulic circuits can be operated and controlled alternatingly, it is best suited hydraulic pressure source for double acting clamps.

Pascal pump stops pumping once circuit pressure has been attained and retains the pressure. Furthermore, since there is hardly any temperature fluctuation of working fluid, there is no need for any auxiliary pressure equipment.

HCSD-H□U is made to order.

Model	HCSD-H2U	HCSD-H3U
Pascal pump	X6308U-D	X6310U-D
Control voltage*1	DC24V	
Discharge oil pressure*2 MPa	8.7–26.1	5.55–16.65
Set air pressure MPa	0.2–0.5	
Unloaded oil discharge amount L/min	Refer to **page →173** for performance diagram.	
Tank capacity*3 L	H.L. 3.5 L.L. 1.5	
Operating temperature °C	0–50	
Fluid used	General mineral based hydraulic oil (ISO-VG32 equivalent)	
Mass kg	20	

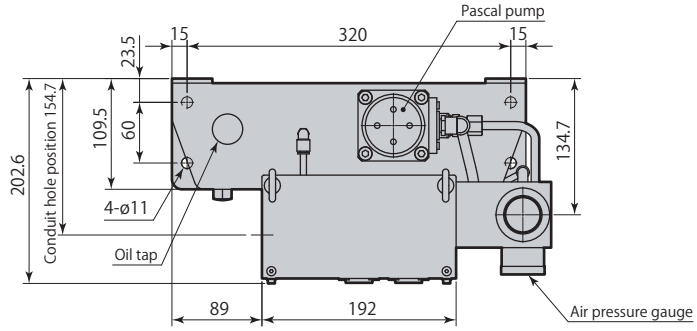
*1 : Ask us if the control voltage is different.

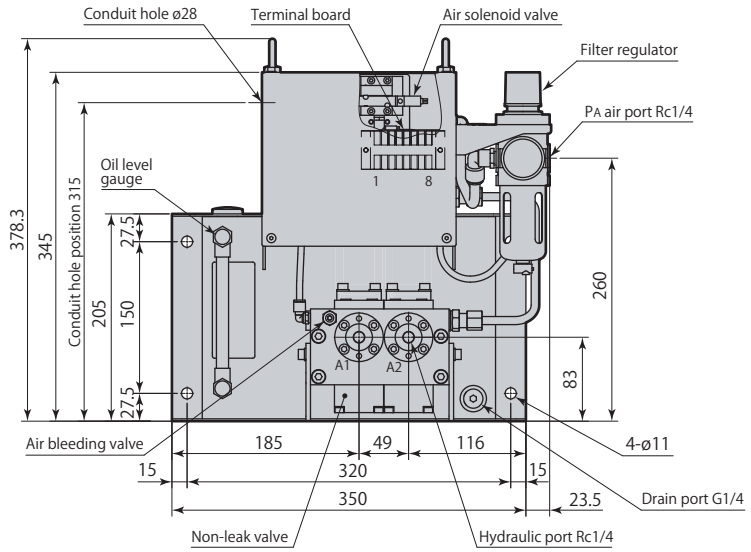
*2 : Ask for consultation on specifications that exceed discharge oil pressure range.

*3 : Oil level in the tank should be always between H.L. and L.L. of the gauge.

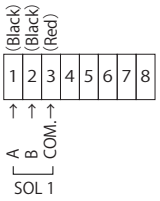
Dimensions

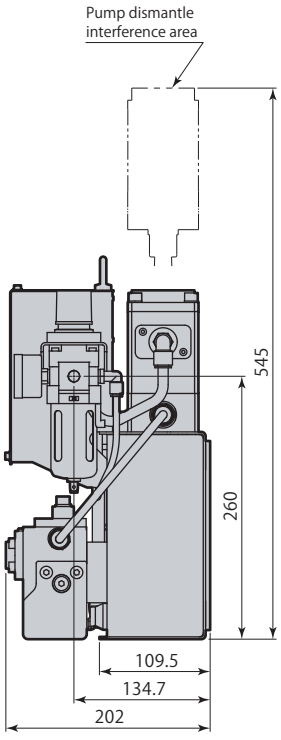
HCSD-H□U Double acting circuit control unit



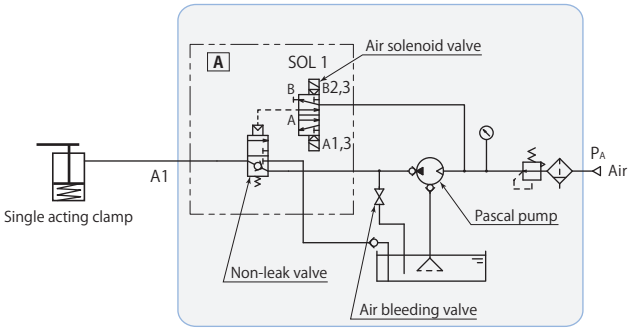


Wiring Diagram





Control unit model **HCSD-H□A**



This is a hydraulic control unit that is air driven and solenoidal operated, combining non-leak valve with non-leak feature (zero oil leaks), which is essential for hydraulic clamps, and Pascal pump.

Pascal pump stops pumping once circuit pressure has been attained and retains the pressure. Furthermore, since there is hardly any temperature fluctuation of working fluid, there is no need for any auxiliary pressure equipment.

HCSD-H□A is made to order.

Model	HCSD-H2A	HCSD-H3A
Pascal pump	X6308U-D	X6310U-D
Control voltage*1	DC24V	
Discharge oil pressure*2 MPa	8.7–26.1	5.55–16.65
Set air pressure MPa	0.2–0.5	
Unloaded oil discharge amount L/min	Refer to **page →173** for performance diagram.	
Tank capacity*3 L	H.L. 3.5 L.L. 1.5	
Operating temperature °C	0–50	
Fluid used	General mineral based hydraulic oil (ISO-VG32 equivalent)	
Mass kg	17	

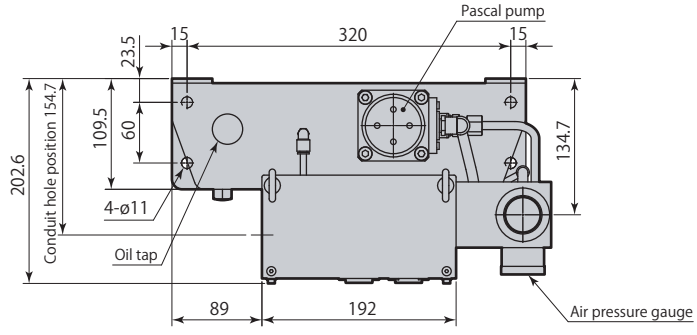
*1 : Ask us if the control voltage is different.

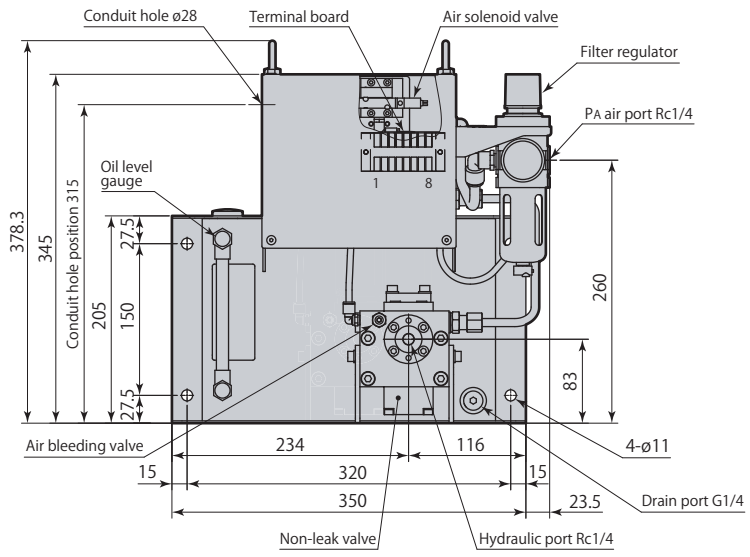
*2 : Ask for consultation on specifications that exceed discharge oil pressure range.

*3 : Oil level in the tank should be always between H.L. and L.L. of the gauge.

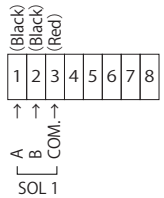
Dimensions

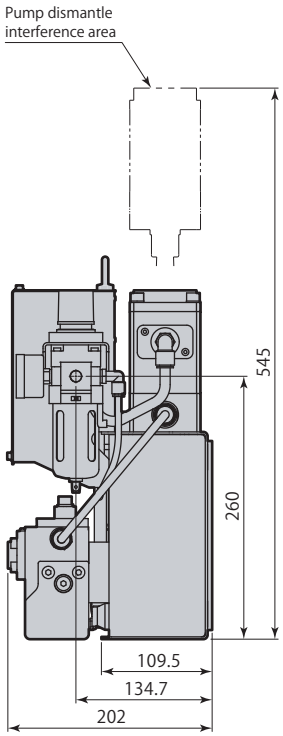
HCSD-H□A Single acting circuit control unit



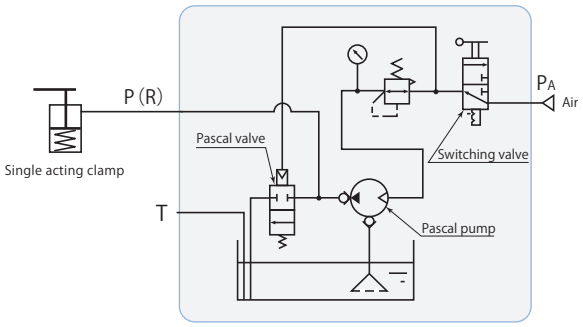


Wiring Diagram





Control unit model **HCT-□**



Compact hydraulic control unit for air drive and manual operations. Pascal pump stops pumping once circuit pressure has been attained and retains the pressure. Furthermore, since there is hardly any temperature fluctuation of working fluid, there is no need for any auxiliary pressure equipment.

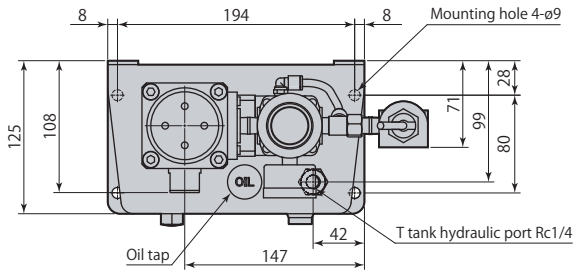
Model		HCT-2	HCT-3
Pascal pump		X6308-HCK-C	X6310-HCK-C
Discharge oil pressure*1	MPa	8.7–26.1	5.55–16.65
Set air pressure	MPa	0.2–0.5	
Unloaded oil discharge amount	L/min	Refer to **page →173** for performance diagram.	
Tank capacity*2	L	H.L. 1.5 L.L. 0.6	
Operating temperature	°C	5–60	
Fluid used		General mineral based hydraulic oil (ISO-VG32 equivalent)	
Mass	kg	8.3	

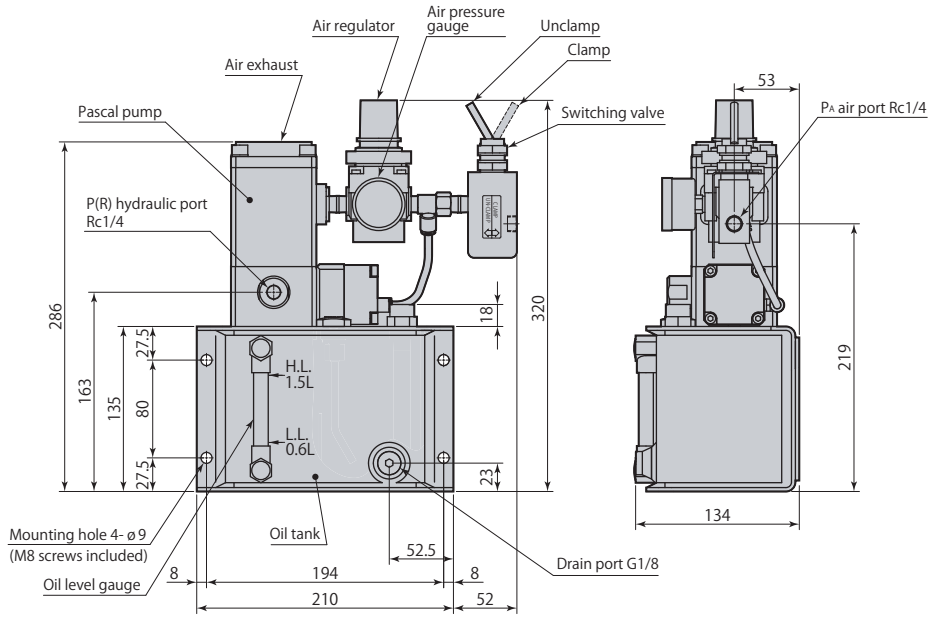
∗1: Ask for consultation on specifications that exceed discharge oil pressure range.

∗2: Oil level in the tank should be always between H.L. and L.L. of the gauge.

Dimensions

HCT-□ Single acting circuit control unit





Pascal pump model **X63**

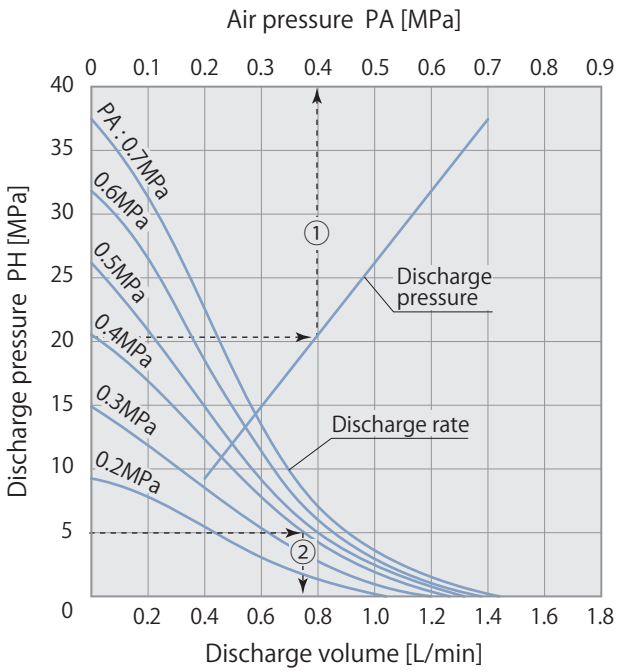
- Air-driven, compact, high performance hydraulic pump.
- Pascal pump is a compact but reliable hydraulic pump, which converts a compressed air force into high-pressure hydraulic power.
- Secure and high speed reciprocation of air and hydraulic piston generates a repetitive suction and discharge of air and oil. As the hydraulic pressure becomes close to the designated level, the reciprocation becomes slower. At the designated hydraulic pressure, the driving air force and hydraulic force become balanced to maintain the pressure.
- At the balanced condition, there is no air consumption so that there is no power loss or temperature rise compared to an electric pump. In the event of an air supply failure, the hydraulic pressure can be kept by the built-in check valve on the discharge side.
- If there is a decrease in the downstream holding pressure, the pump immediately reacts to start reciprocating to recover the pressure loss.

Model	X6308	X6310
Control unit models	HCD2H-W HCD2H-S HCSD-H2U HCSD-H2A HCT-2	HCD3H-W HCD3H-S HCSD-H3U HCSD-H3A HCT-3
Boosting ratio	58	37
Mass	2.6 kg	

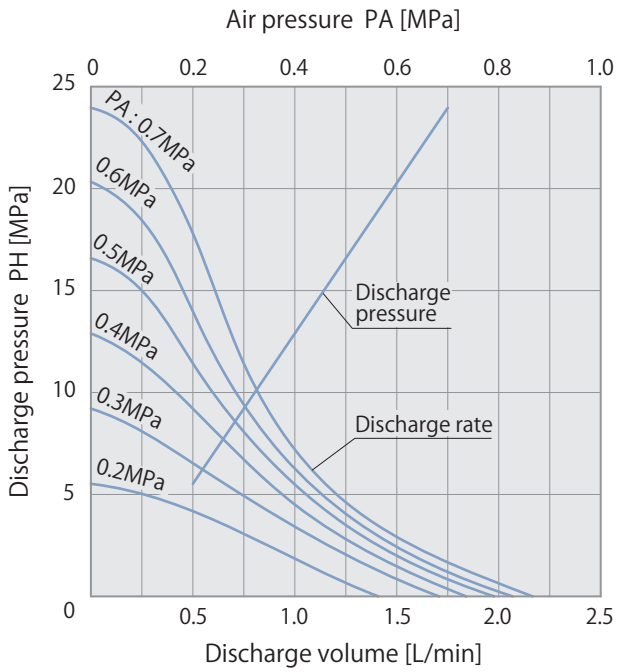
Air pressure range	:0.2–0.7 MPa
Air consumption	:0.4 Nm³/min
Operating noise	:78±1 db (A)
Operating temperature	:0–70 ℃ (No frozen)

Performance diagram [Measured with operating oil ISO-VG32 at 20℃]

X6308 PH = 58 (PA-0.05)



X6310 PH = 37 (PA-0.05)



1. How to read the discharge pressure (PH)* [ex:X6308]

*:PH is the pump discharge pressure when cylinders are clamped and the circuit pressure is built up.

When 20 MPa is required for PH, the desired air pressure (PA) should be 0.4 MPa by following the chain line ①.

2. How to read the discharge volume [ex:X6308]

When 0.4 MPa air pressure (PA) is supplied, with discharge pressure at 5 MPa, the discharge volume should be 0.75 L/min by following the chain line ②. (Pump discharge pressure while cylinders are in action may vary according to the circuit structure.)

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Work clamp & Work support 35 MPa

Swing clamp

Old model	New model	End date
CTD	**CTW/CTK**	October 2003
CTC	**CTV**	August 2003
CTB	**CTW**	October 1998

Link clamp

Old model	New model	End date
CLW	**CLW-N**	June 2019
CLV	**CLV-N**	June 2019
CLB	**CLW**	January 2000

Work support

Old model	New model	End date
CSD	**CSV**	August 2003
CSE	**Production discontinued**	August 2003
CSF	**CSW**	August 2003

Control system 30 MPa

Coupling valve

Old model	New model	End date
VHC	**VHD**	December 2010

Reducing valve

Old model	New model	End date
VRD	**VRG**	October 2008

Sequence valve

Old model	New model	End date
VED	**VEF**	January 2014

Control unit

Old model	New model	End date
HCD□	**HCD□H**	November 2015

Control unit

Old model	New model	End date
HCK	**HCT**	November 2011

Pascal pump

Old model	New model	End date
HPX	**X63**	July 2013

Ask for more details about compatibility with old model.