

# GP-A SERIES

**NEW**

## High Accuracy Eddy Current Type Displacement Sensor



### High Accuracy Analog Sensing of Minute Displacement

#### High Resolution 0.04% F.S.

Minute displacement of metallic objects can be accurately measured with a resolution of 0.04% F.S.

#### Linearity $\pm 0.5\%$ F.S.

Displacement is accurately output since it incorporates a high accuracy linearity correction circuit.

#### Stable Temperature Characteristics

Sensor head:  $0.5 \mu\text{m}/^\circ\text{C}$   
 Amplifier:  $0.4 \mu\text{m}/^\circ\text{C}$   
 There is almost no effect of temperature variations.

#### Incorporates Zero-adjustment Function

The analog voltage output corresponding to the standard measured value can be forcibly set to 0V (analog current output 4mA). This is useful for an error check by taking the measured master workpiece values as standard. Job change-over can also be smoothly done.

Further, the zero-adjustment function can be set not only at the amplifier, but also with an external input, so that setting can be done even from a remote place.



#### Suitable for Various Analog Control Devices

It is suitable for various analog control devices since it is equipped with two outputs, analog voltage (0 to 5V) and analog current (4 to 20mA).

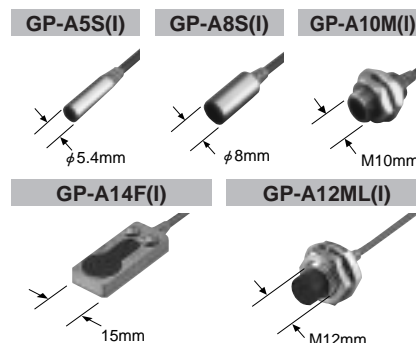
#### Different Frequency Type Also Available

In case of **GP-A14F** type, the standard type and the different frequency type can be mounted next to each other. For models besides **GP-A14F** type, they can be mounted at 1/3 the interval required for the same frequency types. It is optimally suited for high accuracy measurement, such as, deformation measurement, etc., by being adjacently mounted in a narrow space.

#### Choice of Sensor Heads

$\phi 5.4\text{mm}$  non-threaded type for 1mm sensing,  $\phi 8\text{mm}$  non-threaded type and M10mm threaded type for 2mm sensing are available. Further, long range M12 threaded type which can sense up to 5mm and front sensing type which can be embedded in metal and can sense up to 3mm have been newly added to the sensor range. The sensor head can be selected according to the application and the mounting space.

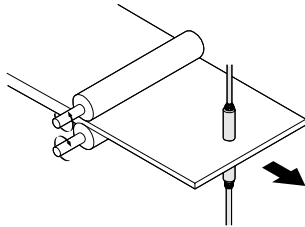
The sensor heads have superior environmental resistance as they are protected as per IP67 (IEC) & IP67g (JEM) and, moreover, the cable joint has a protector.



## APPLICATIONS

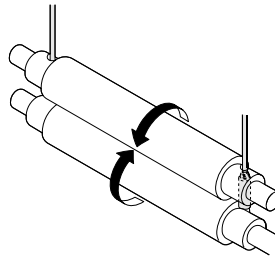
### Measuring iron sheet thickness

In combination with the digital panel controller **CA** series, it is optimally suited for measuring thickness of continuous iron sheets.



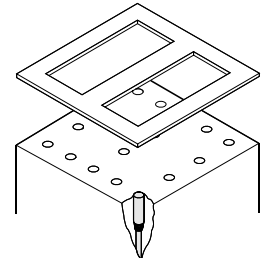
### Measuring gap between rollers

Fine gap measurement is possible to control the gap between rollers.



### Measuring parallelism of chassis

Even a slight tilt can be reliably detected.



### Simple Connection with a Connector

Since the connection between the sensor head and the amplifier is connector type, simple and quick connection is realized.

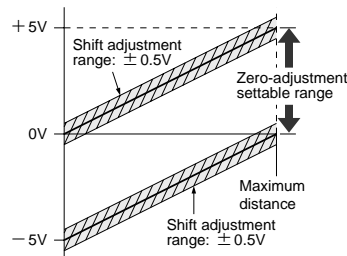
The problem of measurement error due to variation in contact resistance in terminal type connection has been eliminated.



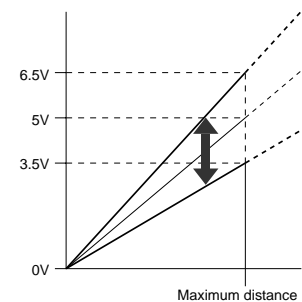
### Fine Adjustment of Output

Fine adjustment according to the sensing conditions is possible with shift and span functions.

#### Shift adjustment



#### Span adjustment



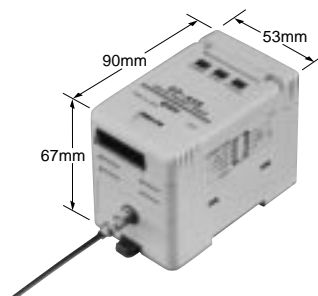
### Equipped with Useful Indicators

The amplifier is equipped with an **ALARM** indicator (yellow), which lights up in case of sensor head cable disconnection or sensor head damage, and an **OVER** indicator (orange), which lights up in case the sensing range is exceeded.



### Compact Amplifier

The amplifier has a W53 × H90 × D67mm compact size. Of course, it is mountable on a DIN rail.



## GP-A

## ORDER GUIDE

Type	Appearance (mm)		Sensing range	Set model No.
	Sensor head	Amplifier		
For 1mm sensing Non-threaded type sensor head Different frequency				GP-A5S
				GP-A5SI
For 2mm sensing Non-threaded type sensor head Different frequency				GP-A8S
				GP-A8SI
For 2mm sensing Threaded type sensor head Different frequency				GP-A10M
		GP-A10MI		
For 5mm sensing Threaded type sensor head Different frequency			GP-A12ML	
			GP-A12MLI	
For 3mm sensing Front sensing type sensor head Different frequency			GP-A14F	
			GP-A14FI	

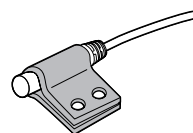
Please ensure to order the sensor head and the amplifier as a set. The set is calibrated and delivered.

## OPTIONS

Type	Model No.	Description	
Sensor head mounting bracket	MS-SS5	Mounting bracket for GP-A5S(I)	
	MS-SS8	Mounting bracket for GP-A8S(I)	
Digital panel controller (Note)	CA2-T1	NPN open-collector transistor	This is a very small controller which allows two independent threshold level settings. <ul style="list-style-type: none"> <li>Supply voltage: 24V DC <math>\pm</math> 10%</li> <li>No. of inputs: 1 No. (sensor input)</li> <li>Input range: 4 to 20mA (CA2-T1) <math>\pm</math> 5V (CA2-T4)</li> </ul> • Main functions: Threshold level setting function, zero-adjust function, scale setting function, hysteresis setting function, start/hold function, auto-reference function, power supply ON-delay function, etc.
	CA2-T4		
	CA-R1	Relay-contact	This is a multi-functional controller having mathematical functions, hold function, etc. <ul style="list-style-type: none"> <li>Supply voltage: 100 to 240V AC <math>\pm</math> 10%</li> <li>No. of inputs: 2 Nos. (sensor inputs)</li> <li>Input range: 4 to 20mA (CA-□1) <math>\pm</math> 5V (CA-□4)</li> </ul> • Power supply for sensor: 12V DC, 150mA <ul style="list-style-type: none"> <li>Main functions:                Mathematical functions, process number selection function, hold function, scaling function, auto-reference function, power supply ON-delay function, measurement start delay function, hysteresis setting function, etc.             </li> </ul>
	CA-R4		
	CA-T1	NPN open-collector transistor	
	CA-T4		
CA-B1	NPN open-collector transistor With BCD output		
CA-B4			

## Sensor head mounting bracket

It enables easy fixing of the sensor head.



## Digital panel controller

• CA2 series



• CA series



Note: For further details, refer to P.776~ for the ultra-compact digital panel controller CA2 series, and to P.766~ for the digital panel controller CA series.

## SPECIFICATIONS

Item	Type	For 1mm sensing		For 2mm sensing				For 5mm sensing		For 3mm sensing	
		Non-threaded type sensor head		Non-threaded type sensor head		Threaded type sensor head		Threaded type sensor head		Front sensing type sensor head	
Set model No.			Different frequency		Different frequency		Different frequency		Different frequency		Different frequency
		GP-A5S	GP-A5SI	GP-A8S	GP-A8SI	GP-A10M	GP-A10MI	GP-A12ML	GP-A12MLI	GP-A14F	GP-A14FI
Sensing range		0 to 1mm		0 to 2mm				0 to 5mm		0 to 3mm	
Standard sensing object		Iron sheet 8 × 8 × t1mm		Iron sheet 12 × 12 × t1mm				Iron sheet 30 × 30 × t1mm		Iron sheet 15 × 15 × t1mm	
Supply voltage		24V DC ± 10%									
Current consumption		150mA or less									
Analog output (Analog voltage output ) (Analog current output )		Analog voltage • Output voltage: 0 to 5V • Output impedance: 100Ω approx.					Analog current • Output current: 4 to 20mA • Load resistance: 0 to 350Ω				
Response frequency		1.6kHz ( - 3dB)									
Resolution		0.04% F.S.									
Linearity		Within ± 0.5% F.S.									
Alarm output		NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between alarm output and 0V) • Residual voltage: 1.6V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)									
Output operation		Turns ON when the sensor head connection is improper or the sensor head cable is disconnected.									
Short-circuit protection											
External zero-adjustment input		Input condition: Non-voltage contact or NPN open-collector transistor input Signal condition: Low ... 0 to 1V (duration 30ms or more) High ... 5 to 30V, or open Operation: Low ... External zero-adjustment setting High ... External zero-adjustment ineffective									
Zero-adjustment setting method		Push button setting/External input setting									
Power indicator		Green LED (lights up when the power is ON)									
Over indicator		Orange LED (lights up when sensing range is exceeded)									
Alarm indicator		Yellow LED (lights up when alarm output is ON)									
Adjustments		① Shift adjustment (by push-buttons), ② Span adjustment (by 14-turn adjuster)									
Temperature characteristics (Note 1)	Sensor head	0.5 μm/°C	0.6 μm/°C	1 μm/°C	0.6 μm/°C	1 μm/°C	1.5 μm/°C	2.5 μm/°C	0.9 μm/°C	1.5 μm/°C	
	Amplifier	0.4 μm/°C	0.8 μm/°C				2.0 μm/°C		1.2 μm/°C		
Protection	Sensor head	IP67 (IEC), IP67g (JEM)									
	Amplifier										
Ambient temperature	Sensor head	- 10 to + 55°C, Storage: - 20 to + 70°C									
	Amplifier	0 to + 50°C (No dew condensation), Storage: 0 to + 50°C									
Ambient humidity		35 to 85% RH, Storage: 35 to 85% RH									
Voltage withstandability	Sensor head	250V AC for one min. between all supply terminals connected together and enclosure									
Insulation resistance	Sensor head	20MΩ, or more, with 250V DC megger between all supply terminals connected together and enclosure									
Vibration resistance	Sensor head	10 to 55Hz frequency, 1.5mm amplitude in X, Y and Z directions for two hours each									
	Amplifier	10 to 150Hz frequency, 0.75mm amplitude in X, Y and Z directions for two hours each									
Shock resistance	Sensor head	500m/s <sup>2</sup> acceleration (50G approx.) in X, Y and Z directions for five times each									
	Amplifier	100m/s <sup>2</sup> acceleration (10G approx.) in X, Y and Z directions for five times each									
Material	Sensor head	Enclosure: Stainless steel (SUS303) Sensing part: Polyallylate			Enclosure: Stainless steel (SUS303) Sensing part: ABS			Enclosure: Brass (Nickel plated) Sensing part: Nylon		Enclosure: Stainless steel (SUS303) Sensing part: ABS	
	Amplifier	Enclosure: ABS									
Cable	Sensor head	Connector attached high frequency coaxial cable, 3m long									
Cable length (Note 2)	Amplifier	Up to total 100m with 0.3mm <sup>2</sup> , or more, cable									
Weight	Sensor head	40g approx.				50g approx. (Note 3)		45g approx. (Note 3)		50g approx.	
	Amplifier	170g approx.									
Accessories		Adjusting screwdriver: 1 No.				Nut: 2 Nos., Toothed lock washer: 1 No. Adjusting screwdriver: 1 No.				2 Nos. each of M3 countersunk head screws, spring washers, plain washers and M3 nuts Adjusting screwdriver: 1 No.	

Notes: 1) These values are for a range which is 20 to 60% of the maximum sensing distance.

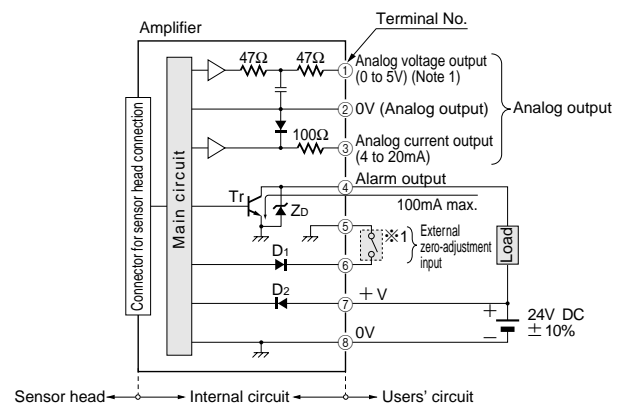
2) Take care that the output voltage is reduced due to the resistance of the wiring cable.

3) The given weight of the threaded type sensor head is the value including the weight of the nuts and the toothed lock washer.

# GP-A

## I/O CIRCUIT AND WIRING DIAGRAMS

### I/O circuit diagram

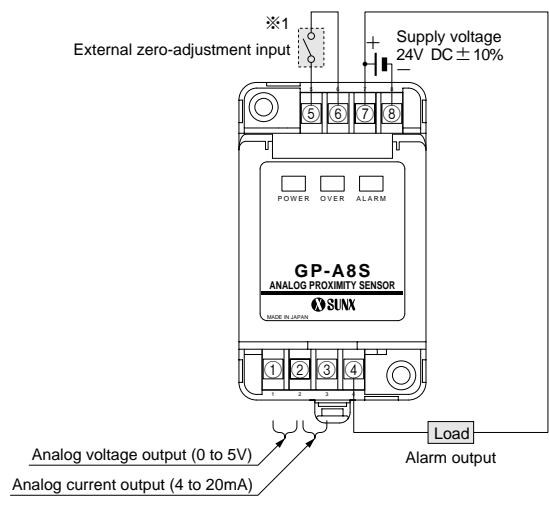


Note: In case of using the analog voltage output, connect a device having a high input impedance. Also, take care that the output voltage is reduced due to the resistance of the wiring cable.

Symbols ... D1: Input protection diode  
 D2: Reverse supply polarity protection diode  
 Zb: Surge absorption zener diode  
 Tr: NPN output transistor

※1  
 Non-voltage contact or NPN open-collector transistor  
 Terminal No. 5 or 6  
 Low (0 to 1V) (duration 30ms or more): external zero-adjustment setting  
 High (5 to 30V, or open): external zero-adjustment ineffective

### Wiring diagram

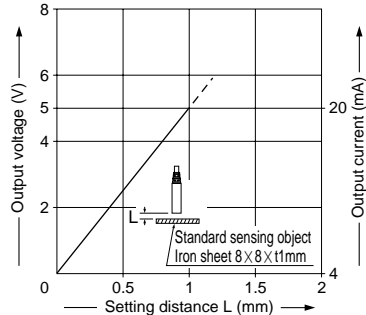


Note: After the wiring, make sure to fit the terminal covers. The terminal cover having a concave depression at the top should be fitted on the side having terminal Nos. 1 to 4.

## SENSING CHARACTERISTICS (TYPICAL)

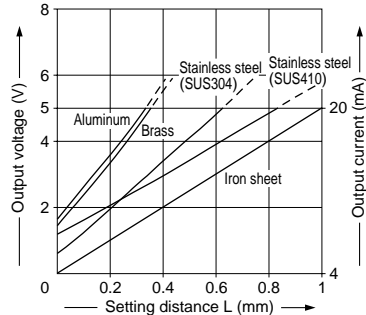
### GP-A5S(I)

Correlation between setting distance and output voltage/current



As shown in the graph on the left, an analog voltage/current proportional to the distance from the standard sensing object can be obtained.

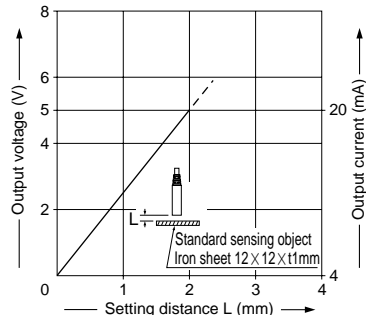
Correlation between material and output voltage/current



As shown in the graph on the left, the analog voltage/current differs depending on the material of the sensing object.

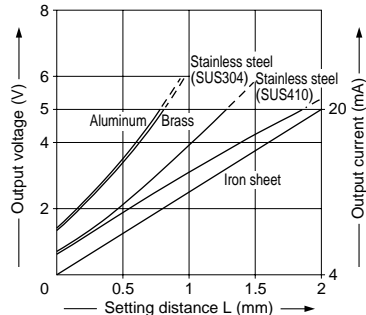
### GP-A8S(I) GP-A10M(I)

Correlation between setting distance and output voltage/current



As shown in the graph on the left, an analog voltage/current proportional to the distance from the standard sensing object can be obtained.

Correlation between material and output voltage/current

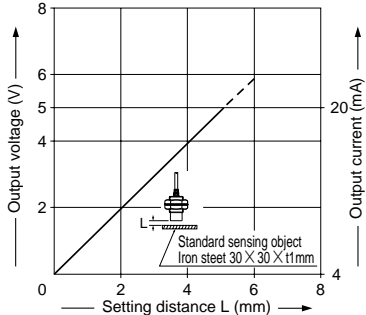


As shown in the graph on the left, the analog voltage/current differs depending on the material of the sensing object.

## SENSING CHARACTERISTICS (TYPICAL)

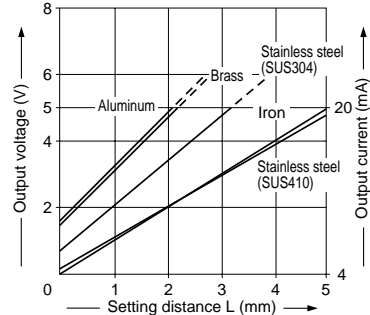
### GP-A12ML(I)

#### Correlation between setting distance and output voltage/current



As shown in the graph on the left, an analog voltage/current proportional to the distance from the standard sensing object can be obtained.

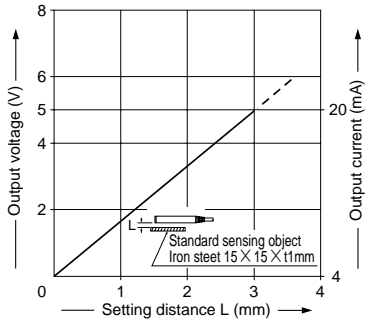
#### Correlation between material and output voltage/current



As shown in the graph on the left, the analog voltage/current differs depending on the material of the sensing object.

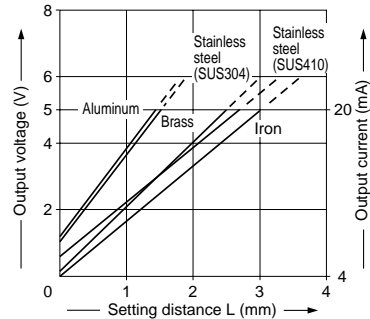
### GP-A14F(I)

#### Correlation between setting distance and output voltage/current



As shown in the graph on the left, an analog voltage/current proportional to the distance from the standard sensing object can be obtained.

#### Correlation between material and output voltage/current



As shown in the graph on the left, the analog voltage/current differs depending on the material of the sensing object.

## PRECAUTIONS FOR PROPER USE



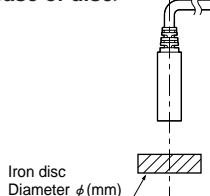
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

- Make sure to use in combination the sensor head and amplifier which have the same production serial number (5 digit). Since adjustment is done before shipment, if items with different production serial numbers are combined, the sensing characteristics will deteriorate even if they have the same model number.
- The length of the sensor head cable cannot be changed.

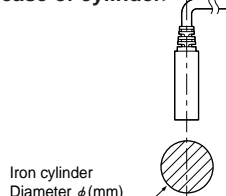
### Linearity in case of disc-shaped or cylindrical objects

- In case the sensing object is disc-shaped or cylindrical, the linearity of the analog output varies with the sensing object size. In this case, if the analog voltage output and the analog current output are adjusted to 0V and 4mA, respectively, when the sensor head is in contact with the sensing object, and to 5V and 20mA, respectively, when the sensor head is 2mm [GP-A5S(I): 1mm, GP-A12ML(I): 5mm, GP-A14F(I): 3mm] away from the sensing object, the linearity ( $\pm 0.5\%$  F.S.) can be attained if the disc has a diameter of  $\phi 12\text{mm}$  [GP-A12ML(I):  $\phi 30\text{mm}$ ], or more, and the cylinder has a diameter of  $\phi 10\text{mm}$  [GP-A12ML(I):  $\phi 50\text{mm}$ ], or more and a length of 50mm.

#### <In case of disc>



#### <In case of cylinder>

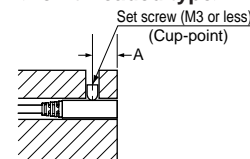


### Mounting sensor head

- The tightening torque should be under the value given below.

#### Mounting with set screw

##### <Non-threaded type>



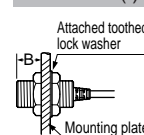
Model No.	A (mm)	Tightening torque
GP-A5S(I)	5 or more	0.44N·m
GP-A8S(I)		0.58N·m

Note: Do not apply excess torque.

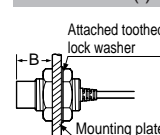
#### Mounting with nut

##### <Threaded type>

##### GP-A10M(I)

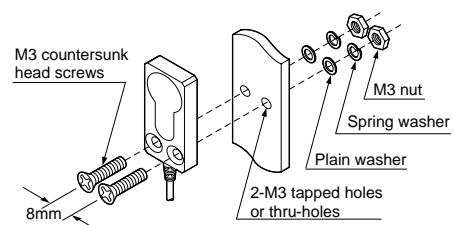


##### GP-A12ML(I)



Model No.	B part (mm)	Tightening torque
GP-A10M(I)	7 or more	9.8N·m
GP-A12ML(I)	14 or more	20N·m

#### Mounting GP-A14F(I)





## PRECAUTIONS FOR PROPER USE

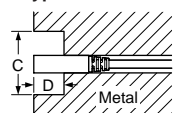
## Distance from surrounding metal

- As metal around the sensor may affect the sensing performance, pay attention to the following points.

## &lt;Embedding of the sensor in metal&gt;

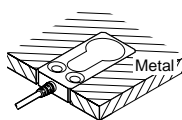
- Since the analog output may change if the sensor is completely embedded in metal, keep the minimum distance specified in the table below. **GP-A14F(I)** can be used by being completely embedded in metal. However, the surrounding metal should not protrude beyond the sensing face.

## &lt;Non-threaded type sensor head threaded type sensor head&gt;



Model No.	C (mm)	D (mm)
GP-A5S(I)	φ18	4
GP-A8S(I)		7
GP-A10M(I)		14
GP-A12ML(I)	φ50	14

## &lt;Front sensing type sensor head&gt;

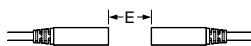


## Mutual interference

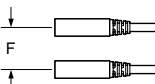
- If several sensor heads are mounted together, since the specifications may not be met, keep the minimum separation distance given below.

## &lt;Non-threaded type sensor head threaded type sensor head&gt;

## Face to face mounting

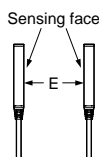


## Parallel mounting

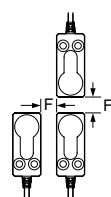


## &lt;Front sensing type sensor head&gt;

## Face to face mounting



## Parallel mounting



Model No.	Condition	E (mm)	F (mm)
GP-A5S(I)	Between 'I' type and non-'I' type	18	11
	Between two 'I' types or two non-'I' types	50	36
GP-A8S(I)	Between 'I' type and non-'I' type	22	11
	Between two 'I' types or two non-'I' types	60	38
GP-A10M(I)	Between 'I' type and non-'I' type	24	14
	Between two 'I' types or two non-'I' types	210	130
GP-A14F(I)	Between 'I' type and non-'I' type	14	0
	Between two 'I' types or two non-'I' types	68	30

- Notes: 1) 'I' type is different frequency type.  
2) If the required resolution is lower than the specification (0.04% F.S.), it is possible to bring the sensor heads nearer than the separation distances given in the table above. For further details, please contact our office.

## Mounting amplifier

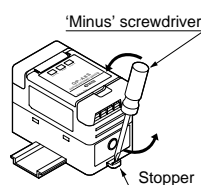
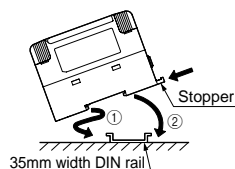
## Mounting on DIN rail

- With the stopper pressed in the direction of the arrow (it locks), fit the front portion of the mounting section of the amplifier on the 35mm width DIN rail.

(Lightly press the grooved section of the stopper downwards when pressing the stopper in.)

- Press and fit the rear portion of the mounting section on the 35mm width DIN rail.

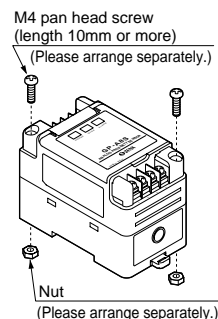
- To remove, insert a 'minus' screwdriver into the stopper and pull out.



## Mounting with screws

- Use two commercially available M4 pan head screws (length 10mm or more). The tightening torque should be 1.2N·m or less.

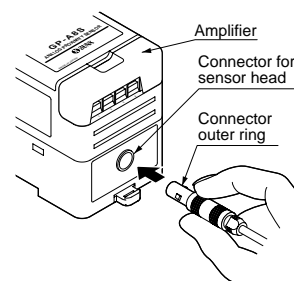
(Please arrange the pan head screws and nuts separately. The mounting holes for the screws can be accessed by removing the terminal cover. To remove the terminal cover, insert a 'minus' screwdriver into the groove of the terminal cover and lift up.



- Notes: 1) If two, or more, amplifiers are mounted together, make sure to leave a gap of at least 10mm between them.  
2) If the amplifier is installed in a control box, etc., ensure proper ventilation.

## Connection of sensor head and amplifier

- Hold the sensor head's connector by the outer ring and insert it into the connector provided on the amplifier for sensor head connection. Insert till you hear a click sound.



- To remove the sensor head, hold its connector by the outer ring and pull it straight out.

- Note: Do not pull by holding the cable, as this can result in cable disconnection.

## Dimensions of suitable crimp terminals

(Unit: mm)

Y type	Round type
(After crimping)	(After crimping)

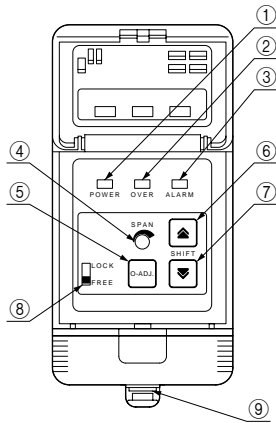
- Note: Please use crimp terminals which have insulation sleeves.  
Recommended crimp terminal: Type 1.25 - 3.0

## Wiring

- Make sure to carry out the wiring in the power supply off condition.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of the sensor head or the amplifier, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.

## PRECAUTIONS FOR PROPER USE

### Functional description



※Cover opened condition

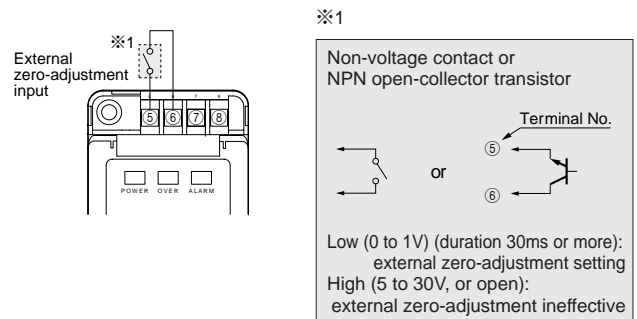
	Description	Function
①	Power indicator (Green)	Lights up when the power is ON.
②	Over indicator (Orange)	Lights up when the sensing range is exceeded.
③	Alarm indicator (Yellow)	Lights up when the sensor head connection is improper or the sensor head cable is disconnected.
④	Span adjuster	Analog output's output voltage range and output current range can be adjusted. It is a 14-turn potentiometer.
⑤	Zero-adjustment button	The zero-point of the analog output can be set. Further, if it is pressed continuously for 3 sec., or more, the zero-point value can be erased.
⑥	Shift-up button	Analog output's offset value can be increased.
⑦	Shift-down button	Analog output's offset value can be decreased.
⑧	Button operation effective/ineffective selection switch	If both the buttons are pressed simultaneously for 3 sec., or more, the set value can be erased. If it is set to the 'LOCK' side, the operation of the zero-adjustment button, the shift-up button and the shift-down button is ineffective. Set it to the 'FREE' side during adjustment, and to the 'LOCK' side during sensing. The values of zero-point setting and shift adjustment are stored in an EEPROM (memory) whenever the switch is changed from the 'FREE' side to the 'LOCK' side.
⑨	Connector for sensor head	It is the connector for sensor head connection.

### Alarm output

- It is output when the sensor head connection is improper or the sensor head cable is disconnected.
- The alarm output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

### External zero-adjustment input

- The external zero-adjustment input should be applied 30 min., or more, after the power supply is switched on.
- Zero-adjustment can be remotely done by an external input by using the zero-adjustment input terminals (terminal Nos. 5 and 6).
- If the external zero-adjustment input terminals (terminal Nos. 5 and 6) are short-circuited for 30ms, or more, the analog voltage output and the analog current output are forcibly set to 0V and 4mA, respectively.



- The external zero-adjustment input operation is independent of the state of the 'button operation effective/ineffective selection switch'. However, since the external zero-adjustment setting is not stored in the EEPROM (memory), it is canceled when the power supply is switched off. In case it is desired to store the setting in the EEPROM, set the 'button operation effective/ineffective selection switch' once to the 'FREE' side and again to the 'LOCK' side, before switching off the power supply.

Note: If the power supply is switched on with the external zero-adjustment input terminals (terminal Nos. 5 and 6) short-circuited, since zero-adjustment gets done in the transient state of the power supply switching on, stable sensing is not possible. Further, ensure to apply the zero-adjustment input 30 min., or more, after the power supply is switched on.

### Others

- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- Do not use the sensor at places having intense vibrations, as this can cause malfunction.
- Avoid dust, dirt, and steam.
- Take care that the product does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- Take care that the sensing face is not covered with metal dust, scrap, etc., as this can cause malfunction.



## PRECAUTIONS FOR PROPER USE

## Adjustment

• This product is delivered after being adjusted with the standard sensing object. However, since there is some difference due to the sensing object being used, carry out the adjustment as per the following procedure, using a voltmeter or ammeter, oscilloscope, etc.

① Switch on the power supply after confirming that proper connection has been made to the external device to which GP-A is to be connected.

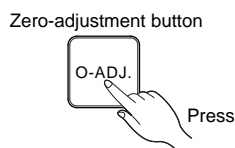
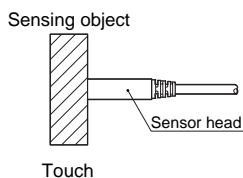
② Start the adjustment 30 min., or more, after switching on the power supply.

③ Open the cover on the top of the amplifier and set the 'button operation effective/ineffective selection switch' to the 'FREE' side.

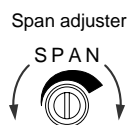
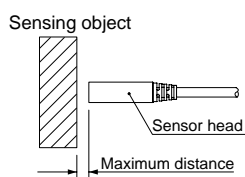
Button operation effective/ineffective selection switch.



④ Touching the sensor head to the sensing object, press the 'zero-adjustment button' and set the zero-point. At this time, the analog voltage output and the analog current output are forcibly set to 0V and 4mA, respectively.



⑤ Set the sensor head at the maximum distance [GP-A5S(I): 1mm, GP-A8S(I) and GP-A10M(I): 2mm, GP-A12ML(I): 5mm and GP-A14F(I): 3mm ] from the sensing object. At this time, adjust the analog voltage output to +5V or the analog current output to 20mA with the 'span adjuster'.



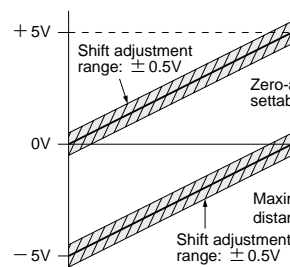
Note: Since the analog voltage output and the analog current output get adjusted simultaneously, it is not possible to adjust them individually.

⑥ Once again, touch the sensor head to the sensing object, and confirm that the analog voltage output and the analog current output are 0V and 4mA, respectively. In case they are not, repeat the adjustment from step ④.

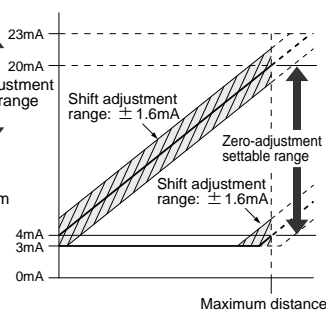
⑦ The following shift adjustment and span adjustment can be done if required.

## Shift adjustment range

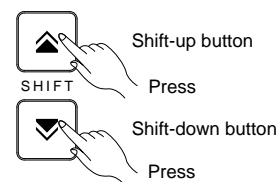
## &lt;Analog voltage output&gt;



## &lt;Analog current output&gt;



• Using the 'shift-up button' and the 'shift-down button', it is possible to adjust the offset value for the analog voltage output by  $\pm 0.5V$  and that for the analog current output by  $\pm 1.6mA$ .

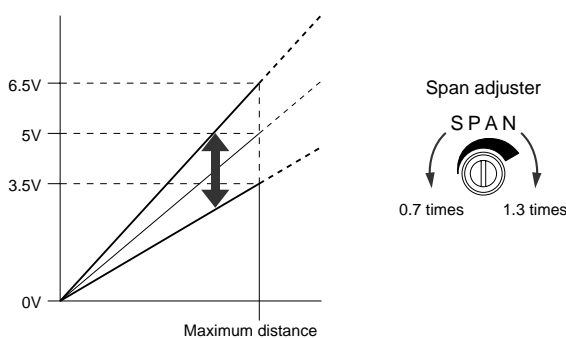


• As long as the sensing object is within the sensing range, the analog voltage output and the analog current output can be adjusted to 0V and 4mA, respectively, with the 'zero-adjustment button'.

Note: The analog current output is limited to a lower limit of 3mA and an upper limit of 23mA by a control circuit.

## Span adjustment range

• The output span (slope) can be adjusted with the 'span adjuster' over a range of 0.7 to 1.3 times than that for the standard sensing object.



Note: Since the span adjustment can be done irrespective of the 'button operation effective/ineffective selection switch' position, do not operate the span adjuster after the adjustment.

⑧ After the adjustment, make sure to set the 'button operation effective/ineffective selection switch' to the 'LOCK' side and close the cover on top of the amplifier.

Button operation effective/ineffective selection switch



• The values of zero-point setting and shift adjustment get stored in an EEPROM when the switch is set to the 'LOCK' side. The values stored in the EEPROM are not erased even when the power supply is switched off. However, kindly note that the EEPROM has a life span and its guaranteed life is 100,000 write operation cycles.

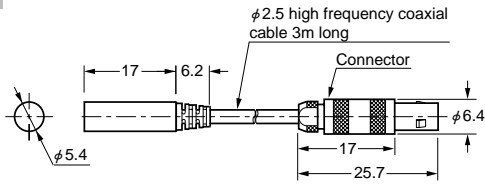
Notes: 1) The set values are not stored in the EEPROM if the power supply is switched off when the switch is on the 'FREE' side.

2) If the switch is set to the 'LOCK' side before adjustment, the set values cannot be changed.

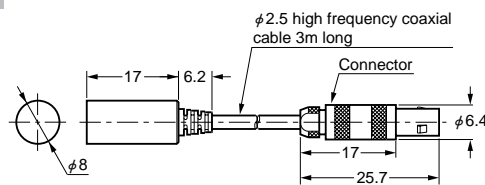
## DIMENSIONS (Unit: mm)

### Sensor head

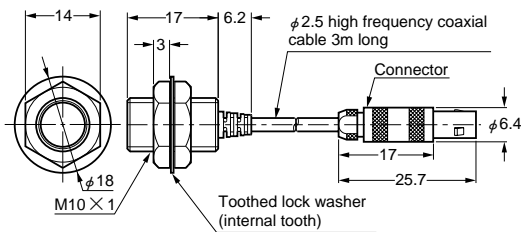
#### GP-A5S(I)



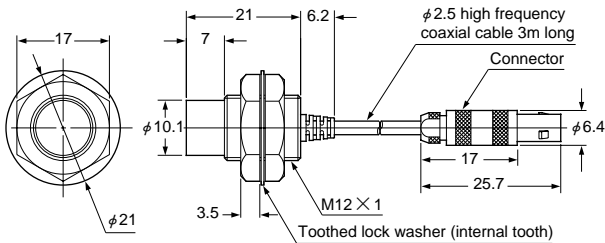
#### GP-A8S(I)



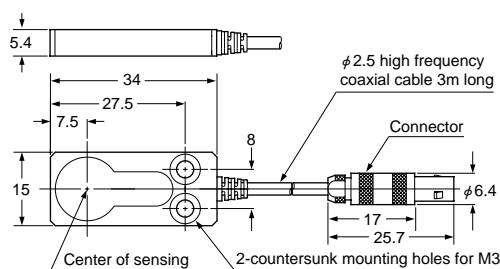
#### GP-A10M(I)



#### GP-A12ML(I)

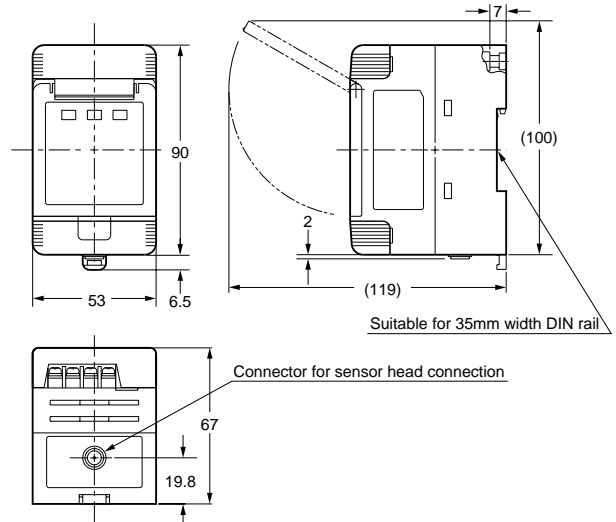


#### GP-A14F(I)

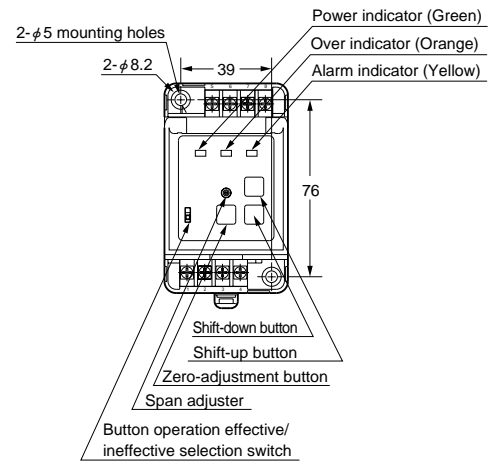


### Amplifier

#### All models

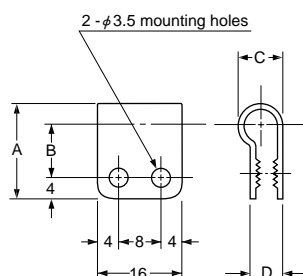


#### Cover removed condition



### MS-SS5 MS-SS8

Mounting bracket for GP-A5S(I) (Optional), mounting bracket for GP-A8S(I) (Optional)



Material: Nylon 66

Model No.	MS-SS5	MS-SS8
Item		
A	18	20
B	10	11
C	8.3	10.3
D	6.1	6.5
Applicable model	GP-A5S(I)	GP-A8S(I)

Collimated Beam Sensors  
LA-300

Outer Diameter Measurement  
LD

Image Sensor  
VI

Displacement Sensing  
GP-A

LA