General-Use Potentiometer Tuning

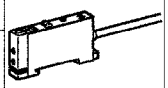
HPX Series

High Sensitivity over a Long Scanning Distance of 800mm (Thru Scan Model), Easy-to-Use Functions/Structure, and High Reliability.

- Quick response (50μs) plus mark detection.
- Low profile (10mm), DIN rail attachable at a single touch.
- Self-diagnostic LEDs plus self-diagnostic output.
- Fine-tuning of sensitivity using multi-turn potentiometer with indicator.

PHOTOELECTRIC SENSORS A
CLICK

AMPLIFIER UNIT ORDER GUIDE

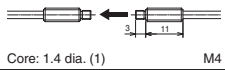
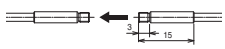
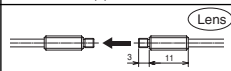
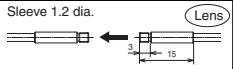
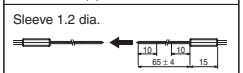
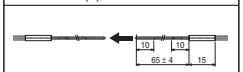
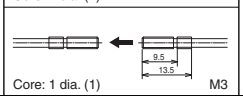
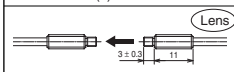
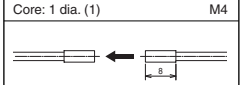
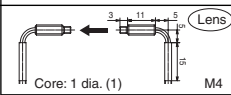
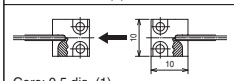
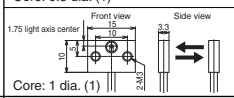
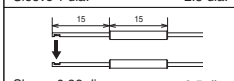
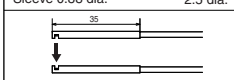
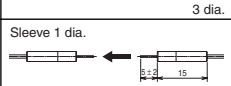
Model	Shape	Supply voltage	Output mode	Operation mode	Sensitivity adjustment	Stability indication	Self-diagnostic indication	Self-diagnostic output	Timer function	Catalog listing
High sensitivity		10 to 30Vdc	NPN open collector	Light ON/ Dark ON, selectable	○	○	○	○	○	**HPX-H1**
			PNP open collector							**HPX-H2**
Low hysteresis			NPN open collector		○	○	○	○	○	**HPX-A1**
			PNP open collector							**HPX-A2**
Fast detection			NPN open collector		○	○	○	○	○	**HPX-F1**
			PNP open collector							**HPX-F2**
Mark detection			NPN open collector		○	○	○	○	○	**HPX-V1**
			PNP open collector							**HPX-V2**

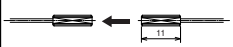
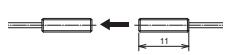
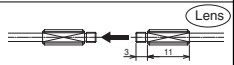
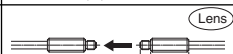
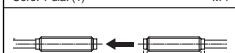
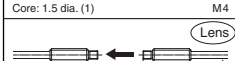
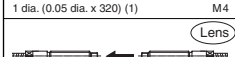
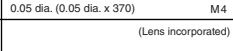
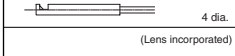
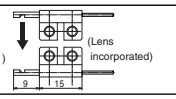
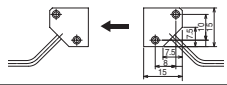
AMPLIFIER UNIT SPECIFICATIONS

Model	High sensitivity	Low hysteresis	Fast response	Mark detection
Catalog listing	**HPX-H**□	**HPX-A**□	**HPX-F**□	**HPX-V**□
Supply voltage	10 to 30Vdc (Ripple 10% max.)			
Current consumption	Max. 35mA			
Operating mode	Light operated/Dark operated, switch selectable			
Output form	NPN or PNP transistor open collector			
Control output	Output switching current: Max. 100mA (resistive load), output dielectric strength: Max. 30V, residual voltage: Max. 1V (at 100mA switching current), with output short-circuit protection circuit			
Self-diagnostic output	Output switching current: Max. 50mA (resistive load), output dielectric strength: Max. 30V, residual voltage: Max. 1V (at 50mA switching current), with output short-circuit protection circuit			
Response time	Max. 500μs for operation and recovery		Max. 50μs for operation, Max. 70μs for reset	Max. 500μs for operation and reset
Sensitivity adjustment	3-turn potentiometer with indicator			
Light Emitter	Red LED			Green LED
Indicator	Light-operated (LO) indicator: Red (ON during LO), Stability indicator: Green (ON during stable LO or DO (dark-operated); blinking during self-diagnostics)			
Timer function	OFF delay 40ms/instantaneous switch selectable			
Ambient light immunity	Incandescent Lamp: Max. 5,000lx, Sun light: Max. 20,000lx			
Operating temperature range	−20 to +60°C (If gang mounted, max. operating temperature is 50°C)			
Storage temperature range	−40 to +70°C			
Humidity range	35 to 85%RH (non-condensing)			
Insulation resistance	Min. 20MΩ (500Vdc megger)			
Dielectric strength	1,000Vac 50/60Hz for 1 min. between case and all electrically live metals			
Vibration	10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hours each in X, Y, and Z directions			
Shock	500m/s² repeated 3 times in X, Y, and Z directions			
Wiring method	Pre-leaded			
Weight	About 55g (body only, with 2 m cable)			
Others	Equipped with a reverse connection protection circuit and power on/off malfunction prevention circuit (about 100ms)			

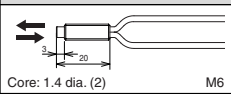
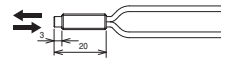
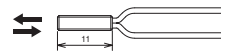
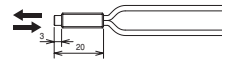
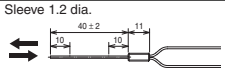
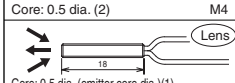
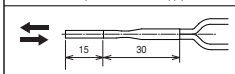
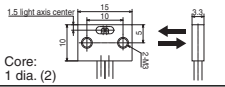
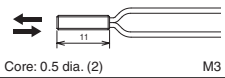
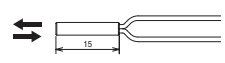
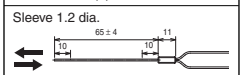
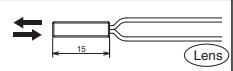
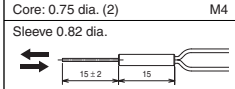
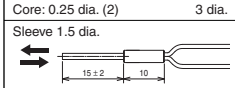
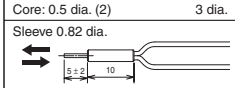
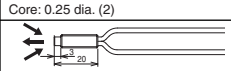
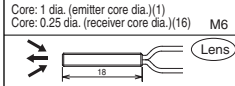
FIBER UNIT AND AMPLIFIER COMBINATIONS

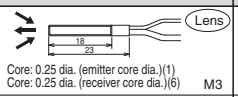
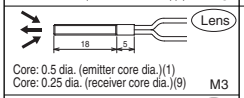
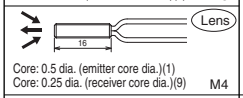
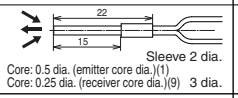
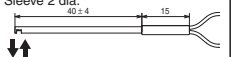
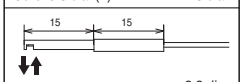
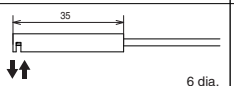
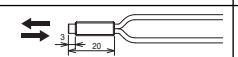
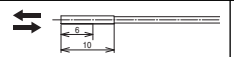
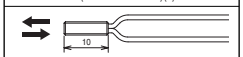
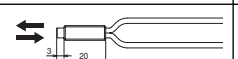
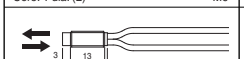
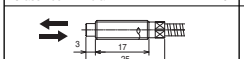
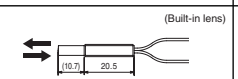
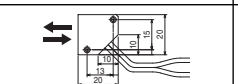
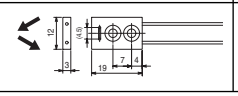
Thru scan

Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Long distance	 Core: 1.4 dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	800 400 160 60	Long scanning distance	Cut to length 2m	R20	HPF-T001
	 Core: 1.4 dia. (1) 3 dia.						HPF-T002
Standard	 Core: 1 dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	400 200 80 30	Standard	Cut to length 2m	R20	HPF-T003
	 Core: 1 dia. (1) 3 dia.						HPF-T004
	 Core: 1 dia. (1) M4			Sleeve (flexible)		R10/R20	HPF-T005
	 Core: 1 dia. (1) 3 dia.						HPF-T006
	 Core: 1 dia. (1) M3			Standard diameter and compact		R20	HPF-T045
Ultra bend - tolerant	 Core: 0.5 dia. (1) M3	HPX-H HPX-A HPX-F HPX-V	50 25 12 –	Static installation, flexible, and small diameter	Cut to length 2m	R1	HPF-T024
	 Core: 1 dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	300 150 60 –	Static installation, flexible, and standard model		R2	HPF-T025
	 Core: 1 dia. (1) 3 dia.						HPF-T031
	 Sleeve 1 dia. 2.5 dia.	HPX-H HPX-A HPX-F HPX-V	20 10 3 –	Static installation, flexible, and side view model		R1	HPF-T026
Space saving	 Core: 1 dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	300 150 60 20	Elbow	Cut to length 2m	R20	HPF-T010
	 Core: 0.5 dia. (1)	HPX-H HPX-A HPX-F HPX-V	50 25 12 –	Static installation, flexible, small diameter, and flat top view model		R1	HPF-T028
	 Core: 1 dia. (1)	HPX-H HPX-A HPX-F HPX-V	80 40 12 –	Static installation, flexible, standard, and flat side view model		R5	HPF-T028LF
Side view	 Sleeve 1 dia. 2.5 dia.	HPX-H HPX-A HPX-F HPX-V	60 30 12 4	Small diameter sleeve	Cut to length 2m	R15	HPF-T007
	 Sleeve 0.88 dia. 2.5 dia.	HPX-H HPX-A HPX-F HPX-V	20 10 3 –	Fine diameter sleeve	Cut to length 1m	R5	HPF-T037
	 3 dia.	HPX-H HPX-A HPX-F HPX-V	240 120 48 –	Standard diameter	Cut to length 2m	R20	HPF-T042
Small diameter	 Sleeve 1 dia. Core: 0.25 dia. (1) 3 dia.	HPX-H HPX-A HPX-F HPX-V	12 6 2 –	Fine diameter	Cut to length 2m	R15	HPF-T015

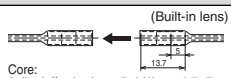
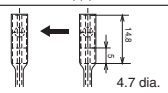
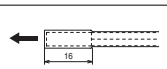
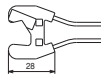
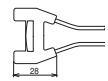
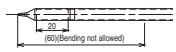
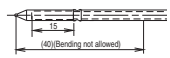
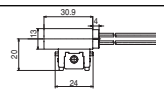
Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Small diameter	 Core: 0.25 dia. (1) 1.0 dia.	HPX-H HPX-A HPX-F HPX-V	12 6 2 –	Fine diameter	Connector 0.5m		HPF-T038
	Sleeve 0.4 dia.  Core: 0.125 dia. (1)	HPX-H HPX-A HPX-F HPX-V	6 3 – –	Fine diameter sleeve			HPF-T039
	Sleeve 0.4 dia.  Core: 0.25 dia. (1) 3 dia.	HPX-H HPX-A HPX-F HPX-V	12 6 2 –	Fine diameter sleeve	Cut to length 2m	R15	HPF-T040
	 Core: 0.5 dia. (1) 2 dia.	HPX-H HPX-A HPX-F HPX-V	100 50 20 –	Small diameter			HPF-T043
	 Core: 0.75 dia. (1) M3	HPX-H HPX-A HPX-F HPX-V	220 110 45 –	Small diameter and long scanning distance			HPF-T044
Elastic	 Core: 0.25 dia. (1) M3	HPX-H HPX-A HPX-F HPX-V	100 40 20 8	Elastic small diameter	Cut to length 2m	R4	HPF-T008
	 Core: 0.25 dia. (4) 1.5 dia.						HPF-T009
	Lens  Core: 0.25 dia. (16) M4	HPX-H HPX-A HPX-F HPX-V	265 130 50 –	Elastic standard diameter			HPF-T033
Heat resistant	Lens  Core: 1 dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	250 120 50 15	To 105˚C	Cut to length 2m	R25	HPF-T012
	 Core: 1.5 dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	400 200 80 30	To 150˚C		R35	HPF-T017
	Lens  Glass fiber: 1 dia. (0.05 dia. x 320) (1) M4	HPX-H HPX-A HPX-F HPX-V	200 100 40 15	To 200˚C	Connector 1m	R15	HPF-T018
	Lens  Glass fiber: 0.05 dia. (0.05 dia. x 370) M4	HPX-H HPX-A HPX-F HPX-V	250 120 50 15	Heat and cold resistant from -60˚C to +350˚C	Connector 2m	R25	HPF-T014
Narrow beam	(Lens incorporated)  M4	HPX-H HPX-A HPX-F HPX-V	1,500 750 300 110	Parallel beam top view	Cut to length 2m	R20	HPF-T019
	 (Lens incorporated) 4 dia.	HPX-H HPX-A HPX-F HPX-V	1,600 800 320 120	Parallel beam side view			HPF-T020
	(Lens incorporated)  M4	HPX-H HPX-A HPX-F HPX-V	1,200 600 240 90	Narrow beam top view		R15	HPF-T023
Mapping	Core: 1.5 dia. (1)  (Lens incorporated)	HPX-H HPX-A HPX-F HPX-V	350 175 70 –	Narrow beam -1.5˚/+1.5˚max. side view	Cut to length 2m	R5	HPF-T030
Wide beam		HPX-H HPX-A HPX-F HPX-V	250 125 50 15	Array	Cut to length 2m	R4	HPF-T021

Diffuse scan

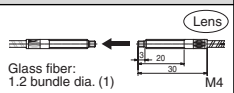
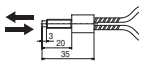
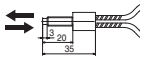
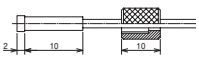
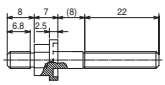
Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Long distance	 Core: 1.4 dia. (2) M6	HPX-H HPX-A HPX-F HPX-V	230 120 45 15	Long scanning distance	Cut to length 2m	R20	HPF-D001
Standard	 Core: 1 dia. (2) M6	HPX-H HPX-A HPX-F HPX-V	150 80 30 10	Standard	Cut to length 2m	R20	HPF-D002
	 Core: 1 dia. (2) M6						HPF-D003
Ultra bend - tolerant	 Core: 0.5 dia. (2) M3	HPX-H HPX-A HPX-F HPX-V	10 5 2 –	Small diameter		R1	HPF-D029
	 Core: 1 dia. (2) M6	HPX-H HPX-A HPX-F HPX-V	80 40 15 –	Standard		R2	HPF-D030
	Sleeve 1.2 dia.  Core: 0.5 dia. (2) M4	HPX-H HPX-A HPX-F HPX-V	10 5 2 –	Small diameter sleeve (bendable)	Cut to length 2m	R10/R1	HPF-D031
	 Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(4) M3	HPX-H HPX-A HPX-F HPX-V	18 10 5 –	Coaxial		R1/R4	HPF-D032
	 Core: 1 dia. (2) 3 dia.	HPX-H HPX-A HPX-F HPX-V	80 40 15 –	Standard diameter		R5	HPF-D044
Compact	 Core: 1 dia. (2)	HPX-H HPX-A HPX-F HPX-V	For details, contact Yamatake Corporation.	Static installation, flexible, standard, and flat side-view model	Cut to length 2m	R2	HPF-D045LF
Small diameter	 Core: 0.5 dia. (2) M3	HPX-H HPX-A HPX-F HPX-V	40 20 8 3	Small diameter	Cut to length 2m	R15	HPF-D004
	 Core: 0.5 dia. (2) 3 dia.						HPF-D005
	Sleeve 1.2 dia.  Core: 0.5 dia. (2) M4			Small diameter sleeve			HPF-D006
	 Core: 0.75 dia. (2) M4	HPX-H HPX-A HPX-F HPX-V	80 40 15 5	Small diameter long scanning distance			HPF-D018
	Sleeve 0.82 dia.  Core: 0.25 dia. (2) 3 dia.	HPX-H HPX-A HPX-F HPX-V	4 2 – –	Fine diameter sleeve	Cut to length 0.5m		HPF-D019
	Sleeve 1.5 dia.  Core: 0.5 dia. (2) 3 dia.	HPX-H HPX-A HPX-F HPX-V	40 20 8 4	Small diameter sleeve	Cut to length 2m		HPF-D021
	Sleeve 0.82 dia.  Core: 0.25 dia. (2)	HPX-H HPX-A HPX-F HPX-V	4 2 – –	Fine diameter sleeve	Cut to length 0.5m	R4	HPF-D039
Coaxial	 Core: 1 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(16) M6	HPX-H HPX-A HPX-F HPX-V	150 80 30 10	Coaxial	Cut to length 2m	R20	HPF-D009
	 Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(4) M3	HPX-H HPX-A HPX-F HPX-V	40 20 8 3	Coaxial		R15	HPF-D010

Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Coaxial	 Core: 0.25 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(6) M3	HPX-H HPX-A HPX-F HPX-V	25 13 5 –	Coaxial	Connector 0.5m	R4	HPF-D034
	 Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9) M3	HPX-H HPX-A HPX-F HPX-V	50 25 10 3		Cut to length 2m	R15	HPF-D035
	 Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9) M4						HPF-D038
	 Sleeve 2 dia. Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9) 3 dia.	HPX-H HPX-A HPX-F HPX-V	40 20 8 –	Small diameter coaxial			HPF-D042
Side view	Sleeve 2 dia.  Core: 0.5 dia. (2) 3 dia.	HPX-H HPX-A HPX-F HPX-V	15 8 3 –	Small diameter sleeve	Cut to length 2m	R15	HPF-D011
	 2.8 dia.			Small diameter short sleeve			HPF-D041
	 6 dia.	HPX-H HPX-A HPX-F HPX-V	50 32 12 –	Standard diameter		R20	HPF-D043
Elastic	 Core: 0.25 dia. (emitter core dia.)(16) Core: 0.25 dia. (receiver core dia.)(16) M6	HPX-H HPX-A HPX-F HPX-V	100 50 20 8	Standard	Cut to length 2m	R4	HPF-D012
	 Core: 0.25 dia. (emitter core dia.)(2) Core: 0.25 dia. (receiver core dia.)(2) 1.5 dia.	HPX-H HPX-A HPX-F HPX-V	8 4 – –	Small diameter sleeve	Connector 1m		HPF-D036
	 Core: 0.25 dia. (emitter core dia.)(2) Core: 0.25 dia. (receiver core dia.)(2) M3			Small diameter	Cut to length 2m		HPF-D037
Heat resistant	 Core: 1 dia. (2) M6	HPX-H HPX-A HPX-F HPX-V	100 50 20 5	To 105˚C	Cut to length 2m	R25	HPF-D013
	 Core: 1.5 dia. (2) M6	HPX-H HPX-A HPX-F HPX-V	150 80 30 10	To 150˚C		R35	HPF-D022
	 Glass fiber: 1.4 dia. M6	HPX-H HPX-A HPX-F HPX-V	50 50 20 7	To 200˚C	Connector 1m	R15	HPF-D023
	Sleeve 2.1 dia.  Glass fiber: 1.4 dia. M6			Sleeve heat resistant to 200˚C			HPF-D024
	 Glass fiber: 1.5 dia. M6	HPX-H HPX-A HPX-F HPX-V	90 30 18 4	Heat and cold resistant from -60˚C to 350˚C	Cut to length 2m	R25	HPF-D015
Parallel beam	(Built-in lens)  M5	HPX-H HPX-A HPX-F HPX-V	20 20 12 –	Parallel beam reflection	Cut to length 2m	R15	HPF-D025
Wide beam		HPX-H HPX-A HPX-F HPX-V	100 50 20 6	Array	Cut to length 2m	R4	HPF-D026
Limited reflection		HPX-H HPX-A HPX-F HPX-V	2.5 ± 0.5 2.5 ± 0.5 – –	Limited reflection	Cut to length 2m	R15	HPF-D028

Wet process

Group	Appearance	Sensing type	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Oil and chemical-proof	(Built-in lens)  Core: 3 dia. (effective lens dia.) (1) 4.7 dia.	HPX-H HPX-A HPX-F HPX-V	1,500 750 300 —	PFA tube small diameter	Cut to length 2m	R20	HPF-T029
	 4.7 dia.	HPX-H HPX-A HPX-F HPX-V	340 170 70 —				HPF-T035
	 Core: 1 dia. (2) 6 dia.	HPX-H HPX-A HPX-F HPX-V	50 50 20 5	PFA tube		R25/R80	HPF-D014
Liquid level	 	—	—	Pipe-mounted. Light received when liquid present. 3 to 13mm dia. pipes.	Cut to length 5m	R4	HPF-T032
	 	—	—	Pipe-mounted. Light received when liquid absent. 8 to 19mm dia. pipes.			HPF-T034
	 6 dia.	—	—	Contact type. PFA tube 6mm dia.	Cut to length 2m	R25/R40	HPF-D027
	 4 dia.	—	—	Contact type. PFA tube 4mm dia.		R15/R30	HPF-D033
Liquid leak	 	—	—	Contact type	Cut to length 5m	R20	HPF-D040

Vacuum

Group	Appearance	Sensing type	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Thru scan	 Glass fiber: 1.2 bundle dia. (1) M4	HPX-H HPX-A HPX-F HPX-V	120 60 25 —	Heat resistant to 350˚C. Elbow connection	Connector 1m	R25	HPF-VT07
Diffuse scan	 Glass fiber: 1.7 bundle dia. M6	HPX-H HPX-A HPX-F HPX-V	35 20 8 —				HPF-VD07
	 Glass fiber: 1.7 bundle dia. M6			Heat resistant to 350˚C. Straight connection			HPF-VD09
—	 Core: 1 dia.	—	—	Air side	Cut to length 2m	R20	HPF-VA01
	 	—	—	Heat resistant to 200˚C. Light connector	—	—	HPF-VJ03

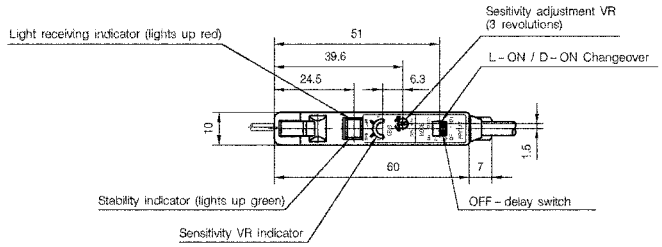
EXTERNAL DIMENSIONS

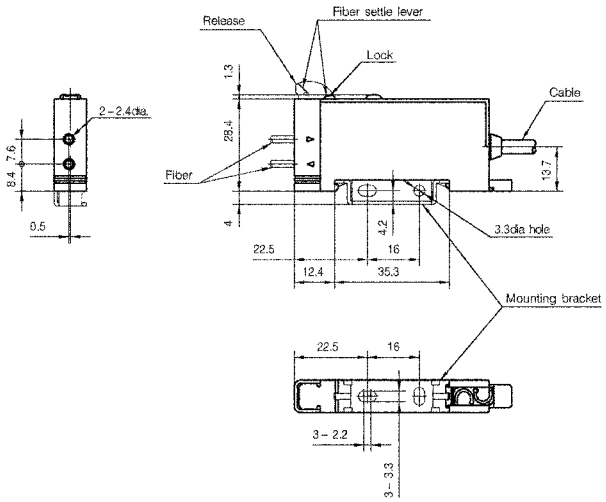
(unit: mm)

Amplifier unit

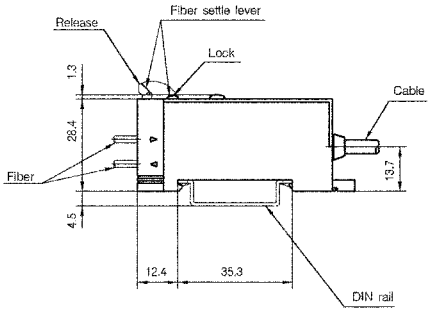
HPX-H, A, F, V (in common)

When mounted on bracket (attached)



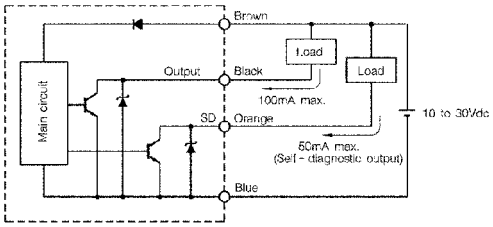


When mounted on DIN rail

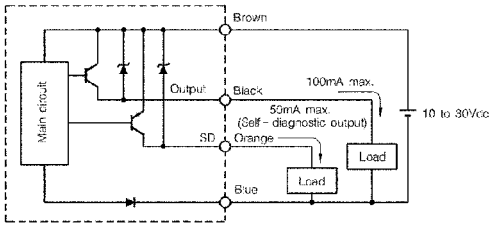


OUTPUT CIRCUIT DIAGRAM

● NPN output type



● PNP output type



BASIC PRECAUTIONS

● Wiring

- Make sure you connect a photoelectric sensor to the power supply and load correctly.
- If a high-voltage or power cable exists near a photoelectric sensor lead, isolate the photoelectric sensor's lead or lay in another conduit to prevent surge and noise influence.
- Connect the lead securely to the connector using crimp terminal.
- Use a lead of at least 0.3mm^2 in cross-sectional area for extensions. The lead length should not be over 100m. Consider the influence of noise due to lead extension.
- If a switching power supply is used, ground its frame.
- If capacitive load is used, connect a current limiting resistor so as to limit the rush current to max. 100mA.

● Handling

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