Swing clamp

Flat mount model　Double acting　7MPa

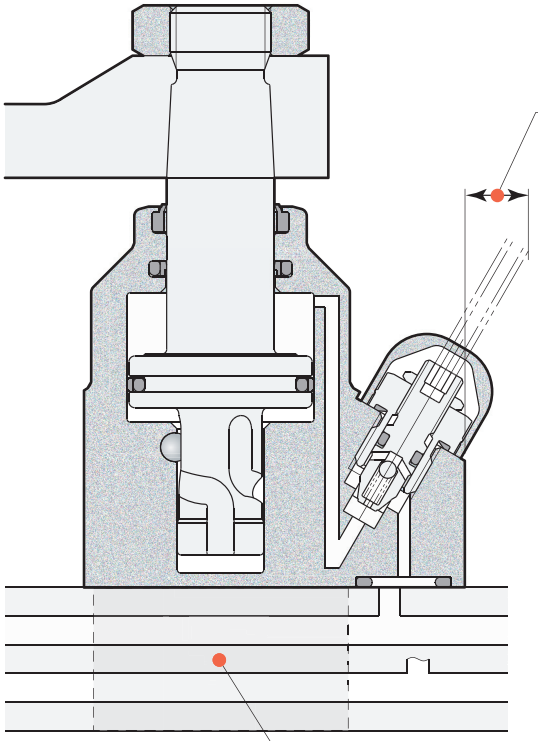
model CTJ

Flat mount model
model CTJ

Pascal
www.pascaleng.co.jp

Swing clamp
Flat mount model

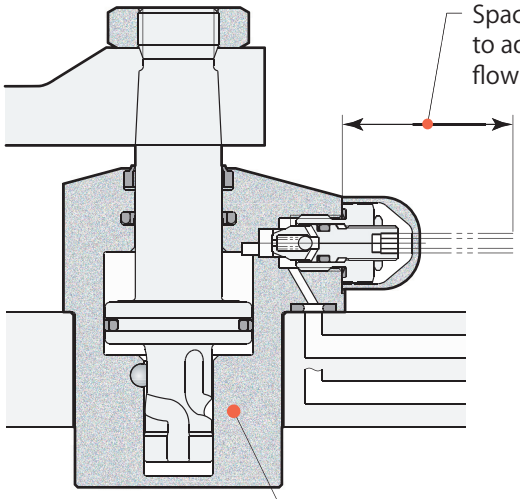
model **CTJ** JP PAT.



Since the embedded hole is not machined, the piping design under the clamp is easy and the jig plate can be made thin.

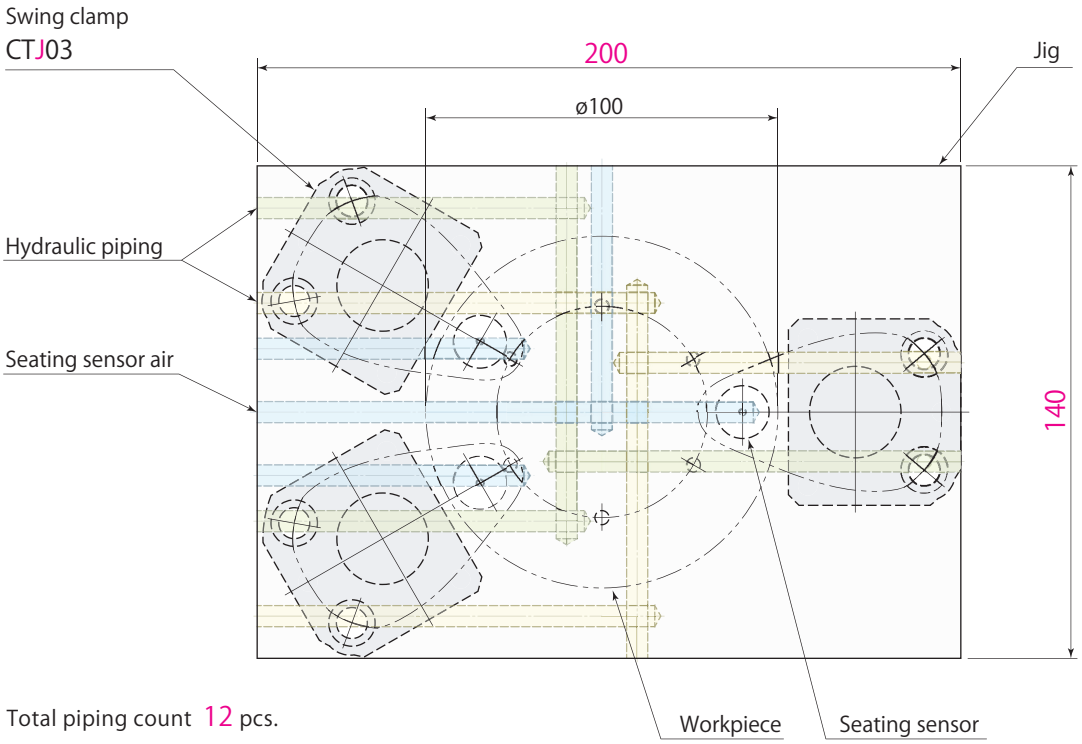
Swing clamp
Compact model

model **CTM**



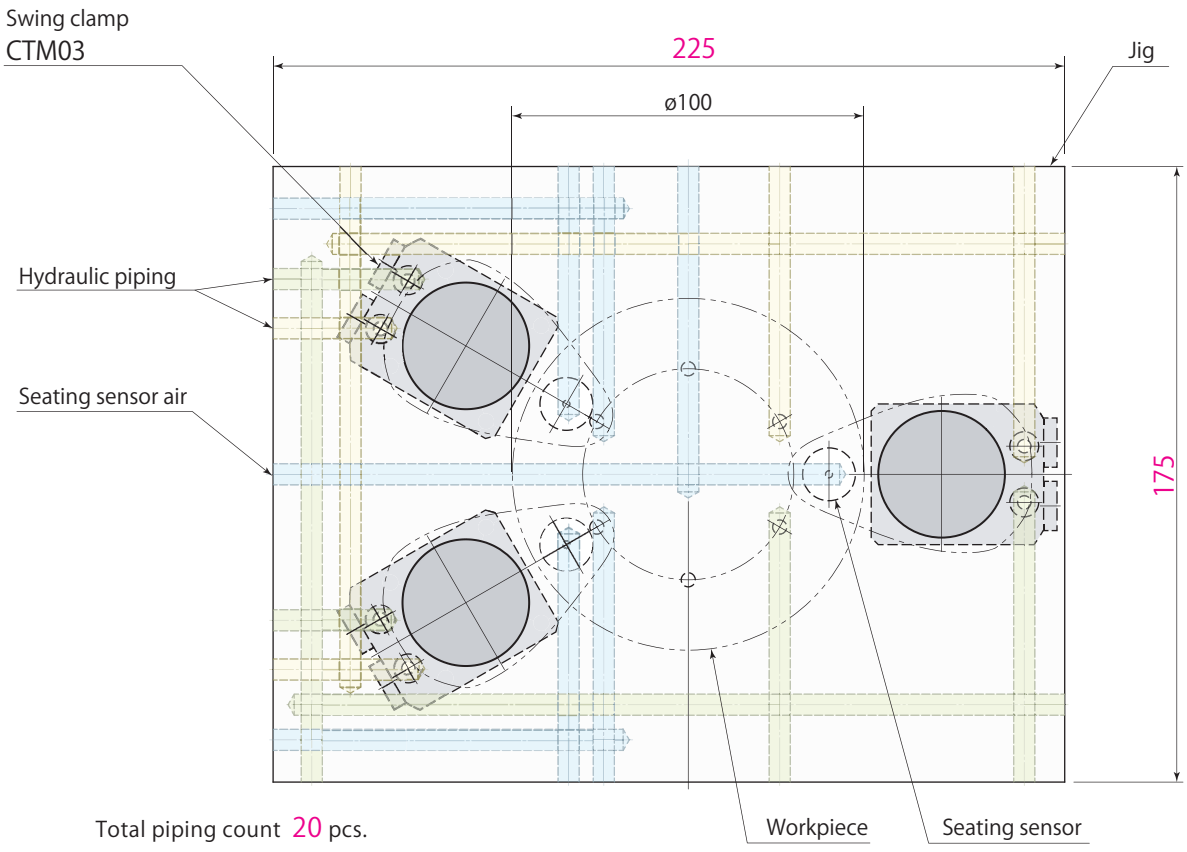
Embedded holes need to be machined, complicating piping. Therefore, the jig plate becomes thicker.

Jig area **29** % down Total piping distance **38** % down



Total piping count 12 pcs.

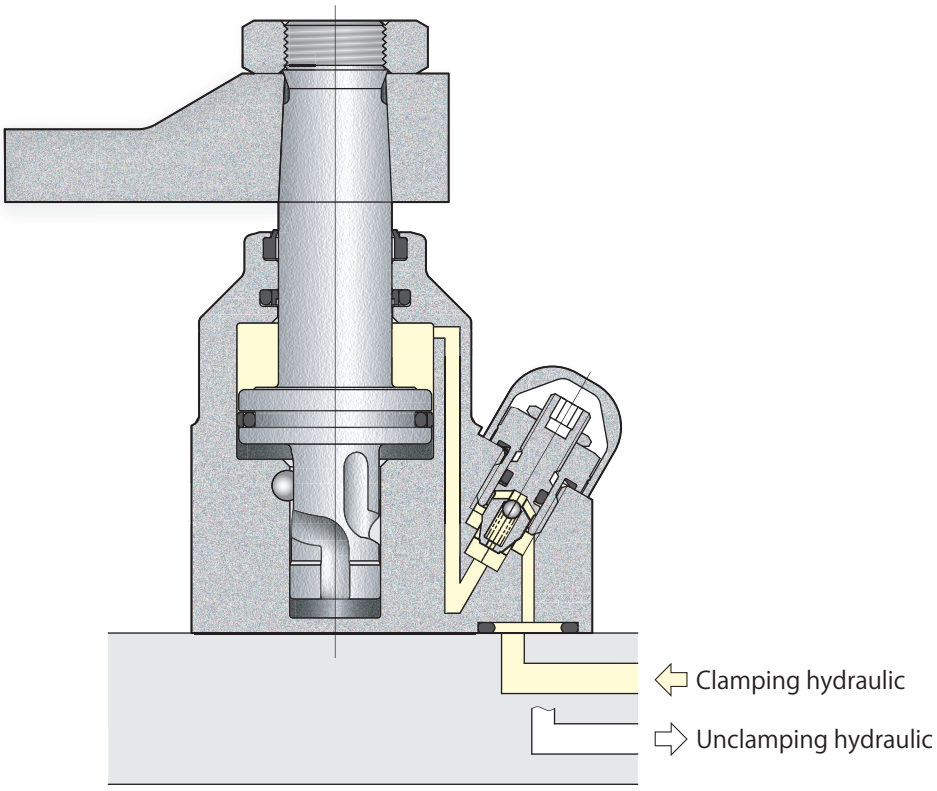
Size Down



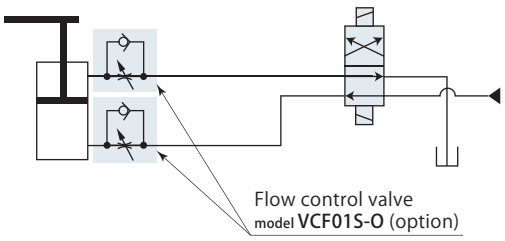
Total piping count 20 pcs.

model **CTJ□-□** JP PAT.

Eliminating the embedding of the main body
makes it easier to process the jig plate.



Hydraulic circuit diagram



Specifications

Size / Swing direction (when clamping)

CTJ — 02 / 03 / 05 —

L : Counter-clockwise

R : Clockwise

Model			CTJ02	CTJ03	CTJ05
Cylinder force (Hydraulic pressure 7MPa)		kN	1.41	2.48	4.87
Cylinder inner diameter		mm	20	26	37
Rod diameter		mm	12	15	22
Effective area (Clamp)		cm^2	2.0	3.5	7.0
Swing angle			90°±3°		
Positioning pin groove position accuracy			±1°		
Repeated clamp positioning accuracy			±0.5°		
Full stroke		mm	9.5	10.5	12.5
90° swing stroke		mm	4.5	5.5	7.5
Clamp stroke		mm	5	5	5
Cylinder capacity	Clamp	cm^3	1.9	3.7	8.7
	Unclamp	cm^3	3.0	5.6	13.4
Mass		kg	0.46	0.62	1.13
Recommended tightening torque of mounting screws*		N·m	7	7	12
Recommended tightening torque of nut		N·m	7	22	60

- Pressure range：1.5–7 MPa
- Proof pressure：10.5 MPa
- Operating temperature：0–70 ℃
- Fluid used： General mineral based hydraulic oil (ISO-VG32 equivalent)
- Seals are resistant to chlorine-based cutting fluid.

∗：ISO R898 class 12.9

Performance table

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

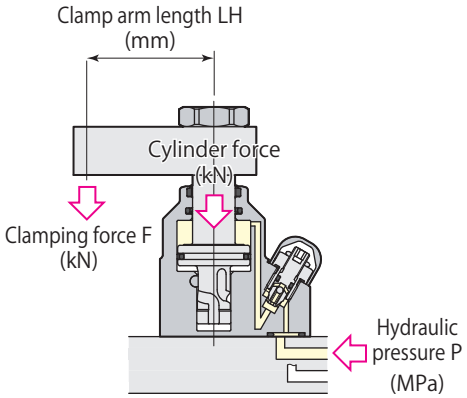
Clamping force calculation formula

F＝P/(Coefficient 1+Coefficient 2×LH)

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

CTJ03 with clamp arm length(LH)50 mm at hydraulic pressure of 7 MPa,
Clamping force F is calculated by
＝7/(2.82+0.0165×50)＝1.92 kN

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



model CTJ02　Clamping force　F=P/(4.97+0.0323×LH)

Hydraulic pressure	Cylinder force	Clamping force kN								Max. arm length Max. LH
		Clamp arm length LH mm								
MPa	kN	25	30	40	50	60	70	80	100	mm
7	1.41	1.21	1.18	1.12	1.06	1.01		Nonusable range		67
6.5	1.31	1.12	1.09	1.04	0.99	0.94	0.90			74
6	1.21	1.04	1.01	0.96	0.91	0.87	0.83	0.79		84
5.5	1.11	0.95	0.93	0.88	0.84	0.80	0.76	0.73		97
5	1.01	0.87	0.84	0.80	0.76	0.72	0.69	0.66	0.61	115
4.5	0.90	0.78	0.76	0.72	0.68	0.65	0.62	0.60	0.55	140
4	0.80	0.69	0.67	0.64	0.61	0.58	0.55	0.53	0.49	↑
3.5	0.70	0.61	0.59	0.56	0.53	0.51	0.48	0.46	0.43	↑
3	0.60	0.52	0.50	0.48	0.46	0.43	0.41	0.40	0.37	↑
2.5	0.50	0.43	0.42	0.40	0.38	0.36	0.35	0.33	0.30	↑
2	0.40	0.35	0.34	0.32	0.30	0.29	0.28	0.26	0.24	↑
1.5	0.30	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.18	140

model CTJ03　Clamping force　F=P/(2.82+0.0165×LH)

Hydraulic pressure	Cylinder force	Clamping force kN								Max. arm length Max. LH
		Clamp arm length LH mm								
MPa	kN	30	40	50	60	70	80	100	120	mm
7	2.48	2.11	2.01	1.92	1.84	1.76				73
6.5	2.30	1.96	1.87	1.78	1.70	1.63	1.57	Nonusable range		82
6	2.13	1.81	1.72	1.64	1.57	1.51	1.45			93
5.5	1.95	1.66	1.58	1.51	1.44	1.38	1.33	1.23		107
5	1.77	1.51	1.44	1.37	1.31	1.26	1.21	1.12	1.04	127
4.5	1.59	1.36	1.29	1.23	1.18	1.13	1.09	1.01	0.94	155
4	1.42	1.21	1.15	1.10	1.05	1.01	0.96	0.89	0.83	↑
3.5	1.24	1.05	1.00	0.96	0.92	0.88	0.84	0.78	0.73	↑
3	1.06	0.90	0.86	0.82	0.79	0.75	0.72	0.67	0.62	↑
2.5	0.89	0.75	0.72	0.69	0.66	0.63	0.60	0.56	0.52	↑
2	0.71	0.60	0.57	0.55	0.52	0.50	0.48	0.45	0.42	↑
1.5	0.53	0.45	0.43	0.41	0.39	0.38	0.36	0.34	0.31	155

model CTJ05　Clamping force　F=P/(1.44+0.00711×LH)

Hydraulic pressure	Cylinder force	Clamping force kN								Max. arm length Max. LH
		Clamp arm length LH mm								
MPa	kN	50	60	80	100	120	140	160	180	mm
7	4.87	3.90	3.75	3.49						80
6.5	4.52	3.62	3.48	3.24						89
6	4.17	3.34	3.22	2.99	2.79	Nonusable range				100
5.5	3.82	3.07	2.95	2.74	2.56					114
5	3.48	2.79	2.68	2.49	2.33	2.18				133
4.5	3.13	2.51	2.41	2.24	2.09	1.96	1.85			159
4	2.78	2.23	2.14	1.99	1.86	1.75	1.64	1.55	1.47	199
3.5	2.43	1.95	1.88	1.74	1.63	1.53	1.44	1.36	1.29	↑
3	2.09	1.67	1.61	1.49	1.40	1.31	1.23	1.16	1.10	↑
2.5	1.74	1.39	1.34	1.25	1.16	1.09	1.03	0.97	0.92	↑
2	1.39	1.11	1.07	1.00	0.93	0.87	0.82	0.78	0.74	↑
1.5	1.04	0.84	0.80	0.75	0.70	0.65	0.62	0.58	0.55	199

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.

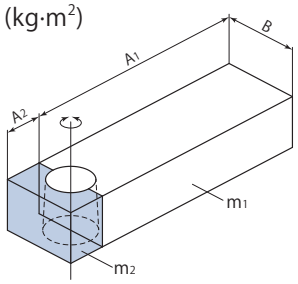
● The cam groove may be damaged in case the swing speed is set at the nonusable range in the graph.

Example of calculation for moment of inertia

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

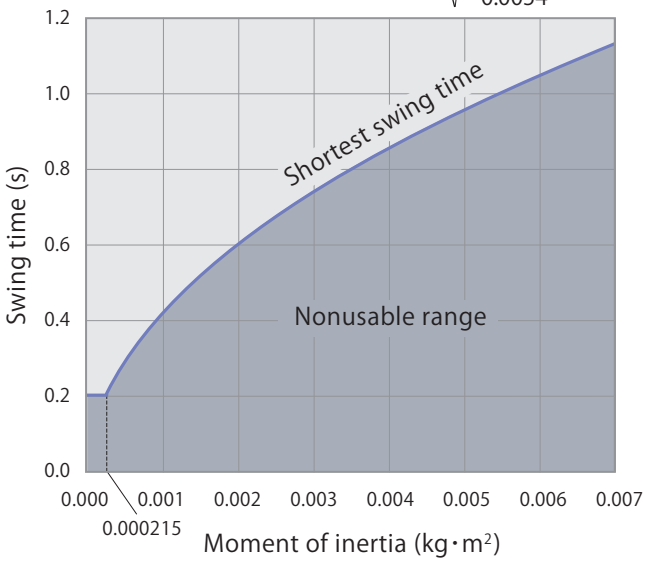
I : Moment of inertia (kg·m²)

m: Mass (kg)



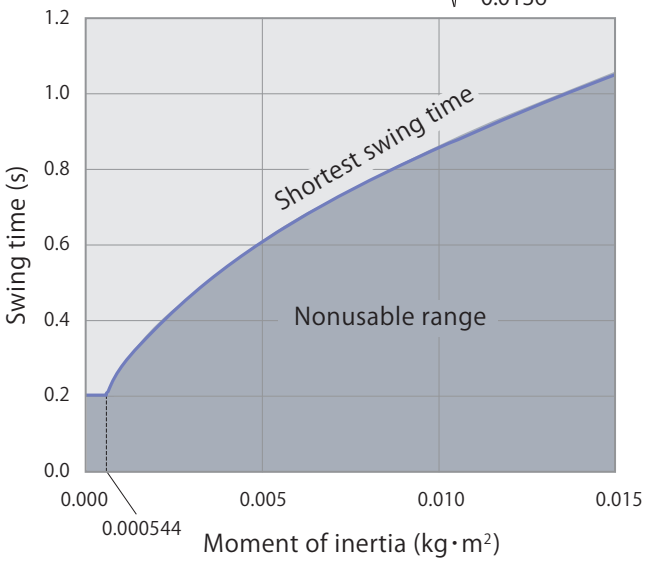
CTJ02

Shortest swing time calculation formula $t = \sqrt{\frac{I}{0.0054}}$



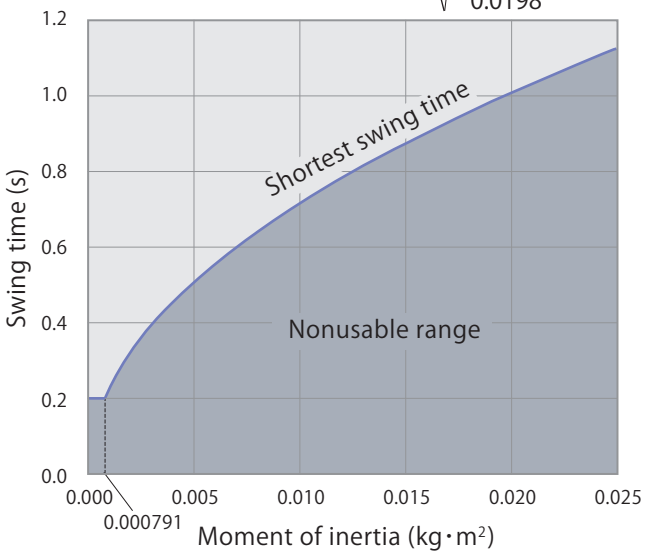
CTJ03

Shortest swing time calculation formula $t = \sqrt{\frac{I}{0.0136}}$

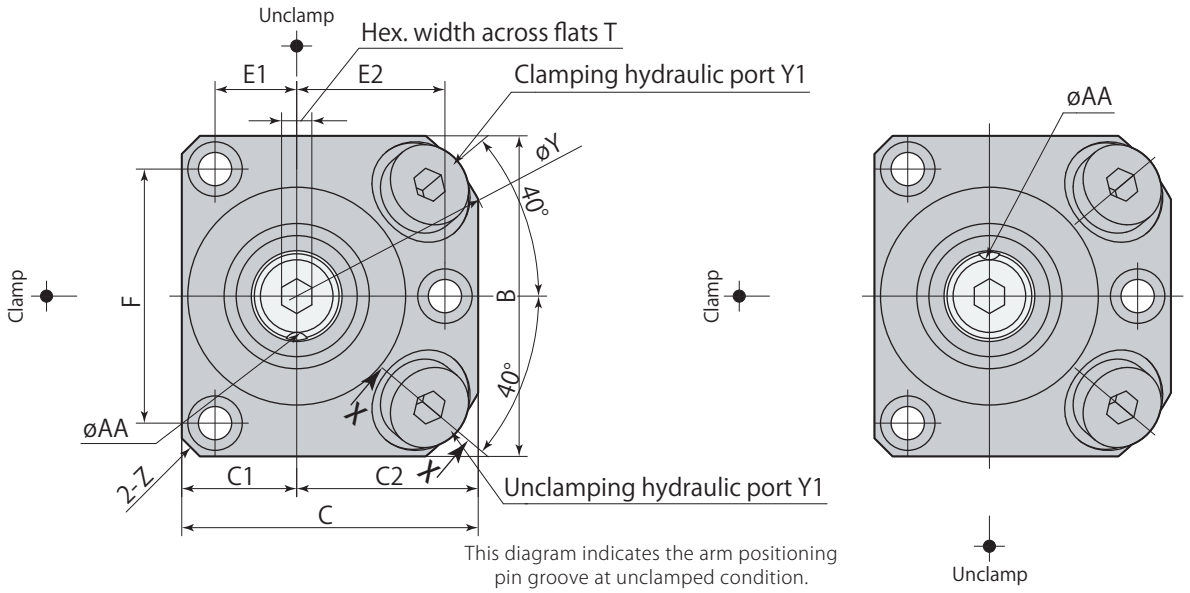


CTJ05

Shortest swing time calculation formula $t = \sqrt{\frac{I}{0.0198}}$

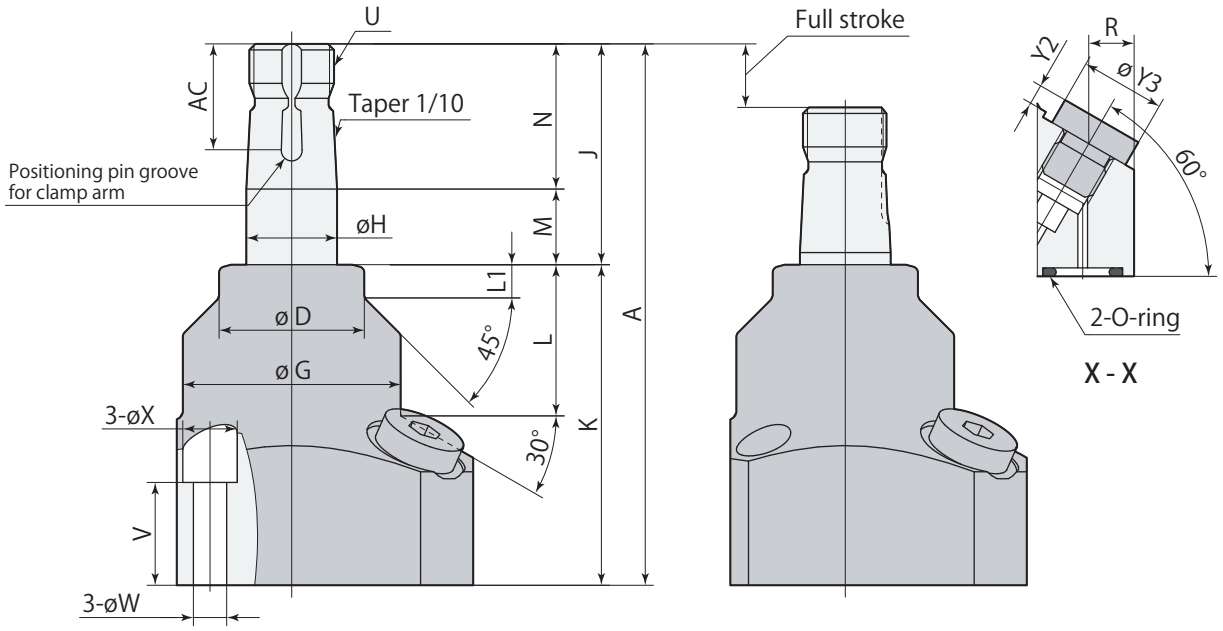


Dimensions



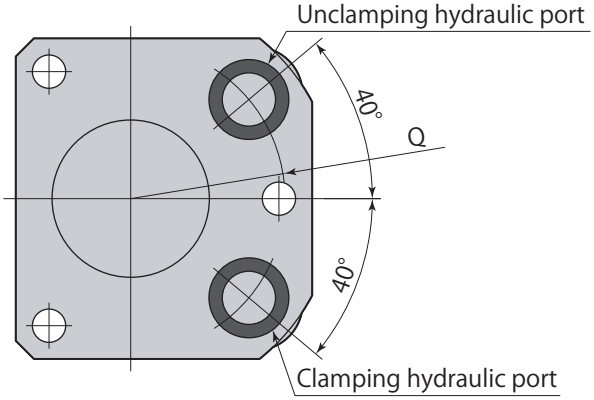
Swing direction L (counter-clockwise)

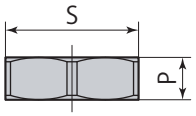
Swing direction R (clockwise)



Unclamp

Stroke end





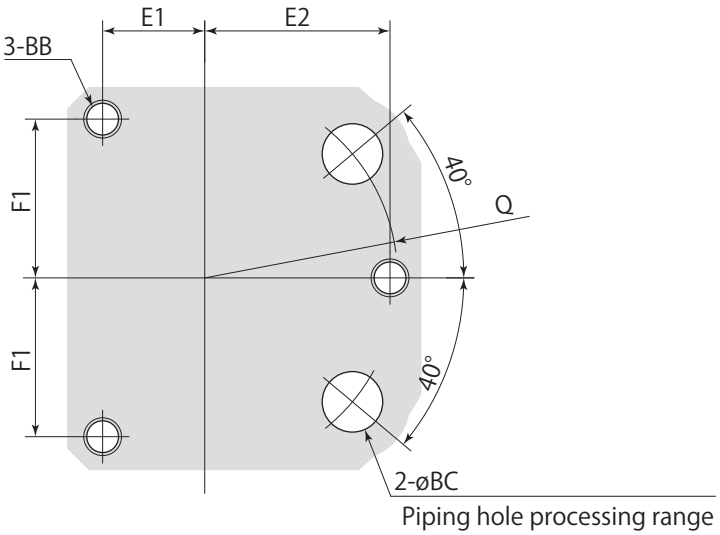
Hex nut for arm mount

- Hex nut for arm mount is included.
- Clamp arm, positioning pin and mounting screws are not included.

mm

Model		CTJ02	CTJ03	CTJ05
A		78	89.5	106.5
B		48	53	60
C		43	49	61
C1		16	19	25
C2		27	30	36
øD		21	24	36
E1		10.5	13.5	19
E2		21.5	24.5	30
F		37	42	48
øG		30	36	48
øH		12	15	22
J		29.5	36.5	46.5
K		48.5	53	60
L		20.5	25	31.5
L1		4.5	5.5	5.5
M		11.5	12.5	14.5
N		18	24	32
P		5	7	9
Q		R22.5	R25.5	R31.5
R		7.5	7.5	7.5
S (Nut width across flats)		17	22	30
T (Hex. socket)		4	5	8
U		M10×1	M14×1.5	M20×1.5
V		16	16	15.5
øW		5.5	5.5	6.5
øX		9	9	10.5
øY		62	68	80
Y1		G1/8	G1/8	G1/8
Y2		3.3	3.3	3.3
øY3		14	14	14
Z		C3	C3	C3
øAA (Pin groove diameter)		3	4	5
AC		13.5	17.5	21.5
Positioning pin (Dowel pin)		ø3(h8)×8	ø4(h8)×10	ø5(h8)×12
O-ring (FKM-90)		P10	P10	P10
Taper sleeve		CTH02-MS	CTH03-MS	CTH05-MS
Flow control valve	Meter-in	VCF01S	VCF01S	VCF01S
	Meter-out	VCF01S-O	VCF01S-O	VCF01S-O
Air bleeding valve		VCE01	VCE01	VCE01

Mounting details



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

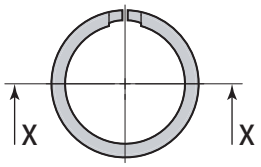
mm

Model	CTJ02	CTJ03	CTJ05
BB	M5	M5	M6
øBC	8	8	8
E1	10.5	13.5	19
E2	21.5	24.5	30
F1	18.5	21	24
Q	R22.5	R25.5	R31.5

Taper sleeve (option)

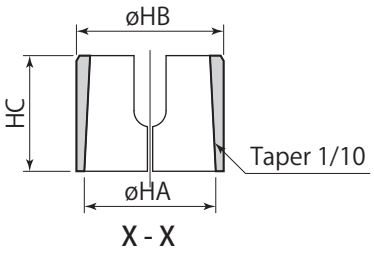
Size

CTH 02 / 03 / 05 — MS : Taper sleeve



mm

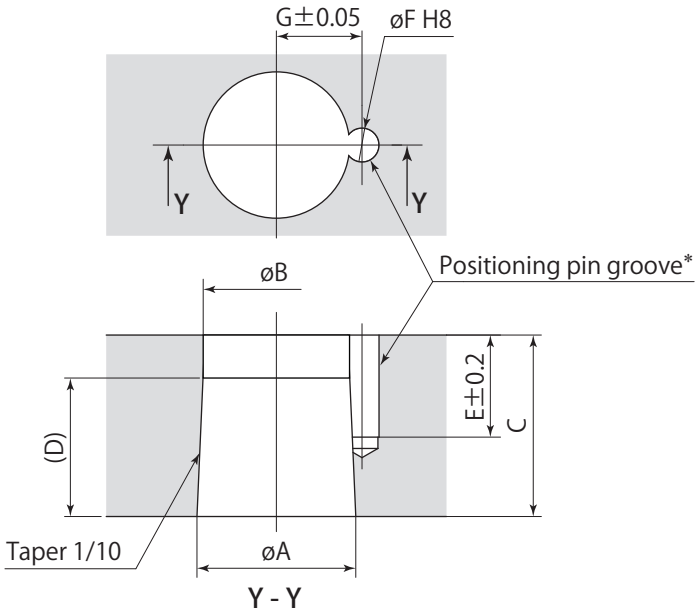
Taper sleeve	CTH02-MS	CTH03-MS	CTH05-MS
Applicable swing clamp	CTJ02	CTJ03	CTJ05
øHA	12	15	22
øHB	14	17	25
HC	10	14	19

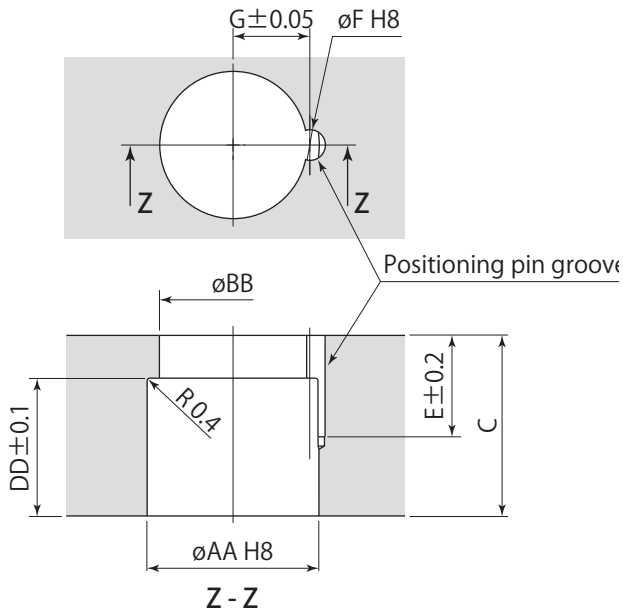


Clamp arm mounting details

Not using taper sleeve **Using taper sleeve**

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





∗ : No need to machine the pin groove 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-MS	CTH03-MS	CTH05-MS
Applicable swing clamp	CTJ02	CTJ03	CTJ05
øA	12 $^{-0.016}_{-0.034}$	15 $^{-0.016}_{-0.034}$	22 $^{-0.020}_{-0.041}$
øB	11	14.1	20.5
C	13	17	23
D	10	9	15
E	8.5	10.5	12.5
øF (pin groove diameter)	3 $^{+0.014}_{0}$	4 $^{+0.018}_{0}$	5 $^{+0.018}_{0}$
G	6.5	8	11.5
øAA	14 $^{+0.027}_{0}$	17 $^{+0.027}_{0}$	25 $^{+0.032}_{0}$
øBB	11.5	15	21
DD	10	14	19

Specifications

(Nil) : Meter-in

Body color : Silver

O : Meter-out

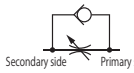
Body color : Black

VCF — G port size

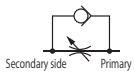
- 01S : G1/8
- 01 : G1/8
- 02 : G1/4
- 03 : G3/8

Control method

- (Nil) : Meter-in



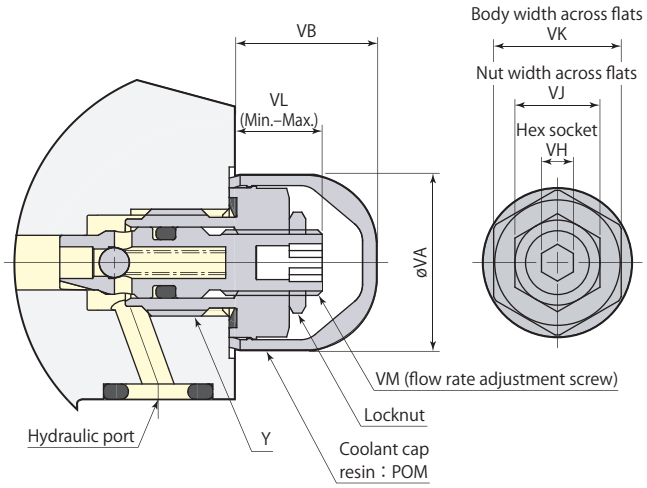
- O : Meter-out



Model		Meter-in				Meter-out			
		VCF01S	VCF01	VCF02	VCF03	VCF01S-O	VCF01-O	VCF02-O	VCF03-O
G port size		G1/8	G1/8	G1/4	G3/8	G1/8	G1/8	G1/4	G3/8
Cracking pressure	MPa	0.04	0.04	0.04	0.04	0.1	0.1	0.1	0.1
Orifice area	mm^2	4.9	4.9	9.6	19.6	3.1	3.1	6.2	12.6
Recommended tightening torque	N·m	10	10	30	35	10	10	30	35
Mass	kg	0.011	0.013	0.024	0.038	0.011	0.013	0.024	0.038

- Pressure range : 0.5–7 MPa
- Proof pressure : 10.5 MPa
- Operating temperature : 0–70 ℃
- Fluid used : General mineral based hydraulic oil (ISO-VG32 equivalent)

Dimensions



mm

Model	VCF01S VCF01S-O	VCF01 VCF01-O	VCF02 VCF02-O	VCF03 VCF03-O
Y	G1/8	G1/8	G1/4	G3/8
øVA	16	16	21	24
VB	13	13	13	14
VH	3	3	5	6
VJ	8	8	10	14
VK	12	12	17	19
VL	8–11	7–11	7.5–11.5	8.5–12.5
Adjustment screw number of turns	4 rotations	5.3 rotations	5.3 rotations	5.3 rotations
VM	M6×0.75	M6×0.75	M8×0.75	M10×0.75

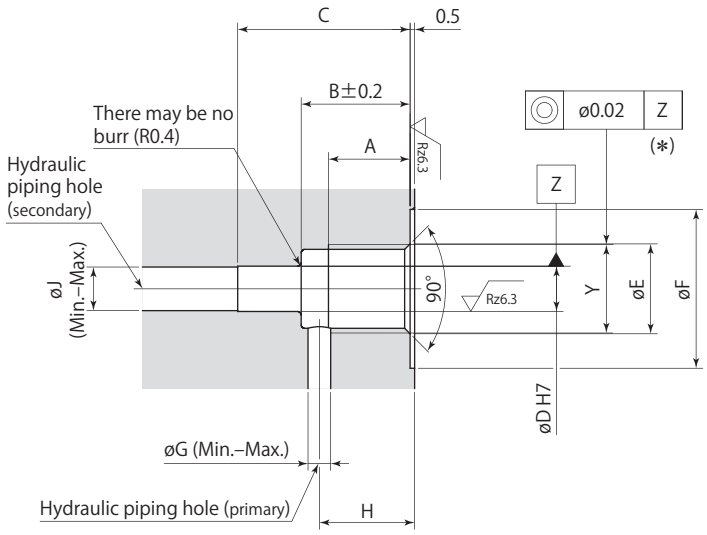
- Use a closed wrench or socket wrench for mounting and dismounting.
- Flow control valve can be mounted on hydraulic port (G port) when manifold piping.
- Adjust flow rate without hydraulic pressure. Conducting adjustments with hydraulic pressure may result in damaging seal.
- Diagram above indicates mounting for meter-in (VCF□).
- VCF 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 and work support

Model	VCF01S	VCF01	VCF02	VCF03
Swing clamp (double acting)	CTM03, 04, 05, 06 CTP04, 05, 06 CTJ02, 03, 05	CTM10 CTU01, 02, 04, 06	CTM16 CTU10, 16	CTU25
Swing clamp (single acting)*	CTN02, 04, 05, 06	CTT01, 02, 04, 06	CTN10, 16 CTT10, 16	CTT25
Swivel clamp (double acting)*	CTS04	CTS06	CTS10, 16	–
Link clamp (double acting)	CLM03, 04 CLP04, 05, 06	CLM05, 06, 10 CLU02, 04, 06	CLM16 CLU10, 16	CLU25
Link clamp (single acting)*	CLN04	CLN05, 06 CLT02, 04, 06	CLN10, 16 CLT10, 16	CLT25
Work lift cylinder	CNB01	CNB02, 04	–	–
Push, pull cylinder	–	CNA02, 04, 06	CNA10, 16	CNA25
Work support*	CSU CSP-D(CSN, CSY)	–	–	–

∗ : Single acting swing clamp, swivel clamp, single acting link clamp and work support are meter-in only.

Mounting details



Rz: ISO4287(1997)

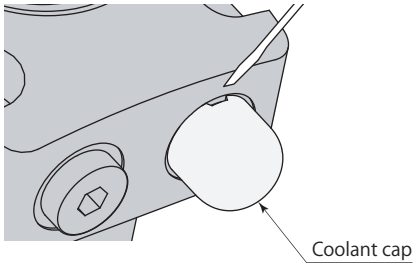
mm

Model	VCF01S VCF01S-O	VCF01 VCF01-O	VCF02 VCF02-O	VCF03 VCF03-O
A	9	9	13	13
B	11	13	18	19
C	15.5	17.5	22.5	23.5
øD	$5^{+0.012}_{0}$	$5^{+0.012}_{0}$	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$
øE	9.9	9.9	13.3	16.8
øF	17.5	17.5	21.5	24.5
øG	1.5–2	2.5–3	3.5–5	5–6
H	9–10	9.5–11.5	14.5–15.5	15–16
øJ	2.5–5	2.5–5	3.5–6	5–8
Y	G1/8	G1/8	G1/4	G3/8

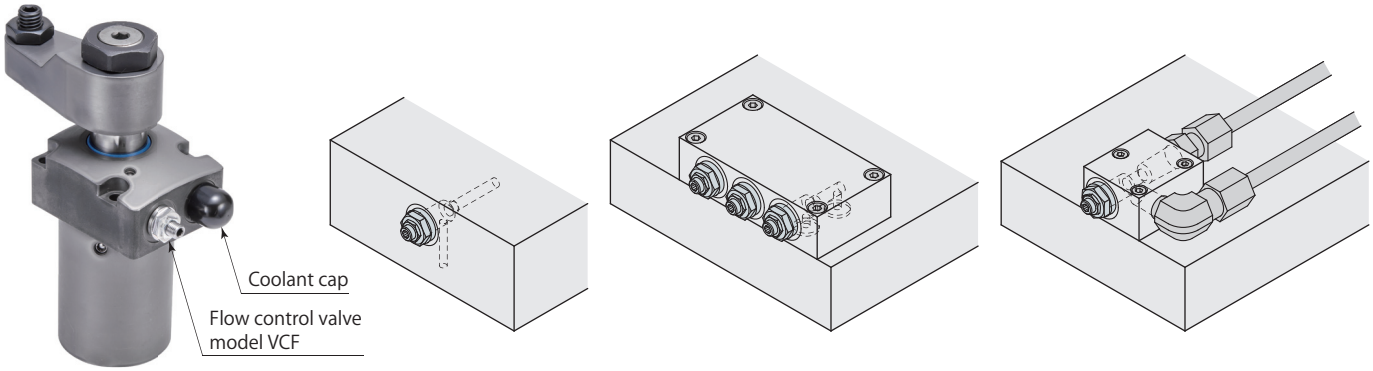
∗: Concentricity is required when machining øD and Y-portion thread. Misalignment or machining defect may cause the trouble of installation and adjusting flow rate.

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

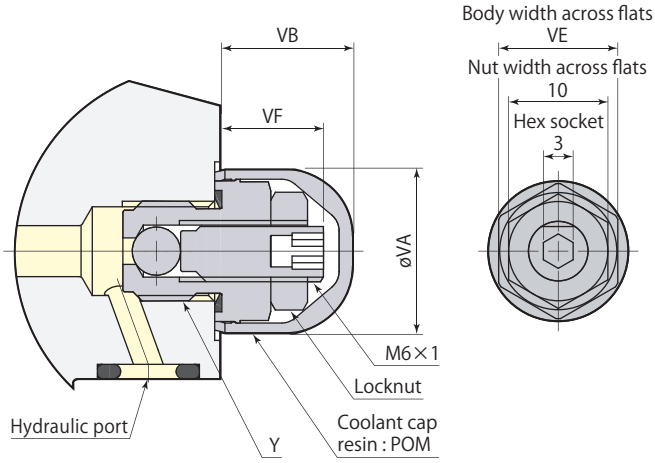
G port size

VCE

01	: G1/8
02	: G1/4
03	: G3/8

Model	VCE01	VCE02	VCE03
G port size	G1/8	G1/4	G3/8
Recommended tightening torque N·m	10	30	35
Mass kg	0.017	0.029	0.044
Pressure range MPa	0–50		
Operating temperature °C	0–70		
Fluid used	General mineral based hydraulic oil (ISO-VG32 equivalent)		

Dimensions

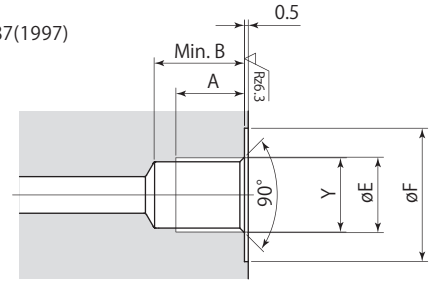


mm

Model	VCE01	VCE02	VCE03
A	9	13	13
B	10	14	14
øE	9.9	13.3	16.8
øF	17.5	21.5	24.5
Y	G1/8	G1/4	G3/8
øVA	16	21	24
VB	13	13	14
VE	12	17	19
VF	10.5	10.5	11.5

Mounting details

Rz: ISO4287(1997)



- 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.

Applicable clamp and work support

Model	VCE01	VCE02	VCE03
Swing clamp (double acting)	CTM03, 04, 05, 06, 10 CTP04, 05, 06 CTU01, 02, 04, 06 CTJ02, 03, 05	CTM16 CTU10, 16	CTU25
Swing clamp (single acting)	CTN02, 04, 05, 06 CTT01, 02, 04, 06	CTN10, 16 CTT10, 16	CTT25
Swivel clamp (double acting)	CTS04, 06	CTS10, 16	–
Link clamp (double acting)	CLM03, 04, 05, 06, 10 CLP04, 05, 06 CLU02, 04, 06	CLM16 CLU10, 16	CLU25
Link clamp (single acting)	CLN04, 05, 06 CLT02, 04, 06	CLN10, 16 CLT10, 16	CLT25
Work lift cylinder	CNB01, 02, 04	–	–
Push, pull cylinder	CNA02, 04, 06	CNA10, 16	CNA25
Work support	CSU CST CSP-D(CSN, CSY, CSK)	–	–

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CERTIFICATE OF APPROVAL ISO9001

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