

SSD-LN BH*-LN

Length measuring function

Cylinder/hand with length measuring sensor

ø12/ø16/ø20/ø25/ø32/ø50

Overview

A length measuring sensor is installed onto the small cylinder hand component. This enables work on workpieces (actuator function) and detection/inspection (defective parts check/simple length measurement) at the same time.

Features

Select according to applications

Linear and gripping system are available for actuator. Output can be selected depending on the application.

Defective parts check for workpieces can be done.
(Display, analog output)

Defective parts check for workpieces and simple length measurement in the specified stroke range can be done at the same time as the actuator work.

High function with added display
(Display)

Display is a two-channel specification, and two actuators can be controlled with a single display. (One analog output point, four switch output points x 2 CH)

Intermediate detection available
(Switch output)

Sorting mixed workpieces and workpiece detection is possible.

In addition, amplifier installed type is capable of detecting one point and separated amplifier type up to two points.

Operation adjustment is easy
(Switch output)

Switch operation point, operating range can be easily adjusted with trimmer.

Bend resistance improved

Alloy wire is used for the sensor lead wire. Leadout direction can be selected from 2 directions.



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LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

2 Function integrated actuator.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Series includes display Inspection is simple and easy

Display added to analog output.
By the addition of display, inspection results are processed directly and digitally displayed, thus eliminating the hassles of post-processing.

Simplifying conventionally difficult intermediate search (hand)

Since the sensor output is proportional to the actuator operation, workpiece intermediate gripping can be detected. A variety of workpiece transport needs are met, such as sorting mixed workpieces, detecting differently shaped workpieces and abnormal gripping detection.

By key operation adjustment is easy

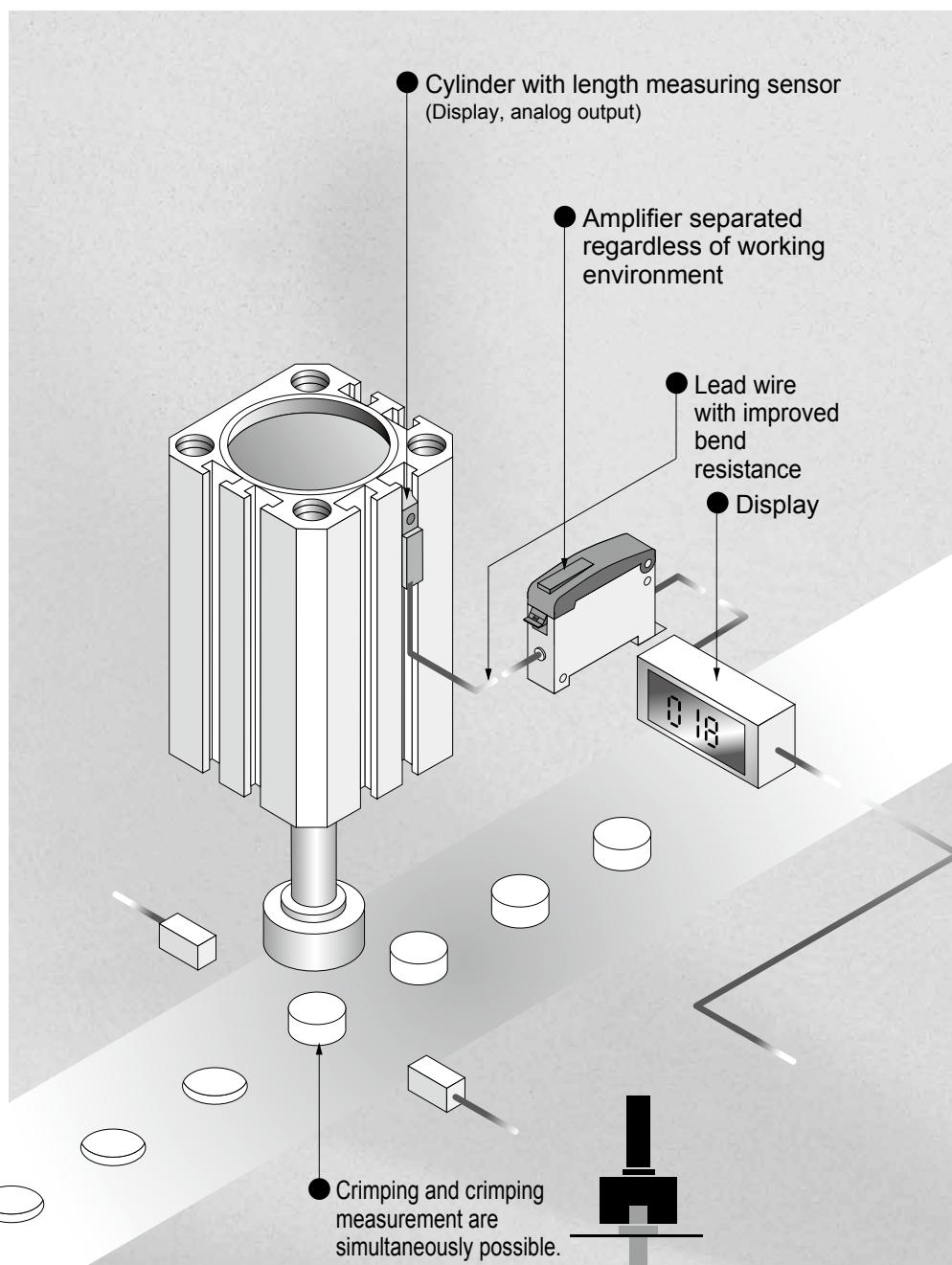
The switch operation point and operating range are easily adjusted with key operation on the display.

Models and bore sizes have increased A wide range of choices according to the application

Mounted actuator has models compatible with super increased compact cylinder SSD series, cross roller parallel hand BHA/BHG series and highly rigid centering hand BHE series and can support a wider range of applications.

[Length measuring sensor]

Named as a portmanteau of the terms linear (meaning straight line) and norm (meaning reference), a newly developed special magnetic sensor (PAT.P) that can obtain a nearly linear output for the travel distance of the piston with magnet. Intermediate detection and length measurement functions never achieved by conventional cylinder switches can be added to the actuator.



Eliminates the inspection process.

LINEAR NORM

A newly developed length measuring sensor is installed onto the small cylinder and hand component. This is a next-dimension pneumatic component that enables workpiece operation (actuator function) and detection/inspection (defective parts check, simple length measurement) at the same time.

Actuator system with length measuring sensor (LN)

Linear system

Cylinder with LN

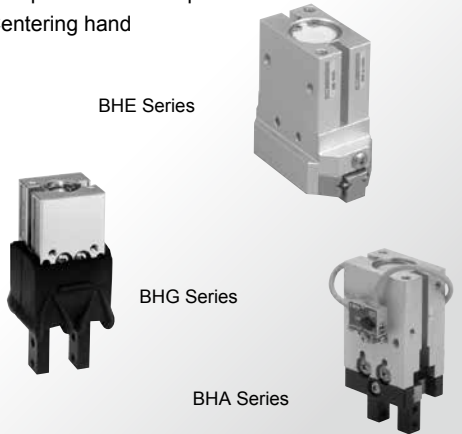
Cylinder
Super compact cylinder



Gripping system

Hand with LN

Applicable hand
Compact cross roller parallel hand
Centering hand

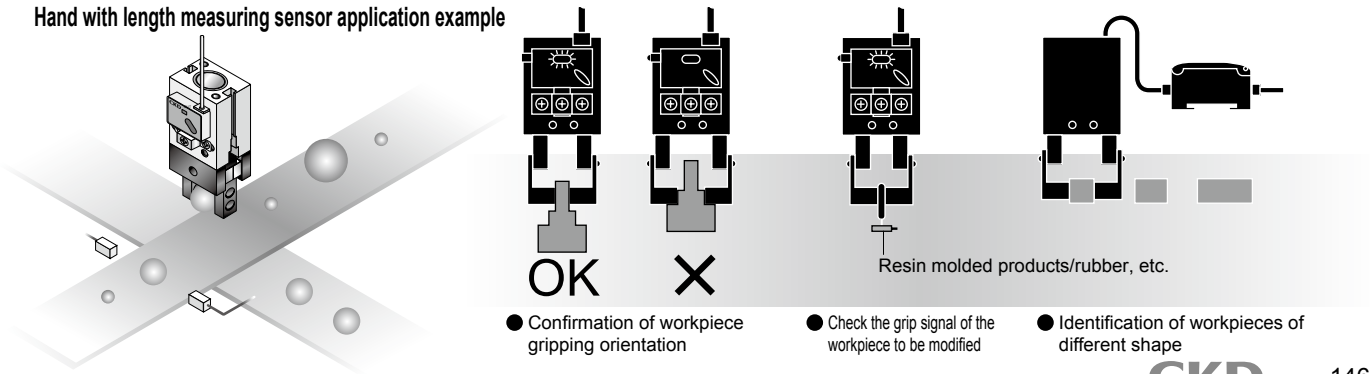


Output	Analog output	Switch/analog double output display	Analog output	Switch/analog double output display	Switch output
	1 to 5 V voltage output at an arbitrary 8 mm within the stroke	1 to 5 V voltage and switch output at an arbitrary 10 mm within the stroke	1 to 5 V voltage output at double finger full stroke	1 to 5 V voltage and switch output at double finger full stroke	ON-OFF output at double finger full stroke
Amplifier separated	●	●	●	●	●
Amplifier mounting	—	—	—	—	●
Bore size (mm)	ø12 ø16 ø20 ø32 ø50	ø20 or equiv. ø25 or equiv.	ø20 or equiv. ø25 or equiv.	ø12 ø16 ø20 ø50 or equiv. equiv. equiv. equiv.	
Stroke length (mm)	20, 30, 50		—		

Display



Hand with length measuring sensor application example

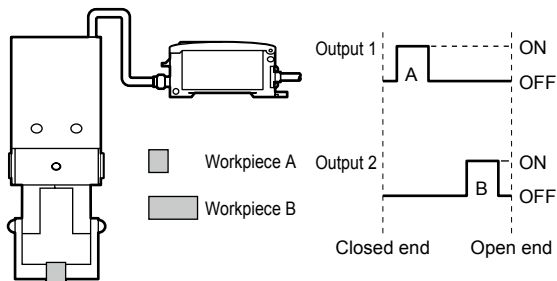


- Confirmation of workpiece gripping orientation
- Check the grip signal of the workpiece to be modified
- Identification of workpieces of different shape

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

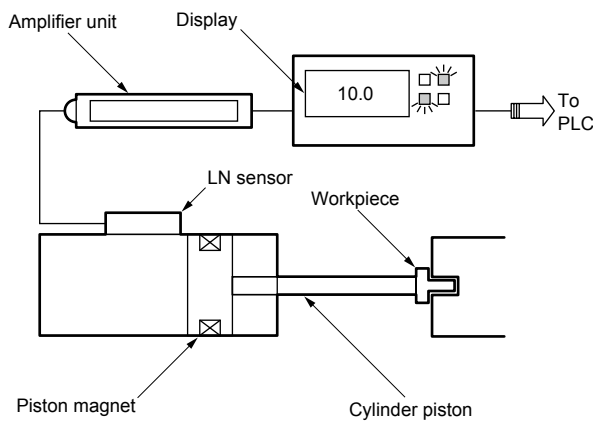
Applications

1 Determination of differently shaped workpieces



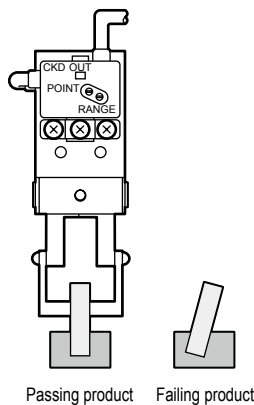
Workpieces A and B are of different sizes. To clarify which workpiece is gripped, 1 is to be output when A is gripped and 2 output when B is gripped. When using switch, settings are made easily with the trimmer on the length measuring sensor's amplifier unit. Display of switch outputs are digitally set with buttons. The trimmer can change the operation point and range, so signals for each A and B workpiece can be output if a narrow movement range is set, and workpieces can be judged on the load side (example: PLC). In addition, for the analog output, analog output will change in accordance with the size of the workpiece. Hence control is possible by reading these changes into the PLC.

2 Press fit of workpiece



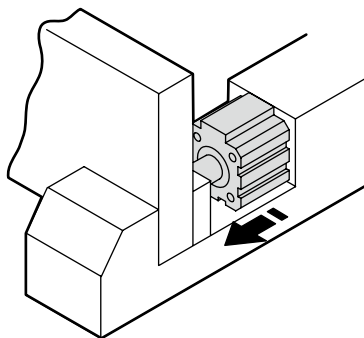
Using a length measuring sensor with the compact cylinder allows inspection of workpiece press-fitting with the length measuring sensor's output while the workpiece is press-fitted with the cylinder. When using a display, the thickness of the workpiece can be measured at the display section. By reading the determined signal into the PLC, the line can be automated. For the cylinder, the limited measured range length is set at the factory to match the user's required detection position, allowing the system to be used by simply connecting the wiring.

3 Confirmation of workpiece gripping orientation



It can be used to check whether the workpiece is gripped at the correct orientation. A narrow movement range is set so that it turns ON only at normal workpiece gripping orientation.

4 Confirmation of clamping



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

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending



Sensor/amplifier/display



* Excluding display



Sensor/amplifier section specifications

°F = 9/5°C + 32

Item		Amplifier installed/ switch output LN-□ VS1PAH/V	Amplifier separate/ switch output LN-□H/ VCS□S	Amplifier separate/ analog output LN-10□ CLS	Amplifier separate/ display (LN-DN) dedicated LN-10□CLDS
Applications		PLC/relay		PLC	_____
Power supply voltage		24 VDC ±10%			
Current consumption		20 mA or less		30 mA or less	
Indicator lamp		Switch output indicator lamp: yellow LED lit when ON		Green LED lit when power applied Sensor mounting position display yellow LED lit	
Switch output point		1	2	_____	
Switch output		NPN open collector output, 30 VDC or less 50 mA or less, internal voltage drop 1.2 V or less		_____	
Analog output		_____		1 to 5V connected load 50 kΩ or more	1 to 4.5V (Input to display)
Analog output linearity		_____		±5% F.S. or less	_____
Valid measured range length		_____		Hand: Double finger full stroke Cylinder: At any 8 mm area over piston stroke	Hand: Double finger full stroke Cylinder: At any 10 mm area over piston stroke
Lead wire	Sensor section	35 mm (oil resistant vinyl cabtyre cable 3-conductor 0.2 mm ²)	2 m (oil resistant vinyl cabtyre cable 3-conductor, 0.2 mm ² shielded bend resistant wire)		
	Amplifier section	3 m (oil resistant vinyl cabtyre cable 3-conductor, 0.2 mm ² , bend resistant wire)	3 m (oil resistant vinyl cabtyre cable 4-conductor 0.2 mm ²)	3 m (oil resistant vinyl cabtyre cable 4-conductor, 0.2 mm ² , shielded wire)	3 m (oil resistant vinyl cabtyre cable 7-conductor, 0.2 mm ² , shielded wire)
Insulation resistance		20 MΩ and over with 500 VDC megger			
Withstand voltage		No failure after 1 minute of 1,000 VAC application.			
Shock resistance	Sensor section	294 m/s ²	980 m/s ²		
	Amplifier section		294 m/s ²		
Degree of protection	Sensor section	IEC standard IP65	IEC standards IP67, oil resistance		
	Amplifier section		IEC standard IP65		
Ambient temperature/humidity		-10 (14°F) to 60°C (140°F), 85% RH or less			
Switch operating range adjusting range (*3)		0 to 80% and over of full stroke (Applies to one stroke of the two hand fingers)		_____	
Switch operating points temperature drift		0.1 mm/10°C (50°F) or less		_____	
Analog output temperature drift		_____		50 mV/10°C (50°F) or less	_____
Repeatability (*1)		±0.1 mm or less (at 25°C, magnetic field disturbance, no deformation or wear of actuator/jig)			_____
Mounting method		Dedicated bracket mounting	DIN rail or direct mount		
Weight (g)		54	172	175	199

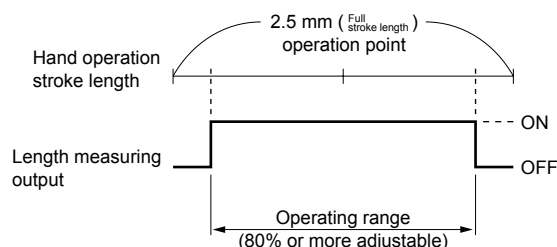
*1 : This value includes actuator repeatability. This applies to one stroke of two hand finger strokes.

*2 : Refer to page 1497 for a guide on selecting models for mixed workpiece sorting applications.

*3 : Switch operating range adjusting range

Example) BHA-LN-01CS operational stroke length - 5 mm

5 mm for two fingers → 2.5 mm for one finger.



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

Display section specifications

Item	LN-DN
Power supply voltage	24 VDC ±10%
Current consumption	150 mA or less
Sensor input	2CH (1 to 4.5V voltage input)
Output	- Analog output (1 point) x 2CH (1 to 5 V voltage output) - Switch output (4 points) x 2CH: ON-OFF output based on arbitrary set position (1), or window output based on same set position (2)
Display	7-segment display (max. display ± 1999.9 mm, min. unit 0.1 mm) - Absolute value/incremental value identification display, CH identification display, switch output display, switch output short-circuit display
Switch output	NPN open collector output (*4), 30 VDC/50 mA or less, internal voltage drop 1.2 V or less, PLC, relay
Analog output	1 to 5 V output, connecting load 500 KΩ and over
Analog output linear accuracy (*1)	±1% F.S. or less (at 25°C (77°F): CKD regulated measuring method)
7-segment display linear accuracy (*2)	7-segment display is reference value
Repeatability (*3)	±0.1 mm or less (at 25°C, magnetic field disturbance, no deformation or wear of actuator/jig)
Analog output temperature drift	50 mV/10°C (50°F) or less (fluctuation of approx. ±0.1 mm or equivalent with displayed value conversion)
Insulation resistance	20 MΩ and over with 500 VDC megger
Withstand voltage	No failure after 1 minute of 1,000 VAC application.
Shock resistance	294 m/s ²
Degree of protection	IEC standard IP40
Ambient temperature/humidity	-10 (14°F) to 60°C (140°F)/85% RH or less
Mounting method	DIN rail or direct mount
Weight (g)	93

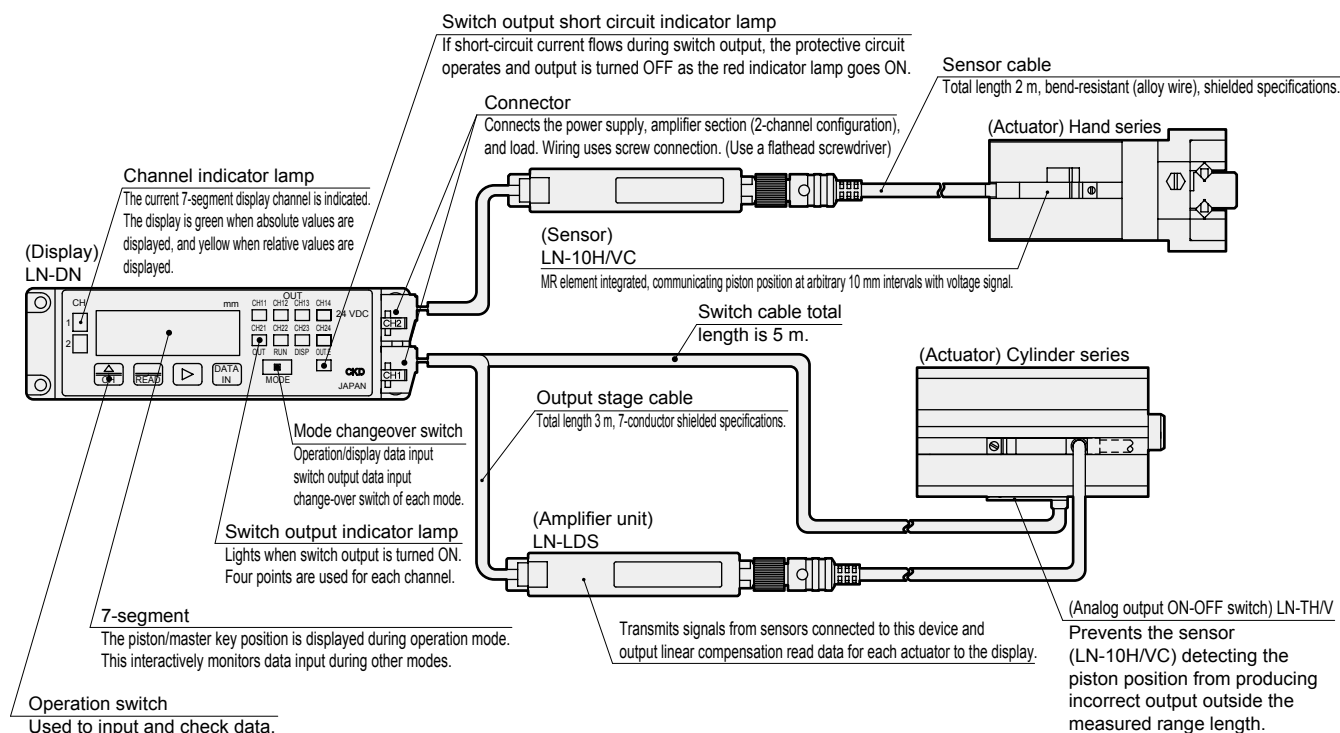
*1 : Because an analog sensor for converting the piston magnetic flux density to a voltage value is used, accuracy may decrease in actual use if magnetic contact occurs from either end of the piston stroke or a disturbing magnetic field enters the vicinity.

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

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

*4 : Contact CKD for the PNP open collector output.

Configuration of display



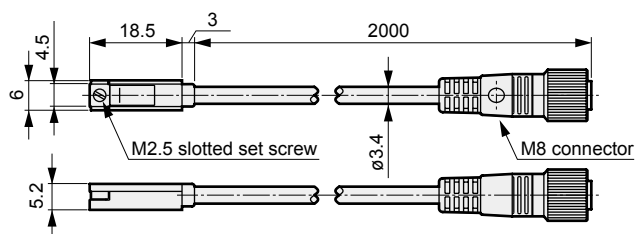
Dimensions



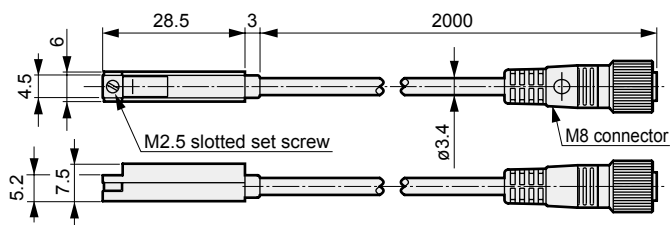
Sensor section

● Amplifier separated

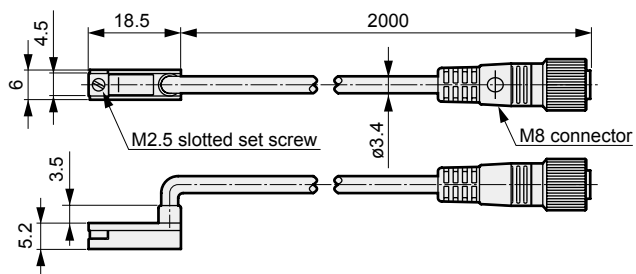
● LN-05HC



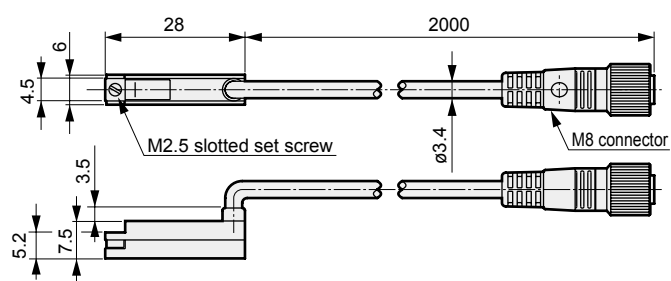
● LN-10HC



● LN-05VC



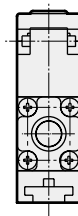
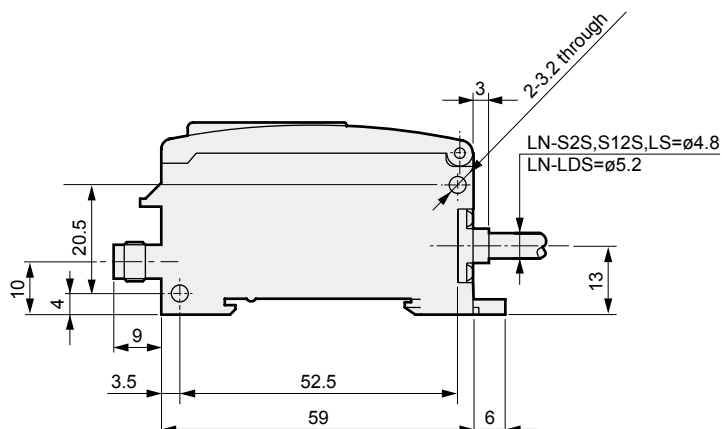
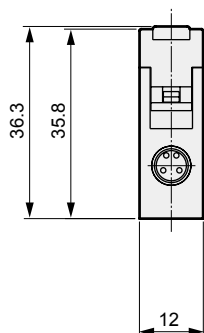
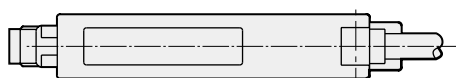
● LN-10VC



Amplifier section

● Amplifier separated

● LN-□S

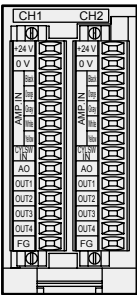
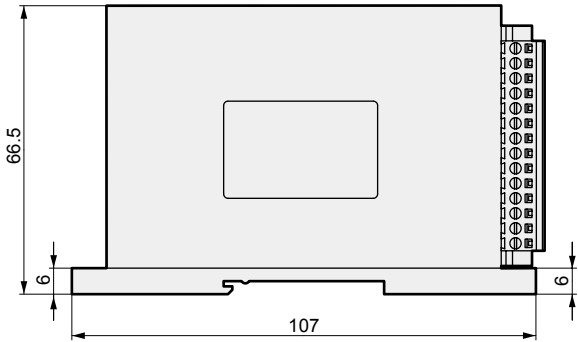
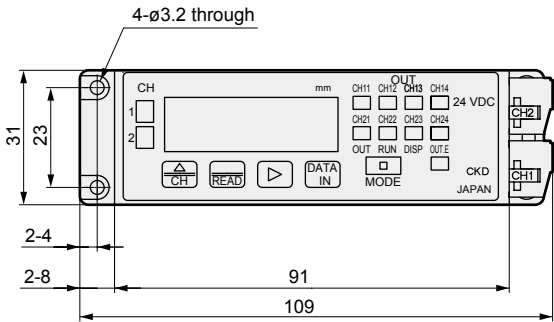


Dimensions

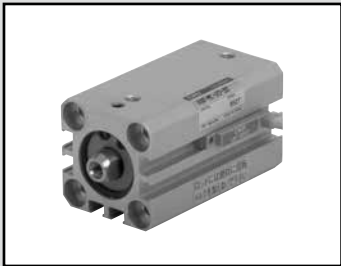


Display section

● LN-DN



LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending



Cylinder with length measuring sensor

SSD-LN Series

● Bore size: $\varnothing 12/\varnothing 16/\varnothing 20/\varnothing 32/\varnothing 50$



* Excluding display



SSD-LN

Cylinder section specifications

● SSD-LN Series

Model No. (*1)		SSD-LN	SSD-O-LN
Item			
Actuation		Double acting/single rod	Double acting/single rod/low speed
Working fluid		Compressed air	
Max. working pressure MPa		1.0 (≈150 psi, 10 bar)	
Min. working pressure MPa		0.1 (≈15 psi, 1 bar)	0.05 (≈7.3 psi, 0.5 bar)
Proof pressure MPa		1.6 (≈230 psi, 16 bar)	
Ambient temperature °C		-10 (14°F) to 60 (140°F) (no freezing)	
Bore size	mm	$\varnothing 12/\varnothing 16/\varnothing 20/\varnothing 32/\varnothing 50$	
Stroke length	mm	20/30($\varnothing 12/\varnothing 16$), 20/50 ($\varnothing 20/\varnothing 32/\varnothing 50$)	
Stroke tolerance	mm	0 to +1	
Port size		M5 ($\varnothing 12/\varnothing 16/\varnothing 20$), Rc1/8 ($\varnothing 32$), Rc1/4 ($\varnothing 50$)	
Piston speed	mm/s	50 to 500	10 to 200
Cushion		None	
Lubrication		Not required (if necessary: turbine oil class 1 ISO VG32)	Not available
Non-rotating accuracy °		$\pm 2(\varnothing 12)$, $\pm 1.5(\varnothing 16/\varnothing 20)$, $\pm 1(\varnothing 32/\varnothing 50)$	

*1 : Appearance and dimensions of cylinders are the same as the compact cylinder SSD-ML (double acting rotation-stop), but the internal structure differs. (This cylinder is for length measurement.)

Sensor, amplifier (separated) specifications

Refer to page 1470.

Display section specifications

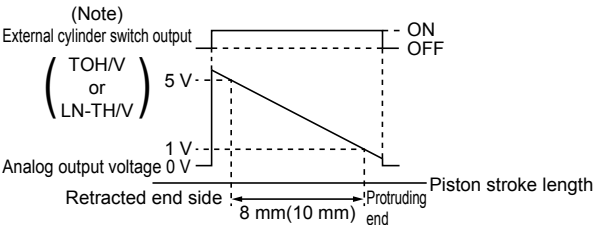
Refer to page 1471.

Weight table

Unit (g)

Stroke length Bore size	20	30	50
$\varnothing 12$	111	122	
$\varnothing 16$	135	157	
$\varnothing 20$	189		263
$\varnothing 32$	346		476
$\varnothing 50$	661		914

Length measuring sensor output characteristics



(Notes)

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

Analog output ON-OFF switch model No.	Output	Measured range length
TOH/V5	Analog output	8 mm
LN-TH/V	Display	10 mm

How to order

SSD - LN - 20 20 - 10 H C 1 2 5 LDS DN

A Drive equipment specifications

B Cylinder bore size

C Cylinder stroke

D Sensor lead wire outlet direction

E Sensor mounting surface (*1)

F Analog output ON-OFF change-over switch mounting surface (*1) (*2)

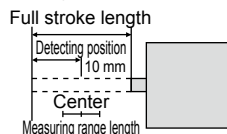
G Detecting position

H Amplifier unit output and shape

I Display (*4)

⚠ Precautions for model selection

- *1 : Sensor and analog output ON-OFF switch cannot be installed on the same surface. (ø12, ø16 only)
- *2 : The lead wire outlet direction of analog output ON-OFF switch, the same one as the sensor, will be selected automatically. Lead wire length is 5 m specifications.
- *3 : If detection position is at "10", the detection position center is located 10 mm in front of the cylinder full stroke projecting end, with measured range length ± 4 (± 5) mm of this center point. The detecting position should be an integer.



- *4 : Two channels can be used for display. Ch1 is allocated by this model display. When using another channel, the display must be ordered separately.

A-LN-**B**C-10**D**E**F**G**I**LDS

- *5 : When ordering a single model for maintenance:

- Cylinder: **A**-LN-**B**C
- Sensor: LN-10**D**C
- Amplifier unit: LN-**H**
- Display: LN-DN

· Analog output ON-OFF switch

SW-TOH5 or TOV5: Select when the mounted actuator is ø20 and over in diameter with an analog output amplifier (LN-LS).

LN-TH or TV: Select for display.

When placing a discrete order, refer to product specifications sheet or handling precautions attached with the unit for details on setting.

- Cylinder mounting bracket model No.

LN - A - LB - 20

Code	Description
A Bore size	
12	For ø12
16	For ø16
20	For ø20
32	For ø32
50	For ø50

Note: Two axial feet and eight hexagon socket head cap screws for installation are attached (4 pcs. for ø50).

Cylinder mounting bracket (axial foot) is available. Order separately when required.

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

Cylinder switches may be mountable in a separate groove for piston protrusion and pull end confirmation. Order separately when required.

- Discrete cylinder switch model No.

SW - T 0 H 3

A Output

B Lead wire outlet direction

C Lead wire length

Code	Description
A Drive equipment specifications	
SSD	Super compact (double acting)
SSD-0	Super compact (double acting/low speed)
B Cylinder bore size (mm)	
12	ø12
16	ø16
20	ø20
32	ø32
50	ø50
C Cylinder stroke (mm)	
20	20
30	30 (compatible with ø12, ø16 only)
50	50 (applicable except for ø12, ø16)
D Sensor lead wire outlet direction	
H	Axial lead wire
V	Radial lead wire
E Sensor mounting surface	
1	Right
2	Bottom side
3	Left
F Analog output ON-OFF switch mounting surface	
1	Right
2	Bottom side
3	Left
G Detecting position (mm)	
Refer to the figure at left. (*3)	
H Amplifier unit output and shape	
LS	Amplifier separate/analog output
LDS	Amplifier separate/for display (LN-DN)
I Display	
DN	Switch output section NPN display

Code	Description
A Output	
0	Reed 2-wire
5	Reed 2-wire without indicator lamp
2	Proximity 2-wire
3	Proximity 3-wire
2Y	Proximity 2-wire 2-color display
3Y	Proximity 3-wire 2-color display
B Lead wire outlet direction	
H	Axial lead wire
V	Radial lead wire
C Lead wire length	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

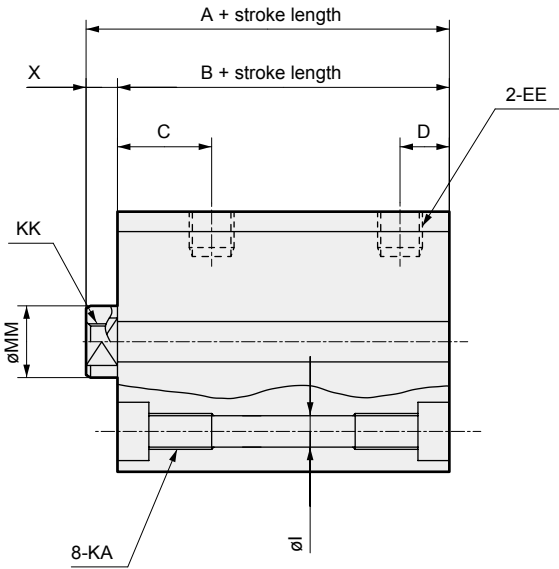
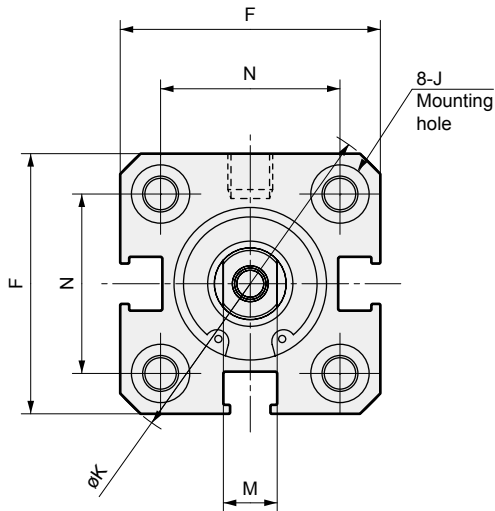
LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

SSD-LN/SSD-O-LN Series

Dimensions

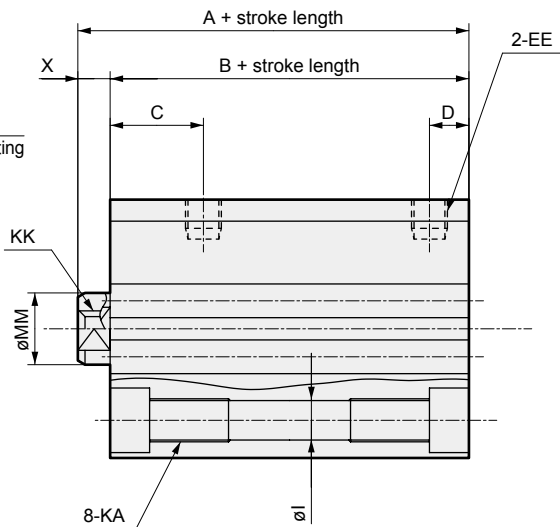
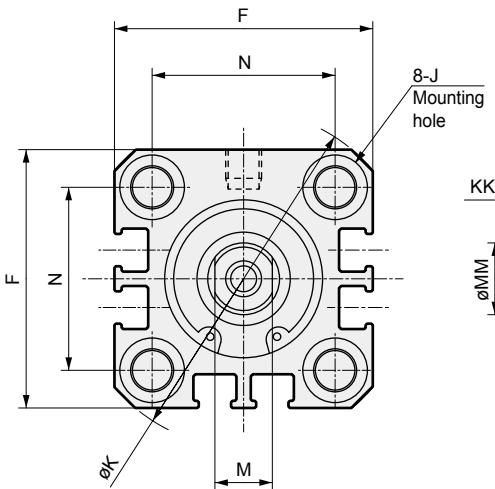


- SSD-LN/SSD-O-LN
· $\phi 12/\phi 16$



*1 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.
*2 : Refer to the next page for dimensions.

- SSD-LN/SSD-O-LN
· $\phi 20$

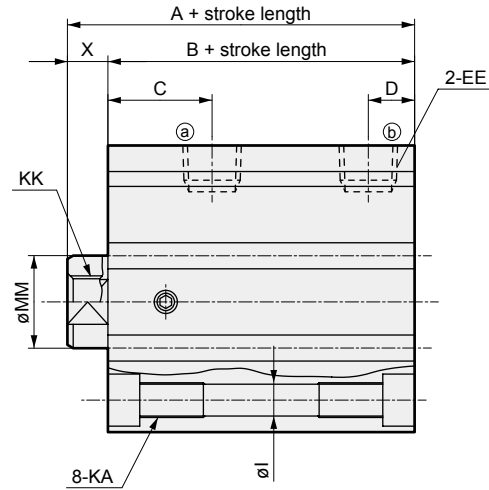
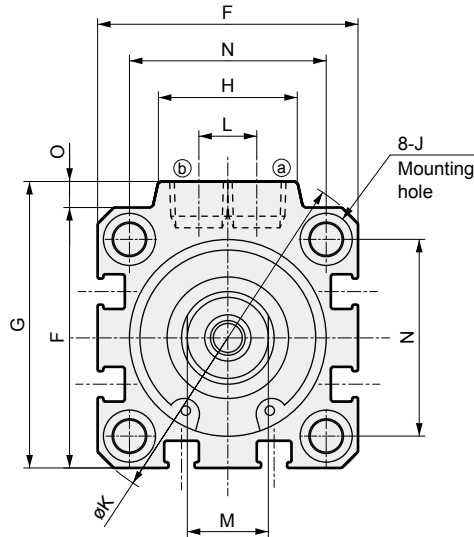


Dimensions



- SSD-LN/SSD-O-LN
ø32/ø50

Note: Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.



Code	A	B	C	D	EE	F	G	H	I	J	K	KA	KK	L
Bore size (mm)														
ø12	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	-
ø16	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	-
ø20	39	34.5	13	5.5	M5	36	-	-	5.5	9 spot face depth 5.5	47	M6 depth 11	M5 depth 7	-
ø32	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
ø50	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

Code	M	MM	N	O	X	Remarks
Bore size (mm)						
ø12	5	6	15.5	-	3.5	Overall length is 5 mm longer than standard product (SSD-ML). Other dimensions are the same as standard products.
ø16	6	8	20	-	3.5	Overall length is 5 mm longer than standard product (SSD-ML). Other dimensions are the same as standard products.
ø20	8	10	25.5	-	4.5	Dimensions are the same as standard product (SSD-ML).
ø32	14	16	34	4.5	7	Dimensions are the same as standard product (SSD-ML).
ø50	18	20	50	7	8	Dimensions are the same as standard product (SSD-ML).

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending



Length measuring sensor with hand

BHA/BHG/BHE-LN Series

● Operating stroke length

BHA-LN, BHG-LN: 5/9/11/15 mm

BHE-LN: 7/10/14/16 mm



* Excluding display



Hand specifications

● BHA Series

Item	Cross roller parallel hand (double acting)			
	BHA-LN-01CS	BHA-LN-03CS	BHA-LN-04CS	BHA-LN-05CS
Cylinder bore size mm	ø12	ø16	ø20	ø25
Working fluid	Compressed air			
Max. working pressure MPa	0.7 (≈100 psi, 7 bar)			
Min. working pressure MPa	0.1 (≈15 psi, 1 bar)			
Ambient temperature °C	5 (41°F) to 60 (140°F)			
Double finger stroke mm	5	9	11	15
Port size	M3	M5		
Weight g	140	200	290	460
Lubrication	Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)			

● BHG Series

Item	Cross roller parallel hand (double acting/with rubber cover)			
	BHG-LN-01CS	BHG-LN-03CS	BHG-LN-04CS	BHG-LN-05CS
Cylinder bore size mm	ø12	ø16	ø20	ø25
Working fluid	Compressed air			
Max. working pressure MPa	0.7 (≈100 psi, 7 bar)			
Min. working pressure MPa	0.15 (≈22 psi, 1.5 bar)			
Ambient temperature °C	5 (41°F) to 60 (140°F)			
Double finger stroke mm	5	9	11	15
Port size	M3	M5		
Weight g	170	230	320	490
Lubrication	Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)			

● BHE Series

Item	Centering hand (double acting)			
	BHE-LN-01CS	BHE-LN-03CS	BHE-LN-04CS	BHE-LN-05CS
Cylinder bore size mm	ø12	ø16	ø20	ø25
Working fluid	Compressed air			
Max. working pressure MPa	0.7 (≈100 psi, 7 bar)			
Min. working pressure MPa	0.2 (≈29 psi, 2 bar)			
Ambient temperature °C	5 (41°F) to 60 (140°F)			
Double finger stroke mm	7	10	14	16
Port size	M3	M5		
Weight g	130	180	300	480
Lubrication	Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)			

Note: Hand appearance is the same as the standard, but the internal structure differs. (This hand is for length measurement.)

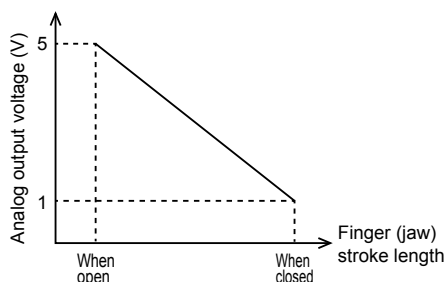
Sensor, amplifier (separated) specifications

Refer to page 1470.

Display section specifications

Refer to page 1471.

Length measuring sensor output characteristics



Gripping power performance data is shown below.

- BHA : Page 1602
- BHG : Page 1608
- BHE : Page 1755

How to order

● Analog output

BHE - **LN** - **04CS** - **10** **H** **C** **LDS** **DN**

● Switch output

BHE - **LN** - **05CS** - **10** **H** **C** **S12S**

A Drive equipment specifications

B Cylinder bore size

C Compatible sensor (*1)

D Sensor lead wire outlet direction

E Sensor lead wire terminal specifications

F Amplifier unit output and shape

G Display (*2)

⚠ Precautions for model selection

*1 : Depending on the drive equipment on the length measurement sensor compatible sensors and amplifiers differ.

*2 : Two channels can be used for display. Ch1 is allocated by this model display. When using another channel, the display must be ordered separately.

(A)-LN-(B)-(C)(D)(E)LDS

*3 : When ordering a single model for maintenance:

- Hand: (A)-LN-(B)
- Sensor: LN-(C)(D)
- Amplifier unit (amplifier separate): LN-(F)
- Amplifier unit with sensor (amplifier installed): LN-(C)(V)(F)
- Display: LN-DN

When placing a discrete order, refer to product specifications sheet or handling precautions attached with the unit for details on setting.

● Discrete cylinder switch model No.

SW - **T** **2** **H** **3**

A Output

B Lead wire outlet direction

C Lead wire length

⚠ Precautions for model selection

For the hand, 1 cylinder switch can be mounted in a separate groove to confirm whether the finger (jaw) is open or closed, regardless of whether analog or switch output is used. Order separately when required.

Code	Description
A Drive equipment specifications	
BHA	Cross roller parallel hand (double acting)
BHG	Cross roller parallel hand (double acting/with rubber cover)
BHE	Centering hand (double acting)
B Size (cylinder bore size)	
01CS	ø12
03CS	ø16
04CS	ø20
05CS	ø25
C Compatible sensor	
05	For 01CS, 03CS
10	For 04CS, 05CS
D Sensor lead wire outlet direction	
H	Axial lead wire
V	Radial lead wire (amplifier installed in V only)
E Sensor lead wire terminal specifications	
Blank	Without connector (for amplifier installed)
C	With M8 connector (for amplifier separated)
F Amplifier unit output and shape	
S1PAH	Amplifier installed/lead wire straight switch 1-point output
S1PAV	Amplifier installed/lead wire L type switch 1-point output
S2S	Amplifier separate/switch 2 point output (01CS, 03CS compatible)
S12S	Amplifier separate/switch 2 point output (04CS, 05CS compatible)
LS	Amplifier separate/analog output (04CS, 05CS compatible)
LDS	Amplifier separate/for display (LN-DN) (04CS, 05CS compatible)
G Display	
DN	Switch output section NPN display (04CS, 05CS compatible)

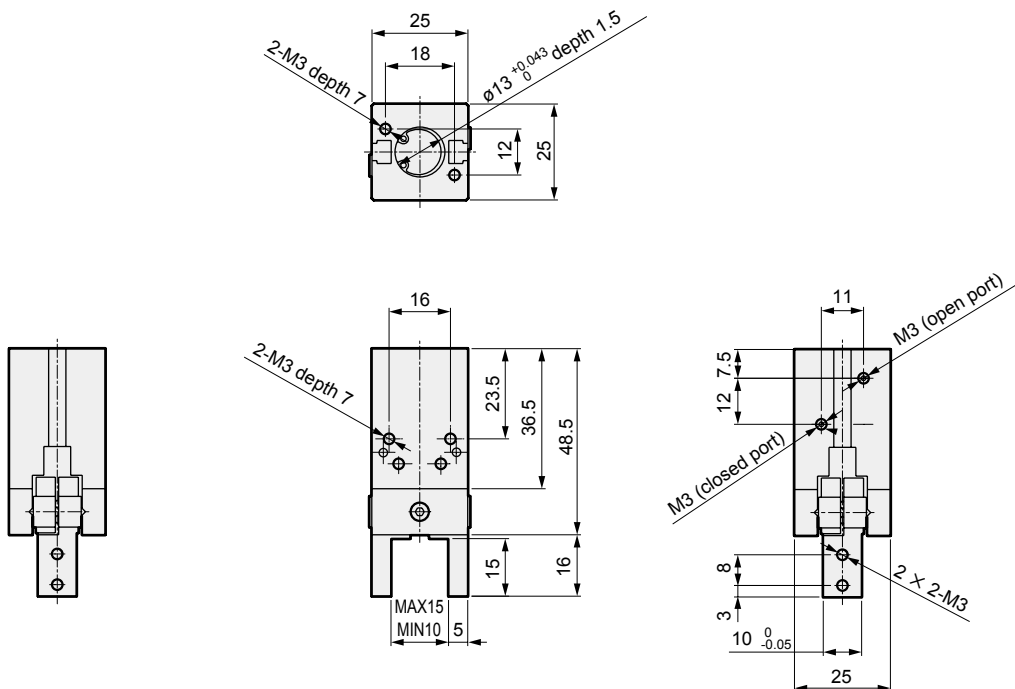
Code	Description
A Output	
2	Proximity 2-wire
3	Proximity 3-wire
B Lead wire outlet direction	
H	Axial lead wire
V	Radial lead wire
C Lead wire length	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions

BHA-LN (amplifier separated)

● BHA-LN-01CS

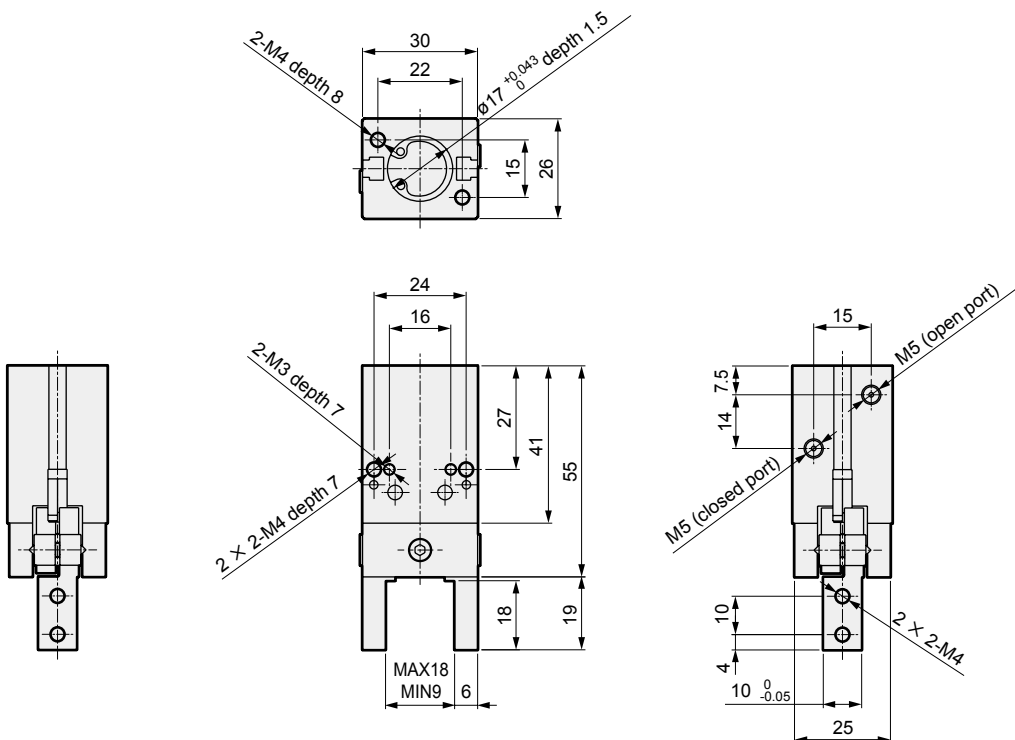


*1 : Longitudinal direction is 3 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

*3 : Only the cylinder bore size code 04CS/05CS can be mounted on display or analog output models.

● BHA-LN-03CS



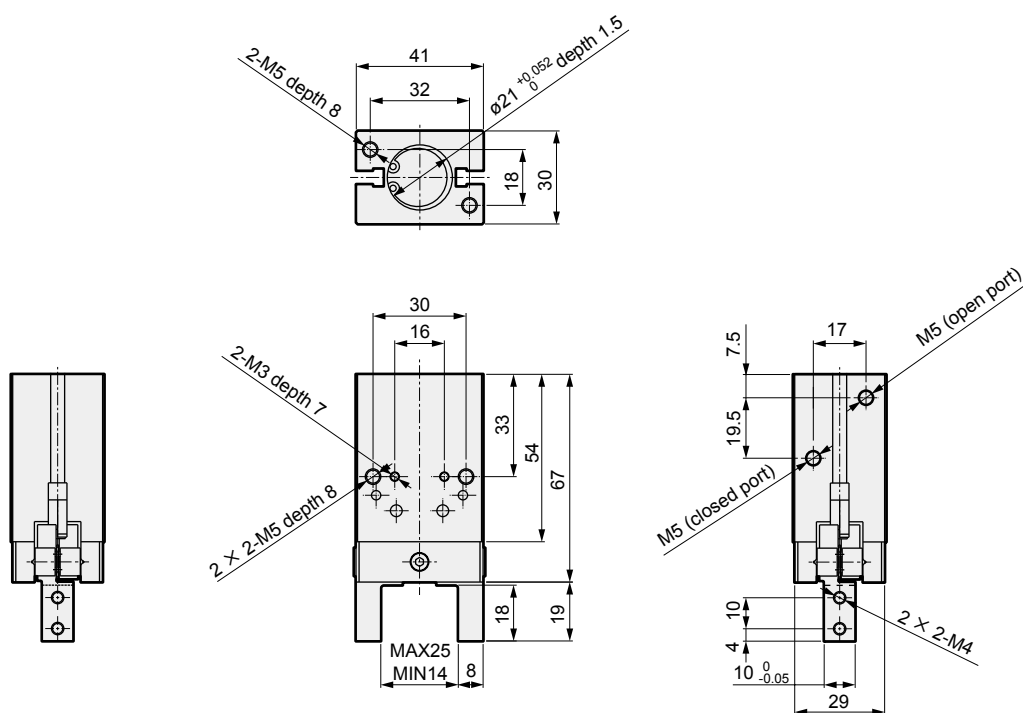
*1 : Longitudinal direction is 2 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

*3 : Only the cylinder bore size code 04CS/05CS can be mounted on display or analog output models.

Dimensions

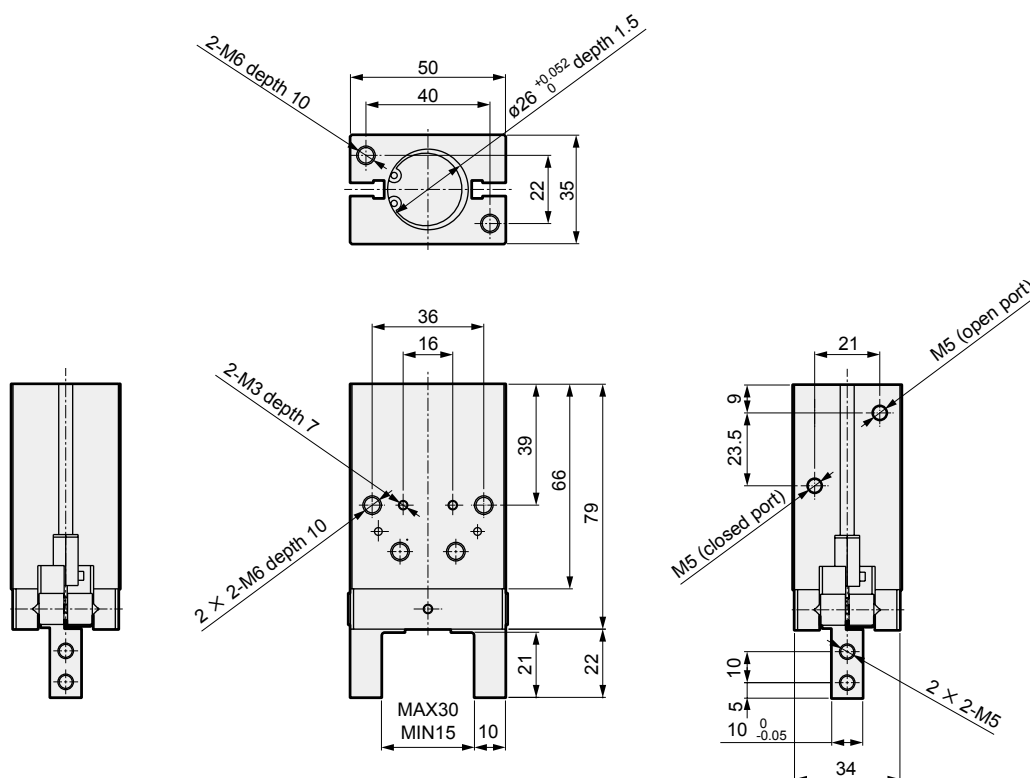
● BHA-LN-04CS



*1 : Longitudinal direction is 5 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

● BHA-LN-05CS



*1 : Longitudinal direction is 5 mm longer than standard products. Other dimensions are the same as standard products.

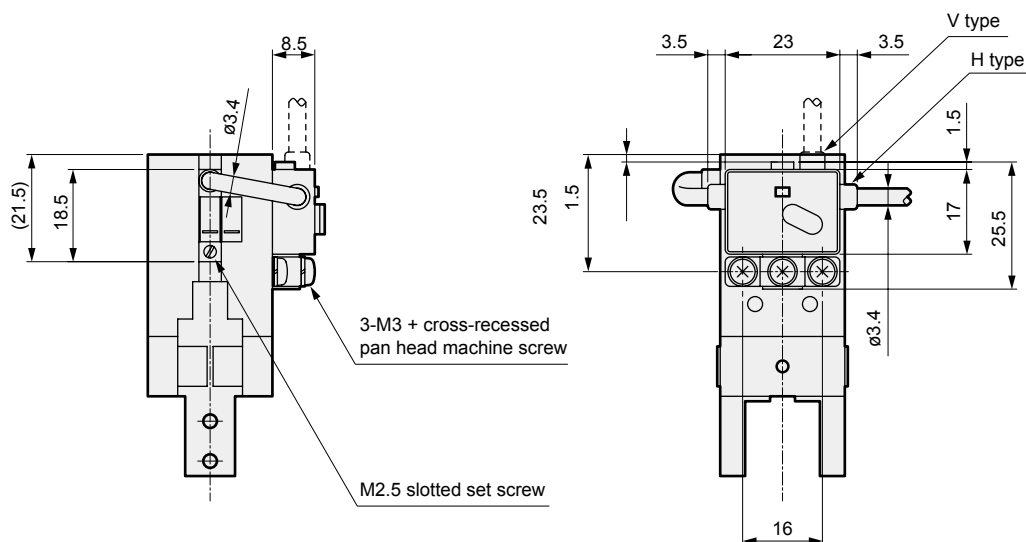
*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions

BHA-LN (amplifier with amplifier installed sensor)

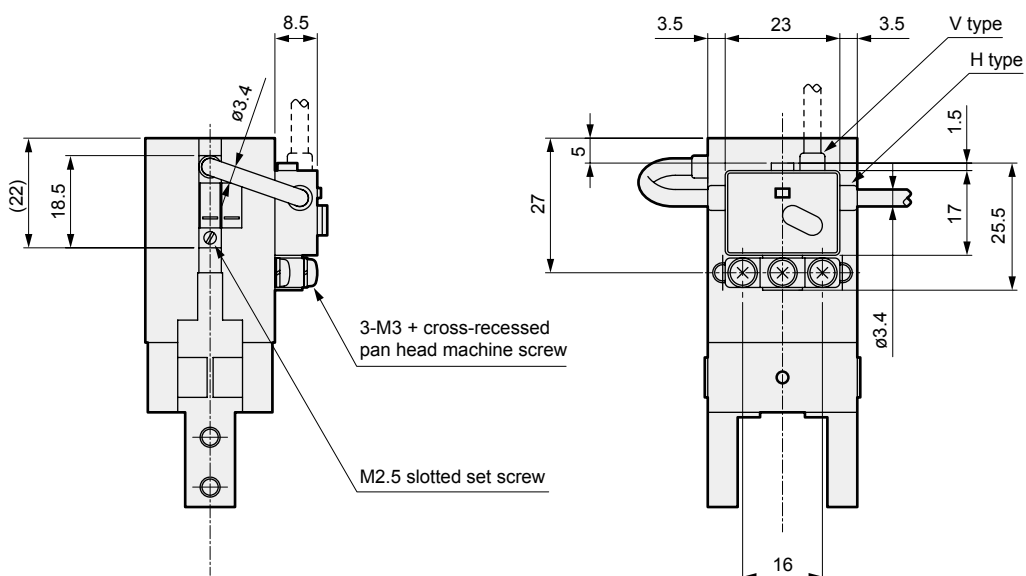
● BHA-LN-01CS diagram



*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.

*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

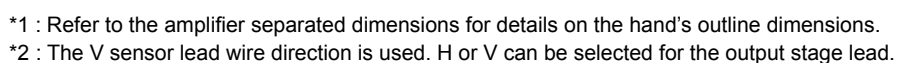
● BHA-LN-03CS diagram



*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.

*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

● BHA-LN-04CS diagram



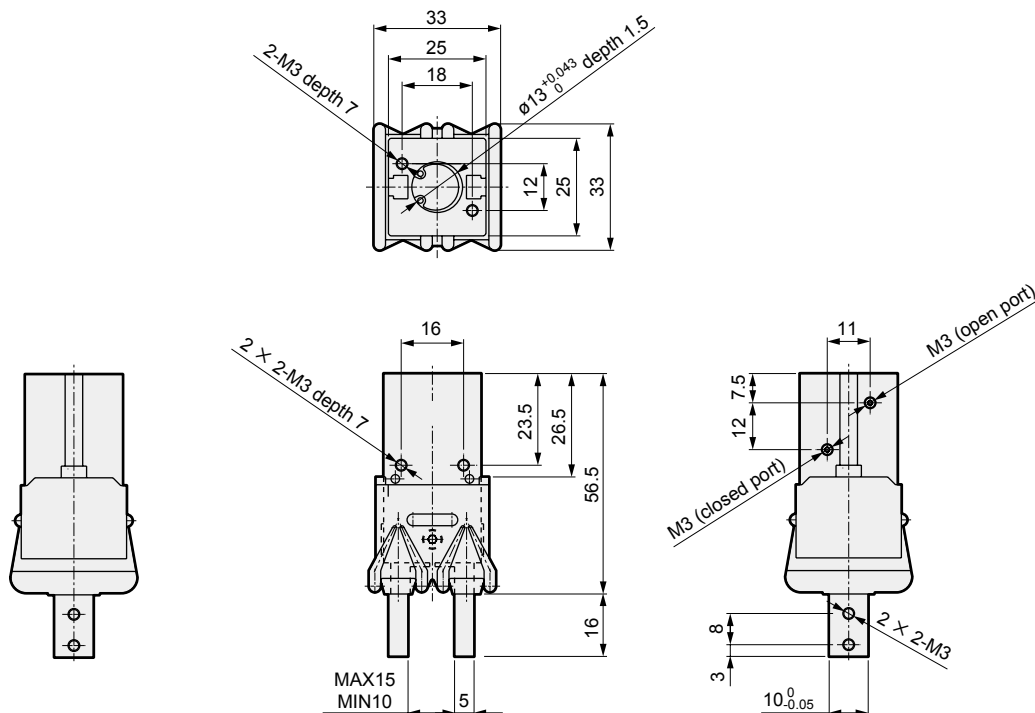
*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions

BHG-LN (amplifier separated)

● BHG-LN-01CS

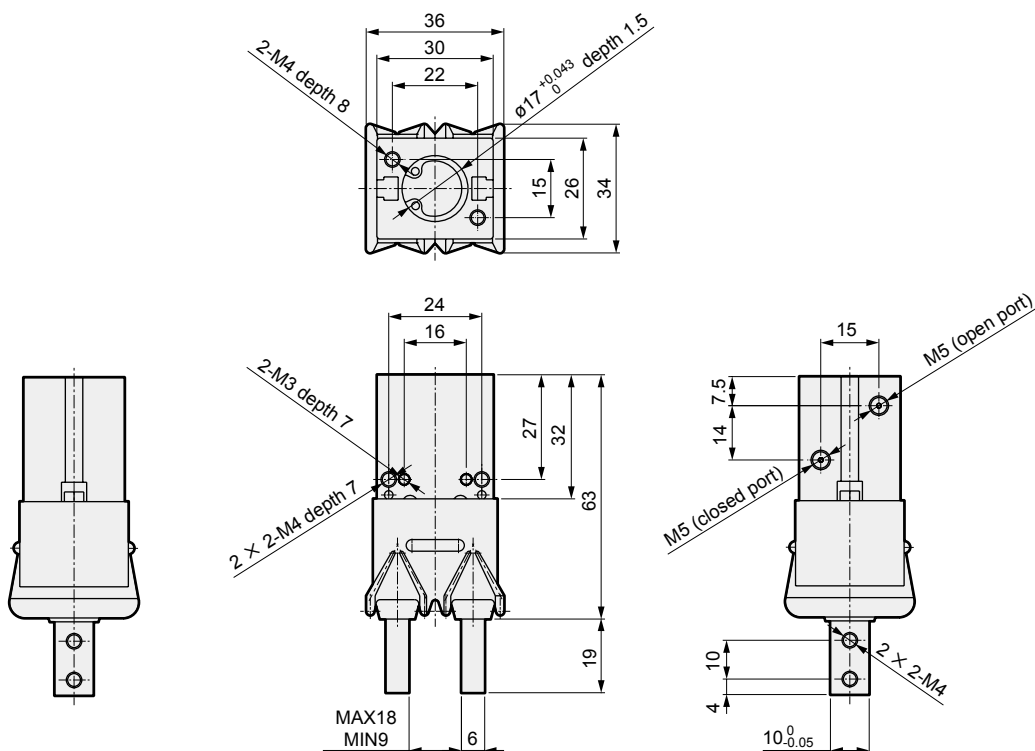


*1 : Longitudinal direction is 3 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

*3 : Only the cylinder bore size code 04CS/05CS can be mounted on display or analog output models.

● BHG-LN-03CS



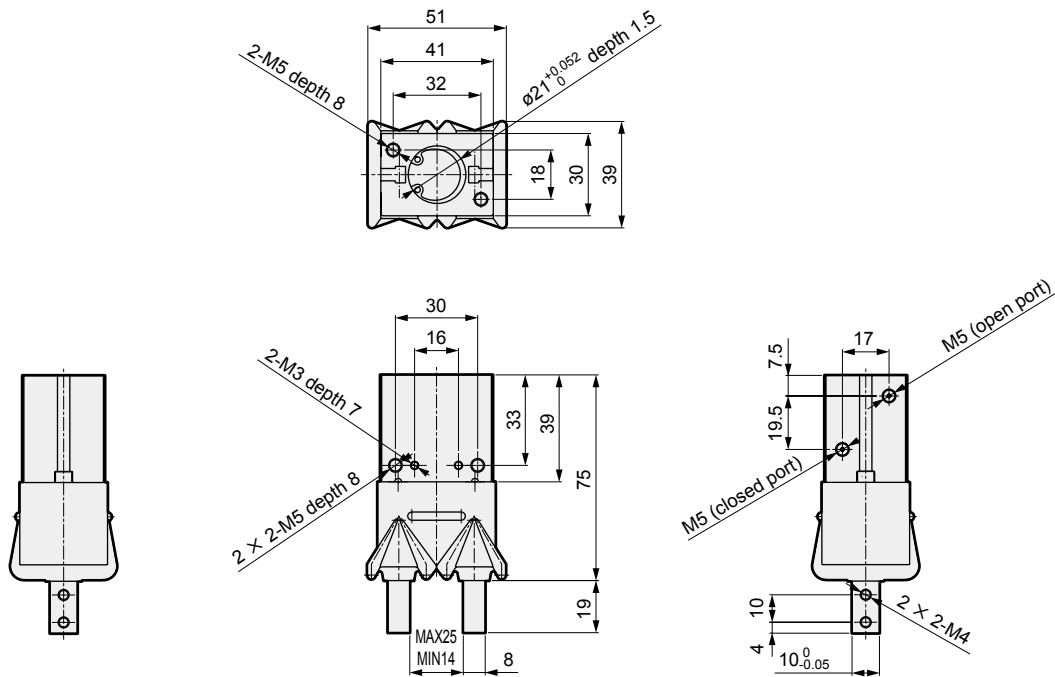
*1 : Longitudinal direction is 2 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

*3 : Only the cylinder bore size code 04CS/05CS can be mounted on display or analog output models.

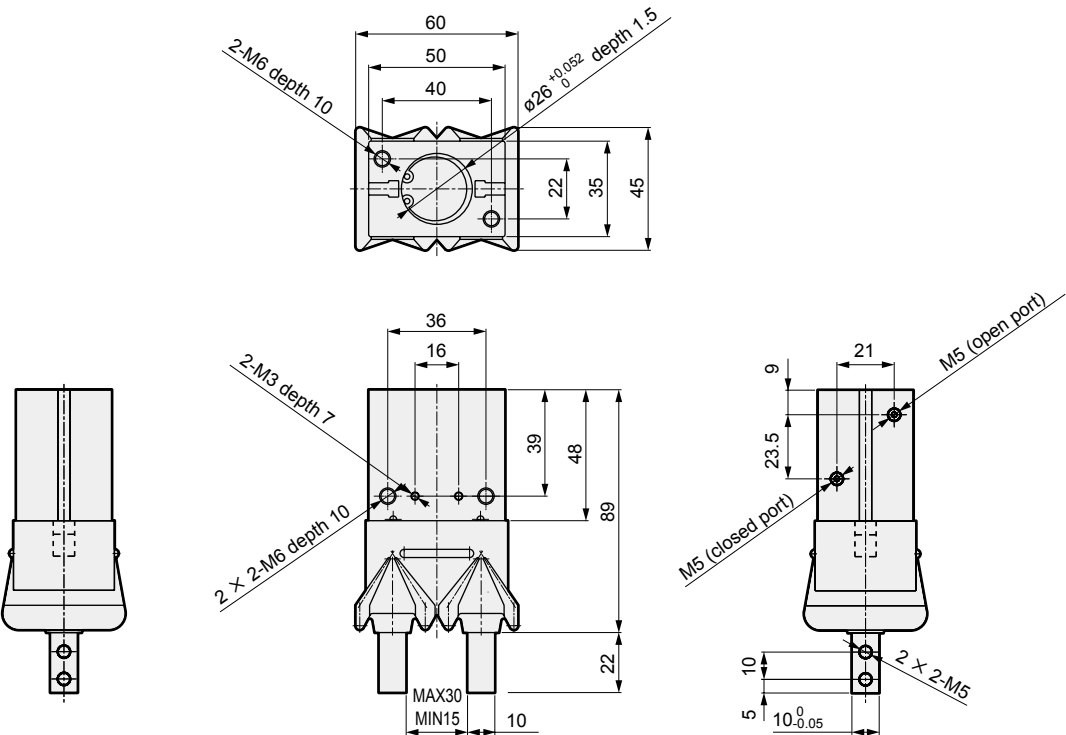
Dimensions

● BHG-LN-04CS



*1 : Longitudinal direction is 5 mm longer than standard products. Other dimensions are the same as standard products.
*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

● BHG-LN-05CS



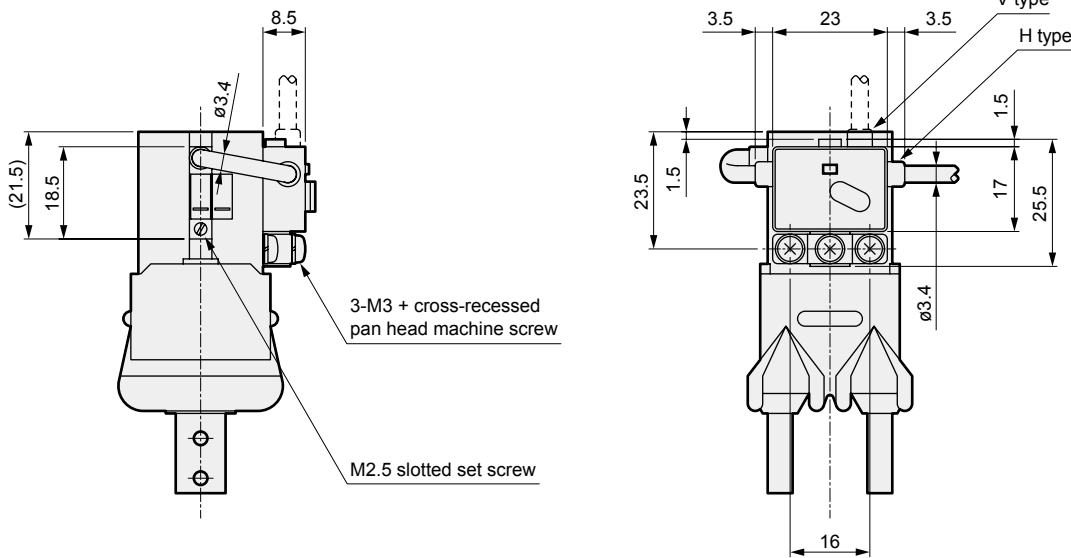
*1 : Longitudinal direction is 5 mm longer than standard products. Other dimensions are the same as standard products.
*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions

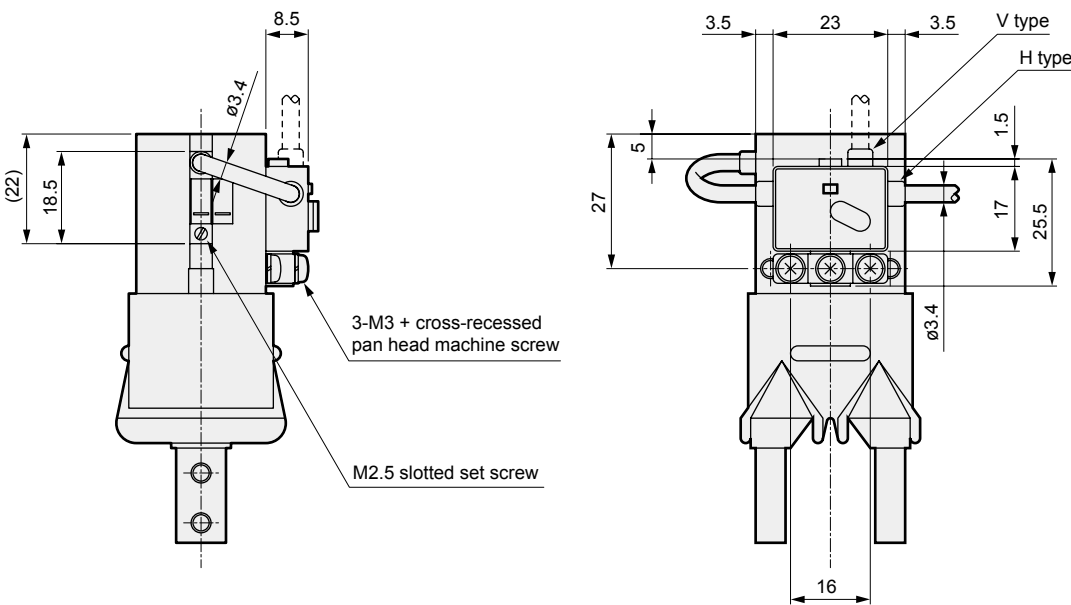
BHG-LN (amplifier with amplifier installed sensor)

● BHG-LN-01CS diagram



*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

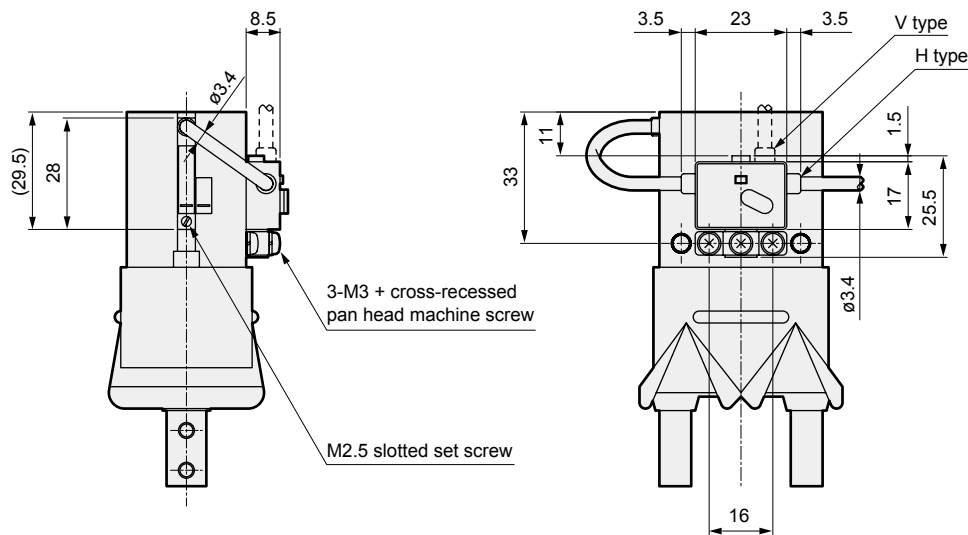
● BHG-LN-03CS diagram



*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

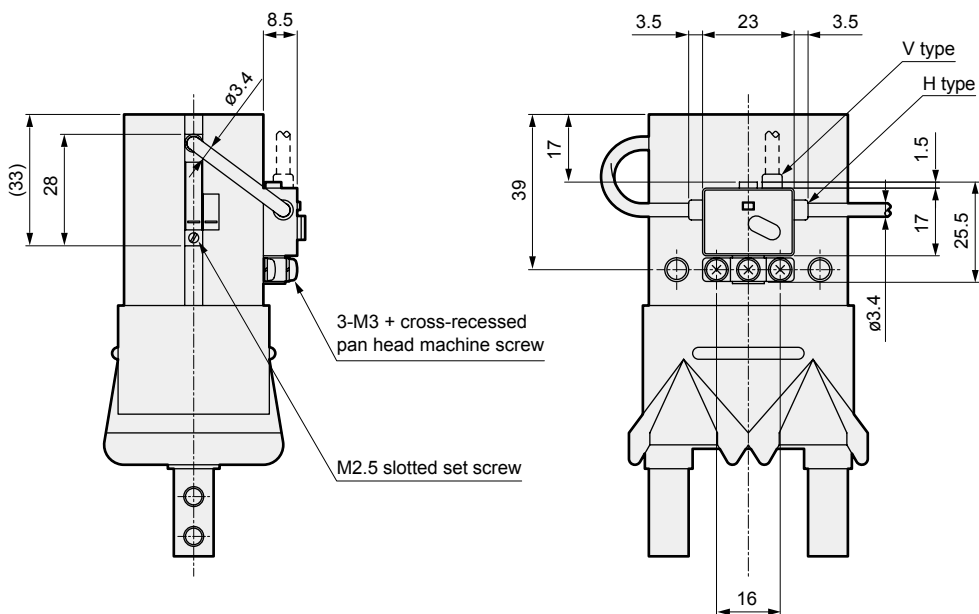
Dimensions

● BHG-LN-04CS diagram



*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

● BHG-LN-05CS diagram



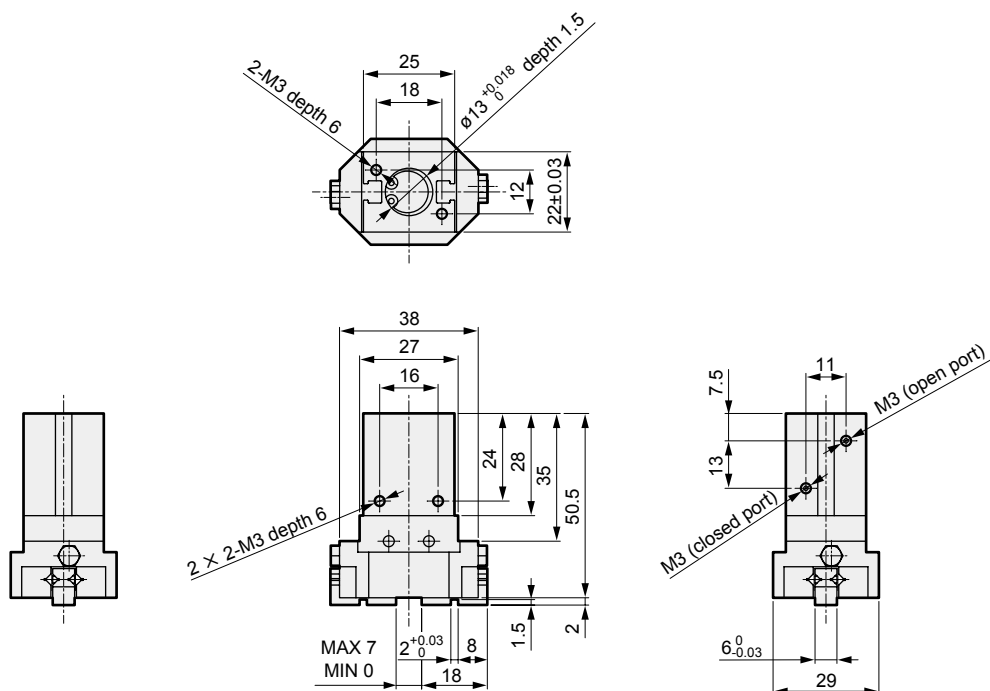
*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions

BHE-LN (amplifier separated)

● BHE-LN-01CS

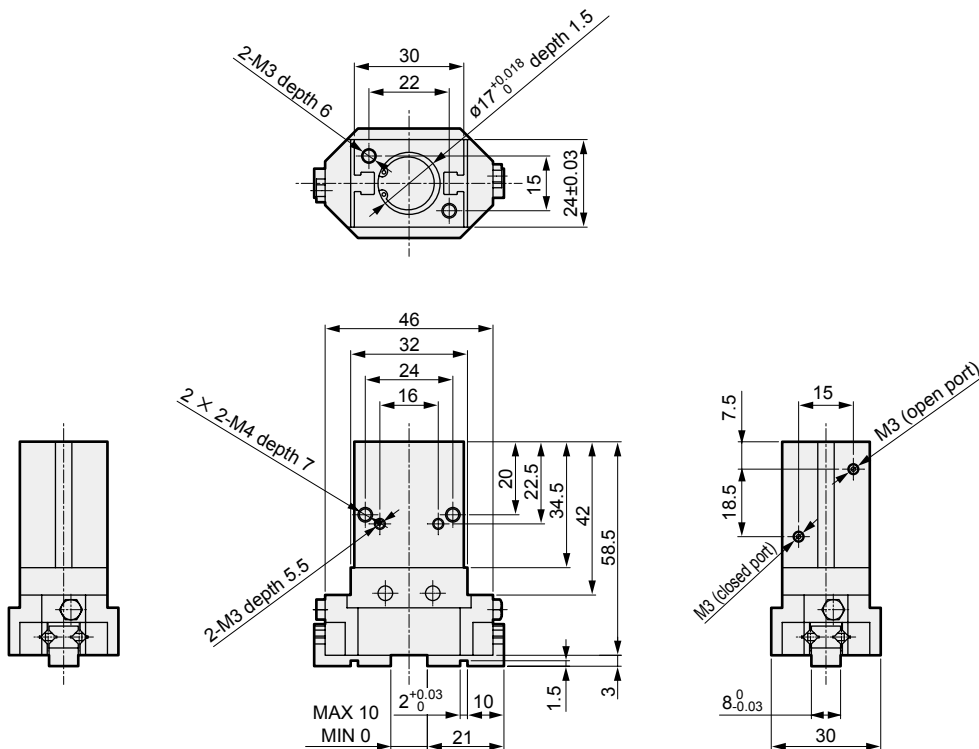


*1 : Longitudinal direction is 3 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

*3 : Only the cylinder bore size code 04CS/05CS can be mounted on display or analog output models.

● BHE-LN-03CS



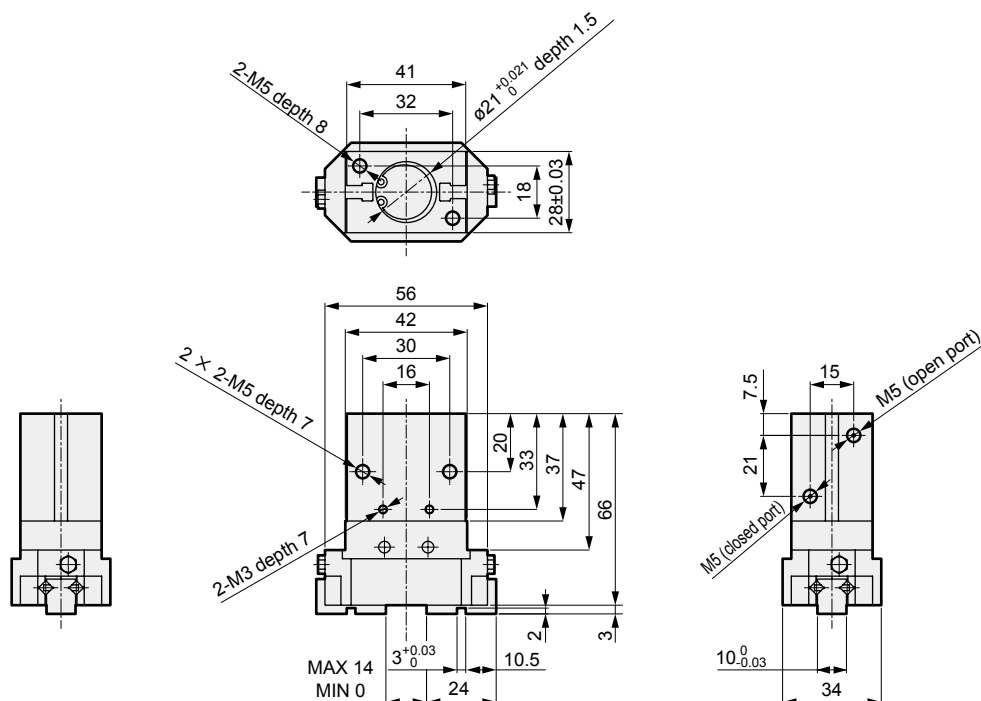
*1 : Longitudinal direction is 6.5 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

*3 : Only the cylinder bore size code 04CS/05CS can be mounted on display or analog output models.

Dimensions

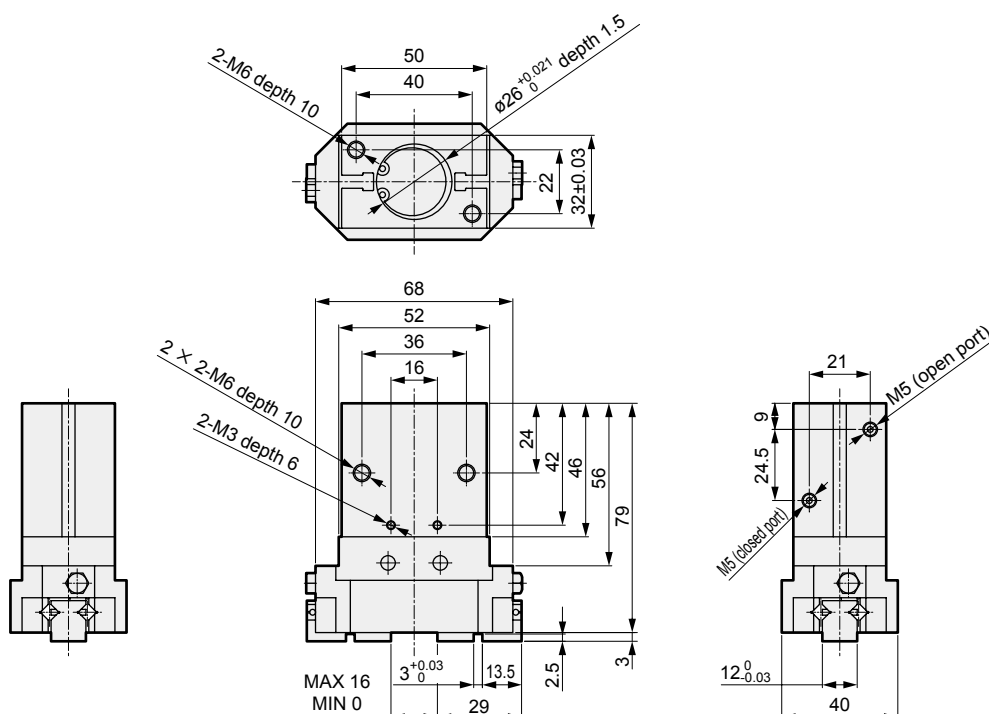
● BHE-LN-04CS



*1 : Longitudinal direction is 5 mm longer than standard products. Other dimensions are the same as standard products.

*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

● BHE-LN-05CS



*1 : Longitudinal direction is 5 mm longer than standard products. Other dimensions are the same as standard products.

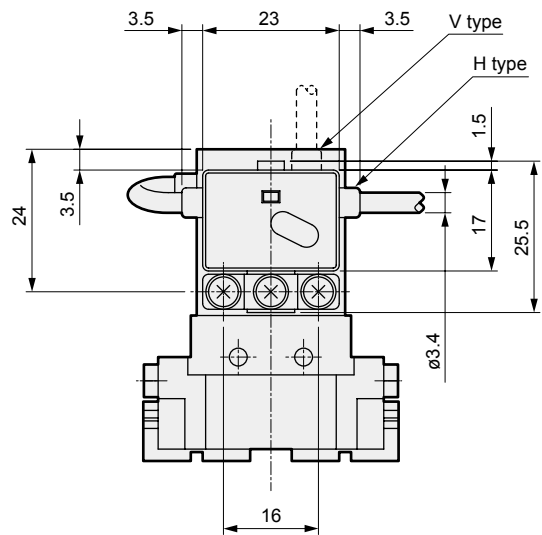
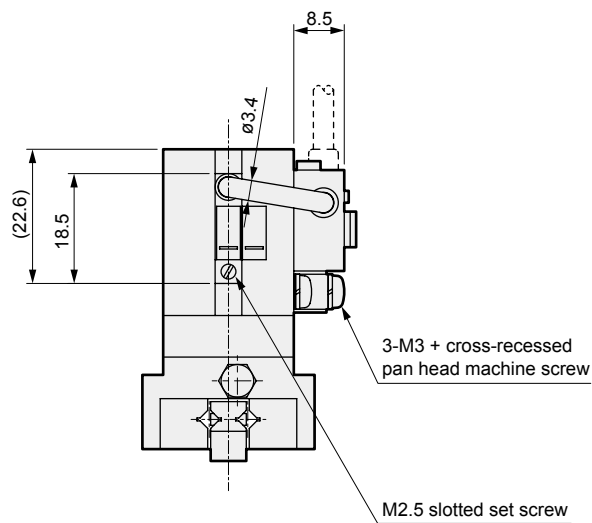
*2 : Refer to pages 1472 and 1473 for outline dimensions of the sensor, amplifier (separated), and display.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Dimensions

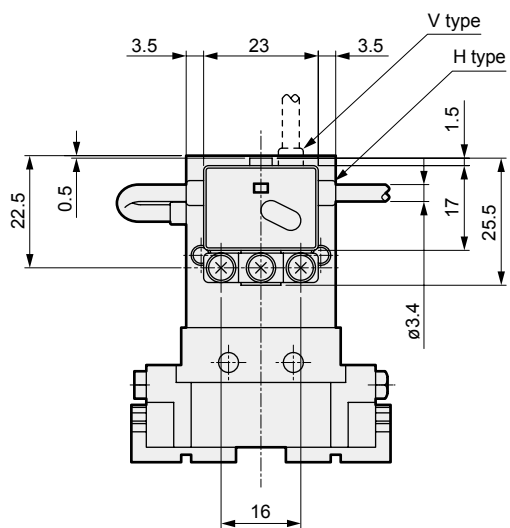
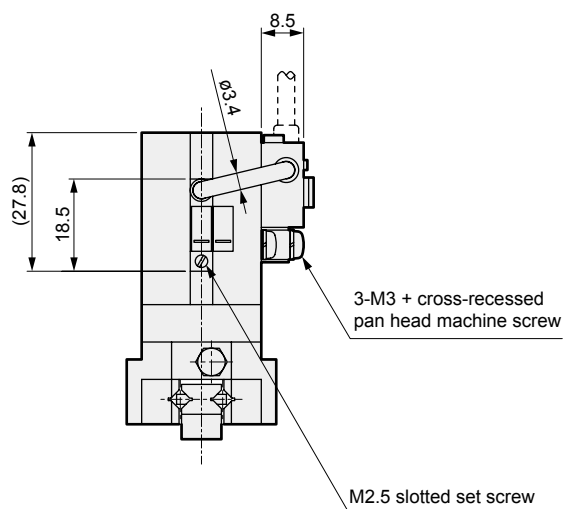
BHE-LN (amplifier with amplifier installed sensor)

● BHE-LN-01CS diagram



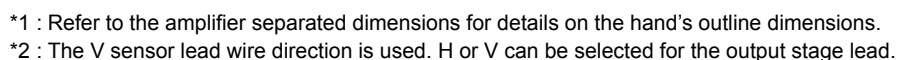
*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

● BHE-LN-03CS diagram



*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

● BHE-LN-04CS diagram

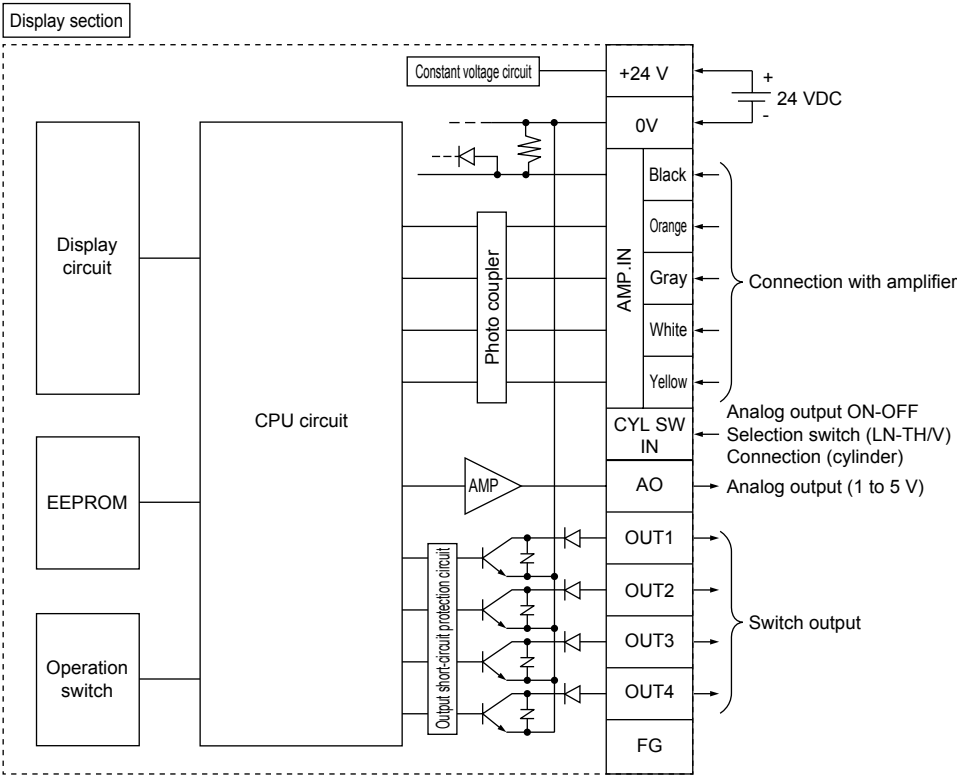


*1 : Refer to the amplifier separated dimensions for details on the hand's outline dimensions.
*2 : The V sensor lead wire direction is used. H or V can be selected for the output stage lead.

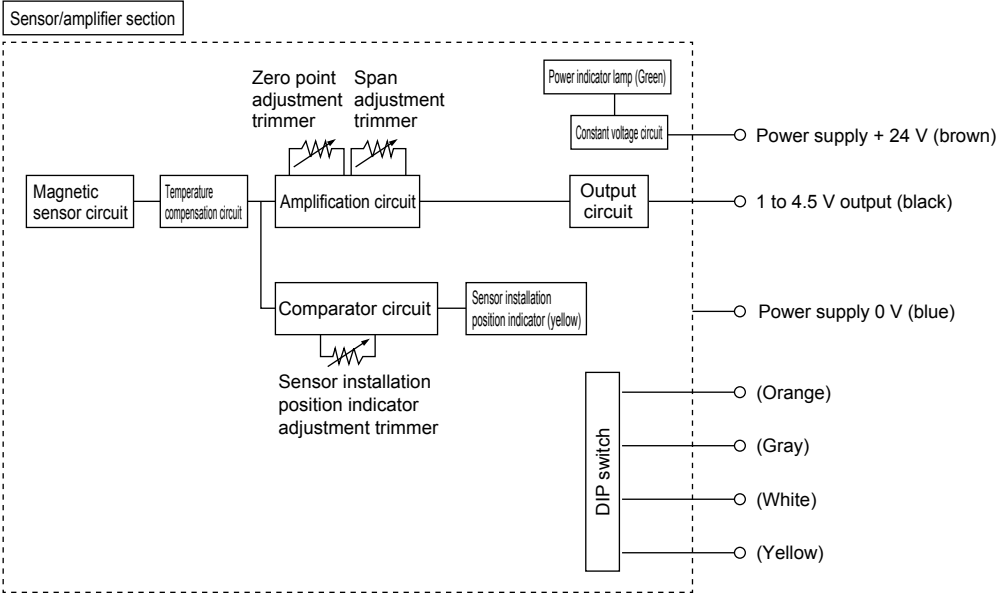
LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Internal circuit diagram

● Display

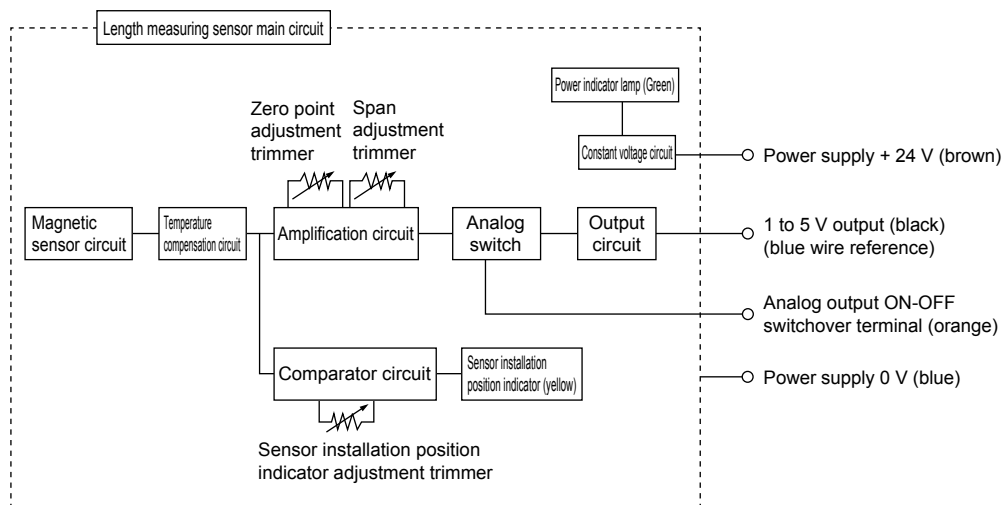


● Output stage transistor ON/OFF during piston detection can be selected with the operation switch.

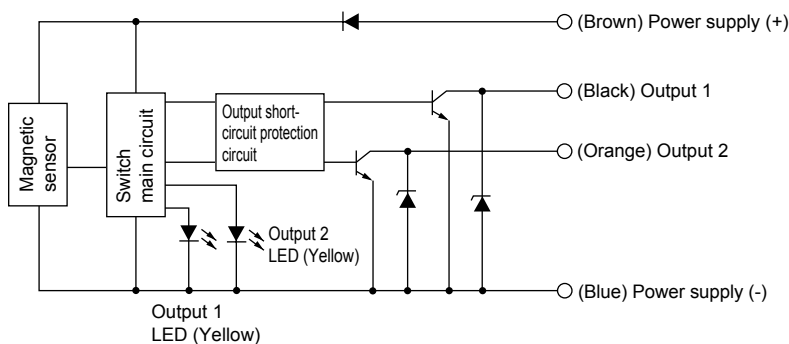


Internal circuit diagram

● Analog output

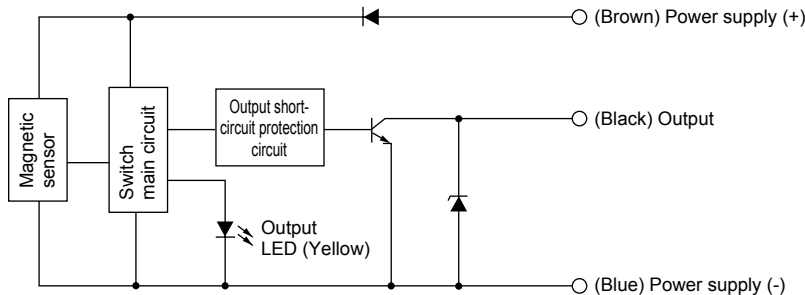


● Switch output, amplifier separated



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

● Switch output, amplifier mounting



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

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
USC3/USC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

When analog output cylinder is installed

When adjusting the sensor installation position or analog output voltage, a workpiece (reference) should be provided so that the piston stops 4 mm from the protruding end and from the retracting end, with the measured range length center and alignment center as reference. Air pressure should be the same as for actual working conditions when making these adjustments.

1 Sensor mounting position adjustment method

At shipment, the sensor is installed within the specified measured range length (example: set to the center if the range is from 8 mm before piston protruding end to protruding end). Follow the following procedures to adjust the position if the sensor installation position has been changed or the measured range length has been changed.

- (1) With the sensor removed, move the sensor installation position indicator lamp adjustment trimmer so the sensor installation position indicator (yellow LED) turns ON. Set the trimmer to the center of the interval at which the yellow LED turns ON. (As this is adjusted before the product is shipped, implement even if the trimmer has been moved inadvertently.)
- (2) Move the cylinder piston to the center of the measured length range.
- (3) Install the sensor on the cylinder. Fix the sensor in a position allowing the following operations in the direction of insertion. Sensor tightening torque is 0.1 to 0.2 N·m. Install the sensor case so the sensor set screw (M2.5 slotted set screw) faces the cylinder head side.

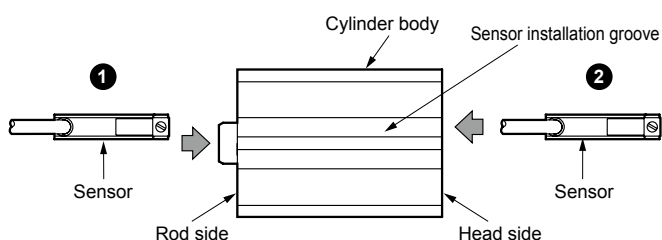
① Insertion from rod side

Fix at the center of the second lighting interval, including where the sensor mounting position indicator turns ON at (1). (Lights for the second time at a short interval equivalent to approx. 1 mm of piston stroke)

② Insertion from head side

Fix at the center of the second lighting interval, including where the sensor mounting position indicator turns ON at (1). (Lights for the second time at a short interval equivalent to approx. 1 mm of piston stroke)

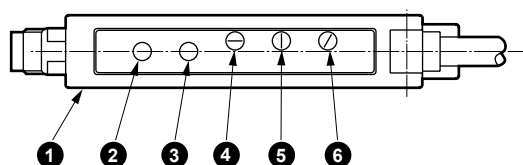
- (4) When the piston stroke of the cylinder on which the sensor is installed is longer than 8 mm, and the length is measured within an 8 mm stroke range of that stroke, connect a cylinder switch T0H/V across the orange and blue wires so that unnecessary analog output voltages are not output outside the measured range length. (When the stroke length is 8 mm or less, it will be short-circuited across the orange and blue wires.) As with the conventional cylinder switch, perform step (2) above, and then position this switch between ON points. The tightening torque of the switch is 0.1 to 0.2 N·m.



2 Analog output voltage adjustment method

The analog output voltage is output at 8 mm in front of the piston protruding end, for example, if the specified measured range length is adjusted to 5 V at 8 mm in front of the protruding end and 1 V at the protruding end. However, the voltage may vary slightly due to the working environment (affected by magnets in the area), so perform fine adjustments with the following procedure.

- (1) 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 T0H/V, and both blue wires to the (-) side of the power supply.
- (2) Connect the black wire to the (+) side of the voltmeter and the blue wire to the (-) side of the voltmeter.
- (3) Move the cylinder piston, and read the voltage value at the length measuring range start (example: 8 mm in front of projecting end) and end (example: projecting end).
- (4) If the voltage difference in (2) is 4 V or less, turn the span adjustment trimmer slightly clockwise. At 4 V or more, move the trimmer slightly counterclockwise.
- (5) Move the cylinder piston again, and read the voltage at the start and end of the length measuring range. Adjust the zero point adjustment trimmer so the reading is 5 V with the start as a reference, and 1 V when using the end as a reference.
- (6) Repeat steps (3), (4) and (5) several times, and perform fine adjustments.



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

When analog output hand is installed

1 Sensor mounting position adjustment method

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

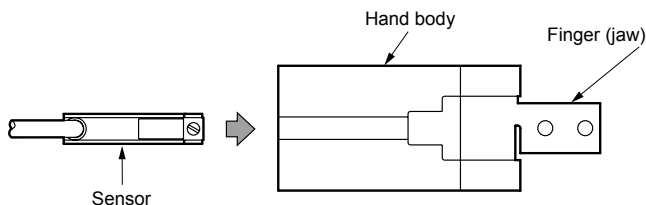
(1) With the sensor removed, move the sensor installation position indicator lamp adjustment trimmer so the sensor installation position indicator (yellow LED) turns ON. Set the trimmer to the center of the interval at which the yellow LED turns ON. (As this is adjusted before the product is shipped, implement even if the trimmer has been moved inadvertently.)

(2) Move the hand finger (jaw) to the center of the stroke.

(3) Install the sensor on the hand. Fix the sensor in a position allowing the following operations. Sensor tightening torque is 0.1 to 0.2 N·m. Install the sensor case so the sensor installation screw (M2.5 slotted set screw) faces the finger (jaw).

① Sensor installation position

Fix at the center of the second lighting interval, including where the sensor mounting position indicator turns ON at (1). (Lights for the second time at a short interval equivalent to approx. 1 mm of piston stroke)



2 Analog output voltage adjustment method

The analog output voltage is adjusted so the finger (jaw) full stroke is 5 V when open and 1 V when closed. However, the voltage may slightly vary due to the working environment (affected 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.

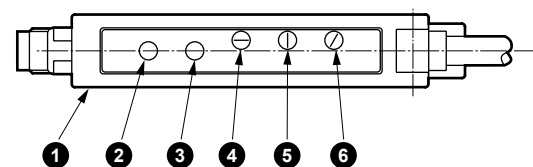
(2) Connect the black wire to the (+) side of the voltmeter and the blue wire to the (-) side of the voltmeter.

(3) Move the finger, and read the voltage value when open and closed.

(4) If the voltage difference in (3) is 4 V or less, turn the span adjustment trimmer slightly clockwise. At 4 V or more, move the trimmer slightly counterclockwise.

(5) Move the finger again, and read voltage when open and closed. Adjust the zero point adjustment trimmer so the reading is 5 V with the open state as a reference, and 1 V with the closed state as a reference.

(6) Repeat steps (3), (4) and (5) several times, and perform fine adjustments.



① Amplifier unit case

② Power indicator lamp

③ Sensor installation position indicator

④ Sensor installation position indicator adjustment trimmer

⑤ Zero point adjustment trimmer

⑥ Span adjustment trimmer

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

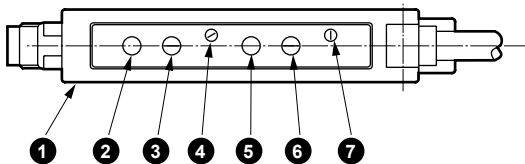
LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

Switch output

1 Sensor mounting position adjustment method

- Before shipment, the sensor is installed at the center of the stroke for both fingers (jaws). 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) Be sure to install the sensor so the set screw (M2.5 slotted set screw) faces the finger (jaw).

Amplifier separated

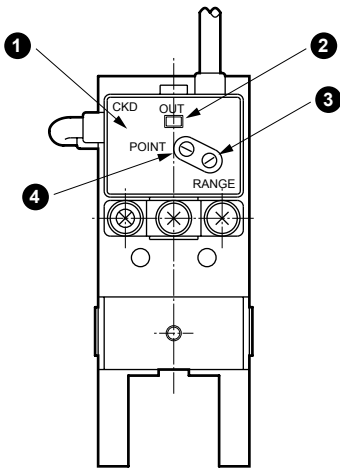


- 1 Amplifier unit case
- 2 Output 1 indicator lamp
- 3 Output 1 operating range adjustment trimmer
- 4 Output 1 operating point adjustment trimmer
- 5 Output 2 indicator lamp
- 6 Output 2 operating range adjustment trimmer
- 7 Output 2 operating point adjustment trimmer

2 Setting the switch output position

- (1) Move the hand's finger (jaw) to the position for switch 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 reference.
- (5) Move the finger (jaw) several times and turn the switch output ON and OFF. Repeat steps (3) and (4) and perform fine adjustments.

Amplifier mounting



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

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



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.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

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

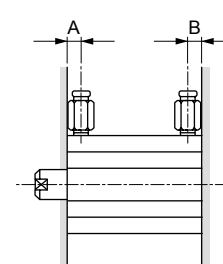
1. Cylinder

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		Applicable fittings	Fitting O.D.	Inapplicable fittings
		A	B			
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



LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/USC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

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.

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

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.

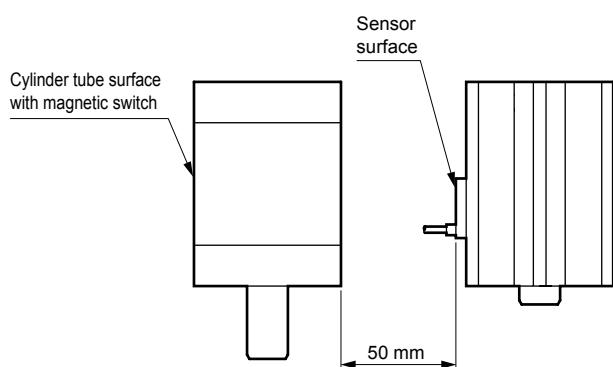
- A bend-resistant lead wire is used for the sensor cable and output stage cable. To optimize bend resistant performance, check that the wire is not bent locally and that tension is not applied.
Note that compared to the middle section of the load, elasticity drops at the outlet from the sensor case 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

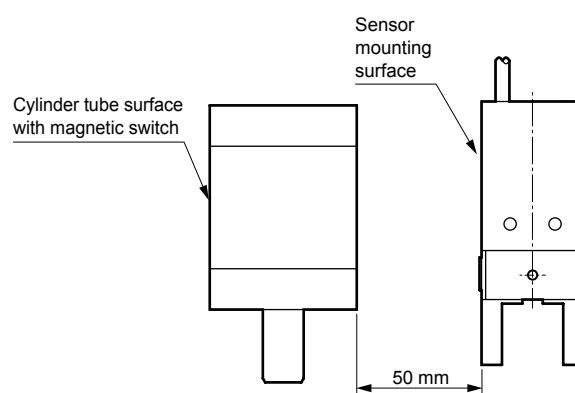
1. Common

⚠ 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.



LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MecHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

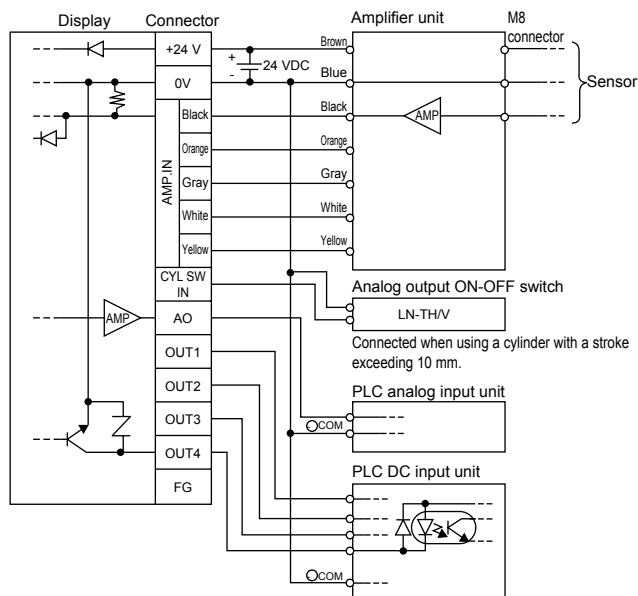
■ When mounting the amplifier unit case with separated amplifier using a side through hole, use M3 cross-recessed pan head machine screws, with tightening torque of 0.5 to 0.7 N·m.

■ 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.

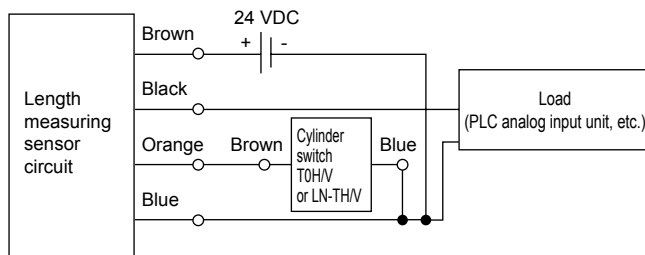
■ Connecting the lead wire

● Display

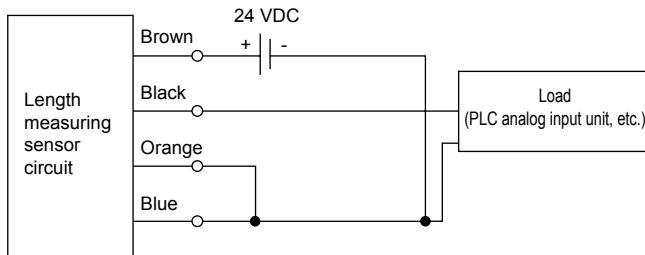


1. Since the display is a two-channel specification, +24 V, 0 V is present at every two places in the connector unit. Since each conduction is present inside the display for these, it operates with either of the wiring.
2. If connecting the amplifier unit with only one model, the channel of the connector 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 mm² 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

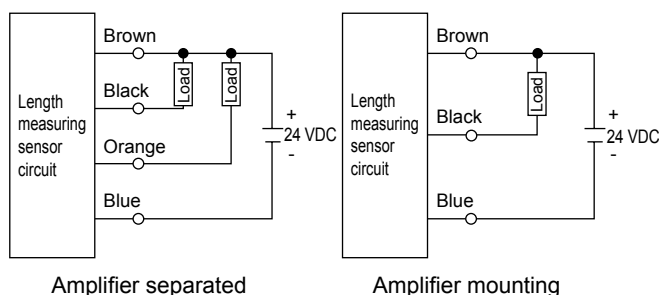


● When analog output hand is installed



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

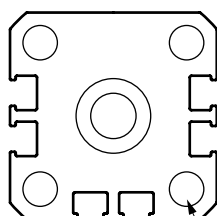
Mounting, installation and adjustment

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.



Bolt mounting hole

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).

LCM
LCR
LCG
LCW
LCX
STM
STG
STS/STL
STR2
UCA2
ULK*
JSK/M2
JSG
JSC3/JSC4
USSD
UFCD
USC
UB
JSB3
LMB
LML
HCM
HCA
LBC
CAC4
UCAC2
CAC-N
UCAC-N
RCS2
RCC2
PCC
SHC
MCP
GLC
MFC
BBS
RRC
GRC
RV3*
NHS
HRL
LN
Hand
Chuk
MechHnd/Chuk
ShkAbs
FJ
FK
SpdContr
Ending

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.

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