

# 2 functions integrated actuator

New length measurement sensor installed on small cylinder and hand components.  
Next-generation pneumatic components enabling simultaneous work on workpiece (actuator function) and inspection (quality judgment, simple length measurement).

RRC  
GRC  
RV3\*  
NHS  
HR  
**LN**  
FH100  
HAP  
BSA2  
BHA/BHG  
LHA  
LHAG  
HKP  
HLA/HLB  
HLAG/HLBG  
HEP  
HCP  
HMF  
HMFb  
HFP  
HLC  
HGP  
FH500  
HBL  
HDL  
HMD  
HJL  
BHE  
CKG  
CK  
CKA  
CKS  
CKF  
CKJ  
CKL2  
CKL2 --HC  
CKH2  
CKLB2  
NCK/SCK/FCK  
FJ  
FK  
Ending

## Series version of display units Making inspection easier and simpler

A display has been added for analog output. This new display lets inspection results be directly processed and displayed digitally, eliminating the need for subsequent processes.

## Simplifying conventionally difficult intermediate detection (manual)

Simplifying conventionally difficult intermediate detection (manual) sensor output is proportional to actuator operation, so intermediate workpiece prehension is detected, and corresponding to workpiece transfer needs such as sorting of mixed workpieces, detection of irregular workpieces, and detection of abnormal prehension.

## Simple adjustment with key operations

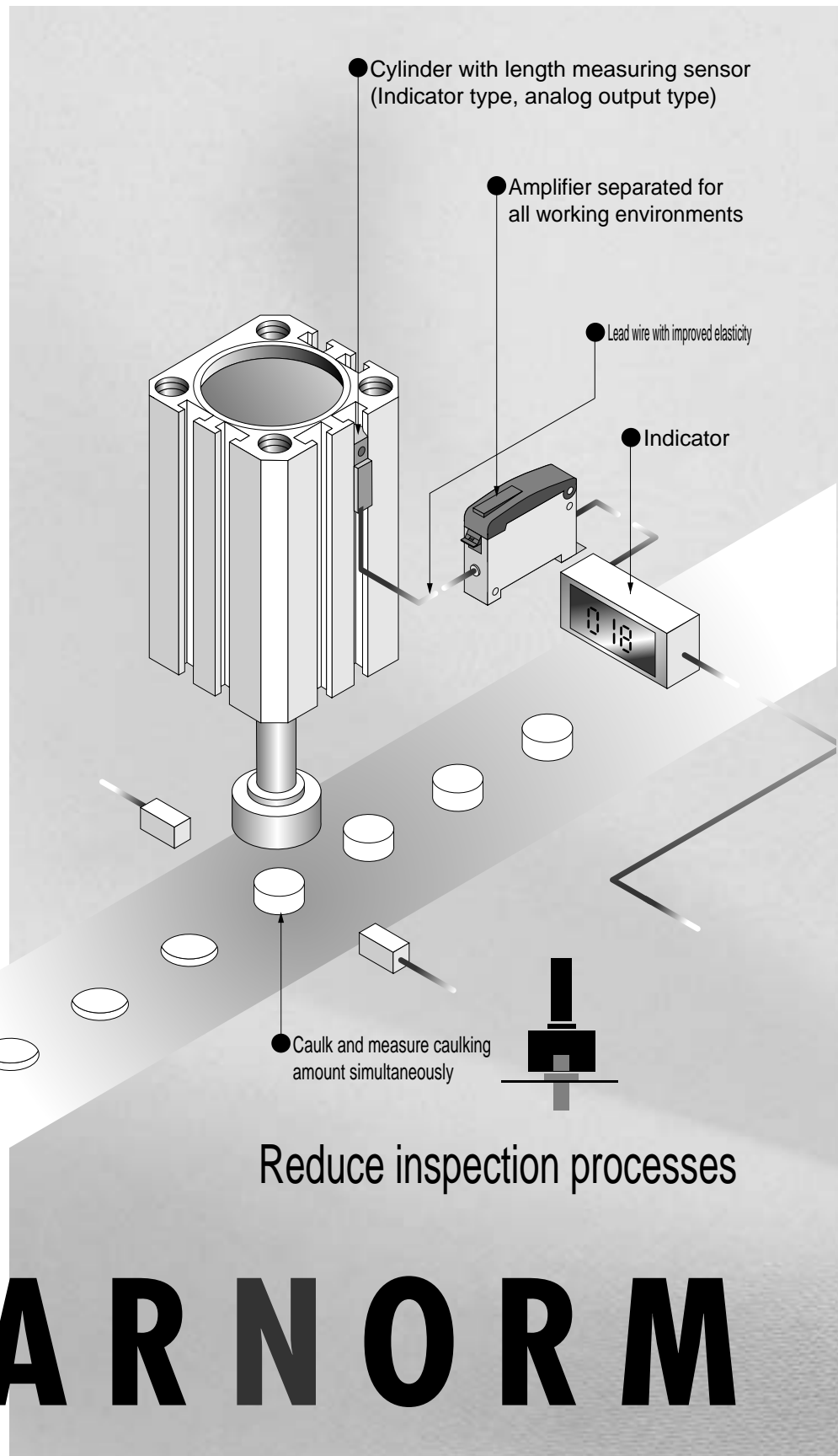
The switch operation point and movement range are easily adjusted with key operation on the display.

## Wide selection of match applications with more mounted models and bore sizes

Compatible mounted actuators have been increased with the super compact cylinder SSD Series, linear sliding cylinder LCS Series, cross roller parallel hand BHA/BHG Series, and highly-rigid centering hand BHE Series, enabling use with many different applications.


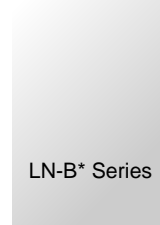
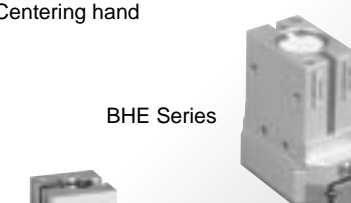

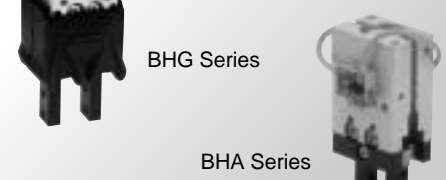
### (What is the length measuring sensor?)

This special new magnetic sensor attains linear output for movement of the piston with a magnet (PAT.P). This sensor enables intermediate detection and workpiece judgment functions that the conventional cylinder switch never achieved.



# LINEAR NORM

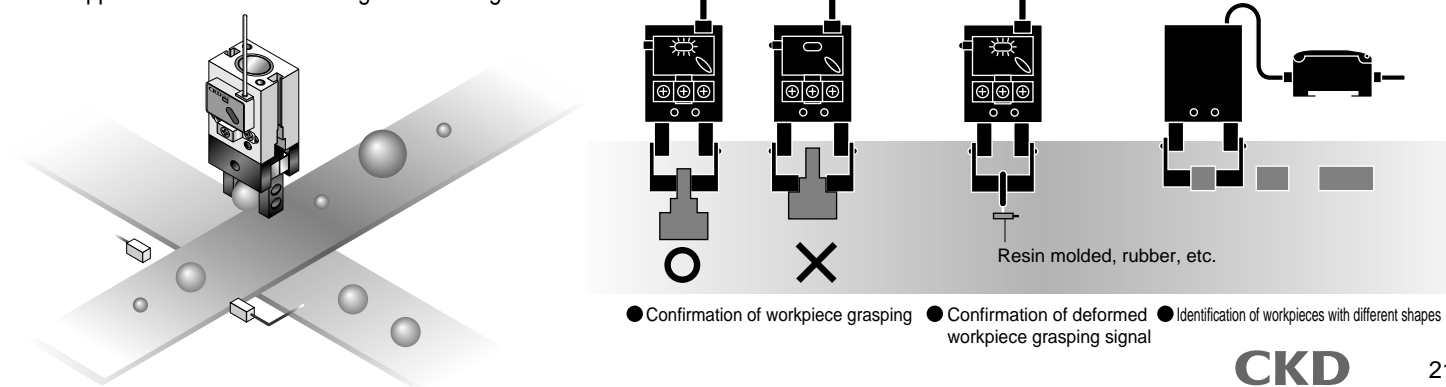
## Actuator variations with length measuring sensor (LN)

Linear system	Grasp system
<b>Cylinder with LN</b> Applicable cylinder Compact cylinder Linear slide cylinder	<b>Hand with LN</b> Incorporated hand Compact cross roller parallel hand Centering hand
 LN-A* Series   LN-B* Series	 BHE Series   BHG Series   BHA Series

Output type	Analog output type		Switch/analog double output display		Switch output type	
	1-5V voltage output between random 8 mm in stroke	1-5V voltage and switch output between random 10 mm in stroke	1-5V voltage output at double-jaw full stroke	1-5V voltage and switch output at double-jaw full stroke	ON-OFF output with full double jaw stroke length	
Amplifier separate type	●	●	●	●	●	
Amplifier mounting	—	—	—	—	●	
Bore size (mm)	φ12 φ16 φ20 φ32 φ50	φ20 φ25 or equivalent or equivalent	φ20 φ25 or equivalent or equivalent	φ20 φ25 or equivalent or equivalent	φ12 φ16 φ20 φ50 or equivalent or equivalent or equivalent or equivalent	
Stroke length (mm)	(Note) 20, 30, 50		—			

Note: Stroke varies with the model. Contact CKD for linear tube diameters and strokes.

### Applications of hand with length measuring sensor



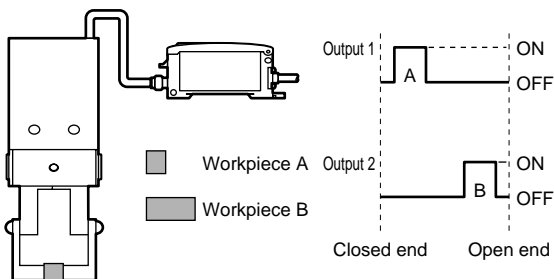
RRC  
GRC  
RV3\*  
NHS  
HR  
**LN**  
FH100  
HAP  
BSA2  
BHA/BHG  
LHA  
LHAG  
HKP  
HLA/HLB  
HLAG/HLBG  
HEP  
HCP  
HMF  
HMFb  
HFP  
HLC  
HGP  
FH500  
HBL  
HDL  
HMD  
HJL  
BHE  
CKG  
CK  
CKA  
CKS  
CKF  
CKJ  
CKL2  
CKL2 --HC  
CKH2  
CKLB2  
NCK/SCK/FCK  
FJ  
FK  
Ending

Cylinder/hand with length measuring sensor  
Length measuring function

## Applications

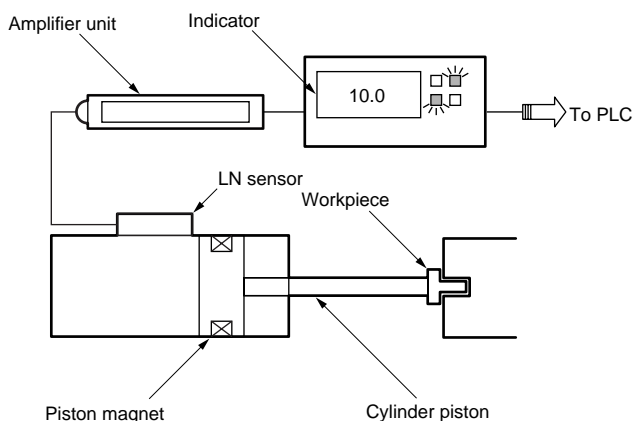
- RRC
- GRC
- RV3\*
- NHS
- HR
- LN**
- FH100
- HAP
- BSA2
- BHA/BHG
- LHA
- LHAG
- HKP
- HLA/HLB
- HLAG/HLBG
- HEP
- HCP
- HMF
- HMFB
- HFP
- HLC
- HGP
- FH500
- HBL
- HDL
- HMD
- HJL
- BHE
- CKG
- CK
- CKA
- CKS
- CKF
- CKJ
- CKL2
- CKL2 \*-HC
- CKH2
- CKLB2
- NCK/SCK/FCK
- FJ
- FK
- Ending

### 1 Judgment of irregular workpieces



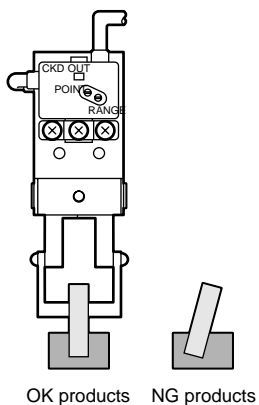
When workpieces A and B are different sizes and it must be decided when each workpiece is grasped, output 1 is issued when A is grasped and output 2 is issued when B is grasped. When using switch type, settings are made easily with the trimmer on the length of the measurement sensor's amplifier unit. Display switch outputs are digitally set with buttons. The trimmer changes the operation point and range, so signals for each A and B workpiece can be output if a narrow movement range is set. This lets the workpiece be decided on the load side, i.e., PLC. Analog output changes with workpiece size, so control is made by retrieving changes in the PLC.

### 2 Pressfit of workpiece



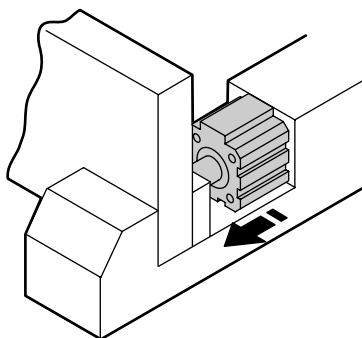
Using a length measurement sensor with the compact cylinder lets workpiece press-fitting be inspected with the length measurement sensor's output while the workpiece is press-fitted with the cylinder. Workpiece thickness is measured with the display. A line is automated by retrieving determined signals in the PLC. For the cylinder type, measurement length range is limited and set at the factory to match the user's required detection position, letting the system can be started by simply connecting wiring.

### 3 Workpiece grasping posture confirmation



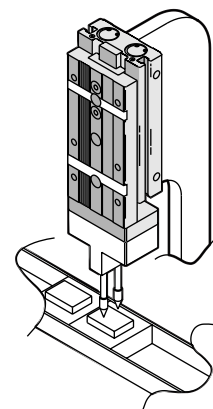
This is used to check whether the workpiece is held correctly. The operating range is set to narrow so that the sensor turns on only when the workpiece is correctly grasped.

### 4 Clamp state confirmation



Clamping is controlled by retrieving the cylinder piston stop position as length measurement sensor output.

### 5 Part inspection state confirmation



Small parts are inspected with the high-precision guided cylinder.



Pneumatic components

# Safety precautions

Always read this section before starting use.

Refer to Intro 69 for general precautions of the cylinder, and to Intro 78 for general precautions of the cylinder switch.

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/BHG
LHA
LHAG
HKP
HLA/HLB
HLAG/HLBG
HEP
HCP
HMF
HMFb
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/SCK/FCK
FJ
FK
Ending

## Cylinder/hand with length measuring sensor: actuator section

### Design & Selection

#### 1. Hand

##### CAUTION

- Gripping power differs based on the length of jaws on the master key, impress voltage, bore size, etc. Select the model based on the workpiece to be gripped.
- It is equivalent to standard type for the grasp characteristics. (BHA: page 284 BHG: page 290 BHE: page 405). Common precautions for the hand are given on pages 260 to 263.
- Avoid using outdoors.
- The range of the most preferable ambient temperature is 5 to 60°C. Do not use the unit if the temperature exceeds 60°C, or damage or operation faults may occur. If the temperature drops below 5°C, the water in the circuit could freeze and cause damage or operation faults, so always provide means to prevent freezing.
- Do not use this product in an environment where corrosion may occur. Failure to do so may cause damage or operation faults.

- Clamping is more accurate when done at low speed. Repeatability is also stable.
- Check that excessive lateral load is not applied to the master key.
- Selection guide of mixed workpiece selection applications  
Select the output type depending on the appearance differential of the workpiece.  
Workpiece differential dimension 1mm + workpiece tolerance variation : switch output type  
Workpiece differential dimension 1mm + workpiece tolerance variation : analog output type
- \* With switch output type, switch output position setting is rough. The above values are reference only, and differ based on the working environment. Consult with CKD for details.

#### 2. Cylinder

##### CAUTION

- Refer to "Pneumatic Cylinders I (Catalog No. CB-029SA)" for details on selecting the LN-B Series cylinder.

### Installation & Adjustment

#### 1. Cylinder

##### CAUTION

- The LN-A Series uses a nonrotating type, do not use where rotational torque is applied to the LN-A Series piston rod. Non-rotating bushing may be deformed and the service life remarkably shortened. Consult with CKD for standard piston rod.
- Use this cylinder always in the state that the load is applied to an axial direction of piston rod.
- When fixing a workpiece onto the end of the LN-A Series piston rod, retract the piston rod to the stroke end and catch a wrench on the section stick out of the rod's parallel section. Tighten so that tightening torque is not applied to the cylinder.
- Applicable piping joints differ based on the cylinder bore size.

##### LN-A Series

Descriptions Bore size (mm)	Port size	Port dimension		Applicable joints	Joint O.D.	Inapplicable joints
		A	B			
φ12·16	M5 × 0.8	5.5	5.5	SC3W-M5-4 SC3W-M5-6 GWS4-M5-S GWS4-M5 GWL4-M5 GWL6-M5	φ11 or less	GWS6-M5
φ20		8	5.5			
φ32	Rc1/8	8	8	SC3W-6-4/6/8 GWS4-6 GWS6-6 GWS8-6 GWL4-6 GWL6-6	φ15 or less	GWS10-6 GWL8-6 GWL10-6
φ50	Rc1/4	10.5	10.5	SC3W-8-6/8/10 GWS4-8 GWS6-8 GWS10-8 GWL4 to 12-8	φ21 or less	GWS-12-8



##### LN-B Series

Descriptions Bore size (mm)	Port size	Port dimension	Applicable joints	Joint O.D.
		A		
φ12	M5 × 0.8	5.5	SC3W-M5-4 SC3W-M5-6 GWS4-M5-S GWS4-M5	φ11 or less
φ16		6.5	SC3W-M5-4 SC3W-M5-6 GWS4-M5-S GWS4-M5 GWL4-M5 GWL6-M5 GWS6-M5	φ13 or less
φ20	Rc1/8	8	SC3W-6-4/6/8 GWS4-6 GWS8-6 GWL6-6 GWS6-6	φ15 or less
φ25		9	GWL4-6	

Cylinder/hand with length measuring sensor  
Length measuring function

## Installation & Adjustment

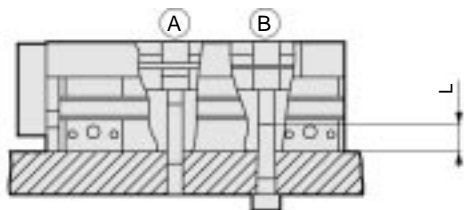
### CAUTION

■ When changing LN-B Series piping port position, apply adhesive to M3 and M5 plug (hexagon socket head set screw). (Low intensity adhesive such as LOCTITE 222/221, or ThreeBond 1344 recommended)

■ Avoid denting or scratches that could obstruct the parallelism of the LN-B Series main body (tube) installation face or slide table face.

Maintain parallelism of the installation mate at 0.05 mm or less.

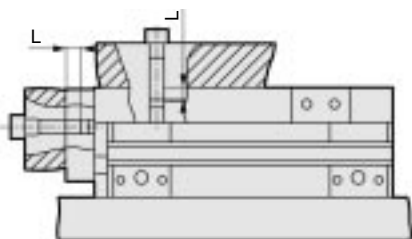
■ Observe the following values for the bolt insertion length and tightening torque when installing LN-B Series main body. (Fig. 1)



Descriptions	A		B		
	Applicable bolts	Tightening torque (N·m)	Applicable bolts	Tightening torque (N·m)	Insertion length L (mm)
LN-B-12	M4×0.7	1.4 to 2.4	M5×0.8	2.9 to 5.1	5 to 8
LN-B-16	M4×0.7	1.4 to 2.4	M6×1.0	4.8 to 8.6	6 to 9
LN-B-20	M5×0.8	2.9 to 5.1	M6×1.0	4.8 to 8.6	6 to 9
LN-B-25	M6×1.0	4.8 to 8.6	M8×1.25	12.0 to 21.6	8 to 12

■ Observe the following bolt insertion lengths and tightening torque when installing the jig on the slide table or end plate of LN-B Series.

(Fig. 2)



Descriptions	Slide table/end plate		
	Applicable bolts	Tightening torque (N·m)	Insertion length L (mm)
LN-B-12	M4×0.7	1.4 to 2.4	4 to 6
LN-B-16	M5×0.8	2.9 to 5.1	5 to 7.5
LN-B-20	M5×0.8	2.9 to 5.1	5 to 7.5
LN-B-25	M6×1.0	4.8 to 8.6	6 to 9

### 2. Hand

### CAUTION

■ Installation of an air dryer and filter is recommended to remove moisture from piping. Install the filter near the directional control valve (primary side) to remove rust, foreign matter and drain.

■ Use a corrosion-resistant galvanized pipe, stainless steel pipe, nylon pipe or rubber pipe, for piping material.

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

■ Before piping, air blow pipes to remove foreign matter, cutting chips, etc.

■ Check that sealing tape or adhesive does not enter when connecting the pipe to the components (filter, directional control valve, cylinder, hand chuck, etc.). Operation faults may occur if sealing tape or cutting chips, etc., are bitten.

■ When installing jaws onto the master key, take the effect onto the hand into consideration. Support the master key with a wrench, etc., so it does not twist, and tighten the jaw. The recommended tightening torques (N·m) are

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

**During Use & Maintenance**

**1. Cylinder**

**⚠ CAUTION**

- Use appropriate pliers (C type snap ring installation tool) to install and remove the rod bushing.
- Even when appropriate pliers are used, the snap ring may come off, causing possible damage or injury. When installing, check that the snap ring fits into the groove before supplying air.

**2. Hand**

**⚠ CAUTION**

- Regularly apply grease to the oscillating section of the master key to extend device life.
- Do not apply excessive force caused by dropping or collision to the master jaw, small jaw, or bearing guide. This could cause a large play in the master jaw and decrease the hand's repeatability to drop. The stop position of the piston, which acts as the sensor detector, could vary and decrease repeatability.

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

Cylinder/hand with length measuring sensor  
Length measuring function

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 -*.HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

## Sensor, amplifier, indicator section

### Design & Selection

#### 1. COMMON

##### ⚠ CAUTION

- Use only a DC safety power supply. Avoid connecting devices, such as motor or valves, that generate noise in power for this unit.
- When wiring, do not lay the power wire for the motor, etc., in the same pipe or use the same wiring (multi-conductor cable, etc.) because induction noise may be applied to the length measuring sensor. Check the inverter power supply and wiring section. (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 is changed.

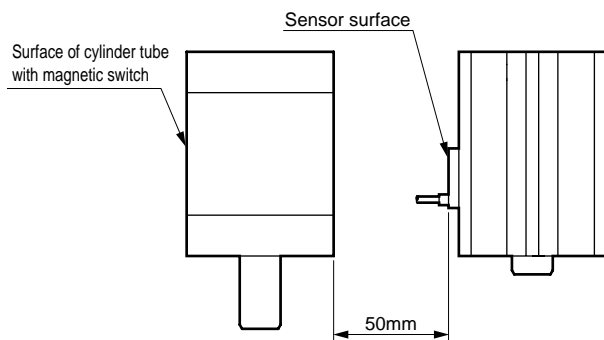
- An elastic lead wire is used for the sensor cable and output stage cable. To optimize elastic performance, check that the wire is not bent locally and that tension is not applied.  
Note that compared to the middle section of the load, elasticity drops at the outlet from the sensor case or amplifier 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 (e.g. local air conditioning).
- This product cannot be used outdoors or in an environment containing corrosive elements.
- Select switch output type when conducting rough judgments and analog output type or display when conducting detailed judgments, including length measurement.

### Installation & Adjustment

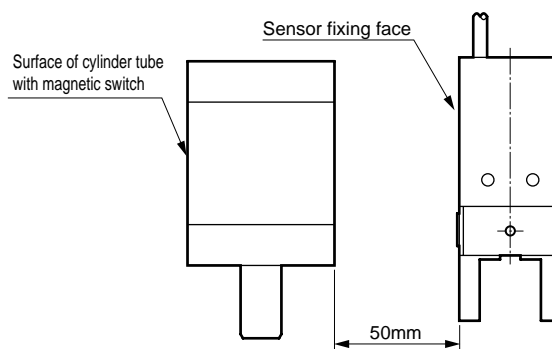
#### 1. COMMON

##### ⚠ CAUTION

- This product cannot be used in an environment where strong magnetic fields are generated (spot welding machine, etc.) because the sensor detection accuracy drop markedly.  
Take care when the cylinder and hand approach other cylinders with magnetic switches. As a guide, there should be no problem if there is a distance of 50mm and over between the sensor surface and cylinder tube surface as shown below.

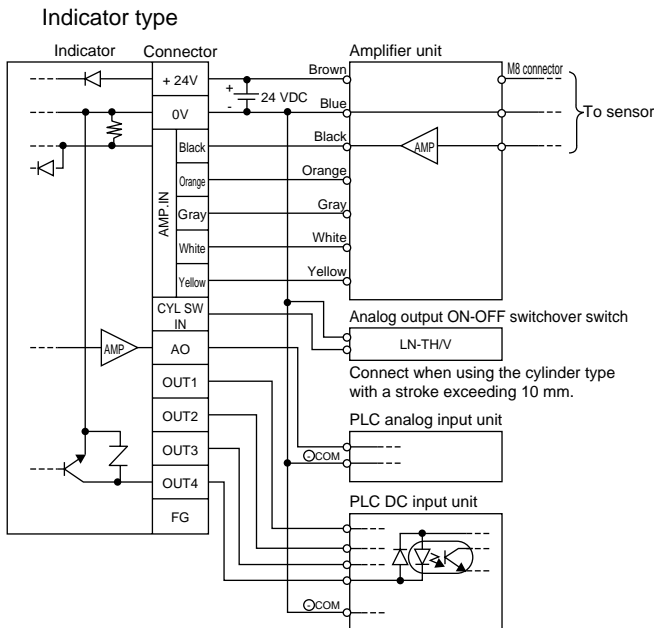


- If the sensor surface (sensor nameplate fixing face) is enclosed by a magnetic substance such as a steel plate, the magnetic force be disturbed, and the sensor not detect a magnetic field. Take care when installing the actuator.



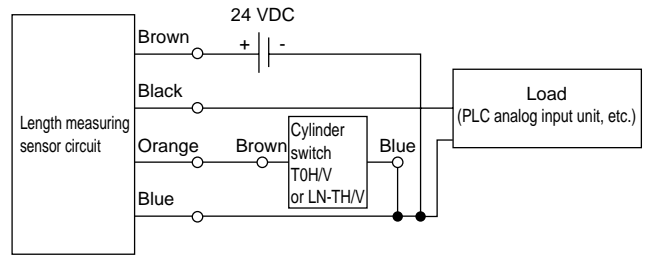
- When installing the amplifier unit case with the amplifier separated type using the through hole on the side, use an M3 cross-headed pan screw, and tighten with a torque of 0.5 to 0.7N·m.
- Rubber plugs are attached to devices with the amplifier installed operating point adjustment trimmer and operating range adjustment trimmer section to maintain waterproof properties. Fit these plugs in after adjusting.
- When installing the display using through holes on the base, use an M3 cross-headed pan screw and tighten with a torque of 0.5 to 0.7 N·m.

## ■ Connection of lead wire

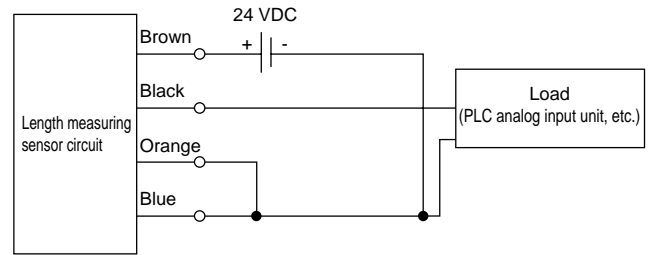


1. The display has 2-channel specifications, so there are two connectors for each, +24 V and 0 V. Each has continuity inside the display, so the display operates when one is connected.
2. Connector channels are irrelevant when only one amplifier is connected.
3. Turn power off before wiring.
4. Disconnect the female side before connecting wires to the display connector.
5. A 0.08 to 1.5mm<sup>2</sup> wire can be connected to the display connector with terminal screw tightening torque of 0.25 N·m.
6. Do not connect or disconnect the connector while power is on.
7. When using a cylinder with a stroke exceeding 10mm, 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. Treating the shield wire  
If noise is a problem, connect the shield wire to COM or FG.  
This is not usually needed.

When analog output type cylinder is installed

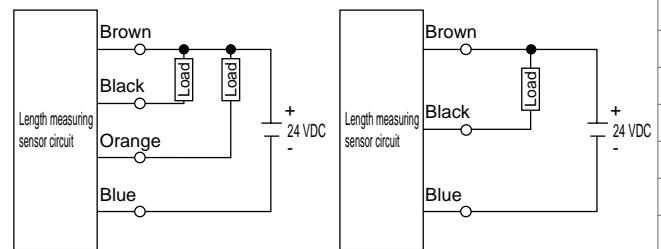


When analog output type hand is installed



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

Switch output type



Amplifier separate type

Amplifier mounting

Switch output is an NPN transistor open collector type.

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/BHG
LHA
LHAG
HKP
HLA/HLB
HLAG/HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HLB
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2*-HC
CKH2
CKLB2
NCK/SCK/FCK
FJ
FK
Ending

Cylinder/hand with length measuring sensor  
Length measuring function



RRC
GRC
RV3*
NHS
HR
LN
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 -*-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

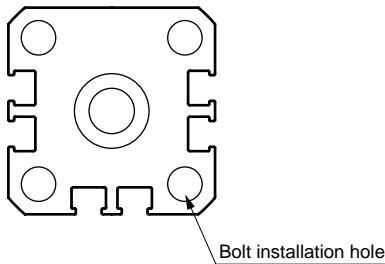
## Installation & Adjustment

### 2. Analog output indicator type

#### ⚠ CAUTION

##### ■ When cylinder is installed.

- When fixing cylinder bolts to fix this cylinder, use stainless steel bolts to maintain the characteristics of the sensor. If an iron bolt is used, distortion may occur in the sensor output voltage waveform, display error could increase, and analog output voltage linearity could drop. (Repeatability is not affected, but performance should be confirmed before operation.)
- Similar problems may occur if the cylinder contacts a magnetic object, especially near the LN Sensor or when the steel plate is shorter than the actuator.



Example. LN-A type

- The length measuring sensor and analog output voltage ON-OFF select T0H/V (Note) or LN-TH/V switch or other cylinder switches can be mounted on the same surface if the mounting positions do not interfere.
- Always connect a cylinder switch (T0H/V or LN-TH/V) to retrieve the analog output voltage within a random 8mm interval (10mm for display type) of the cylinder's full stroke.
- Tighten the sensor with a torque of 0.1 to 0.2 N·m, and install so that sensor set screw faces the cylinder head.

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

##### ■ When hand is installed

- If a magnetic substance such as steel plate is used for the base when installing the hand on the top using the socket and spigot, the analog output voltage linearity may drop. (Repeatability is not affected, but performance should be confirmed before operation.)
- Similar problems may occur on the front or side of the hand if the section contacts a magnetic object.
- When fixing the hand on the top, side or front, use stainless steel bolts to maintain sensor characteristics.
- Tighten the sensor with a torque of 0.1 to 0.2 N·m, and install so that the sensor set screw faces the master key (jaw).

##### ■ Precautions for cylinder and hand

- With the display, if a load short-circuit current flows to the switch output stage transistor because of incorrect wiring or connections, etc., the internal short-circuit protection circuit will cut the short-circuit current. (The output indicator (yellow) turns off and the short-circuit indicator (red) turns on.) To reset short-circuit protection, turn off supplied current once, correct wiring mistakes, etc., then turn the current on again. This product's protective circuit is effective only against specific incorrect connections and load short circuits. It does not necessarily provide protection against all incorrect connections.
- To prevent dislocation after fitting the connector's male and female sides, fix the female side to the male side with screws on the female side.

### 3. Switch output type

#### ⚠ 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. The operation is stabilized by turning the operating range adjustment trimmer clockwise and widening the operating range slightly.
- If a load short circuit current flows to the output stage transistor because of incorrect wiring or connections, etc., the internal short circuit protection circuit function (indicator light change from ON to OFF), and the short circuit current be cut. To cancel the short circuit protection, turn the power supply OFF once, correct any incorrect wiring or connections, and then turn power ON again. This product's protective circuit is effective only against specific incorrect connections and load short circuits. It does not necessarily provide protection against all incorrect connections.
- Install the sensor at a position where the red lines on the hand and sensor are aligned. Tighten the sensor with a torque of 0.1 to 0.2 N·m, and install so the sensor set screw faces the master key (jaw).



**During Use & Maintenance**

1. Common

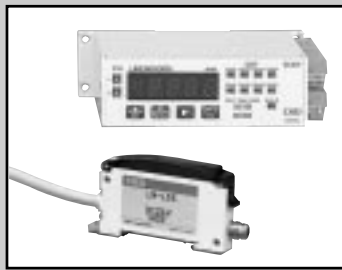
**CAUTION**

■ Length measuring sensor output voltage corresponds to the cylinder position. The value may fluctuate because of jig deformation and wear, etc., due to over-use. (With the hand, the value could fluctuate because of play in the open/close direction at the master jaw and deformation or wear of the small jaw.) 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.  
(See product specifications or handling precautions enclosed with the product for operation procedures.)

- Length measuring sensor output voltage varies with temperature drift in piston magnet flux density (changes in working temperature). This is minimized by the compensation circuit on the sensor. However, when using the display for more detailed judgments and 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 enclosed with the product for operation procedures.)
- Refer to the product specifications or handling precautions enclosed with the product for details on display operations.

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

Cylinder/hand with length measuring sensor  
Length measuring function



# Sensor, amplifier, indicator



Refer to Intro 21 for details.  
\* Excluding indicator



## Sensor/amplifier section specifications

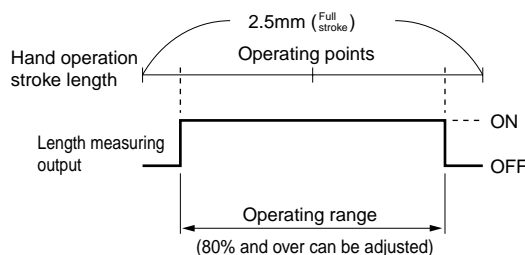
Descriptions		Amplifier mounting switch output type LN-*VS1PAH/V	Amplifier separate switch output type LN-*H/VCS*S	Amplifier separate analog output type LN-10*CLS	Amplifier separate indicator (LN-DN) dedicated LN-10*CLDS
Applications		PLC/relay		PLC	—
Power voltage		24 VDC ±10%			
Current consumption		20mA or less		30mA or less	
Indicator light		Switch output indicator light: Yellow LED ON lighting		Green LED lighting at power supply impressed Sensor installation position indicator yellow LED lighting	
Switch output point		1	2	—	
Switch output specifications		NPN open collector output, 30 VDC or less 50mA or less, internal voltage drop 1.2V or less		—	
Analog output specifications		—		1-5V Connecting load 50KΩ and over	1-4.5V (Input to indicator)
Analog output linearity		—		±5%F.S. or less	—
Valid length measuring range		—		Hand: Double jaw full stroke Cylinder: At any 8mm area over piston stroke	Hand: Double jaw full stroke Cylinder: At any 8mm area over piston stroke
Lead wire	Sensor	35mm (oil resistant vinyl cabtire cable, 3 conductor, 0.2mm <sup>2</sup> )	2m (oil resistant vinyl cabtire cable 3 conductor 0.2mm <sup>2</sup> shield bend resistance line)		
	Amplifier	3m (oil resistant vinyl cabtire cable, 3 conductor, 0.2mm <sup>2</sup> , bend resistance line)	3m (oil resistant vinyl cabtire cable, 4 conductor, 0.2mm <sup>2</sup> )	3m (oil resistant vinyl cabtire cable, 4 conductor, 0.2mm <sup>2</sup> , shield wire)	3m (oil resistant vinyl cabtire cable, 7 conductor, 0.2mm <sup>2</sup> , shield wire)
Insulation resistance		20MΩ and over with 500 VDC megger			
Withstand voltage		No failure impressed at 1000 VAC for one minute			
Maximum shock resistance	Sensor	294m/s <sup>2</sup>	980m/s <sup>2</sup>		
	Amplifier		294m/s <sup>2</sup>		
Protective structure	Sensor	IEC standards IP65	IEC standards IP67/oil resistance		
	Amplifier		IEC standards IP65		
Ambient temperature/humidity		-10 to 60°C, 85%RH or less			
Switch operating range adjusting range (Note 3)		0 to 80% or more of full stroke (Applies to one stroke of the two hand jaws)		—	
Switch operating points temperature drift		0.1mm/10°C or less		—	
Analog output temperature drift		—		50mV/10°C or less	—
Repeatability (Note 1)		± 0.1 mm or less at 25°C, with no external magnetic force, or actuator or jig deformation wear		—	
Installation method		Dedicated bracket installation	DIN rail or direct installation		

Note 1: Value including actuator repeatability. Applies to one stroke of two hand jaws.

Note 2: Refer to page 215 for a guide on selecting models for mixed workpiece sorting applications.

Note 3: Switch operation range adjustment

Example) BHA-LN-01CS operation stroke - 5 mm  
5 mm with two jaws: 2.5 mm for one jaw



If the operation point is set to the center of the stroke, adjustments exceeding 80% or more of the full stroke are possible.

### Indicator section specifications

Descriptions	LN-DN
Power voltage	24 VDC $\pm$ 10%
Current consumption	150mA or less
Sensor input	2CH (1-4.5V voltage input)
Output type	· Analog output (1 point) $\times$ 2 CH (1-5 V voltage output) · Switch output (4 points) $\times$ 2 CH: On-off output based on 1 random set position, or window output based on 2 same set positions
Type of display	· 7-segment display: Maximum display $\pm$ 1999.9 mm, minimum unit 0.1 mm · Absolute value/incremental value identification display, CH identification display, switch output display, switch output short-circuit display
Switch output type	NPN open collector output (Note 4), 30 VDC/50mA or less, internal voltage drop 1.2V or less, PLC, relay
Analog output type	1-5V voltage output, connecting load 500K $\Omega$ and over
Analog output linear accuracy (Note 1)	$\pm$ 1% F.S. or less (caused by at 25°C: our code measuring method)
7-segment display linear accuracy (Note 2)	7-segment display is reference value
Repeatability (Note 3)	$\pm$ 0.1mm or less (Deforming wear free of at 25°C, disturbance magnetic field or actuator, jig)
Analog output temperature drift	50mV/10°C or less (variation of approximate $\pm$ 0.1mm or equivalent with displayed value conversion)
Insulation resistance	20M $\Omega$ and over with 500 VDC megger
Withstand voltage	No failure impressed at 1000 VAC for one minute
Maximum shock resistance	294m/s <sup>2</sup>
Protective structure	IEC standards IP40
Ambient temperature/humidity	-10 to 60°C/85%RH or less
Installation method	DIN rail or direct installation

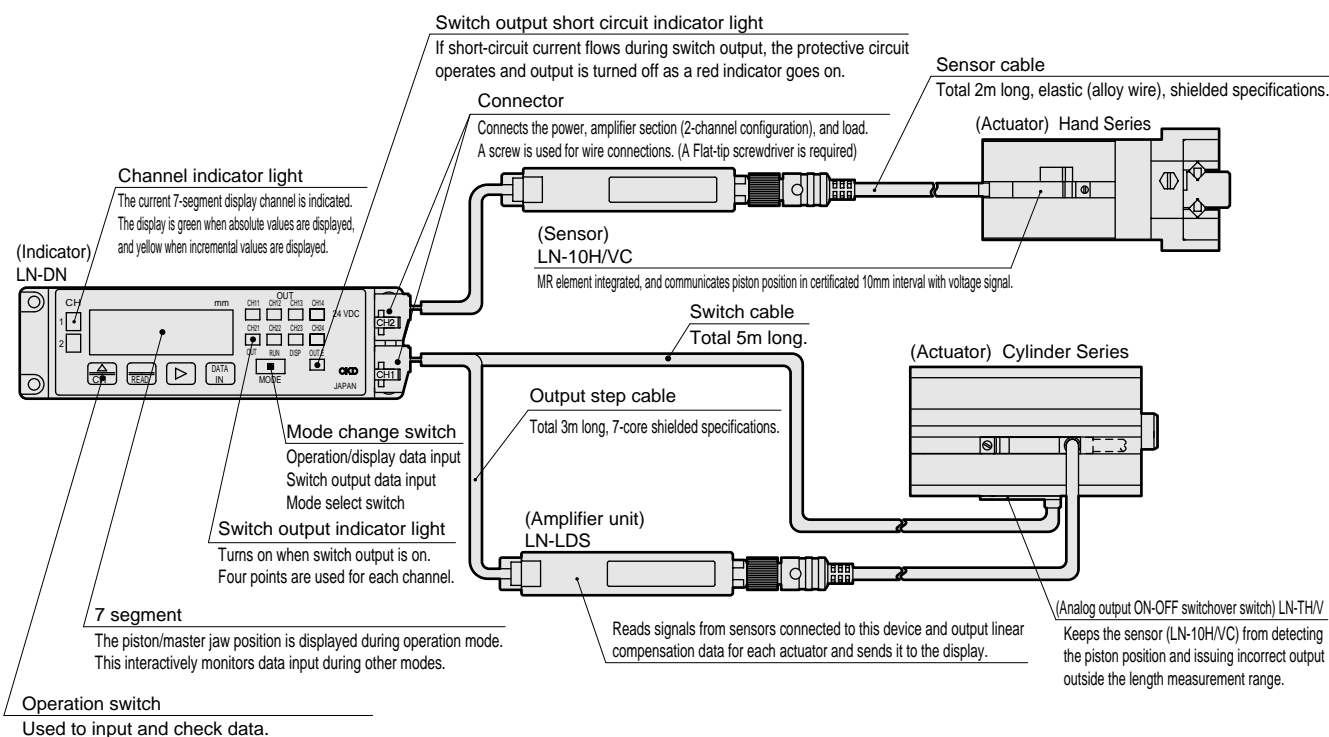
Note 1: Because an analog sensor for converting the piston magnetic flux density to a voltage is used, accuracy may decrease in actual use if magnetic contact occurs from either end of the piston stroke or an external magnetic field is encountered.

Note 2: Display accuracy varies with the span setting for the two piston stop points.

Note 3: This value includes actuator repeatability. This applies to one stroke of two hand jaw strokes.

Note 4: Consult with CKD for the PNP open collector output.

### Configuration of indicator type



RRC  
GRC  
RV3\*  
NHS  
HR  
**LN**  
FH100  
HAP  
BSA2  
BHA/  
BHG  
LHA  
LHAG  
HKP  
HLA/  
HLB  
HLAG/  
HLBG  
HEP  
HCP  
HMF  
HMFB  
HFP  
HLC  
HGP  
FH500  
HBL  
HDL  
HMD  
HJL  
BHE  
CKG  
CK  
CKA  
CKS  
CKF  
CKJ  
CKL2  
CKL2  
-H-C  
CKH2  
CKLB2  
NCK/  
SCK/FCK  
FJ  
FK  
Ending

Cylinder/hand with length measuring sensor  
Length measuring function

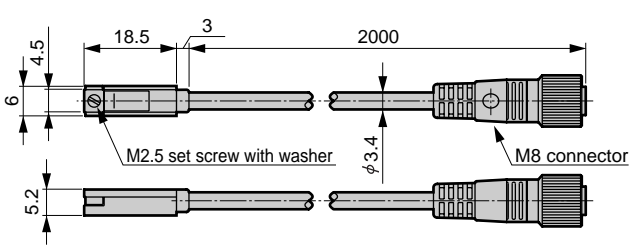
## Dimensions



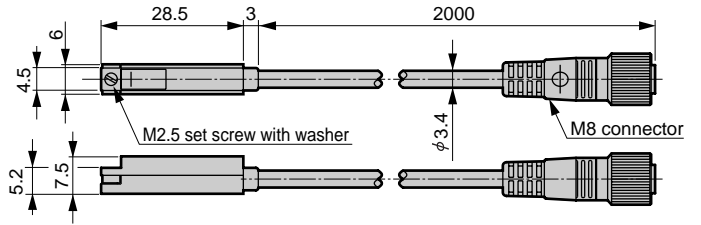
### Sensor

● Amplifier separate type

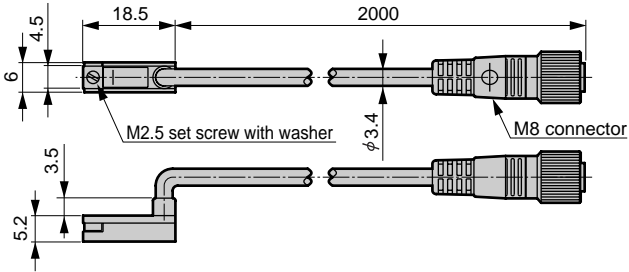
● LN-05HC



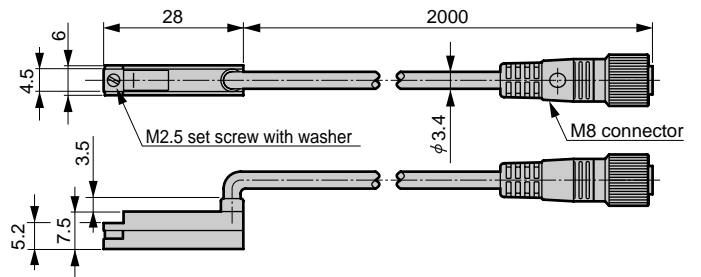
● LN-10HC



● LN-05VC



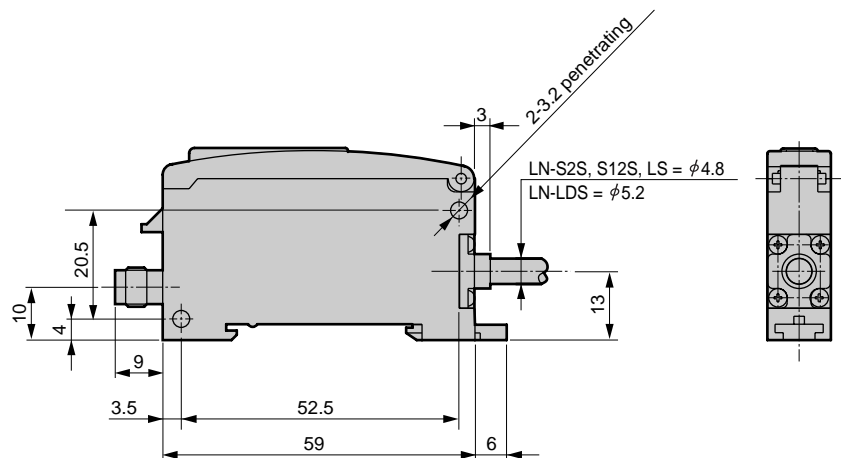
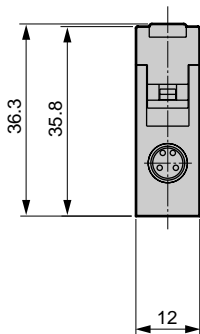
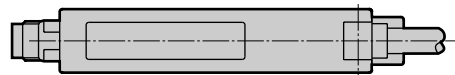
● LN-10VC



### Amplifier

● Amplifier separate type

● LN-\*S



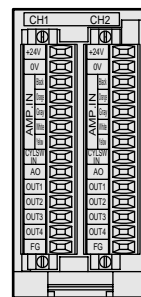
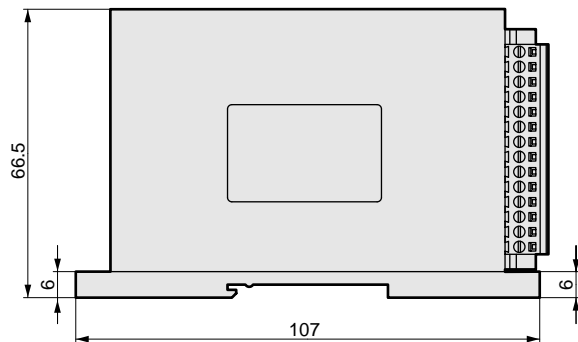
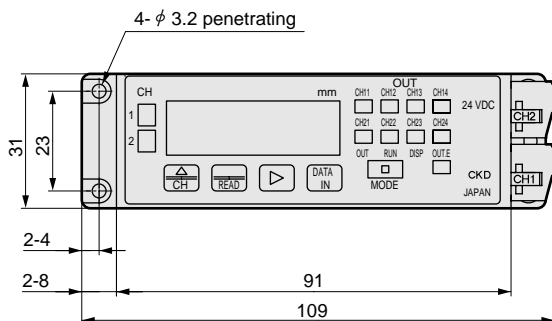
- RRC
- GRC
- RV3\*
- NHS
- HR
- LN**
- FH100
- HAP
- BSA2
- BHA/BHG
- LHA
- LHAG
- HKP
- HLA/HLB
- HLAG/HLBG
- HEP
- HCP
- HMF
- HMFB
- HFP
- HLC
- HGP
- FH500
- HBL
- HDL
- HMD
- HJL
- BHE
- CKG
- CK
- CKA
- CKS
- CKF
- CKJ
- CKL2
- CKL2-\*HC
- CKH2
- CKLB2
- NCK/SCK/FCK
- FJ
- FK
- Ending

### Dimensions



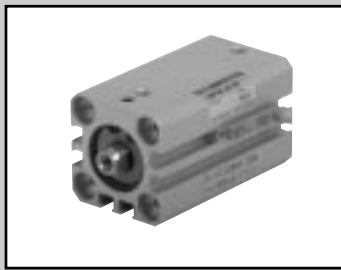
#### Indicator

● LN-DN



RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HLB
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

Cylinder/hand with length measuring sensor  
Length measuring function



## Cylinder with length measuring sensor

# LN Series

- Bore size:  $\phi 12$ ,  $\phi 16$ ,  $\phi 20$ ,  $\phi 32$ ,  $\phi 50$



Refer to Intro 21 for details.  
\* Excluding indicator



- RRC
- GRC
- RV3\*
- NHS
- HR
- LN**
- FH100
- HAP
- BSA2
- BHA/BHG
- LHA
- LHAG
- HKP
- HLA/HLB
- HLAG/HLBG
- HEP
- HCP
- HMF
- HMFB
- HFP
- HLC
- HGP
- FH500
- HBL
- HDL
- HMD
- HJL
- BHE
- CKG
- CK
- CKA
- CKS
- CKF
- CKJ
- CKL2
- CKL2-\*.HC
- CKH2
- CKLB2
- NCK/SCK/FCK
- FJ
- FK
- Ending

### Cylinder section specifications

#### ● LN-A\* Series



LN-A

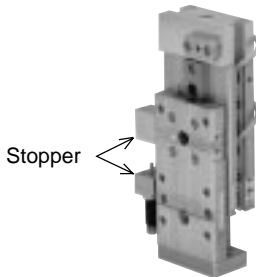
Descriptions	Model no. (Note 1)	
	LN-A**	LN-A0**
Actuation	Double acting single rod type	Double acting single rod low speed type
Working fluid	Compressed air	
Max. working pressure MPa	1.0	
Min. working pressure MPa	0.1	0.05
Withstanding pressure MPa	1.6	
Ambient temperature °C	-10 to 60 (no freezing)	
Bore size (Note 2) mm	$\phi 12$ , $\phi 16$ , $\phi 20$ , $\phi 32$ , $\phi 50$	
Stroke length (Note 2) mm	20, 30 ( $\phi 12$ , $\phi 16$ )/20, 50 ( $\phi 20$ , $\phi 32$ , $\phi 50$ )	
Stroke tolerance mm	0 to +1	
Port size	M5 ( $\phi 12$ , $\phi 16$ , $\phi 20$ ), Rc1/8 ( $\phi 32$ ), Rc1/4 ( $\phi 50$ )	
Piston speed mm/s	50 to 500	10 to 200
Cushion	None	
Lubrication	Not required (use lubrication time turbine oil Class 1 ISO VG32)	Not available
Revolvable angle tolerance °	$\pm 2$ ( $\phi 12$ ), $\pm 1.5$ ( $\phi 16$ , $\phi 20$ ), $\pm 1$ ( $\phi 32$ , $\phi 50$ )	

Note 1: Appearance and dimensions of cylinders are as same as compact cylinder SSD-ML (double acting non-rotating type), but internal structure differs. (This cylinder is for length measurement.)

Note 2: Bore size and stroke length on above table are for standard products. Other tube bore sizes and strokes are available customized. Note that  $\phi 80$  and over is not available.

Rod end male thread specifications is also available as a custom order. Consult with CKD for other custom orders.

#### ● LN-B\* Series



LN-B

Descriptions	Model no. (Note 1)	
	LN-B**	LN-BQ**
Actuation	Double acting	Double acting position locking type
Working fluid	Compressed air	
Max. working pressure MPa	0.7	
Min. working pressure MPa	0.15	0.2
Withstanding pressure MPa	1.0	
Ambient temperature °C	-10 to 60 (no freezing)	
Bore size (Note 2) mm	$\phi 12$ , $\phi 16$ , $\phi 20$ , $\phi 25$	
Stroke length (Note 2) mm	20·50	
Stroke tolerance mm	0 to +2	
Port size (Note 3)	Body side surface M5 ( $\phi 12$ , $\phi 16$ ), Rc1/8 ( $\phi 20$ , $\phi 25$ )	
	Rear body M3 ( $\phi 12$ ), M5 ( $\phi 16$ , $\phi 20$ ), Rc1/8 ( $\phi 25$ )	
Piston speed mm/s	50 to 500	
Cushion	Rubber cushioned	
Lubrication	Not required (use lubrication time turbine oil Class 1 ISO VG32)	

Note 1: Appearance and dimensions of cylinders are as same as linear slide cylinder LCS (double acting type) and LCS-Q (double acting position locking type) but internal structure differs. (This cylinder is for length measurement.)

Note 2: Bore size and stroke length on above table are for standard products. Other strokes are available customized. Note that  $\phi 6$  and  $\phi 8$  are not available.

Note 3: The position locking type does not have a piping section on the back of the unit.

Note 4: Consult with CKD for the stopper.

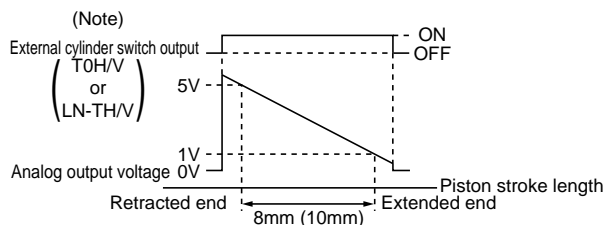
### Sensor/amplifier section (separate type) specifications

Refer to page 222.

### Indicator section specifications

Refer to page 223.

## Length measuring sensor output characteristics



(Note)

A separate analog output ON-OFF select switch for retrieving the analog output voltage is required at a random 8mm (10mm for display) interval of the full cylinder stroke. Combinations are shown below.

Analog output ON-OFF switchover switch model no.	Output type	Length measuring range
TOH/V5	Analog output type	8mm
LN-TH/V	Indicator type	10mm

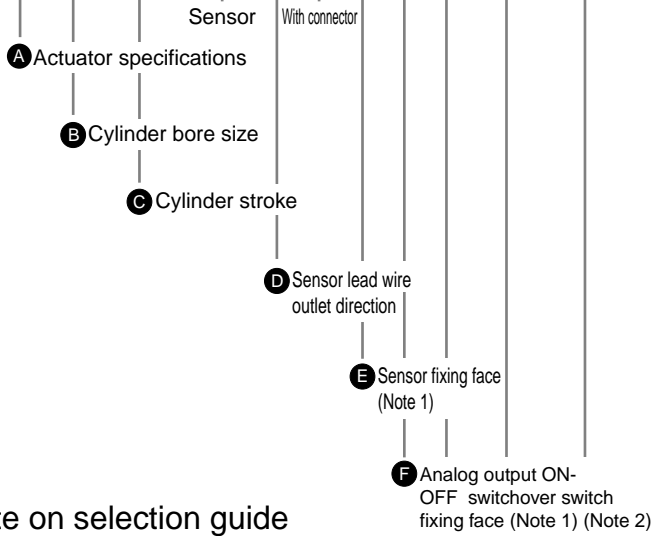


Model numbers are changed in June 2007.  
Contact CKD for new model numbers.

Capability and function are conventional.

### How to order

**LN - A 20 20 - 10 H C 1 2 5 LDS DN**

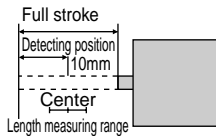


### Note on selection guide

Note 1: Sensor and cylinder switch can not be installed on the same side. (Only  $\phi 12$ ,  $\phi 16$ )

Note 2: Lead wire outlet direction of cylinder switch as same as sensor is selected automatically. Lead wire length is 5m specifications.

Note 3: If detection position is "10", center of detecting position is located at 10mm front from full stroke extended end of cylinder, and length measuring range to be within this center point  $\pm 4$  ( $\pm 5$ ) mm. The detection position is an integer.



Note 4: Two channels can be used for display. One channel is used by this model's display. When using the other channel, the display must be arranged separately. LN- (A)B(C) - (10)D(E)F(G) LDS

Note 5: Ordering a discrete model for maintenance:

Cylinder: LN- (A)B(C)

Sensor: LN- (10)D(C)

Amplifier: LN- (H)

Display: LN- (M)

Analog output on-off selection switch

SW-T0H5 or T0V5: Select when the mounted actuator is 20 or more in diameter with an analog output amplifier (LN-LS). LN-TH or TV: Select for display.

When placing a discrete order, see product specifications or handling precautions enclosed with the unit for details on setting.

● Cylinder mounting bracket model no.

**LN - A - LB - 20**

Symbol	Descriptions
<b>A Bore size</b>	
12	$\phi 12$
16	$\phi 16$
20	$\phi 20$
32	$\phi 32$
50	$\phi 50$

Note: Two axial feet and eight hexagon socket head cap screws for mounting are attached (4 pcs. for  $\phi 50$ ).

Cylinder mounting bracket (axial foot) is available for A and AO. Order separately when required.

Appearance and outline dimensions are the same as for the compact cylinder, but mounting bolt material differs. (Stainless steel bolt is used)

Cases may arise when a cylinder switch can be mounted in the separate groove for piston extension end and retraction end confirmation. Order separately when required.

● Discrete cylinder switch model no.

**SW - T 0 H 3**

Symbol	Descriptions
<b>A Output type</b>	
0	Reed 2 wire
5	Reed 2 wire without indicator light
2	Proximity 2 wire
3	Proximity 3 wire
2Y	Proximity 2 wire 2 color indicator
3Y	Proximity 3 wire 2 color indicator
<b>B Lead wire outlet direction</b>	
H	Axial lead wire
V	Radial lead wire
<b>C Lead wire length</b>	
Blank	1m (standard)
3	3m (option)
5	5m (option)

Symbol	Descriptions	
<b>A Actuator specifications</b>		
A	Super compact type (double acting)	
AO	Super compact type (double acting low speed type)	
B	Linear slide type (double acting)	
BQ	Linear slide type (double acting position locking type)	
<b>B Cylinder bore size (mm)</b>		
12	$\phi 12$	
16	$\phi 16$	
20	$\phi 20$	
25	$\phi 25$ (only to B, BQ)	
32	$\phi 32$ (only to A, AO)	
50	$\phi 50$ (only to A, AO)	
<b>C Cylinder stroke (mm)</b>		
20	20	
30	30 (only to A, AO with $\phi 12$ , $\phi 16$ )	
50	50 (to other than A, AO with $\phi 12$ , $\phi 16$ )	
<b>D Sensor lead wire outlet direction</b>		
H	Axial lead wire	
V	Radial lead wire	
<b>E Sensor fixing face</b>		
1	Right	
2	Bottom	
3	Left	
<b>F Analog output ON-OFF switchover switch installation plane</b>		
1	Right	
2	Bottom	
3	Left	
<b>G Detecting position (mm)</b>		
Refer to left figure. (Note 3)		
<b>H Amplifier unit output type and shape</b>		
LS	Amplifier separate/analog output type	
LDS	Amplifier separate/indicator (LN-DN)	
<b>I Indicator</b>		
DN	Switch output section NPN type indicator	

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
B5A2
BHA/BHG
LHA
LHAG
HKP
HLA/HLB
HLAG/HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HLB
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/SCK/FCK
FJ
FK
Ending

Cylinder with length measuring sensor  
Length measuring function

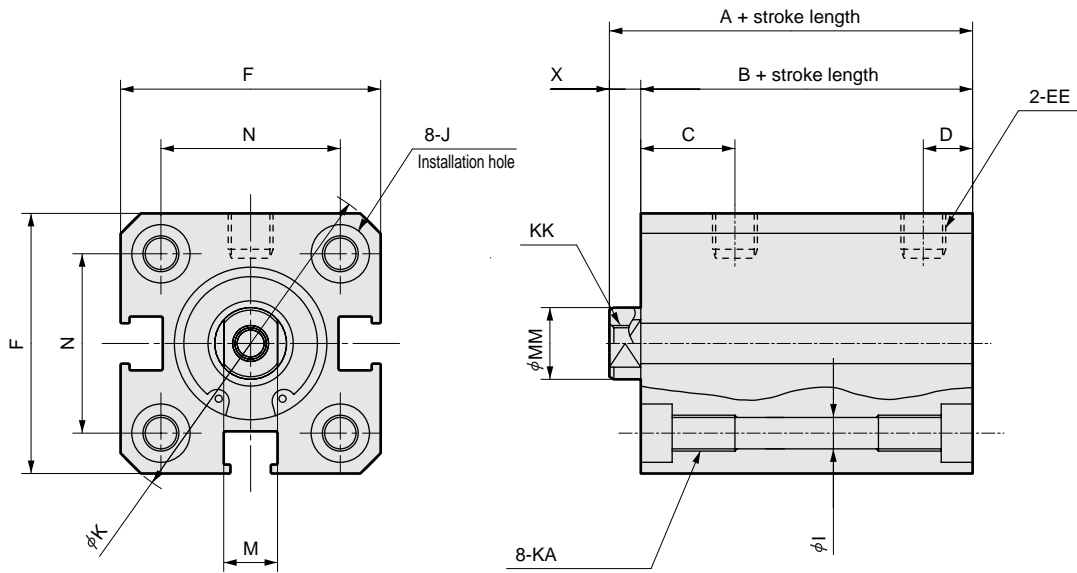
# LN-A (O) Series

## Dimensions

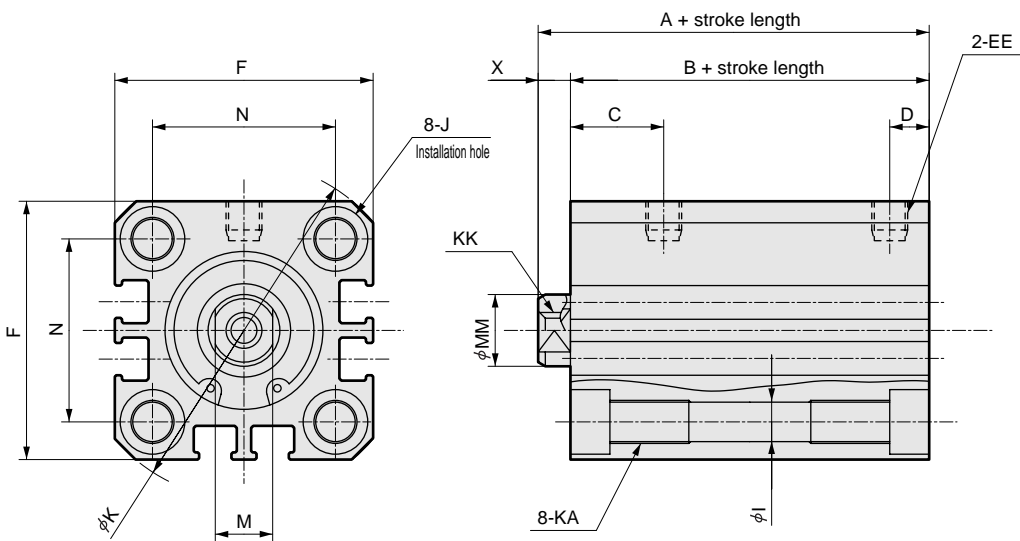
RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 -*HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

● LN-A (O)  
·  $\phi 12 / \phi 16$

Note 1: See pages 224 to 225 for outline dimensions of the sensor, amplifier (separate), and display.  
Note 2: See the next page for the dimensions table.

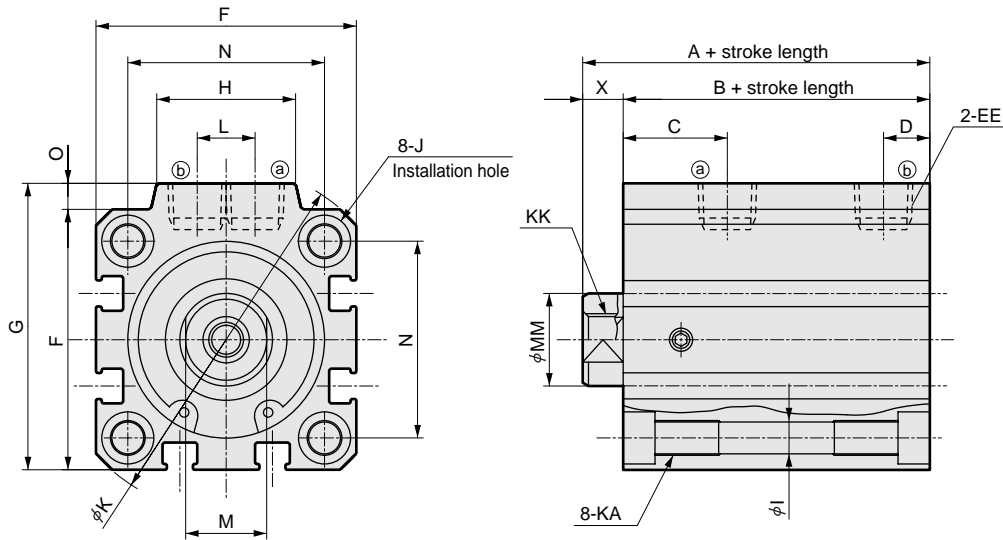


● LN-A (O)  
·  $\phi 20$



- LN-A (O)
- $\phi 32 / \phi 50$

Note : See pages 224 to 225 for outline dimensions of the sensor, amplifier (separate), and display.



Symbol	A	B	C	D	EE	F	G	H	I	J	K	KA	KK	L
Bore size (mm)														
$\phi 12$	35.5	32	10.5	5.5	M5	25	-	-	3.5	6.5 spot face depth 3.5	32	M4 depth 7	M3 depth 6	-
$\phi 16$	35.5	32	10.5	5.5	M5	29	-	-	3.5	6.5 spot face depth 3.5	38	M4 depth 7	M4 depth 8	-
$\phi 20$	39	34.5	13	5.5	M5	36	-	-	5.5	9 spot face depth 5.5	47	M6 depth 11	M5 depth 7	-
$\phi 32$	50	43	18	8	Rc1/8	45	49.5	24	5.5	9 spot face depth 5.5	60	M6 depth 11	M8 depth 13	10
$\phi 50$	53.5	45.5	15.5	10.5	Rc1/4	64	71	33	6.9	11 spot face depth 6.5	86	M8 depth 13	M10 depth 15	15

Symbol	M	MM	N	O	X	Remarks
Bore size (mm)						
$\phi 12$	5	6	15.5	-	3.5	Overall length is 5mm longer than standard products (SSD-ML). Other dimensions are same as standard products.
$\phi 16$	6	8	20	-	3.5	Overall length is 5mm longer than standard products (SSD-ML). Other dimensions are same as standard products.
$\phi 20$	8	10	25.5	-	4.5	The dimension is the same as standard products (SSD-ML).
$\phi 32$	14	16	34	4.5	7	The dimension is the same as standard products (SSD-ML).
$\phi 50$	18	20	50	7	8	The dimension is the same as standard products (SSD-ML).

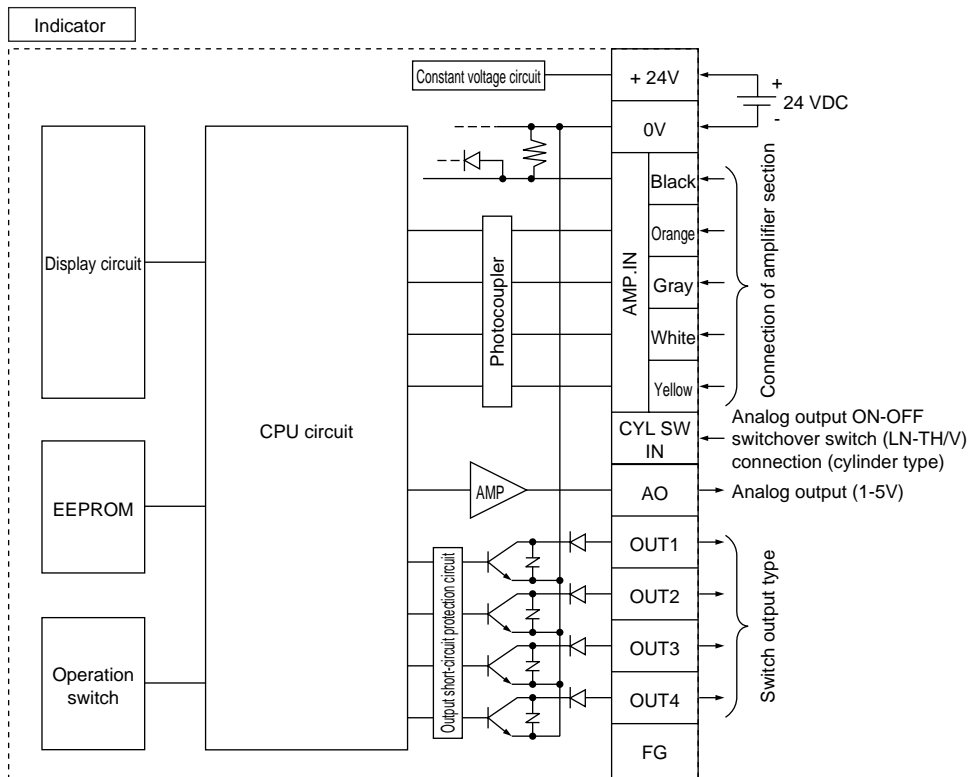
- RRC
- GRC
- RV3\*
- NHS
- HR
- LN**
- FH100
- HAP
- BSA2
- BHA/BHG
- LHA
- LHAG
- HKP
- HLA/HLB
- HLAG/HLBG
- HEP
- HCP
- HMF
- HMFB
- HFP
- HLC
- HGP
- FH500
- HLB
- HDL
- HMD
- HJL
- BHE
- CKG
- CK
- CKA
- CKS
- CKF
- CKJ
- CKL2
- CKL2  
-HC
- CKH2
- CKLB2
- NCK/  
SCK/FCK
- FJ
- FK
- Ending

Cylinder with length measuring sensor  
Length measuring function

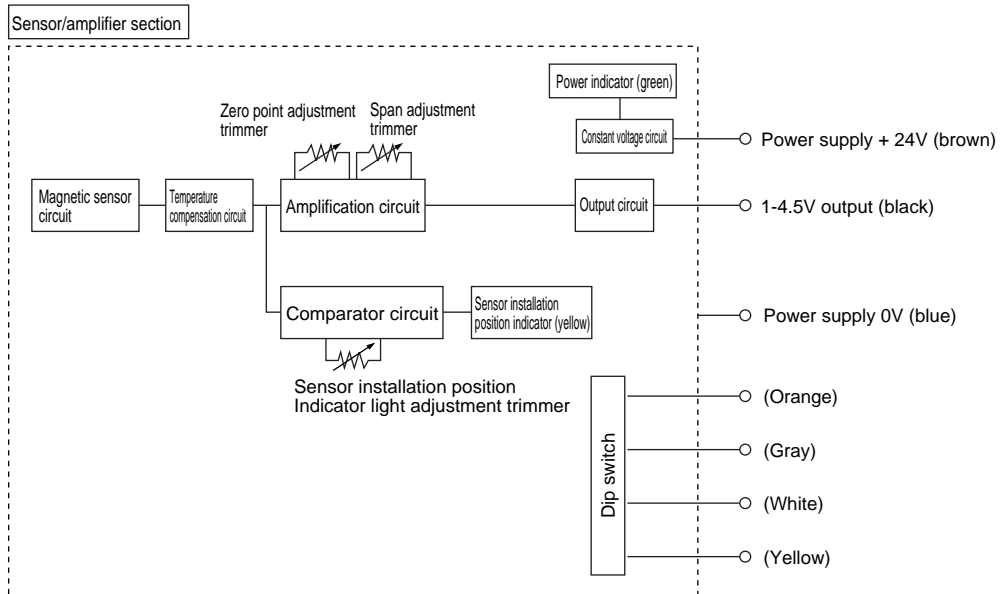
## Internal circuit diagram

● Indicator type

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 -*HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

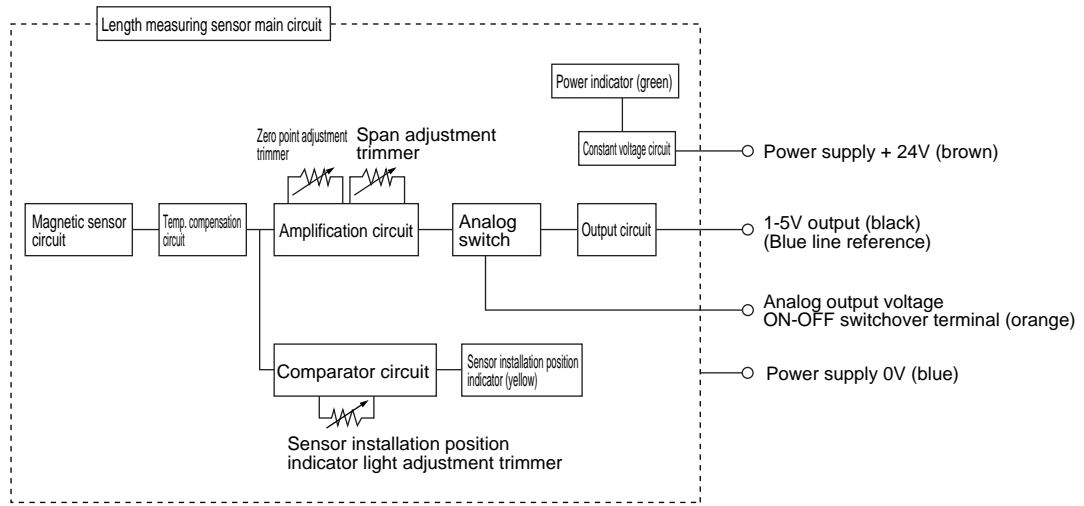


● An output stage transistor on or off during piston detection can be selected with the operation switch.

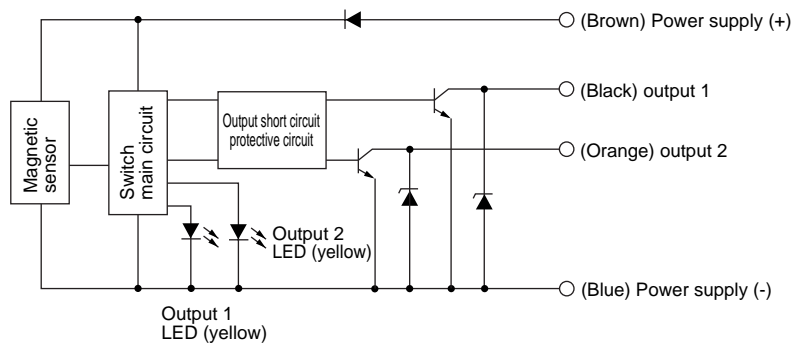


## Internal circuit diagram

### ● Analog output type

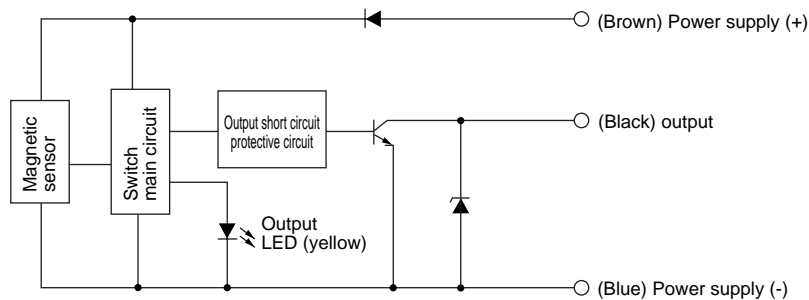


### ● Switch output type/amplifier separate type



● The output step transistor is turned ON during a piston detection.

### ● Switch output type, amplifier mounting



● The output step transistor is turned ON during a piston detection.

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

Cylinder with length measuring sensor/hand  
Length measuring function

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFb
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 -*-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

### When analog output type cylinder is installed

When adjusting the sensor installation position or analog output voltage, a workpiece (reference) should be provided so that the piston stops 4mm from the extension end and from the retraction end. The length measurement range center and the alignment center should be referenced.

Air pressure should be the same as for actual working conditions when making these adjustments.

#### 1 Sensor installation position adjustment method

Before shipment, the sensor is installed within the specified length measurement range (e.g.: set to the center if the range is from 8 mm before piston extended end to extended end). Follow the following procedures to adjust the position if the sensor installation position has been changed or the length measurement range has been changed.

- With the sensor removed, move the sensor installation position indicator light adjustment trimmer so the sensor installation position indicator light (yellow LED) turns ON. Set the trimmer to the center of the interval at which the yellow LED turns ON. (This is adjusted before the product is shipped, so adjust even if the trimmer has been moved inadvertently.)
- Move the cylinder piston to the center of the length measuring range.
- install the sensor on the cylinder. Fix the sensor where the following operations are satisfied per insertion direction. The sensor tightening torque is 0.1 to 0.2 N·m. Install the sensor case so the sensor set screw (M2.5 set screw with washer) faces the cylinder head.

##### 1) Insertion from rod end

Fix at the center of the second lighting interval including where the sensor installation position indicator turns on at (1). (The second lighting is a short interval such as roughly 1mm when the piston stroke is converted.)

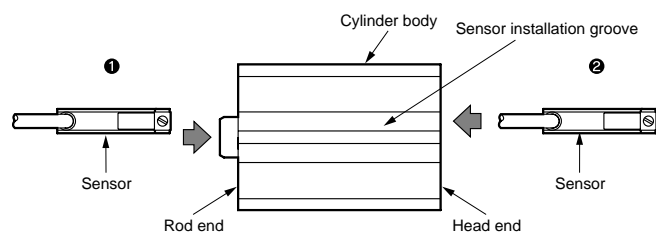
##### 2) Insertion from head end

Fix at the center of the second lighting interval including where the sensor installation position indicator turns on at (1). (The second lighting is a short interval such as roughly 1mm when the piston stroke is converted.)

- When the piston stroke of the cylinder on which the sensor is installed is longer than 8mm, and the length is measured within an 8mm stroke range of that stroke, connect cylinder switch TOH/V across the orange and blue lines so unnecessary analog output voltages are not output outside the length measurement range. (When the stroke is less than 8mm, short-circuit across the orange and blue wires.)

As for the conventional cylinder switch, do step (2) above, and then position this switch between ON points.

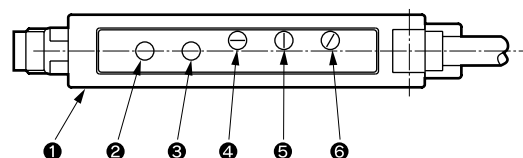
The tightening torque of a switch is 0.1 to 0.2 N·m.



#### 2 Analog output voltage adjustment method

If analog output voltage is output at 8mm in front of the piston extended end, for example, the specified measurement range is adjusted to 5V at 8mm in front of the extended end and 1V at the extended end.

- Connect the brown output stage lead to the (+) side of the 24 VDC stabilized power, the orange lead to the brown wire for cylinder switch TOH/V, and both blues wires to the (-) side of the power supply.
- Connect the black wire to the (+) side of the voltmeter and the blue wire to the (-) side of the voltmeter.
- Move the cylinder piston, and read the voltage value at the length measurement range's start end (e.g.: 8mm in front of extended end) and final end (e.g.: extended end).
- If the difference of the voltage in (2) is 4 V or less, turn the span adjustment trimmer slightly clockwise. If more than 4V, move the trimmer slightly counterclockwise.
- Move the cylinder piston again, and read the voltage at the length measurement range start and end. Adjust the zero point adjustment trimmer so the reading is 5V when using the start end as a reference, and 1V when using the end as a reference.
- Repeat steps (3), (4) and (5) several times, and adjust finely.



- 1 Amplifier unit case
- 2 Power indicator light
- 3 Sensor installation position indicator light
- 4 Sensor installation position indicator light adjustment trimmer
- 5 Zero point adjustment trimmer
- 6 Span adjustment trimmer



### When analog output type hand is installed

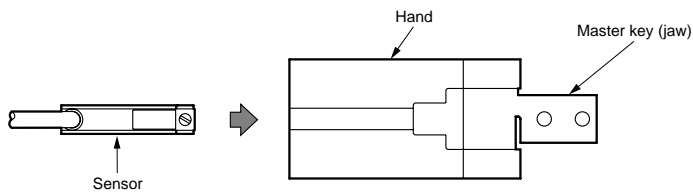
#### 1 Sensor installation position adjustment method

Before shipment, the sensor is installed at the center of the stroke for both jaws on the master jaw. Follow the following procedures to adjust the position if the sensor installation position has been changed or the hand has been replaced.

- (1) With the sensor removed, move the sensor installation position indicator light adjustment trimmer so the sensor installation position indicator light (yellow LED) turns ON. Set the trimmer to the center of the interval at which the yellow LED turns ON. (This is adjusted before the product is shipped, so adjust even if the trimmer has been moved inadvertently.)
- (2) Move the hand master jaw (jaw) to the center of the stroke.
- (3) Install the sensor on the hand. Fix the sensor where the following operations are satisfied. The sensor tightening torque is 0.1 to 0.2 N·m. Install the sensor case so the sensor installation screw (M2.5 nonrotating set screw) faces the master jaw (jaw).

##### 1. Sensor installation position

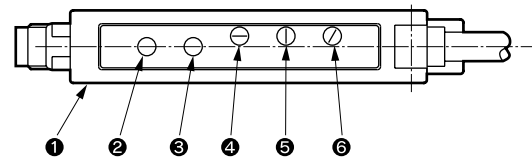
Fix at the center of the second lighting interval including where the sensor installation position indicator turns on at (1). (The second lighting is a short interval such as roughly 1mm when the piston stroke is converted.)



#### 2 Analog output voltage adjustment method

The analog output voltage is adjusted so the master jaw (jaw) full stroke is 5 V when open and 1 V when closed. However, the voltage may slightly vary due to the working environment (effected by magnetic bodies in the area), so adjust finely with the following procedures.

- (1) Connect the brown wire to the (+) side of the 24 VDC stabilized power, and the blue and orange wires to the (-) side.
- (2) Connect the black wire to the (+) side of the voltmeter and the blue wire to the (-) side of the voltmeter.
- (3) Move the master jaw, and read the voltage value when open and closed.
- (4) If the difference of the voltage in (3) is 4 V or less, turn the span adjustment trimmer slightly clockwise. If more than 4 V, move the trimmer slightly counterclockwise.
- (5) Move the master jaw again, and read voltage when open and closed. Adjust the zero point adjustment trimmer so the reading is 5 V when using the open state as a reference, and 1 V when using the closed state as a reference.
- (6) Repeat steps (3), (4) and (5) several times, and adjust finely.



- 1 Amplifier unit case
- 2 Power indicator light
- 3 Sensor installation position indicator light
- 4 Sensor installation position indicator light adjustment trimmer
- 5 Zero point adjustment trimmer
- 6 Span adjustment trimmer

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
B5A2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

Cylinder/hand with length measuring sensor  
Length measuring function

RRC
GRC
RV3*
NHS
HR
<b>LN</b>
FH100
HAP
BSA2
BHA/ BHG
LHA
LHAG
HKP
HLA/ HLB
HLAG/ HLBG
HEP
HCP
HMF
HMFB
HFP
HLC
HGP
FH500
HBL
HDL
HMD
HJL
BHE
CKG
CK
CKA
CKS
CKF
CKJ
CKL2
CKL2 *-HC
CKH2
CKLB2
NCK/ SCK/FCK
FJ
FK
Ending

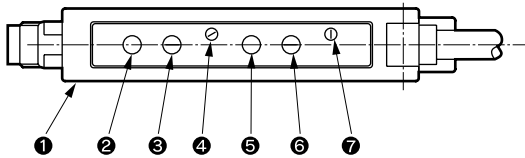
### Switch output type

#### 1 Sensor installation position adjustment method

Before shipment, the sensor is installed at the center of the stroke for both jaws on the master key (jaw). Follow the following procedures to adjust the position if the sensor installation position has been changed or the hand has been replaced.

- (1) Align the red lines on the sensor and hand, and tighten with a sensor tightening torque of 0.1 to 0.2 N·m.
- (2) Install the sensor so the set screw (M2.5 set screw with washer) faces the master key (jaw).

Amplifier separate type

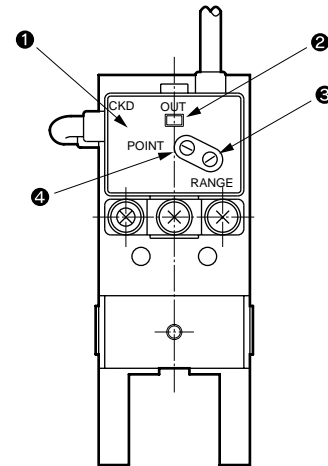


- 1 Amplifier unit case
- 2 Output 1 indicator light
- 3 Output 1 operating range adjustment trimmer
- 4 Output 1 operating points adjustment trimmer
- 5 Output 2 indicator light
- 6 Output 2 operating range adjustment trimmer
- 7 Output 2 operating points adjustment trimmer

#### 2 Setting the switch output position

- (1) Move the hand's master key (jaw) to the position where the switch is to be output.
- (2) Turn the operating range adjustment trimmer a half turn clockwise and then turn slightly clockwise and set it temporarily.
- (3) Move the operating point adjustment trimmer and turn output ON. Set the trimmer at the center of the ON interval.
- (4) Move the operating range adjustment trimmer, and determine the operating range. The operating range is increased or decreased using the approximate center of the operating points as a reference.
- (5) Move the master key (jaws) several times and turn the switch output ON and OFF. Repeat steps (3) and (4) for fine adjustment.

Amplifier mounting



- 1 Amplifier unit case
- 2 Output indicator light
- 3 Output operating range adjustment trimmer
- 4 Output operating points adjustment trimmer

\* Refer to the handling precautions enclosed with the product for details on adjusting and setting the display.