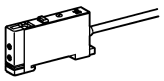
General-Use Potentiometer Tuning

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.**
- **Self-diagnostic LEDs plus self-diagnostic output.**
- **Fine-tuning of sensitivity using multi-turn potentiometer with indicator.**

AMPLIFIER UNIT ORDER GUIDE

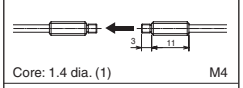
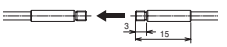
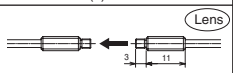
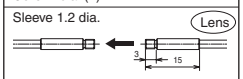
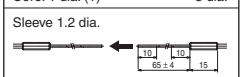
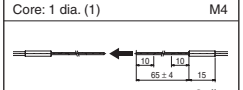
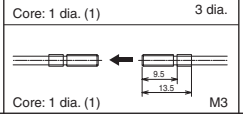
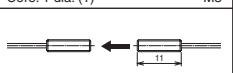
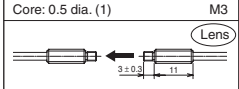
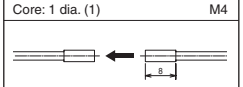
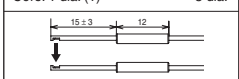
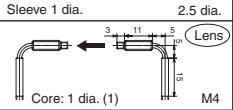
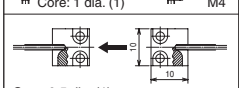
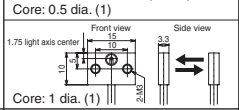
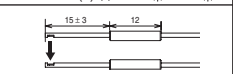
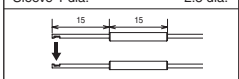
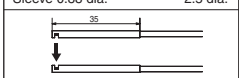
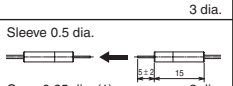
Model	Shape	Supply voltage	Outout mode	Operation mode	Sensitivity ajustment	Stability indication	Self-diagnostic indication	Self-diagnostic output	Timer function	Catalog listing
High sensitivity		10 to 30Vdc	NPN open collector	Light ON/ Light ON, selectable	○	○	○	○	○	**HPX-H1**
			PNP open collector							**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**

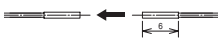
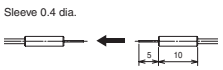
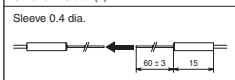
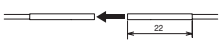
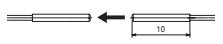
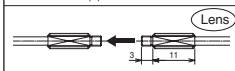
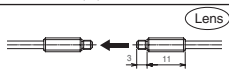
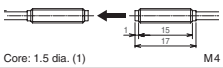
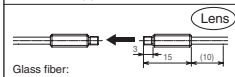
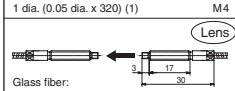
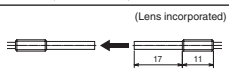
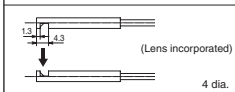
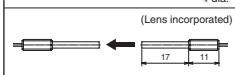
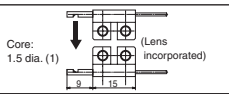
AMPLIFIER UNIT SPECIFICATIONS

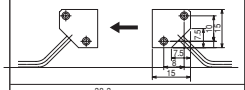
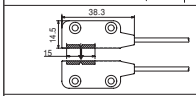
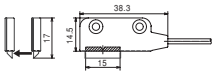
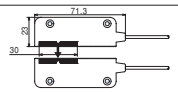
Model	High sensitivity	Low hysteresis	Fast response
Catalog listing	**HPX-H□**	**HPX-A□**	**HPX-F□**
Supply voltage	10 to 30Vdc (Ripple 10% max.)		
Current consumption	Max. 35mA		
Operating mode	Light operated/Dark operated, switch selectable		
Output form	NPN or PNP transistor open collector		
Control 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
Sensitivity adjustment	3-turn potentiometer with indicator		
Light Emitter	Red 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/s^2 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

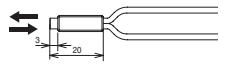
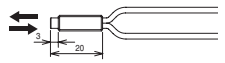
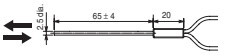
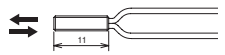
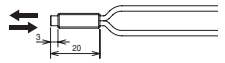
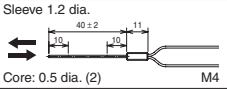
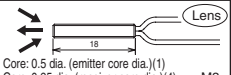
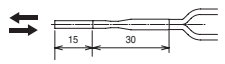
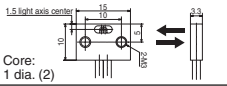
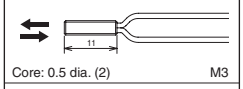
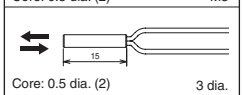
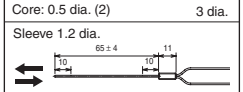
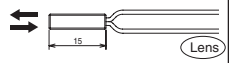
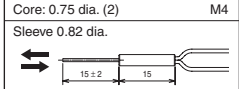
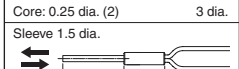
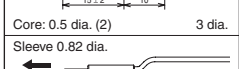
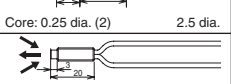
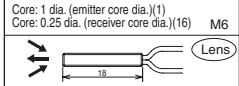
Thru scan

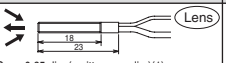
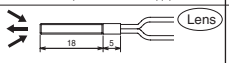
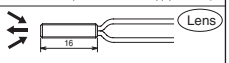
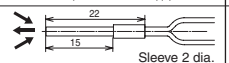
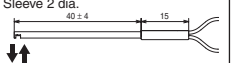
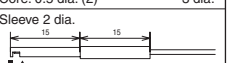
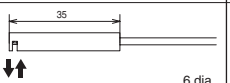
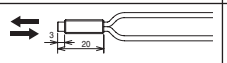
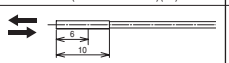
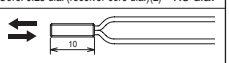
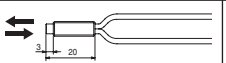
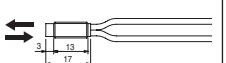
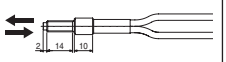
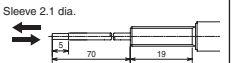
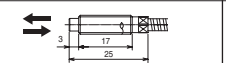
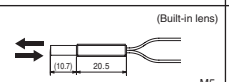
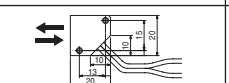
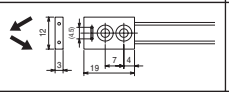
Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Long distance	 Core: 1.4 dia. (1) M4	HPX-H HPX-A HPX-F	800 400 160	Long scanning distance	Cut to length 2m	R20	HPF-T001
	 Core: 1.4 dia. (1) 3 dia.						HPF-T002
Standard	 Core: 1 dia. (1) M4	HPX-H HPX-A HPX-F	400 200 80	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	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	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	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	300 150 60	Elbow	Cut to length 2m	R20	HPF-T010
	 Core: 0.5 dia. (1)	HPX-H HPX-A HPX-F	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	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	60 30 12	Small diameter sleeve	Cut to length 2m	R15	HPF-T007
	 Sleeve 0.88 dia. 2.5 dia.	HPX-H HPX-A HPX-F	20 10 3	Fine diameter sleeve	Cut to length 1m	R5	HPF-T037
	 3 dia.	HPX-H HPX-A HPX-F	240 120 48	Standard diameter	Cut to length 2m	R20	HPF-T042
Small diameter	 Core: 0.25 dia. (1) 3 dia.	HPX-H HPX-A HPX-F	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	12 6 2	Fine diameter	Connector 0.5m	R15	HPF-T038
	 Sleeve 0.4 dia. Core: 0.125 dia. (1)	HPX-H HPX-A HPX-F	6 3 –	Fine diameter sleeve			HPF-T039
	 Sleeve 0.4 dia. Core: 0.25 dia. (1) 3 dia.	HPX-H HPX-A HPX-F	12 6 2	Fine diameter sleeve	Cut to length 2m		HPF-T040
	 Core: 0.5 dia. (1) 2 dia.	HPX-H HPX-A HPX-F	100 50 20	Small diameter			HPF-T043
	 Core: 0.75 dia. (1) M3	HPX-H HPX-A HPX-F	220 110 45	Small diameter and long scanning distance			HPF-T044
Elastic	 Core: 0.25 dia. (1) M3	HPX-H HPX-A HPX-F	100 40 20	Elastic small diameter	Cut to length 2m	R4	HPF-T008
	 Core: 0.25 dia. (4) 1.5 dia.						HPF-T009
	 Core: 0.25 dia. (4) 1.5 dia.						HPF-T046
	 Lens Core: 0.25 dia. (16) M4	HPX-H HPX-A HPX-F	265 130 50	Elastic standard diameter			HPF-T033
Heat resistant	 Lens Core: 1 dia. (1) M4	HPX-H HPX-A HPX-F	250 120 50	To 105˚C	Cut to length 2m	R25	HPF-T012
	 Core: 1.5 dia. (1) M4	HPX-H HPX-A HPX-F	400 200 80	To 150˚C		R35	HPF-T017
	 Lens Glass fiber: 1 dia. (0.05 dia. x 320) (1) M4	HPX-H HPX-A HPX-F	200 100 40	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	250 120 50	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	1,500 750 300	Parallel beam top view	Cut to length 2m	R20	HPF-T019
	 (Lens incorporated) 4 dia.	HPX-H HPX-A HPX-F	1,600 800 320	Parallel beam side view			HPF-T020
	 (Lens incorporated) M4	HPX-H HPX-A HPX-F	1,200 600 240	Narrow beam top view		R15	HPF-T023
Mapping	 Core: 1.5 dia. (1) (Lens incorporated)	HPX-H HPX-A HPX-F	350 175 70	Narrow beam -1.5˚/+1.5˚max. side view	Cut to length 2m	R5	HPF-T030

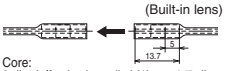
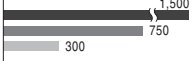
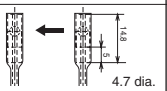
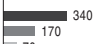
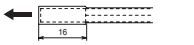
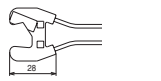
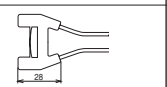
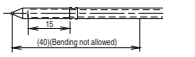
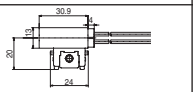
Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Wide beam		**HPX-H** **HPX-A** **HPX-F**	250 125 50	Array	**Cut to length 2m**	**R4**	**HPF-T021**
		**HPX-H** **HPX-A** **HPX-F**	1,200 600 240	Beam 15mm wide		**R15**	**HPF-T021T**
		**HPX-H** **HPX-A** **HPX-F**	1,100 550 200	Beam 15mm wide Side beam			**HPF-T021S**
		**HPX-H** **HPX-A** **HPX-F**	2,000 1,000 400	Beam 30mm wide			**HPF-T021WT**

Diffuse scan

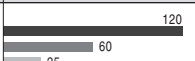
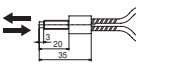
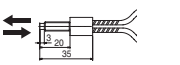
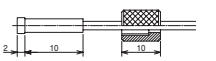
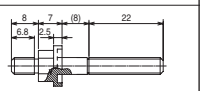
Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Long distance	 Core: 1.4 dia. (2) M6	HPX-H HPX-A HPX-F	230 120 45	Long scanning distance	Cut to length 2m	R20	HPF-D001
Standard	 Core: 1 dia. (2) M6	HPX-H HPX-A HPX-F	150 80 30	Standard	Cut to length 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	10 5 2	Small diameter	Cut to length 2m	R1	HPF-D029
	 Core: 1 dia. (2) M6	HPX-H HPX-A HPX-F	80 40 15	Standard		R2	HPF-D030
	Sleeve 1.2 dia.  Core: 0.5 dia. (2) M4	HPX-H HPX-A HPX-F	10 5 2	Small diameter sleeve (bendable)		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	18 10 5	Coaxial		R1/R4	HPF-D032
	 Core: 1 dia. (2) 3 dia.	HPX-H HPX-A HPX-F	80 40 15	Standard diameter		R5	HPF-D044
Compact	 Core: 1 dia. (2)	HPX-H HPX-A HPX-F	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	40 20 8	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	80 40 15	Small diameter long scanning distance			HPF-D018
	Sleeve 0.82 dia.  Core: 0.25 dia. (2) 3 dia.	HPX-H HPX-A HPX-F	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	40 20 8	Small diameter sleeve	Cut to length 2m		HPF-D021
	Sleeve 0.82 dia.  Core: 0.25 dia. (2) 2.5 dia.	HPX-H HPX-A HPX-F	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	150 80 30	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	40 20 8	Coaxial		R15	HPF-D010

Group	Appearance	Amp	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Coaxial	 Lens Core: 0.25 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(6) M3	HPX-H HPX-A HPX-F	25 13 5	Coaxial	Connector 0.5m	R4	HPF-D034
	 Lens Core: 0.5 dia. (emitter core dia.)(1) Core: 0.25 dia. (receiver core dia.)(9) M3	HPX-H HPX-A HPX-F	50 25 10		Cut to length 2m	R15	HPF-D035
	 Lens 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	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	15 8 3	Small diameter sleeve	Cut to length 2m	R15	HPF-D011
	Sleeve 2 dia.  Core: 0.5 dia. (2) 2.8 dia.			Small diameter short sleeve			HPF-D041
	 6 dia.	HPX-H HPX-A HPX-F	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	100 50 20	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	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	100 50 20	To 105˚C	Cut to length 2m	R25	HPF-D013
	 Core: 1.5 dia. (2) M6	HPX-H HPX-A HPX-F	150 80 30	To 150˚C		R35	HPF-D022
	 Glass fiber: 1.4 dia. M6	HPX-H HPX-A HPX-F	50 50 20	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	90 30 18	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	20 20 12	Parallel beam reflection	Cut to length 2m	R15	HPF-D025
Wide beam		HPX-H HPX-A HPX-F	100 50 20	Array	Cut to length 2m	R4	HPF-D026
Limited reflection		HPX-H HPX-A HPX-F	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		PFA tube small diameter	Cut to length 2m	R20	HPF-T029
	 4.7 dia.	HPX-H HPX-A HPX-F					HPF-T035
	 Core: 1 dia. (2) 6 dia.	HPX-H HPX-A HPX-F		PFA tube		R20/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

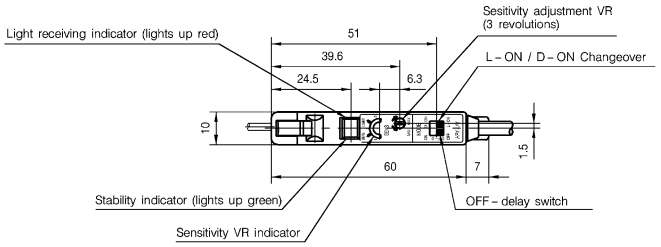
Group	Appearance	Sensing type	Scanning distance (mm)	Features	Cable length (cuttable)	Bend radius	Catalog listing
Thru scan	 Glass fiber: 1.2 bundle dia. (1) M4	HPX-H HPX-A HPX-F		Heat resistant to 350˚C. Elbow connection	Connector 1m	R25	HPF-VD07
Diffuse scan	 Glass fiber: 1.7 bundle dia. M6	HPX-H HPX-A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

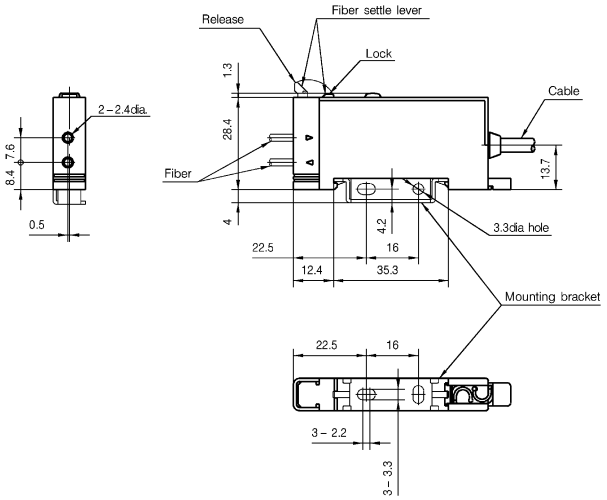
EXTERNAL DIMENSIONS (unit: mm)

●Amplifier unit

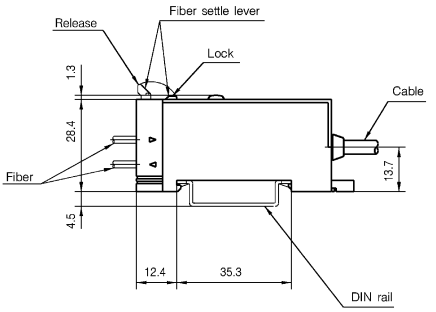
HPX-H, A, F (in common)

When mounted on bracket (attached)



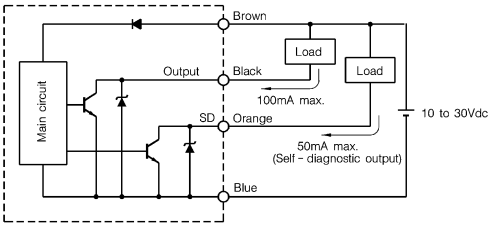


When mounted on DIN rail

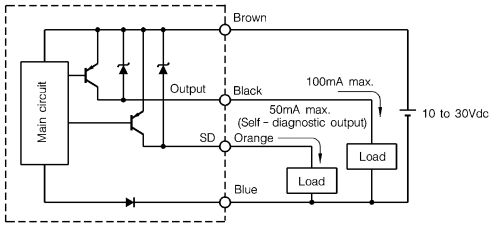


OUTPUT CIRCUIT DIAGRAM

● **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.