Sensing Swing clamp

Double acting 25 MPa

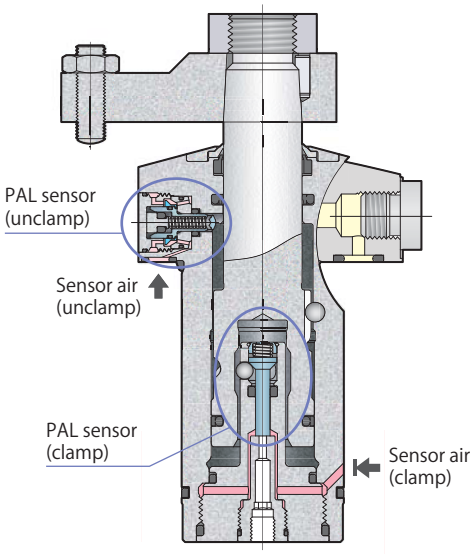
model CTK

3 point sensor model
model CTK04U-LT

3 point sensor model T

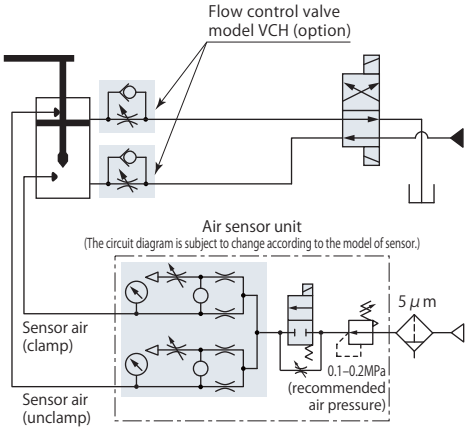
Clamp, Unclamp, Over clamp stroke (Incomplete clamp) detection

model **CTK□U-□T** PAT.



Hydraulic and pneumatic circuit diagram

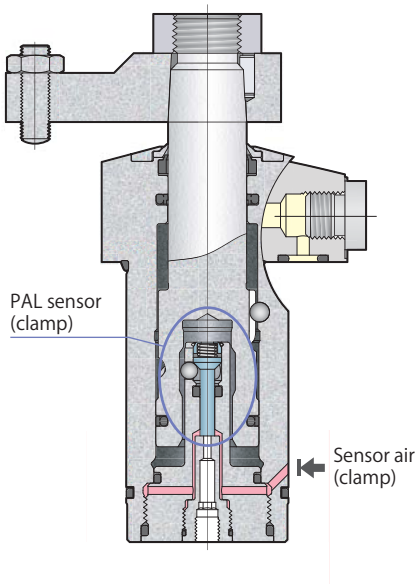
model **CTK□U-□T**



Clamp sensor model C

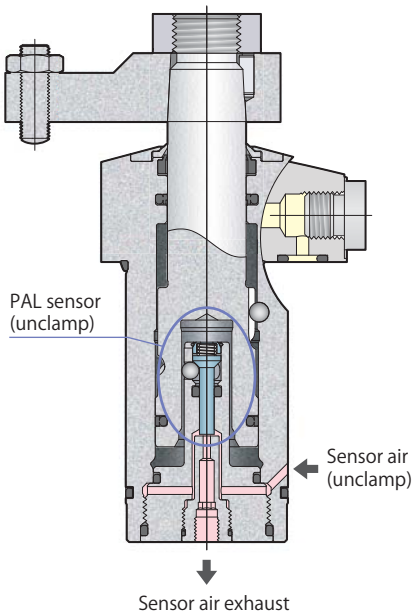
Clamp, Over clamp stroke (Incomplete clamp) detection

model **CTK□U-□C** PAT.



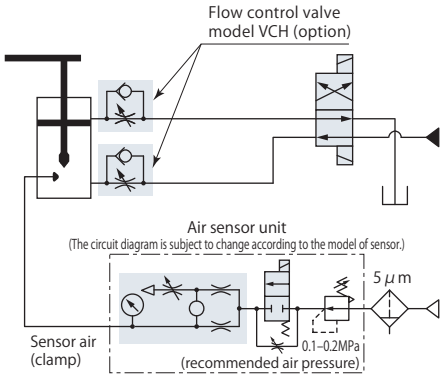
Unclamp sensor model B

model **CTK□U-□B** PAT.

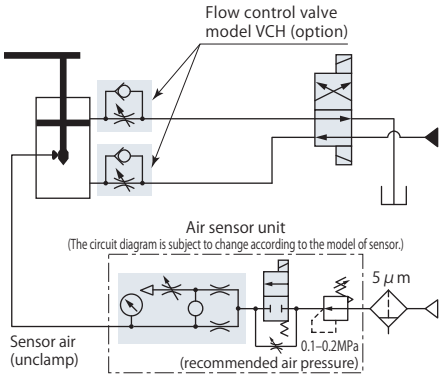


Hydraulic and pneumatic circuit diagram

model **CTK□U-□C**



model **CTK□U-□B**



Specifications

Size

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

Swing direction (when clamping)

L : Counter-clockwise

R : Clockwise

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

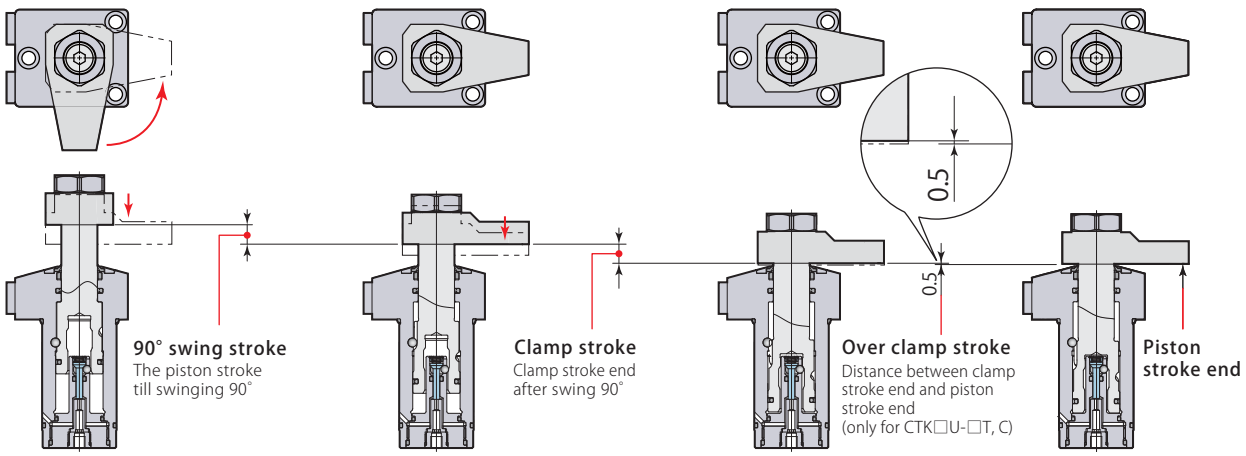
C : Clamp sensor model
Clamp, Over clamp stroke (Incomplete clamp) detection

B : Unclamp sensor model

Model			CTK04U-□□	CTK06U-□□	CTK10U-□□	CTK16U-□□
Cylinder force	Hydraulic pressure 35MPa	kN	5.1	7.6	14.6	20.3
	Hydraulic pressure 25MPa	kN	3.6	5.4	10.4	14.5
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-□T/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-□T/C)		mm	0.5	0.5	0.5	0.5
Cylinder capacity (CTK□U-□T/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 : 5–25 MPa (model CTK-T), 5–35 MPa (model CTK-C/B)
- Proof pressure : 37.5 MPa (model CTK-T), 52.5 MPa (model CTK-C/B)
- 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

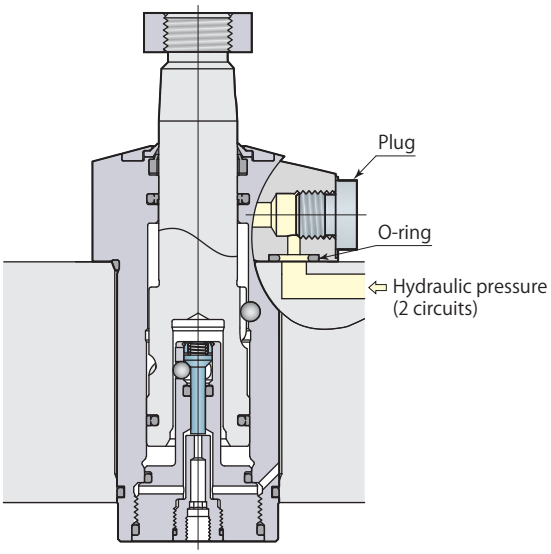
Clamping must be done within the range of clamp stroke.



Manifold piping and G port piping are available.

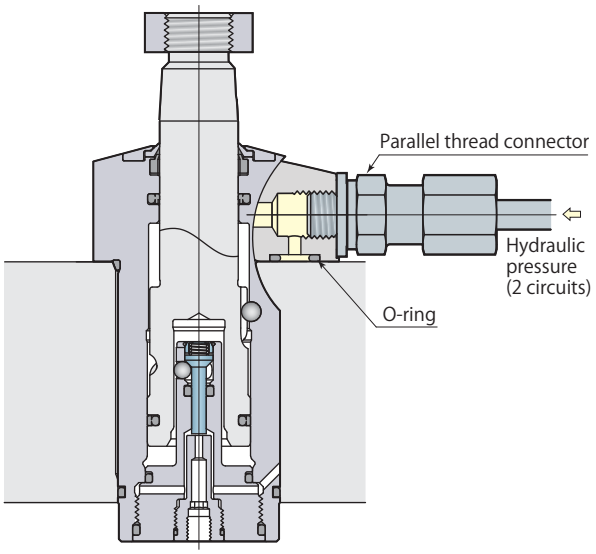
Manifold piping

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.



Flow control valve model VCH

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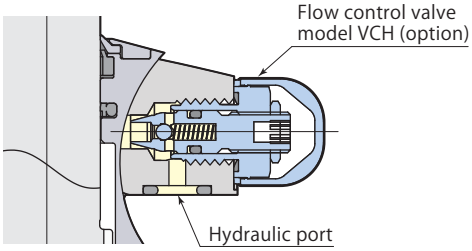

Air bleeding valve model VCE

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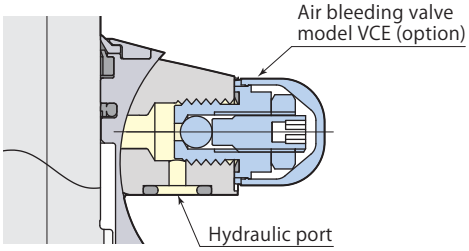
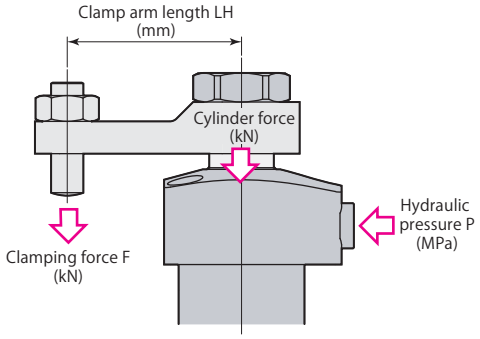


● In case of mounting flow control valve model VCH on the G port of the clamp, air bleeding valve should be installed in the piping to the clamp. (VCE Mounting details. Refer to **page →78**)

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 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								49
25	3.6	3.3	3.2	3.1	2.9	2.8	Nonusable range					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

● 3 point sensor model (model CTK-T) applicable hydraulic pressure should be 5 to 25MPa.

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.

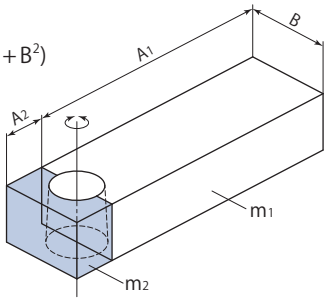
● The cam groove may be damaged in case the swing speed is set at the nonusable range in the graph.

Example of calculation for moment of inertia

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

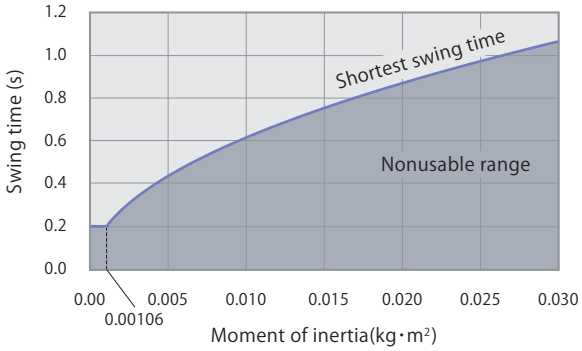
I : Moment of inertia (kg·m²)

m : Mass (kg)



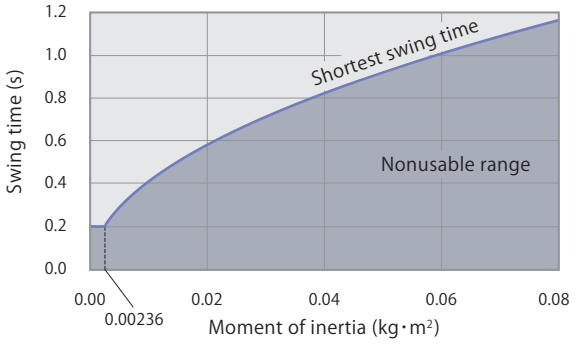
model CTK04

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



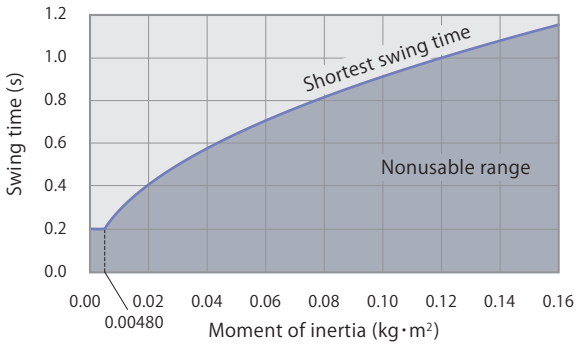
model CTK06

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



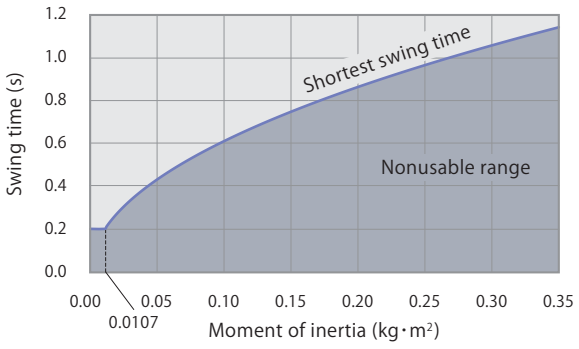
model CTK10

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



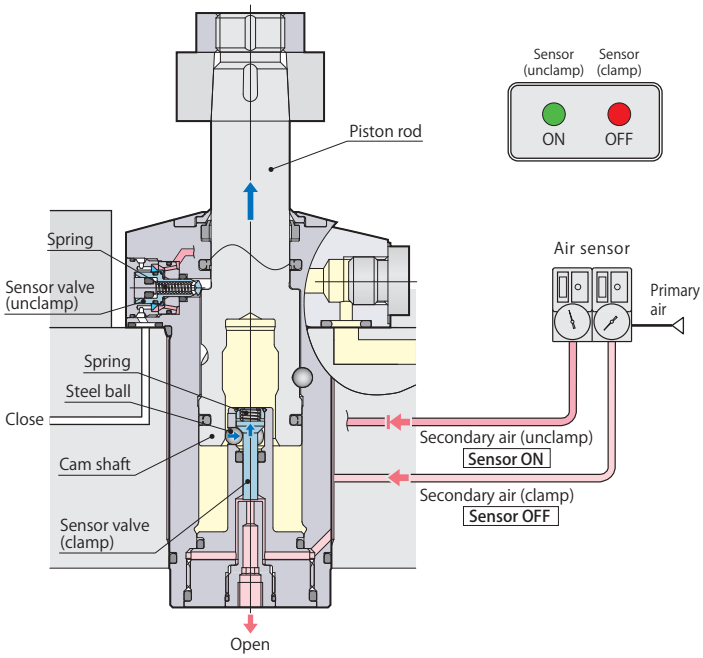
model CTK16

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



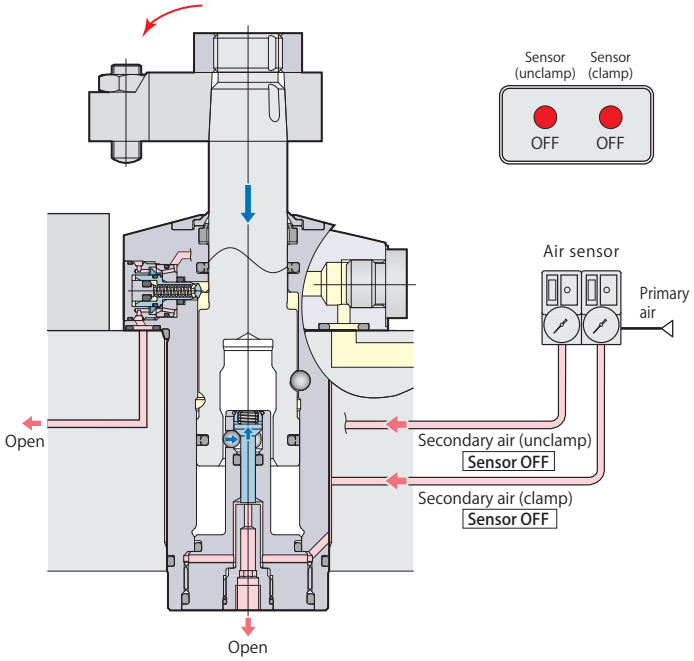
Clamp, Unclamp, Over clamp stroke detection signal

Unclamp detection



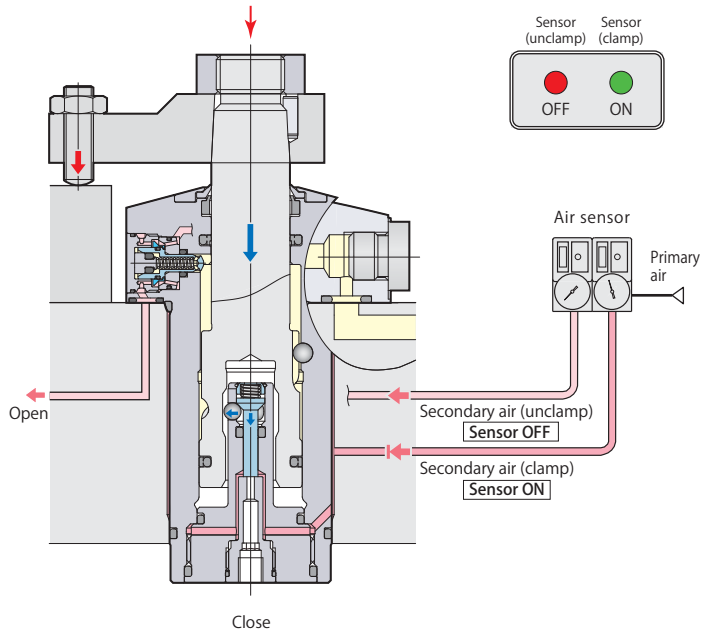
Sensor signal (unclamp)	ON	Unclamp
Sensor signal (clamp)	OFF	

In the middle of swing stroke



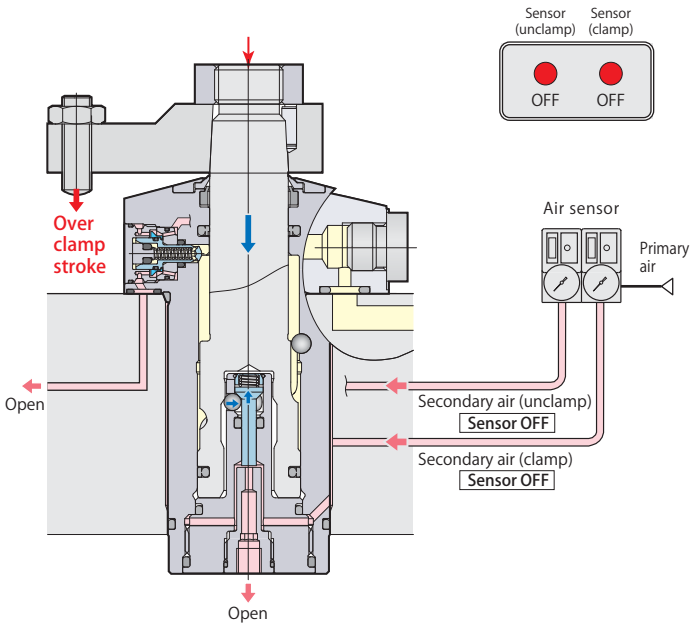
Sensor signal (unclamp)	OFF	In the middle of swing stroke
Sensor signal (clamp)	OFF	

Clamp detection



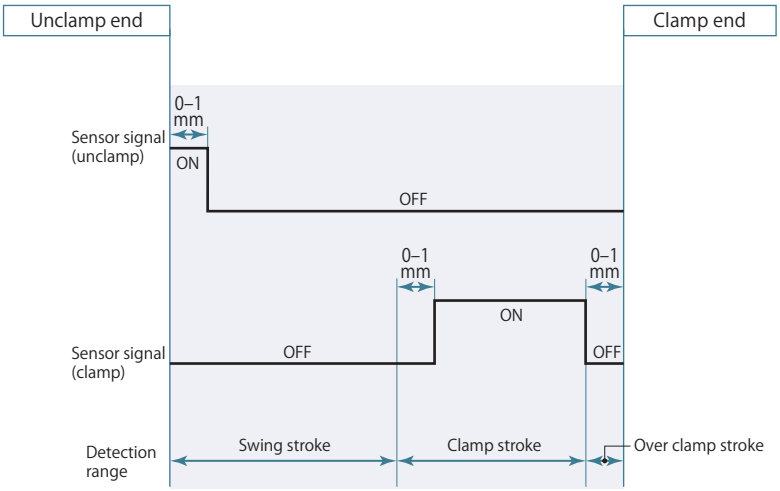
Sensor signal (unclamp)	OFF	Clamp
Sensor signal (clamp)	ON	

Over clamp stroke (Incomplete clamp) detection



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

Air sensor triggering point



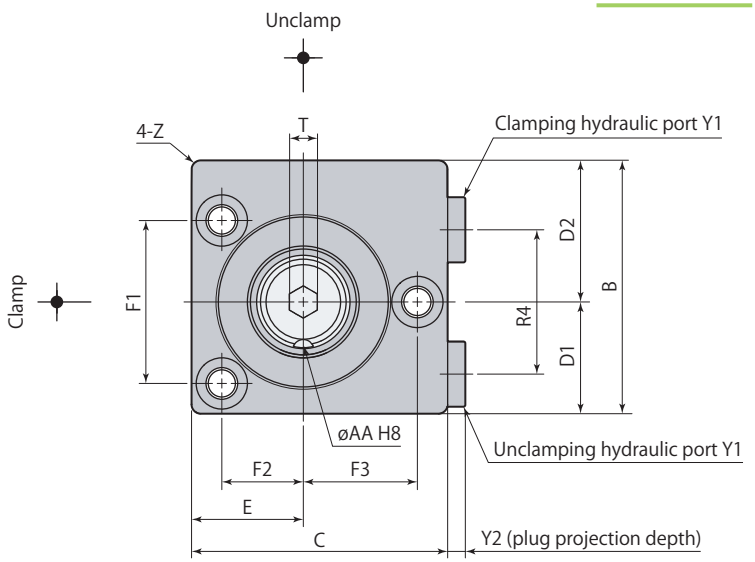
- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

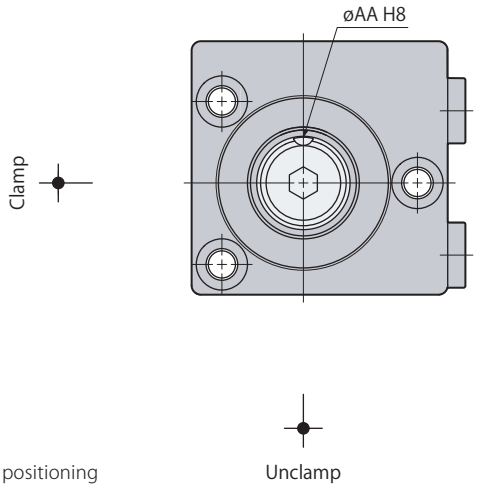
Air sensor unit recommended condition of use

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.

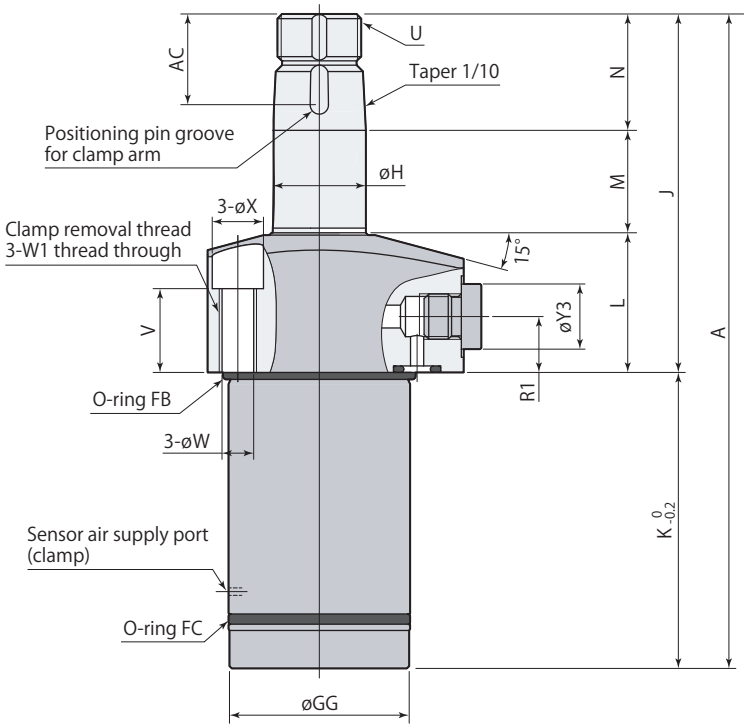
Dimensions



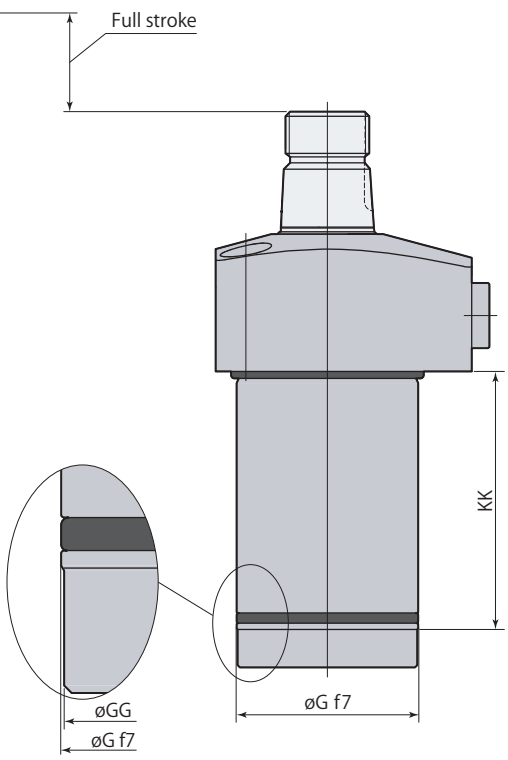


This diagram indicates the arm positioning pin groove at unclamped condition.

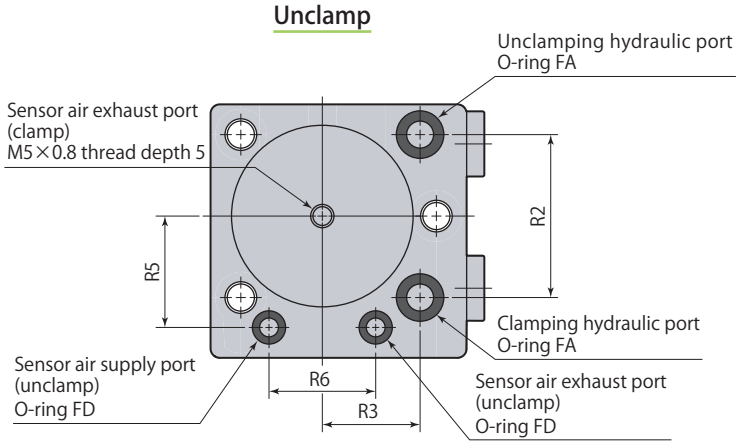
Swing direction L (counter-clockwise)



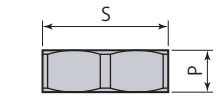
Swing direction R (clockwise)



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.
- Dimension D2 differs from that of CTK□U-□C or -□B.

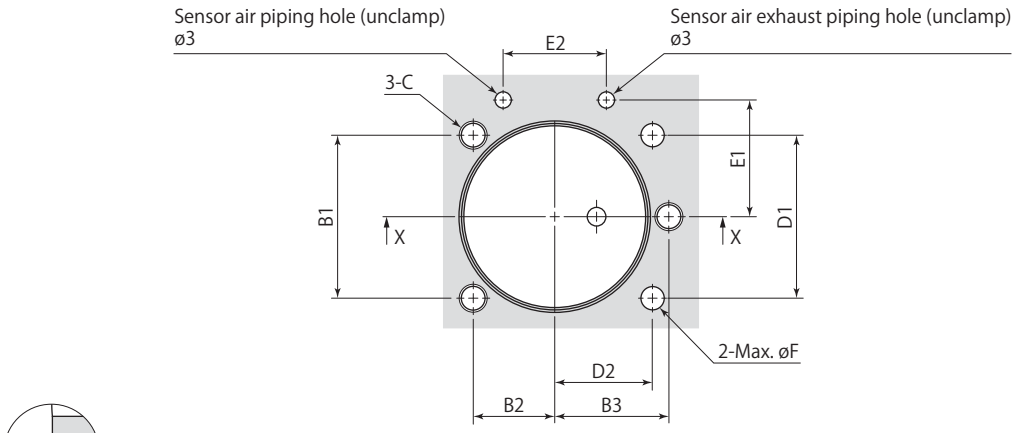
mm

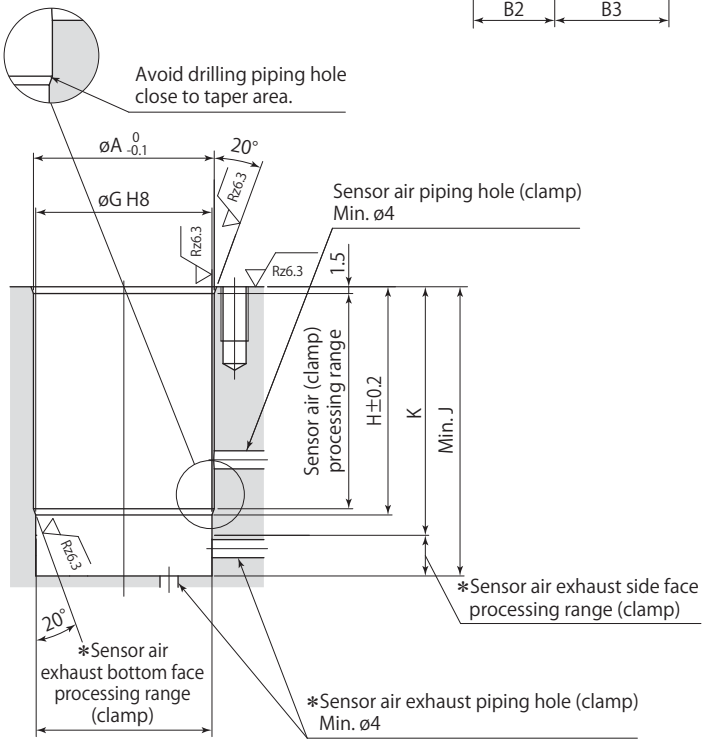
Model	CTK04U-□T	CTK06U-□T	CTK10U-□T	CTK16U-□T
A	121	140.5	168	194.5
B	49.5	54.5	63.5	74.5
C	50	55	70	85
D1	21.5	24	30	37
D2	28	30.5	33.5	37.5
E	21.5	24	30	37
F1	32	35	44	54
F2	16	17.5	22	27
F3	22.5	24.5	32	38
øG	$33^{-0.025}_{-0.050}$	$39^{-0.025}_{-0.050}$	$48^{-0.025}_{-0.050}$	$58^{-0.030}_{-0.060}$
øGG	32.6	38.6	47.6	57.6
øH	16	20	25	32
J	64	77	89.5	103
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
R5	22	24	27.5	32
R6	18	20	25	30
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 (FKM-90)	P7	P7	P7	P8
O-ring FB (FKM-70)	AS568-026	AS568-029	AS568-031	AS568-035
O-ring FC (FKM-70)	AS568-025	AS568-028	AS568-031	AS568-034
O-ring FD (FKM-90)	P5	P5	P5	P5
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

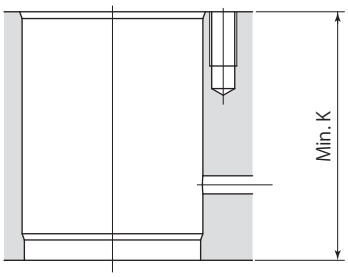
∗: Select the right model of VCH and VCE according to the size of the clamp.
Refer to each page for the details of options.

● Taper sleeve **page →29** ● Flow control valve **page →76** ● Air bleeding valve **page →78**

Mounting details







In through hole X-X

In blind hole X-X

Rz: ISO4287(1997)

*: 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

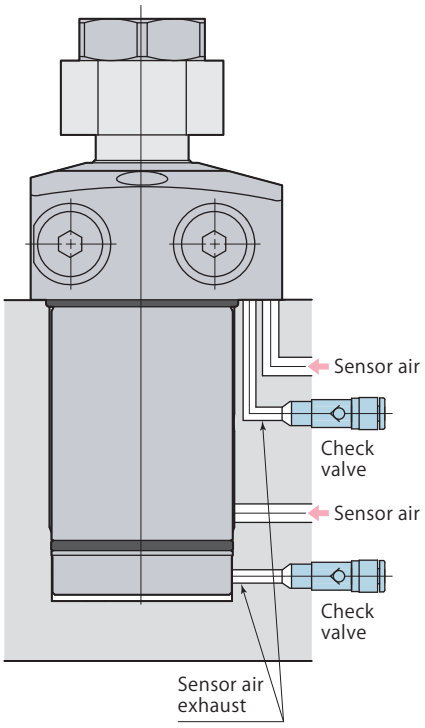
mm

Model	CTK04U-□T	CTK06U-□T	CTK10U-□T	CTK16U-□T
øA	34	40	49	59
B1	32	35	44	54
B2	16	17.5	22	27
B3	22.5	24.5	32	38
C	M5	M6	M8	M10
D1	30	35	44	56
D2	18.5	21	30	33
E1	22	24	27.5	32
E2	18	20	25	30
øF	5	5	5	6
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

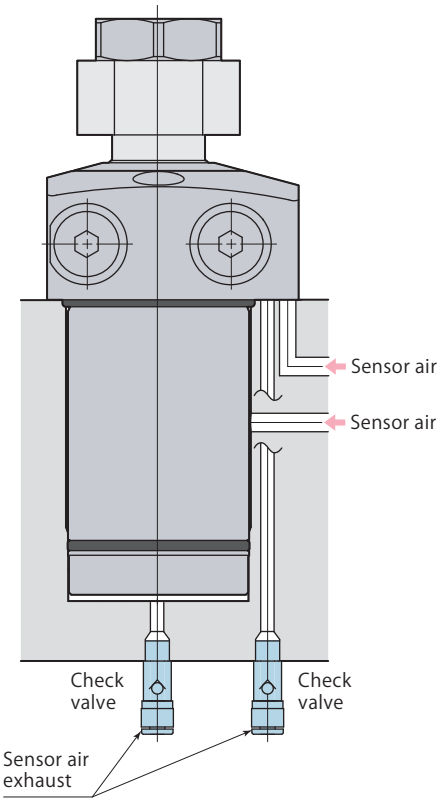
Caution for piping

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

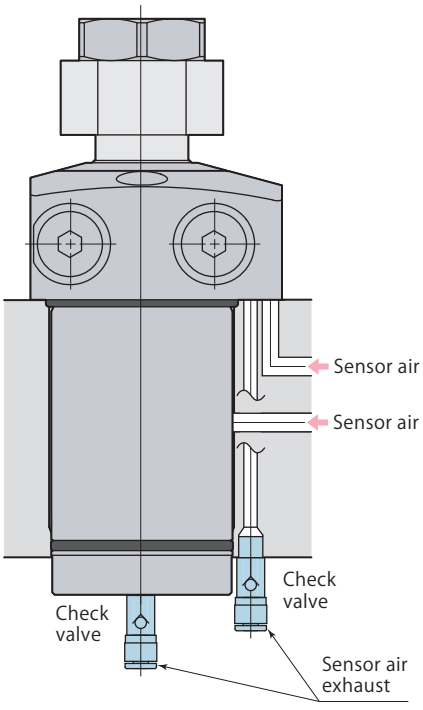
Mounting in blind hole
(Sensor air exhaust：side face)



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



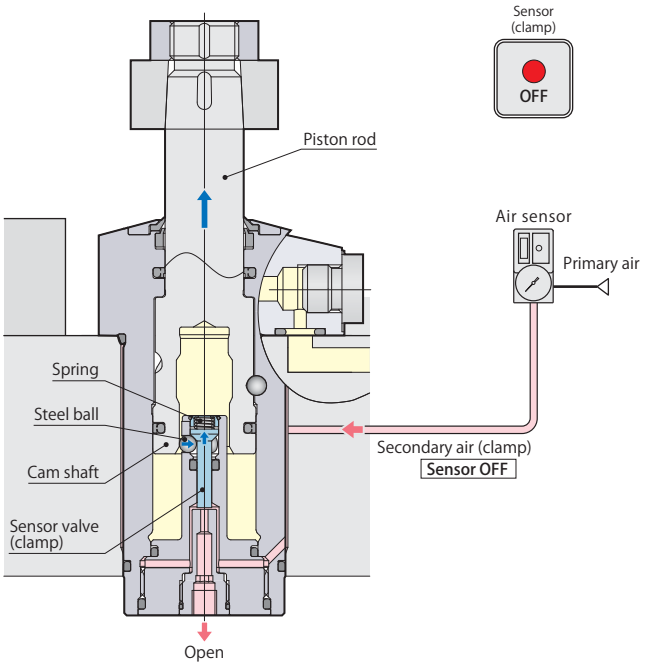
Mounting in through hole



● 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.

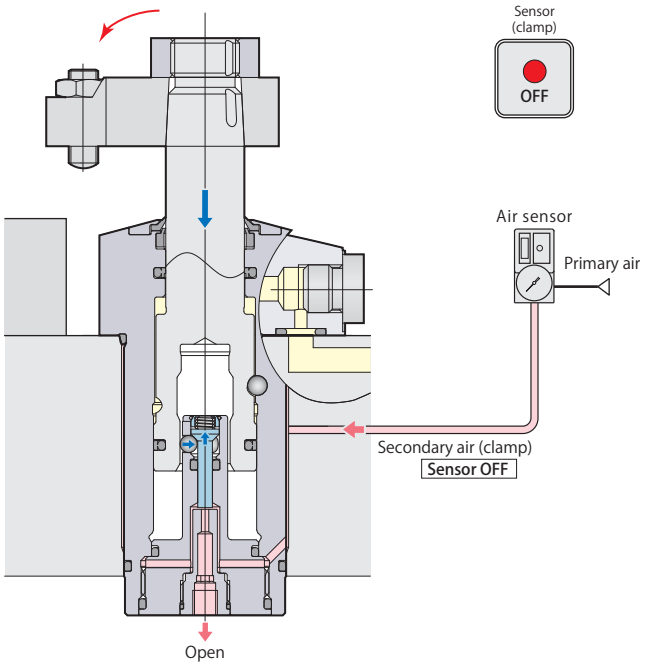
Clamp, Over clamp stroke detection signal

Unclamp



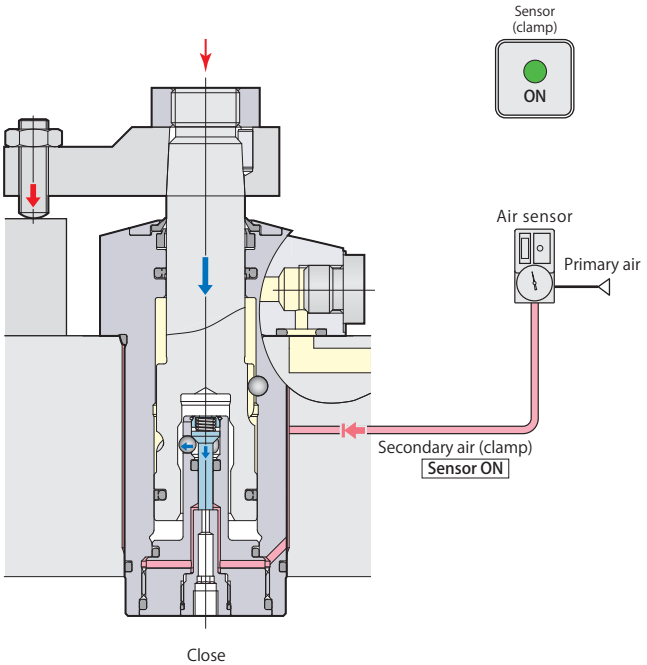
Sensor signal (clamp)	OFF	Unclamp

In the middle of swing stroke



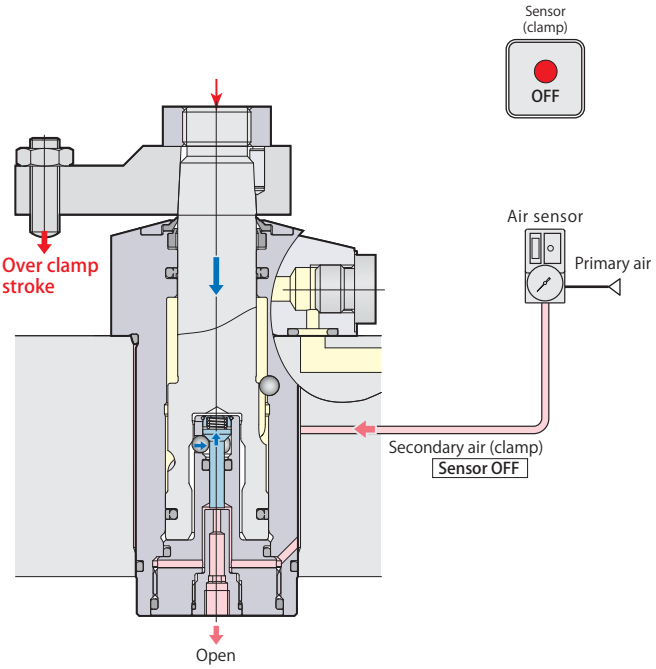
Sensor signal (clamp)	OFF	In the middle of swing stroke

Clamp detection



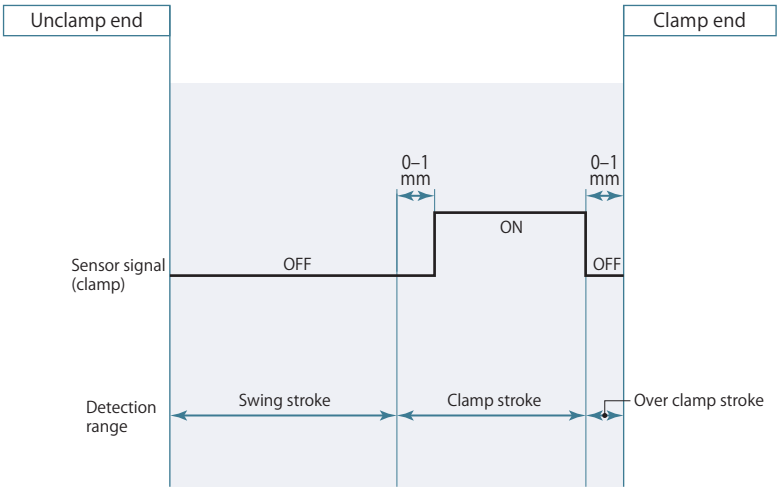
Sensor signal (clamp)	ON	Clamp

Over clamp stroke (Incomplete clamp) detection



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

Air sensor triggering point



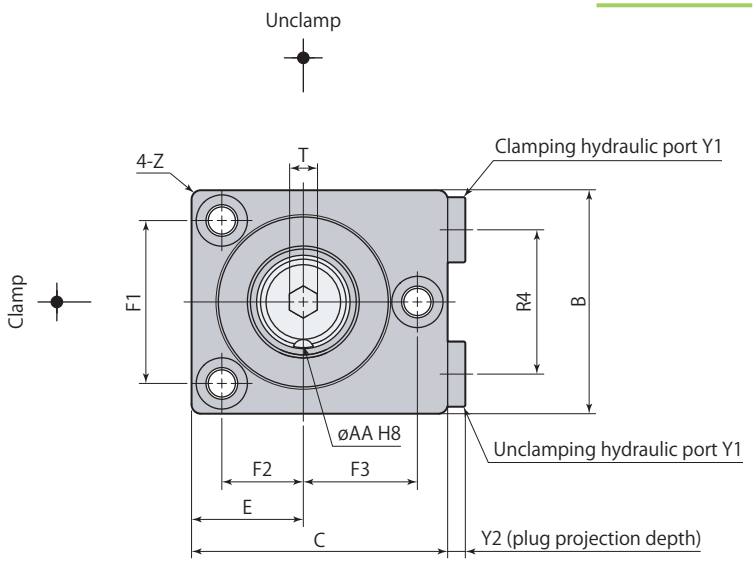
- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

Air sensor unit recommended condition of use

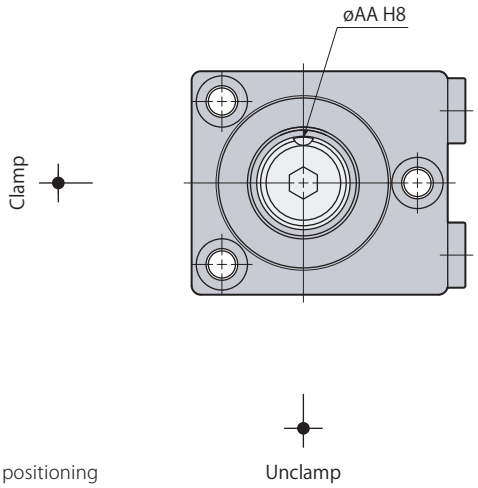
Supplier and model	ISA3-F/G series manufactured by SMC
	GPS2-05, GPS3-E series manufactured by CKD
Air supply pressure	0.1–0.2 MPa
Inner diameter of piping	ø4 mm (ISA3-F：ø2.5 mm)
Overall piping length	5 m or less

- 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.

Dimensions

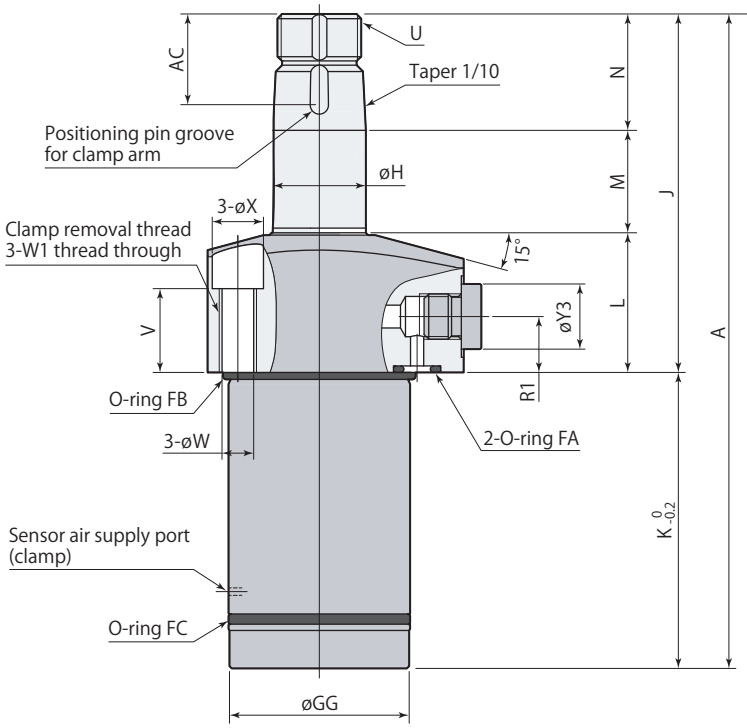


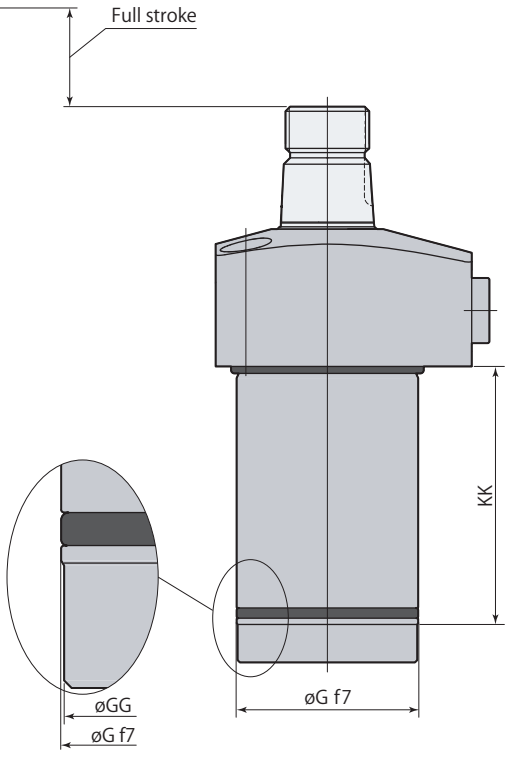
This diagram indicates the arm positioning pin groove at unclamped condition.



Swing direction L (counter-clockwise)

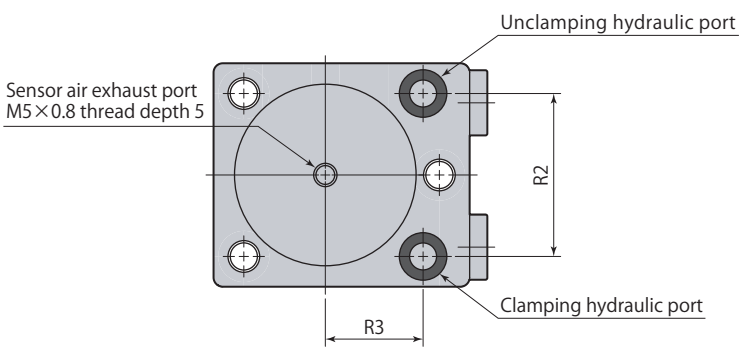
Swing direction R (clockwise)

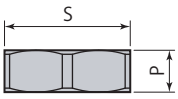




Unclamp

Stroke end





Hex nut for arm mount

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

CTK□U-□C	Swing clamp Clamp sensor model	35MPa Double acting

mm

Model	CTK04U-□C	CTK06U-□C	CTK10U-□C	CTK16U-□C
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	103
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 (FKM-90)	P7	P7	P7	P8
O-ring FB (FKM-70)	AS568-026	AS568-029	AS568-031	AS568-035
O-ring FC (FKM-70)	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

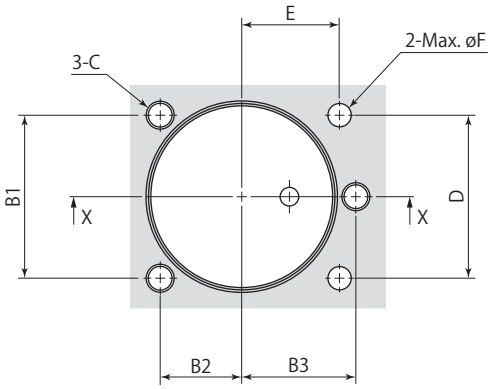
∗: Select the right model of VCH and VCE according to the size of the clamp.

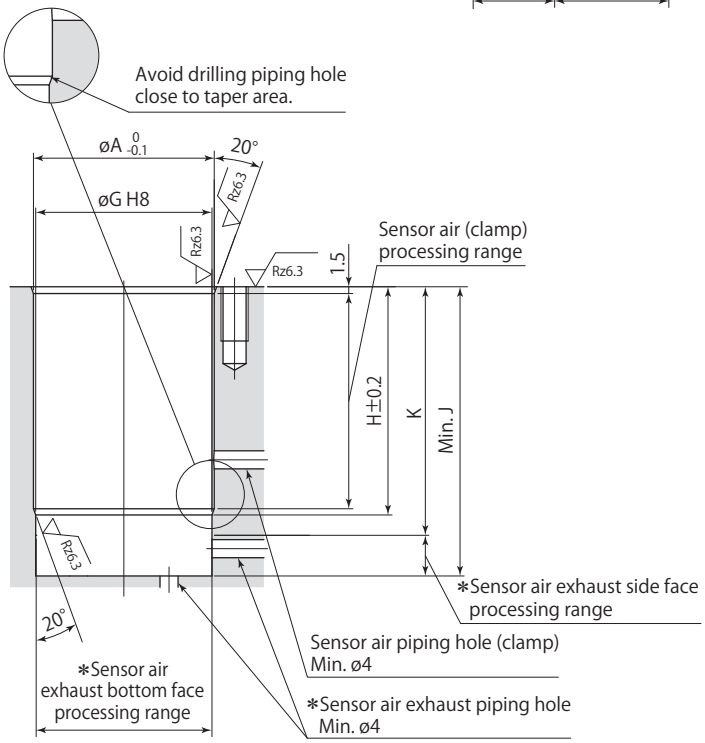
Refer to each page for the details of options.

● Taper sleeve **page →29** ● Flow control valve **page →76** ● Air bleeding valve **page →78**

● The outer shape is identical with CTK□U-□B (Unclamp sensor model).

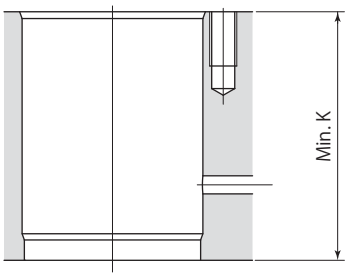
Mounting details





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.
- The mounting hole details are the same with that of CTK□U-□B (Unclamp sensor model).

Mounting details

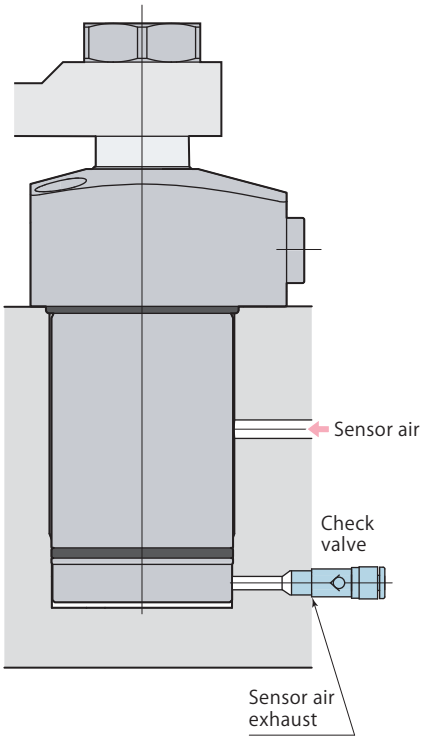
mm

Model	CTK04U-□C	CTK06U-□C	CTK10U-□C	CTK16U-□C
øA	34	40	49	59
B1	32	35	44	54
B2	16	17.5	22	27
B3	22.5	24.5	32	38
C	M5	M6	M8	M10
D	30	35	44	56
E	18.5	21	30	33
øF	5	5	5	6
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

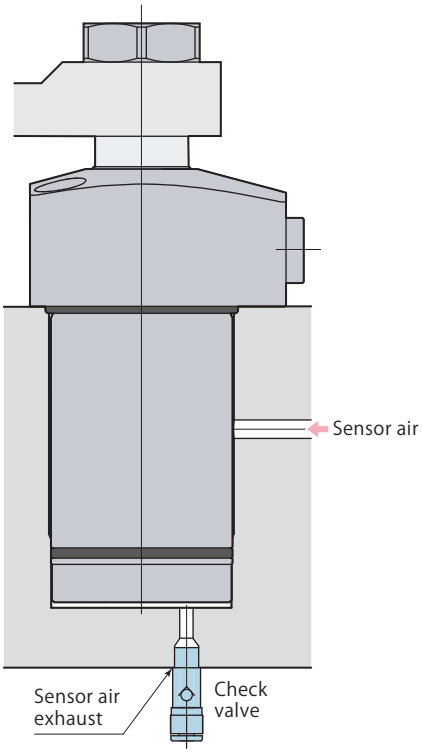
Caution for piping

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

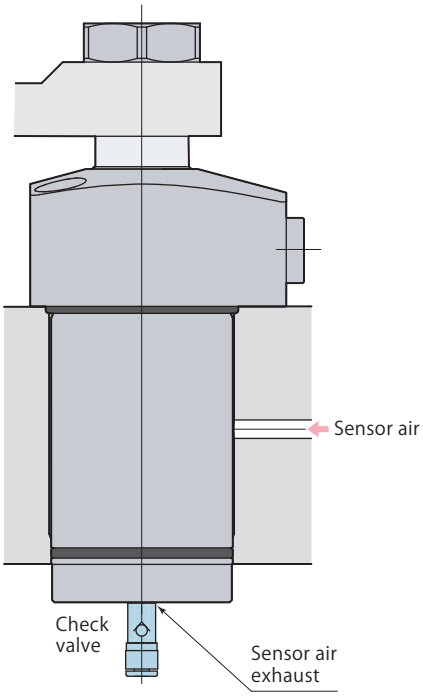
Mounting in blind hole
(Sensor air exhaust：side face)



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



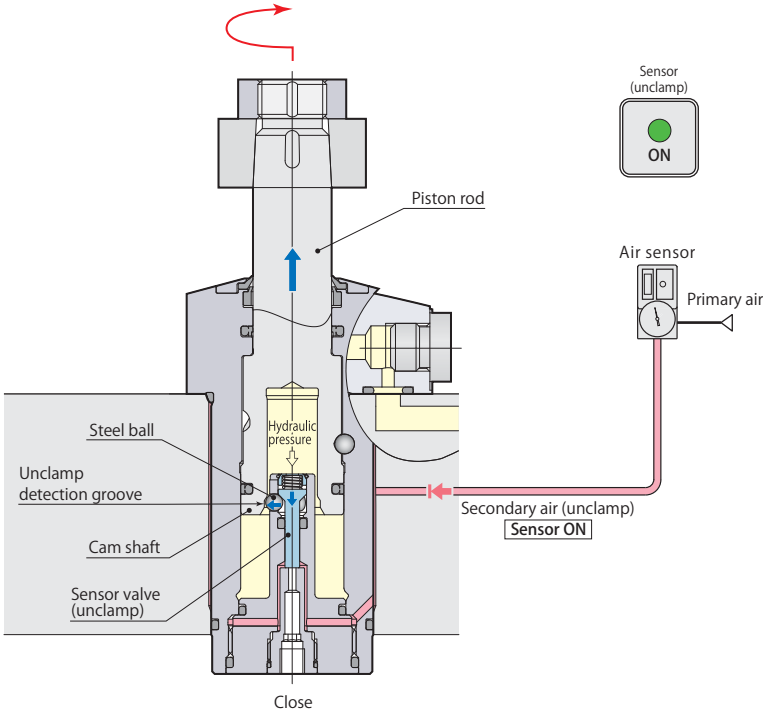
Mounting in through hole



● 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.

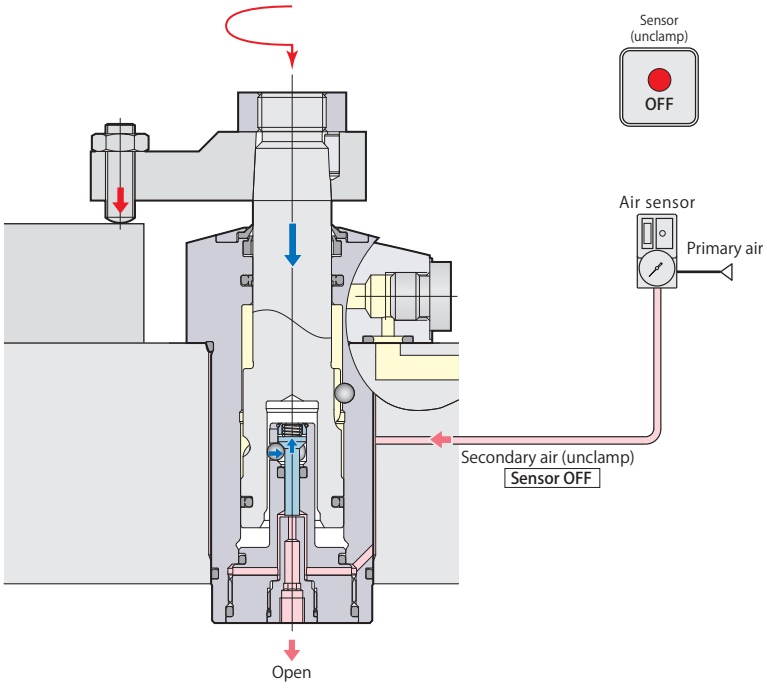
Unclamp detection signal

Unclamp detection



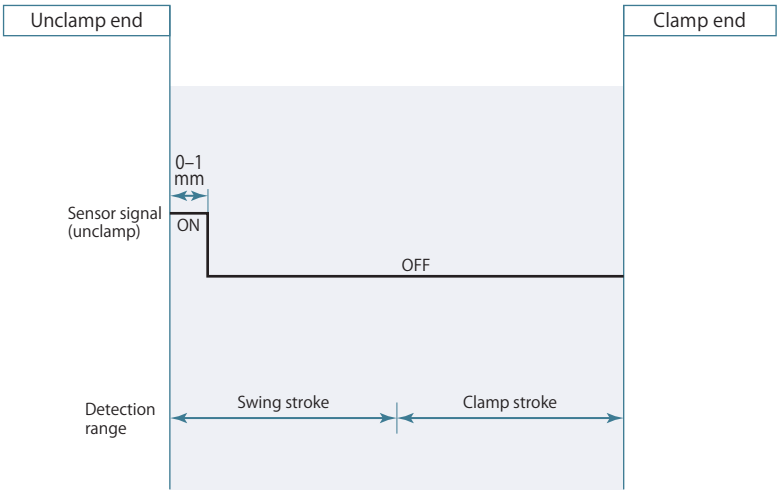
Sensor signal (unclamp)	ON	Unclamp

In the middle of stroke



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

Air sensor triggering point



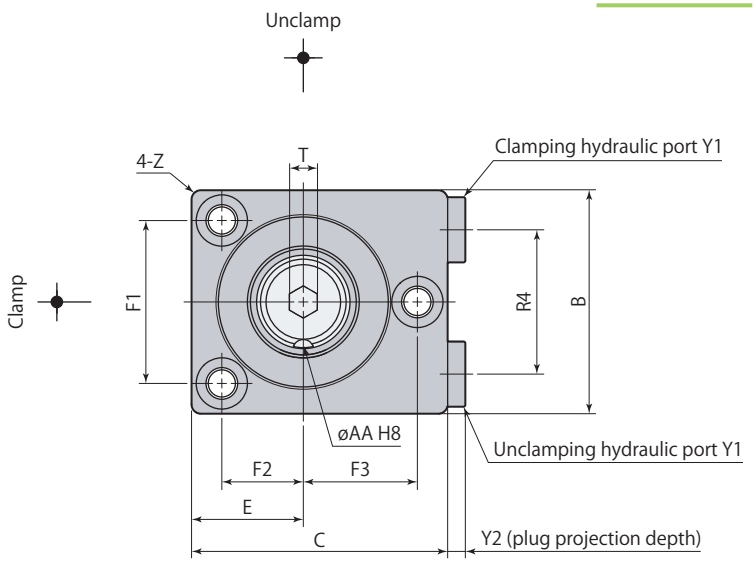
- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

Air sensor unit recommended condition of use

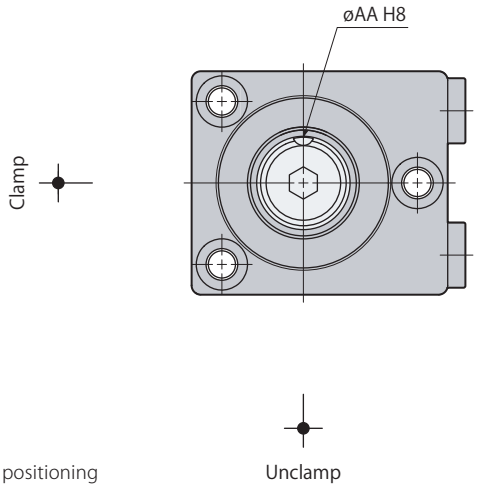
Supplier and model	ISA3-F/G series manufactured by SMC
	GPS2-05, GPS3-E series manufactured by CKD
Air supply pressure	0.1–0.2 MPa
Inner diameter of piping	ø4 mm (ISA3-F：ø2.5 mm)
Overall piping length	5 m or less

- 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.

Dimensions

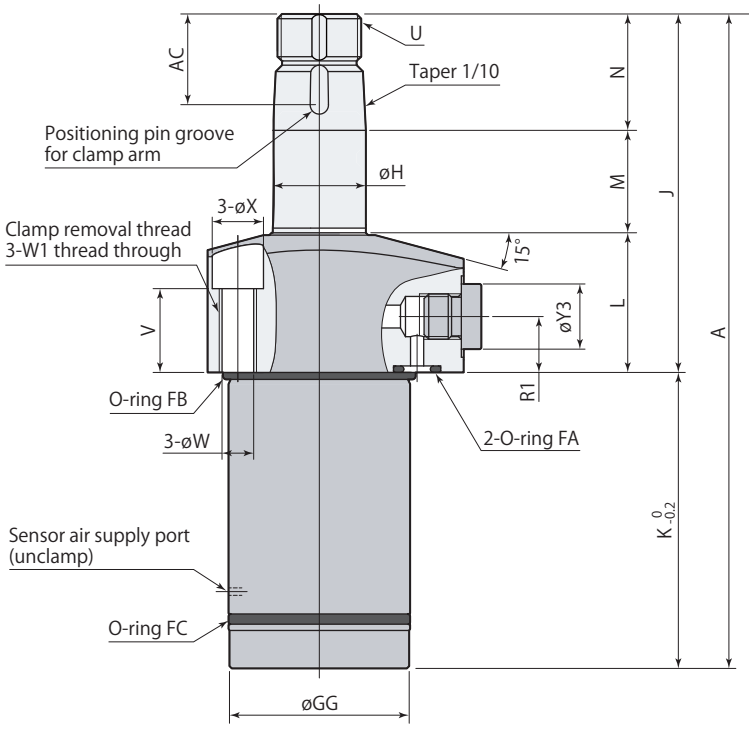


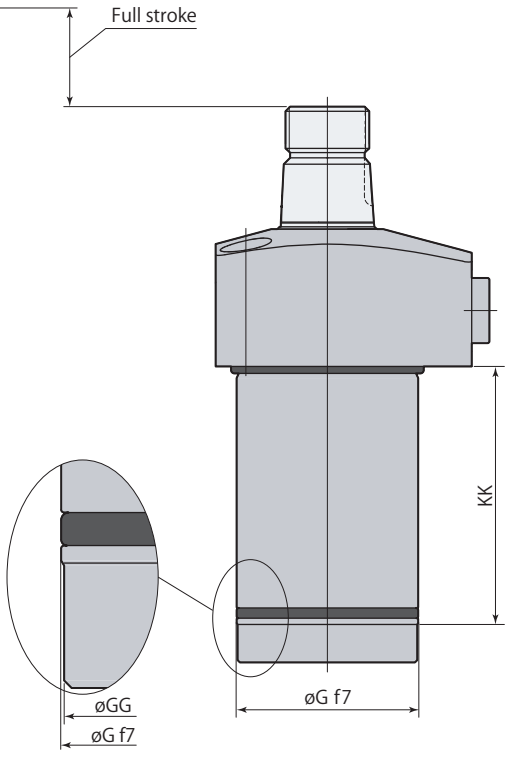
This diagram indicates the arm positioning pin groove at unclamped condition.



Swing direction L (counter-clockwise)

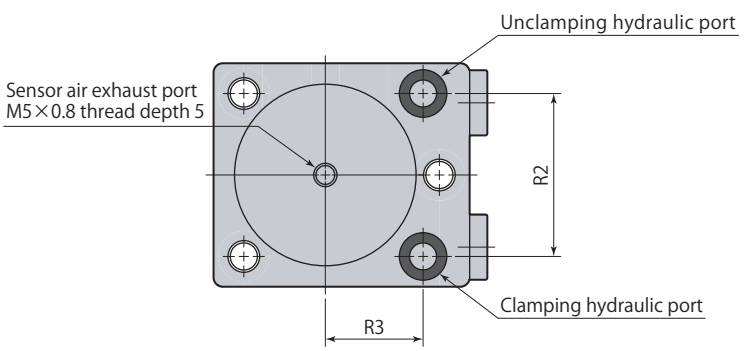
Swing direction R (clockwise)

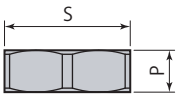




Unclamp

Stroke end





Hex nut for arm mount

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

CTK□U-□B	Swing clamp Unclamp sensor model	35MPa Double acting

mm

Model	CTK04U-□B	CTK06U-□B	CTK10U-□B	CTK16U-□B
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	103
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 (FKM-90)	P7	P7	P7	P8
O-ring FB (FKM-70)	AS568-026	AS568-029	AS568-031	AS568-035
O-ring FC (FKM-70)	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

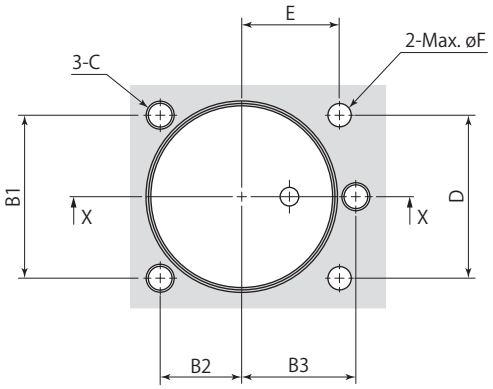
∗: Select the right model of VCH and VCE according to the size of the clamp.

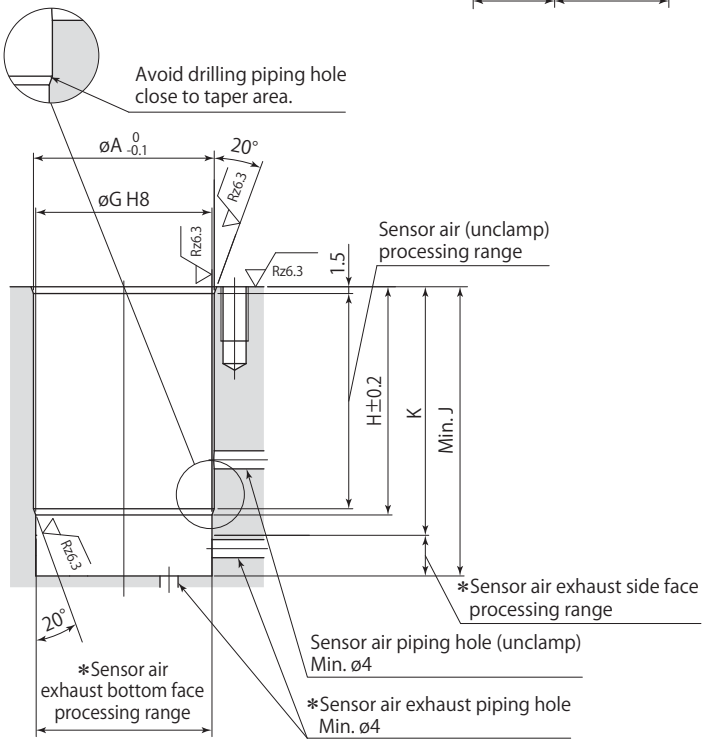
Refer to each page for the details of options.

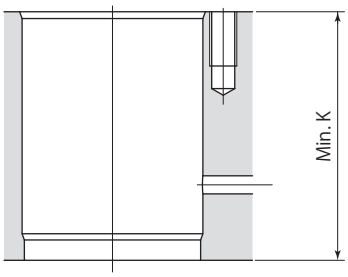
● Taper sleeve **page →29** ● Flow control valve **page →76** ● Air bleeding valve **page →78**

● The outer shape is identical with CTK□U-□C (Clamp sensor model).

Mounting details







In through hole X-X

In blind hole X-X

Rz: ISO4287(1997)

*: 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.
- The mounting hole details are the same with that of CTK□U-□C (Clamp sensor model).

Mounting details

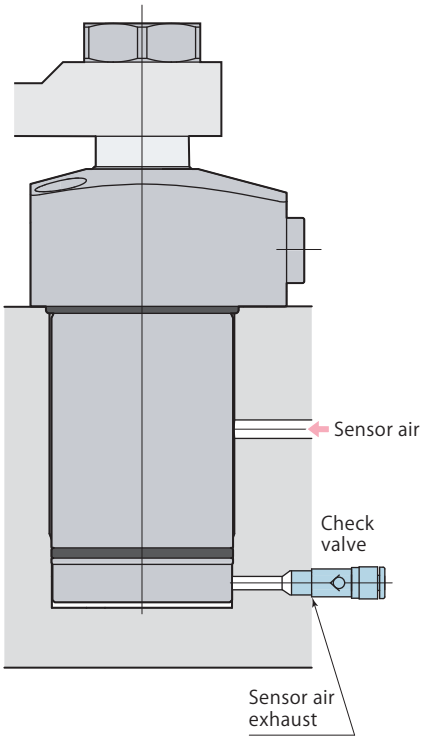
mm

Model	CTK04U-□B	CTK06U-□B	CTK10U-□B	CTK16U-□B
øA	34	40	49	59
B1	32	35	44	54
B2	16	17.5	22	27
B3	22.5	24.5	32	38
C	M5	M6	M8	M10
D	30	35	44	56
E	18.5	21	30	33
øF	5	5	5	6
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

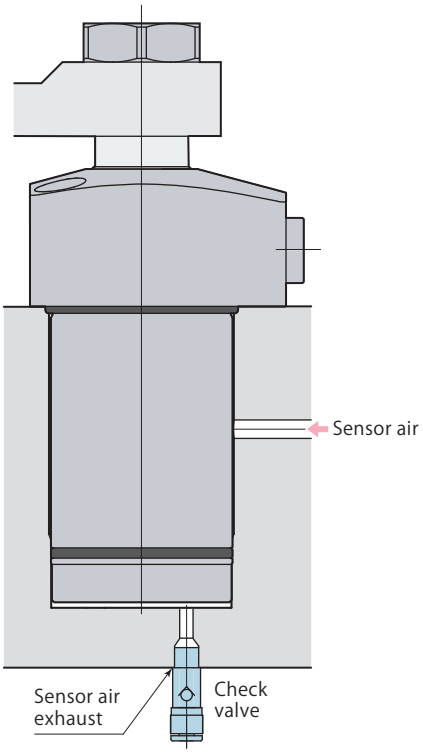
Caution for piping

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

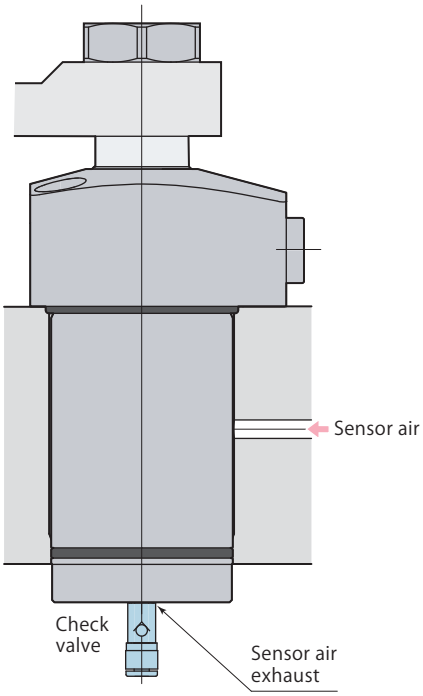
Mounting in blind hole
(Sensor air exhaust：side face)



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



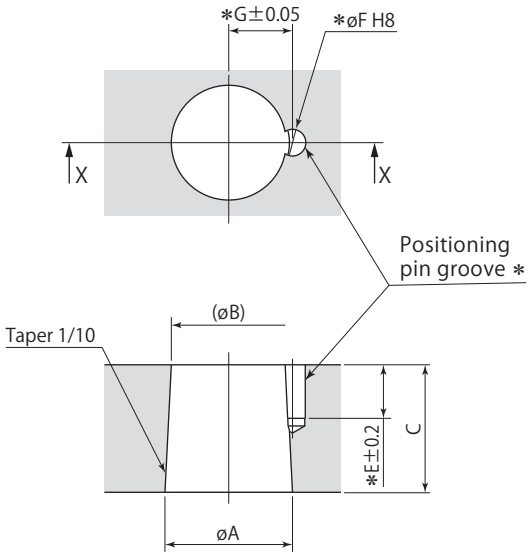
Mounting in through hole



● 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.

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.

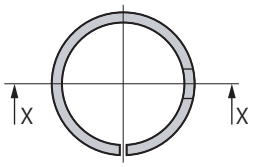
mm

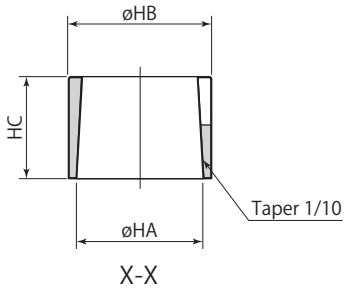
Model	CTK04	CTK06	CTK10	CTK16
øA	$16^{-0.016}_{-0.034}$	$20^{-0.020}_{-0.041}$	$25^{-0.020}_{-0.041}$	$32^{-0.025}_{-0.050}$
øB	14.6	18.4	23.1	29.5
C	14	16	19	25
E	8.5	10.5	12.5	12.5
øF (pin groove diameter)	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
G	8.1	10.1	12.6	16.1

Taper sleeve

Size

CTH [04 / 06 / 10 / 16] – [KS] : Taper sleeve





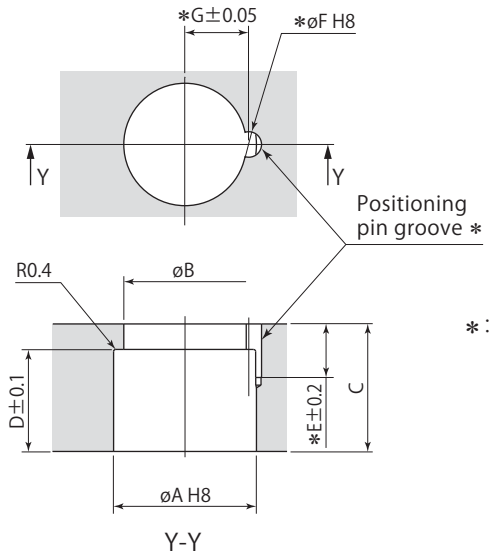
mm

Taper sleeve	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS
Applicable swing clamp	CTK04	CTK06	CTK10	CTK16
øHA	16	20	25	32
øHB	18	22	28	36
HC	11	13	16	22

Clamp arm mounting details

(**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 (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

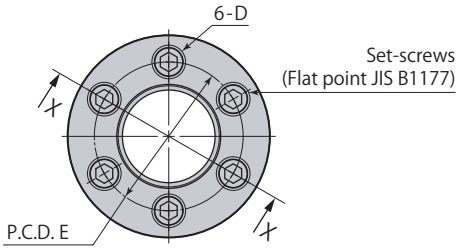
Taper sleeve	CTH04-KS	CTH06-KS	CTH10-KS	CTH16-KS
Applicable swing clamp	CTK04	CTK06	CTK10	CTK16
øA	$18^{+0.027}_{0}$	$22^{+0.033}_{0}$	$28^{+0.033}_{0}$	$36^{+0.039}_{0}$
øB	15	19	23.5	30
C	14	16	19	25
D	11	13	16	22
E	8.5	10.5	12.5	12.5
øF (pin groove diameter)	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
G	8.1	10.1	12.6	16.1

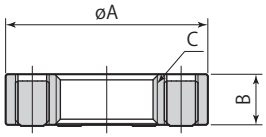
Perfect nut

Size

CTH **04** **06** **10** **16** – **KN** : Perfect nut

indicates made to order.





X-X

mm

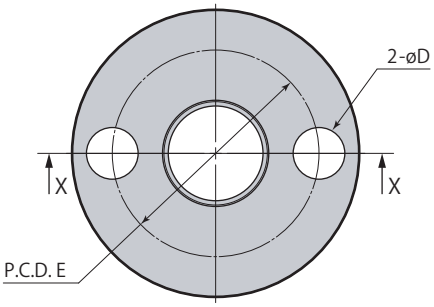
Perfect nut		CTH04-KN	CTH06-KN	CTH10-KN	CTH16-KN
Applicable swing clamp		CTK04	CTK06	CTK10	CTK16
Set-screws	Size	M5×0.8 length 8	M6×1 length 8	M8×1.25 length 8	M8×1.25 length 8
	Recommended tightening torque	2 N·m	3 N·m	6 N·m	7 N·m
øA		30	36	48	55
B		8	9	10	11
C		M14×1.5	M18×1.5	M22×1.5	M28×1.5
D		M5×0.8	M6×1	M8×1.25	M8×1.25
E		22	26.5	35	42
Mass		0.04 kg	0.06 kg	0.12 kg	0.16 kg

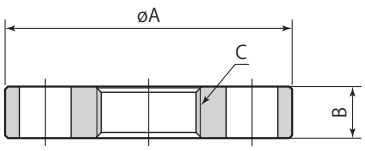
Perfect release nut

Size

CTH — 04 / 06 / 10 / 16 — KNR : Perfect release nut

indicates made to order.



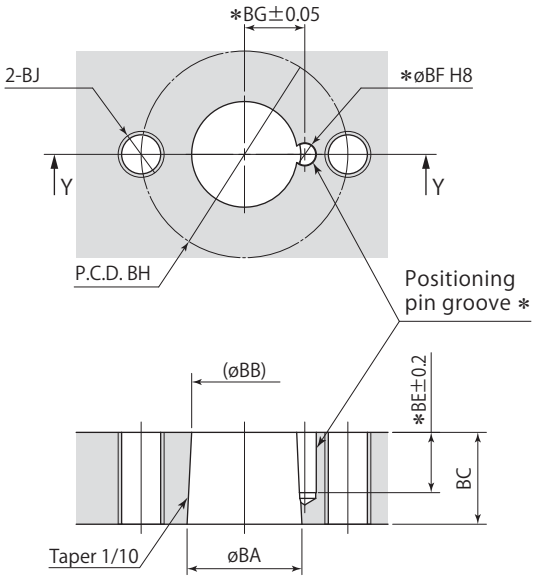


X-X

Clamp arm mounting details

(Using perfect release nut)

Drill a 1/10 taper hole into the clamp arm, and provide the tap holes for draw screws to remove the clamp arm.



Y-Y

∗: No need to machine the pin groove (BE, øBF, BG) unless positioning pin is used for the arm.

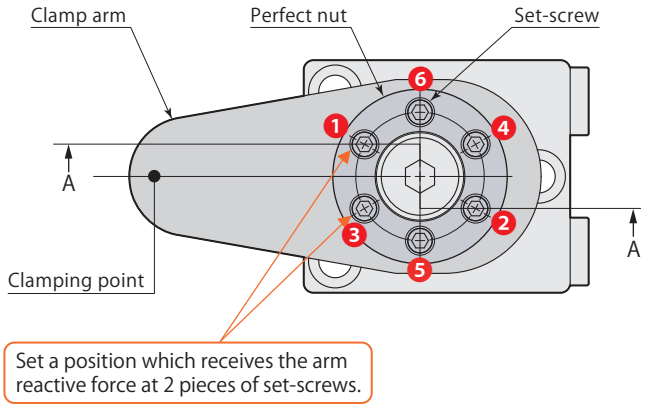
mm

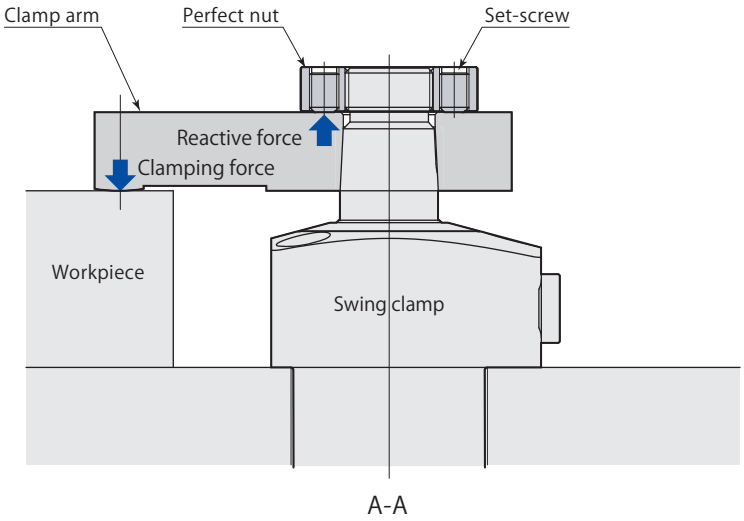
Perfect release nut	CTH04-KNR	CTH06-KNR	CTH10-KNR	CTH16-KNR
Applicable swing clamp	CTK04	CTK06	CTK10	CTK16
Recommended draw screw	M6×1	M8×1.25	M10×1.5	M10×1.5
øA	40	50	62	70
B	8	9	10	11
C	M14×1.5	M18×1.5	M22×1.5	M28×1.5
øD	6.8	9	11	11
E	29	36	45	52
Mass	0.07 kg	0.12 kg	0.21 kg	0.28 kg
øBA	$16^{-0.016}_{-0.034}$	$20^{-0.020}_{-0.041}$	$25^{-0.020}_{-0.041}$	$32^{-0.025}_{-0.050}$
øBB	14.6	18.4	23.1	29.5
BC	14	16	19	25
BE	8.5	10.5	12.5	12.5
øBF (pin groove diameter)	$3^{+0.014}_{0}$	$4^{+0.018}_{0}$	$5^{+0.018}_{0}$	$6^{+0.018}_{0}$
BG	8.1	10.1	12.6	16.1
BH	29	36	45	52
BJ	M6	M8	M10	M10

● Draw screws are not included with perfect release nut.

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.

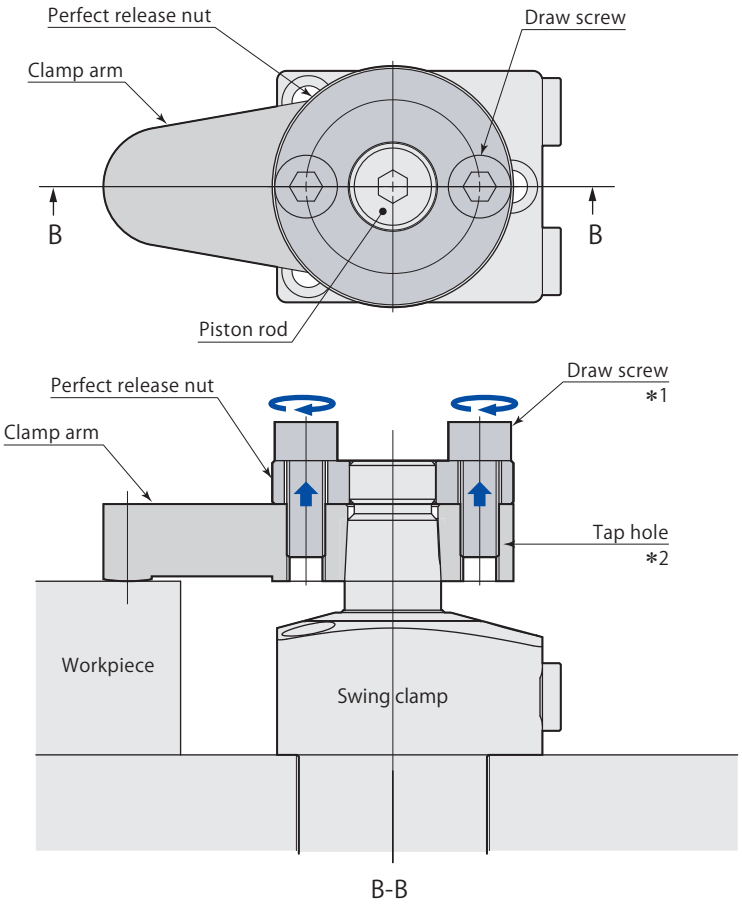




- The clamp arm may bite at the taper of the clamp rod and it will cause the demount failure if the set screw is tightened with excessive force. Be sure to use recommended torque when tightening.
- More secure tightening can be accomplished by applying some thread adhesive on set-screws.
  Recommended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

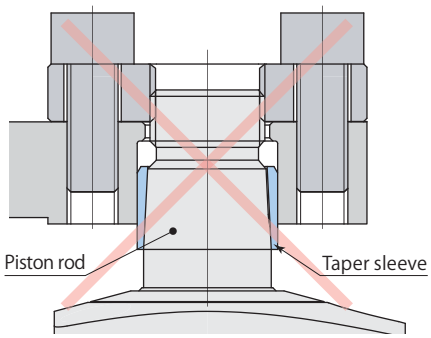


*1 : Turn draw screws as a pair, alternately turning 45° to 90° at a time to tighten them evenly. Some movement is felt in hand as clamp arm comes off, but there is no danger involved in this procedure.

*2 : Tap holes for draw screws are needed on clamp arm in order to use perfect release nut. Refer to clamp arm mounting details on **page →31** 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 →31**)



Mounting & dismounting of clamp arm

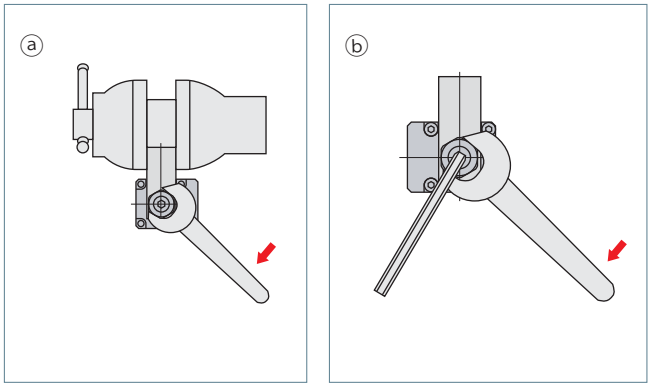
- Swing clamp may be damaged if excessive torque is applied to piston rod, since structure is intended for swinging using cam mechanism with lead grooves. Follow instructions shown below to prevent excessive torque from being applied on piston rod when mounting or dismounting clamp arm.
- Be sure to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

Model		CTK04	CTK06	CTK10	CTK16
Recommended tightening torque of locknut	N·m	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.