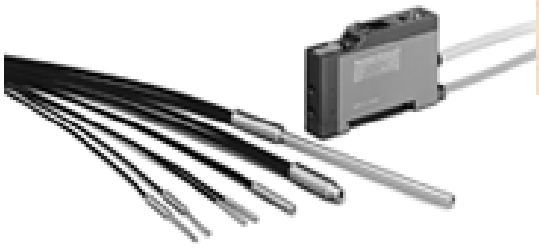
HPX-T Series

Auto-tuning Fiber Optic Photoelectric Sensors

FEATURES

Built-in Auto-tuning Automatically Adjusts Scanning Characteristics. Adjustment Steps, Results and Scanning Conditions Digitally Displayed on LED.

- *Built-in auto-tuning. (Scanning conditions are read to select scanning characteristics.)*
  : Close to long scanning distances automatically supported on a single sensor unit.
- *Digital display indicates adjustment steps, results and scanning conditions.*
  : Incoming light level display, scanning margin display, insufficient sensitivity display, maximum sensitivity setting.
- *3 sensitivity settings can be selected.*
  : Sensitivity setting (presence detection, back/front judgment), positioning sensitivity setting, maximum sensitivity setting.
- *Remote-tuning types.* **T3/TV3** *(mark Detection type)*
- *Mutual interference prevention. (pulse-phase shift system)*
- *OFF delay can be set.*
- *Low profile (10mm). Attachable on DIN rail at a single touch.*
- *Free-cut optical fiber unit attachable and detachable with single-touch, snap action lever.*
- *Furnished cable adapter allows ease-of-use with small-diameter cables.*



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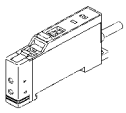
AMPLIFIER UNIT ORDER GUIDE

Model	Shape	Supply voltage	Output mode	Operation mode	Auto-tuning	Remote-tuning	Incoming light level display	Scanning margin display	3 sensitivity settings	Timer function	Mark detection type	Catalog listing
Auto-tuning		10 to 30Vdc	NPN open collector	Light ON/ dark ON selectable	○	—	○	○	○	○	—	**HPX-T1**
			PNP open collector									**HPX-T2**
Remote-tuning			NPN open collector			○						**HPX-T3**
Remote-tuning mark detection type											○	**HPX-TV3**

No. CP-PC-2156SE

AMPLIFIER UNIT SPECIFICATIONS

Model	Auto-tuning model		
Catalog listing	**HPX-T1/HPX-T2**	**HPX-T3**	**HPX-TV3**
Supply voltage	10 to 30Vdc (ripple 10% max.)		
Current consumption	50mA max.		
Operation mode	Light ON/dark ON switch selectable		
Output mode	NPN transistor open collector (**-T2**: PNP transistor open collector)		
Control output	Output switching circuit: 100mA max. (resistive load), output dielectric strength: 30V max., voltage drop: 1V max. (at 100mA switching circuit), with output short-circuit protection circuit		
Response time	500μs max. for operation and recovery		
Sensitivity adjustment	Sensitivity and hysteresis automatically set by button (auto-tuning) (Remote-tuning is possible on **-T3/-TV3** types by short-circuiting the pink lead. *)		
Light emitter	Red LED (680 nm)		Green LED
Display functions	Digital display: incoming light level (in RUN mode), scanning margin/setting error (after sensitivity is set) Operation indicator: red (lit at output ON). Stability indicator: green (ON during stable LO/ON during stable DO). OFF delay timer function: ON/OFF indication by decimal point.		
Timer function	OFF delay 40ms/instantaneous switch selectable		
Ambient light immunity	Incandescent lamp: 5,000lux max., Sunlight: 20,000lux max.		
Operating temperature range	−20 to +55°C (if gang mounted −20 to +50°C)		
Storage temperature range	−40 to +70°C		
Humidity range	35 to 85% RH (condensation not allowed)		
Insulation resistance	20MΩ min. (at 500Vdc)		
Dielectric strength	1000Vac, 50/60Hz for 1 minute between case and electrically live metals		
Vibration resistance	10 to 55Hz, 1.5mm peak-to-peak amplitude, 3 times in X, Y and Z directions		
Wiring method	Pre-leaded		
Weight	Approx. 55g (body only with 2m cable)		
Others	Reverse connection protection circuit, power ON/OFF malfunction prevention circuit (approx. 200ms)		

• Installation Instructions No.: CP-UM-3125E

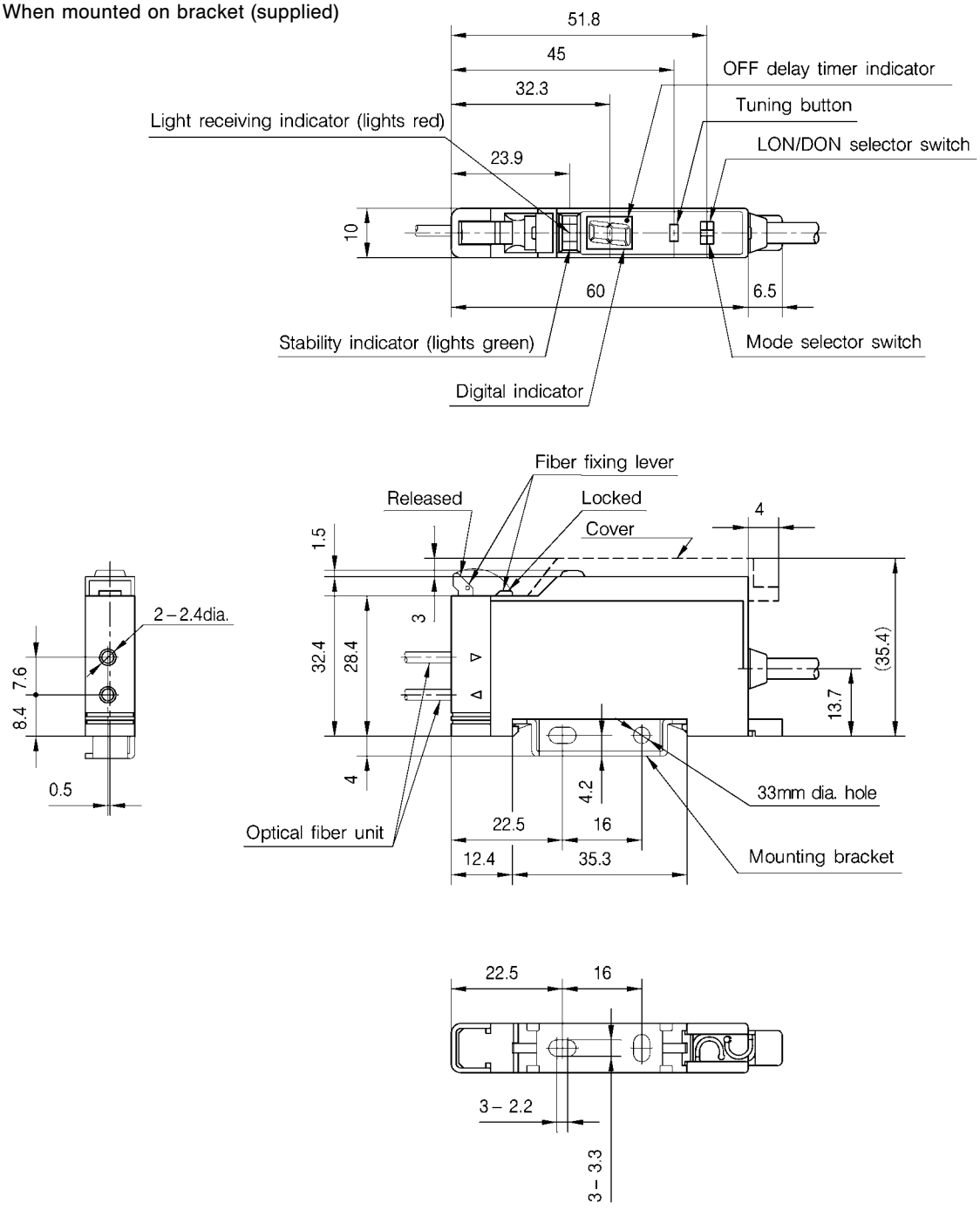
* : Sensitivity Setting only.

EXTERNAL DIMENSIONS

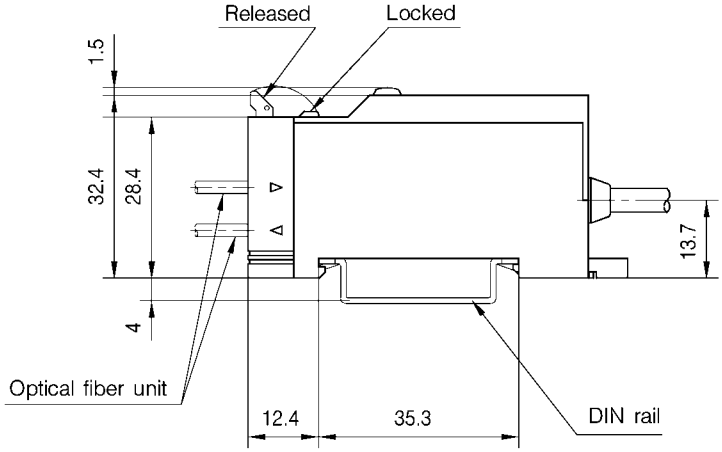
● Amplifier unit (unit: mm)

HPX-T

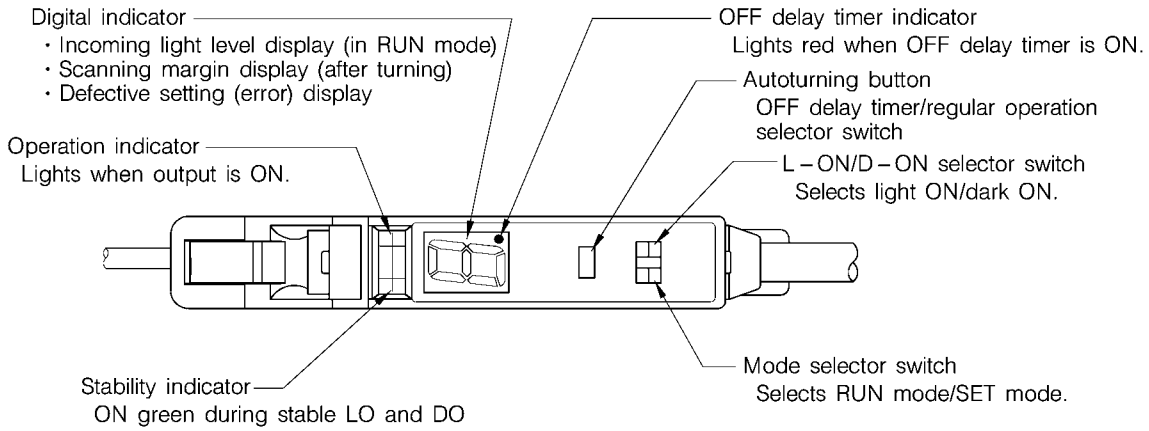
• When mounted on bracket (supplied)



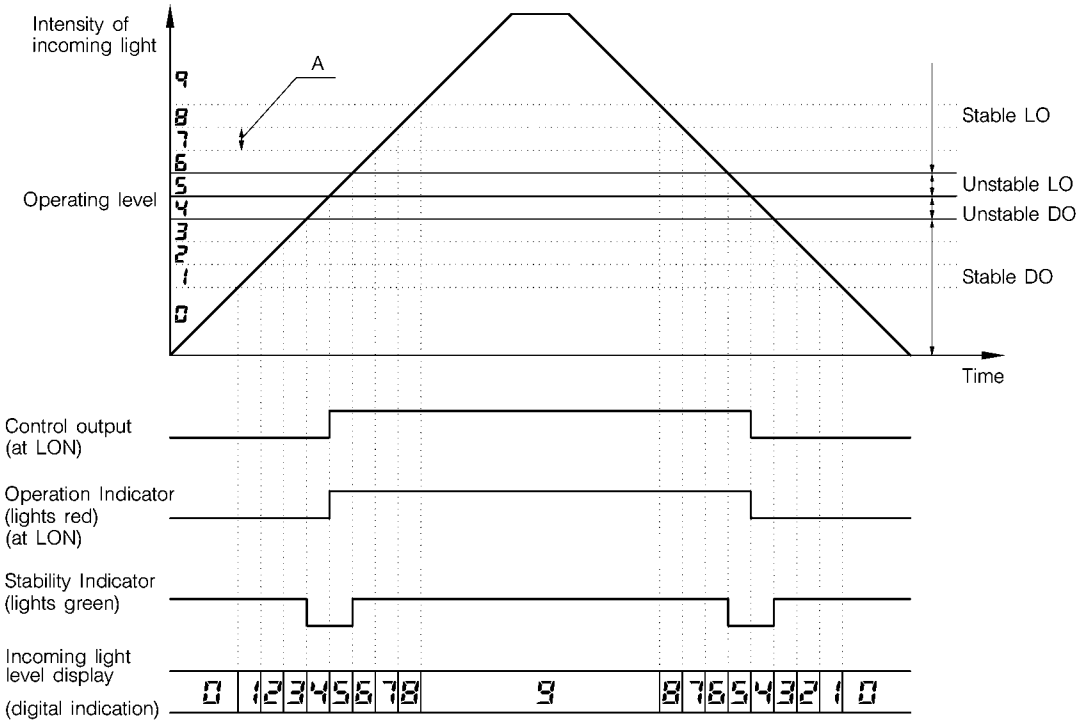
• When mounted on DIN rail



NAMES OF PARTS



OPERATIONAL TIMING CHARTS OF OUTPUTS & INDICATORS

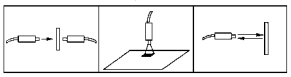
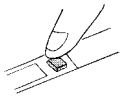
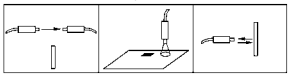
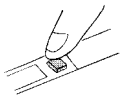


A : A double width of hysteresis, automatically set on sensitivity setting.

SENSITIVITY SETTING (Tuning)

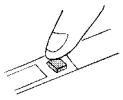
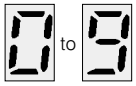
Be sure to place the optical fiber within the scanning distance before setting the sensitivity (tuning).

● Sensitivity setting

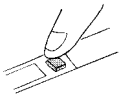
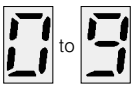
Step	Setting conditions	Operation	Display			Display during Insufficient sensitivity			Display during insufficient level difference		
			Digital indicator	Red LED	Green LED	Digital indicator	Red LED	Green LED	Digital indicator	Red LED	Green LED
1	—	SET ⇧ RUN Set the mode selector switch to SET.	1 "1" is displayed.	Out	Out						
2	Place the workpiece at the specified position. Workpiece  Background	 Press the tuning button once (1st time)	2 "2" is displayed.	Out	Blinking	2 "2" is displayed.	Blinking	Blinking	—	—	—
3	Move the workpiece. Workpiece  Background	 Press the tuning button once (2nd time).	1 to 9 Scanning margin 1 to 9 is displayed.	Out	Lit	E "E" blinks.	Blinking	Out	E "E" Lit	Lit	Out
4 End of Procedure	—	SET ⇩ RUN Set the mode selector switch to RUN.	0 to 9 Incoming light level 0 to 9 is displayed.	—	—	E "E" blinks. Output is OFF.	Blinking	Out	E "E" Lit Output is OFF.	Lit	Out

Note: The order of steps 2 and 3 may be reversed.

● Positioning sensitivity setting

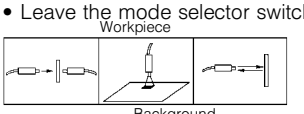
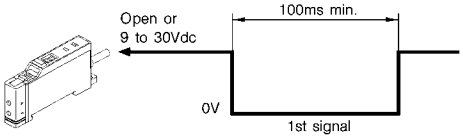
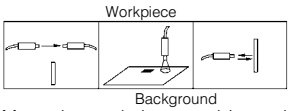
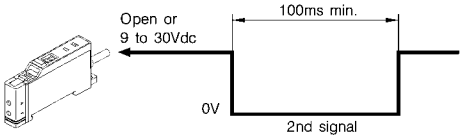
Step	Setting conditions	Operation	Display			Display during insufficient sensitivity		
			Digital indicator	Red LED	Green LED	Digital indicator	Red LED	Green LED
1	—	SET ⇧ RUN Set the mode selector switch to SET.	 ''1'' is displayed.	Out	Out			
2	Align fiber unit with workpiece at desired position. 	 Press the tuning button once.	 ''2'' is displayed.	Out	Blinking	 ''2'' is displayed.	Blinking	Blinking
3 End of Procedure	—	SET ⇩ RUN Set the mode selector switch to RUN.	 Incoming light level 0 to 9 is displayed.	—	—	 ''E'' blinks. Output is OFF.	Blinking	Out

● Maximum sensitivity setting

Step	Operation	Display		
		Digital indicator	Red LED	Green LED
1	SET ⇧ RUN Set the mode selector switch to SET.	 ''1'' is displayed.	Out	Out
2	 Press the tuning button for at least three seconds.	 ''H'' is displayed.	Lit	Lit
3 End of Procedure	SET ⇩ RUN Set the mode selector switch to RUN.	 Incoming light level 0 to 9 is displayed.	—	—

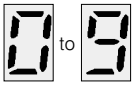
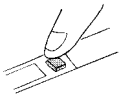
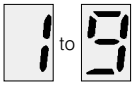
● Setting the remote sensitivity (-T3, -TV3)

Set the hysteresis level according to the externally input auto-tuning signal instead of pressing the tuning button. (Note that positioning and maximum sensitivity cannot be set.)

Step	Operation	If error occurs
1	• Leave the mode selector switch at RUN.  Place the workpiece at the specified position. Input the 1st signal to the remote-tuning input. 	It is same of Sensitivity setting's case. Please see the Sensitivity setting's page (Display during Insufficient Sensitivity and Insufficient Level Difference).
2	 Move the workpiece, and input the 2nd signal to the remote-tuning input. (Allow at least 200ms between input of the 1st and 2nd signals.) 	
3	The scanning margin is displayed for about one second after the 2nd remote-tuning signal is input, and the display then returns to normal.	

When the remote sensitivity is not set, either cut the pink lead (remote-tuning input lead) at the root of the cord, or connect it to + power supply terminal.

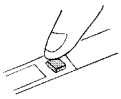
DISPLAY DURING OPERATION (RUN Mode)

Situation	Operation	Display		
		Digital indicator	Red LED	Green LED
Regular operation	—	 Incoming light level 0 to 9 is displayed.	Lit at output ON	Lit during stable light or dark ON
To monitor scanning margin during tuning (only when setting the sensitivity) See Note.	 Press the tuning button once.	 The scanning margin 1 to 9 during tuning is displayed. See Note.	—	—

Note: "[-]" is displayed when set by positioning. "[H]" is displayed when set by maximum sensitivity.

SETTING THE OFF DELAY TIMER

Be sure to set the mode selector switch to RUN before setting the OFF delay timer.

Operating state	Operation	Digital indicator
Switching from Instantaneous Output to OFF Delay Output	 Press the tuning button for at least 10 seconds.	 Digital display OFF delay timer lit
Switching from OFF Delay Output to Instantaneous Output	(Same as above)	 Digital display OFF delay timer out

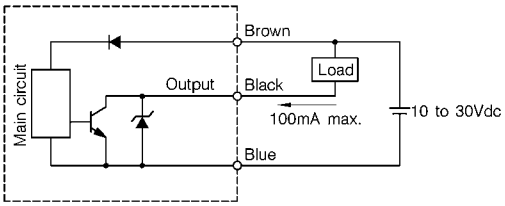
SCANNING MARGIN DISPLAY

The following table shows the correspondence between the scanning margin and the digital display after the sensitivity has been set:

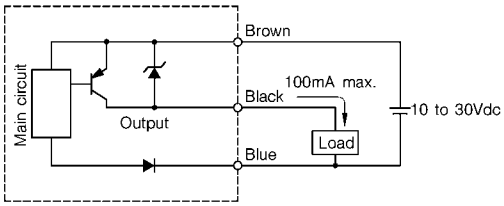
Scanning margin display (digital indicator)	1	2	3	4	5	6	7	8	9
Margin (factor) for automatically set hysteresis	1.0X min.	1.2X min.	1.5X min.	2X min.	3X min.	4X min.	5X min.	6X min.	7X min.

OUTPUT CIRCUIT

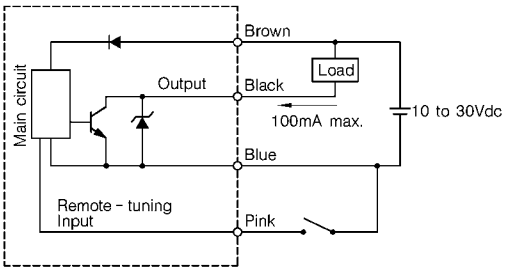
● **HPX-T1** (NPN)



● **HPX-T2** (PNP)



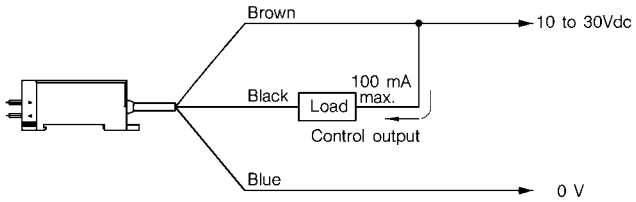
● **HPX-T3, HPX-TV3** (NPN)



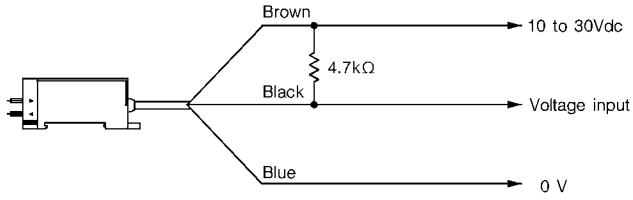
WIRING DIAGRAMS

● **HPX-T1** (NPN)

• When driving a direct load

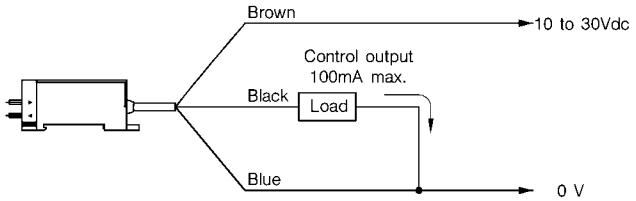


• When connected to a voltage input device

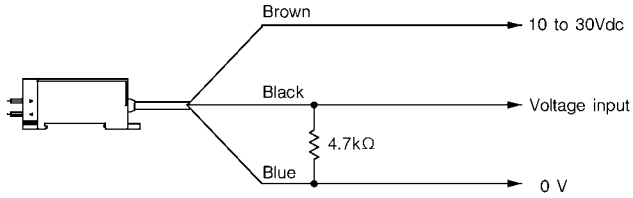


● **HPX-T2** (PNP)

• When driving a direct load

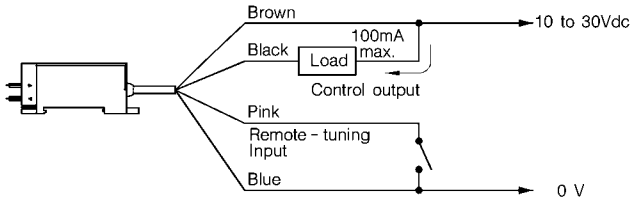


• When connected to a voltage input device

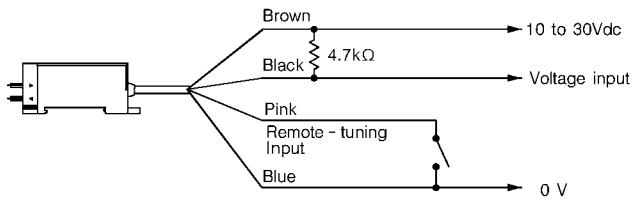


● **HPX-T3, HPX-TV3** (NPN)

• When driving a direct load



• When connected to a voltage input device

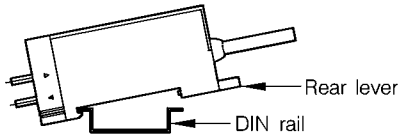


MOUNTING METHOD

The single-touch DIN-mounting system allows the **HPX-T** 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-T** 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-T** on the mounting bracket, follow the same procedure as that for the DIN rail.

BASIC PRECAUTIONS

● Wiring

• Be sure to connect the photoelectric sensor to the power supply and load correctly.

• If a high-voltage cable or power cable is located near a photoelectric sensor, isolate the photoelectric sensor's cable or lay in a separate conduit to prevent surge or the influence of noise.

• Connect the cable securely to the connector using a crimp terminal.

• Use leads of 0.3mm^2 in cross-sectional area for extensions. The lead length should be kept to 100m at most. When connecting extensions, consider the possible influence of noise.

• If a switching power supply is used, ground its frame.

• If a capacitive load is used, connect a current limiting resistor to limit rush current to 100mA or less.

● 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.

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