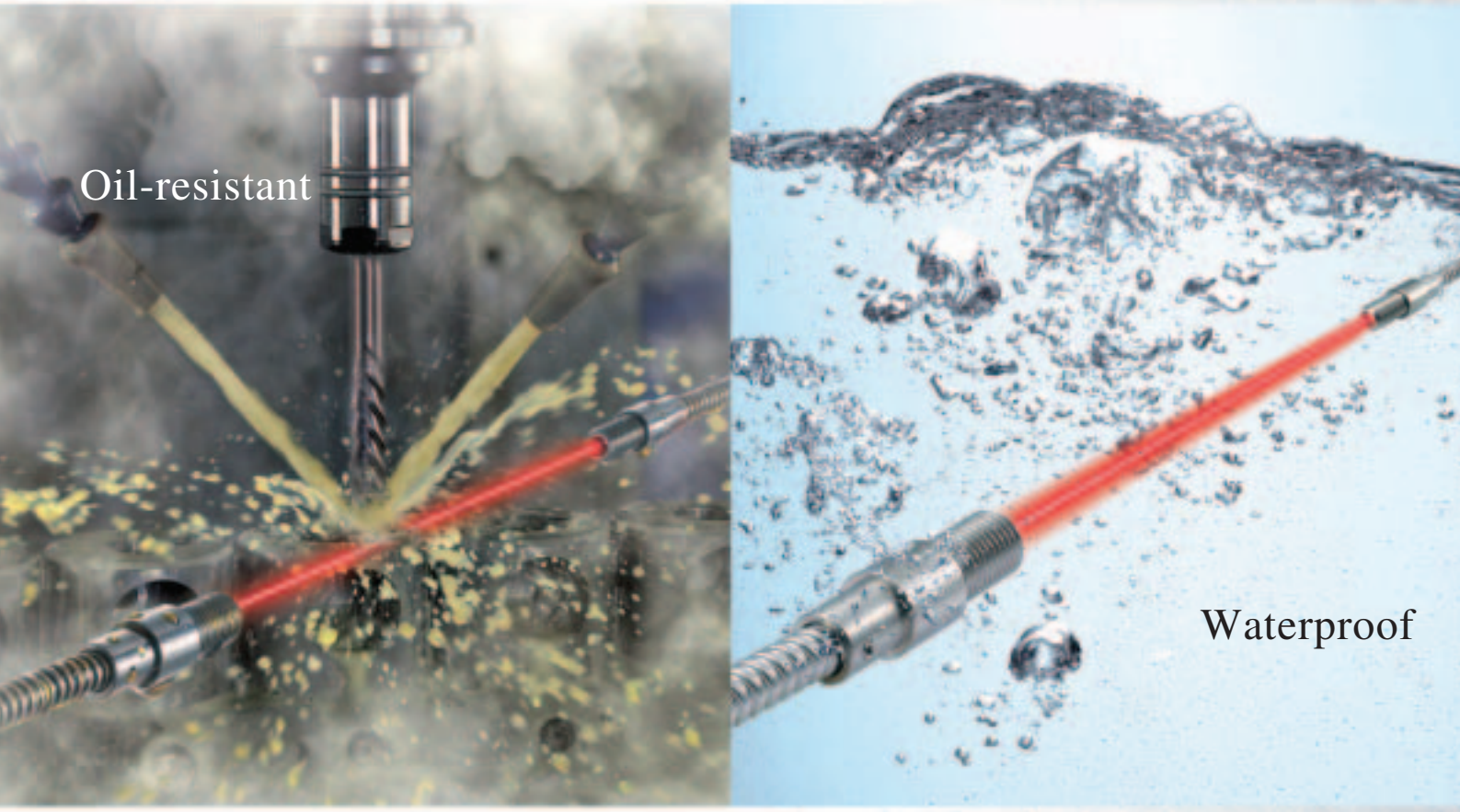
KEYENCE

Heavy-duty Photoelectric Sensors
PX Series

PX Series

Heavy-Duty Industrial Photoelectric Sensors

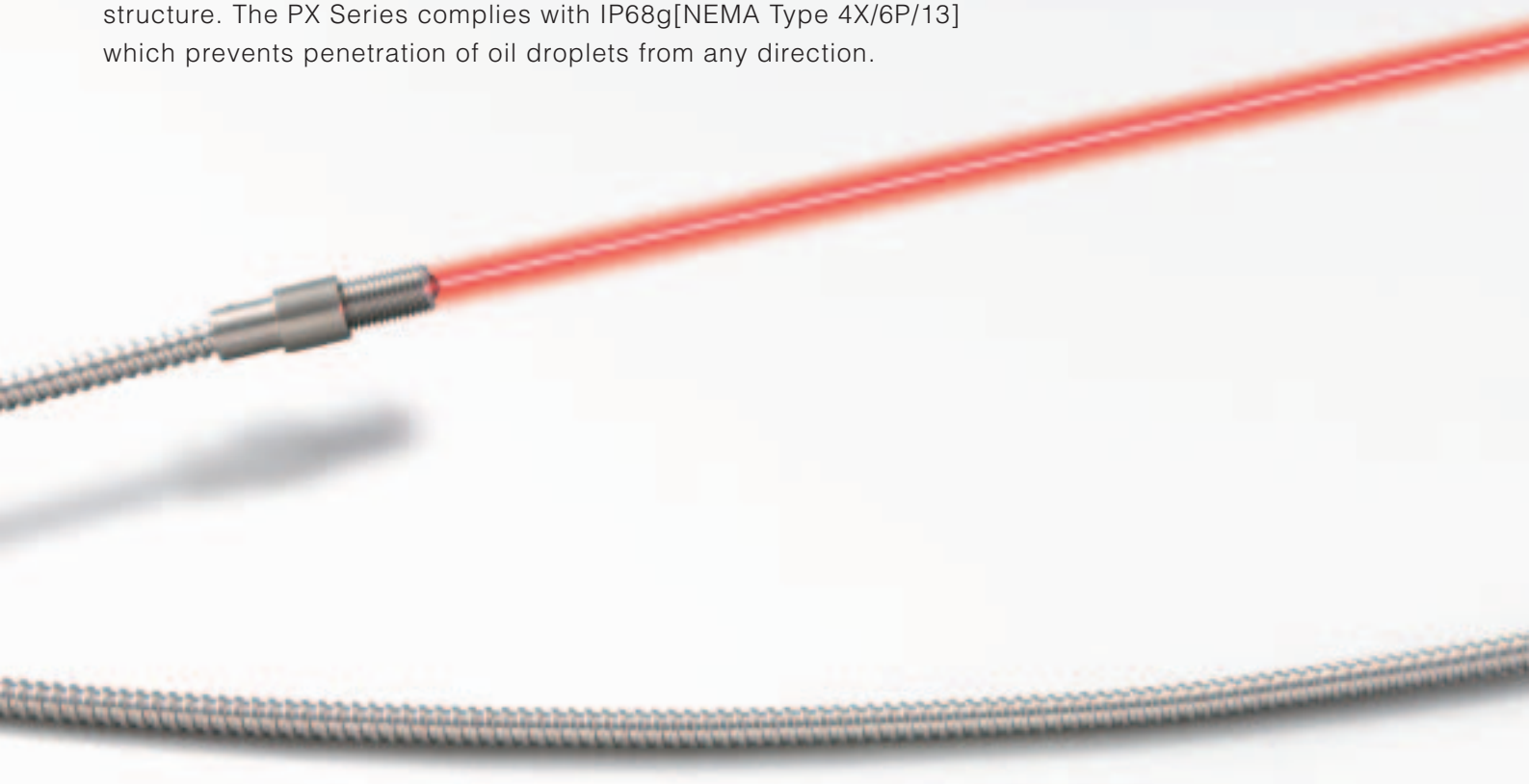


Designed to Last!

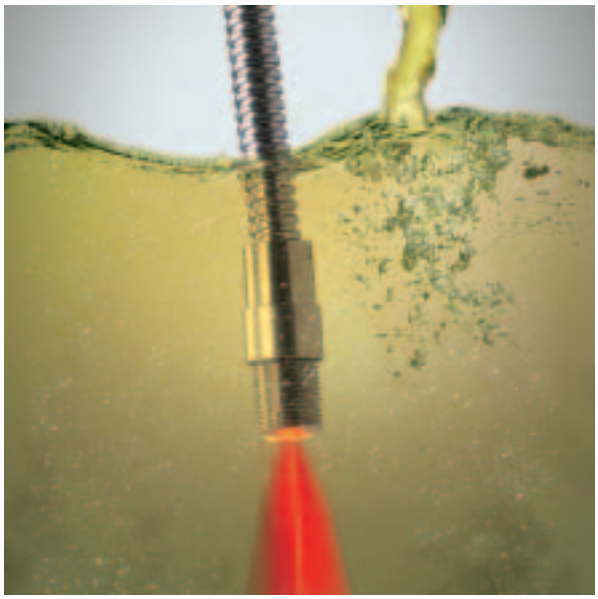
Enclosure Ratings: IP68g/69K [NEMA Type 4X/6P/13]

RUGGED PHOTOELECTRIC SENSORS

Outstanding resistance to harsh environments thanks to the new “vacuum packed” structure. The PX Series complies with IP68g[NEMA Type 4X/6P/13] which prevents penetration of oil droplets from any direction.



1 Oil Resistant



IP68g[NEMA Type 4X/6P/13] is oil resistant and waterproof

The PX Series is protected against oil and water ingress from any direction.

*Oil resistance is tested under conditions specified by KEYENCE. Contact KEYENCE for further information.

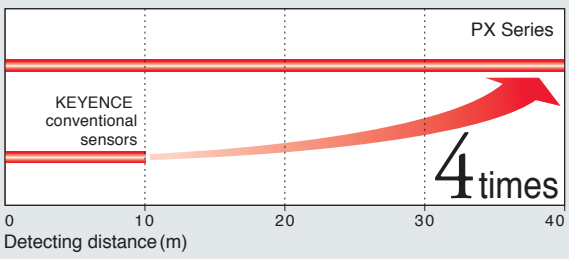
2 Rugged Stainless, Steel Housing

Stainless-steel case is approx.1.9 mm thick

The rigid structure prevents damage from collision with workpieces or overtorquing.

Standard Amplifier
PX-10

3 Blasts through dirt and dust



The infrared sensors offer 4 times the detecting distance of our conventional photosensors. The high power beam allows the PX to operate in environments with significant amounts of dirt or dust.

Detecting building materials in a harsh environment.

40m detecting distance (M12, Thrubeam type)

The powerful beam is resistant to dust and dirt allowing it for use in dusty environments.

4 Rinsable

The IP67 amplifier provides added protection [NEMAType 4x] against water

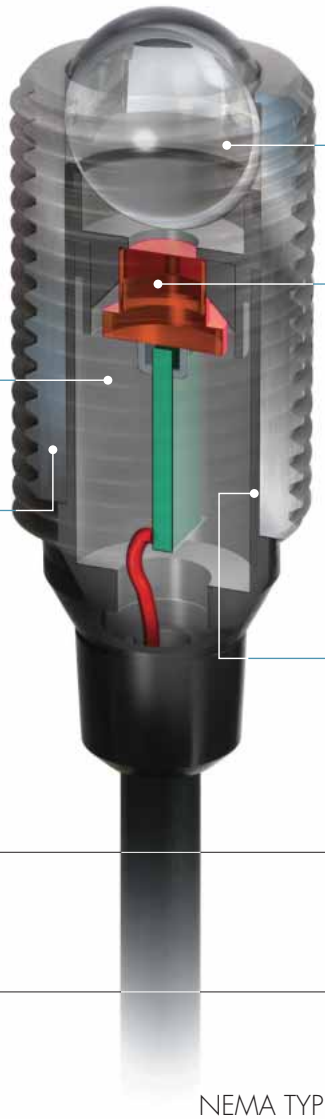
Suitable for use in rinsing processes or lines which use water.

THE FACTS BEHIND THE PX'S PERFORMANCE

SENSOR HEAD

IP68g/IP69K [NEMA Type 4x/6P/13] rated sensor head

IP68g
IP69K
[NEMA Type 4x/6P/13]



FACT. 1

Backfilled structure

The case is completely backfilled under vacuum with transparent epoxy resin. This ensures maximum adhesion with the cable and lens, and prohibits liquid entry.

FACT. 2

Stainless-steel housing is approx. 1.9 mm* thick

The thick walls of the sensor permit higher levels of installation torque, preventing release due to vibration or shock.

* PX-H72(G) only. The cases of other models are 1.5 mm in thickness.

FACT. 3

Glass lens

The tough, scratch-resistant, optical glass lens can be used in the harshest environments.

FACT. 4

Ultra high-intensity LED

Incredible power by combining infrared or 4-element red LED with an optical quality glass lens.

FACT. 5

Plastic inner sleeve

The plastic inner sleeve has low water absorbing properties and excellent oil-resistance. It prevents water or oil from penetrating the case.

IP68g / IP69K
[NEMA Type 4x/6P/13]
SENSOR HEAD

CHARACTERISTICS

ENCLOSURE RATING IP68g

IP68g

- 6: Oil droplets cannot penetrate inside from any direction.
- 8: Water cannot penetrate under a specified pressure within a specified time.
- g: Dust cannot penetrate inside.

The protective structure complies with JEM (Japan Electrical Manufacturers' Association) standards. IP68g does not ensure safe usage when a product is soaked in oil.

IP69K

- An enclosure rating that is determined by DIN40050, part9.
- A structure that is not affected when it is repeatedly sprayed by a steam jet . 8000 to 10000kPa/temperature 80˚C±5˚C , at 0˚, 30˚, 60˚ and 90˚ for 30 seconds, at the distance from 100 to 150mm.

*The IP tests are conducted under a specified conditions within a specified time and do not ensure the performance for extended periods of time.

NEMA TYPE REFERENCE

4X	Indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.
6P	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formations.
13	Indoor use primarily to provide a degree of protection aginst dust, spraying of water, oil, and noncorrosive coolant.

TORSIONAL MOMENT

Model	Screw sizes	Torque
PX-H71/H71G	M8	12 N·m (120 kgf·cm)
PX-H71TZ	M8	12 N·m (120 kgf·cm)
PX-H72/H72G	M12	35 N·m (350 kgf·cm)
PX-H61/H61G	M12	35 N·m (350 kgf·cm)

For installation, be sure not to exceed the torque in the above table.

AMPLIFIER

[NEMA Type 4x/6P/13] Amplifiers Offer Incredible Power and Versatility

IP67

Standard Amplifier
PX-10(P)

M12 connector on the
PX-10C(P)

Dual Outputs

All amplifiers feature an output for sensing (OUT 1), and an output for monitoring or alarm(OUT 2). In addition, amplifiers with pigtail terminations (PX-10, PX-10(P)) feature an external input for remote teach, zero shift, display scaling or light interrupt.

High-power MEGA mode

Using the high power MEGA mode, the PX-H72 family can operate reliably from up to 40 m. The PX-H71 family can operate from up to 20 m. In addition to long distance detection, the high power of the PX easily penetrates oil, grease, dust, dirt and other obstructions, without missing a signal.
The PX Series can pay for itself the very first time you don't have to run out to the floor to adjust it.

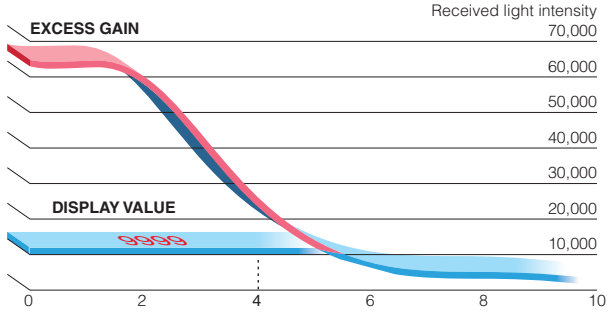
Industry's First High Resolution Display [9999]

M12 thrubeam heads display [9999] up to 4 m.
M8 thrubeam heads display [9999] from up to 1.5 m.
Thrubeam alignment has never been easier.

RECEIVED LIGHT INTENSITY VS. DISTANCE [TYPICAL]

Sensor head:PX-H72/PX-H72G

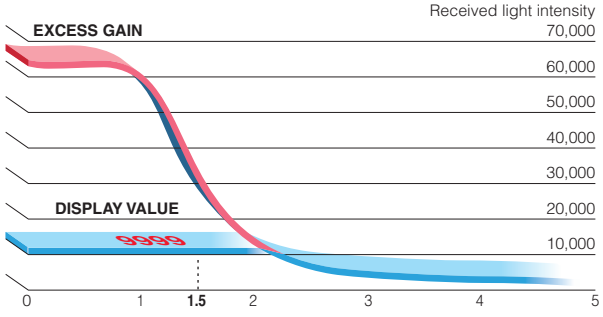
Display reads 9999 even at detection distance of 4 m



Received light intensity to distance (Typical)

Sensor head:PX-H71/PX-H71G/PX-H71TZ

Display reads 9999 even at detection distance of 1.5 m



Received light intensity to distance (Typical)

7 SENSOR HEAD VARIATIONS

VISIBLE RED M8 THRUBEAM STANDARD/GUARDED

M8 THRUBEAM STANDARD:PX-H71
M8 THRUBEAM GUARDED:PX-H71G

The M8 ensures detection distance of 20 m

Since the ultra high-intensity LED is clearly visible, alignment is easy even from a distance.

More resistant to tension and shock

A stainless steel jacket is also available.
The shock-resistant structure is not easily damaged if accidentally hooked or struck with a tool.

Model:PX-H71
Type: M8 thrubeam
Detection distance: 20 m (MEGA mode)
Light source: Red LED

Model:PX-H71G
Type: M8 thrubeam guarded
Detection distance: 20 m (MEGA mode)
Light source: Red LED

INFRARED M12 THRUBEAM STANDARD/GUARDED

M12 THRUBEAM STANDARD:PX-H72
M12 THRUBEAM GUARDED:PX-H72G

The M12 ensures detection distance of 40 m

Unaffected by oil or dirt.

More resistant to tension and shock

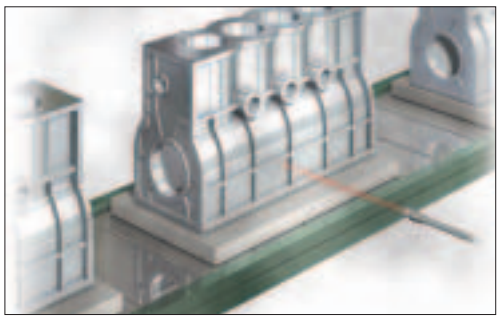
For locations where broken or cut cables are common, use the stainless-steel guarded PX-H72G

Model:PX-H72
Type: M12 thrubeam straight
Detection distance: 40 m (MEGA mode)
Light source: Infra-red

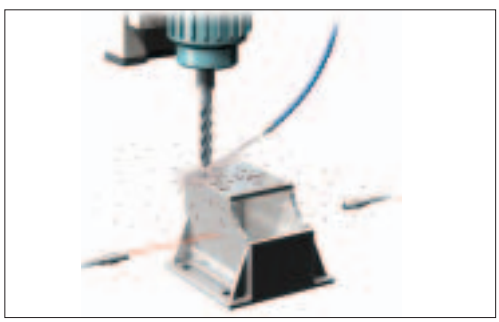
Model:PX-H72G
Type: M12 thrubeam guarded
Detection distance: 40 m (MEGA mode)
Light source: Infra-red

APPLICATIONS

Positioning of cars in final assembly line. Sensor used: PX-H72G.



Checking passage of engine block. Sensor used: PX-H61G.



Checking the seating of workpieces for an NC processor. Sensor used: PX- H71G.

Checking the passage of cars on a conveyer. Sensor used: PX-H72G.

M8 THRUBEAM HEX-SHAPED: PX-H71TZ

Space-saving trouble

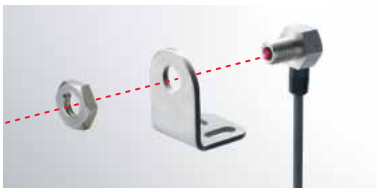
The TZ Series has a neat, space-saving design that arranges the cable at 90˚ to prevent entanglement.

Model:PX-H71TZ

Type: M8 thrubeam hex shaped
Detection distance: 20 m (MEGA mode)
Light source: Red LED

Simple single-point mounting

Use a KEYENCE mounting bracket, or existing mounting holes. In either case, simply tighten a single nut and the job is done.



M12 REFLECTIVE STANDARD: PX-H61
M12 REFLECTIVE GUARDED: PX-H61G

Visible red LED takes the hassle out of your setup

The high power LED makes detection possible from up to 2 m. The shield reduces diffraction resulting from liquid droplets to ensure stable target detection even under unstable conditions.

More resistant to tension and shock

Choose the guarded PX-H61G for areas where cuts, breaks and pulls in the cable are a common headache.

Model:PX- H61Type

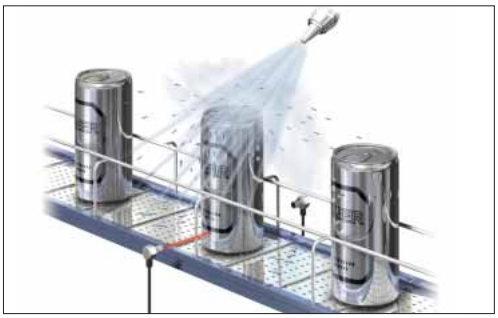
M12 reflective
Detection distance: 2 m (MEGA mode)
Light source: Red light

Shield

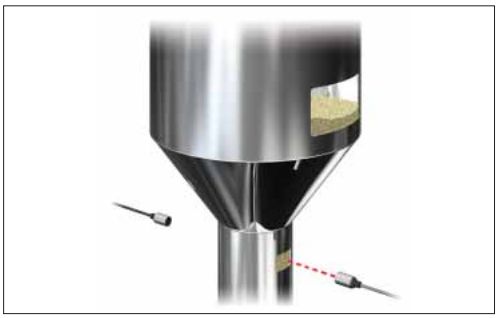
Model:PX-H61GType

M12 reflective guarded
Detection distance: 2 m (MEGA mode)
Light source: Red LED

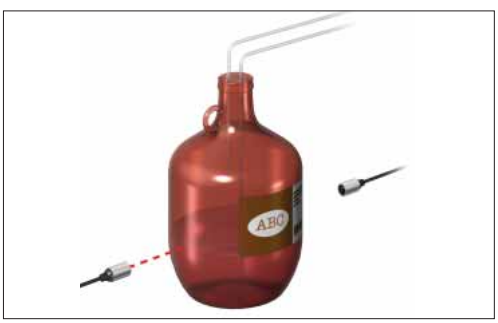
APPLICATIONS



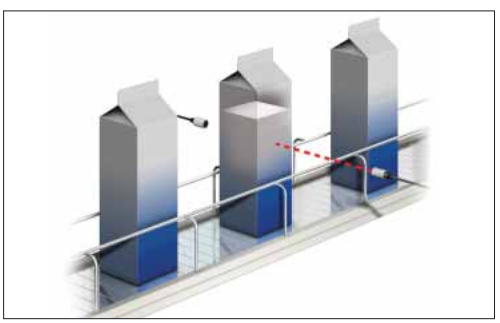
Checking products passage in a rinsing process.
Sensor used:
PX-H71TZ



Detecting the level of contents in a hopper.
Sensor used:
PX-H72



Detecting the presence/absence of contents in a bottle.
Sensor used:
PX-H72



Detecting the presence/absence of contents in a milk carton. Sensor used:
PX-H72

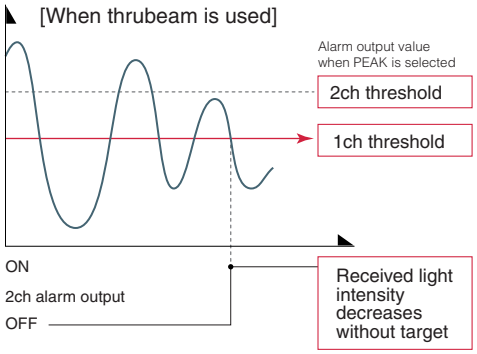
ARE SENSOR PROBLEMS KEEPING YOU UP AT NIGHT?

Although your PX sensor can operate at the touch of a button, right out of the box, additional features can be activated to increase uptime, and reduce the interval between maintenance.

Alarm for low light level, or output failure

Low light alarm

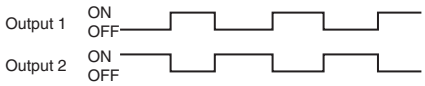
The high power of the PX allows it to operate reliably for extended periods with significant buildup on its lens. At some point, however, the head may need to be cleaned. The low light alarm lets you decide when the light level becomes dangerously low, so you can schedule cleaning at an appropriate time.



Alarm in real time for disconnection or output breakage

Output monitoring mode

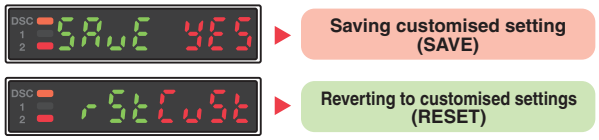
Output 2 always performs the opposite action of output 1. It can detect disconnection or output breakage with logic.



Saving customised settings

Minimize downtime due to unauthorised changes

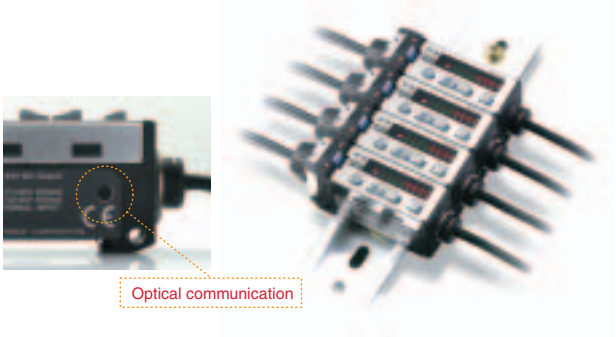
Often when attempting, to troubleshoot a sensor, users may change settings that shouldn't be changed. Simplify the troubleshooting process by reverting back to your SAVED settings.



Interference prevention up to 4 units

Several sensors can be closely positioned without interference.

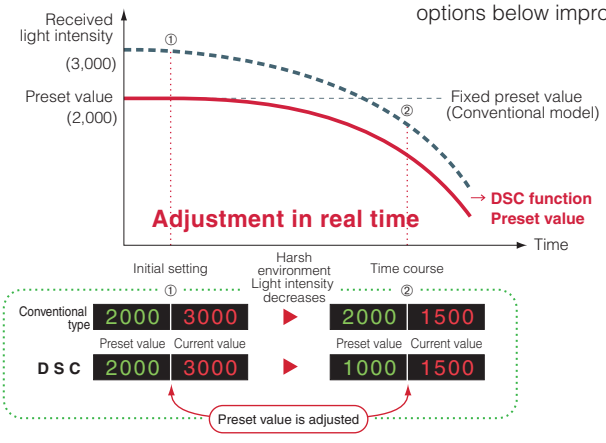
The PX Series communicates through an optical link on the side of the amplifier, ensuring that only one sensor emits light at a given time.



Eliminate the effects of dirt and other deposits for more stable

Automatic Sensitivity Tracking

With conventional sensors, once the set point is adjusted, it's just a matter of time before debris leads to false outputs, and it has to be "tweaked" or reset. With the DSC function (Dynamic Stability Control), the PX continuously and automatically adjusts the set point according to the environmental conditions. Allowing your line to run longer between cleanings. Combine the powerful beam with DSC and the Low Light Alarm, and you may never have to take a sensor troubleshooting call in the middle of the night ever again.



Edge Triggering

Without DSC, debris will eventually cause the light throughput to fall below your set point. Edge triggering can be used to ignore slow, gradual decreases in intensity due to buildup, and only focus on a quick change in conditions as would happen when a target is present. Using the Edge Triggering mode with one of the 5 timer options below improves flexibility in your application.

5 Timer functions

Equipped with 5 timer functions.

- ON-Delay
- OFF-Delay
- One-shot
- ON-Delay with OFF-Delay
- ON-Delay with One-shot

Timer duration selectable (1 ms to 9999 ms)

LET THE FUNCTIONALITY OF THE PX PUT YOUR MIND AT REST

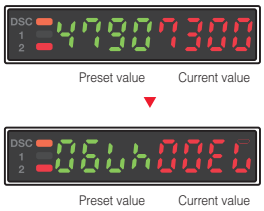
Customise the PX display

The PX display can be set for:

- Standard Display
- Peak / Bottom display
- Bar Graph / Excess Gain
- Hi-resolution, extended display (up to 65504)
- Current modes (Light-on/Dark-on, Power Mode)

Invert the PX display

The digital display can be inverted if needed to align it with other devices on a DIN rail



Attenuate the signal

For applications where the transmit/receive distance is short, the amplifier may saturate at [9999]. This may make it difficult to detect smaller or translucent targets. The attenuation feature can drop the light intensity below the saturation point, and allow stable detection.

Power saving function cuts approx. 30% of current consumption

Power saving function

This mode automatically turns off the digital display. It can also reduce current consumption during operation.

In ECO mode: 820 mW

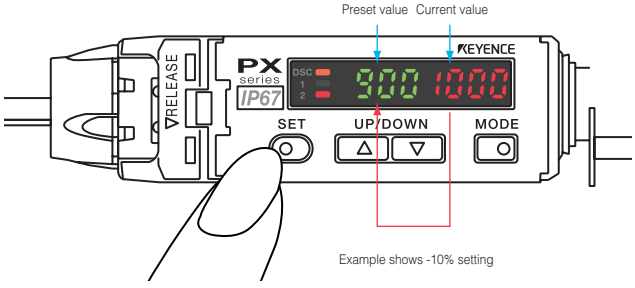
Simple setting by external input or button operation

Simple TEACH, SHIFT or SCALE via front panel, or remote input*

*(available on PX-10/PX-10P only)

% Tuning

If light intensity fluctuates due to dust or misalignment, you can periodically adjust the setpoint with the touch of a button, or pulse from an external input.* The PX set value is adjusted to a fixed percentage of the current value. You can adjust the percentage between 0 to 99% (typical for diffuse heads), or 0 to -99% (typical for thrubeam heads).

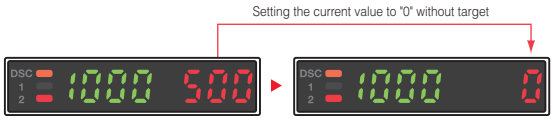


Display scaling function

You can freely set the displayed light intensity with this function. When using several units, you can standardise the received light intensity.

Zero shift function

This function adjusts the current received light intensity. When using a reflective type, you can forcibly set the received light intensity of the background to 0. This is effective when there is little difference in light intensity between the background and a target.



Emission stop input

LED transmission can be individually stopped by external input

[Application]

- Checking failures when starting operation
- Preventing interference with other photoelectric sensors

Remote teach

You can set the sensitivity to the same settings as the set button with this function.

SPECIFICATIONS

Sensor head

Type		M8 Thrubeam			M12 Thrubeam		M12 Reflective	
		Straight	Spiral	Screw nut	Straight	Spiral	Straight	Spiral
Model *1		PX-H71	PX-H71G	PX-H71TZ	PX-H72	PX-H72G	PX-H61	PX-H61G
Light source		Red 4-element LED (Wavelength: 635 nm)			Infrared LED (Wavelength: 870 nm)		Red 4-element LED (Wavelength: 635 nm)	
Detecting distance	TURBO	4 m			10 m		400 mm	
	SUPER	6 m			15 m		600 mm	
	ULTRA	12 m			30 m		1200 mm	
	MEGA	20 m			40 m		2000 mm	
Detectable object		ø4 mm Opaque materials			ø7.5 mm Opaque materials		—	
Spot diameter		—			—		Approx. 15 x 15 mm at 100 mm	
Environmental resistance	Enclosure rating	IEC: IP68/JEM: IP68g/NEMA: 4X, 6P, 13/DIN: IP69K						
	Ambient light	Incandescent lamp: 20,000lx max., Sunlight: 30,000lx max.						
	Ambient temperature	-10°C to +55°C (No freezing)						
	Relative humidity	35 to 85% (No condensation)						
	Vibration	10 to 55 Hz amplitude 1.5 mm 2 hours each in X, Y and Z axis						
Materials		Housing : SUS303 (Plastic parts: PMP, POM) Lens : BK7						
Accessories		Screw nut (SUS303) x 4, toothed washer (SUS304) x 2 [PX-H71TZ has 2 screw nuts]					Screw nut x 2, toothed washer x 1	
Weight (Including cable) *2		Approx. 80 g	Approx. 250 g	Approx. 88 g	Approx. 90 g	Approx. 260 g	Approx. 80 g	Approx. 220 g

*1: Standard cable length is 2 m for all models. The PX-H71 and the H71TZ are available with a 10 m cable for both transmitter and receiver. The PX-H72 is available with a 30 m cable for the transmitter and 10 m cable for the receiver. Contact KEYENCE for cable length variations of spiral types.
*2: The PX-H71G, H72G and H61G have SUS304 spiral protective tube on the cables.

Amplifier

Type		Cable type	Connector type
Model	NPN output	PX-10	PX-10C
	PNP output	PX-10P	PX-10CP
Response time		500 μs (TURBO)/ 1 ms (SUPER)/ 4 ms (ULTRA)/ 16 ms (MEGA)	
Output selection		LIGHT-ON/DARK-ON	
Indicator		- Operation indicator: Red LED x 2, DSC orange LED x 1 - Dual digital monitor: Dual 7-segment display [Preset value (4-digit green LED) and current value (4-digit red LED) illuminated together, current value range: 0 to 65504, excess gain: 0P to 999P] - Hold function: Possible to display both peak and bottom hold values. Selectable from 5 variations. - Bar LED monitor [Excess gain displayed (85% to 115% in 7 steps)] - Scaling display	
Detection mode		Light intensity (automatic sensitivity-tracking function provided)/[Limit light intensity/output monitor]	
Shift function		1999 to 9999 selectable	
Timer function		Timer OFF/ OFF-delay/ ON-delay/ One-shot/ ON-delay, OFF-delay/ ON-delay One-shot Timer duration selectable: 1 ms to 9999 ms Maximum error against the setting value: ±10% max.	
Control output	NPN output	NPN open-collector 40 V, 100 mA max. for an output/100 mA max. for two outputs, residual voltage 1 V max.	
	PNP output	PNP open-collector 30 V, 100 mA max. for an output /100 mA max. for two outputs, residual voltage 1 V max.	
External input*1		Input time 2 ms (ON)/ 20 ms (OFF) min.	
Interference prevention*2		Up to 4 units (in all power modes)	
Ratings	Supply voltage*3	12 to 24 VDC ripple (P-P) 10% max. Class2	
	Current consumption	Standard mode: 50 mA max. at 24 V/ 55 mA max. at 12 V Power saving mode: 40 mA max. at 24 V/45 mA max. at 12 V	
Environmental resistance	Enclosure rating	IEC: IP67/JEM: IP67/NEMA: 4X	
	Ambient temperature*4	-10°C to +55°C (No freezing)	
	Relative humidity	35 to 85% (No condensation)	
	Vibration	10 to 55 Hz amplitude 1.5 mm 2 hours each in X, Y and Z axis	
Materials		Housing: PBT, display: PSU, display cover/connector cover: SUS304, radiator plate: SUS304, gasket: NBR	
Weight		100 g (Including cable)	50 g

*1. PX-10(P) only. Not available for PX-10C(P).
*2. The received light intensity may vary somewhat when the sensor head's cable layout is changed, so redo the sensitivity setting when changing the layout. The interference prevention function is affected somewhat when using multiple units installed adjacent to each other. Fine-tune the sensitivity (increase the setting) for adjacent layouts.
*3. Use a 24 VDC power voltage when using a head light transmitting cable of 3 m or more (PX-H71/H71TZ) or 10 m or more (PX-H72).
*4. When using multiple units connected adjacently, the ambient temperature varies with the conditions below.
2 to 4 Units: -10 to +50°C, 5 to 17 Units: -10 to +45°C.

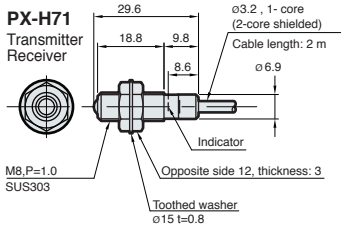
OPTIONS *1

Type	M12 socket cable*2 straight (2 m)	L-shaped M12*2 socket cable (2 m)	End unit	Mounting bracket A for M8	Mounting bracket A for M12	Mounting bracket B for M8	Mounting bracket B for M12
Model	OP-75721	OP-75722	OP-26751	PX-B71	PX-B72	PX-B71L	PX-B72L
Shape			(2 pieces per package) 	(1 bracket per package) 	(1 bracket per package) 	(1 bracket per package) 	(1 bracket per package)

*1: Amplifier has no accessories. Apply a DIN rail or M3 screws (x 2) using mounting holes on the side to firmly fix it. The use of multiple amplifiers requires a DIN rail, and end units for both ends. (OP-26751)
*2: When using the PX-10C(P), the OP-75721 or the OP-75722 is required.

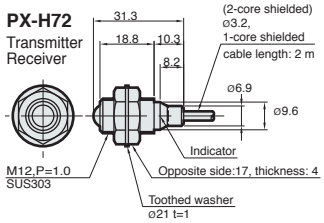
Unit : mm

PX-H71
Transmitter
Receiver



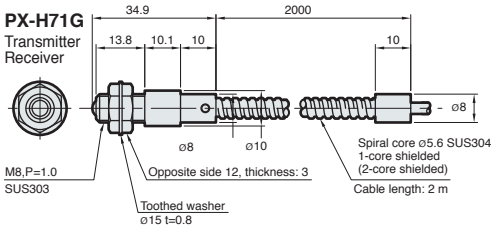
*Descriptions in parentheses are for cables of receiver.

PX-H72
Transmitter
Receiver



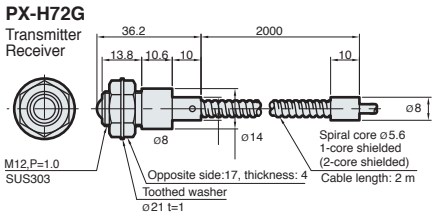
*Descriptions in parentheses are for cables of receiver.

PX-H71G
Transmitter
Receiver



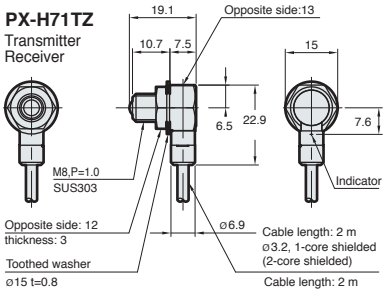
*Descriptions in parentheses are for cables of receiver.

PX-H72G
Transmitter
Receiver



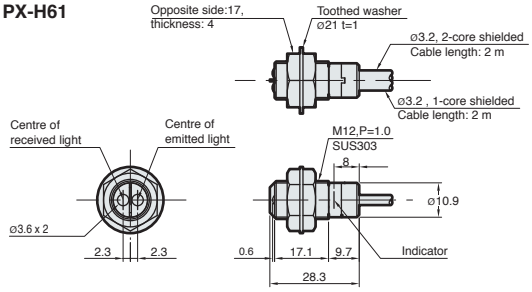
*Descriptions in parentheses are for cables of receiver.

PX-H71TZ
Transmitter
Receiver

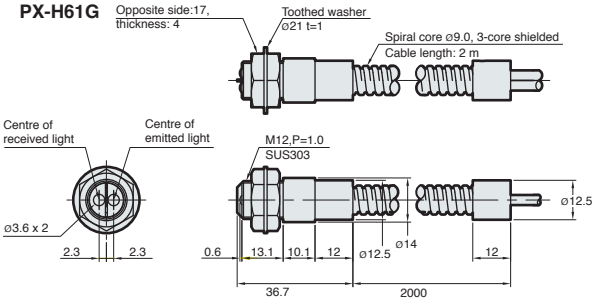


*Descriptions in parentheses are for cables of receiver.

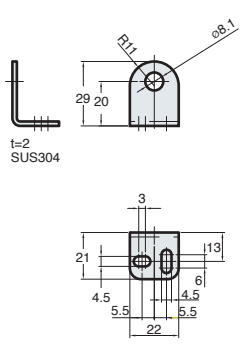
PX-H61



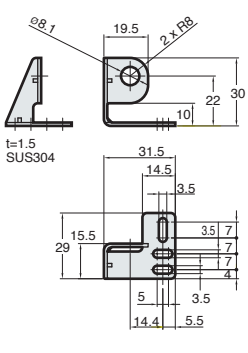
PX-H61G



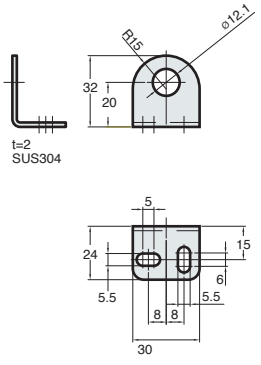
PX-B71



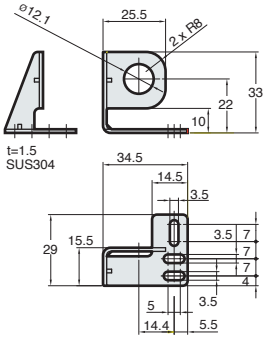
PX-B71L



PX-B72

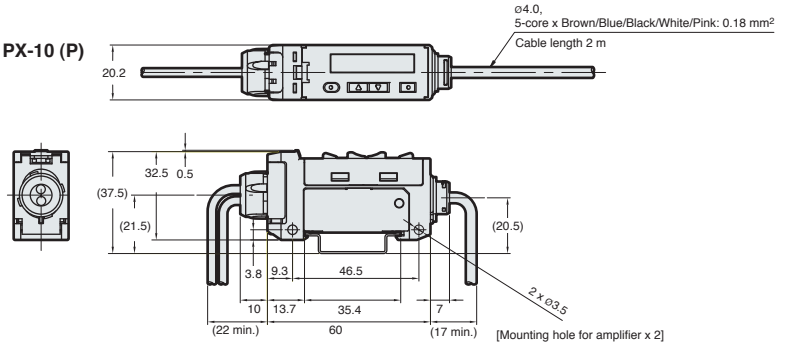


PX-B72L

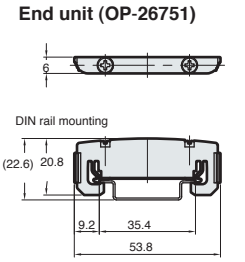


Unit : mm

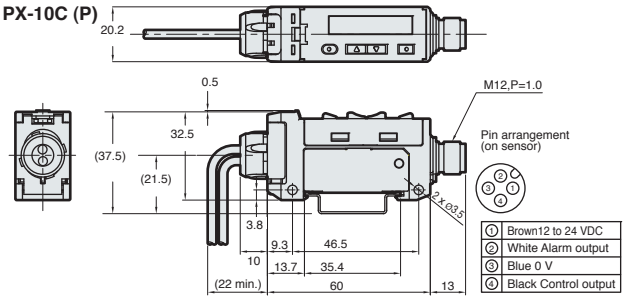
PX-10 (P)



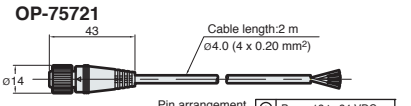
End unit (OP-26751)



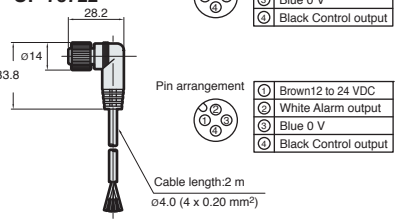
PX-10C (P)



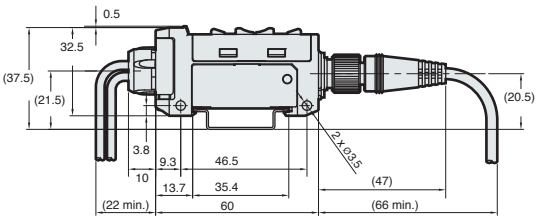
OP-75721



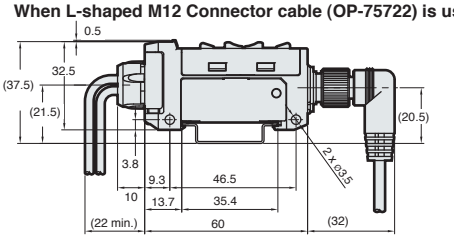
OP-75722



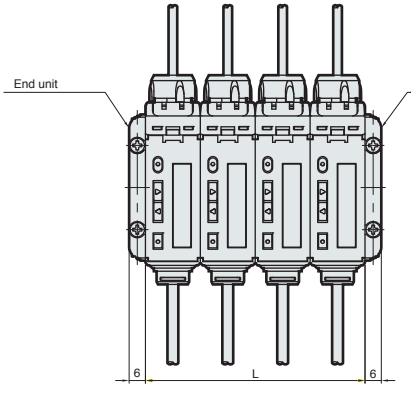
When M12 Connector cable (OP-75721) is used.



When L-shaped M12 Connector cable (OP-75722) is used.

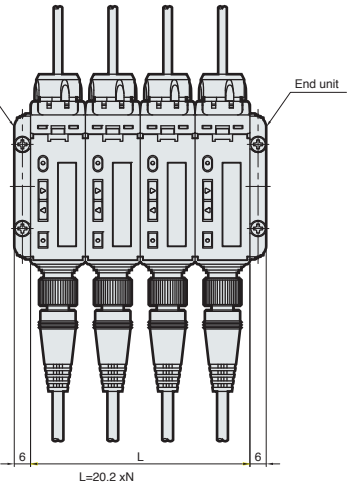


When several units are connected [PX-10(P)]



L=20.2 xN
N:Number of connected unit

When several units are connected [PX-10C(P)]



L=20.2 xN
N:Number of connected unit

PROTECTIVE TUBE/EXTENSION PROTECTIVE TUBE

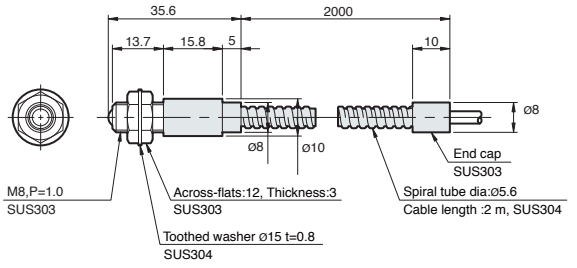
A protective tube option is available. By adding extention protective tubes, a sensor head having long cable can be protected for whole length.

Type	Applicable to	Protective tube (2 m)	Extension protective tube (2 m)
M8	PX-H71	OP-77673	OP-77675
M12	PX-H72	OP-77674	

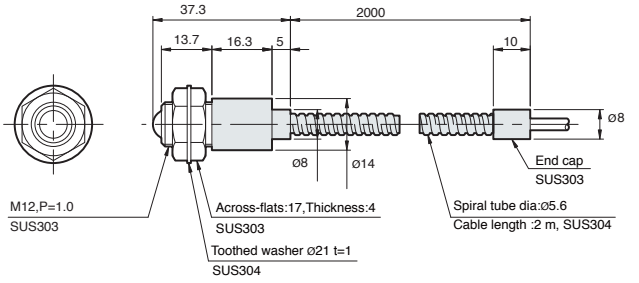
Note: This option is a protective tube only and cable is not included. Extention protective tube OP-77675 cannot be mounted to the PX sensor head directly.

Unit : mm

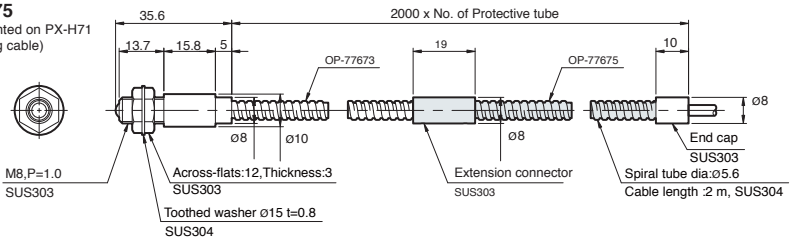
OP-77673
(When mounted on PX-H71)



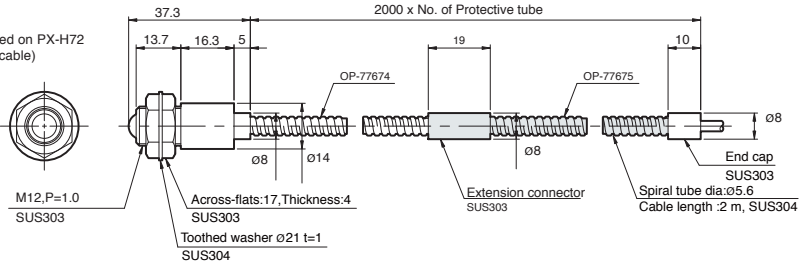
OP-77674
(When mounted on PX-H72)



OP-77675
(When mounted on PX-H71 having long cable)



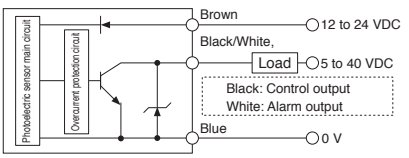
(When mounted on PX-H72 having long cable)



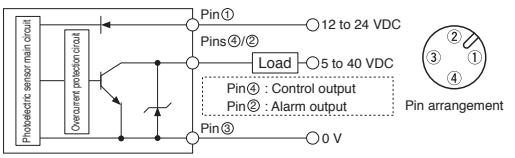
INPUT/OUTPUT CIRCUITS

Output circuit

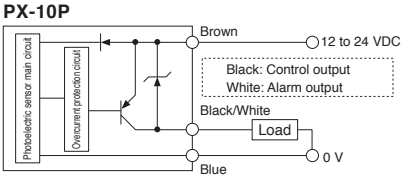
NPN
PX-10



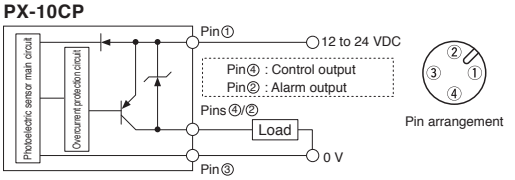
NPN Connector type
PX-10C



PNP
PX-10P

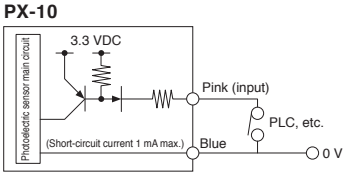


PNP Connector type
PX-10CP

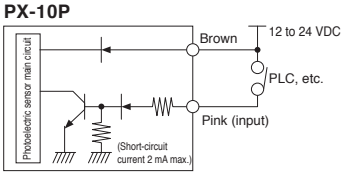


Input circuit

NPN
PX-10



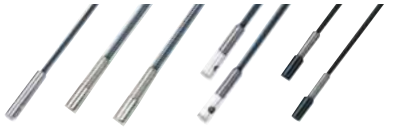
PNP
PX-10P



Detecting drill□bit breakage

ENVIRONMENT PROOF — FU-91/92/96

Long detecting distance, entirely FEP-sheathed type



FU-91 FEP-sheathed, reflective

FU-92 FU-96 FEP-sheathed, thrubeam

FU-77V+F-4 Ultra-high power lens

FEP chemical resistance data

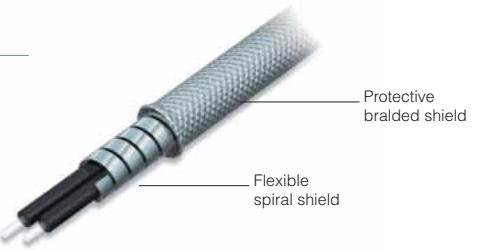
Material / Chemical	FEP	ABS	Polycarbonate
Acetone	●	X	X
Methyl ethyl ketone	●	X	X
Benzene	●	▲	X
Methyl alcohol	●	▲	X
Toluene	●	X	X
Hydrochloric acid	●	▲	▲
Sulfuric acid (98%)	●	X	X

● : Completely resistant
X : Not resistant
▲ : Resistant depending on the conditions
■ : Fairly resistant

TOUGH & DURABLE — FU-TG

Stainless steel armour

The outer braided shield adds strength against pulling, and the inner flexible spiral shield increases the strength against side impact.



METAL PROTECTOR — PZ-B11/B61

Protective Bracket (for PZ-M/V Series)

This rugged bracket surrounds our PZ-M/V Series photoelectric sensors in a protective cage.

Specifications are subject to change without notice.

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