Pascal

# Sensing Link clamp

## Double acting 7 MPa

## 1 port 3 point sensor model model CLM-W

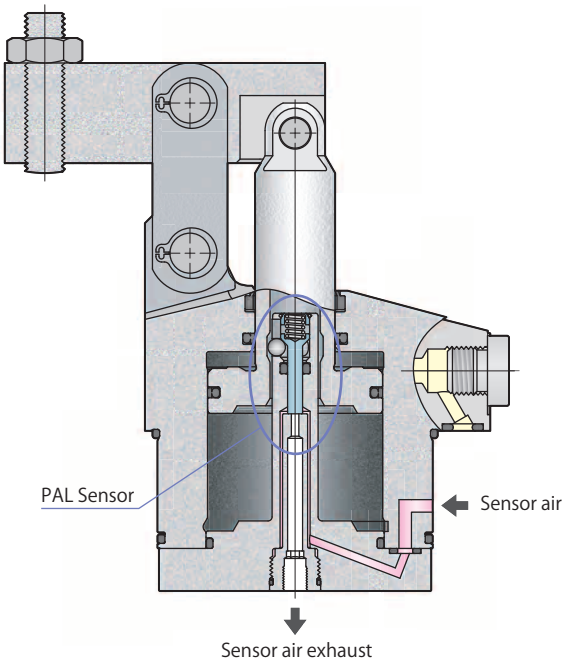
1 port 3 point sensor model
model CLM06-FW

## 1 port 3 point sensor model W

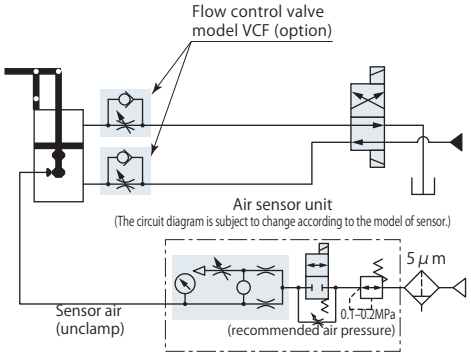
Clamp, Unclamp, Over clamp stroke (Incomplete clamp) detection

model **CLM□-□W** PAT.

## 3-point (clamp, unclamp, over clamp stroke) detection in a pneumatic circuit!




### Hydraulic and pneumatic circuit diagram



## Specifications

Size clampClamp arm mounting direction

CLM 04 05 06 10 16 — L : Left side  F : Front side  R : Right side 

W : 1 port 3 point sensor model
Clamp, Unclamp, Over clamp stroke (Incomplete clamp) detection

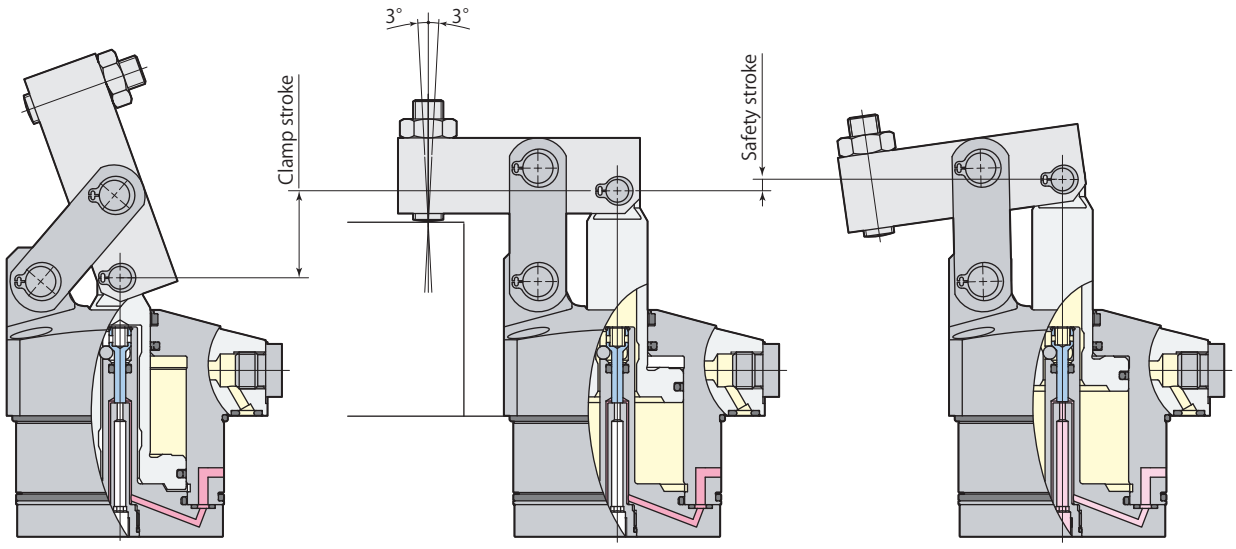
indicates made to order.

| Model | | | CLM04-W | CLM05-W | CLM06-W | CLM10-W | CLM16-W |
|---|---|---|---|---|---|---|---|
| Cylinder force (hydraulic pressure 7 MPa) | | kN | 3.7 | 5.0 | 6.7 | 11.1 | 16.6 |
| Cylinder inner diameter | | mm | 26 | 30 | 35 | 45 | 55 |
| Rod diameter | | mm | 14 | 14 | 16 | 20 | 22 |
| Effective area (clamp) | | $cm^2$ | 5.3 | 7.1 | 9.6 | 15.9 | 23.8 |
| Full stroke | | mm | 20.5 | 23.5 | 26 | 29.5 | 35 |
| Clamp stroke*1 | | mm | 17.5 | 20.5 | 23 | 26.5 | 32 |
| Stroke margin | | mm | 3 | 3 | 3 | 3 | 3 |
| Max. oil flow rate | | L/min | 1.1 | 1.7 | 2.6 | 5.1 | 9.1 |
| Cylinder capacity | Clamp | $cm^3$ | 10.9 | 16.6 | 25.0 | 46.9 | 83.2 |
| | Unclamp | $cm^3$ | 7.7 | 13.0 | 19.8 | 37.7 | 69.9 |
| Mass | | kg | 0.6 | 0.9 | 1.2 | 2.0 | 3.0 |
| Recommended tightening torque of mounting screws*2 | | N・m | 7 | 7 | 12 | 12 | 29 |

- 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.

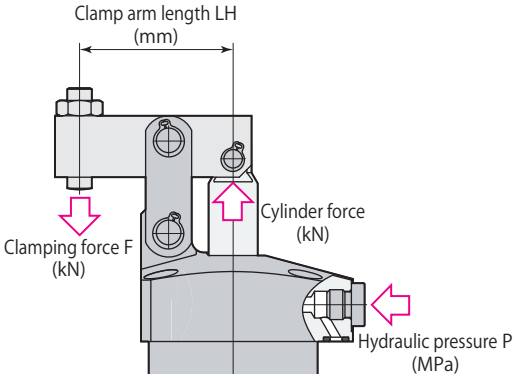
*1：Indicates a distance from unclamping position to clamping point .　*2：ISO R898 class 12.9

When clamping the workpiece, the clamp arm should be situated l ike the sketch as shown below. (Clamping point)
Please avoid any non-axial force such as the bending moment tow ard the piston rod. (Allowable angle ±3 °




Unclamp　Clamping point　Over clamp stroke (Full stroke)

## Performance diagram



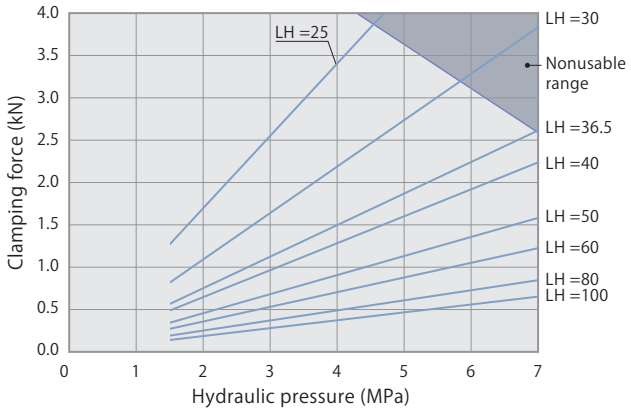

Clamping force varies depending on the clamp arm length (LH) and hydraulic pressure (P).

Clamping force calculation formula
F = Coefficient 1 × P/(LH - Coefficient 2)
F:Clamping force P:Hydraulic pressure LH:Clamp arm length

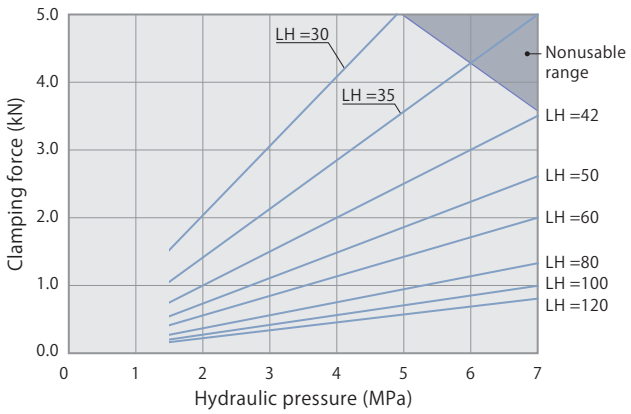
CLM06 with clamp arm length (LH) = 50 mm at hydraulic pressure of 7 MPa, Clamping force F is calculated by
18.18×7/(50-21.0)=4.4 kN

Do not use the clamp in the nonusable range. It may cause damage of link mechanism.

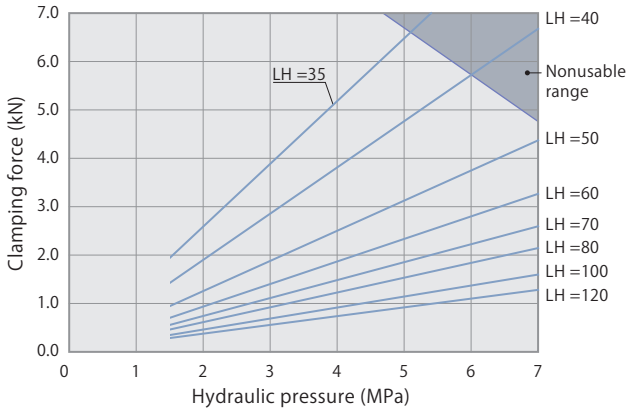
### model CLM04



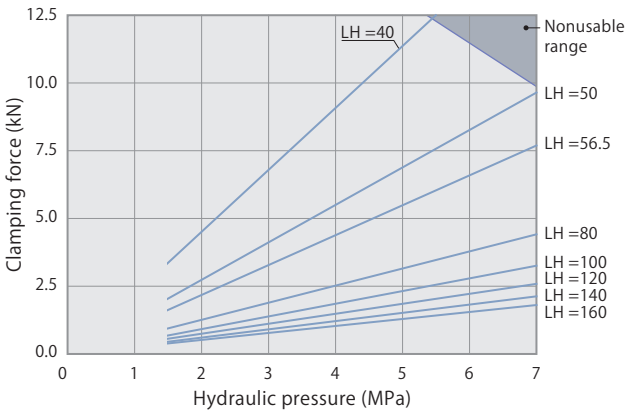

### model CLM05



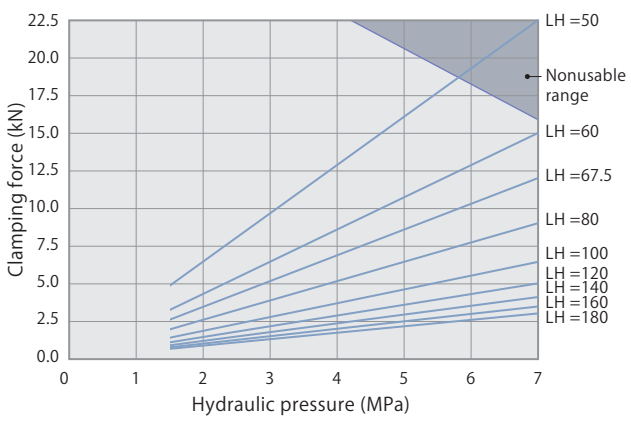

### model CLM06




### model CLM10




### model CLM16



## Performance table

### model CLM04

Clamping force F=7.65×P/(LH-16.0)

| Hydraulic pressure MPa | Cylinder force kN | Clamping force kN — Clamp arm length LH mm | | | | | | | | Min. arm length Min. LH mm |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 25 | 30 | 36.5 | 40 | 50 | 60 | 80 | 100 | |
| 7 | 3.7 | | | 2.6 | 2.2 | 1.6 | 1.2 | 0.8 | 0.6 | 36.5 |
| 6.5 | 3.5 | | | 2.4 | 2.1 | 1.5 | 1.1 | 0.8 | 0.6 | 34 |
| 6 | 3.2 | | | 2.2 | 1.9 | 1.3 | 1.0 | 0.7 | 0.5 | 31 |
| 5.5 | 2.9 | | 3.0 | 2.1 | 1.8 | 1.2 | 1.0 | 0.7 | 0.5 | 29 |
| 5 | 2.7 | | 2.7 | 1.9 | 1.6 | 1.1 | 0.9 | 0.6 | 0.5 | 27 |
| 4.5 | 2.4 | 3.8 | 2.5 | 1.7 | 1.4 | 1.0 | 0.8 | 0.5 | 0.4 | 25 |
| 4 | 2.1 | 3.4 | 2.2 | 1.5 | 1.3 | 0.9 | 0.7 | 0.5 | 0.4 | 24 |
| 3.5 | 1.9 | 3.0 | 1.9 | 1.3 | 1.1 | 0.8 | 0.6 | 0.4 | 0.3 | ↑ |
| 3 | 1.6 | 2.5 | 1.6 | 1.1 | 1.0 | 0.7 | 0.5 | 0.4 | 0.3 | ↑ |
| 2.5 | 1.3 | 2.1 | 1.4 | 0.9 | 0.8 | 0.6 | 0.4 | 0.3 | 0.2 | ↑ |
| 2 | 1.1 | 1.7 | 1.1 | 0.7 | 0.6 | 0.4 | 0.3 | 0.2 | 0.2 | ↑ |
| 1.5 | 0.8 | 1.3 | 0.8 | 0.6 | 0.5 | 0.3 | 0.3 | 0.2 | 0.1 | 24 |
| Max. pressure MPa | | 4.5 | 5.8 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | |

indicates nonusable range

### model CLM05

Clamping force F=11.77×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 | |
| 7 | 5.0 | | | 3.5 | 2.6 | 2.0 | 1.3 | 1.0 | 0.8 | 42 |
| 6.5 | 4.6 | | | 3.3 | 2.4 | 1.8 | 1.2 | 0.9 | 0.8 | 39 |
| 6 | 4.2 | | | 3.0 | 2.2 | 1.7 | 1.1 | 0.9 | 0.7 | 36 |
| 5.5 | 3.9 | | 3.9 | 2.8 | 2.1 | 1.6 | 1.1 | 0.8 | 0.6 | 33 |
| 5 | 3.5 | | 3.6 | 2.5 | 1.9 | 1.4 | 1.0 | 0.7 | 0.6 | 31 |
| 4.5 | 3.2 | 4.6 | 3.2 | 2.3 | 1.7 | 1.3 | 0.9 | 0.6 | 0.5 | 29 |
| 4 | 2.8 | 4.1 | 2.9 | 2.0 | 1.5 | 1.1 | 0.8 | 0.6 | 0.5 | 27 |
| 3.5 | 2.5 | 3.6 | 2.5 | 1.8 | 1.3 | 1.0 | 0.7 | 0.5 | 0.4 | ↑ |
| 3 | 2.1 | 3.1 | 2.1 | 1.5 | 1.1 | 0.9 | 0.6 | 0.4 | 0.3 | ↑ |
| 2.5 | 1.8 | 2.6 | 1.8 | 1.3 | 0.9 | 0.7 | 0.5 | 0.4 | 0.3 | ↑ |
| 2 | 1.4 | 2.0 | 1.4 | 1.0 | 0.7 | 0.6 | 0.4 | 0.3 | 0.2 | ↑ |
| 1.5 | 1.1 | 1.5 | 1.1 | 0.8 | 0.6 | 0.4 | 0.3 | 0.2 | 0.2 | 27 |
| Max. pressure MPa | | 4.9 | 5.9 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | |

indicates nonusable range

### model CLM06

Clamping force F=18.18×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 | 40 | 50 | 60 | 70 | 80 | 100 | 120 | |
| 7 | 6.7 | | | 4.4 | 3.3 | 2.6 | 2.2 | 1.6 | 1.3 | 48 |
| 6.5 | 6.3 | | | 4.1 | 3.0 | 2.4 | 2.0 | 1.5 | 1.2 | 44 |
| 6 | 5.8 | | | 3.8 | 2.8 | 2.2 | 1.8 | 1.4 | 1.1 | 41 |
| 5.5 | 5.3 | | 5.3 | 3.4 | 2.6 | 2.0 | 1.7 | 1.3 | 1.0 | 38 |
| 5 | 4.8 | 6.5 | 4.8 | 3.1 | 2.3 | 1.9 | 1.5 | 1.2 | 0.9 | 35 |
| 4.5 | 4.3 | 5.8 | 4.3 | 2.8 | 2.1 | 1.7 | 1.4 | 1.0 | 0.8 | 33 |
| 4 | 3.8 | 5.2 | 3.8 | 2.5 | 1.9 | 1.5 | 1.2 | 0.9 | 0.7 | 31 |
| 3.5 | 3.4 | 4.5 | 3.3 | 2.2 | 1.6 | 1.3 | 1.1 | 0.8 | 0.6 | ↑ |
| 3 | 2.9 | 3.9 | 2.9 | 1.9 | 1.4 | 1.1 | 0.9 | 0.7 | 0.6 | ↑ |
| 2.5 | 2.4 | 3.2 | 2.4 | 1.6 | 1.2 | 0.9 | 0.8 | 0.6 | 0.5 | ↑ |
| 2 | 1.9 | 2.6 | 1.9 | 1.3 | 0.9 | 0.7 | 0.6 | 0.5 | 0.4 | ↑ |
| 1.5 | 1.4 | 1.9 | 1.4 | 0.9 | 0.7 | 0.6 | 0.5 | 0.3 | 0.3 | 31 |
| Max. pressure MPa | | 5.0 | 5.9 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | |

indicates nonusable range

### model CLM10

Clamping force F=35.07×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 | 80 | 100 | 120 | 140 | 160 | |
| 7 | 11.1 | | 9.6 | 7.7 | 4.4 | 3.3 | 2.6 | 2.1 | 1.8 | 50 |
| 6.5 | 10.3 | | 8.9 | 7.1 | 4.1 | 3.0 | 2.4 | 2.0 | 1.7 | 46 |
| 6 | 9.5 | | 8.3 | 6.6 | 3.8 | 2.8 | 2.2 | 1.8 | 1.6 | 43 |
| 5.5 | 8.7 | | 7.6 | 6.0 | 3.5 | 2.6 | 2.0 | 1.7 | 1.4 | 41 |
| 5 | 8.0 | 11.3 | 6.9 | 5.5 | 3.2 | 2.3 | 1.8 | 1.5 | 1.3 | 38 |
| 4.5 | 7.2 | 10.2 | 6.2 | 4.9 | 2.8 | 2.1 | 1.7 | 1.4 | 1.2 | 36 |
| 4 | 6.4 | 9.1 | 5.5 | 4.4 | 2.5 | 1.9 | 1.5 | 1.2 | 1.0 | ↑ |
| 3.5 | 5.6 | 7.9 | 4.8 | 3.8 | 2.2 | 1.6 | 1.3 | 1.1 | 0.9 | ↑ |
| 3 | 4.8 | 6.8 | 4.1 | 3.3 | 1.9 | 1.4 | 1.1 | 0.9 | 0.8 | ↑ |
| 2.5 | 4.0 | 5.7 | 3.4 | 2.7 | 1.6 | 1.2 | 0.9 | 0.8 | 0.6 | ↑ |
| 2 | 3.2 | 4.5 | 2.8 | 2.2 | 1.3 | 0.9 | 0.7 | 0.6 | 0.5 | ↑ |
| 1.5 | 2.4 | 3.4 | 2.1 | 1.6 | 0.9 | 0.7 | 0.6 | 0.5 | 0.4 | 36 |
| Max. pressure MPa | | 5.4 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | |

indicates nonusable range

### model CLM16

Clamping force F=64.15×P/(LH-30.0)

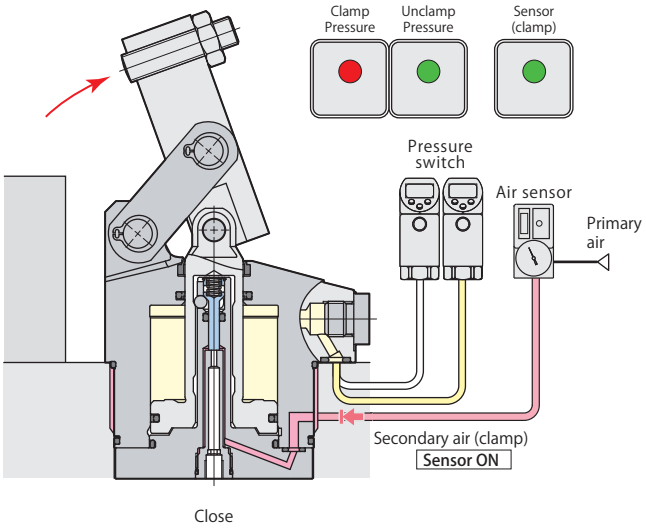
| Hydraulic pressure MPa | Cylinder force kN | Clamping force kN — Clamp arm length LH mm | | | | | | | | | Min. arm length Min. LH mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 50 | 60 | 67.5 | 80 | 100 | 120 | 140 | 160 | 180 | |
| 7 | 16.6 | | 15.0 | 12.0 | 9.0 | 6.4 | 5.0 | 4.1 | 3.5 | 3.0 | 59 |
| 6.5 | 15.4 | | 13.9 | 11.1 | 8.3 | 6.0 | 4.6 | 3.8 | 3.2 | 2.8 | 55 |
| 6 | 14.3 | | 12.8 | 10.3 | 7.7 | 5.5 | 4.3 | 3.5 | 3.0 | 2.6 | 52 |
| 5.5 | 13.1 | 17.6 | 11.8 | 9.4 | 7.1 | 5.0 | 3.9 | 3.2 | 2.7 | 2.4 | 49 |
| 5 | 11.9 | 16.0 | 10.7 | 8.6 | 6.4 | 4.6 | 3.6 | 2.9 | 2.5 | 2.1 | 46 |
| 4.5 | 10.7 | 14.4 | 9.6 | 7.7 | 5.8 | 4.1 | 3.2 | 2.6 | 2.2 | 1.9 | 44 |
| 4 | 9.5 | 12.8 | 8.6 | 6.8 | 5.1 | 3.7 | 2.9 | 2.3 | 2.0 | 1.7 | ↑ |
| 3.5 | 8.3 | 11.2 | 7.5 | 6.0 | 4.5 | 3.2 | 2.5 | 2.0 | 1.7 | 1.5 | ↑ |
| 3 | 7.1 | 9.6 | 6.4 | 5.1 | 3.8 | 2.7 | 2.1 | 1.7 | 1.5 | 1.3 | ↑ |
| 2.5 | 5.9 | 8.0 | 5.3 | 4.3 | 3.2 | 2.3 | 1.8 | 1.5 | 1.2 | 1.1 | ↑ |
| 2 | 4.8 | 6.4 | 4.3 | 3.4 | 2.6 | 1.8 | 1.4 | 1.2 | 1.0 | 0.9 | ↑ |
| 1.5 | 3.6 | 4.8 | 3.2 | 2.6 | 1.9 | 1.4 | 1.1 | 0.9 | 0.7 | 0.6 | 44 |
| Max. pressure MPa | | 5.8 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | |

indicates nonusable range

## Clamp, Unclamp, Over clamp stroke detection signal

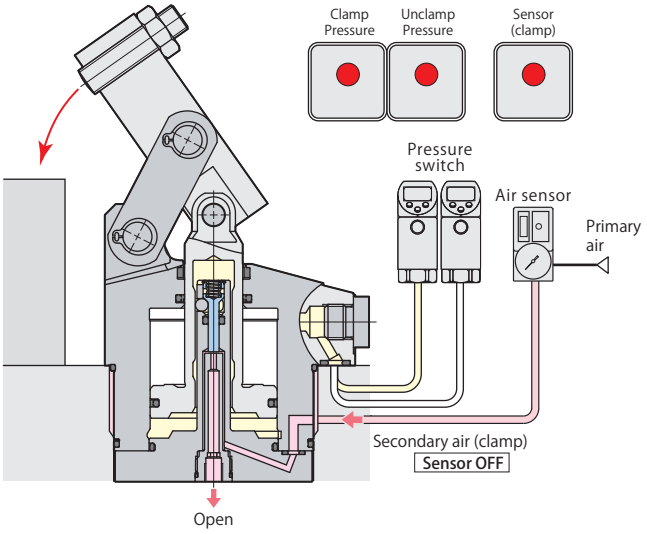
The “ON” and “OFF” indications of the sensor alone are not enough to make sure of the clamp status.
It should be used in conjunction with pressure switches in the hydraulic circuit.

### Unclamp detection



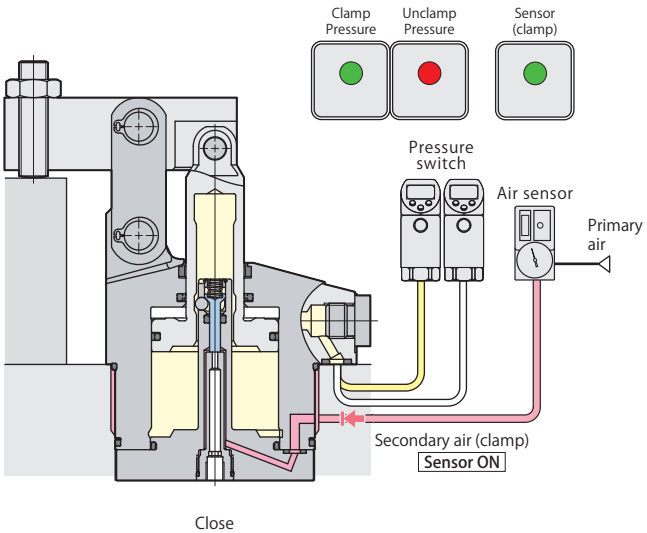

| | | |
|---|---|---|
| Sensor signal | ON | Unclamp |
| Hydraulic P.S. (Clamp) | OFF | |
| Hydraulic P.S. (Unclamp) | ON | |

### In the middle of swing stroke



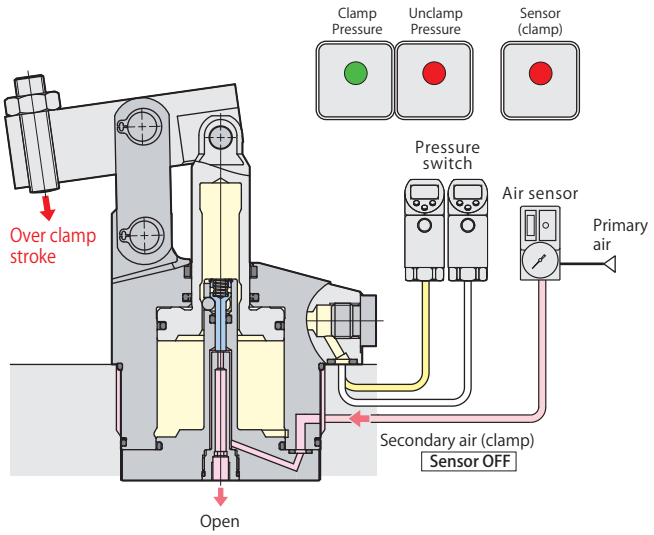

| | | |
|---|---|---|
| Sensor signal | OFF | In the middle of swing stroke |
| Hydraulic P.S. (Clamp) | OFF | |
| Hydraulic P.S. (Unclamp) | OFF | |

### Clamp detection



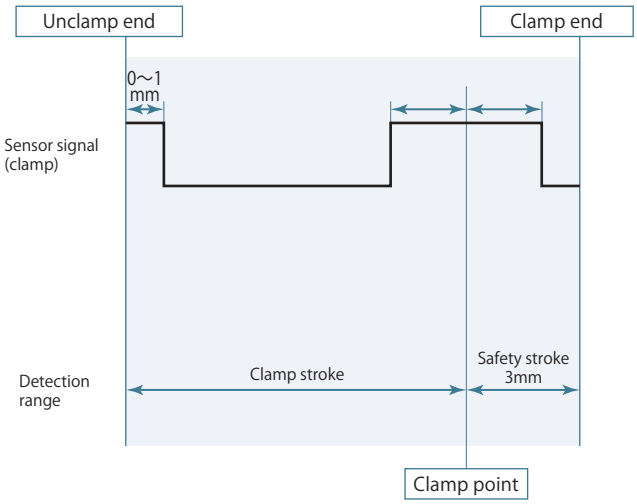

| | | |
|---|---|---|
| Sensor signal | ON | Clamp |
| Hydraulic P.S. (Clamp) | ON | |
| Hydraulic P.S. (Unclamp) | OFF | |

### Over clamp stroke (Incomplete clamp) detection




| | | |
|---|---|---|
| Sensor signal | OFF | Over clamp stroke (Incomplete clamp) |
| Hydraulic P.S. (Clamp) | ON | |
| Hydraulic P.S. (Unclamp) | OFF | |

## Air sensor triggering point



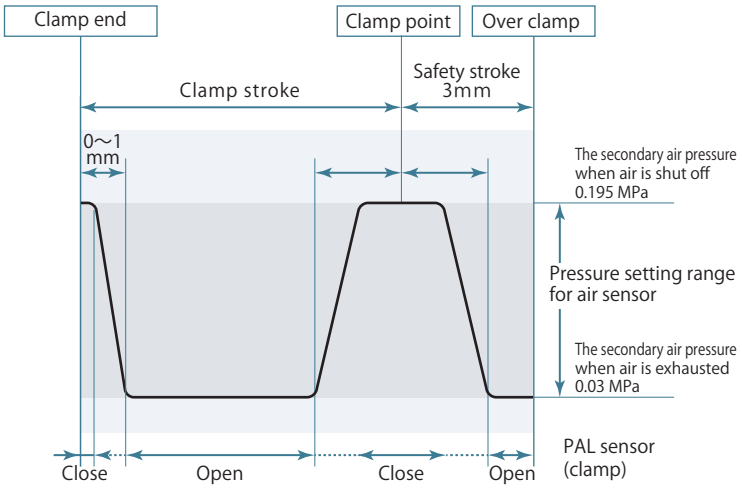

- Refer to the sensor supplier's instruction manual for the details of setting.
- Sensing performance such as detectable time and pressure differs depending on the supplier and model number of the sensor. Select the right model referring to sensor's application and characteristics.

## 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.

## Relation between sensor air pressure, PAL sensor and piston stroke




The diagram shown on the left indicates the relation between the PAL sensor, piston stroke, and secondary air pressure. (The pressure shown in the diagram is a reference based on the 0.2 MPa of primary air pressure for one piece of clamp.)

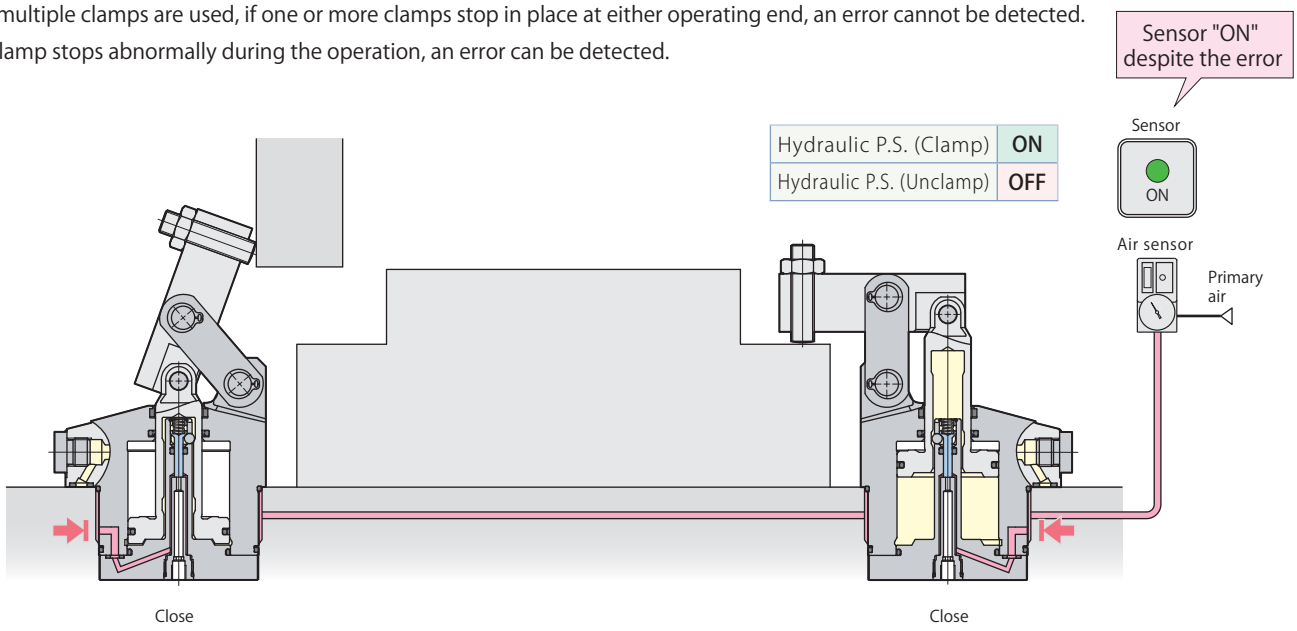
Since the new PAL sensor works with less air-leakage compared to previous sensor valve,

- Enhances the pressure setting range of the sensor which enables the sensor to set easily.
  (Ex. Pressure setting range 0.03–0.195 MPa in the diagram)
- Allows the use for a number of clamps by one air sensor because of better pressure holding when air is shut off.
  (Maximum number of clamps to be detected by one sensor is 10.)
- Allows to choose less air-consumed, i.e. small orifice diameter type, air sensor.
- Can create large differential-pressure when opening and closing the PAL sensor so that sensor primary pressure can be set as low as possible and reduce the consumption of air.

## Caution in use

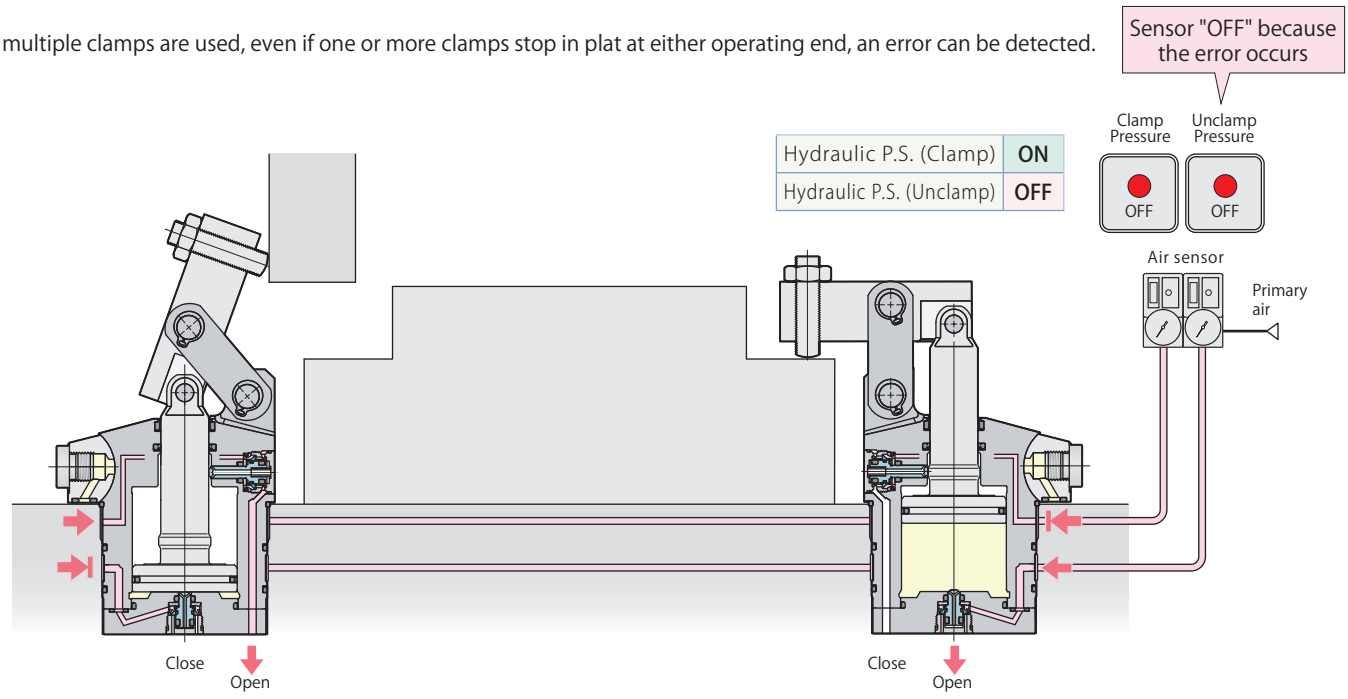
### 1 port 3 point sensor model CLM-W

When multiple clamps are used, if one or more clamps stop in place at either operating end, an error cannot be detected.
If the clamp stops abnormally during the operation, an error can be detected.




### 3 point sensor model CLM-T (conventional)

When multiple clamps are used, even if one or more clamps stop in plat at either operating end, an error can be detected.

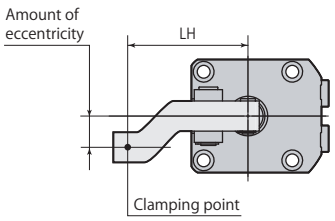



The 1-port, 3-point sensor model cannot detect errors when it is used in conjunction with hydraulic circuit pressure in case the condition shown in the above diagram occurs, i.e. clamp arm interferes the obstacles or other reasons.
The conventional 3-point sensor model can reliably detect errors and is recommended to use it in this case.

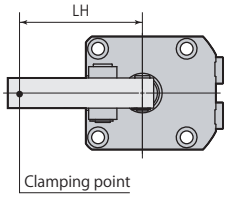
## Clamp arm allowable eccentricity

An eccentric shape clamp arm, as shown in diagram on right can be used with link clamp model CLM, 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 CLM04** (indicates nonusable range)

| Hydraulic pressure MPa | Allowable eccentricity mm, Clamp arm length LH mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 25 | 30 | 36.5 | 40 | 50 | 60 | 80 | 100 |
| 7 | | | 6 | 8 | 15 | 21 | 33 | 46 |
| 6.5 | | | 8 | 10 | 18 | 25 | 39 | 53 |
| 6 | | | 10 | 13 | 21 | 29 | 45 | 60 |
| 5.5 | | 6 | 12 | 16 | 25 | 34 | 53 | ↑ |
| 5 | | 8 | 15 | 19 | 30 | 41 | 60 | ↑ |
| 4.5 | 6 | 11 | 19 | 23 | 36 | 48 | ↑ | ↑ |
| 4 | 7 | 14 | 23 | 29 | 43 | 58 | ↑ | ↑ |
| 3.5 | 9 | 18 | 29 | 35 | 53 | 60 | ↑ | ↑ |
| 3 | 13 | 23 | 37 | 44 | 60 | ↑ | ↑ | ↑ |
| 2.5 | 17 | 30 | 48 | 57 | ↑ | ↑ | ↑ | ↑ |
| 2 | 24 | 41 | 60 | 60 | ↑ | ↑ | ↑ | ↑ |
| 1.5 | 36 | 60 | ↑ | ↑ | ↑ | ↑ | ↑ | 60 |

**model CLM05** (indicates nonusable range)

| Hydraulic pressure MPa | Allowable eccentricity mm, Clamp arm length LH mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 30 | 35 | 42 | 50 | 60 | 80 | 100 | 120 |
| 7 | | | 6 | 6 | 6 | 10 | 16 | 21 |
| 6.5 | | | 6 | 6 | 8 | 16 | 24 | 30 |
| 6 | | | 6 | 10 | 14 | 23 | 32 | 42 |
| 5.5 | | 6 | 6 | 14 | 20 | 32 | 44 | 56 |
| 5 | | 6 | 12 | 19 | 26 | 42 | 58 | 60 |
| 4.5 | 6 | 8 | 16 | 25 | 35 | 55 | 60 | ↑ |
| 4 | 6 | 11 | 20 | 30 | 44 | 60 | ↑ | ↑ |
| 3.5 | 6 | 14 | 25 | 38 | 53 | ↑ | ↑ | ↑ |
| 3 | 10 | 19 | 32 | 46 | 60 | ↑ | ↑ | ↑ |
| 2.5 | 15 | 26 | 41 | 58 | ↑ | ↑ | ↑ | ↑ |
| 2 | 22 | 36 | 56 | 60 | ↑ | ↑ | ↑ | ↑ |
| 1.5 | 33 | 52 | 60 | ↑ | ↑ | ↑ | ↑ | 60 |

**model CLM06** (indicates nonusable range)

| Hydraulic pressure MPa | Allowable eccentricity mm, Clamp arm length LH mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 35 | 40 | 50 | 60 | 70 | 80 | 100 | 120 |
| 7 | | | 8 | 8 | 8 | 8 | 8 | 8 |
| 6.5 | | | 8 | 8 | 8 | 8 | 8 | 8 |
| 6 | | | 8 | 12 | 14 | 16 | 18 | 20 |
| 5.5 | | 6 | 12 | 20 | 25 | 28 | 34 | 42 |
| 5 | 6 | 10 | 18 | 27 | 36 | 42 | 54 | 65 |
| 4.5 | 9 | 14 | 26 | 36 | 48 | 58 | 75 | 80 |
| 4 | 13 | 20 | 35 | 48 | 64 | 78 | 80 | ↑ |
| 3.5 | 19 | 28 | 46 | 66 | 80 | 80 | ↑ | ↑ |
| 3 | 26 | 40 | 65 | 80 | ↑ | ↑ | ↑ | ↑ |
| 2.5 | 34 | 52 | 80 | ↑ | ↑ | ↑ | ↑ | ↑ |
| 2 | 47 | 68 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 1.5 | 68 | 80 | ↑ | ↑ | ↑ | ↑ | ↑ | 80 |

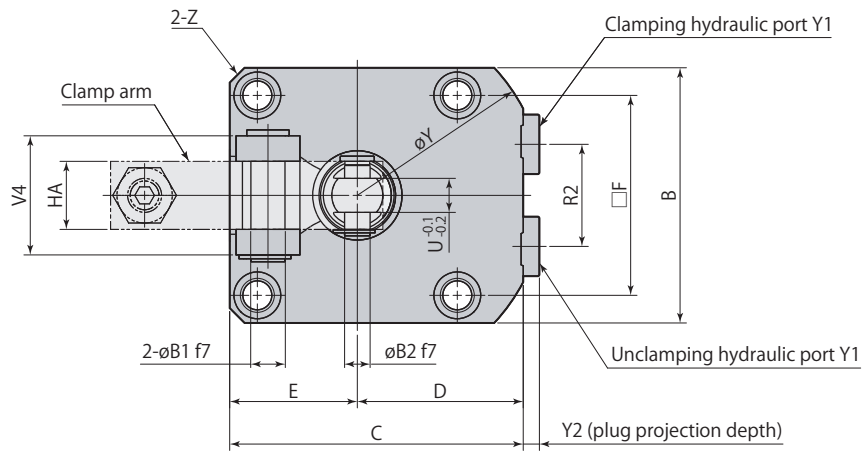
**model CLM10** (indicates nonusable range)

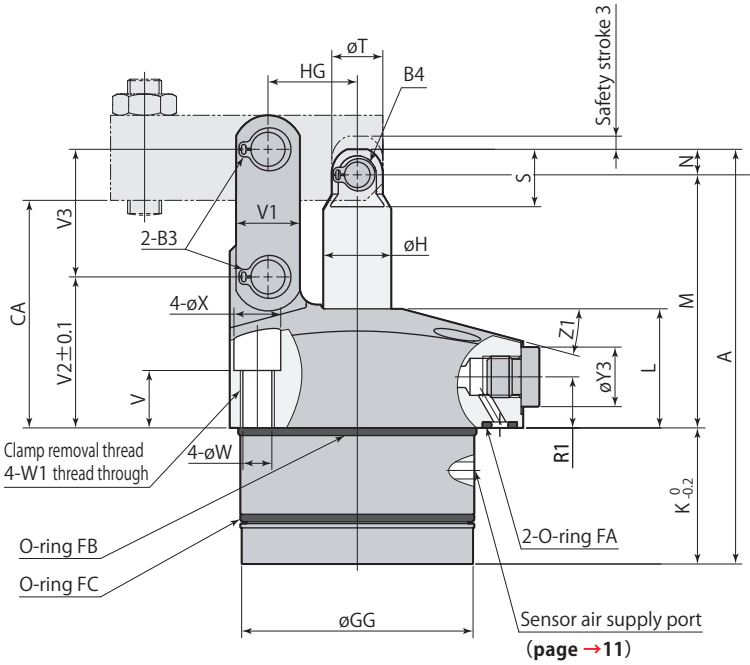
| Hydraulic pressure MPa | Allowable eccentricity mm, Clamp arm length LH mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 40 | 50 | 56.5 | 80 | 100 | 120 | 140 | 160 |
| 7 | | 9 | 9 | 9 | 14 | 16 | 18 | 19 |
| 6.5 | | 9 | 9 | 15 | 22 | 30 | 38 | 45 |
| 6 | | 9 | 9 | 22 | 32 | 44 | 55 | 65 |
| 5.5 | | 9 | 15 | 32 | 45 | 60 | 75 | 88 |
| 5 | 9 | 15 | 20 | 42 | 60 | 80 | 95 | 95 |
| 4.5 | 9 | 22 | 30 | 56 | 80 | 95 | ↑ | ↑ |
| 4 | 11 | 30 | 40 | 75 | 95 | ↑ | ↑ | ↑ |
| 3.5 | 16 | 38 | 52 | 95 | ↑ | ↑ | ↑ | ↑ |
| 3 | 22 | 48 | 66 | ↑ | ↑ | ↑ | ↑ | ↑ |
| 2.5 | 30 | 64 | 85 | ↑ | ↑ | ↑ | ↑ | ↑ |
| 2 | 44 | 85 | 95 | ↑ | ↑ | ↑ | ↑ | ↑ |
| 1.5 | 66 | 95 | ↑ | ↑ | ↑ | ↑ | ↑ | 95 |

**model CLM16** (indicates nonusable range)

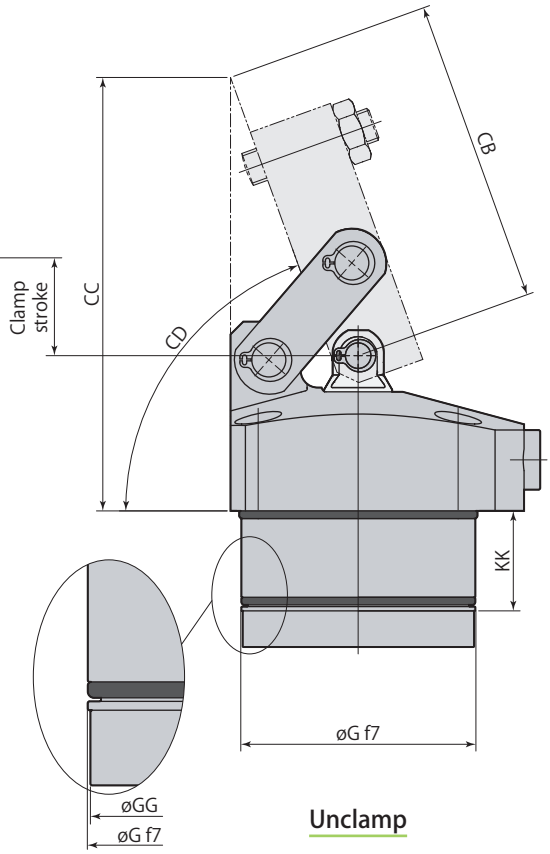
| Hydraulic pressure MPa | Allowable eccentricity mm, Clamp arm length LH mm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 50 | 60 | 69.5 | 80 | 100 | 120 | 140 | 160 | 180 |
| 7 | | 11 | 18 | 28 | 37 | 45 | 53 | 61 | 68 |
| 6.5 | | 12 | 22 | 33 | 51 | 63 | 74 | 86 | 97 |
| 6 | | 15 | 26 | 39 | 63 | 81 | 97 | 110 | 110 |
| 5.5 | 11 | 19 | 31 | 45 | 72 | 98 | 110 | ↑ | ↑ |
| 5 | 11 | 24 | 38 | 53 | 82 | 110 | ↑ | ↑ | ↑ |
| 4.5 | 13 | 29 | 45 | 62 | 96 | ↑ | ↑ | ↑ | ↑ |
| 4 | 17 | 36 | 54 | 74 | 110 | ↑ | ↑ | ↑ | ↑ |
| 3.5 | 23 | 45 | 66 | 89 | ↑ | ↑ | ↑ | ↑ | ↑ |
| 3 | 31 | 57 | 82 | 110 | ↑ | ↑ | ↑ | ↑ | ↑ |
| 2.5 | 43 | 74 | 104 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 2 | 60 | 100 | 110 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 1.5 | 88 | 110 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | 110 |

## Dimensions

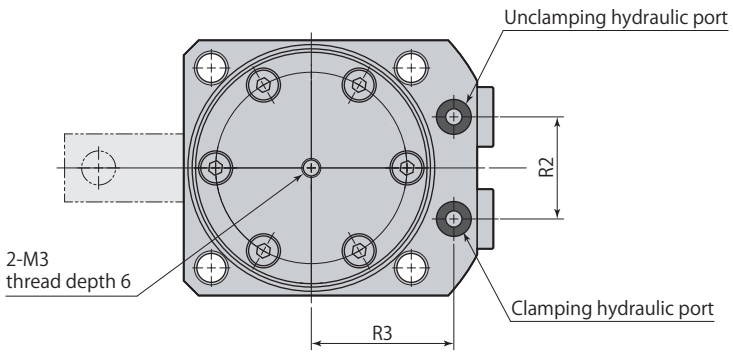



clamp

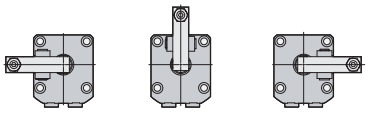



Unclamp




- This diagram represents external contour of CLM□-F. CLM□-L and CLM□-R differ only in terms of mounting direction of clamp arm and otherwise all dimensions are identical to those of CLM□-F.

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



- Clamp arm and mounting screws are not included.
- Use a snap ring (B4) and a pin (øB2) when installing a clamp arm.

mm

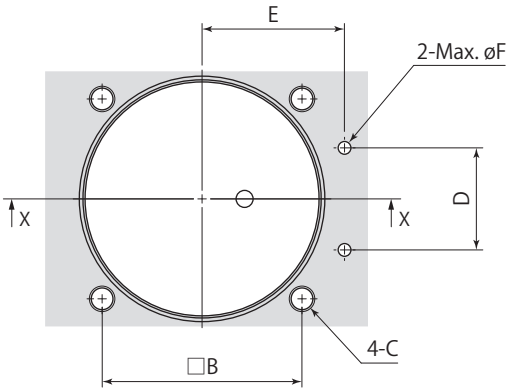
| Model | CLM04-□W | CLM05-□W | CLM06-□W | CLM10-□W | CLM16-□W |
|---|---|---|---|---|---|
| A | 83 | 92.5 | 97.5 | 113.5 | 132.5 |
| B | 45 | 51 | 60 | 70 | 85 |
| C | 54 | 61 | 69 | 81 | 94.5 |
| D | 31.5 | 35.5 | 39 | 46 | 52 |
| E | 22.5 | 25.5 | 30 | 35 | 42.5 |
| F | 34 | 40 | 47 | 55 | 63 |
| øG | 40 $^{-0.025}_{-0.050}$ | 48 $^{-0.025}_{-0.050}$ | 55 $^{-0.030}_{-0.060}$ | 65 $^{-0.030}_{-0.060}$ | 75 $^{-0.030}_{-0.060}$ |
| øGG | 39.4 | 47.4 | 54.4 | 64.4 | 74.4 |
| øH | 14 | 14 | 16 | 20 | 22 |
| K | 27.5 | 29.5 | 32 | 38.5 | 40.5 |
| KK | 19.5 | 21 | 23.5 | 25 | 25 |
| L | 25 | 28 | 28 | 30 | 37 |
| M | 50 | 57 | 59.5 | 67 | 82 |
| N | 5.5 | 6 | 6 | 8 | 10 |
| R1 | 11 | 12 | 12 | 13 | 16 |
| R2 | 18 | 22 | 24 | 30 | 32 |
| R3 | 26 | 30 | 33.5 | 39.5 | 45 |
| S | 12.5 | 13.5 | 13.5 | 17.5 | 22 |
| øT | 11 | 12 | 12 | 15 | 19 |
| U (width across flats) | 6 | 6 | 8 | 10 | 11 |
| V | 15.5 | 16.5 | 13.5 | 15.5 | 17.5 |
| V1 | 11 | 13 | 15 | 19 | 25 |
| V2 | 30.5 | 34.5 | 35.5 | 39 | 48 |
| V3 | 22 | 26 | 30 | 35.5 | 43.5 |
| V4 | 21 | 21 | 28 | 37 | 40 |
| øW | 5.5 | 5.5 | 6.8 | 6.8 | 9 |
| W1 | M6×1 | M6×1 | M8×1.25 | M8×1.25 | M10×1.5 |
| øX | 9.5 | 9.5 | 11 | 11 | 14 |
| øY | 72 | 81 | 88 | 106 | 116 |
| Y1 | G1/8 | G1/8 | G1/8 | G1/8 | G1/4 |
| Y2 | 3.8 | 3.8 | 3.8 | 3.8 | 4.8 |
| øY3 | 14 | 14 | 14 | 14 | 19 |
| Z | C3 | C3 | C3.5 | C4.5 | C10 |
| Z1 | 15° | 15° | 15° | 12° | 15° |
| øB1 | 6 $^{-0.010}_{-0.022}$ | 6 $^{-0.010}_{-0.022}$ | 8 $^{-0.013}_{-0.028}$ | 10 $^{-0.013}_{-0.028}$ | 12 $^{-0.016}_{-0.034}$ |
| øB2 | 6 $^{-0.010}_{-0.022}$ | 6 $^{-0.010}_{-0.022}$ | 6 $^{-0.010}_{-0.022}$ | 8 $^{-0.013}_{-0.028}$ | 10 $^{-0.013}_{-0.028}$ |
| B3 (snap ring) *1 | STW-6 | STW-6 | STW-8 | STW-10 | STW-12 |
| B4 (snap ring) *1 | STW-6 | STW-6 | STW-6 | STW-8 | STW-10 |
| CA | 44.5 | 51 | 53.5 | 59 | 72 |
| CB | 50.2 | 61.2 | 71.7 | 78.7 | 90.8 |
| CC | 77.7 | 92.4 | 101.9 | 111.4 | 130.8 |
| CD | About 70° | About 71° | About 70° | About 70° | About 69° |
| HA | 12 | 12 | 16 | 19 | 22 |
| HG | 16 | 18.5 | 21 | 24.5 | 30 |
| O-ringFA (FKM-90) | P5 | P5 | P5 | P7 | P7 |
| O-ringFB (FKM-70) | AS568-029 | AS568-031 | AS568-034 | AS568-037 | AS568-040 |
| O-ringFC (FKM-70) | AS568-028 | AS568-031 | AS568-033 | AS568-036 | AS568-039 |
| Flow control valve *2 Meter-in | VCF01S | VCF01 | VCF01 | VCF01 | VCF02 |
| Flow control valve *2 Meter-out | VCF01S-O | VCF01-O | VCF01-O | VCF01-O | VCF02-O |
| Air bleeding valve *2 | VCE01 | VCE01 | VCE01 | VCE01 | VCE02 |

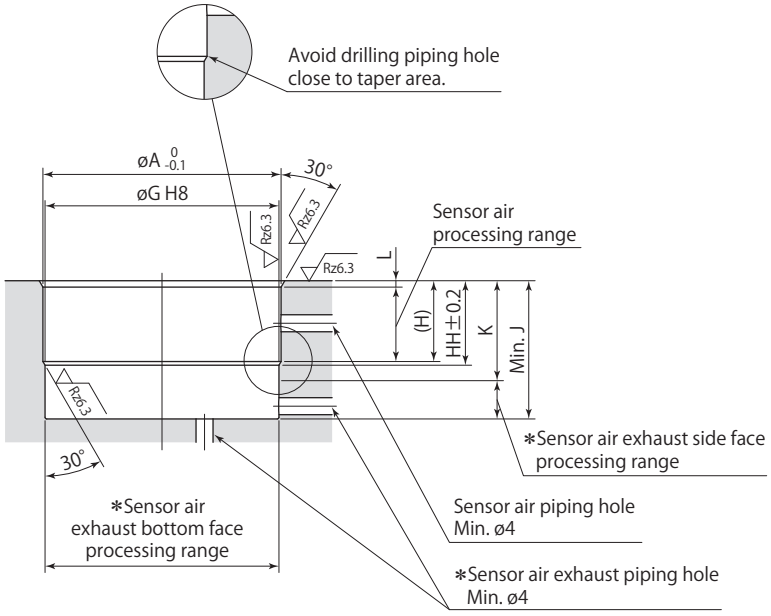
∗1：Snap ring is made by Ochiai Corporation.

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

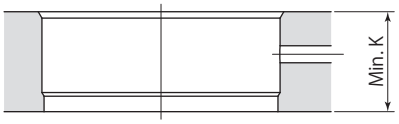
● Refer to separate catalog(CLS-53J) for the details of Flow control valve and Air bleeding valve.

## Mounting details




In blind hole X-X




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 30° 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

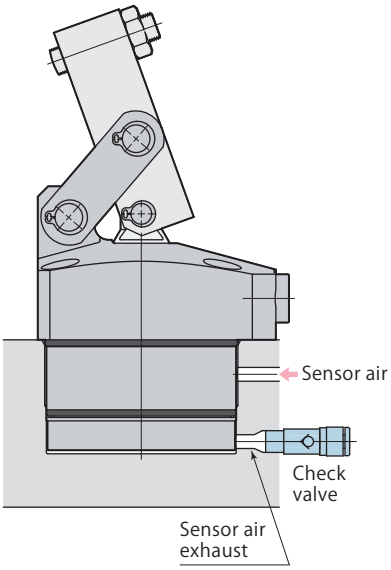
mm

| Model | CLM04-□W | CLM05-□W | CLM06-□W | CLM10-□W | CLM16-□W |
|---|---|---|---|---|---|
| øA | 40.8 | 49 | 56 | 66 | 76 |
| B | 34 | 40 | 47 | 55 | 63 |
| C | M5 | M5 | M6 | M6 | M8 |
| D | 18 | 22 | 24 | 30 | 32 |
| E | 26 | 30 | 33.5 | 39.5 | 45 |
| øF | 3 | 3 | 3 | 5 | 5 |
| øG | $40^{+0.039}_{0}$ | $48^{+0.039}_{0}$ | $55^{+0.046}_{0}$ | $65^{+0.046}_{0}$ | $75^{+0.046}_{0}$ |
| H | 15 | 16.5 | 19 | 20.5 | 20.5 |
| HH | 15.7 | 17.4 | 19.9 | 21.4 | 21.4 |
| J | 28 | 30 | 32.5 | 39 | 41 |
| K | 19.5 | 21 | 23.5 | 25 | 25 |
| L | 1.2 | 1.5 | 1.5 | 1.5 | 1.5 |

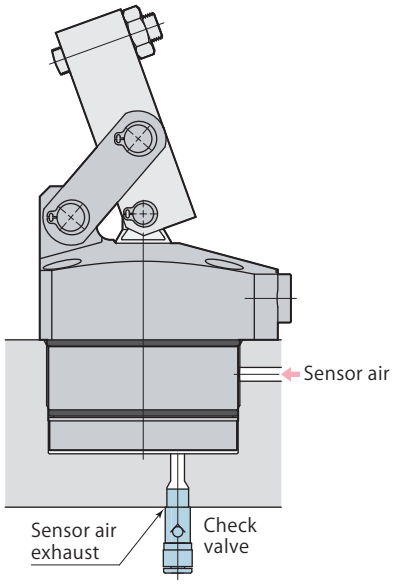
## Caution for piping

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

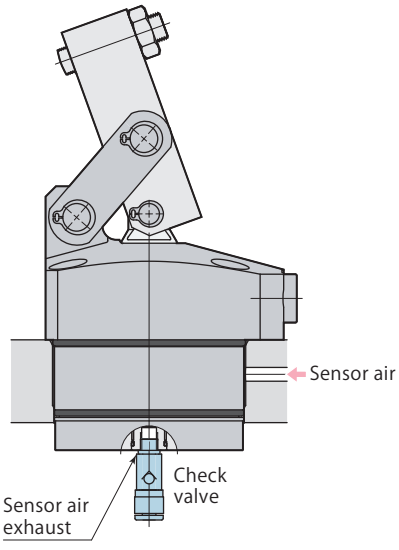
Mounting in blind hole
(Sensor air exhaust：side face)




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



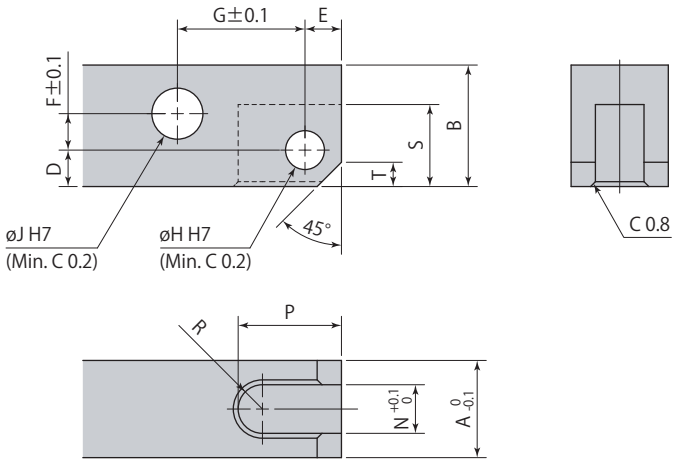

Mounting in through hole




- 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 dim ensions shown in the table below.




Recommended material：S45C (HB167–229)

mm

| Link clamp | CLM04 | CLM05 | CLM06 | CLM10 | CLM16 |
|---|---|---|---|---|---|
| A | 12 | 12 | 16 | 19 | 22 |
| B | 14 | 16 | 20 | 25 | 32 |
| D | 5.5 | 6 | 6 | 8 | 10 |
| E | 5.5 | 6 | 6 | 7 | 10 |
| F | 2.5 | 3.5 | 6 | 7.5 | 9.5 |
| G | 16 | 18.5 | 21 | 24.5 | 30 |
| øH | $6^{+0.012}_{0}$ | $6^{+0.012}_{0}$ | $6^{+0.012}_{0}$ | $8^{+0.015}_{0}$ | $10^{+0.015}_{0}$ |
| øJ | $6^{+0.012}_{0}$ | $6^{+0.012}_{0}$ | $8^{+0.015}_{0}$ | $10^{+0.015}_{0}$ | $12^{+0.018}_{0}$ |
| N | 6 | 6 | 8 | 10 | 11 |
| P | 14.5 | 17 | 17 | 20 | 25.5 |
| R | R3 | R3 | R4 | R5 | R5.5 |
| S | 12 | 13.5 | 13.5 | 17.5 | 22 |
| T | 3 | 4 | 4 | 5 | 8 |

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

Pascal

Itami, Hyogo, Japan 664-8502
TEL. 072-777-3333  FAX. 072-777-3520

CERTIFICATE OF APPROVAL ISO9001

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