

# High Accuracy Inductive Gauging Sensors

## EX-500W Series

### Features

- Accurately measures all types of metal targets
- Linearity of  $\pm 0.3\%$  of F.S.
- Resolution of 0.03% of F.S.
- Digital adjustment circuit/Auto-zero function
- DIN-rail-mountable

### Measuring Distance

Non-shielded – 0 to 10 mm

0 to 5 mm

0 to 2 mm

0 to 1 mm



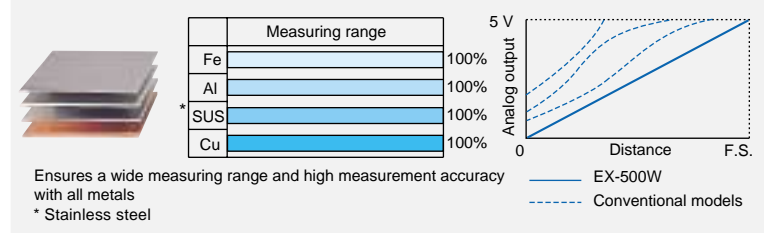
### Description

#### High resolution and accuracy

The EX-500W Series measures target displacement with a resolution of 0.03% of F.S. The dual analog outputs can be connected to external equipment. Using the built-in linearizer circuit, the EX-500W Series accurately outputs absolute displacement values with a linearity of  $\pm 0.3\%$  of F.S.

#### Wide measuring range for nonferrous targets

The EX-500W Series provides a wide measuring range and high measurement accuracy for nonferrous targets, unlike the more limited conventional sensors.



#### Auto-zero function

Pressing the auto-zero key sets the current measured value to 0 V. Zero-point adjustment with a standard target is as simple as pressing the auto-zero key, making sensor setup at product changeover quick and easy. (External control terminal is provided.)

#### Interference suppression function

The interference suppression function allows side-by-side installation of up to 5 sensors, enabling multi-point measurements in limited spaces.



#### Compatible sensor heads

Sensor heads of the same type can replace each other with only minor adjustments. The sensor cable can easily be extended by adding the optional extension cable and changing the switch settings.



#### Safety functions

If the sensor head is damaged or the cable is disconnected, the ALARM LED indicator lights and an alarm signal is output.

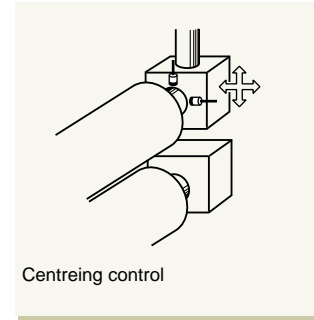
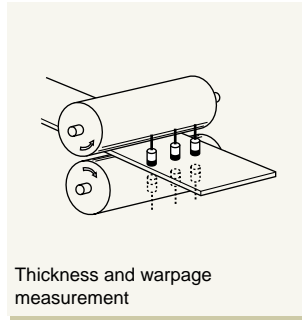
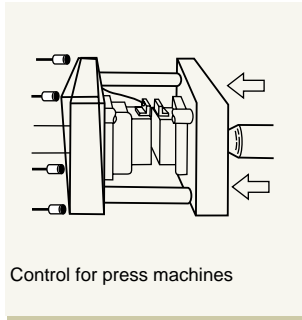


#### Heat-resistant sensor heads (105°C) conform to IP-67

The EX-500W Series offers four types of sensor heads including high-accuracy and long-range models. These sensor heads are ideal for measurements in harsh environments.



## Applications



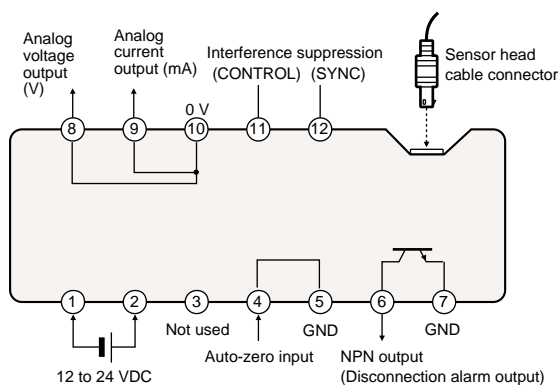
## Specifications

Type	Size	M8	M8	M16	M22
Model	Sensor head	EX-008	EX-008	EX-016	EX-022
	Controller	EX-501W	EX-502W	EX-505W	EX-510W
Measuring range		0 to 1 mm	0 to 2 mm	0 to 5 mm	0 to 10 mm
Analog output	Output voltage	0 to 5 V (Output impedance: 100 Ω)			
	Output current	4 to 20 mA (Applicable load: 0 to 350 Ω)			
	Resolution	0.03% of F.S. (RESPONSE= 3, 4)			
	Linearity	±0.3% of F.S. (RESPONSE= 2, 3, 4)			
Response time (Response mode)		0.1 ms (RESPONSE= 1), 1 ms (RESPONSE= 2), 10 ms (RESPONSE= 3), 100 ms (RESPONSE= 4)			
Disconnection alarm output <sup>1</sup> (N.C.)		NPN: 100 mA max. (40 V), Residual voltage: 1 V max.			
Functions		Auto-zero function/Auto-span function, Response time selector function/Preset metal characteristic memory function, Cable length selector function/Interference suppression function			
Temperature fluctuation	Sensor head	0.03% of F.S./°C	0.03% of F.S./°C	0.03% of F.S./°C	0.03% of F.S./°C
	Controller	0.04% of F.S./°C <sup>2</sup>	0.04% of F.S./°C <sup>2</sup>	0.04% of F.S./°C <sup>2</sup>	0.04% of F.S./°C <sup>2</sup>
Power supply voltage		12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 to 24 VDC ±10%	12 to 24 VDC ±10%
Current consumption		220 mA max.	220 mA max.	220 mA max.	220 mA max.
Enclosure rating		Sensor head: IP-67	Sensor head: IP-67	Sensor head: IP-67	Sensor head: IP-67
Ambient temperature	Sensor head	-20 to +105°C	-20 to +105°C	-20 to +105°C	-20 to +105°C
	Controller	0 to +50°C	0 to +50°C	0 to +50°C	0 to +50°C
Weight	Sensor head	Approx. 50 g	Approx. 50 g	Approx. 63 g	Approx. 80 g
	Controller	Approx. 360 g	Approx. 360 g	Approx. 360 g	Approx. 360 g

The above data was obtained using an aluminum target (A5052 t = 1 mm). When measuring steel or stainless steel targets, refer to the characteristics of linearity for these materials.

1. NPN output can easily be converted to PNP output by connecting the optional OP-5148 PNP Output Converter.
2. When the distance between the sensor head and the target is 50% of the measuring range and the operating temperature is 10 to 40°C (EX-008) or 0 to 50°C (EX-016 and EX-022).

## Connections



### 4 Auto-zero input terminal:

Sets the analog voltage to 0 V when this terminal and GND terminal 5 are short-circuited. (When current output is used, the output current is set to 4 mA.)

### 6 NPN output (Disconnection alarm output) terminal:

Outputs a signal when the sensor head cable is disconnected.

### 8 Analog voltage output terminal:

Analog voltage of 0 to 5 V relative to full measuring range is output.

### 9 Analog current output terminal:

Analog current of 4 to 20 mA relative to full measuring range is output.

### 11 & 12 Interference suppression terminals:

Terminals 1, 5, and 7 are internally connected.

## Part Names and Functions



### 1. Sensor head cable connector

### 2. LED Indicators

**POWER:** Power indicator

**OVER:** Out-of-range indicator

**ALARM:** Disconnection alarm indicator

### 3. Response time selector switch

You can select one of the following four response times;

RESPONSE	1	2	3	4
Response time	0.1 ms	1 ms	10 ms	100 ms

### 4. Mode selector switch

This switch is used to select the desired mode based on the target material.

MODE	Function	Reference metals	Other metals
1 <b>MEASUREMENT mode</b>	When measuring targets, set the switch to this position.	—	—
2 <b>ADJUSTMENT mode for aluminum</b>	When adjusting output voltage (current), select the ADJUSTMENT mode based on the target material.	Aluminum (A5052)	Copper (C1100) Brass (C3560)
3 <b>ADJUSTMENT mode for stainless steel</b>		Stainless steel (SUS304)	—
4 <b>ADJUSTMENT mode for steel</b>		Iron (S45C)	Iron (SS41) Stainless steel (SUS410)

### 5. Cable length selector switch

Normally set this switch to “3 m” (the lower position).

### 6. Lock switch

When this switch is set to LOCK (the lower position), any output adjustment keys (7) are disabled.

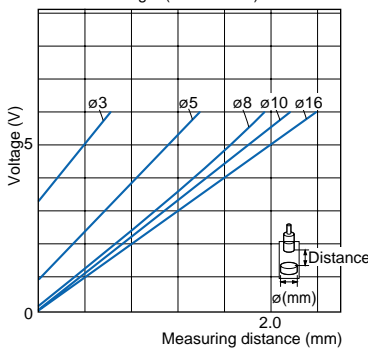
### 7. Output adjustment keys

Functions are adjusted with the Mode selector switch.

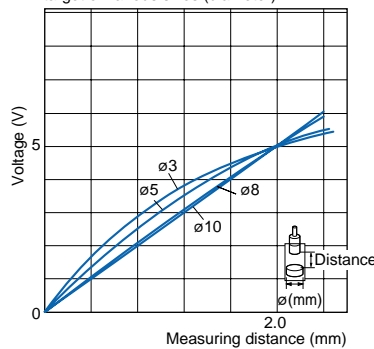
## Characteristics

### Output voltage for measuring targets of various sizes (Typical) EX-502W/EX-008 (Target: Aluminum A5052)

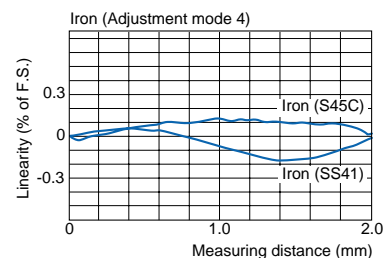
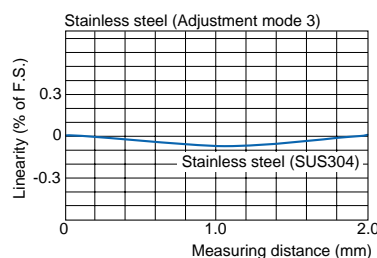
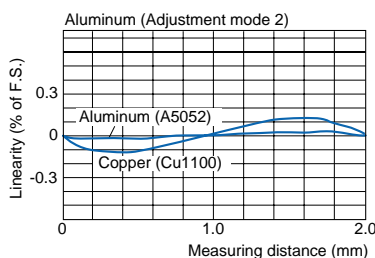
Calibrating analog output voltage using a standard target (50 x 50 mm)



Calibrating analog output voltage using target of various sizes (diameter)



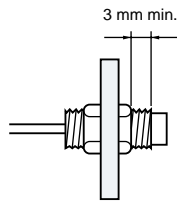
### Linearity for various metal measurements (Typical) EX-502W/EX-008



## Hints on Correct Use

### Sensor head installation

Secure the nut away from the tip of the metal case as shown on the right.



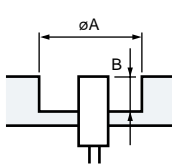
### Tightening torque

When tightening the nut, do not exceed the maximum tightening torque specified below.

EX-008	EX-016	EX-022
10 N•m max.	20 N•m max.	30 N•m max.

### Flush-mounting the sensor head

To flush-mount the sensor head in a metal base, follow the guidelines given in the table below.



Distance	A (mm)	B (mm)
Model		
EX-008	20	11
EX-016	45	20
EX-022	60	25

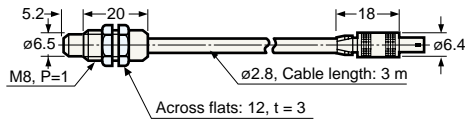
### Cable extension

The standard sensor head cable length is 3 m. It can be extended to 10 m by connecting an optional 7-m extension cable (Model: OP-20708).

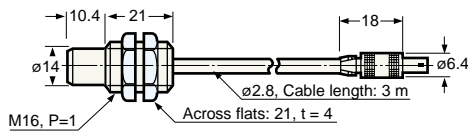
## Dimensions

### Sensor head

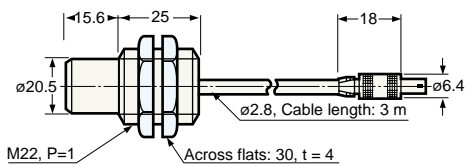
#### EX-008



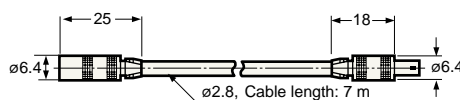
#### EX-016



#### EX-022



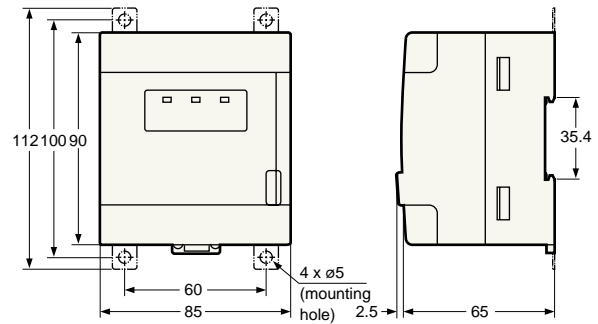
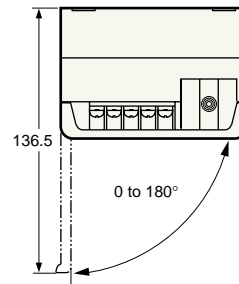
### Extension cable (optional: OP-20708)



### Controller

Unit: mm

#### EX-501W/502W/505W/510W



## Options

### RD Series Analog Sensor Controller



The RD Series processes analog input signals from sensors. It can easily perform various arithmetic operations such as tolerance limit differentiation and peak-to-peak hold.

For details on the RD Series, see the RD Series descriptions.