

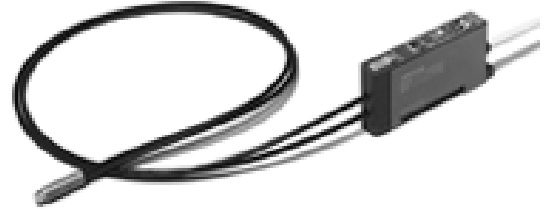
# HPX-MA Series

## Analog Output Fiber Optic Photoelectric Sensors

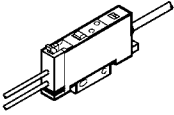
### FEATURES

The **HPX-MA** Series Features the Strong Capability for a Wide Variety of Applications by Analog Output and Detection in High Resolution.

- Sensitivity selector is equipped to enable the detection ranging from high resolution to high sensitivity.
- A 3-turn span adjusting variable resistor is provided to adjust the output range according to the detection range.
- High speed response mode enabling high speed detection.
- Single-touch DIN rail mounting system and 10mm thin sensor body.
- Free-cut optical fiber unit attachable with single-touch snap action lever.
- Furnished cable adapter allows ease-of-use with small-diameter cables.



### AMPLIFIER UNIT ORDER GUIDE

Appearance	Supply voltage	Output voltage range	Catalog listing
	10.8 to 26.4Vdc	1 to 5Vdc (proportional to intensity of incoming light)	<b>HPX-MA</b>

### AMPLIFIER UNIT SPECIFICATIONS

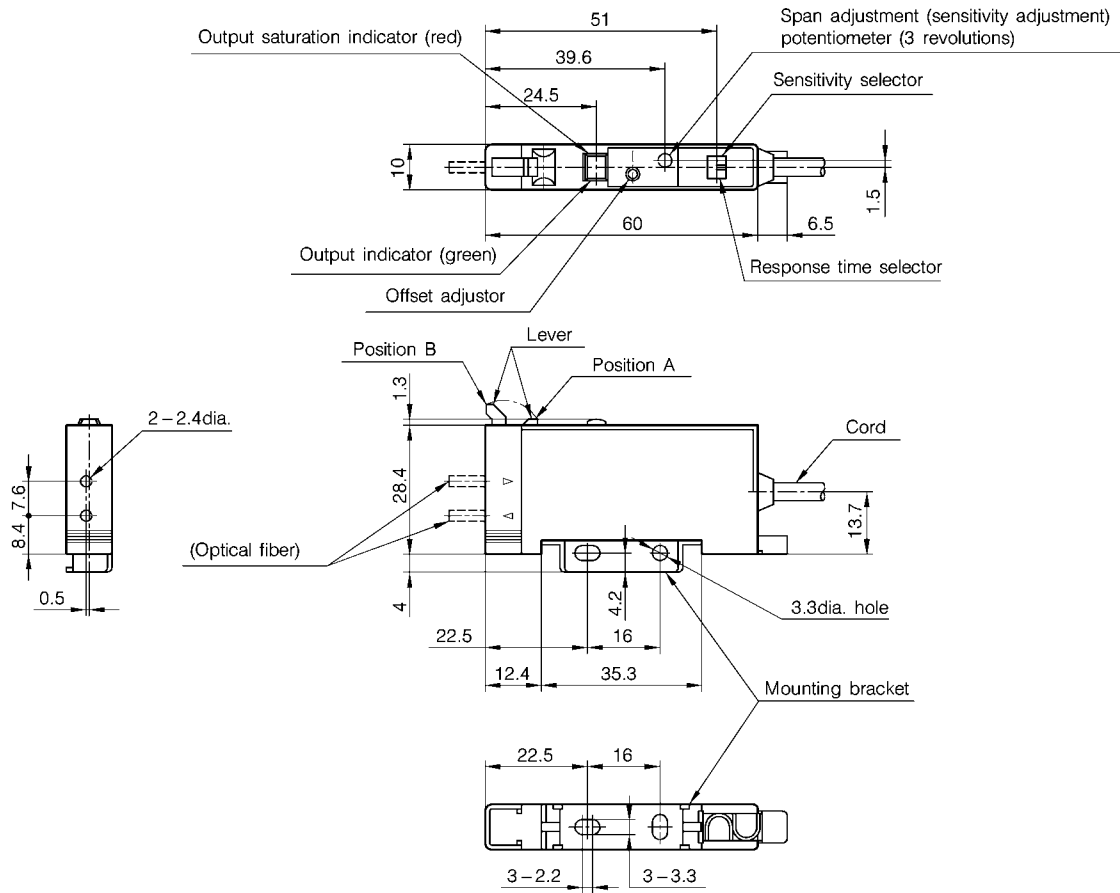
Model	Analog output model
Catalog listing	<b>HPX-MA</b>
Supply voltage	10.8 to 26.4Vdc (Max.10% ripple)
Current consumption	Max. 40mA
Output voltage range	1 to 5Vdc (proportional to intensity of incoming light)
Output impedance	47Ω
Load resistance	Min. 10kΩ
Resolution	NORMAL/NORMAL (SENS/RESP):1% FS max., NORMAL/FAST (SENS/RESP): 6% FS max. FINE/NORMAL (SENS/RESP): 0.3% FS max., FINE/FAST (SENS/RESP): 2% FS max.
Response time (RESP)	NORMAL (RESP): 50ms, FAST (RESP): 1ms
Sensitivity selection (SENS)	NORMAL/FINE selectable
Light emitter	Red LED (680nm)
Indicator	Output indicator (green): Lights at output voltage 1V or more Output saturation (red): Lights at output voltage 5V or more
Span adjustment (sensitivity adjustment)	3-turn variable resistor
Offset adjustment	1-turn variable resistor (0.75 to 1.5V)
Ambient light immunity	Incandescent lamp: Max. 3,000lux, Solar light: Max. 10,000lux
Operating ambient temperature	- 20 to +60°C (gang-mounting: - 20 to +50°C)
Storage ambient temperature	- 40 to +70°C
Operating ambient humidity	35 to 85% RH (no condensation allowed)
Insurance resistance	Min. 20MΩ (500Vdc megger)
Dielectric strength	1,000Vac 50/60Hz for 1 minute between case and electrically live metals
Vibration resistance	10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hours in X, Y and Z directions
Shock resistance	500m/s <sup>2</sup> 3 times in X, Y and Z directions
Connection method	Pre-leaded
Weight	Approx. 55g (body only, with 2m cable)
Others	Reverse connection protection circuit

- Installation Instructions No.: CP-UM-5066E

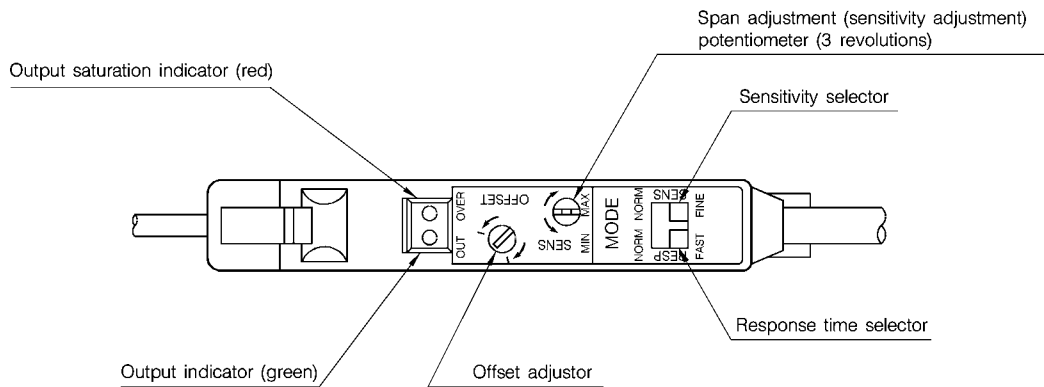
## EXTERNAL DIMENSIONS

### ● Amplifier

(unit: mm)



## NAMES OF PARTS



### - Span adjustment (sensitivity adjustment) potentiometer

Adjusts the changing rate of output to the incoming light level (3 revolutions). The output voltage can be adjusted in the range of offset to 6V.

### - Output saturation indicator (red)

Lights at output voltage more than 5V. This indicator is used for span adjustment.

### - Offset adjuster

Performs offset adjustment for output. Output reference voltage can be adjusted in 0.75 to 1.5V range.

### - Output indicator (green)

Lights at output voltage more 1V. This indicator is used for offset adjustment.

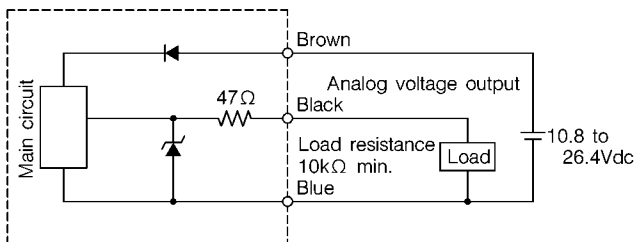
### - Sensitivity selector

Changeovers sensitivity (NORMAL/FINE).  
 NORMAL: Used when high sensitivity is required  
 FINE: Used when high resolution is required.

### - Response time selector

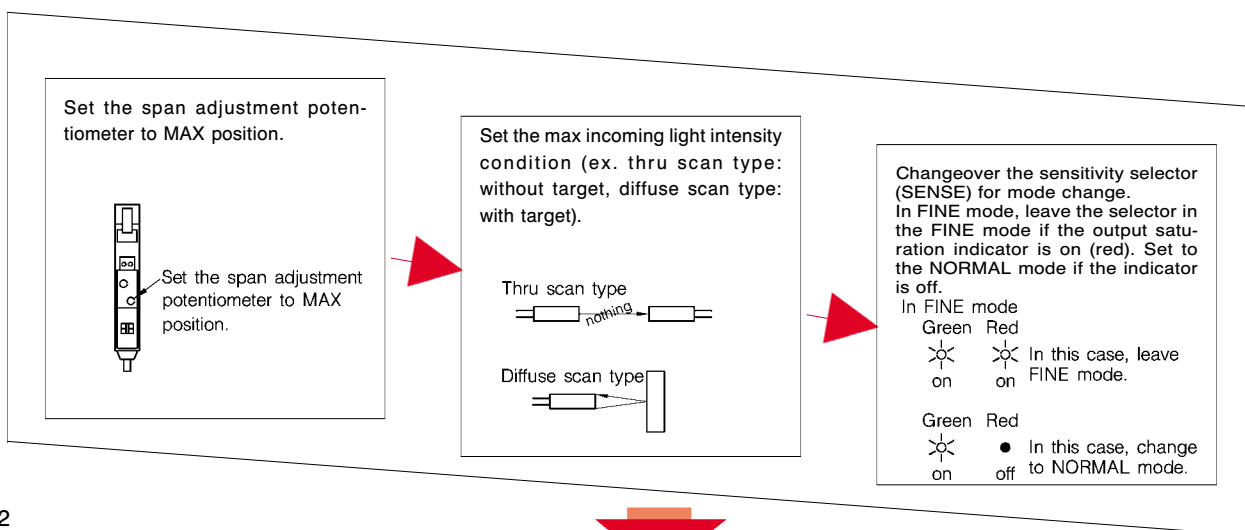
Changeovers response time (NORMAL/FINE).  
 NORMAL: Response time is 50ms. High resolution can be obtained.  
 FAST: Response time is 1ms. This is used when the detection of high changing rate is required.

## OUTPUT CIRCUIT

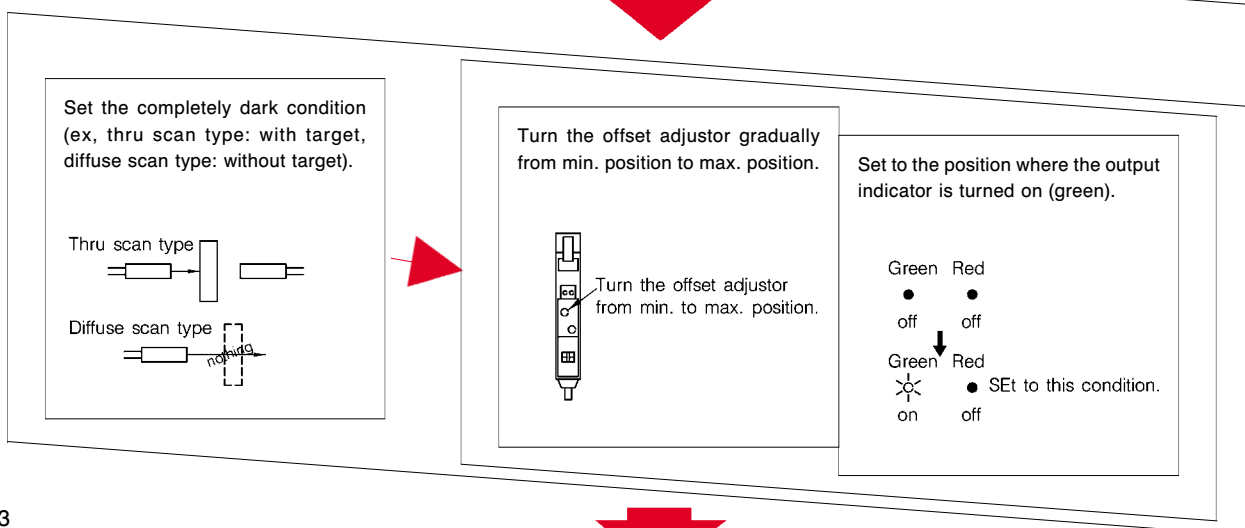


## SENSITIVITY ADJUSTMENT METHOD

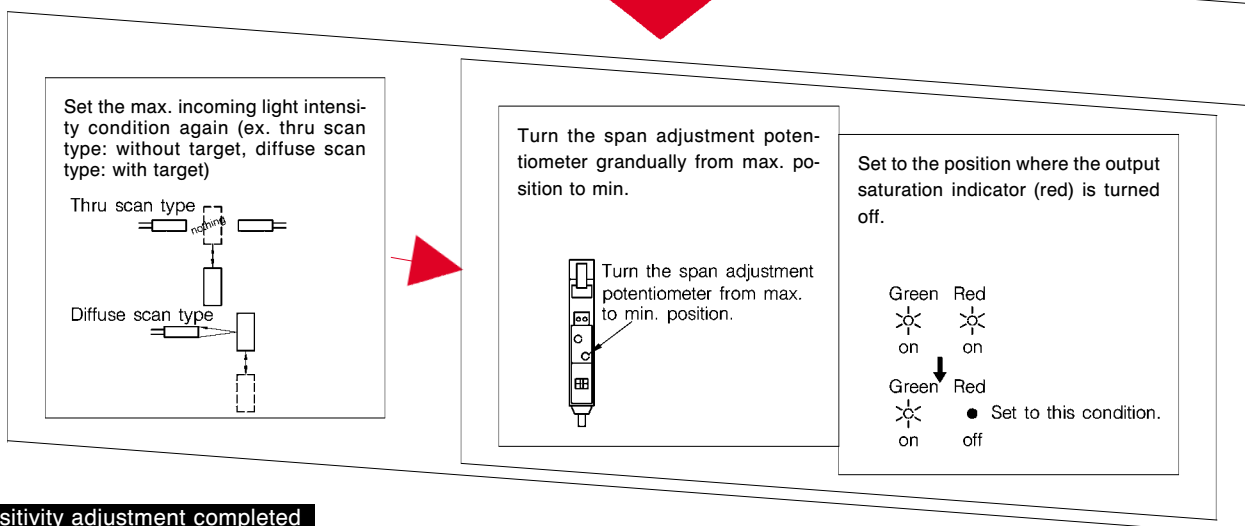
### - Step 1



### - step 2



### - step 3



### - Sensitivity adjustment completed

**Note:** The response time selector for mode changeover is set according to application.

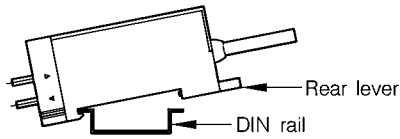
**Note:** Indicator can be used as a guideline for adjustment. If high accuracy setting is required, monitor the output voltage using a voltmeter at the step 2 and 3.

The adjustment target is 1V for the step 2, and 5V for the step 3.

## MOUNTING METHOD

The single-touch DIN-mounting system allows the **HPX** to be mounted on a DIN rail without using any tools.

- **How to mount/dismount on/from a DIN rail**
- Hook the front of the amplifier over the DIN rail.



- Push down the rear of the amplifier onto the DIN rail.
- To dismount the **HPX** from the DIN rail, pull out the rear lever with a flat-head screwdriver.

- **When a DIN rail is not used**

When not using a DIN rail, use the mounting bracket (supplied). To mount the **HPX** on the mounting bracket, follow the same procedure as that for the DIN rail.

## BASIC PRECAUTIONS

### • Wiring

- If cable is extended, the conductor resistance of cable may cause output voltage drop. In addition, the resolution may drop by the noise coming directly through the cable. If an extension cable is necessary, use a 0.3mm minimum leads (if possible, use a shielded cable) of maximum 5m. Be sure to check the output voltage and resolution before use. The resolution drop can be prevented to some degree by applying a 10nF ceramic capacitor between output and 0V.
- If the wires of photoelectric sensor are laid in the same conduit together with high-voltage or power lines or switching signal lines, the output voltage may become unstable by the inductance. Isolate the photoelectric sensor's cable or lay in a separate conduit.
- When using a commercially available switching regulator, ground the flame ground and ground terminals. If used without grounding, the switching noise may cause output fluctuations.

### • Handling

- Do not swing a photoelectric sensor by its cable.
- Do not impact or damage the scanning head.
- Do not pull the cable of the photoelectric sensor with excessive force. The tensile strength of the cable is about 49N at 50cm from the conduit.



## RESTRICIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

**YAMATAKE**

*Specifications are subject to change without notice.*

**Yamatake Corporation**  
**Advanced Automation Company**

**International Business Headquarters**

Totate International Building

2-12-19 Shibuya Shibuya-ku

Tokyo 150-8316 Japan

URL:<http://www.yamatake.com>

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