For WET PROCESSES

No. CP-PC-2214E

SENSORS & FIBERS

# WET PROCESS

## PRODUCTS

Fiber-optic liquid leak detectors

Pipe-mounted fiber-optic liquid-level sensors

Tank-level fiber-optic cables

Chemical-proof fiber-optic cables

azbil

# A wide variety of options for liquid detection

## Pipe-mounted fiber-optic cable liquid-level sensors

HPF-T034 HPF-T032


Inherently safe product | Pipe dia. 8 to 19mm T034 | Pipe dia. 3 to 13mm T032 | PFA protection Cable | R4 | 5m Cut to length

**Array of 16 optical axes prevents error due to water droplets and air bubbles!**

Details on page 4 ⇒

## Pipe-mounted liquid-level sensors with self-contained amplifier

HPQ-T

LO selectable DO | CE

**Liquid-level detection without adjustment!**

Details on page 6 ⇒

## Tank-level fiber-optic cables

HPF-D027/D033

Inherently safe product | PFA protection Cable | R40/30 | 2m Cut to length

**Tip structure prevents liquid cling, for reliable detection!**

Details on page 7 ⇒

## Chemical-proof fiber-optic cables HPF-T029/T035/D014

Inherently safe product | PFA protection Cable | R20 | 2m Cut to length

**Minimum bend radius of 20mm (R20) for easy running of cables!**

Details on page 10 ⇒

## Liquid leak detectors with self-contained amplifier HPQ-D

NO/NC | NPN/PNP | CE | UL

PFA protection Case | Cable

**For leaks of acids and alkaline chemicals!**

Details on page 8 ⇒

## Liquid leak fiber-optic detector HPF-D040

Inherently safe product | PFA protection Case | Cable | R20 | 5m Cut to length

**For leaks of organic solvents like IPA!**

Details on page 8 ⇒

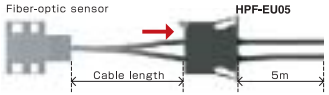


Note: Contact Yamatake Corporation for applications in explosive atmospheres.

### "Extension cord" for fiber-optic cables

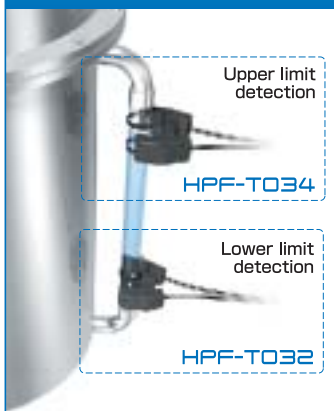
R4 | 5m Cut to length

Cables can be extended 5m using the **HPF-EU05** fiber-optic extender, sold separately.

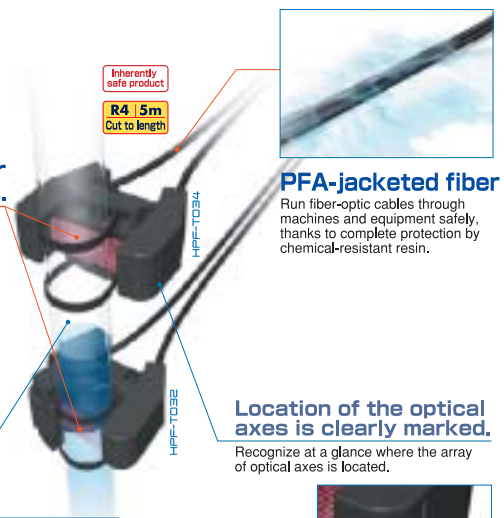


# HPF-T032 HPF-T034

Inherently safe product | Pipe dia. 8 to 19mm T034 | Pipe dia. 3 to 13mm T032 | PFA protection Cable




## Fail-safe detection uses 2 different sensing methods for detection of upper and lower limits of tank liquid level.




### Array of 16 optical axes eliminates the effects of air bubbles and water droplets.

Adverse effects from air bubbles and water droplets are reduced, resulting in reliable detection.

### PFA-jacketed fiber

Run fiber-optic cables through machines and equipment safely, thanks to complete protection by chemical-resistant resin.

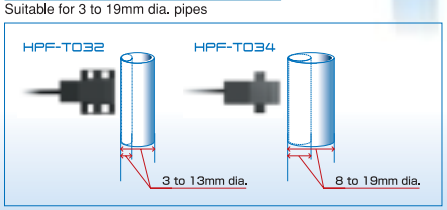


### Location of the optical axes is clearly marked.

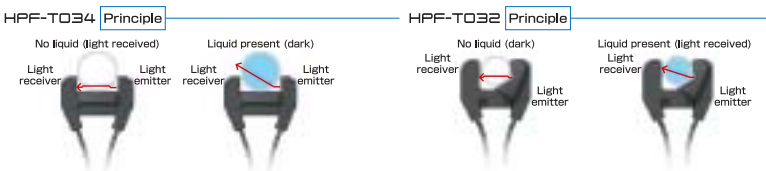
Recognize at a glance where the array of optical axes is located.

### Usable with a wide range of pipe diameters.

Suitable for 3 to 19mm dia. pipes

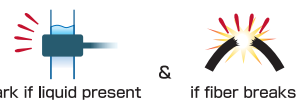



## Refraction-based sensing ensures reliable operation.



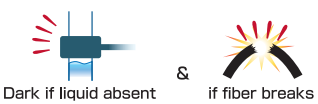

## Fail-safe concept for pipe-mounted liquid-level sensors

**Upper limit detection**



Dark if liquid present & if fiber breaks → Required optical system: Light circuit closed when no liquid: HPF-T034

**Lower limit detection**



Dark if liquid absent & if fiber breaks → Required optical system: Light circuit closed when liquid present: HPF-T032

### Catalog Listing

| Model | Shape | Pipe diameters | Features | | Bend radius | Catalog listing |
|---|---|---|---|---|---|---|
| Liquid level detection |  | 3 to 13mm | Receives light when liquid present | 5m Cut to length | R4 | HPF-T032 |
| |  | 8 to 19mm | Receives light when liquid absent | | | HPF-T034 |

### Specifications

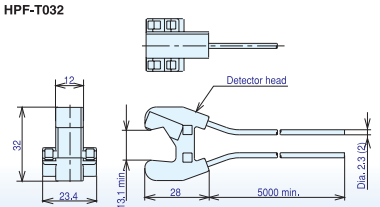
| Catalog listing | HPF-T032 | HPF-T034 |
|---|---|---|
| Detection method | Thru scan | |
| Applicable amplifier | HPX-AG_ / HPX-T_ / HPX-ETS / HPX-H_ | |
| Applicable pipe | PFA transparent pipe, 1mm thick | |
| Standard target liquid | Water* | |
| Operating temperature | −30 to +70℃ | |
| Material | Body: Polyester imide. Fiber: Polyethylene (PFA coating) | |

*In some cases operation may not be reliable due to type of pipe, degree of liquid transparency, or liquid refractive properties. Be sure to confirm operation before actual use.
When using pipes other than those of recommended materials and thicknesses, be sure to test in advance that operation is satisfactory, or contact Yamatake Corporation.

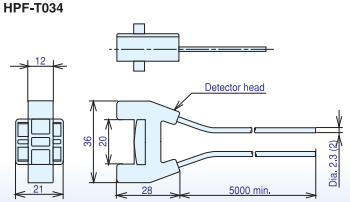
### External Dimensions

(Unit: mm)

**HPF-T032**




**HPF-T034**



# HPQ-T Series

CE NPN/PNP LO selectable DO

## Liquid is easily detected using a pipe-mounted sensor.

### Stable detection

Refractive detection ensures sufficient gain between light-ON and dark ON light levels. This sensor is also suitable for liquids with poor light transmission (such as resist liquid and waste fluid).

### Suitable for various pipe diameters

Made for pipe diameters from 8 to 13mm (1mm thick). Mount with a cable tie or M3 screw.

### Operation panel is located on the side.

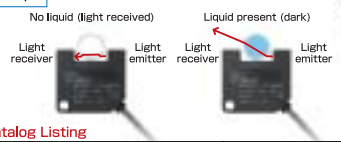
Indicator and operation selector switch are located on the side. Even when sensors are gang-mounted, adjustment while checking the indicator is easy.

LO selectable DO

### One model can detect both upper limit and lower limit.

Note: For pipe diameters of less than 8mm contact Yamatake Corporation, as adjustable sensitivity sensors are also available.

**Principle**




### Catalog Listing

| Detection method | Pipe diameter | Output mode | Catalog listing |
|---|---|---|---|
| Pipe-mounted liquid-level detection | 8 to 13mm | Open collector NPN transistor | HPQ-T1 |
| | 1/8" or 1/4" | | HPQ-T1-004 |
| | 8 to 13mm | Open collector PNP transistor | HPQ-T2 |
| | 1/8" or 1/4" | | HPQ-T2-005 |

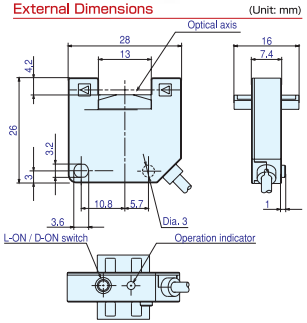
Note: Cord is 2m long.

### Specifications

| Catalog listing | | HPQ-T1, HPQ-T1-004 | HPQ-T2, HPQ-T2-005 |
|---|---|---|---|
| Power supply voltage | | 10 to 28Vdc (ripple voltage 10% max.) | |
| Current consumption | | 25mA max. | |
| Applicable pipe types | | PFA transparent pipe, 1mm thick | |
| Applicable medium | | Transparent or opaque liquids | |
| Repetitive detection positional accuracy | | 1mm max. | |
| Operation mode | | Light ON (L-ON) or dark ON (D-ON), selectable by switch<br>Liquid detection: dark. Liquid non-detection: light | |
| Output mode | | NPN transistor output, open collector | PNP transistor output, open collector |
| Control output | Switching current | 100mA max. (resistive load) | |
| | Output dielectric strength | 30V | |
| | Voltage drop | 1V max. (at 100mA switching current) | |
| Response time | | 2ms max. (for operation and release) | |
| Light emitter | | Red LED (peak emission wavelength 950nm) | |
| Indicator | | Operation indicator: red (lit when output ON) | |
| Ambient light immunity | | 1,000 lux max. (incandescent lamp) | |
| Operating temperature range | | −10 to +55℃ | |
| Operating humidity range | | 35 to 85% (no condensation allowed) | |
| Sealing | | IP50 (IEC 529) | |
| Circuit protection | | Built-in reverse connection protection circuit, malfunction prevention circuit at power ON (approx. 20ms), output short-circuit protection | |

### External Dimensions

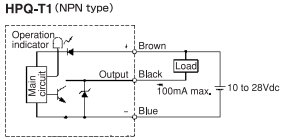
(Unit: mm)



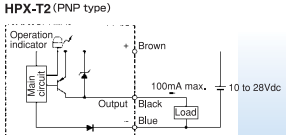

Note: Cord is 2m long.
*In some cases operation may not be reliable due to type of pipe, degree of liquid transparency, or liquid refractive properties. Be sure to confirm operation before actual use. When using pipes other than those of recommended materials and thicknesses, be sure to test in advance that operation is satisfactory, or contact Yamatake Corporation.

### Output Circuit Diagram

**HPQ-T1** (NPN type)




**HPX-T2** (PNP type)








# HPF-D027/D033 Series

Inherently safe product | PFA protection Cable

## All-resin structure ensures no metal contamination.

The **HPF-D027** and **-D033** are both made of PFA tubing with no metal parts, even inside.

Heat resistant to 105℃

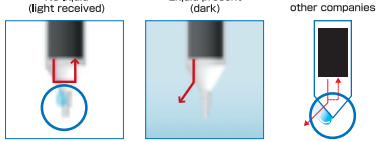
R30 2m Cut to length

### 4mm diameter allows easy running of cables.

The **HPF-D033** uses space-saving 4mm dia. PFA tubing, making it easy to run fiber-optic cables.

Note: The **HPF-D027** uses 6mm dia. PFA tube.

**Principle**




### Reliable detection by preventing liquid cling!

Proprietary tip structure prevents liquid from clinging to the tip, eliminating a cause of faulty operation.

### Catalog Listing

| Model | Shape | Features | | Bend radius | Catalog listing |
|---|---|---|---|---|---|
| Liquid level detection 6mm dia. type | | Contact type<br>Liquid cling prevention<br>Heat-resistant to 105℃ | Cut to length | R25/R40 | HPF-D027 |
| Liquid level detection 4mm dia. type | | | Cut to length | R15/R30 | HPF-D033 |

Note: Fiber cables can be cut to the desired length.

### Specifications

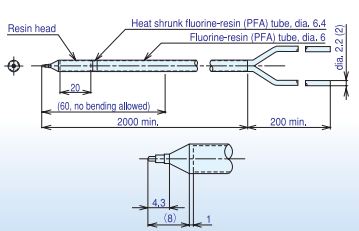
| Catalog listing | HPF-D027 | HPF-D033 |
|---|---|---|
| Detection method | Diffuse scan (liquid contacting type) | |
| Applicable amplifier | HPX-AG__ / HPX-T__ / HPX-ETS / HPX-H__ | |
| Repetitive detection positional accuracy | 1mm max. (water) | |
| Standard target liquid | Water* | |
| Pressure resistance | −49 to +490kPa | |
| Operating temperature range | −30 to +105℃ | |
| Material | Polyethylene (PFA coating) | |

*Detection may not be possible for some liquid colors and viscosities.

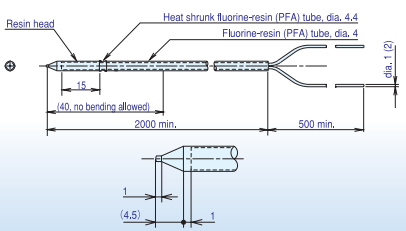
### External Dimensions

(Unit: mm)

**HPF-D027**




**HPF-D033**



Liquid leak detectors with self-contained amplifier / Liquid leak fiber-optic detector

# HPQ-D Series

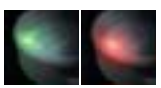
NO/NC NPN/PNP PFA protection Case Cable

## Built-in amplifier, liquid absorbing paper not needed, usable with various liquids.

Optical type


### Acids or alkaline liquids, IPA (isopropyl alcohol), pure water, Fluorinert, Galden, etc.

Notes: ・For explosion-proof applications, be sure to select a suitable fiber type.
・Fluorinert and Galden are registered trademarks of 3M and Solvay Solexis respectively.



### Operation indicator

Sensor status can be checked from the body side.
Normal state (green LED lit)
Liquid leakage (red LED lit)

### Body and cable are protected by PFA.

PVC brackets are available for acidic or alkaline liquids. PFA (partially SUS) brackets are available for organic solvents.

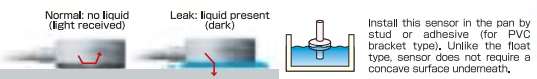
### Suitable for export equipment

CE marking, UL certified.
Wide variety of output modes and types are available.
●NO/NC output ●NPN/PNP output

### Easy maintenance

After leak detection, simply wipe the detector surface—a much easier process than with detection tape or a liquid-absorbing model.

Principle




Install this sensor in the pan by stud or adhesive (for PVC bracket type). Unlike the float type, sensor does not require a concave surface underneath.

# HPF-D040 Series

Inherently safe product PFA protection Case Cable

### Body and cable are protected by PFA

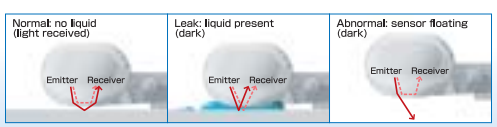
Sensor can be used even in environments like IPA and other organic solvents.
Note: SUS is partially used for bracket.

### Saves space

Sensor head is only 9.9mm high.

R20 5m Cut to length

Principle




When a leak is detected, no light reaches the receiver. Since the same is true in a fiber cable break or disconnection, operation is fail-safe. Install in the pan with a stud.



## Catalog Listing

### HPQ-D Series

■ Body

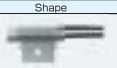
| Detection method | Specifications | Catalog listing |
|---|---|---|
| Optical refraction system | NC, NPN, PVC bracket type | HPQ-D11 |
| | NC, PNP, PVC bracket type | HPQ-D12 |
| | NC, NPN, PFA bracket type | HPQ-D21 |
| | NC, PNP, PFA bracket type | HPQ-D22 |
| | NO, NPN, PVC bracket type | HPQ-D13 |
| | NO, NPN, PFA bracket type | HPQ-D23 |

■ Accessory

| Specifications | Catalog listing |
|---|---|
| PVC bracket (10 units) | HPQ-B01 |
| PFA bracket (10 units) | HPQ-B02 |

Notes: ・For **HPQ-D11/12/21** models, a sensor with 5m cable (2m PFA tube) is also available, specially produced for the U.S. market (**-L05**).
・Normally open type: no UL certification.
・Some UL-certified models are available. For details, contact Yamatake Corporation.

### HPF-D040 Series

| Type | Shape |
|---|---|
| Leak detection |  |

| Features | Bend radius | Catalog listing |
|---|---|---|
| 5m Cut to length | R20 | HPF-D040 |

## Specifications

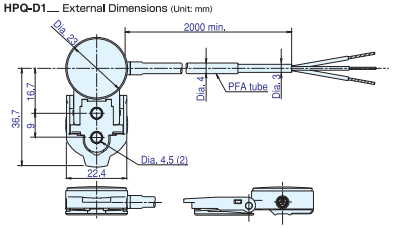
| Catalog Listing | HPQ-D_1 | HPQ-D_2 |
|---|---|---|
| Power supply voltage | 12 to 24Vdc (ripple voltage 10% max.) | |
| Current consumption | 30mA max. | |
| Mounting face | Polyvinyl chloride plate, stainless steel plate, etc, (see note 1) | |
| Standard target liquid | Water (see note 2) | |
| Operation mode | Normal state: ON. State upon leak detection: OFF | |
| Output mode | NPN transistor output, open collector | PNP transistor output, open collector |
| Control output: Switching current | 50mA max. (resistive load) | |
| Control output: Output dielectric strength | 30V, with an output short-circuit protection circuit | |
| Control output: Voltage drop | 1V max. (at 50mA switching current) | |
| Light emitter | Infrared LED | |
| Indicator | Green light ON in normal state, Orange light ON when leak detected, | |
| Operating temperature range | −25 to +50℃ | |
| Operating humidity range | 35 to 85% RH (no condensation allowed) | |
| Sealing | IP67 (IEC standard) | |
| Circuit protection | Built-in reverse connection protection circuit, malfunction prevention circuit at power ON (approx. 20ms). | |
| Material | Body: PFA. Cable: PFA coating. Bracket: PVC or PFA (SUS). | |

Notes: 1. Operation may be unstable with some mounting surface colors or conditions.
2. If the target liquid is other than the one specified, verify the device's operation or contact Yamatake Corporation in advance.

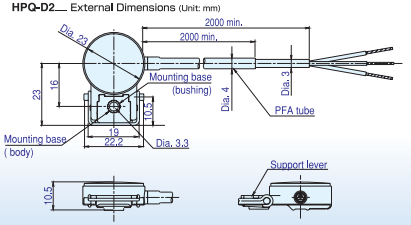
| Catalog listing | HPF-D040 |
|---|---|
| Detection method | Diffuse scan (contact type) |
| Applicable amplifier | HPX-AG__ / HPX-ET__ |
| Standard target liquid | IPA (isopropyl alcohol) |
| Operating temperature range | −30 to +70℃ |
| Material | Body: PFA. Cable: polyethylene (PFA coating). Bracket: PFA (SUS). |

## External Dimensions and Wiring Diagrams

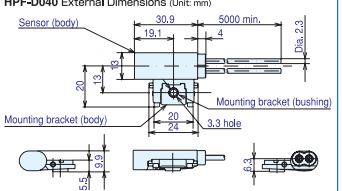
HPQ-D1__ External Dimensions (Unit: mm)

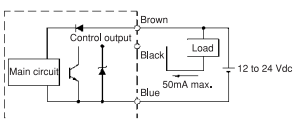


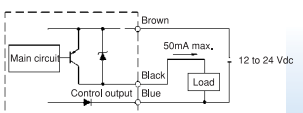

HPQ-D2__ External Dimensions (Unit: mm)




HPF-D040 External Dimensions (Unit: mm)



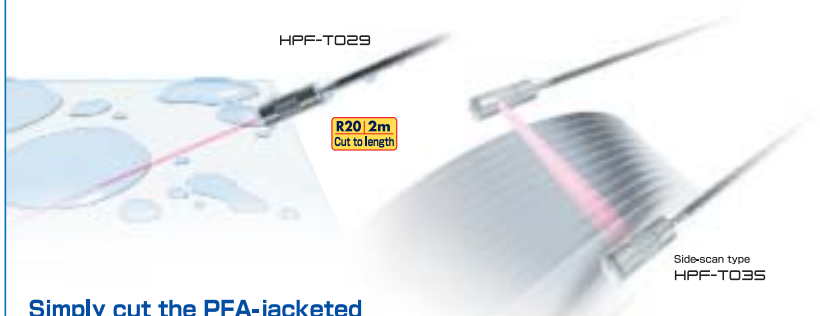



Chemical-proof fiber-optic cables

# HPF-T029/T035/D014

Inherently safe product

PFA protection Cable




## Simply cut the PFA-jacketed cable to length and insert as is into the amplifier.

## Bend radius of R20mm with 2.2mm tube diameter

Conventional model

HPF-T029
HPF-T035

### Catalog Listing

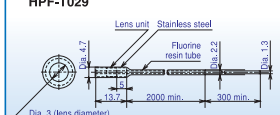
| Model | Shape | Combination mode | Scanning distance (mm) (Note 1) | Features | | Bend radius | Catalog listing |
|---|---|---|---|---|---|---|---|
| **Thru scan** •Oil and chemical-proof •Small diameter | 4.7mm dia. | HPX-AG | HP 4,500 | Fluorine resin fiber | Cut to length | R20 | HPF-T029 (Note 2) |
| **Thru scan** •Oil and chemical-proof •Side view •Small diameter | 4.7mm dia. | HPX-AG | HP 1,030 | | Cut to length | R20 | HPF-T035 (Note 2) |
| **Diffuse scan** •Oil and chemical-proof | 6mm dia. | HPX-AG | HP 190 | | Cut to length | R80 | HPF-D014 |

Notes: 1. Values indicate capability. Actual scanning distance is limited by fiber length (standard 2m x 2 ≒4m).
2. **HPF-T029/HPF-T035**: Standard length is 2m. However, 5m type is also available. For details, contact Yamatake Corporation.

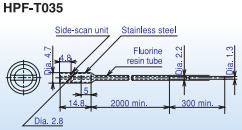
### External Dimensions

(Unit: mm)

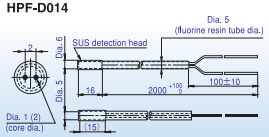
**HPF-T029**




**HPF-T035**




**HPF-D014**






# Recommended Combinations of HPX-AG Amplifier and Fiber Unit

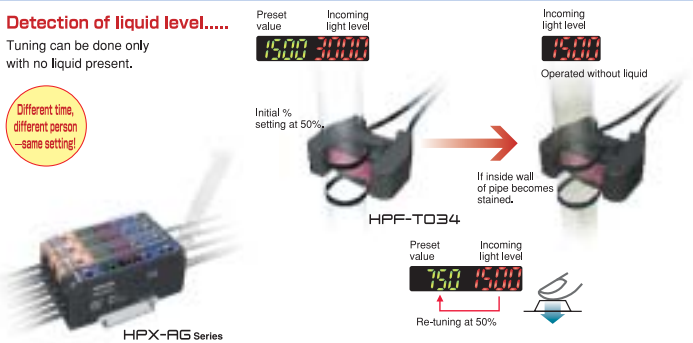
## Easy setup with no liquid present

Patent pending

### Detection of liquid level.....

Tuning can be done only with no liquid present.

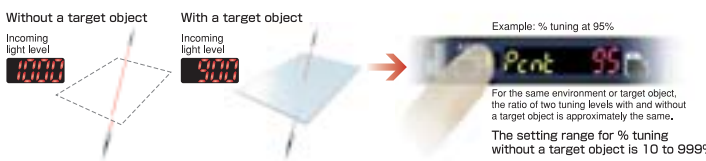
Different time, different person –same setting!




When used with incoming light level without liquid.

### Percent (%) tuning

For re-tuning on the same application, simply press the AUTO button in the % tuning setting mode.




For the same environment or target object, the ratio of two tuning levels with and without a target object is approximately the same.

The setting range for % tuning without a target object is 10 to 999%.

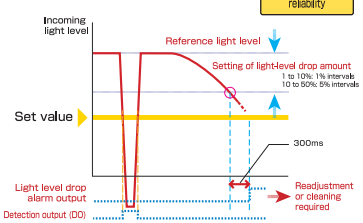
### Use of HPX-AG02 light-level drop alarm output

Alarm output warns the user of reduced light levels due to dirt on the pipe or a change in liquid color, before the problem has a chance to cause a sensing error.

An alarm signal is output when the incoming light level falls below a preset drop amount for more than 300ms.

Promotes preventive maintenance

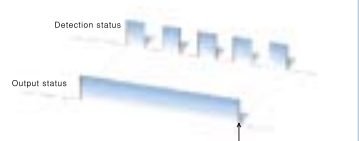
Improves equipment reliability




### Use of HPX-AG04 latched output

Example application: In combination with the **HPX-D040** liquid leak fiber-optic detector, highly volatile chemical liquids can be detected reliably.

During Latch operation, the amplifier display blinks.




Example application: An interlock for liquid leakage detection, used in combination with the **HPF-D040** liquid leak fiber-optic detector.

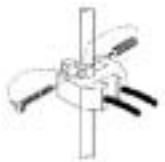
For more information on products recommended for use with the **HPX-AG** Series, refer to the product catalog and specifications.

# Handling precautions

## HPF-T032/T034

### Mounting method

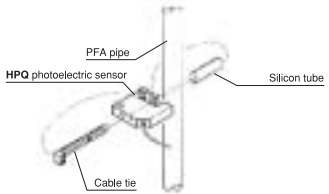
- As shown below, mount the fiber unit using the included cable ties and anti-slip tubes. Firmly tighten the two upper and lower cable ties and then cut off any extra length.
- If an additional cable tie is required, use one no more than 2.5mm wide. Recommended pipe material is PFA, 1mm thick. For pipe diameter, see information on **HPX-T032/T034** in this brochure.



## HPQ-T

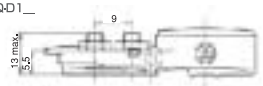
### Mounting method

- This photoelectric sensor is pipe-mounted using either an M3 screw or cable tie. When mounting the sensor with a cable tie, be sure to secure the sensor by passing the cable tie through the silicon tube to prevent the sensor from slipping.

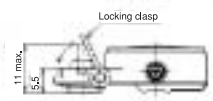



## HPQ-D

HPQ-D1__




HPQ-D2__




(Unit: mm)

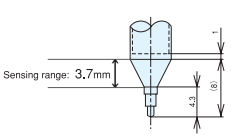
### Mounting method

- Mount the sensor horizontally. After locking the mounting base in position, insert the sensor body onto the mounting base and fix it in place by tilting down the locking clasp of the sensor.
- Fastening with screws
  Remove the knock-out holes of the mounting base and place the sensor on two stainless steel (etc.) M4 stud bolts welded on the metal pan. Secure with two M4 nuts. For the PFA type, mount similarly with one M3 stud bolt.
- Mounting with adhesives
  The PVC bracket type can be mounted with adhesive. If the mounting surface is PVC (vinyl chloride), the same material as the bracket, the use of monomeric adhesives for vinyl chloride is recommended. However, be sure to check the specifications of the adhesive to be used, taking into consideration the material of the other mounting surfaces

## HPF-D027/D033

### Mounting method

- To install the fiber-optic sensor, use a commercially available fluorine-resin joint that matches the outside diameter of the PFA tube.

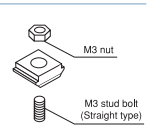

The level at which liquid is detected differs according to surface tension and leakage situation where the fiber unit is located.

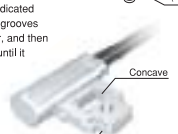
- The following may cause unstable sensing:
  1. Bubbles on conical portion of sensing head.
  2. Chemical precipitate on conical portion of sensing head.
  3. High density liquid
  4. Some liquid properties, such as milky white color.
  5. Scratches or deformation of the fiber unit tip. Protect it (esp. the conical part) from impact.

## HPF-D040

### Mounting method

- When using an SUS mounting base, insert the welded M3 stud bolt into the hole of the mounting base, and then fasten with an M3 nut (not supplied).
- Put the ridges of the dedicated mounting base into the grooves of the fiber-optic sensor, and then slide the base forward until it is in place.

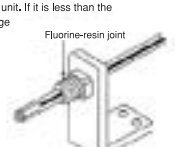



## HPF-T029/T035/D014

### Mounting method

- To install the fiber-optic sensor, use a commercially available fluorine-resin joint that matches the outside diameter of the PFA tube.
- The bend radius of the protective tube must be more than the minimum bend radius specified for each fiber unit. If it is less than the minimum bend radius, it may damage the fiber unit.




For application or handling of sensors, be sure to check user's manuals or specifications.



■ Combination with the **HPF-EU05** (5m extender), applicability by amplifier

| Catalog | Total combined distance | HPX-AG | | HPX-ET | HPX-H | HPX-A | Description |
|---|---|---|---|---|---|---|---|
| | | nL | HP | | | | |
| **HPF-T032** | 10m | OK | OK | NG | OK | NG | Detection may not be possible depending on the chemical nature of the liquid. Be sure to check operation before actual use. |
| **HPF-D040** | 10m | OK | OK | OK | OK | NG | |
| **HPF-D027** | 7m | OK | OK | NG | OK | NG | |
| **HPF-D033** | 7m | OK | OK | NG | NG | NG | |
| **HPF-T029** | 7m | Approx. 1/4 distance decrease | | | | | Use the decrease amount as a rough guideline only. |
| **HPF-T035** | 7m | Approx. 1/4 distance decrease | | | | | |
| **HPF-T014** | 7m | Approx. 1/4 distance decrease | | | | | |

# Chemical resistance of PFA (fluorocarbon polymer)

| Substance | | PFA |
|---|---|---|
| Acetone | $(CH_3)_2CO$ | ○ |
| Acrylonitrile | $C_2H_3CN$ | ○ |
| Ammonia | $NH_3$ | ○ |
| Ammonium chloride | $NH_4Cl$ | ○ |
| Ammonium sulfate | $(NH_4)_2SO_4$ | ○ |
| Aniline | $C_6H_5NH_2$ | ○ |
| Asphalt | | ○ |
| Barium chloride | $BaCl_2$ | ○ |
| Barium hydroxide | $Ba(OH)_2$ | ○ |
| Barium nitrate | $Ba(NO_3)_2$ | ○ |
| Benzene | | ○ |
| Calcium chloride | $CaCl_2$ | ○ |
| Carbon tetrachloride | $CCl_4$ | ○ |
| Chlorine | $Cl_2$ | ○ |
| Chloroform | $CHCl_3$ | ○ |
| Citric acid | $C_3H_4(OH)(COOH)_3$ | ○ |
| Cresol | $C_6H_4(OH)(CH_3)$ | ○ |
| Dilute acetic acid | $CH_3COOH$ | ○ |
| Dilute caustic soda | NaOH | ○ |
| Dilute hydrochloric acid | HCl | ○ |
| Dilute nitric acid | $HNO_3$ | ○ |
| Dilute sulfuric acid | $H_2SO_4$ | ○ |
| Enamel paint | | ○ |
| Ethanol | $C_2H_5OH$ | ○ |
| Ether | $(CH_3)_2O$ | ○ |
| Ethylene glycol | $C_2H_4(OH)_2$ | ○ |
| Ferrosilicon | | ○ |
| Fluorine | $F_2$ | △ |
| Freon-11 | $FCCl_3$ | ○ |
| Frit | | ○ |

| Substance | | PFA |
|---|---|---|
| Gasoline | | ○ |
| Glycerin | $C_3H_5(OH)_3$ | ○ |
| Heavy oil A, B, C | | ○ |
| Isobutyl alcohol | $i\text{-}C_4H_9OH$ | ○ |
| Isobutyl methyl ketone | $C_4H_9COCH_3$ | ○ |
| Isooctane | $i\text{-}C_8H_{18}$ | ○ |
| Kerosene | | ○ |
| Lactic acid | | ○ |
| Light oil | | ○ |
| Methanol | $CH_3OH$ | ○ |
| Methyl violet | $C_7H_{16}$ | ○ |
| Mineral oil | | ○ |
| Naphtha | | ○ |
| Natural volatile oil | | ○ |
| Nitrobenzene | $C_6H_5NO_2$ | ○ |
| Phenol | $C_6H_5OH$ | ○ |
| Propyl alcohol | $C_3H_5(OH)_3$ | ○ |
| Propylene glycol | $C_3H_2(OH)_2$ | ○ |
| Silicone oil | | ○ |
| Sodium dichromate | $Na_2Cr_2O_7$ | ○ |
| Sodium carbonate | $Na_2CO_3$ | ○ |
| Sodium chloride | NaCl | ○ |
| Thinner | | ○ |
| Toluene | $C_6H_5CH_3$ | ○ |
| Trichloroethane | $C_2H_3Cl_3$ | ○ |
| Trichloroethylene | $C_2HCl_3$ | ○ |
| Turbine oil | | ○ |
| Turpentine oil | | ○ |
| Vegetable oil | | ○ |
| Water | $H_2O$ | ○ |

Note: ○ = resistant. The table does not imply guarantee of detection for each substance.
△ Contact Yamatake Corporation regarding fluorine.

## European standards (EN standards)

**About CE Marking (CE:conformité Européenne = European conformity)**

In order to make the best use of the advantages obtained by European unification, the European Union (EU) Commission adjusted the safety regulations in the EU area to produce unified regulations by product category, such as machinery, toys, and medical devices. This was done in the European Communities Directive (= EC Directive) officially announced in 1989. Documents such as the Machine Directive, EMC Directive (regulations on the compatibility of electromagnetic waves generated by electrical products), Low Voltage Directive, and Medical Device Directive were issued. At the same time, the system of granting CE marking by product category began. The EC Directive most directly relevant for Yamatake's products is the Low Voltage Directive. The Machinery Directive is also relevant indirectly.

**About EN standards (EN: European Norm = European standard)**

EC directives like those mentioned above are laws that must be observed. However, they contain only basic requirements written in general terms, resulting in difficulty in concrete understanding. Therefore, many manufacturers now design products based on what are known as EN standards. In parallel with unifying the regulations (EC directives) in the EU area, the industrial standards and safety standards of each country are also being unified. This unification of standards is being carried out by CEN (Comitunified standards, the letters EN are used at the head of each standards number.

EN standards assist in concrete product design by giving numerical values and drawings pertaining to the safety requirements of EC directives. Whether the EN standards should be adopted or not is left up to the manufacturer. In other words, it is theoretically possible not to adopt the EN standards. However, in such a case, much effort is required to demonstrate objectively, using relevant data and documents, that the adopted method satisfies the EC directives. Also, explaining the reason for not using the EN standards is difficult. Since the easiest way to receive EC marking and satisfy the EC directives is to gather all the EN standards related to the directives and then to develop products that meet the standards, almost all manufactures follow this method. In this case the CE marking can be used only after the EN standards are met and all the relevant EC directives are satisfied.

## UL standards ( : Recognition mark)

This mark recognizes that samples of a part that does not function independently, or a part with limited functions, have been tested by UL and comply with the applicable UL standards.
Note: Even if parts having this recognition mark are used in the final product, the final product cannot be listed as UL-approved on that basis alone.



Memo

**Note**

Descriptions in this brochure are effective as of November 2006. This brochure mainly covers product specifications. When installing or wiring a product, be sure to read the user's manual corresponding to the product's date of manufacture. Product specifications are subject to change without notice due to technological advances or specification changes. To order a product or ask a question, contact Yamatake Corporation or our nearest distributor.

# A wide variety of options for liquid detection

www.azbil.com

**⚠RESTRICTIONS ON USE**

These products have 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 these products in applications where human safety may be put at risk.

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*Specifications are subject to change without notice.*


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