

- Embedded amplifier sensor with body and cord covered with fluoroplastic (PFA) housing and tube for enhanced resistance to oils and chemicals.

Excellent resistance to oils and chemicals, capable of immersed use.

- Easy-to-use embedded amplifier sensor
- Long detecting distance (through-beam: 3 m; diffuse-reflective: 30 cm)
- High-speed response of 0.35 ms
- Optional external sensitivity adjustment employed

Type

Detection method	Detecting distance	Model	Operation mode	Output mode
 Through-beam type	 3m	PF-T3DS	Dark-ON	NPN open collector output
 Diffuse-reflective type	 300mm	PF-R03S	Light-ON	

• Red LED models

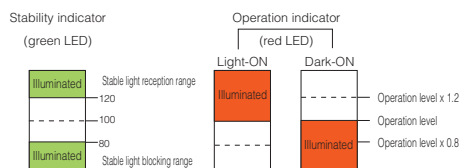
Red LED is used for light emitting element for resistance to underwater attenuation for detection of objects in water.

Model PF-T3RDS (through-beam)

Model PF-R03RS (reflective)

Indicators

- The operation indicator (red LED) and stability indicator (green LED) show the levels of light intensity as described in the figure below.
- After aligning the optical axis and adjusting the sensitivity, use a detection object to block and unblock the light beam several times to make sure that the sensitivity level is in a range that allows stable activation and deactivation.
- Setting the sensitivity in a range allowing stable operation achieves higher reliability against changes in the operating environment generated after the sensitivity is set.



The red LED (OP.L) is the operation indicator. In the L.ON (Light-ON) mode, the indicator is illuminated when a certain amount of light is detected. In the D.ON (Dark-ON) mode, the indicator is illuminated when a certain amount of light is not detected.

Chemical resistance of PFA (fluoroplastic)

Substance	PFA	Substance	PFA
Bunker A, B, C heavy oil	○	Mineral oil	○
Aniline	○	Ethylene trichloride	○
Acrylic nitrile	○	Bichromate of soda	○
Asphalt	○	Barium nitrate	○
Acetone	○	Silicon oil	○
Alcohol	○	Vegetable oil	○
Ammonia	○	Thinner	○
Isooctane	○	Barium hydroxide	○
Isobutyl alcohol	○	Phenol	○
Isobutyl methyl ketone	○	Turbine oil	○
Ethanol (ethyl alcohol)	○	Sodium carbonate	○
Ether	○	Turpentine	○
Ethylene glycol	○	Natural volatile oil	○
Enamel paint	○	Kerosene	○
Ammonium chloride	○	Trichloroethane	○
Calcium chloride	○	Trichloroethylene	○
Sodium chloride	○	Toluene	○
Barium chloride	○	Naphtha	○
Chlorine	○	Lactic acid	○
Gasoline	○	Nitrobenzene	○
Glass raw material	○	Fluorine	×
Dilute hydrochloric acid	○	Ferrosilicon	○
Dilute caustic soda	○	Freon 11	○
Dilute acetic acid	○	Propyl alcohol	○
Dilute nitric acid	○	Propylene glycol	○
Dilute sulfuric acid	○	Benzene	○
Citric acid	○	Methanol (methyl alcohol)	○
Glycerin	○	Methyl violet	○
Cresol	○	Water	○
Chloroform	○	Carbon tetrachloride	○
Light oil	○	Ammonium sulfate	○

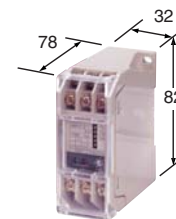
○ : applicable × : inapplicable

Rating/Performance/Specification

	Model	PF-T3DS	PF-R03S
Rating/performance	Detection method	Through-beam type	Diffuse-reflective type
	Detecting distance	3m	300mm
	Detection object	φ 20mm (Min.) Opaque	Standard detection object: 100 x 100 mm white drawing paper
	Power supply	12-24V DC ±10% / Ripple 10% max.	
	Current consumption	Transmitter: 12 mA max. Receiver: 15 mA max.	20mA max.
	Operation mode	Dark-ON(*1)	Light-ON(*2)
	Output mode	NPN open collector output Sink current 100 mA, 30 V DC max.	
	Response time	0.35ms max.	
	Hysteresis	————	10% max.
	Operating angle	10° (at receiver)	————
Specification	Light source (wavelength)	Infrared LED (880 nm)	
	Indicator	Transmitter: power indicator (red LED) Receiver: operation indicator (red LED) Stability indicator (green LED)	Operation indicator (red LED) Stability indicator (green LED)
	Volume	Not provided (optional: sensitivity adjustable with external volume)	
	Short circuit protection	Provided	
	Case material	PFA (fluoroplastic)	
	Connection	Permanently attached cord 3m length (2 m protected with PFA tube)	
		Transmitter: 0.15 sq. 2 core Receiver: 0.15 sq. 4 core	0.15 sq. 4 core
	Mass	About 100 g (transmitter/receiver)	
	Notes		

*1 Model PF-T3S for Light-ON mode
*2 Model PF-R03DS for Dark-ON mode

- Applicable power supply unit
PS Series
High capacity of 200 mA at 12 VDC



(General-purpose type) PS3N
PS3N-SR
(Multifunctional type) PS3F
PS3F-SR

Environmental Specification

	Environment	
Ambient light		5,000 lx max.
Ambient temperature		-25 - +55°C (non-freezing/ non-condensing)
Protective structure		IP 67g (sensor body and cord up to 2 m from body) *
Vibration		10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
Shock		500 m/s ² / 3 times each in 3 directions
Dielectric withstanding		1,000 VAC for 1 minute
Insulation resistance		500 VDC, 20 MΩ or higher

*Indicates Class g oil resistance in addition to IEC Standard IP 67 protective structure.

Using In-line Volume Unit for PFA Sensor (optional)

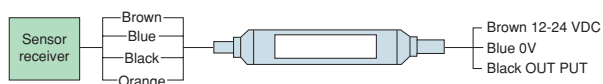
In-line volume unit models provided with an operation mode selector switch, sensitivity adjustment volume and operation indicator are available for adjustment at a distant location.

● Specification

Model: PF-V2 (NPN output)
PF-V2PN (PNP output)
Power supply: 12~24V DC ±10% / Ripple 10% max.
Output mode: Open collector output
100 mA (30 VDC) max. / Residual voltage: 1 V max.
Response time: 0.3ms max.
Short circuit protection: Provided
Connection: permanently attached cord (2 m)
Sensor: φ 4 with four 0.2 mm² cores
Power/output: φ 4 with three 0.2 mm² cores
Case material: Polycarbonate
Mass: Approx. 150g

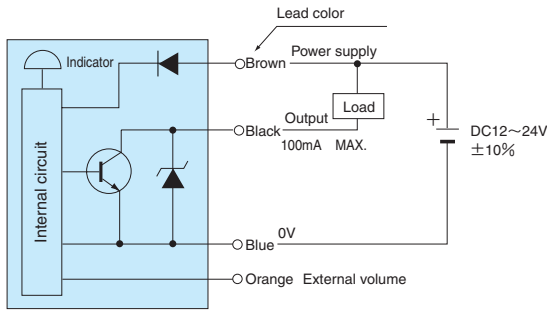
● Connection

Connect to the receiver of a through-beam sensor or reflective-type sensor.



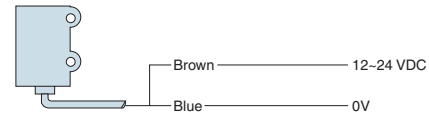
(Note) The volume unit and the cord are not covered with PFA (fluoroplastic) and should be used in normal atmosphere.

Input/Output Circuit and Connection

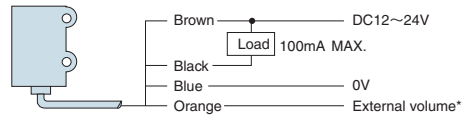


- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.

Through-beam type transmitter



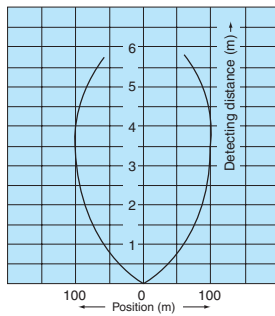
Through-beam type receiver and diffuse-reflective type



*Cut this lead off when not using the volume unit (model PF-V2) to leave it open and prevent it from touching other leads.

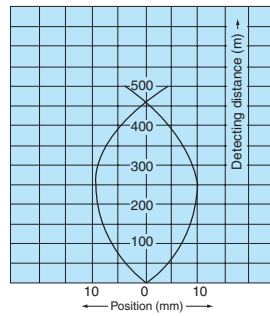
Directional characteristics(Typical Example)

PF-T3DS



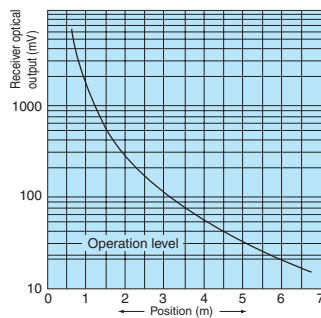
Activation area characteristics(Typical Example)

PF-R03S

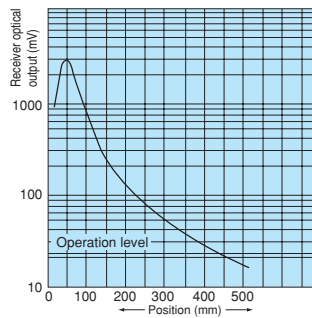


Distance-Output Characteristics (Typical Example)

PF-T3DS

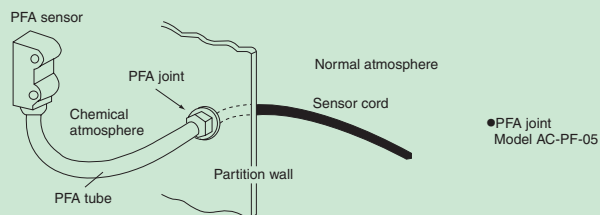


PF-R03S



Hint on Handling (Reference Example)

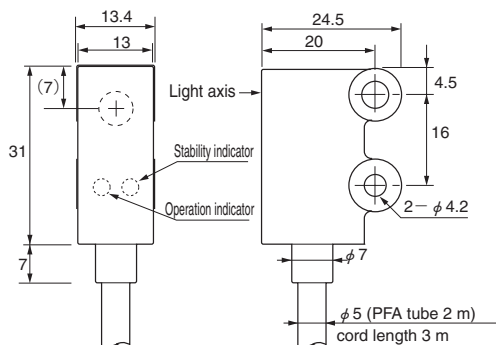
- The sensor body and part of the cord is covered with PFA (fluoroplastic). A vinyl chloride cord extends out of the PFA tube (at 2 m from the sensor) and there is no sealing between the PFA tube and the cord. When using in chemical atmosphere, use the separately-available PFA joint, etc. in the partition wall between the chemical and normal atmospheres to route the cord.



Dimensions (in mm)

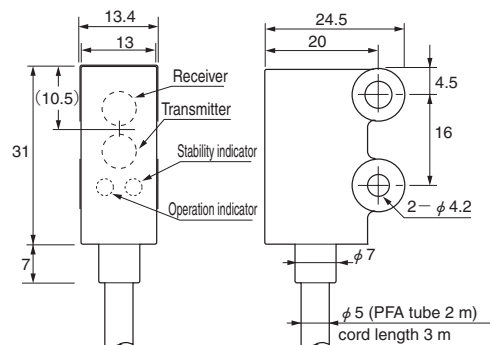
PF-T3DS

CAD



PF-R03S

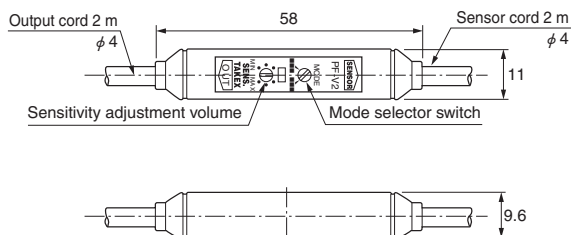
CAD



(The only indicator on the transmitter is power indicator.)

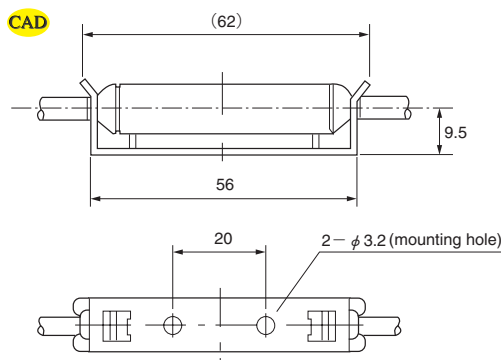
PF-V2 volume unit (optional)

CAD



With mounting bracket HZ-01 attached

CAD



For Correct Use

- Do not bend the PFA tube into a radius of 30 mm or smaller.
- The tensile strength and bending strength of the sensor body and tube should be 0.2 N·m max.
- This product can be used under water at a depth of 50 cm at most. Be sure to refer to the chemical resistance performance table to check resistance before using the sensor in chemical solution.
- Do not use the sensor in hazardous environment requiring.
- To extend the cord, use wires of at least 0.3 mm². Do not extend the cord between the sensor and external volume.
- Use M4 screws to mount the sensor. When using stainless steel screws, the tightening torque should be 0.6 N·m max. For higher chemical resistance, use fluoroplastic (PFA) screws.
- While PFA (fluoroplastic) has resistance to chemicals, it is not completely chemical proof against fluorine or strongly acidic chemicals. The durability may vary depending on the permeability, erosiveness or temperature of chemicals and sensor operating condition.
- The electric operation guarantee period of the product is 1 year after delivery. The resistance to chemicals of PFA in terms of appearance is not covered since the durability may vary.