Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Cylinder with length measuring sensor/hand/actuator

Design/selection

1. Hand

⚠CAUTION

- Since gripping power varies with the length of the jaw attached to the finger, applied pressure, bore size, etc., determine according to the workpiece gripped.
- Gripping characteristics are equivalent to the standard. (BHA: page 1602 BHG: page 1608 BHE: page 1755). Check pages 1764 to 1769 for common precautions for the hand.
- Avoid use outdoors.
- The most desirable range of the ambient temperature for use of the hand is 5 to 60°C. Do not use the unit if the temperature exceeds 60°C, or damage and/or misoperations may occur. If the temperature is less than 5°C, moisture in the circuit may freeze and lead to damage or faults. Take measures to prevent freezing.
- Do not use this product in an environment where corrosion may occur. Use in such an environment could lead to damage or operation failure.
- Clamping operation is accurate when performed as softly as possible at a low speed. Repeatability is also stable.
- Check that excessive lateral load is not applied to the finger.
- Selecting models for mixed workpiece sorting applications
  Select the output depending on the appearance differential of the workpiece.
  Workpiece exterior differential ≥ 1 mm + tolerance variation of workpiece: Switch output
  Workpiece exterior differential ≤ 1 mm + tolerance variation of workpiece: Analog output
  *Switch output position setting is approximate for switch output. The above values are reference only, and differ based on the working environment. Contact CKD for details.

Mounting, installation and adjustment

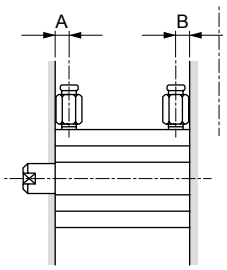
1. Cylinder

⚠CAUTION

- As the SSD-LN, SSD-O-LN Series uses a rotation-stop, do not use where rotation torque is applied to the SSD-LN, SSD-O-LN Series piston rod. The bushing for the rotation lock may deform and significantly shorten the service life.
  Contact CKD for standard piston rod.
- Use the product so that load on the piston rod is always applied in the rod axial direction.
- When fixing a workpiece onto the tip of the SSD-LN, SSD-O-LN Series piston rod, retract the piston rod to the stroke end and apply a wrench to the section protruding from the rod's parallel section. Tighten so that torque is not applied to the cylinder body.
- Note that applicable piping fittings differ based on the cylinder bore size.

· SSD-LN, SSD-O-LN

Item / Bore size (mm)	Port size	Port position A	Port position B	Applicable fittings	Fitting O.D.	Inapplicable fittings
ø12/16	M5×0.8	5.5	5.5	SC3W-M5-4 SC3W-M5-6 GWS4-M5-S GWS4-M5 GWL4-M5 GWL6-M5	ø11 or less	GWS6-M5
ø20		8	5.5			
ø32	Rc1/8	8	8	SC3W-6-4/6/8 GWS4-6 GWS6-6 GWS8-6 GWL4-6 GWL6-6	ø15 or less	GWS10-6 GWL8-6 GWL10-6
ø50	Rc1/4	10.5	10.5	SC3W-8-6/8/10 GWS4-8 GWS6-8 GWS10-8 GWL4 to 12-8	ø21 or less	GWS-12-8



Mounting, installation and adjustment

2. Hand

⚠CAUTION

■ To remove moisture in the pipes, attaching an air dryer and filter is recommended. Install a filter near the directional control valve (primary side) to remove rust, foreign matter and drainage.

■ Use corrosion-proof materials such as zinc, plated pipes, stainless steel pipes, nylon pipes or rubber pipes for piping material.

■ Check that the cross-section of the pipe connecting the hand and directional control valve has sufficient effective cross-sectional area to attain specified piston speed.

■ Before piping, clean out the pipes using an air blower to remove all foreign matter and cutting chips from the pipes.

■ Check that sealing tape or adhesive does not enter when connecting the pipe to the components (filter, directional control valve, cylinder, hand/chuck, etc.). Snagged sealing tape or cutting chips could lead to operation failure.

■ When mounting the jaw to the finger, to prevent any effect on the hand, support with a wrench, etc., when tightening so that the finger is not twisted. The recommended tightening torques (N·m) are as follows.

BHA/BHG/BHE - 01 : 0.59
BHA/BHG/BHE - 03, 04 : 1.4
BHA/BHG/BHE - 05 : 2.8

Use/maintenance

1. Cylinder

⚠CAUTION

■ Use appropriate pliers (C type snap ring installation tool) to install and remove the rod metal.

■ Even in cases when appropriate pliers are used, be careful as the snap ring may pop out at the tip of the pliers and cause physical or equipment damage.
In addition, during mounting, be sure that the unit fits securely into the snap ring groove before supplying air.

2. Hand

⚠CAUTION

■ Regularly grease the oscillating section of the finger. Regular replenishment can extend service life further.

■ Do not apply excessive force caused by dropping or collision to the finger, attachment, or bearing guide. This could cause large play in the finger and decrease the hand's repeatability. The stop position of the piston, which acts as the sensor detector, could vary and decrease repeatability.

Product-specific cautions: Sensor/amplifier/display

Design/selection

1. Common

⚠CAUTION

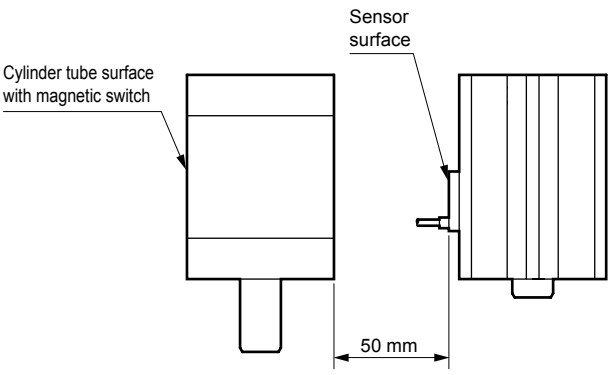
- Use only a DC safety power supply. Do not connect motors, valves, etc., that generate noise to the power supply used in this device.
- While wiring, ensure that inductive noise is not applied to the length measuring sensor and that the motor, etc. power lines do not use the same piping and wiring (through multi-core cables, etc.). Use caution with the inverter power supply and its wiring section as well.
  (Check that the inverter power frame ground is correctly grounded and noise is released.)
- Note that noise resistance performance may be adversely affected if the length of the sensor cable or output stage cable lead wire is changed.
- A bend-resistant lead wire is used for the sensor cable and output stage cable. To optimize bend resistant performance, check that the wire is not bent locally and that tension is not applied.
  Note that compared to the middle section of the load, elasticity drops at the outlet from the sensor case or amplifier unit case and at the M8 connector section because the lead is fixed. Check that repeated bending is not applied to these sections.
- This product cannot be used where the ambient temperature fluctuates suddenly (example: localized air conditioning).
- This product cannot be used outdoors or in an atmosphere containing corrosive elements.
- Select switch output when conducting rough judgments and analog output or display when conducting detailed judgments, including length measurement.

Mounting, installation and adjustment

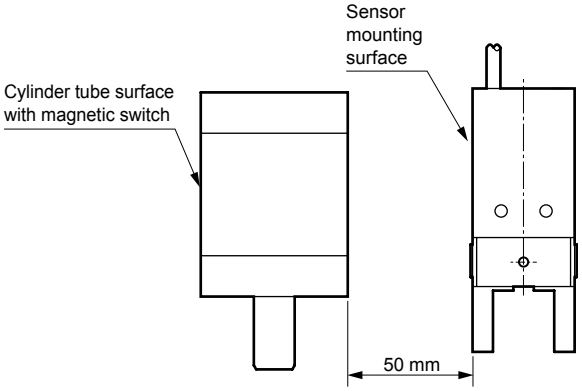
1. Common

⚠CAUTION

- This product cannot be used in an environment where strong magnetic fields are generated (spot welding machine, etc.) because the sensor detection accuracy drops markedly.
  Use caution when this cylinder/hand is adjacent to other magnetic switches with cylinder. As a guideline, a distance of 50 mm or more between the sensor surface and cylinder tube surface should be sufficient, as shown in the figure below.



- If the sensor surface (sensor nameplate mounting surface) is covered by a magnetic substance such as a steel plate, the magnetic force may be disturbed, and the sensor will not detect a magnetic field. Take care when installing the actuator.



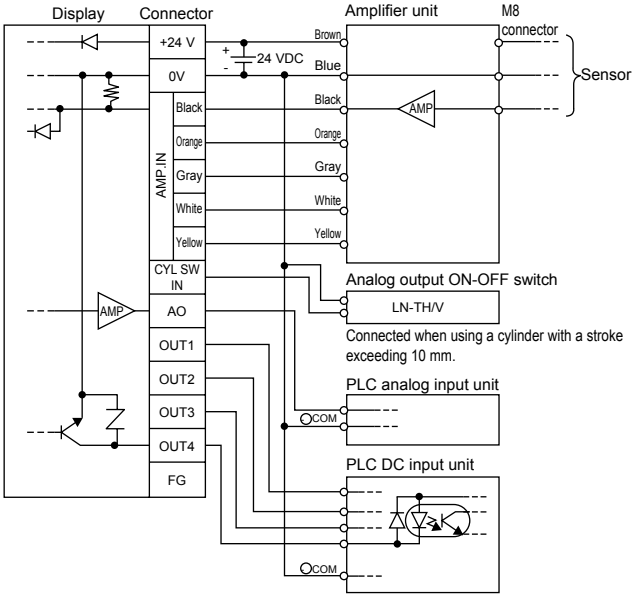
■ When mounting the amplifier unit case with separated amplifier using a side through hole, use M3 cross-recessed pan head machine screws, with tightening torque of 0.5 to 0.7 N·m.

■ Rubber plugs are attached to devices with the amplifier installed operating points adjustment trimmer and operating range adjustment trimmer section to maintain water resistance. Fit these plugs in after adjusting.

■ When mounting the display using a bottom through hole, use M3 cross-recessed pan head machine screws, with tightening torque of 0.5 to 0.7 N·m.

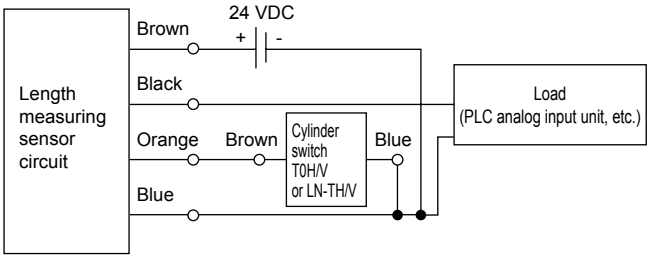
■ Connecting the lead wire

● Display

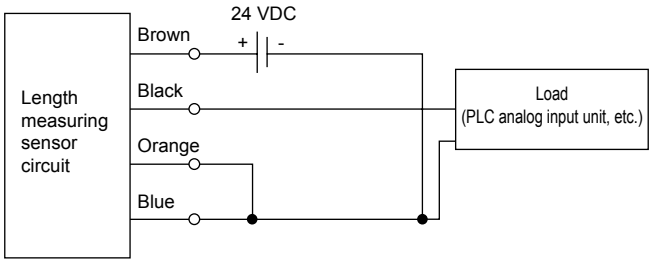


1. Since the display is a two-channel specification, +24 V, 0 V is present at every two places in the connector unit. Since each conduction is present inside the display for these, it operates with either of the wiring.
2. If connecting the amplifier unit with only one model, the channel of the connector unit does not matter.
3. Turn power OFF before wiring this product.
4. When connecting the wires to the display connector unit, connect with the female side pulled out.
5. The connectable wire size of the display connector unit is 0.08 to 1.5 mm^2 and its terminal screw tightening torque is 0.25 N·m.
6. Do not insert or remove the connector during the energized state.
7. When using a cylinder with a stroke exceeding 10 mm, connect the “analog output ON-OFF switch” to the display. Connect the brown wire to the “CYL SW IN” terminal and the blue wire to 0 V.
8. Treatment of shielded wire
   If noise is a problem, connect the shielded wire to COM or FG. This is not usually called for.

● When analog output cylinder is installed

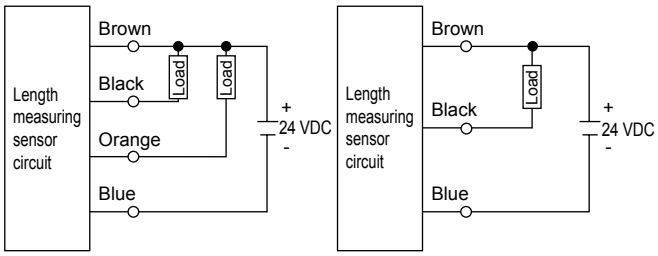


● When analog output hand is installed



Connect the orange wire to the blue wire (-).

● Switch output



Switch output is an NPN transistor open collector type.

Product-specific cautions: Sensor/amplifier/display

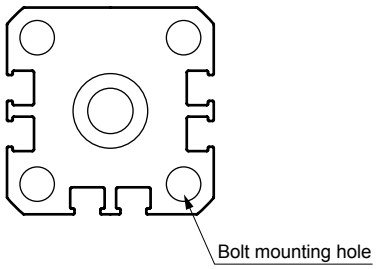
Mounting, installation and adjustment

2. Analog output/display

⚠CAUTION

■ Cylinder equipped

- When fixing the cylinder, use stainless steel bolts for cylinder bolt mounting to maintain the sensor characteristics. If an iron bolt is used, strain occurs in the sensor output voltage waveform, display errors increase and analog output voltage linearity decreases.
  (Although it does not affect the repeatability, check the performance during actual use.)
  Similar problems may occur if a part of the cylinder body contacts a magnetic object.
  In particular, note that this problem will be more severe near the LN sensor or when the steel plate is shorter than the actuator body.



Example. SSD-LN, SSD-O-LN types

- The length measuring sensor and TOH/V (Note), or LN-TH/V switch for analog output voltage ON-OFF switching or another cylinder switch, can be mounted on the same surface if the mounting positions do not interfere.
- Be sure to connect a cylinder switch (TOH/V or LN-TH/V) to take out the analog output voltage within an arbitrary 8 mm interval (10 mm for display) of the cylinder's full stroke.
- Ensure that the sensor tightening torque is 0.1 to 0.2 N·m and install so that the sensor mounting screw faces the cylinder head side.

(Note) The selected switch differs with the type of cylinder, analog output, and the display.

■ Hand equipped

- If the hand is top-mounted using a spigot section and the base is a magnetic substance such as an iron plate, strain occurs in the sensor output voltage waveform, display errors increase and analog output voltage linearity decreases.
  (Although it does not affect the repeatability, check the performance during actual use.)
  Similar problems may occur on the front or side of the hand if the section contacts a magnetic object.
  In particular, note that this problem will be more severe near the LN sensor or when the steel plate is shorter than the actuator body.
  When fixing the hand, regardless of top, side, or front mounting, use stainless steel bolts to maintain the sensor characteristics.
- Ensure that the sensor tightening torque is 0.1 to 0.2 N·m and the sensor mounting screw faces the finger (jaw).

■ Cylinder/hand common items

- For the display, if load short-circuit current flows to switch output stage transistors due to wiring errors/connection, the internal short-circuit protection circuit is activated and the short-circuit current is cut. (The output indicator lamp (yellow) turns OFF and the short-circuit indicator lamp (red) turns ON.)
  To reset short-circuit protection, turn OFF feed current once, correct wiring mistakes, etc., then turn the current ON again.
  This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.
- After fitting male and female connectors, fix the male side with screws provided on the female side to prevent fallout.

3. Switch output

⚠CAUTION

■ If the operating range is too narrow or if the operating points are incorrectly adjusted when setting the switch output operating position, the output may or may not turn ON. Readjust in this case.
Operation is stabilized by turning the operating range adjustment trimmer clockwise and widening the operating range slightly.

■ If load short-circuit current flows to output stage transistors due to wiring errors/connection, the internal short-circuit protection circuit is activated (turns display OFF from ON) and the short-circuit current is cut.
To reset short-circuit protection, turn OFF feed power supply once, correct wiring mistakes, etc., then turn the current ON again.
This product's protection circuit is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

■ Install the sensor at a position where the red lines on the hand and sensor are aligned. Ensure that the sensor tightening torque is 0.1 to 0.2 N·m and the sensor mounting screw faces the finger (jaw).

Use/maintenance

1. Common

⚠CAUTION

■ Length measuring sensor output voltage corresponds to the cylinder piston position. The value may fluctuate because of jig deformation and wear, etc., due to use over time. (For the hand, fluctuation is caused by finger opening and closing direction backlash and attachment deformation and wear.)
The display value, analog output voltage, and switch output position may fluctuate because of this, regardless of the model, so compensation should be regularly made.
(Refer to the product specifications sheet or handling precautions attached with the product for operation procedures.)

■ Length measuring sensor output voltage varies with temperature drift in piston magnet flux density (changes in working ambient temperature). This is minimized by the compensation circuit on the sensor. However, it is used for more detailed judgments. When large errors occur in the display, analog output voltage or switch output position, compensation should be made regularly with simple key operations (teaching function) on the display. (Refer to the product specifications or handling precautions attached with the product for operation procedures.)

■ Refer to the product specifications sheet or handling precautions attached with the product for display operation.