Pascal

Sensing air Swing clamp

Double acting 0.5MPa

Dual cylinder 3 point sensor model

model **CTY-T**

3 point sensor model

model CTY32-LT

3 point sensor model T

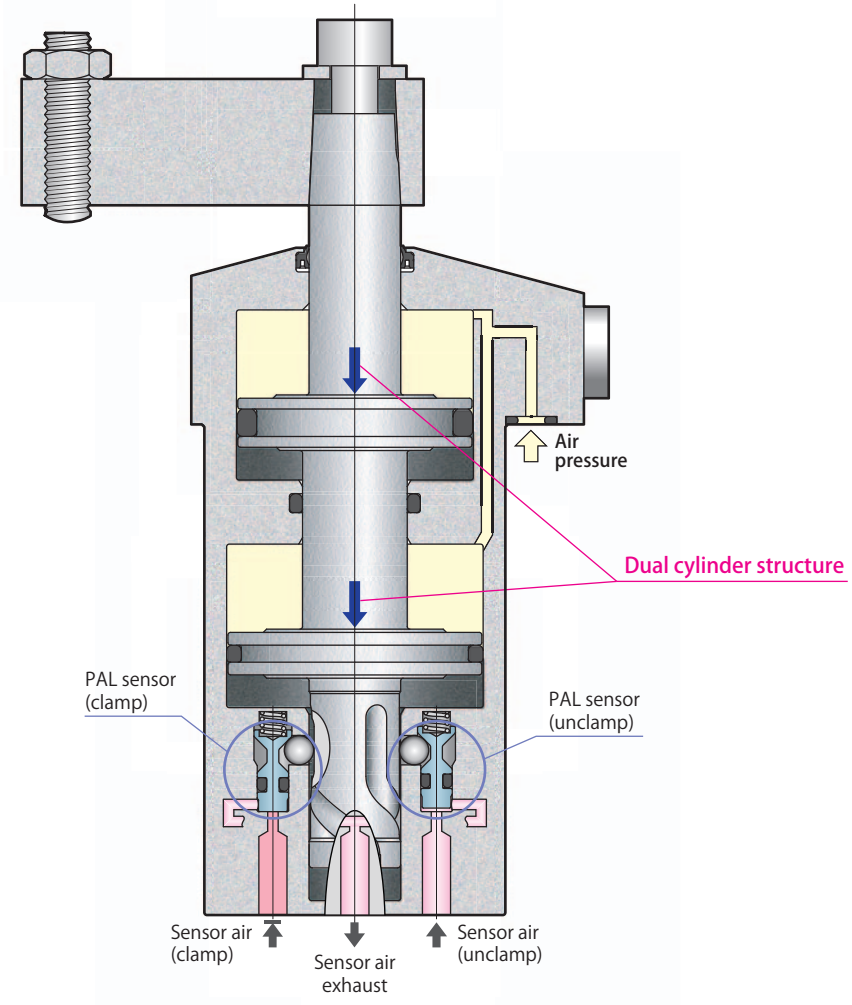
Clamp, Unclamp, Over clamp stroke (Incomplete clamp) detection

model CTY□-□T PAT.

Sensor model can prevent tool breakage and effective machining due to incomplete clamp.

The 3 point sensor model can detect the status of clamp, unclamp and over clamp stroke with just 2 circuits of air.

Refer to **pages →5, 6** for the details.



Specifications

Size

CTY — 25 / 32 / 40 / 50 / 63 —

Swing direction (when clamping)

L : Counter-clockwise

R : Clockwise

T : 3 point sensor model
Clamp, Unclamp, Over clamp stroke (Incomplete clamp) detection

Model			CTY25-□T	CTY32-□T	CTY40-□T	CTY50-□T	CTY63-□T
Cylinder force (air pressure 0.5MPa)		N	620	930	1400	2060	3030
Rod diameter		mm	12	14	16	20	25
Effective area (clamp)		mm^2	1249	1857	2786	4112	6054
Swing angle			90°±3°				
Positioning pin groove position accuracy			±1°				
Repeated clamp positioning accuracy			±0.5°				
Full stroke		mm	17.5	17.5	18.5	21.5	25
90° swing stroke		mm	9	9	10	13	16.5
Clamp stroke		mm	8	8	8	8	8
Over clamp stroke		mm	0.5	0.5	0.5	0.5	0.5
Cylinder capacity	Clamp	cm^3	21.9	32.5	51.5	88.4	151.3
	Unclamp	cm^3	23.8	35.2	55.3	95.2	163.6
Mass		kg	0.4	0.57	0.79	1.32	2.10
Recommended tightening torque of mounting screws*1		N·m	4.0	4.0	4.0	5.9	5.9
Recommended tightening torque of cap screw*2		N·m	11	25	25	50	53

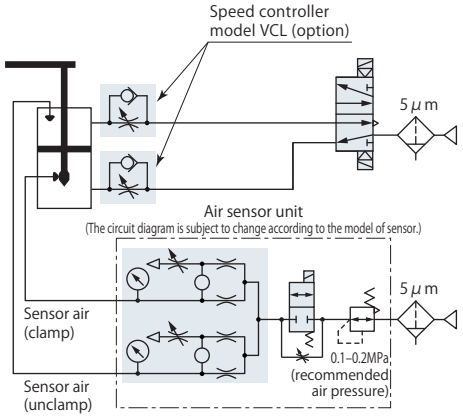
- Pressure range : 0.1–0.5 MPa
- Proof pressure : 0.75 MPa
- Operating temperature : 0–70 ℃
- Fluid used : Air*3
- Oil supply : Not required
- Seals are resistant to chlorine-based cutting fluid. (not thermal resistant specification)

*1 : ISO R898 class 12.9

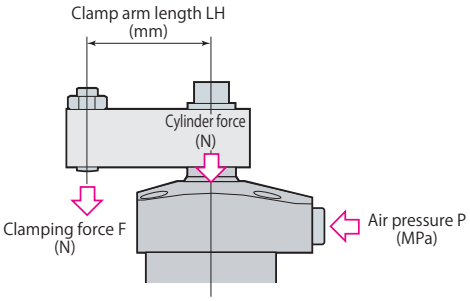
*2 : Arm mounting screw

*3 : Supply the dry and filtered air. Particulate size 5 μm or less is recommended.

Pneumatic circuit diagram



Performance table



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

Clamping force calculation formula

F＝P × 1000/(Coefficient 1＋Coefficient 2 × LH)

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

CTY50-T with clamp arm length (LH) 60 mm at air pressure of 0.5 MPa, Clamping force F is calculated by

0.5×1000/(0.243+0.00055×60)＝1810 N

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

model CTY25-□T Clamping force F=P×1000/(0.801+0.00232×LH)

Air pressure MPa	Cylinder force N	Clamping force N / Max. arm length LH mm						Max. arm length Max. LH mm
		30	40	50	65	80	100	
0.5	620	570	560	550	Nonusable range			62
0.4	500	460	450	440	420	410		82
0.3	370	340	340	330	320	300	290	120
0.2	250	230	220	220	210	200	190	120

model CTY32-□T Clamping force F=P×1000/(0.538+0.00150×LH)

Air pressure MPa	Cylinder force N	Clamping force N / Max. arm length LH mm						Max. arm length Max. LH mm
		35	50	70	90	100	120	
0.5	930	850	820		Nonusable range			66
0.4	740	680	650	620				88
0.3	560	510	490	470	450	440	420	129
0.2	370	340	330	310	300	290	280	129

model CTY40-□T Clamping force F=P×1000/(0.359+0.00094×LH)

Air pressure MPa	Cylinder force N	Clamping force N / Max. arm length LH mm						Max. arm length Max. LH mm
		50	70	90	110	130	150	
0.5	1400	1230			Nonusable range			65
0.4	1110	990	940					86
0.3	840	740	710	680	650			125
0.2	560	490	470	450	430	420	400	160

model CTY50-□T Clamping force F=P×1000/(0.243+0.00055×LH)

Air pressure MPa	Cylinder force N	Clamping force N / Max. arm length LH mm						Max. arm length Max. LH mm
		60	80	100	120	140	160	
0.5	2060	1810	1740		Nonusable range			88
0.4	1640	1450	1390	1340				117
0.3	1230	1090	1040	1010	970	940	910	173
0.2	820	720	700	670	650	620	600	173

model CTY63-□T Clamping force F=P×1000/(0.165+0.00032×LH)

Air pressure MPa	Cylinder force N	Clamping force N / Max. arm length LH mm						Max. arm length Max. LH mm
		75	90	110	130	150	170	
0.5	3030	2650	2580	2500	Nonusable range			121
0.4	2420	2120	2060	2000	1940	1880		162
0.3	1820	1590	1550	1500	1450	1410	1370	244
0.2	1210	1060	1030	1000	970	940	910	244

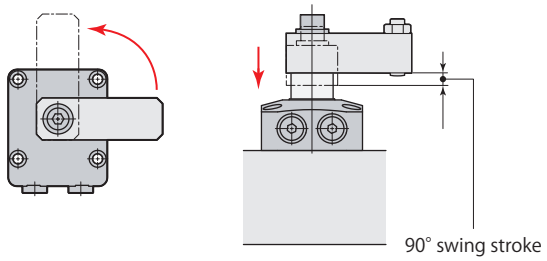
Swing speed adjustment

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 speed controller 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.

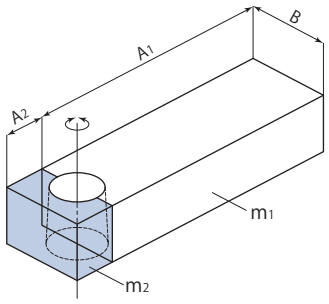


Example of calculation for moment of inertia

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

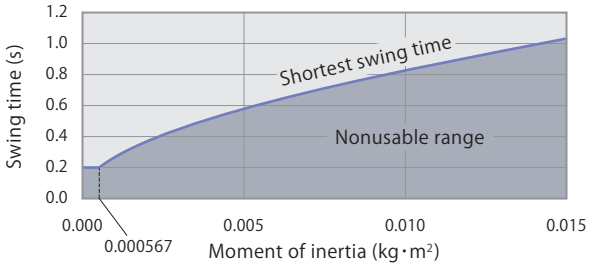
I : Moment of inertia (kg·m²)

m: Mass (kg)



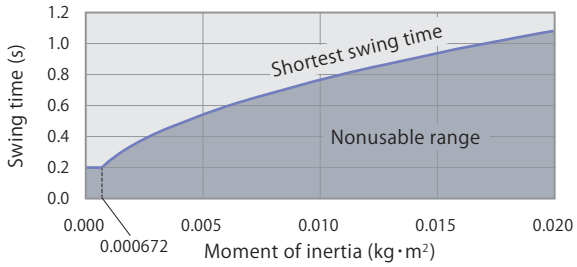
model CTY25-□T

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0142}}$



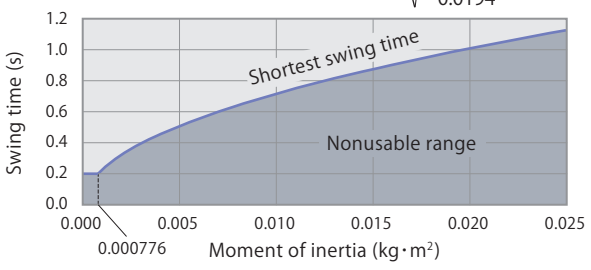
model CTY32-□T

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0168}}$



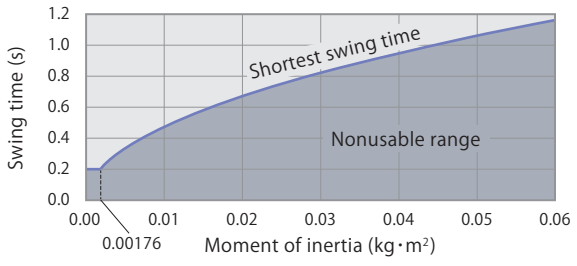
model CTY40-□T

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0194}}$



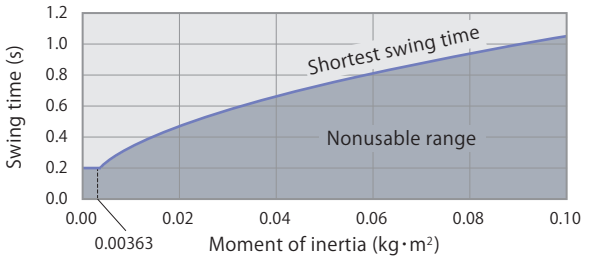
model CTY50-□T

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0440}}$



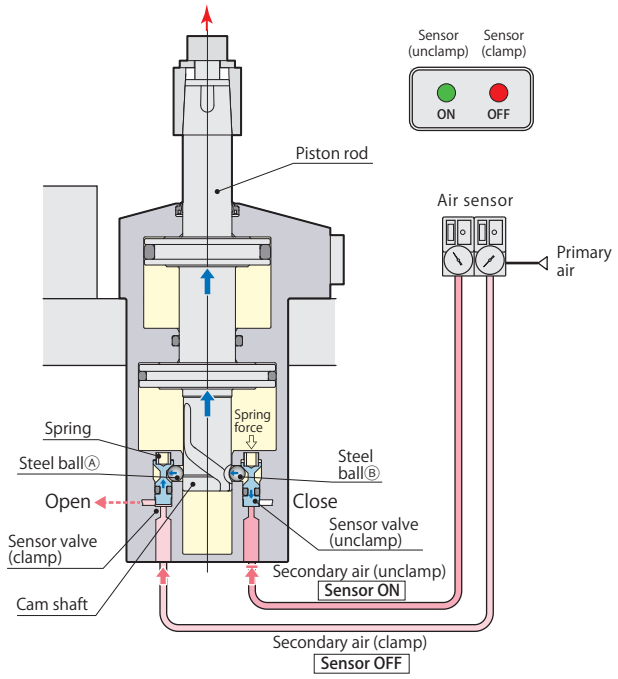
model CTY63-□T

Shortest swing time calculation formula $t=\sqrt{\frac{I}{0.0908}}$



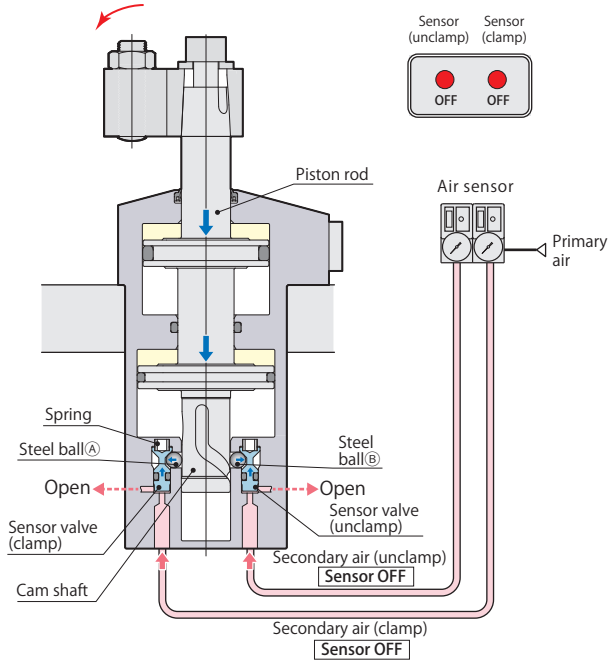
Clamp, Unclamp, Over clamp stroke detection signal

Unclamp detection



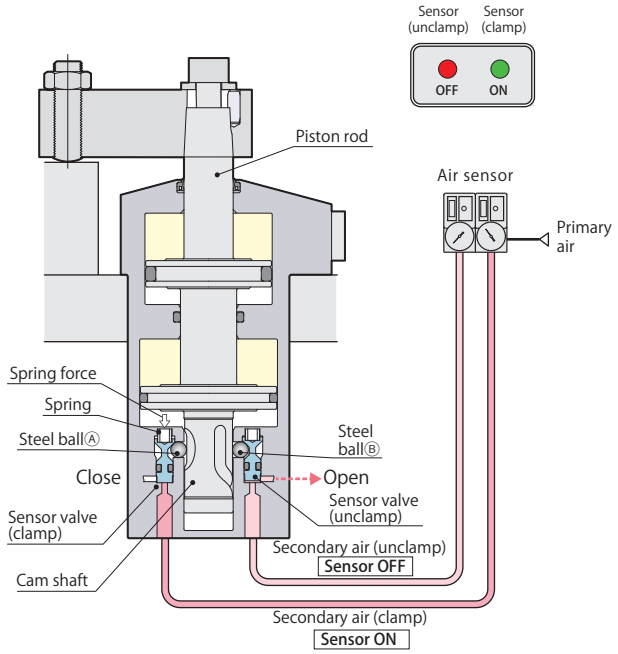
Sensor signal (unclamp)	ON	Unclamp
Sensor signal (clamp)	OFF	

In the middle of swing stroke



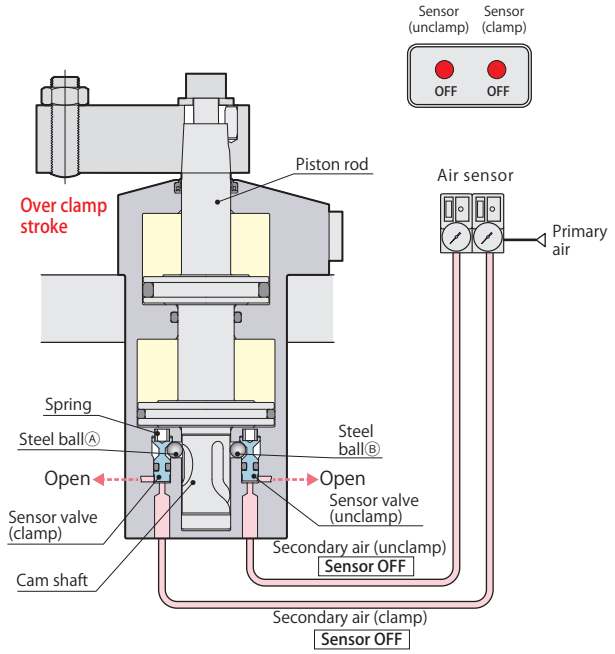
Sensor signal (unclamp)	OFF	In the middle of swing stroke
Sensor signal (clamp)	OFF	

Clamp detection



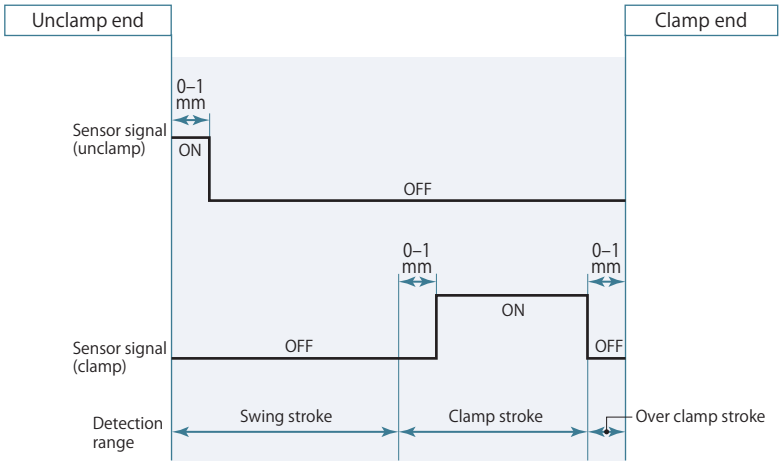
Sensor signal (unclamp)	OFF	Clamp
Sensor signal (clamp)	ON	

Over clamp stroke (Incomplete clamp) detection



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

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.

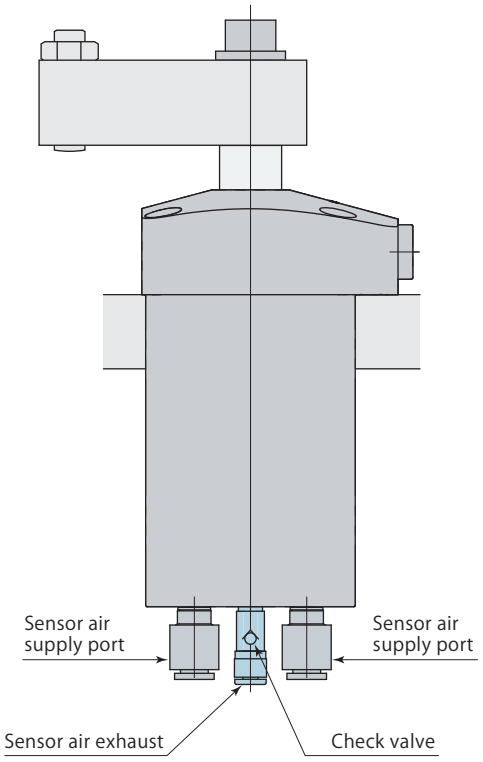
Air sensor unit recommended condition of use

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.

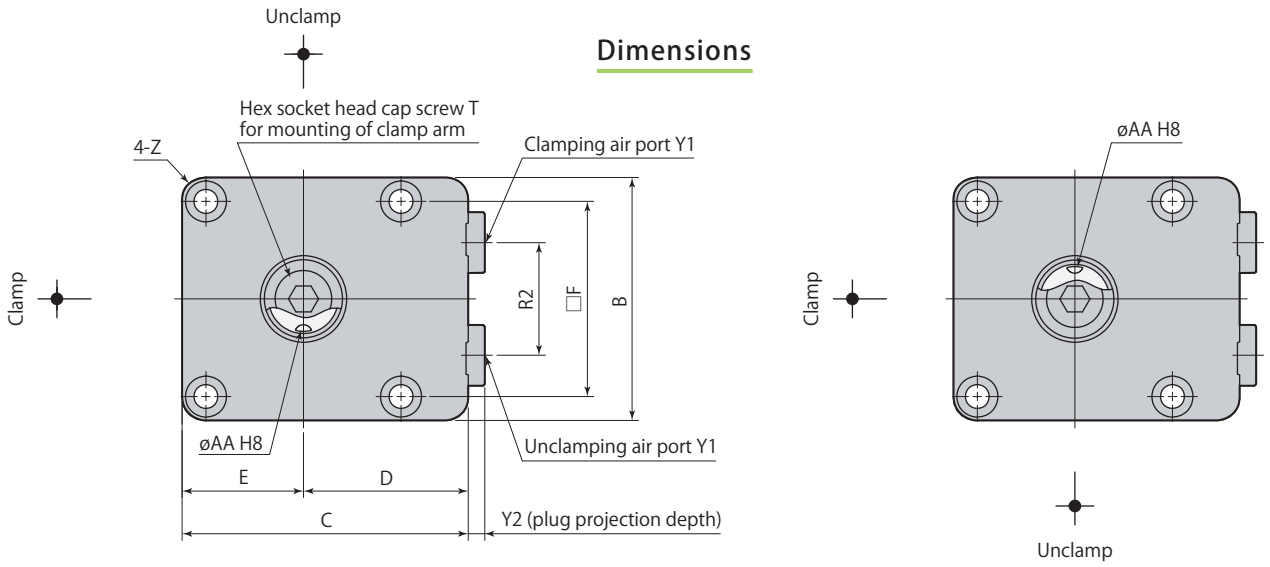
Caution for piping

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



- 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.

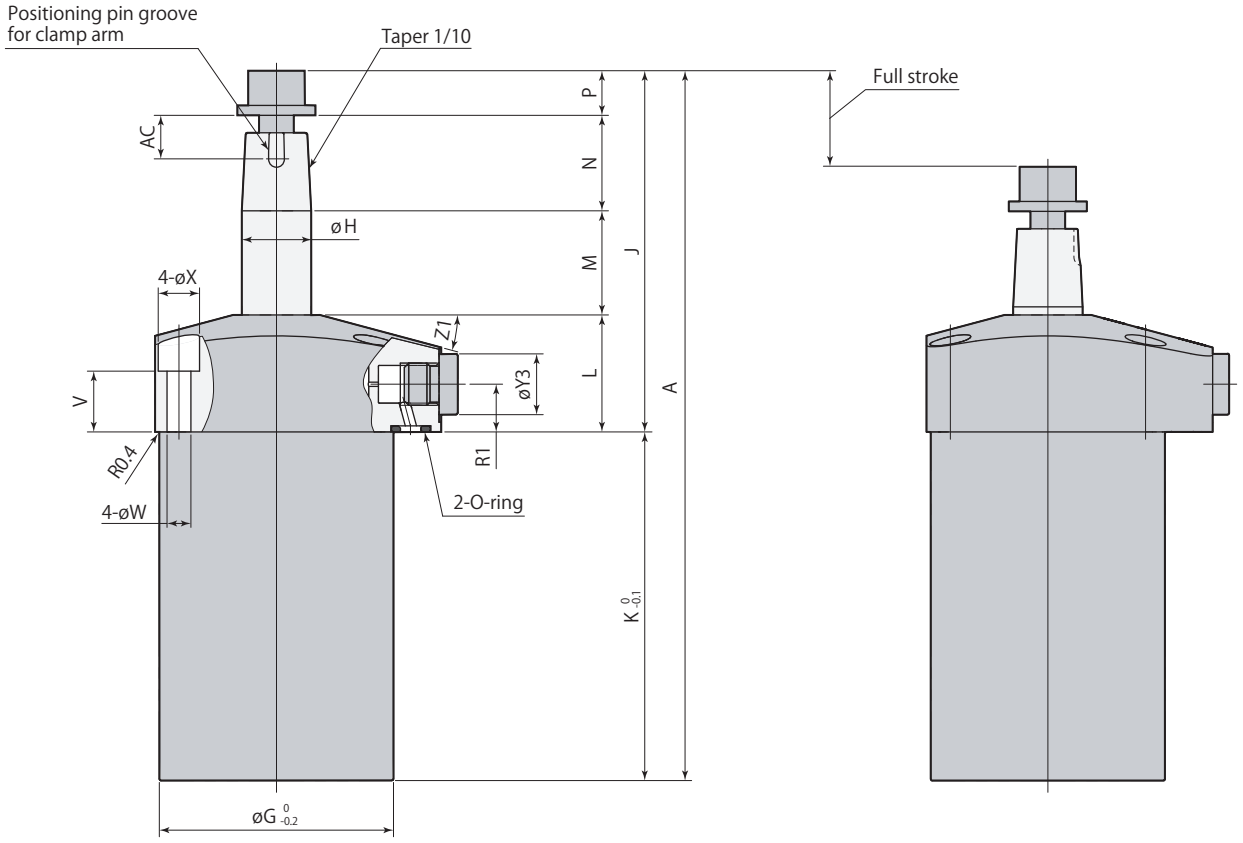
Dimensions



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

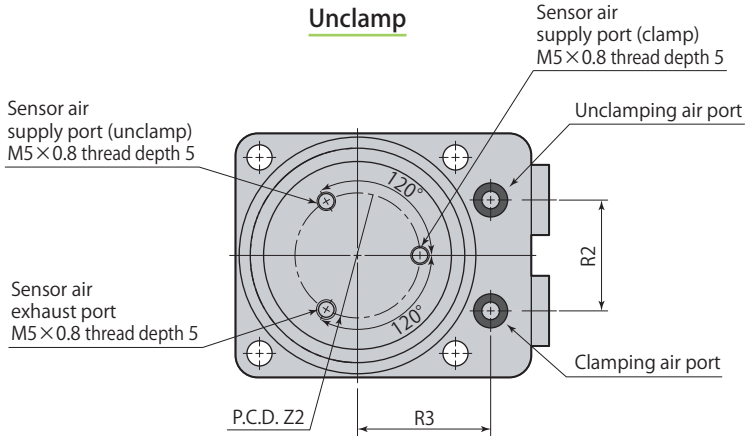
Swing direction L (counter-clockwise)

Swing direction R (clockwise)



Unclamp

Stroke end



- Clamp arm, positioning pin and mounting screws are not included.

mm

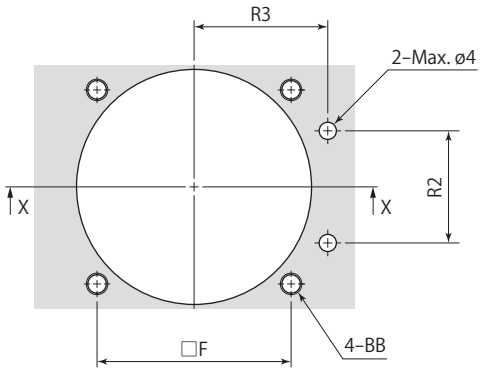
Model		CTY25-□T	CTY32-□T	CTY40-□T	CTY50-□T	CTY63-□T
A		145.3	155.3	166.3	193.2	224.2
B		45	50	56	66	78
C		54	60	66	80	91
D		31.5	35	38	47	52
E		22.5	25	28	33	39
F		34	39	45	53	65
øG		39	46	54	64	77
øH		12	14	16	20	25
J		70.8	75.8	79.8	95.7	106.2
K		74.5	79.5	86.5	97.5	118
L		27	27	27	32	32
M		19.5	19.5	20.5	23.5	27
N (arm thickness)		16	19	22	27	32
P		8.3	10.3	10.3	13.2	15.2
R1		11	11	11	12.5	12.5
R2		18	20	26	30	40
R3		26	28	31	36	41
T		M6×1 length 20	M8×1.25 length 16	M8×1.25 length 16	M10×1.5 length 20	M12×1.75 length 25
V		14	14	14	17	16
øW		5.5	5.5	5.5	6.8	6.8
øX		9.5	9.5	9.5	11	11
Y1		G1/8	G1/8	G1/8	G1/4	G1/4
Y2		3.8	3.8	3.8	4.8	4.8
øY3		14	14	14	19	19
Z		R5	R5	R5	R6	R6
Z1		15°	15°	15°	14°	13°
Z2		19	22	27	33.8	42
øAA (pin groove diameter)		$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$5^{+0.018}_{0}$
AC		10.5	10.5	10.5	12.5	12.5
Positioning pin (dowel pin)		ø3(h8)×10	ø4(h8)×10	ø4(h8)×10	ø5(h8)×12	ø5(h8)×12
O-ring (FKM-90)		P6	P6	P6	P6	P6
Taper sleeve		CTH25-XS	CTH32-XS	CTH40-XS	CTH50-XS	CTH63-XS
Speed controller*	Meter-in	VCL01-I	VCL01-I	VCL01-I	VCL02-I	VCL02-I
	Meter-out	VCL01-O	VCL01-O	VCL01-O	VCL02-O	VCL02-O

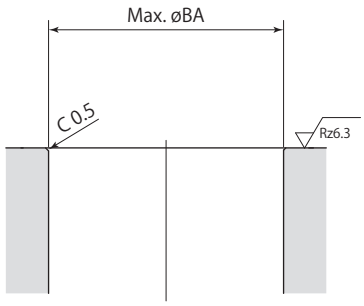
∗: Select the right model of VCL according to the size of the clamp.

Refer to each page for the details of options.

● Taper sleeve **page →11** ● Speed controller **page →13**

Mounting details





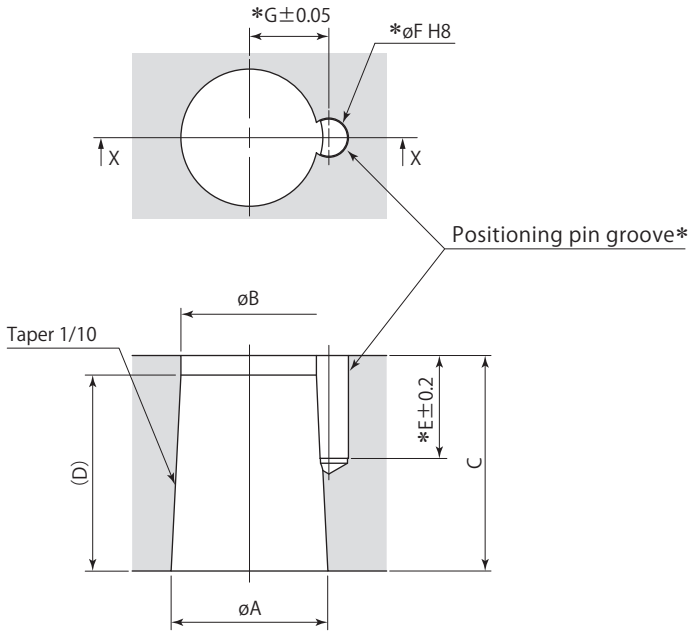
X-X

mm

Model	CTY25-□T	CTY32-□T	CTY40-□T	CTY50-□T	CTY63-□T
F	34	39	45	53	65
R2	18	20	26	30	40
R3	26	28	31	36	41
øBA	39.5	46.5	54.5	64.5	77.5
BB	M5	M5	M5	M6	M6

Clamp arm mounting details

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



X-X

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

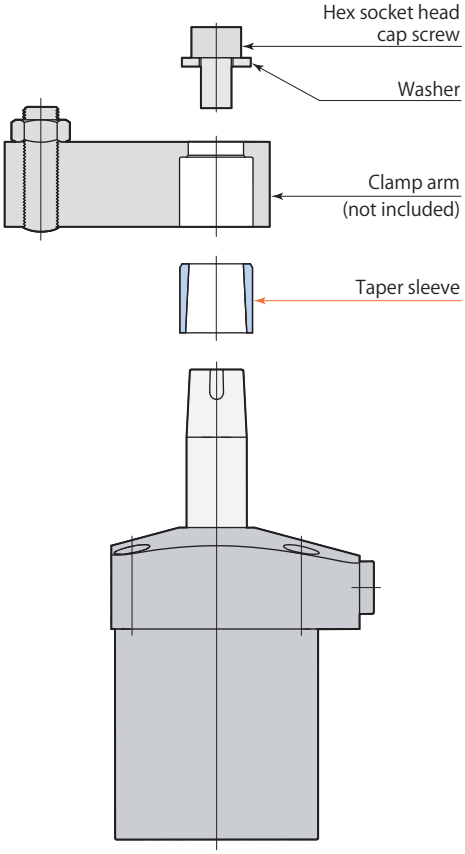
mm

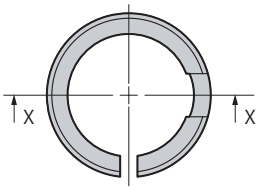
Model	CTY25-□T	CTY32-□T	CTY40-□T	CTY50-□T	CTY63-□T
øA	12 $^{-0.016}_{-0.034}$	14 $^{-0.016}_{-0.034}$	16 $^{-0.016}_{-0.034}$	20 $^{-0.020}_{-0.041}$	25 $^{-0.020}_{-0.041}$
øB	10.5	12.6	14	17.8	22.4
C	16	19	22	27	32
D	15	14	20	22	26
E	10.5	10.5	10.5	12.5	12.5
øF (pin groove diameter)	3 $^{+0.014}_{0}$	4 $^{+0.018}_{0}$	4 $^{+0.018}_{0}$	5 $^{+0.018}_{0}$	5 $^{+0.018}_{0}$
G	6.1	7.1	8.1	10.1	12.6

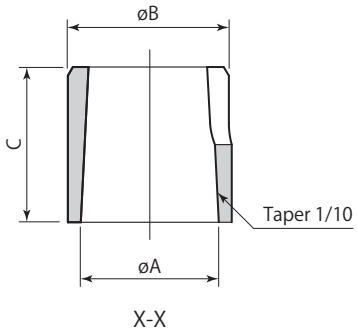
Taper sleeve

Size

CTH **25** / **32** / **40** / **50** / **63** — **XS** : Taper sleeve







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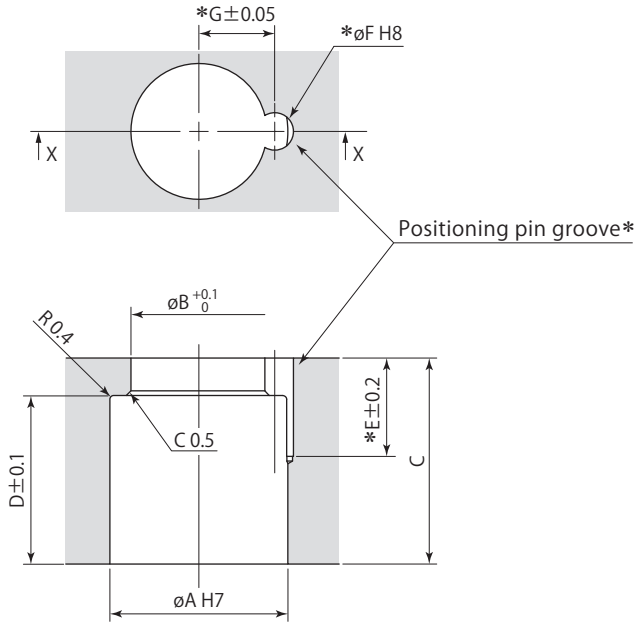
Taper sleeve	CTH25-XS	CTH32-XS	CTH40-XS	CTH50-XS	CTH63-XS
Applicable swing clamp	CTY25-□T	CTY32-□T	CTY40-□T	CTY50-□T	CTY63-□T
øA	12	14	16	20	25
øB	14.5	17	19	24	29
C	10	14	18	22	26

Clamp arm mounting details

(Using taper sleeve)

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



X-X

∗: No need to machine the pin groove (E, øF, G) 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	CTH25-XS	CTH32-XS	CTH40-XS	CTH50-XS	CTH63-XS
Applicable swing clamp	CTY25-□T	CTY32-□T	CTY40-□T	CTY50-□T	CTY63-□T
øA	14.5 +0.018 0	17 +0.018 0	19 +0.021 0	24 +0.021 0	29 +0.021 0
øB	10.5	13	14.5	18.5	23
C	16	19	22	27	32
D	10	14	18	22	26
E	10.5	10.5	10.5	12.5	12.5
øF (pin groove diameter)	3 +0.014 0	4 +0.018 0	4 +0.018 0	5 +0.018 0	5 +0.018 0
G	6.1	7.1	8.1	10.1	12.6

Specifications

I : Meter-in

Locknut color : Silver

O : Meter-out

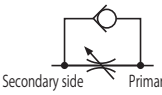
Locknut color : Black

G port size

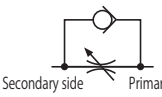
VCL — 01 : G1/8 / 02 : G1/4

Control method

I : Meter-in



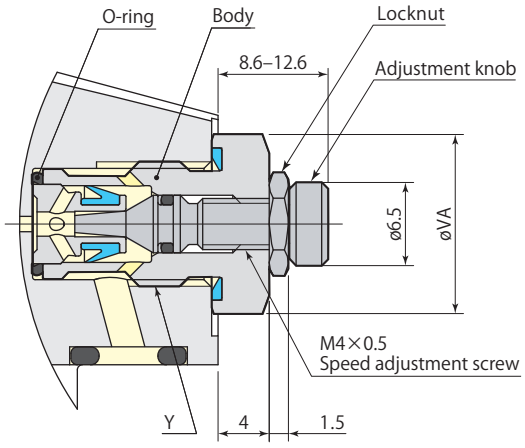
O : Meter-out

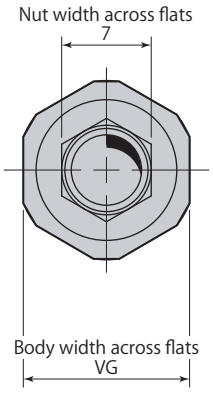


Model		VCL01-I	VCL01-O	VCL02-I	VCL02-O
G port size		G1/8		G1/4	
Orifice area	mm²	2.8		6.2	
Recommended tightening torque	N·m	7		15	
Mass	kg	0.01		0.02	

● Pressure range : 0.1–1.0 MPa ● Proof pressure : 1.5 MPa ● Operating temperature : 0–70 ℃ ● Fluid used : Air*

∗ : Supply the dry and filtered air. Particulate size 5 μm or less is recommended.





mm

Model	VCL01	VCL02
Y	G1/8	G1/4
øVA	14	19
VG	13	17
Adjustment screw number of turns	8 rotations	
O-ring*1	6.0×1.0*2	8.0×1.0*2

∗1 : FKM-90

∗2 : Inner diameter × Thickness

● Use a closed wrench or socket wrench for mounting and dismounting.

● Speed controller can be mounted on air port (G port) when using manifold piping.

● This diagram depicts mounted condition for meter-out (VCL□-O).

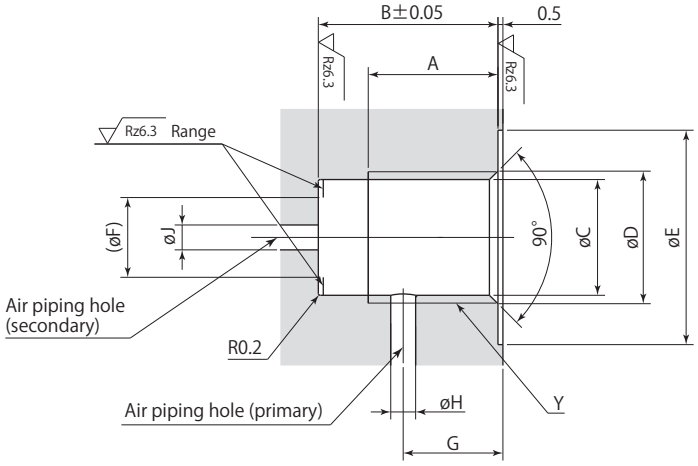
● VCL is shipped with the valve fully open. Adjust the flow rate by loosening the screw after it is tighted up to close the valve. Tighten the locknut after adjustment is completed.

Applicable clamp

Model	VCL01	VCL02
Air swing clamp	CTX32, CTX40 CTY25, CTY32, CTY40	CTX50, CTX63 CTY50, CTY63
Air link clamp	CLX32, CLX40 CLY32, CLY40* CLZ25	CLX50, CLX63 CLY50, CLY63*

∗ : Air link clamp boost model CLY are meter-out only.

Mounting details



mm

Model	VCL01	VCL02
A	9	13
B	14	18
øC	$8.7^{+0.1}_{0}$	$11.6^{+0.1}_{0}$
øD	9.9	13.3
øE	17.5	21.5
øF	6	8
G	8–11	9–12.5
øH	2	3
øJ	2	3
Y	G1/8	G1/4

Rz: ISO4287(1997)

Mounting & dismounting of speed controller

- When mounting or dismounting a speed controller, be sure to set pressure within air circuit to 0 MPa before starting.
- When mounting a speed controller, be sure to tighten it with the recommended tightening torque.

Pascal

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CERTIFICATE OF APPROVAL ISO9001

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