

Set to 100 or 0 with just one button!  
**neo PRESET**



Accurate, Stable Operation  
with Simple Setup!



Laser sensor **NEW**  
**LV-neo**



Fibreoptic sensor **NEW Version**  
**FS-neo**



Photoelectric sensor **NEW**  
**PS-neo**

The technology first introduced by the FS NEO to make easy setup and simple display a reality is now available in the LV and PS Series!



---

## Simple Setup

1 push setting with the PRESET Button

---

## Simple Display

All sensors display "0" or "100"

---

## Simple Operation

Laser, fibreoptic, and photoelectric models all share the same simple functionality

---



## Simple and Precise detection with the “NEO Preset”

**NEW  
CONCEPT**

### Complete setting with just one click

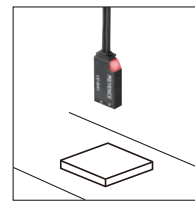
When using a thru-beam model, sensitivity adjustments are completed with a single push of the PRESET button. Using a reflective model? Press once with a target present, and once without to calibrate according to the different conditions.



**NEW  
CONCEPT**

### Simple one click setup for reflective applications

When using diffuse reflective type sensors, variations in the received light intensity can occur due to changing conditions such as mounting position and target configuration, thus resulting in unstable operation when attempting to detect small objects. The NEO Preset function erases these concerns and enables detection to be as simple as a thru-beam.



No target present...

100



Target detected!

0



With the "NEO Series", sensor changes never go unnoticed!

Conventional

If a sensor error occurs...

**It is difficult to know which sensor has the error.**



NEO Preset

If a sensor error occurs...

**The error is quickly noticed!**



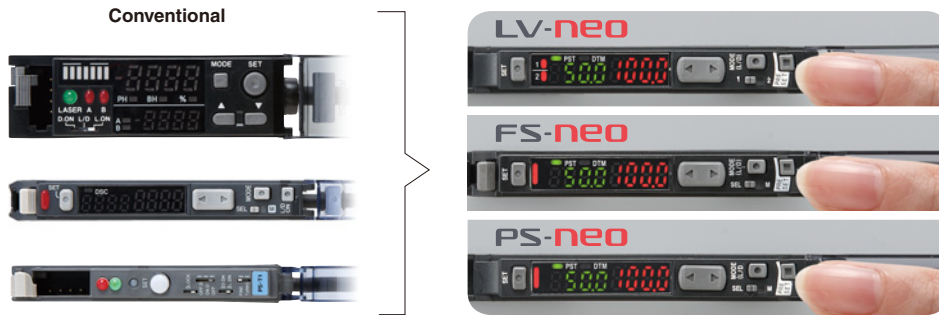
By standardising the received light intensity display of multiple sensors to "100" and "0", it is easy to tell where an error has occurred because the sensor will not return to the original display value of "100" or "0".



**NEW  
CONCEPT**

## Laser, fibreoptic, and photoelectric models all share the same simple operation

Until now, the method of operation to activate new features differed from sensor to sensor. The NEO Series eliminates this problem by integrating the same features, functions, and key layout in all series. This allows you to select the best model for your application without having to learn the operation of a new sensor each time.

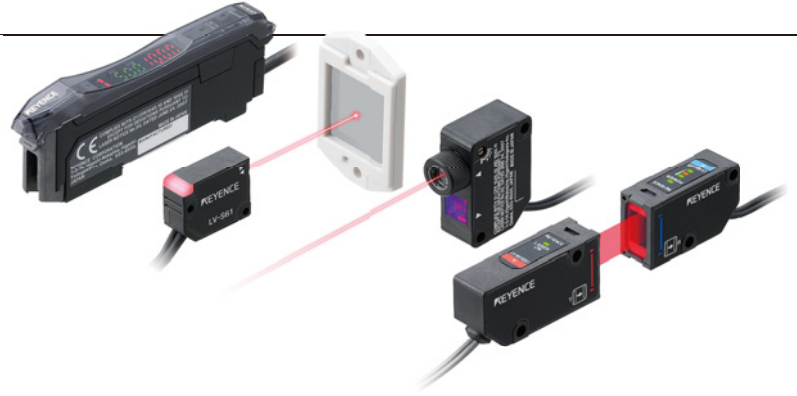


# neo series

Digital Laser Sensor

## LV-**neo**

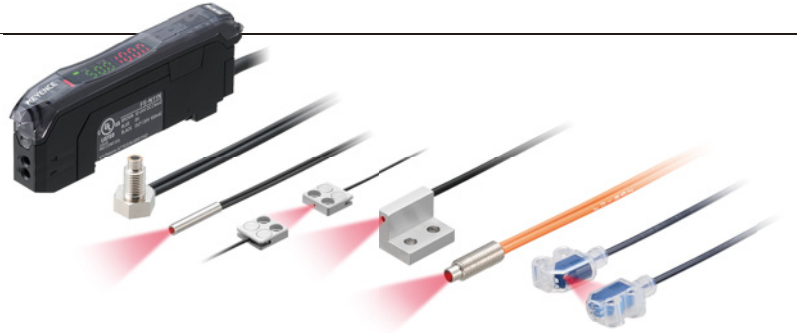
Long distance with a visible beam for the next level of laser detection



Digital Fibreoptic Sensor

## FS-**neo**&FU

More than 100 fibre unit variations to support a wide range of applications



Digital Photoelectric Sensor

## PS-**neo**

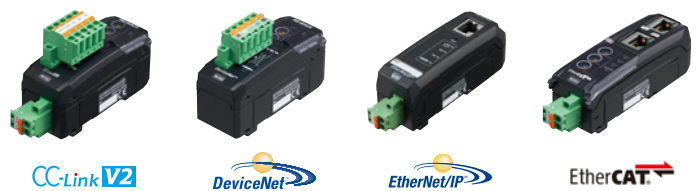
High environmental resistance and cable extension capabilities provide increased installation versatility



Network Communication Unit

## NU series

Incorporate the NEO Series with an open field network for complete interfacing versatility





Long distance with a visible beam  
 for the next level of laser detection



\* The UL certificate is for LV-NHxx sensor head and LV-Nxx amplifier used in combination.

Using a laser enables long distance detection for difficult applications while maintaining a focused, visible beam spot.

**1 Visible red laser beam spot**

Precise detection positioning is possible without troublesome installation alignment caused by a weak or invisible beam.

**2 Long distance detection with a focused beam**

By using a laser light source, the beam spot remains unchanged over long distances, eliminating any concern about the mounting location.

**3 Full lineup conforming to Class 1 laser requirements**

Class 1 lasers provide completely safe operation and can be used in the same manner as other photoelectric sensors.

**LV-NEO FUNCTION**

**NEO Preset**

Simply press the PRESET button to change the light intensity display to "100" or "0" to complete the sensitivity settings.

**Open field network compatibility**

Connect an NU Series model for open field network compatibility.

**NEO MEGA**

MEGA Mode provides Class 2 equivalent light intensity while maintaining Class 1 laser safety.

**Reduced wiring**

No need to wire to a terminal block when using the NU Series.

**Application function**

**Interference prevention function**

**DATUM function**

Even if dirt or debris causes the displayed light intensity to decrease, the DATUM function automatically detects the change and restores the display to its original state, thus maintaining stable operation.

**Pause function**

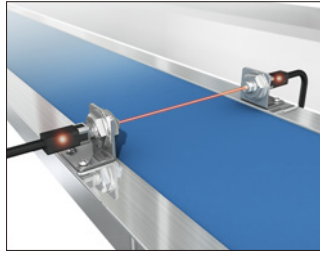
**Sleep function**

**Monitor Output Type (LV-N11MN)**

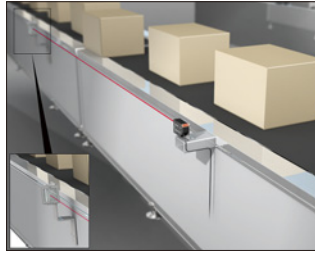


## Lasers are Visible, Long Range, and Adjustable

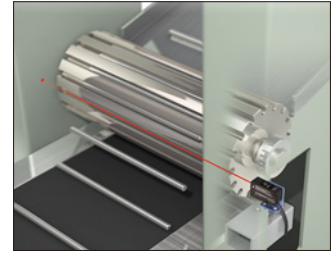
Visible beam ensures simple alignment and installation



Long range detection is possible, eliminating installation restrictions



Because the beam remains unchanged, lasers can easily detect through small gaps

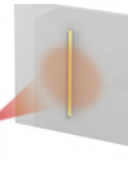


### Stable detection of small targets

Because the beam remains focused, small targets can be pinpointed for detection. Furthermore, because the LV-NEO resists up to 20,000 lux, stable operation is maintained even when exposed to sun and fluorescent lighting.

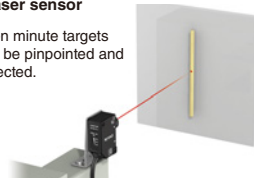
#### Conventional photoelectric sensor

Because the light diffuses, the sensor is affected by background objects.



#### Laser sensor

Even minute targets can be pinpointed and detected.



## Application function modes enable easy selection of desired functions

Laser sensors are designed for general use, but requirements for target detection often demand more. Therefore, customers often seek additional setting options.

The following modes are built into the NEO Series. Simply select the intended use. There is no need for complicated setting operations.



#### Drop detection mode

Targets dropped through the beam are detected by the falling intensity level.



#### Percentage tuning mode

The set value is tuned and maintained to -5% of the current value.



#### Reflective model background cancellation mode

Sets the background as 0 with no target present when using a reflective model.



#### Maximum intensity mode

Sets the sensor to MEGA mode with the extended 5-digit display activated.



#### Area detection mode

Set a high and low value for zone detection.

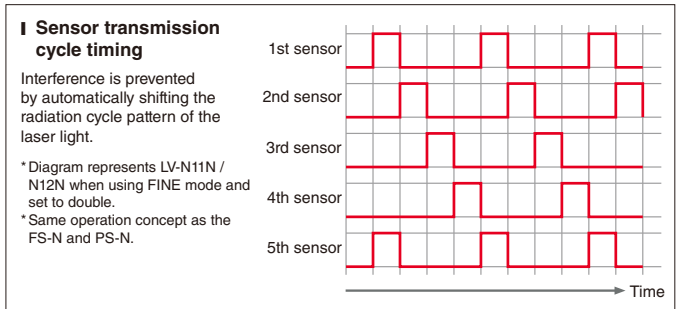


#### Zero datum mode

Sets the condition of no target present as 0 to allow simple detection of transparent objects or height changes.

# Interference Prevention function supports up to 8 sensors\*

Factory automation equipment is continuously decreasing in size, yet the number of applications that require sensors is steadily rising. When installing multiple sensors in a small area, the problem of interference between nearby sensors can arise. The NEO Series is equipped with a function that prevents interference from up to 4 (or 8\*) other sensors.  
 \* When in ULTRA or MEGA mode and set to "double".



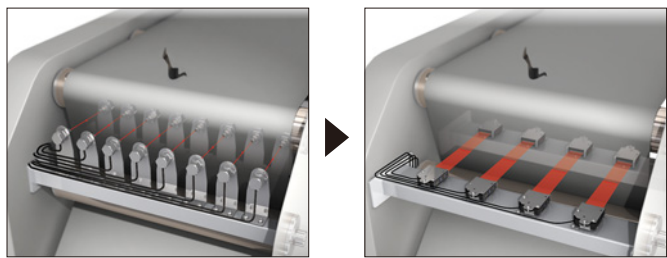
## Pause function controls the sensor output

The desired sensor output status can be controlled through an external signal input, regardless of the received light intensity. This will prove useful during a test run because the ON/OFF signal from the sensor can be confirmed on the PLC without requiring the sensor to have a target present/absent.

### <Application improvement example using the area laser>

**LV-NH300 30 mm-wide area type** (Thrubeam model)

### Less sensors are required to provide the same area detection



8 fiberoptic sensors used

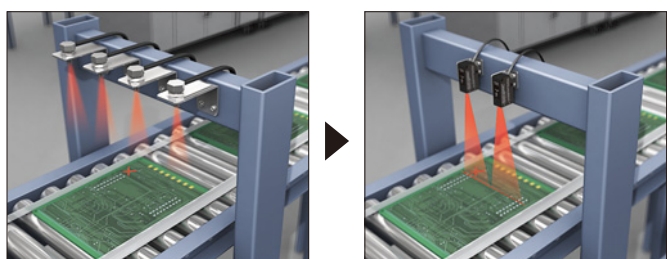
4 LV-NH300 sensors used

**I Detection of a hole in the target (hole position unspecified)**  
 <Film tear detection>

The LV-NH300 is a 30 mm wide directional laser sensor. Holes within the 30 mm width are reliably detected. Because the detection area is small when using other photoelectric sensors, they may be unable to reliably detect the holes if the position varies. As a result, multiple sensors are required with the conventional method.

**LV-NH42 Long distance area type** (Reflective model)

### Variation in target position is possible



4 fiberoptic sensors used

2 LV-NH42 sensors used

**I Mark detection with variable target position**  
 <Board BAT mark detection>

With the LV-NH42 area reflective laser sensor, the detection area increases as the detection distance increases. If the target is within the area range, the sensor will detect even if there is position variation. As a result, the number of required sensors can be reduced. In addition, the detection area is easily confirmed due to the visible laser beam.

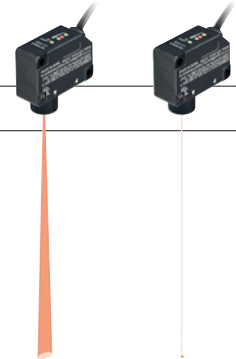
<Sensor head variations>

**LV-NH32 Adjustable Beam Spot**

Spot size can be adjusted as needed



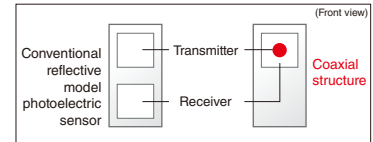
When using the LV-NH32, simply rotate the focus ring to change the spot diameter/width as desired, according to the size of the target. Additionally, the use of a very high-powered sensor head enables detection over long distances of up to 1.2 m.



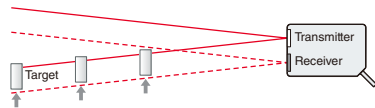
**LV-NH35 / NH62 / S61 Coaxial Structure**

Coaxial light ensures detection through small spaces

When using conventional reflective type photoelectric sensors, the position at which the sensor switches ON when the target passes through may vary. Additionally, conventional sensors cannot always be installed if the installation area is too small. This problem can be solved by using a coaxial structure in which the receiver is positioned in the same axis as the transmitter.



**I Conventional reflective photoelectric sensor**



**I Coaxial structure**



Even in small locations, the target can be detected as long as the beam spot is able to reach the target. The sensor switches ON at the same position, regardless of the distance to the target.

**LV-S71 / S72 Compact, M6 Thrubeam**

Compact thrubeam installation is now possible

Featuring an ultra-small M6 size sensor head, installation area is no longer a concern. A variety of installation brackets are also available.

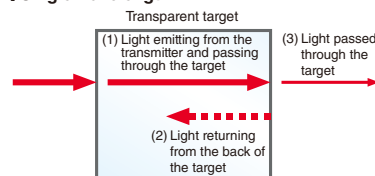


**LV-S62 / S63 Multi-Wavelength Laser**

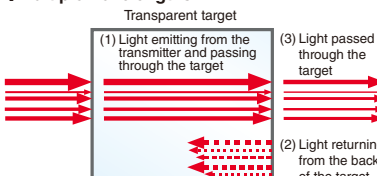
Stable transparent target detection using a multi-wavelength laser

A multi-wavelength laser has been adopted to ensure stable, accurate detection of transparent targets.

**I Single wavelength**



**I Multiple wavelengths**



At a single wavelength, the light is reduced by surfaces (1) and (2), causing the light at (3) to be unstable. By emitting light at different wavelengths, the effects of surface (2) on the light are kept to a minimum, enabling the light intensity at (3) to remain stable.

<b>Reflective</b> ▲ P.13	<b>Spot type</b>	 <p><b>LV-S41</b></p> <p><b>Small size</b> Enables long distance, small spot detection with an ultra-small footprint.</p>	 <p><b>LV-S41L</b></p> <p><b>Small size, Side view</b> Space-saving, side view sensor head provides a long distance small spot.</p>	 <p><b>LV-NH32</b> <b>NEW</b></p> <p><b>Adjustable beam spot</b> Up to 1.2 m detecting distance. Freely adjust the size and shape of the beam spot for precision and versatility.</p>				
	<b>Area type</b>	 <p><b>LV-NH35</b> <b>NEW</b></p> <p><b>Coaxial structure</b> Provides effective detection through a small hole or narrow gap.</p>	 <p><b>LV-NH37</b> <b>NEW</b></p> <p><b>Ultra-small beam spot <math>\phi 50\mu\text{m}</math></b> Enables extremely minute target detection with background cancellation.</p>	 <p><b>LV-S31</b></p> <p><b>Small size, Adjustable range</b> Dual photodiode allows adjustable distance-based detection while reducing background influence.</p>				
		 <p><b>LV-NH42</b> <b>NEW</b></p> <p><b>Long distance</b> Reliably detects targets with holes or position variation.</p>						
	<b>Retro-reflective</b> ▲ P.14	<b>Spot type</b>	 <p><b>LV-S61</b></p> <p><b>Small beam spot</b> Provides compact size while achieving a small beam spot of <math>\phi 2.5\text{ mm}</math> for up to 500 mm distance.</p>	 <p><b>LV-NH62</b> <b>NEW</b></p> <p><b>Standard</b> Achieves a small beam spot of <math>\phi 1.5\text{ mm}</math> over a 1 m range with the capability to detect up to 8 m.</p>				
		<b>Area type</b>	 <p><b>LV-S62</b></p> <p><b>Area beam</b> Excellent transparent target detection with the ability to switch between a small spot or area beam.</p>	 <p><b>LV-S63</b></p> <p><b>Long-distance transparent object detection</b> 35 m detection with a square beam spot to provide stable detection of transparent objects.</p>				
<b>Thru-beam</b> ▲ P.15	<b>Spot type</b>	 <p><b>LV-S71</b></p> <p><b>Small: M6</b> Provides the compact size of a fibre sensor while achieving a small beam spot of <math>\phi 1.2\text{ mm}</math> at a distance of 500 mm.</p>	 <p><b>LV-S72</b></p> <p><b>Small: M6 (with slit)</b> Built-in <math>\phi 6\text{ mm}</math> slit filter allows for high accuracy detection.</p>					
	<b>Area type</b>	 <p><b>LV-NH100</b> <b>NEW</b></p> <p><b>10 mm beam width</b> Effective for height differentiation and applications with position variation.</p>	 <p><b>LV-NH300</b> <b>NEW</b></p> <p><b>30 mm beam width</b> Effective for height differentiation and applications with position variation.</p>	 <p><b>LV-NH110</b> <b>NEW</b></p> <p><b>High power 10 mm beam width</b> High power enables accurate detection of low light transmission targets.</p>				
<b>Amplifier part</b> ▲ P.17	<table border="0"> <tr> <td> <b>Cable Type</b> <b>NEW</b> </td> <td> <b>M8 connector Type</b> <b>NEW</b> </td> <td> <b>Zero line Type</b> <b>NEW</b> </td> <td> <b>Monitor output Type</b> <b>NEW</b> </td> </tr> </table>				<b>Cable Type</b> <b>NEW</b> 	<b>M8 connector Type</b> <b>NEW</b> 	<b>Zero line Type</b> <b>NEW</b> 	<b>Monitor output Type</b> <b>NEW</b> 
<b>Cable Type</b> <b>NEW</b> 	<b>M8 connector Type</b> <b>NEW</b> 	<b>Zero line Type</b> <b>NEW</b> 	<b>Monitor output Type</b> <b>NEW</b> 					



**Reflective model** Spot type

Type	Appearance (mm)	Detecting distance (mm)	Spot diameter (mm)	Model	Dimensions
Small size		MEGA : 600 ULTRA : 500 SUPER : 400 TURBO : 300 FINE : 200 HSP : 150	Approx. $\phi 1.2$ (Up to 500 mm distance)	LV-S41	[P.18]
Small size, Side view		MEGA : 480 ULTRA : 400 SUPER : 320 TURBO : 240 FINE : 160 HSP : 120	Approx. $\phi 1.2$ (Up to 400 mm distance)	LV-S41L	[P.18]
Adjustable beam spot		MEGA : 1200 ULTRA : 1000 SUPER : 750 TURBO : 500 FINE : 250 HSP : 200	Approx. $\phi 0.8$ max. (Up to 300 mm distance)	LV-NH32 <span style="border: 1px solid red; padding: 2px;">NEW</span>	[P.20]
Coaxial structure		MEGA : 750 ULTRA : 600 SUPER : 450 TURBO : 300 FINE : 150 HSP : 100	Approx. $\phi 2$ (Up to 600 mm distance)	LV-NH35 <span style="border: 1px solid red; padding: 2px;">NEW</span>	[P.21]
Ultra-small beam spot		70 $\pm$ 15 (Common for all power modes)	Approx. $\phi 50 \mu\text{m}$ (At 70 mm distance)	LV-NH37 <span style="border: 1px solid red; padding: 2px;">NEW</span>	[P.21]
Small size, Adjustable range		Adjustment range: 50 to 200 (Range in which the reference distance can be adjusted)	Approx. $\phi 2$ (Up to 200 mm distance)	LV-S31	[P.18]

**Reflective model** Area type

Type	Appearance (mm)	Detecting distance (mm)	Area width (mm)	Model	Dimensions
Long distance		MEGA : 1200 ULTRA : 1000 SUPER : 750 TURBO : 500 FINE : 250 HSP : 200	Approx. 48x0.4 (At 200 mm distance)	LV-NH42 <span style="border: 1px solid red; padding: 2px;">NEW</span>	[P.21]

**Accessories/Options**

**LV-S41**

With mounting bracket  
L-shaped mounting bracket OP-66846\*  
Accessory

**LV-S41L**

With mounting bracket  
L-shaped mounting bracket OP-66846\*  
Accessory (front mounted)  
Accessory (rear mounted)

**LV-NH32**

With mounting bracket (accessory)

**LV-NH35**

With mounting bracket (accessory)

**LV-NH37**

With mounting bracket (accessory)

**LV-S31**

With mounting bracket (accessory)

**LV-NH42**

With mounting bracket (accessory)

**Slit (accessory)**

Area width can be selected.

**Lens LVL-01\* [P.16]**

For thicker area.

\* sold separately

**Reflective model characteristics**

**LV-NH32**

Characteristics of detecting distance and minimum spot diameter (typical example)

**LV-NH37**

Characteristics of setting distance and spot diameter (typical example)

**LV-NH42**

Characteristics of detecting distance and area width (typical example)

## Retro-reflective Type Spot type

Type	Appearance (mm)	Detecting distance (m)	Spot diameter (mm)	Model	Dimensions
Small beam spot		MEGA : 2.5 ULTRA : 2 SUPER : 1.5 TURBO : 1 FINE : 0.75 HSP : 0.5	Approx. $\phi$ 2.5 (Up to 0.5 m distance)	LV-S61	[P.18]
Standard		MEGA : 8 ULTRA : 7 SUPER : 6 TURBO : 5 FINE : 3.5 HSP : 2	Approx. $\phi$ 1.5 (Up to 1 m distance)	LV-NH62 <span style="border: 1px solid red; padding: 2px;">NEW</span>	[P.21]

All models support the P.R.O. function. The polarizing filter reduces direct reflected light from a mirrored-surface workpiece.

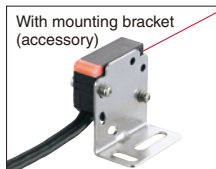
## Retro-reflective Type Area type

Type	Appearance (mm)	Detecting distance (m)	Area width (mm)	Model	Dimensions
Wide area		MEGA : 12(6) *1 ULTRA : 10(5) SUPER : 8(3.5) TURBO : 5(2) FINE : 2.5(0.7)	Area spot: Approx. 10x2 mm Small beam spot: Approx. 2x2 mm (Up to 500 mm distance)	LV-S62	[P.18]
Long-distance transparent object detection		MEGA : 35 *2 ULTRA : 30 SUPER : 25 TURBO : 15 FINE : 8	Approx. 8x12 mm (Up to 3.5 m distance)	LV-S63	[P.19]

All models support the P.R.O. function. The polarizing filter reduces direct reflected light from a mirrored-surface workpiece. \*1 Numbers not enclosed in parentheses are the detecting distance for area spot. Numbers enclosed in parentheses are the detecting distance for small beam spot. To be used for glass detection, we recommend that the detecting distance is set to 1 m or less. \*2 To be used for glass detection, we recommend that the detecting distance is set to 3.5 m or less.

### Mounting bracket (accessories/options)

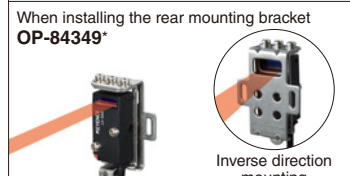
#### LV-S61



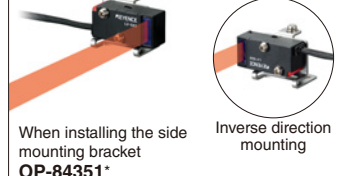
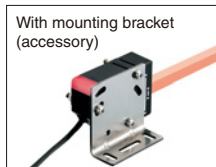
LV-S62 Using the optional mounting brackets allows you to adjust the optical axis right, left, up, or down.



#### LV-NH62



#### LV-S63

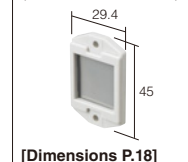


\* sold separately

Be sure to use the dedicated mounting brackets because optical axis adjustment is required.

### Reflectors

#### OP-51430 (R-6 Gray) (Included with LV-S61)



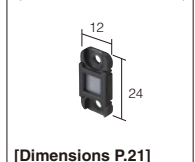
[Dimensions P.18]

#### R-6 (Included with LV-NH62)



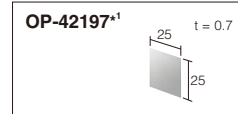
[Dimensions P.21]

#### R-7 (Included with LV-NH62)



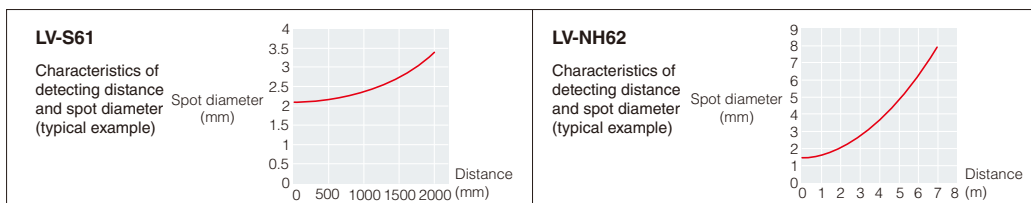
[Dimensions P.21]

### Reflective tape (sold separately)

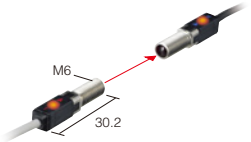
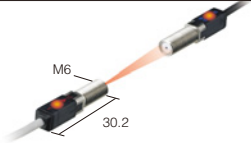


(The detecting distance remains unchanged even if the reflective tape is used.)  
\*1 Less light intensity variation type (model OP-87123) is also available.

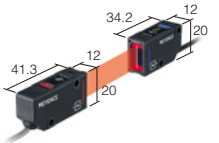
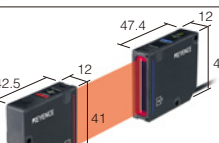
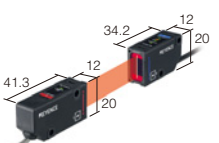
### Characteristics



Thrubeam type Spot type


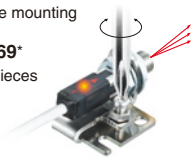
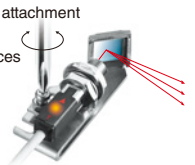
Type	Appearance (mm)	Detecting distance (mm)	Spot diameter (mm)	Model	Dimensions
Small beam spot		500 (Common for all power modes.)	Approx. $\phi 1.2$ (Detecting distance: 500 mm)	LV-S71	[P.20]
Position detection		500 (Common for all power modes.)	Approx. $\phi 6$ (Detecting distance: 500 mm)	LV-S72	[P.20]

Thrubeam type Area type

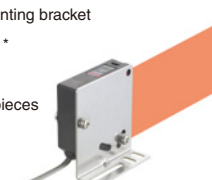
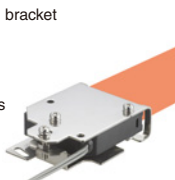
Type	Detecting width (mm)	Appearance (mm)	Detecting distance (mm)	Area width (mm)	Model	Dimensions
Standard	10		2000 (Common for all power modes.)	Approx. 12	LV-NH100 <b>NEW</b>	[P.22]
	30			Approx. 32	LV-NH300 <b>NEW</b>	[P.22]
High power	10			Approx. 12	LV-NH110 <b>NEW</b>	[P.22]

Mounting bracket (accessories/options)



LV-S71 / S72

	Standard mounting bracket (accessory)		Small type mounting bracket <b>OP-66869*</b> Set of 2 pieces		Side viewer attachment <b>LV-F1*</b> Set of 2 pieces
			With optical-axis alignment function Optical-axis can be aligned from the upper direction.		With optical-axis alignment function Optical-axis can be aligned from the upper direction.

LV-NH300

	With mounting bracket <b>LV-B301*</b> Mounted vertically Set of 2 pieces		With mounting bracket <b>LV-B302*</b> Mounted horizontally Set of 2 pieces
---	---	---	---

LV-NH100 / NH110

	With mounting bracket <b>LV-B101*</b> Mounted vertically Set of 2 pieces		With mounting bracket <b>LV-B102*</b> Mounted horizontally Set of 2 pieces
--	---	---	---

\* sold separately

## Sensor head specifications

### LV-Sxx (Spot Reflective)

Type	Small	Small side view	Adjustable distance definite reflective
Model	LV-S41	LV-S41L	LV-S31
FDA (CDRH) Part 1040.10	Class 1 Laser Product		
IEC 60825-1	Class 1 Laser Product		
Light source	Visible red semiconductor laser, Wavelength: 655 nm		
Detecting distance	MEGA	600 mm	480 mm
	ULTRA	500 mm	400 mm
	SUPER	400 mm	320 mm
	TURBO	300 mm	240 mm
	FINE	200 mm	160 mm
	HSP	150 mm	120 mm
			50 to 200 mm (Adjustment range)
Ambient temperature	-10 to +50°C (No freezing)		0 to +50°C (No freezing)
Material	Case	Glass reinforced plastic	
	Display	Polycarbonate	
	Lens cover	Norbornene plastic	Acrylic
Weight	Approx. 70 g		Approx. 75 g
Dimensions	[P.18]	[P.18]	[P.18]

\* Transmitter lens: Norbornene plastic/Receiver lens cover: Polyarylate

### LV-NHxx (Spot Reflective)

Type	Straight-beam coaxial	Adjustable beam spot	Ultra-small beam spot
Model	LV-NH35	LV-NH32	LV-NH37
FDA (CDRH) Part 1040.10	Class 1 Laser Product		
IEC 60825-1	Class 1 Laser Product		
Light source	Visible red semiconductor laser, Wavelength: 660 nm		
Detecting distance	MEGA	750 mm	1200 mm
	ULTRA	600 mm	1000 mm
	SUPER	450 mm	750 mm
	TURBO	300 mm	500 mm
	FINE	150 mm	250 mm
	HSP	100 mm	200 mm
			70±15 mm
Ambient temperature	-10 to +55°C (No freezing)		
Relative humidity	35 to 85% RH (No condensation)		
Material	Case	Glass reinforced plastic	
	Lens cover	Norbornene plastic	Acrylic* <sup>1</sup>
			Glass* <sup>1</sup>
Weight	Approx. 65 g		
Dimensions	[P.21]	[P.20]	[P.21]

\*<sup>1</sup> The LV-NH32 and the LV-NH37 receivers are polyarylate.

### LV-NHxx (Area Beam Reflective)

Type	Long-distance area	
Model	LV-NH42	
FDA (CDRH) Part 1040.10	Class 1 Laser Product	
IEC 60825-1	Class 1 Laser Product	
Light source	Visible red semiconductor laser, Wavelength: 660 nm	
Detecting distance	MEGA	1200 mm
	ULTRA	1000 mm
	SUPER	750 mm
	TURBO	500 mm
	FINE	250 mm
	HSP	200 mm
Ambient temperature	-10 to +55°C (No freezing)	
Relative humidity	35 to 85% RH (No condensation)	
Material	Case	Glass reinforced plastic
	Lens cover	Polyarylate
Weight	Approx. 65 g	
Dimensions	[P.21]	

### LV-Sxx (Retro-reflective)

Type	Small spot	Parallel light area	Long-distance transparent object
Model	LV-S61	LV-S62	LV-S63
FDA (CDRH) Part 1040.10	Class 1 Laser Product		
IEC 60825-1	Class 1 Laser Product		
Light source	Visible red semiconductor laser* <sup>1</sup>		
Detecting distance*	MEGA	2.5 m	12 m (6 m)
	ULTRA	2 m	10 m (5 m)
	SUPER	1.5 m	8 m (3.5 m)
	TURBO	1 m	5 m (2 m)
	FINE	0.75 m	2.5 m (0.7 m)
	HSP	0.5 m	-
Ambient temperature	-10 to +50°C (No freezing)		
Material	Case	Glass reinforced plastic	
	Lens cover	Acrylic	
	Reflective mirror	Polycarbonate, acrylic	
Weight	Approx. 70 g	Approx. 65 g	Approx. 110 g
Dimensions	[P.18]	[P.18]	[P.19]

\* Numbers enclosed in parentheses are the detecting distance for small beam spot.

\*<sup>1</sup>Wavelength: LV-S61: 655 nm LV-S62/S63: 660 nm

### LV-NHxx (Spot Retro-Reflective)

Type	Small spot	
Model	LV-NH62	
FDA (CDRH) Part 1040.10	Class 1 Laser Product	
IEC 60825-1	Class 1 Laser Product	
Light source	Visible red semiconductor laser, Wavelength: 660 nm	
Detecting distance	MEGA	8 m
	ULTRA	7 m
	SUPER	6 m
	TURBO	5 m
	FINE	3.5 m
	HSP	2 m
Ambient temperature	-10 to +55°C (No freezing)	
Material	Case	Glass reinforced plastic
	Lens cover	Norbornene plastic
	Reflective mirror	Polycarbonate, acrylic
Weight	Approx. 65 g	
Dimensions	[P.21]	

### LV-Sxx (Spot Thrubeam)

Type	Small standard	Small (with slit)
Model	LV-S71	LV-S72
FDA (CDRH) Part 1040.10	Class 1 Laser Product	
IEC 60825-1	Class 1 Laser Product	
Light source	Visible red semiconductor laser, Wavelength: 655 nm	
Detecting distance	MEGA	500 mm
	ULTRA	
	SUPER	
	TURBO	
	FINE	
	HSP	
Ambient temperature	-10 to +50°C (No freezing)	
Material	Case	Metal part: Stainless steel, Plastic part: Polyarylate
	Lens cover	Transmitter: Norbornene plastic Receiver: Polyarylate
Weight	Approx. 70 g	
Dimensions	[P.20]	[P.20]

### LV-F1

Type	Side-view attachment for thrubeam	
Model	LV-F1	
Applicable head	LV-S71 LV-S72	
Detecting distance	MEGA	250 mm
	ULTRA	
	SUPER	
	TURBO	
	FINE	
	HSP	
Ambient temperature	-10 to +50°C (No freezing)	
Material	Metal part: SUS304 Mirror part: Glass	
Vibration resistance	10 to 55 Hz, double amplitude: 1.5 mm 2 hours in each of X, Y and Z axis directions	
Weight	Approx. 22 g	
Dimensions	[P.20]	

### LV-NHxx (Area Thrubeam)

Type	Area thrubeam		
	High power	High performance	
Model	LV-NH110	LV-NH100	LV-NH300
Detecting area	10 mm	30 mm	
FDA (CDRH) Part 1040.10	Class 1 Laser Product		
IEC 60825-1	Class 1 Laser Product		
Light source	Visible red semiconductor laser, Wavelength: 660 nm		
Detecting distance	2000 mm		
Ambient temperature	-10 to +55°C (No freezing)		
Relative humidity	35 to 85% RH (No condensation)		
Material	Case	Glass reinforced plastic	
	Lens cover	Transmitter: Glass, Receiver: Polyarylate	
Weight	Approx. 75 g	Approx. 95 g	
Dimensions	[P.22]	[P.22]	[P.22]

### LV-L01 Specifications (lens attachment for LV-NH42) (Unit: mm)

Name	LV-L01	slit 1 is mounted	slit 2 is mounted	slit 3 is mounted	slit 4 is mounted
Detecting distance	MEGA	960	840	720	600
	ULTRA	800	700	600	500
	SUPER	600	525	450	375
	TURBO	400	350	300	250
	FINE	200	175	150	125
	HSP	160	140	120	100
Area thickness	50 mm	2.6			
	100 mm	4.0			
	150 mm	5.5			
Area width	50 mm	15.0	11.5	9.5	7.5
	100 mm	26.0	20.0	17.0	13.0
	150 mm	37.0	29.0	24.0	19.0
Case material	Polyacetal (main body) Arton (lens)				
Weight	Approx. 1 g				
Dimensions	[P.21]				

### Example of "width x thickness" of area in LV-L01 detecting distance (Unit: mm)

Distance	LV-NH42	LV-NH42 + black slit	LV-NH42 + gray slit	LV-L01	L01 + slit 1	L01 + slit 2	L01 + slit 3	L01 + slit 4
100	26×0.6	13×0.6	5×0.6	27×4	20×4	17×4	13×4	10×4
200	48×0.4	25×0.4	9×0.4	49×7	38×7	32×7	25×7	19×7
300	70×0.8	36×0.8	13×0.8	72×10	56×10	47×10	36×10	27×10
400	92×1.34	48×1.34	17×1.34	94×13	73×13	61×13	48×13	36×13



Amplifier

Cable type

Type	Appearance	Model		Control outputs	External input	Monitor output	Dimensions
		NPN output	PNP output				
Standard	Main unit	LV-N11N <b>NEW</b>	LV-N11P <b>NEW</b>	2	1	0	[P.23]
	Expansion unit	LV-N12N <b>NEW</b>	LV-N12P <b>NEW</b>				
Monitor output	Main unit	LV-N11MN <b>NEW</b>	-	1	1	1	

M8 connector type

Type	Appearance	Model		Control outputs	External input	Monitor output	Dimensions
		NPN output	PNP output				
Standard	Main unit	LV-N11CN <b>NEW</b>	LV-N11CP <b>NEW</b>	1	1	0	[P.23]
	Expansion unit	LV-N12CN <b>NEW</b>	LV-N12CP <b>NEW</b>				

Zero line type

Type	Appearance	Model	Control outputs	External input	Monitor output	Dimensions
Standard		LV-N10 <b>NEW</b>	None*1	0	0	[P.23]

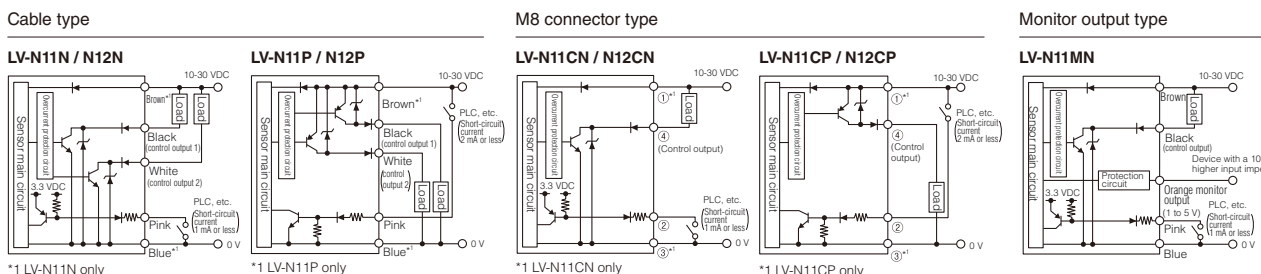
\*1 Counted as one output when added to an NU Series communication unit.

Specifications

Type	2 output		1 output		Zero line	Monitor output
Cable/connector	Cable		M8 connector		-	Cable
Main/Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Expansion unit	Main unit
Model	NPN LV-N11N	LV-N12N	LV-N11CN	LV-N12CN	LV-N10	LV-N11MN
	PNP LV-N11P	LV-N12P	LV-N11CP	LV-N12CP		-
I/O	Control outputs	2 output	1 output		None	1 output
	External input	1 input	1 input		None	1 input
	Monitor output		None			1 output
Response time	80 μs (HIGH SPEED)/250 μs (FINE)/500 μs (TURBO)/1 ms (SUPER)/4 ms (ULTRA)/16 ms (MEGA) * 80 μs cannot be selected when the LV-S31/S62/S63 is connected					
Output selection	LIGHT-ON/DARK-ON (switch-selectable)					
Timer function	Timer OFF/OFF-delay timer/ON-delay timer/One-shot timer, Timer duration selectable: 1 ms to 9,999 ms, Maximum error against the setting value: ±10% max.					
Control outputs	NPN output	NPN open collector 30 V, Residual voltage 1 V or less (Output current: 10 mA or less) / 2 V or less (Output current: 10 to 100 mA) (Stand-alone) 1 output max: 100 mA or less, 2 output total: 100 mA or less (Multiple connections) 1 output max: 20 mA or less				
	PNP output	PNP open collector 30 V, Residual voltage 1.2 V or less (Output current: 10 mA or less) / 2.2 V or less (Output current: 10 to 100 mA) (Stand-alone) 1 output max: 100 mA or less, 2 output total: 100 mA or less (Multiple connections) 1 output max: 20 mA or less				
Monitor output (LV-N11MN only)	1 to 5 V voltage output; load resistance 10 kΩ or more; repeat precision ±0.5% of F.S.; response time: 1 ms (HIGH SPEED, FINE, TURBO), 1.2 ms (SUPER), 1.8 ms (ULTRA), 4.2 ms (MEGA)					
External input	Input time 2 ms (ON)/20 ms (OFF) or more*1					
Multiple connections to expansion units	Up to 17 units can be connected in total (two-output type is treated as two units)					
Protection circuit	Reverse polarity protection, Over-current protection, Surge absorber					
Number of interference prevention units*4	Connected to other than LV-S31: 0 for HIGH SPEED; 2 for FINE/TURBO/SUPER; 4 for ULTRA/MEGA, Connected to LV-S31: 2 for FINE; 4 for TURBO/SUPER/ULTRA/MEGA					
Rating	Power voltage*5	24 VDC (operating voltage 10-30 VDC (with ripple)), ripple (P-P) 10% or less, Class 2 or LPS*7				
	NPN	Normal: 830 mW or less (at 30 V, 30 mA at 24 V, 56 mA or less at 12 V)*2 Eco on mode: 710 mW or less (at 30 V, 26 mA at 24 V, 48 mA or less at 12 V)*2 Eco Full mode: 550 mW or less (at 30 V, 21 mA at 24 V, 40 mA or less at 12 V)				
	PNP	Normal: 950 mW or less (at 30 V, 33 mA at 24 V, 60 mA or less at 12 V)*2 Eco on mode: 815 mW or less (at 30 V, 29 mA at 24 V, 52 mA or less at 12 V)*2 Eco Full mode: 650 mW or less (at 30 V, 24 mA at 24 V, 40 mA or less at 12 V)				
Environmental resistance	Ambient temperature	-20 to +55°C (No freezing)*3				
	Relative humidity	35 to 85% RH (No condensation)				
	Vibration resistance	10 to 55 Hz, double amplitude: 1.5 mm, 2 hours each in the X, Y and Z axis				
	Shock resistance	500 m/s <sup>2</sup> 3 times for each of X, Y and Z axis				
Material	Case	Main unit and cover material: Polycarbonate				
	Cable	PVC				
Case size	H 32.6 mm × W 9.8 mm × L 78.7 mm					
Weight	Approx. 75 g	Approx. 65 g	Approx. 20 g	Approx. 20 g	Approx. 20 g	Approx. 75 g

- \*1 Input time is 25 ms (ON)/25 ms (OFF) when external calibration time is selected. \*2 Increases 30 mW (1 mA) for HIGH SPEED mode.
- \*3 If more than one unit is used together, the ambient temperature varies with the conditions below. Mount the units on the DIN rail with mounting brackets and check that the output current is 20 mA or less for a unit.  
One or two more units connected: -20°C to +55°C; 3 to 10 more units connected: -20°C to +50°C; 11 to 16 more units connected: -20°C to +45°C. When using 2-outputs, one unit is counted as two units.
- \*4 These numbers double when "DOUBLE" is selected.
- \*5 To connect more than 9 units, the power voltage must be 20 V or more.
- \*6 It increases by 15% when connected to the LV-NH100/NH110/NH300. It does not include the power consumption of the load.  
Power consumption when expansion units are connected is the total power consumption of each amplifier unit. Example: When one main unit (LV-N11N) is connected to 2 expansion units (LV-N12N) and they are used with LV-NH100 heads in HIGH SPEED mode.  
(1.15 × 860 mW × 1) + (1.15 × 860 mW × 2) = 2967 mW max.
- \*7 Use with the over current protection device which is rated 30 V or more and not more than 1 A.

I/O Circuit Diagram

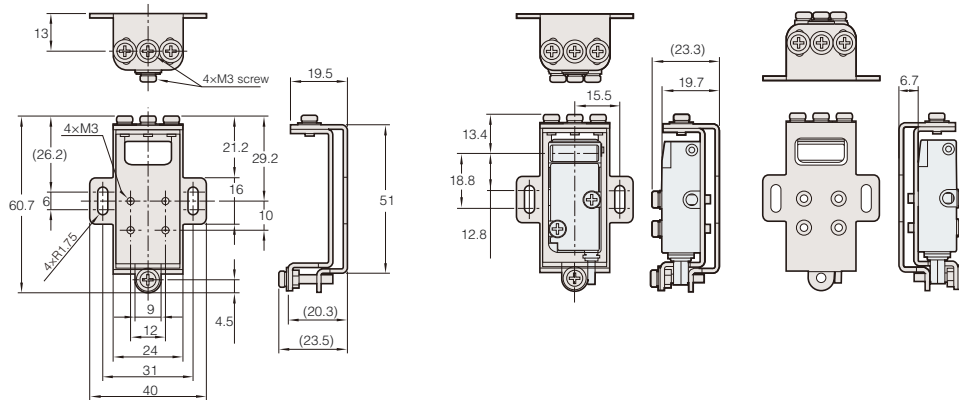


\*1 LV-N11N only      \*1 LV-N11P only      \*1 LV-N11CN only      \*1 LV-N11CP only



**OP-84349** L-shaped mounting bracket for the LV-S62 (sold separately)

When mounting bracket is attached



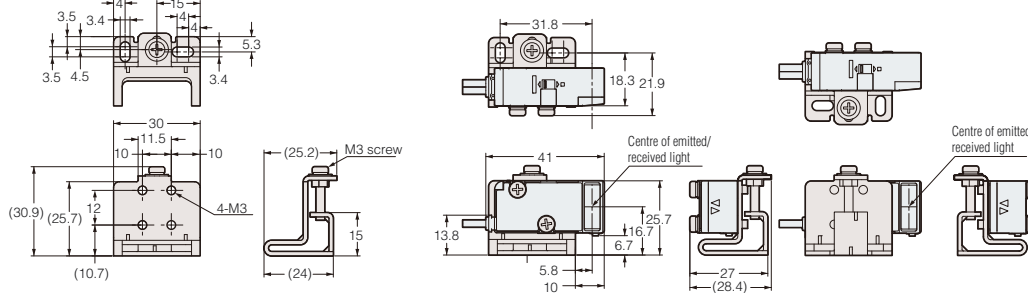
Material: SUS304  
t = 1.5

Accessory screws  
M3, P = 0.5xℓ5...3  
Material: SUS  
M3, P = 0.5xℓ16.5...1  
Material: SUS  
M3, P = 0.5xℓ18...2  
Material: SUS

Accessory nuts  
M3...1  
Material: SUS

**OP-84351** Side mounting bracket for the LV-S62 (sold separately)

When mounting bracket is attached

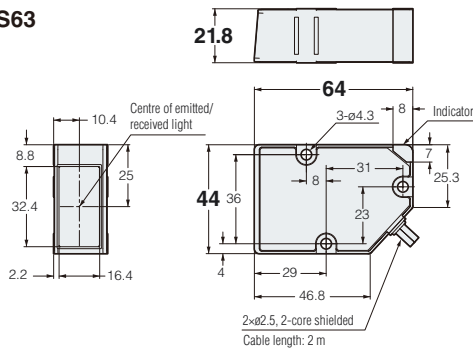


Material: SUS304  
t = 1.5

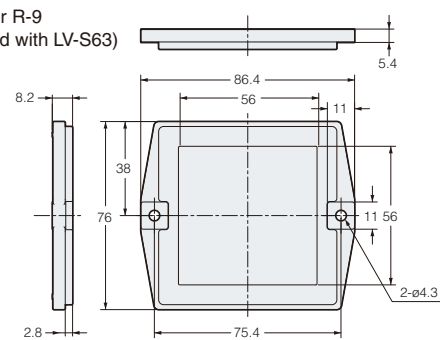
Accessory screws  
M3, P = 0.5xℓ16.5...1  
Material: SUS  
M3, P = 0.5xℓ18...2  
Material: SUS

Accessory nuts  
M3...1  
Material: SUS

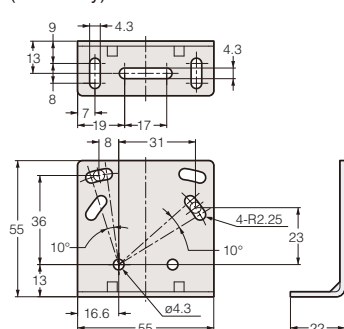
**LV-S63**



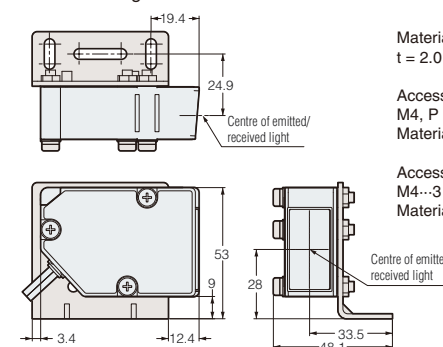
**Reflector R-9**  
(Included with LV-S63)



**Rear mounting bracket for the LV-S63**  
(accessory)



When mounting bracket is attached



Material: SUS304  
t = 2.0

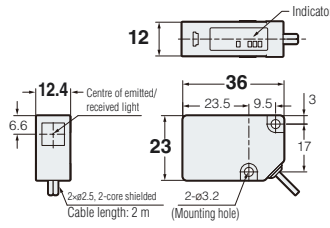
Accessory screws  
M4, P = 0.7xℓ30...3  
Material: SUS

Accessory nuts  
M4...3  
Material: SUS

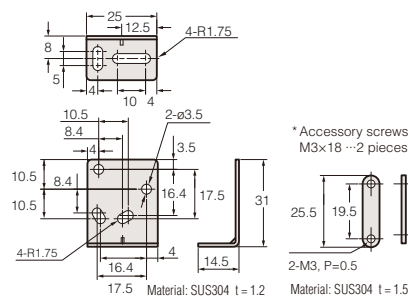




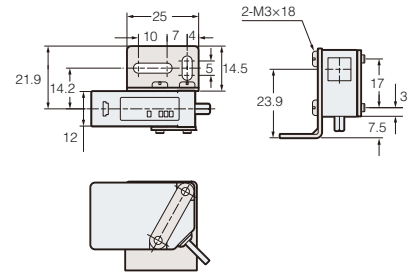
LV-NH35/NH62



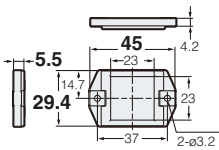
Mounting bracket (accessory)



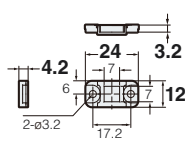
LV-NH35 / NH62 (with bracket)



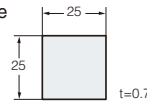
Reflector R -6  
(Included with LV-NH62)



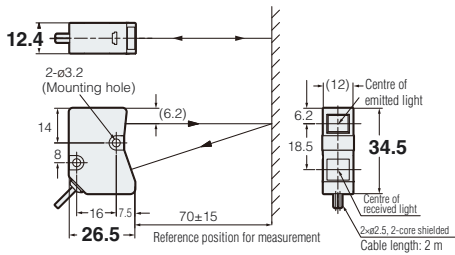
Reflector R -7  
(Included with LV-NH62)



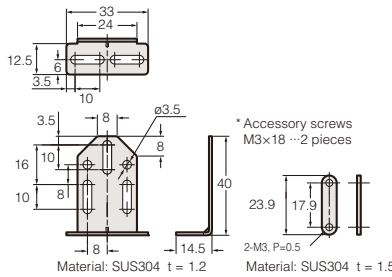
Reflective tape  
OP-42197  
OP-87123



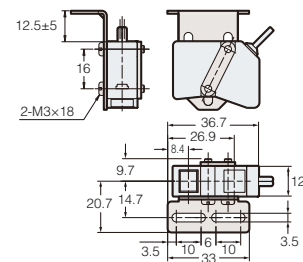
LV-NH37



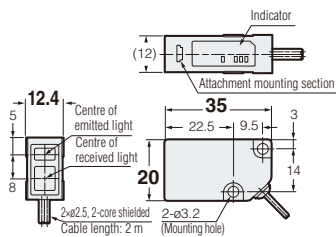
Mounting bracket for the LV-NH37 (accessory)



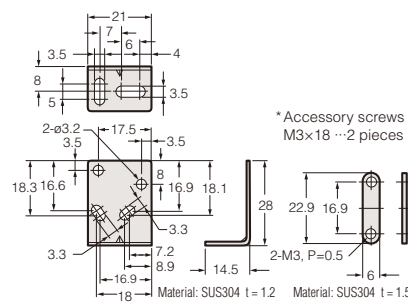
LV-NH37 (with bracket)



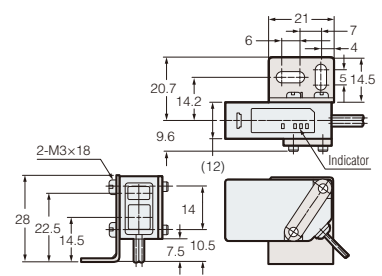
LV-NH42



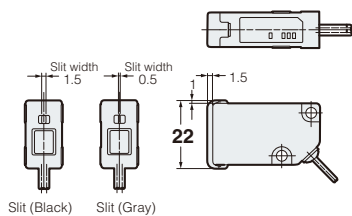
Mounting bracket for the LV-NH42 (accessory)



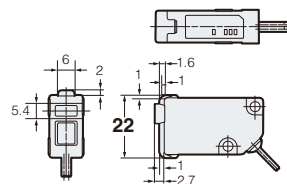
LV-NH42 (with bracket)



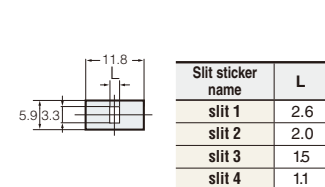
When a slit included with LV-NH42 is attached



When LV-L01 is attached (LV-NH42)

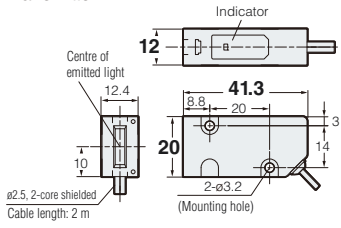


Slit seal (Included with the LV-L01)

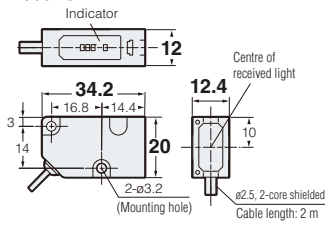


**LV-NH100 / NH110**

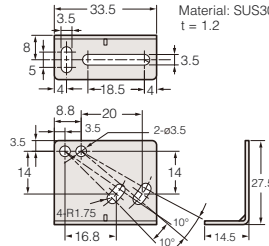
**Transmitter**



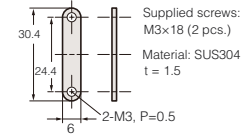
**Receiver**



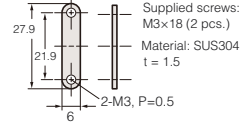
**LV-B101** (bracket, transmitter, and receiver set for the LV-NH100 / NH110)



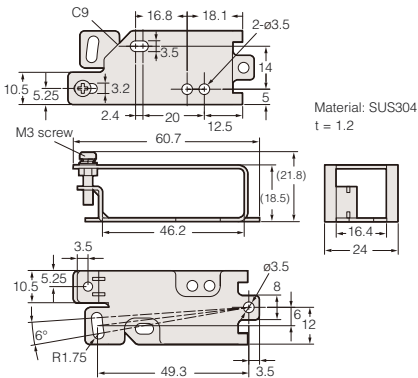
**Plate nut for the transmitter**



**Plate nut for the receiver**



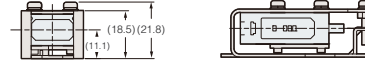
**LV-B102** (bracket, transmitter, and receiver set for LV-NH100 / NH110)



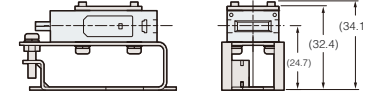
**When the LV-NH100 / NH110 transmitter is attached (inside)**



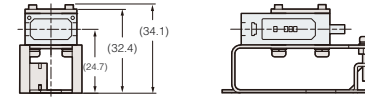
**When the LV-NH100 / NH110 receiver is attached (inside)**



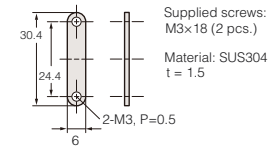
**When the LV-NH100 / NH110 transmitter is attached (outside)**



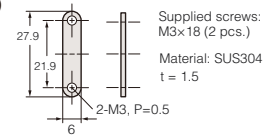
**When the LV-NH100 / NH110 receiver is attached (outside)**



**Plate nut for the transmitter**

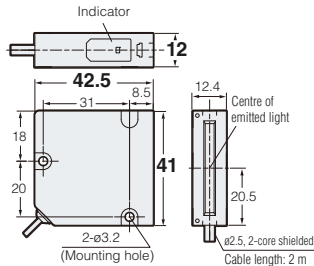


**Plate nut for the receiver**

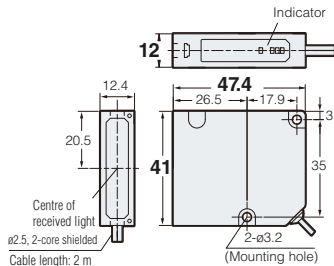


**LV-NH300**

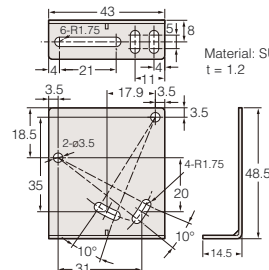
**Transmitter**



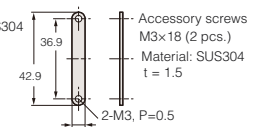
**Receiver**



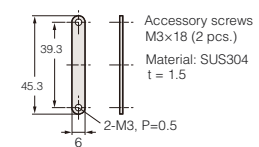
**LV-B301** (bracket, transmitter, and receiver set for LV-NH300)



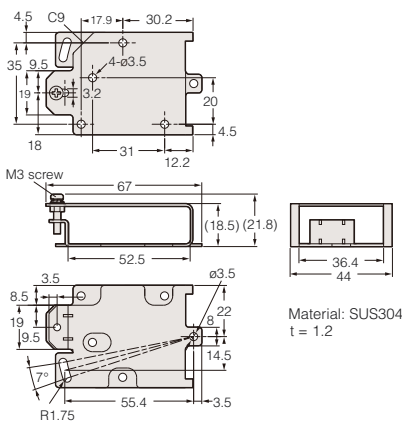
**Plate nut for the transmitter**



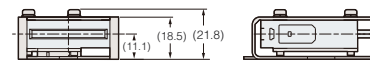
**Plate nut for the receiver**



**LV-B302** (bracket, transmitter, and receiver set for LV-NH300)



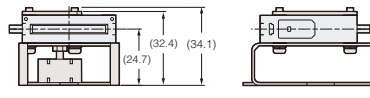
**When the LV-NH300 transmitter is attached (inside)**



**When the LV-NH300 receiver is attached (inside)**



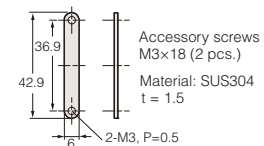
**When the LV-NH300 transmitter is attached (outside)**



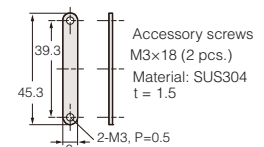
**When the LV-NH300 receiver is attached (outside)**



**Plate nut for the transmitter**

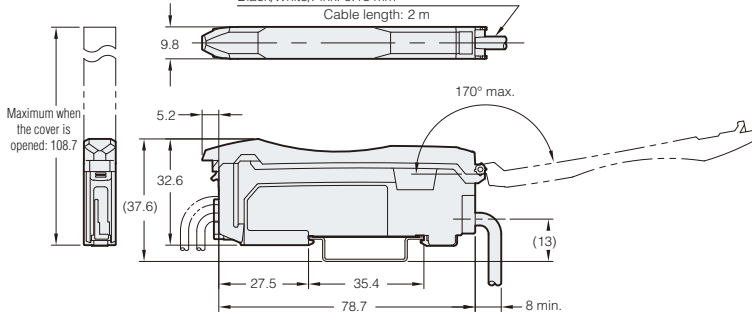


**Plate nut for the receiver**



**LV-N11N / N11P / N11MN** Cable type, Main unit

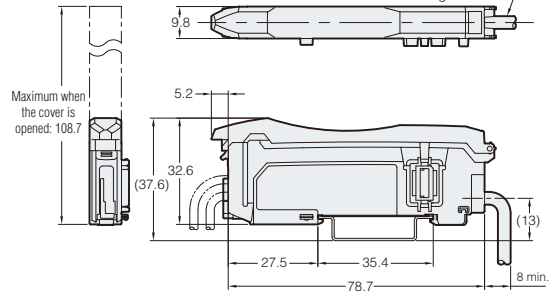
ø3.9, 5-core x Brown/Blue: 0.34 mm<sup>2</sup>,  
Black/White/Pink: 0.18 mm<sup>2</sup>\*  
Cable length: 2 m



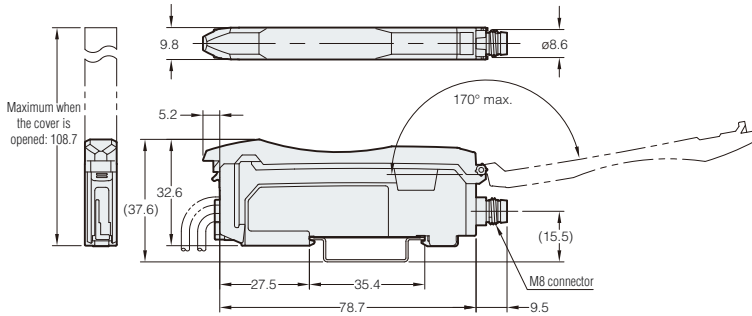
\* LV-N11MN: ø3.9, 5-core x Brown/Blue: 0.34 mm<sup>2</sup>, Black/Orange/Pink: 0.18 mm<sup>2</sup>

**LV-N12N / N12P** Cable type, Expansion unit

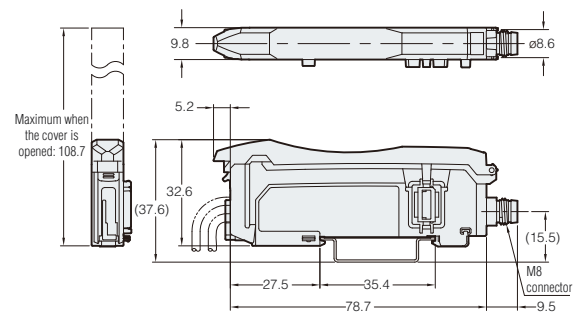
ø3.9, 3-core x Black/White/Pink: 0.18 mm<sup>2</sup>  
Cable length: 2 m



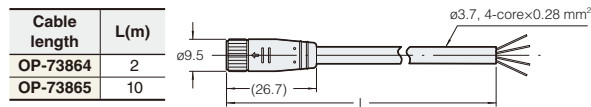
**LV-N11CN / N11CP** M8 connector type, Main unit



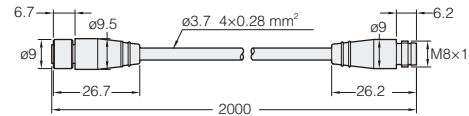
**LV-N12CN / N12CP** M8 connector type, Expansion unit



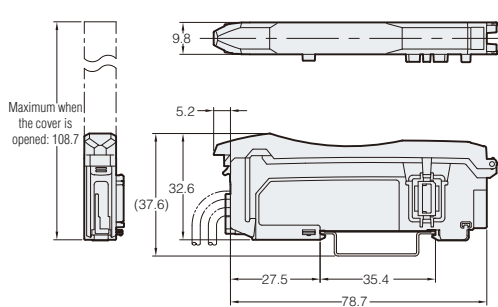
**M8 connector cable (OP-73864 / 73865 sold separately)**



**M8 connector junction cable (OP-85498 sold separately)**



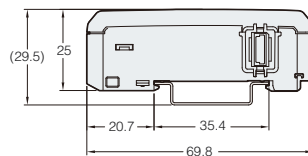
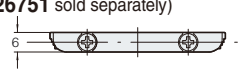
**LV-N10** Zero line type, Expansion unit



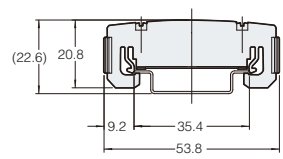
**OP-87199** Conversion adaptor



When the end unit is attached  
**(OP-26751 sold separately)**



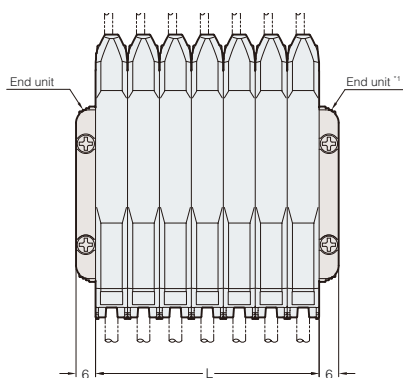
**DIN-rail mounting**



Material: Polycarbonate

Common for all types

When several units are connected:

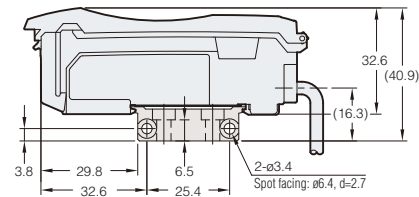


No. of units	L (mm)
1	9.8
2	19.6
3	29.4
4	39.2
5	49.0
6	58.8
7	68.6
8	78.4
9	88.2
10	98.0
11	107.8
12	117.6
13	127.4
14	137.2
15	147.0
16	156.8
17	166.6

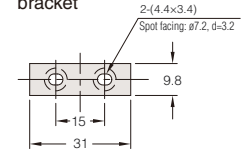
\*1 End units must be used when several units are connected. (OP-26751)

When the mounting bracket is attached **(OP-73880 sold separately)**

**Cable type**

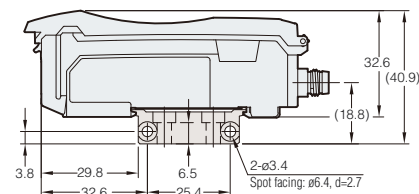


**Reverse side of mounting bracket**



Material: Polycarbonate

**M8 connector type**



More than 100 fibre unit variations to support a wide range of applications



**neo** PRESET

A high-function amplifier and vast array of sensor head options provide easy solutions for the most challenging detection conditions.

## 1 Extensive variety of fibreoptic units

The fibreoptic series has the largest selection of sensor head options which provide a vast range of installation methods and detection solutions.

## 2 High power enables use in a wide range of applications

With the touch of a button, light intensity can easily be switched to 64 times the normal intensity. This high power is often needed for long-distance detection or in adverse environmental conditions where strong light intensity is required.

## 3 Automatic maintenance

Even if debris build-up causes the light intensity to drop, the sensor automatically detects the drop in intensity, and re-calibrates to the original display state.

### FS-NEO FUNCTION

#### NEO Preset NEW

Simply press the PRESET button to change the light intensity display to 100 or 0 to complete the sensitivity settings.

#### NEO MEGA switch

Simply slide the MEGA switch to immediately obtain 64 times the normal light intensity.

#### Application function

Advanced mode settings are pre-programmed into the amplifier. Simply choose a mode according to the application and the optimal settings are automatically selected.

#### DATUM function

#### Open field network compatibility

#### Reduced wiring

#### Interference prevention function

#### Pause function

#### Sleep function

#### Saturation Avoidance function

#### Avoid light interference up to 30,000 lux

Strong resistance to the effects of sunlight and fluorescent lighting enables stable detection.

#### Analogue output type (FS-N11MN)

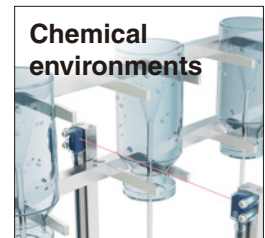
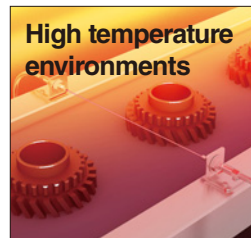
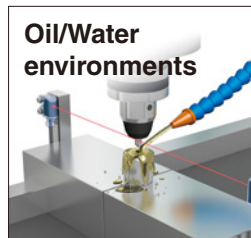
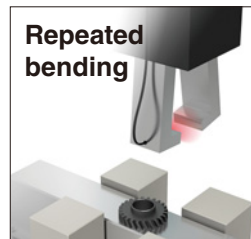
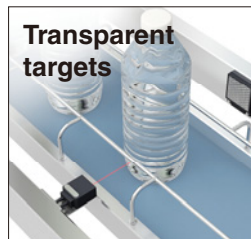


The wide variety of fibre head options provide solutions to a vast range of mounting needs and application conditions.

Mounting options



Detection options



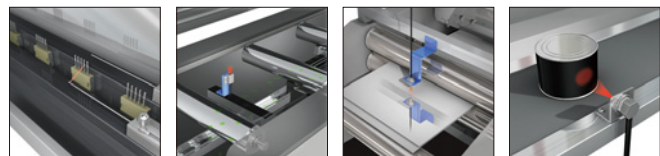
## NEO MEGA - 64 times the power with one switch

The amplifiers are equipped with 5 light transmission modes for increasing the light intensity when higher power is required. The most powerful of these modes is "MEGA Mode". The power can be increased 64-fold from normal power by simply using 1 switch.

[Normal]	FINE Mode	50	
▼	[2x]	TURBO Mode	100
▼	[4x]	SUPER Mode	200
▼	[16x]	ULTRA Mode	800
▼	[64x]	MEGA Mode	3200

64 times the normal light intensity with one switch!

\* There is also a high-speed response HSP mode.



Ample light intensity can be ensured even when using small diameter fibreoptics.

Sufficient reflection can be ensured even with transparent objects

Sufficient variation can be obtained even when distinguishing between 1 or 2 sheets

Sufficient reflection can be ensured even from black targets

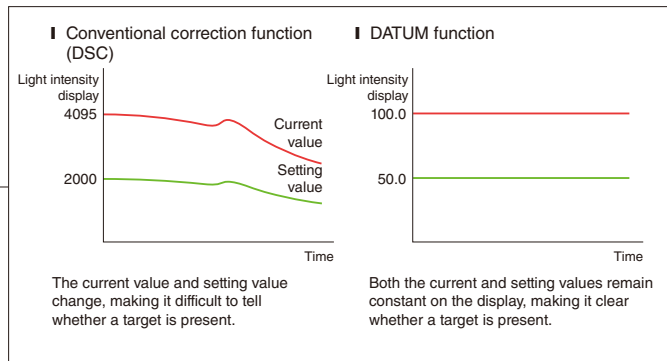


Simply slide the MEGA switch to the right

## Automatic maintenance DATUM function

The automatic maintenance function detects light intensity reduction due to dirt or misalignment, and returns the sensor to its original display state. This feature can cancel the effects of the ambient environment, enabling continuous and highly accurate detection.

As build-up occurs, the setting value changes according to light intensity. Datum corrects the setting value based on a running average of this received light intensity value. Since the display values are scaled, the current value is displayed as an even "100.0" rather than an arbitrary value, making target presence evident.



## Saturation Avoidance function adjusts the optimum power to prevent excess light intensity

When a small target is being detected by a thru-beam sensor, or when a reflective sensor experiences background reflections, the ambient light may be too strong and might interfere with accurate target detection. In this case, simply press two buttons, and this function will automatically adjust the light intensity to the optimum level.

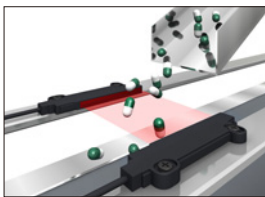
**Excess light intensity causes the display value to go off the scale.**

Target present      No target

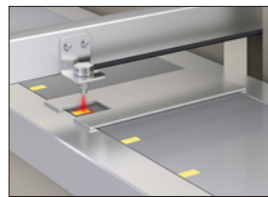
**Light transmission level and light intensity gain are automatically calibrated so stable detection can be achieved.**

Target present      No target

Use the Saturation Avoidance function in the following examples

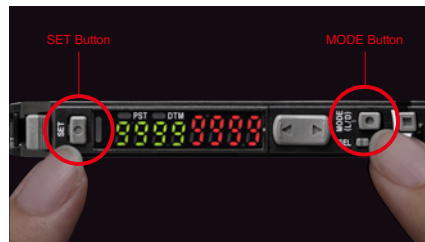


**[Area / Thru-beam model]**  
Target is small / thin  
Light travels around the target.



**[Reflective model]**  
Background reflection is strong  
The difference in light intensity may be lost.

Simply press MODE and SET at the same time.



## Power-saving Sleep function

This function holds the amplifier in a power save state during external signal input. The normal display is restored after any key is pressed.



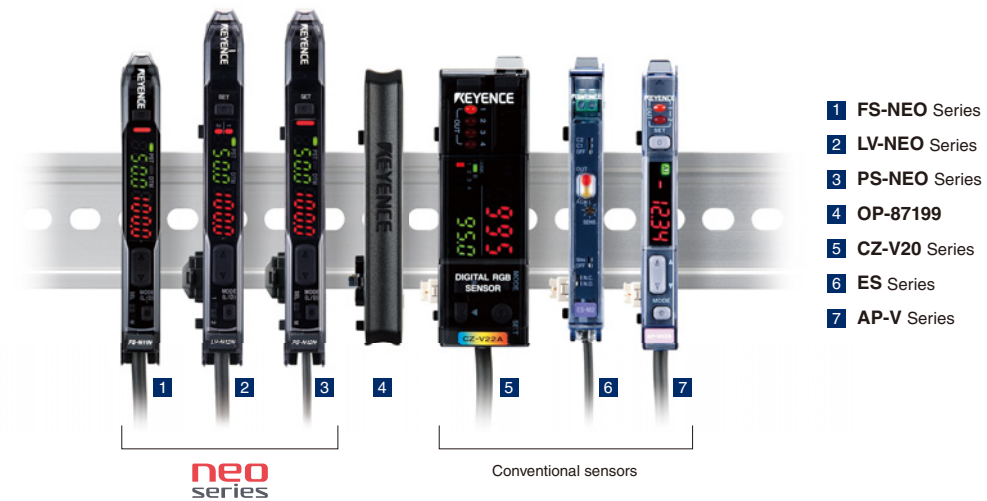
Once sleep mode is entered, light transmission is stopped and the display monitor switches off. A single segment on the digital monitor pulses across the display.

## KEYENCE Reduced wiring link

Conventional sensors can also be connected for a dramatic reduction in wiring and installation time.

By using the OP-87199 conversion connector **4** on conventional KEYENCE sensors, the NEO Series sensors can easily be connected to significantly reduce wiring and installation time.

<Example connection of NEO Series and conventional sensors>



### Connection method supporting open field networks

## Support for open field networks via the sensor input unit

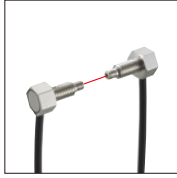
The NEO Series **2 3 4** is able to support open field networks by using the NU Series **1**. Conventional sensors **7 8 9** are supplied with power simply by connecting expansion units. The sensor output information can be transmitted by connecting e-CON to the NU-EN8N sensor input unit **5**.



Standard/Simple Mounting	<p><b>Threaded and Hex-shaped Fibres</b></p> <p>Threaded for easy mounting onto brackets and machine equipment.</p>  <p>Thrubeam type ▶ P.29 Reflective model ▶ P.34</p>	<p><b>Cylindrical (Set Screw Installation)</b></p> <p>Suitable for installation in locations where space is limited. Installed by drilling a hole and using a set screw.</p>  <p>Thrubeam type ▶ P.29 Reflective model ▶ P.35</p>	<p><b>Integrated bracket</b></p> <p>The sensor is integrated into an L-shaped bracket, which simplifies installation.</p>  <p>Thrubeam type ▶ P.30 Reflective model ▶ P.35</p>
	<p><b>Small Spot Reflective</b></p> <p>Great for small object detection. Spot size and focal distance are adjustable, so there is no need to change the distance between the sensor and the target.</p>  <p>Reflective model ▶ P.36</p>	<p><b>Focused Beam/High power</b></p> <p>Use of a lens reduces the field of view based on the aperture angle. This narrow beam helps avoid deflection and is suitable for detecting objects at longer distances.</p>  <p>Thrubeam type ▶ P.30 Reflective model ▶ P.37</p>	
	<p><b>Retro-reflective</b></p> <p>Effective for detecting transparent objects. The beam passes through the (transparent) target twice, so light attenuation increases.</p>  <p>Retro-reflective Type ▶ P.40</p>	<p><b>Definite-reflective</b></p> <p>Detects within a fixed range. Reduces background effects and features a space-saving, thin profile design.</p>  <p>Reflective model ▶ P.37</p>	
Small space	<p><b>Flat Bracket Fibres</b></p> <p>This thin profile sensor comes with mounting holes for installation where space is limited.</p>  <p>Thrubeam type ▶ P.31 Reflective model ▶ P.37</p>	<p><b>Sleeve</b></p> <p>The thin sleeve design eliminates problems caused by limited mounting space and allows the sensor to be placed closer to the target. Lineup includes side-view and bendable sleeve types.</p>  <p>Thrubeam type ▶ P.31 Reflective model ▶ P.38</p>	
	<p><b>Oil/Chemical Resistant</b></p> <p>The PTFE coating allows these fibres to be used in almost any environment, including oil or chemical-splash conditions.</p>  <p>Thrubeam type ▶ P.32 Reflective model ▶ P.38</p>	<p><b>High-flex</b></p> <p>Provides higher flexibility than an electric wire. Resistant to 30 million bends!</p>  <p>Thrubeam type ▶ P.32 Reflective model ▶ P.39</p>	<p><b>Heat Resistant</b></p> <p>Ideal for use in high temperature applications. Withstands temperatures up to 350°C.</p>  <p>Thrubeam type ▶ P.32 Reflective model ▶ P.39</p>
Dedicated application	<p><b>Area</b></p> <p>The wide-area beam is ideal for applications where there is variance in target position and for detecting multiple shapes or moving targets.</p>  <p>Thrubeam type ▶ P.33 Reflective model ▶ P.40</p>	<p><b>Liquid-level</b></p> <p>Accurate liquid level detection sensors are available in transparent tube-mount or immersion type models.</p>  <p>Reflective model ▶ P.40</p>	<p><b>Vacuums</b></p> <p>Can be used in vacuum and high temperature environment.</p>  <p>Thrubeam type ▶ P.41</p>
	<p><b>Amplifiers</b></p> <p>▶ P.42</p>	<p><b>Cable Type</b> <b>M8 connector Type</b> <b>Zero line Type</b></p> 	

Thrubeam type Standard/Simple Mounting Type

### Threaded and Hex-shaped Fibres



Threaded fibres must be mounted onto brackets before use.

#### Benefits!

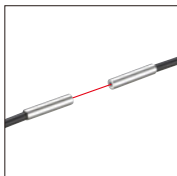
With the hex-shaped fibre, one end is secured with a nut, making installation easier.

Stainless steel braided cable is recommended in areas where the fibre can be damaged due to machine operator activity.

Size/Shape	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm)*1		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm)*2	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
M4	Hex-shaped 2 m Free-cut (ø2.2) -40 to +50°C 	R2 ToughFlex	MEGA :3100 FINE :640	ULTRA : 2100 SUPER : 1300 TURBO : 880 HSP : 320	ø1.13	ø0.005	FU-77TZ Approx. 43 g	[P.48]
		R10 Stainless Steel	MEGA :1800 FINE :640 Lens attachment [P.33]	ULTRA : 1800 SUPER : 1300 TURBO : 880 HSP : 320			FU-77TG Approx. 43 g	[P.48]
	Threaded	R0.5 ToughFlex	MEGA :3600 FINE :880	ULTRA : 3000 SUPER : 1800 TURBO : 1300 HSP : 430			FU-77V Approx. 25 g	[P.47]
		R2 ToughFlex	MEGA :3600 FINE :880	ULTRA : 3000 SUPER : 1800 TURBO : 1300 HSP : 430			FU-77 Approx. 21 g	[P.47]
		R10 Stainless Steel	MEGA :1800 FINE :880 Lens attachment [P.33]	ULTRA : 1800 SUPER : 1800 TURBO : 1300 HSP : 430			FU-77G Approx. 39 g	[P.47]
		R25	MEGA :3600 FINE :1100 Lens attachment [P.33]	ULTRA : 3200 SUPER : 2200 TURBO : 1500 HSP : 540			FU-7F Approx. 21 g	[P.47]
M6	Threaded 2 m Free-cut (ø2.2) -40 to +50°C FU-71Z: -40 to +50°C FU-71: -40 to +70°C 	R4	MEGA :2200 FINE :440 Lens attachment [P.33]	ULTRA : 1400 SUPER : 860 TURBO : 600 HSP : 220	ø1	FU-78 Approx. 9 g	[P.48]	
		R2 ToughFlex	MEGA :3600 FINE :1100	ULTRA : 3600 SUPER : 2300 TURBO : 1600 HSP : 590	ø1.5	FU-71Z Approx. 25 g	[P.47]	
M6	Threaded 2 m Free-cut (ø2.2) -40 to +50°C FU-71Z: -40 to +50°C FU-71: -40 to +70°C 	R25	MEGA :3600 FINE :1300	ULTRA : 3600 SUPER : 2600 TURBO : 1800 HSP : 650	ø1.5	FU-71 Approx. 25 g	[P.47]	

\*1 When using the FS-N Series. "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

### Cylindrical (Set Screw Installation)



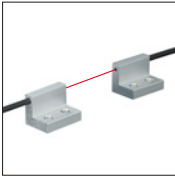
Installed by drilling a hole and using a set screw. Suitable for installation in locations where space is limited.

Size	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm)*1		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm)*2	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
ø1.0	1 m Free-cut (ø1.0) -40 to +50°C 	R2 ToughFlex High-flex	MEGA :590 FINE :140	ULTRA : 430 SUPER : 300 TURBO : 180 HSP : 55	ø0.5	ø0.005	FU-58U <b>NEW</b> Approx. 4 g	[P.46]
		R10	MEGA :380 FINE :85	ULTRA : 270 SUPER : 180 TURBO : 120 HSP : 40	ø0.265		FU-58 Approx. 8 g	[P.46]
ø1.5	1 m Free-cut (ø1.0) -40 to +50°C 	R2 ToughFlex High-flex	MEGA :590 FINE :140	ULTRA : 430 SUPER : 300 TURBO : 180 HSP : 55	ø0.5	FU-59U <b>NEW</b> Approx. 4 g	[P.47]	
		R4 High-flex	MEGA :1200 FINE :230	ULTRA : 810 SUPER : 590 TURBO : 410 HSP : 130	ø0.7	FU-59 Approx. 3 g	[P.46]	
ø2.5	50 cm cut not allowed -40 to +70°C 	R10	MEGA :45 FINE :13	ULTRA : 32 SUPER : 23 TURBO : 18 HSP : -	ø0.125	ø0.005	FU-55 Approx. 3 g	[P.46]
							50 cm cut not allowed -40 to +70°C 	
ø3	2 m Free-cut (ø2.2) -40 to +50°C 	R2 ToughFlex	MEGA :3600 FINE :880	ULTRA : 3000 SUPER : 1800 TURBO : 1300 HSP : 430	ø1.13	FU-5FZ Approx. 19 g	[P.46]	
		R25	MEGA :3600 FINE :1100	ULTRA : 3200 SUPER : 2200 TURBO : 1500 HSP : 540	ø1	FU-5F Approx. 19 g	[P.46]	

\*1 When using the FS-N Series. "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.



### Integrated bracket



The bracket and sensor are integrated.

### Benefits!

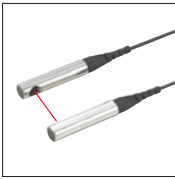
Eliminate concerns about bracket design, bracket and sensor assembly, or loose brackets. Integrated designs reduce space requirements.

Beam emitting direction	Optical axis height	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
				MEGA FINE	Other power modes				
Top	10 mm	2 m Free-cut (ø2.2) -40 to +50°C 	R2 ToughFlex	MEGA :2200 FINE :450	ULTRA : 1700 SUPER : 1000 TURBO : 760 HSP : 290	ø1.13	ø0.005	FU-L51Z Approx. 30 g	[P.50]
	15 mm	2 m Free-cut (ø2.2) -40 to +50°C 							
	20 mm	2 m Free-cut (ø2.2) -40 to +50°C 							
Top (Built-in lens)	10 mm	2 m Free-cut (ø2.2) -40 to +50°C 		MEGA :3600 FINE :3100	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 2100	ø3.5	ø0.2	FU-L50Z Approx. 30 g	[P.50]
Side	10 mm	2 m Free-cut (ø2.2) -40 to +50°C 		MEGA :1900 FINE :410	ULTRA : 1500 SUPER : 900 TURBO : 700 HSP : 270	ø1.13	ø0.005	FU-L54Z Approx. 30 g	[P.50]

\*1 When using the FS-N Series, "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

## Thrubeam type Small Spot/Focused Beam Type

### Focused Beam / High power



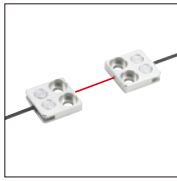
Use of a lens narrows beam width and helps avoid deflection.

Beam emitting direction	Aperture angle	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
				MEGA FINE	Other power modes				
Side	Approx. 6°	2 m Free-cut (ø1.0) FU-16Z: -40 to +50°C FU-16/18: -40 to +70°C 	R2 ToughFlex	MEGA :3600 FINE :1260	ULTRA : 3600 SUPER : 2600 TURBO : 1800 HSP : 760	ø2.5	ø0.1	FU-16Z Approx. 8 g	[P.44]
				MEGA :3600 FINE :1900	ULTRA : 3600 SUPER : 3600 TURBO : 2700 HSP : 1000			FU-16 Approx. 8 g	[P.44]
	Approx. 2°	2 m Free-cut (ø1.0) -40 to +70°C 	R10	MEGA :3600 FINE :1600	ULTRA : 3600 SUPER : 3000 TURBO : 2100 HSP : 960	ø1	ø0.02	FU-18 Approx. 8 g	[P.44]
	Approx. 3°		MEGA :1300 FINE :330	ULTRA : 900 SUPER : 680 TURBO : 530 HSP : 210	FU-18M Approx. 6 g			[P.44]	
Top	Approx. 6°	2 m Free-cut (ø1.0) -40 to +50°C 	R2 ToughFlex	MEGA :3600 FINE :3600	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 2400	ø2.8	ø0.1	FU-50 Approx. 8 g	[P.46]

\*1 When using the FS-N Series, "3600" is assumed as maximum because the fibre cable has a length of 2 m.  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

Thrubeam type Space-Saving Type

Flat Bracket Fibres



Thin bracket-shaped design for mounting in limited spaces.

Benefits!

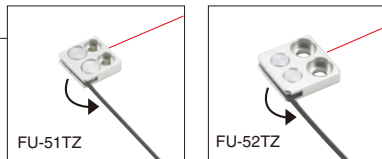
Metal housing eliminates concern about damaged sensors. The sensor and case form a flat surface, so there are no openings where dust and other foreign matter can enter.

Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
Top	1 m Free-cut (ø1.0) -40 to +50°C 2-ø2.1 Thickness 3	R2 ToughFlex	MEGA : 810 FINE : 170	ULTRA : 520 SUPER : 340 TURBO : 260 HSP : 90	ø0.5	ø0.005	FU-51TZ Approx. 5 g	[P.46]
	2 m Free-cut (ø1.3) -40 to +50°C 2-ø3.2 Thickness 3.5		MEGA : 2900 FINE : 610	ULTRA : 1900 SUPER : 1200 TURBO : 850 HSP : 260	ø1		FU-52TZ Approx. 15 g	[P.46]
Side	1 m Free-cut (ø1.0) -40 to +50°C 10.5 6 2-ø2.1 Thickness 2.5		MEGA : 740 FINE : 140	ULTRA : 480 SUPER : 280 TURBO : 200 HSP : 70	ø0.5		FU-57TZ Approx. 5 g	[P.46]
	Flat		1 m Free-cut (ø1.0) -40 to +50°C 13 2-ø2.1 Thickness 2	MEGA : 500 FINE : 140	ULTRA : 340 SUPER : 230 TURBO : 180 HSP : 80		ø0.5	
Flat			2 m Free-cut (ø2.2) -40 to +50°C 15 2-M3 Thickness 4	MEGA : 2900 FINE : 610	ULTRA : 1900 SUPER : 1200 TURBO : 850 HSP : 260		ø1	

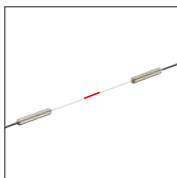
\*1 When using the FS-N Series.

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

FU-51TZ/52TZ can also be used as side-view fibres.



Sleeve



The fibre tip is incorporated into a thin sleeve.

Benefits!

Some long sleeve fibres allow for bending. (See the dimensions diagram for bend radius)

Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
Side	1 m Free-cut (ø1.3) -40 to +70°C ø0.82 2.5 15 15	R25	MEGA : 520 FINE : 100	ULTRA : 380 SUPER : 230 TURBO : 160 HSP : 55	ø0.6	ø0.005	FU-32 Approx. 5 g	[P.44]
	2 m Free-cut (ø2.2) -40 to +70°C 65 ø1.2 ø3 15 Min. bend radius of sleeve: R25		MEGA : 1600 FINE : 330	ULTRA : 1100 SUPER : 660 TURBO : 470 HSP : 140	ø1		FU-34 Approx. 17 g	[P.45]
Top	2 m Free-cut (ø2.2) M4 -40 to +70°C ø1.65 67 15 Min. bend radius of sleeve: R10		MEGA : 3600 FINE : 1100	ULTRA : 3200 SUPER : 2200 TURBO : 1500 HSP : 540	ø1		FU-73 Approx. 24 g	[P.47]
	1 m Free-cut (ø1.0) -40 to +70°C ø0.82 M3 15 15 Do not bend sleeve		MEGA : 690 FINE : 170	ULTRA : 500 SUPER : 340 TURBO : 240 HSP : 72	ø0.5		FU-75F Approx. 10 g	[P.47]
	1 m Free-cut (ø1.0) ø3 -40 to +70°C ø0.4 45 15 Min. bend radius of sleeve: R10		MEGA : 370 FINE : 85	ULTRA : 260 SUPER : 180 TURBO : 120 HSP : 40	ø0.265		FU-76F Approx. 10 g	[P.47]
	50 cm cut not allowed -40 to +70°C ø2.5 ø0.3 5 10 Do not bend sleeve		MEGA : 45 FINE : 13	ULTRA : 32 SUPER : 23 TURBO : 18 HSP : -	ø0.125		FU-56 Approx. 3 g	[P.46]

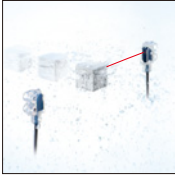
\*1 When using the FS-N Series. "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

**Thrubeam type**

**Environment-proof**

**Oil/Chemical Resistant**



Sensor is encased in fluorocarbon resin.

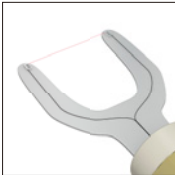
Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
Top	2 m Free-cut (ø2.2) -40 to +70°C ø5 22	R40	MEGA : 3600 FINE : 2800	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 1400	ø3.7	ø0.2	FU-92 Approx. 71 g	[P.48]
	2 m Free-cut (ø2.2) -40 to +70°C ø6.5 36.5		MEGA : 3600 FINE : 3600	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 2400	ø6	-	FU-98 NEW Approx. 70 g	[P.49]
Side	2 m Free-cut (ø2.2) -40 to +70°C ø5 23	R25 <sup>*3</sup>	MEGA : 3600 FINE : 1100	ULTRA : 3600 SUPER : 3000 TURBO : 2200 HSP : 510	ø2.8	ø0.1	FU-96 Approx. 71 g	
	2 m Free-cut (ø2.2) 0 to +60°C 13 Thickness 7 14.3		MEGA : 3600 FINE : 3600	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 2400	ø3.7	ø0.2	FU-96T NEW Approx. 35 g	

\*1 When using the FS-N Series, "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

\*3 25 mm from the end of screw cap of the housing cannot be bent.

**High-flex**



Suited for use with moving parts.

Size	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
ø1.0	1 m Free-cut (ø1.0) -40 to +50°C ø1 6	R2 ToughFlex High-flex	MEGA : 590 FINE : 140	ULTRA : 430 SUPER : 300 TURBO : 180 HSP : 55	ø0.5	ø0.005	FU-58U NEW Approx. 4 g	[P.46]
ø1.5	1 m Free-cut (ø1.0) -40 to +50°C ø1.5 10						FU-59U NEW Approx. 4 g	[P.47]
M3	1 m Free-cut (ø1.0) -40 to +50°C M3 10						FU-79U NEW Approx. 4 g	[P.48]
M4 Built-in lens	1 m Free-cut (ø1.0) -40 to +50°C M4 13	R4 High-flex	MEGA : 1800 FINE : 850	ULTRA : 1800 SUPER : 1800 TURBO : 1200 HSP : 370	ø2.3	ø0.1	FU-70U NEW Approx. 5 g	[P.47]
ø1.5	1 m Free-cut (ø1.0) -40 to +70°C ø1.5 10		MEGA : 1200 FINE : 230	ULTRA : 810 SUPER : 590 TURBO : 410 HSP : 130	ø0.7	ø0.005	FU-59 Approx. 3 g	[P.46]
M3	1 m Free-cut (ø1.0) -40 to +70°C M3 10		FU-79 Approx. 6 g	[P.48]				
6x10.5x2.5	1 m Free-cut (ø1.0) -40 to +70°C 6 10.5	MEGA : 630 FINE : 110	ULTRA : 490 SUPER : 290 TURBO : 180 HSP : 65	FU-57TE Approx. 5 g			[P.46]	

\*1 When using the FS-N Series. \*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

**Heat Resistant**



Suited for use at high temperatures of up to 300°C.

Heat resistant temperature <sup>*3</sup>	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm) (Standard target to be detected)	Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
100°C <sup>*4</sup>	2 m Free-cut (ø2.2) -40 to +100°C M4 15	R5 ToughFlex	MEGA : 3600 FINE : 680	ULTRA : 2200 SUPER : 1600 TURBO : 900 HSP : 390	ø1	ø0.005	FU-86Z Approx. 25 g	[P.48]
105°C <sup>*4</sup>	2 m Free-cut (ø2.2) -40 to +105°C M4 15	R25	MEGA : 3600 FINE : 1100	ULTRA : 3200 SUPER : 2200 TURBO : 1500 HSP : 540			FU-86A Approx. 22 g	[P.48]
150°C <sup>*5</sup>	2 m Free-cut (ø2.2) -40 to +150°C M4 17	R20	MEGA : 2700 FINE : 520	ULTRA : 1800 SUPER : 1100 TURBO : 720 HSP : 340	ø1.5	ø0.005	FU-86H Approx. 35 g	[P.48]
180°C <sup>*6</sup>	2 m Free-cut (ø2.2) -60 to +180°C M4 17	R35	MEGA : 2700 FINE : 570	ULTRA : 1900 SUPER : 1200 TURBO : 790 HSP : 380			FU-88 Approx. 36 g	[P.48]
200°C	2 m cut not allowed -40 to +200°C M4 15 10	R8	MEGA : 1800 FINE : 390	ULTRA : 1300 SUPER : 900 TURBO : 680 HSP : 250	ø1	ø0.005	FU-88K Approx. 30 g	[P.48]
300°C	2 m cut not allowed -40 to +300°C M4 15 10	R25	MEGA : 1800 FINE : 390	ULTRA : 1300 SUPER : 900 TURBO : 680 HSP : 250			FU-84C Approx. 66 g	[P.48]

\*1 When using the FS-N Series, "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

\*3 Use the fiberoptic sensor under dry conditions. Allow some margin for the temperature upper limit when selecting a heat-resistant fibre unit.

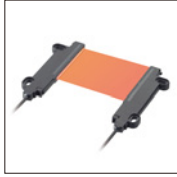
\*4 The recommended maximum ambient temperature during operation is 90°C when constantly using a fibre unit in a high-temperature environment.

\*5 The recommended maximum ambient temperature during operation is 130°C when constantly using a fibre unit in a high-temperature environment.

\*6 The recommended maximum ambient temperature during operation is 150°C when constantly using a fibre unit in a high-temperature environment.

Thrubeam type Dedicated application type

Area



Useful in situations where target position varies.

Type	Detecting width	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Optical axis diameter (mm)	Model / Weight	Dimensions			
				MEGA FINE	Other power modes						
Array	5 mm	Thickness 4 2 m Free-cut (ø2.2) -40 to +70°C	R4 <sup>*2</sup>	MEGA :2200 FINE :440	ULTRA : 1400 SUPER : 840 TURBO : 540 HSP : 200	Approx. 6x0.3	FU-A05 Approx. 20 g	[P.49]			
	10 mm	Thickness 4 2 m Free-cut (ø2.2) -40 to +70°C							Approx. 11x0.3	FU-A10 Approx. 20 g	
Area	10 mm	Thickness 4.2 2 m Free-cut (ø2.2) -40 to +50°C	R2 ToughFlex	MEGA :3400 FINE :1400	ULTRA : 2800 SUPER : 2400 TURBO : 1700 HSP : 640	10x3	FU-12 Approx. 23 g	[P.44]			
	11 mm	Thickness 4 2 m Free-cut (ø2.2) -40 to +50°C		MEGA :3600 FINE :2700	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 1300				11x2	FU-E11 Approx. 20 g	[P.49]
	40 mm	Thickness 5.1 2 m Free-cut (ø2.2) -40 to +50°C		MEGA :3600 FINE :3600	ULTRA : 3600 SUPER : 3600 TURBO : 3600 HSP : 2500						

\*1 When using the FS-N Series. "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.  
\*2 R10 for the first 10 mm of cable from the housing.

Slit for FU-E40 (sold separately)

Model	With OP-84365 attached	With OP-84366 attached
Beam size	30x0.5 mm	20x0.5 mm
Detecting distance by power mode (mm) <sup>*1</sup>	MEGA	3600
	ULTRA	2100
	SUPER	900
	TURBO	450
	FINE	250
	HSP	-
Weight (pair)	Approx. 4 g	



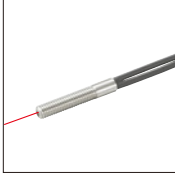
\*1 When using the FS-N Series. "3600 mm" is assumed as maximum because the fibre cable has a length of 2 m.

Thrubeam Lens Options

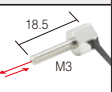
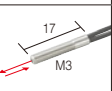
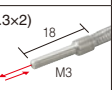
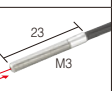
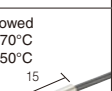
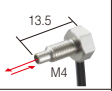
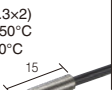
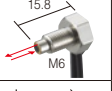
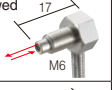
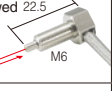
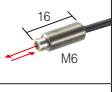
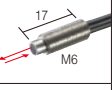
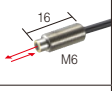
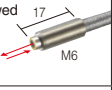
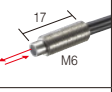
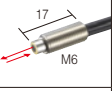
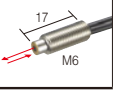
Type	Ambient temperature / Appearance (mm)	Model / Weight	Dimensions	Applicable fibre units	Detecting distance (mm) <sup>*1</sup>					
					MEGA	ULTRA	SUPER	TURBO	FINE	HSP
Ultra-long detecting distance Small-field Aperture Angle: Approx. 8°	-40 to +70°C Tip: ø4.3 9.5	F-4 Approx. 1 g	Set of 2 [P.50]	FU-77T2/77V/77	3600					2700
				FU-7F						3200
				FU-78						2200
				FU-77G/77TG	1800					
Long detecting Aperture Angle: Approx. 15°	-40 to +300°C Tip: ø4 7.9	F-2 Approx. 2 g	Set of 2 [P.50]	FU-77T2/77V/77/84C/88K	3600					2100
				FU-7F/86A	3600					2500
				FU-86Z	3600					1900
				FU-78	3600				3300	1600
FU-77G/77TG					1800					
With mounting holes Side view	-40 to +105°C Locking Nut 9.3 16.7 5.6	F-5 Approx. 10 g	Set of 2 [P.50]	FU-77V/77	3600					2600
				FU-7F/86A						3100
				FU-86Z						2900
				FU-78						2300
				FU-77G						1800
Side view	-40 to +70°C <sup>*2</sup> Tip: ø4 9.5	F-1 Approx. 2 g	Set of 2 [P.50]	FU-77V/77	3600	3100	1900	1300	900	530
				FU-77G	1800			1300	900	530
				FU-7F/86A	3600		3100	2100	1300	630
				FU-86Z	3600	3300	2300	1500	1100	500
				FU-78/84C/88K	3200	2500	1600	1100	800	360

\*1 3600 mm (1800 mm) is assumed as maximum because the fibre cable has a length of 2 m (1 m).  
\*2 When using the F-1 at a temperature of 70°C or more, specify the "Heat-resistant F-1." "Heat-resistant F-1" must be used in a constant temperature.

### Threaded and Hex-shaped Fibres



Threaded fibres must be mounted onto brackets before use.

Size/Shape	Detecting Arrangement	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions	
				MEGA FINE	Other power modes				
M3	Hex-shaped	1 m Free-cut (ø1.3x2) -40 to +50°C 	R2	MEGA : 400 FINE : 70	ULTRA : 270 SUPER : 170 TURBO : 110 HSP : 32	ø0.005 Gold wire	FU-35TZ Approx. 7 g	[P.45]	
		1 m Free-cut (ø1.3x2) -40 to +50°C 	R2 ToughFlex	MEGA : 450 FINE : 72	ULTRA : 290 SUPER : 190 TURBO : 115 HSP : 36		FU-35FZ Approx. 6 g	[P.45]	
	Threaded	1 m Free-cut (ø1.3x2) Spiral 30 cm -40 to +50°C 	R10 Stainless Steel	Lens attachment [P.36]	MEGA : 550 FINE : 110		ULTRA : 400 SUPER : 250 TURBO : 160 HSP : 45	FU-35FG Approx. 15 g	[P.45]
		1 m Free-cut (ø1.3x2) -40 to +70°C 	R25	Lens attachment [P.36]	MEGA : 130 FINE : 36		ULTRA : 90 SUPER : 54 TURBO : 40 HSP : 23	FU-21X Approx. 4 g	[P.44]
		50 cm cut not allowed FU-21X: -40 to +70°C FU-24X: -40 to +50°C 		R10	Lens attachment [P.36]		MEGA : 100 FINE : 13	ULTRA : 72 SUPER : 32 TURBO : 23 HSP : 8	FU-24X Approx. 4 g
M4	Hex-shaped	2 m Free-cut (ø1.3x2) -40 to +50°C 	R2	MEGA : 640 FINE : 140	ULTRA : 420 SUPER : 320 TURBO : 220 HSP : 70	FU-66TZ Approx. 10 g	[P.47]		
		Threaded	2 m Free-cut (ø1.3x2) FU-66Z: -40 to +50°C FU-66: -40 to +70°C 	R2 ToughFlex	MEGA : 770 FINE : 190	ULTRA : 560 SUPER : 380 TURBO : 260 HSP : 80	FU-66Z Approx. 10 g	[P.47]	
	R25		MEGA : 1100 FINE : 300	ULTRA : 860 SUPER : 570 TURBO : 410 HSP : 140	FU-66 Approx. 10 g	[P.47]			
M6	Hex-shaped	2 m Free-cut (ø2.2x2) -40 to +50°C 	R2 ToughFlex	MEGA : 710 FINE : 210	ULTRA : 550 SUPER : 470 TURBO : 310 HSP : 90	FU-67TZ Approx. 32 g	[P.47]		
		1 m cut not allowed -40 to +50°C 	R10 Stainless Steel			FU-67TG Approx. 32 g	[P.47]		
		1 m cut not allowed 22.5 -40 to +50°C 	R10	MEGA : 400 FINE : 70	ULTRA : 270 SUPER : 170 TURBO : 110 HSP : 32	FU-35TG Approx. 32 g	[P.45]		
	Threaded	Parallel	2 m Free-cut (ø2.2x2) -40 to +50°C 	R0.5 ToughFlex	MEGA : 900 FINE : 210	ULTRA : 740 SUPER : 490 TURBO : 320 HSP : 110	FU-67V Approx. 25 g	[P.47]	
			2 m Free-cut (ø2.2x2) -40 to +50°C 	R2 ToughFlex	MEGA : 1200 FINE : 300	ULTRA : 900 SUPER : 590 TURBO : 430 HSP : 140	FU-61Z Approx. 22 g	[P.47]	
		2 m Free-cut (ø2.2x2) -40 to +50°C 	R10 Stainless Steel		MEGA : 900 FINE : 210	ULTRA : 740 SUPER : 490 TURBO : 320 HSP : 110	FU-67 Approx. 21 g	[P.47]	
		1 m cut not allowed -40 to +50°C 		R25	MEGA : 1300 FINE : 380	ULTRA : 1000 SUPER : 820 TURBO : 500 HSP : 160	FU-61 Approx. 21 g	[P.47]	
		2 m Free-cut (ø2.2x2) -40 to +70°C 	MEGA : 1100 FINE : 300		ULTRA : 860 SUPER : 570 TURBO : 410 HSP : 140	FU-6F Approx. 21 g	[P.47]		
		2 m Free-cut (ø2.2x2) -40 to +70°C 	MEGA : 720 FINE : 160		ULTRA : 630 SUPER : 410 TURBO : 270 HSP : 130	FU-25 Approx. 18 g	[P.44]		
		Coaxial	2 m Free-cut (ø2.2x2) -40 to +70°C 						

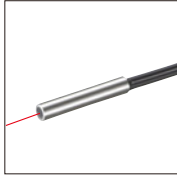
\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

See P.36 for specifications when a reflective lens is attached.



### Cylindrical (Set Screw Installation)



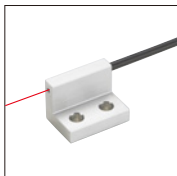
Installed by drilling a hole and using a set screw. Suitable for installation in locations where space is limited.

Size	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes			
ø1.5	1 m cut not allowed -40 to +70°C 	R4 High-flex	MEGA :150 FINE :32	ULTRA :100 SUPER :80 TURBO :54 HSP :22	ø0.005 Gold wire	FU-49X Approx. 3 g	[P.46]
	1 m cut not allowed -40 to +70°C 	R10	MEGA :27 FINE :4.8	ULTRA :18 SUPER :13 TURBO :10 HSP :2.4		FU-46 Approx. 2 g	[P.46]
ø2	1 m Free-cut (ø1.0x2) -40 to +50°C 	R2 ToughFlex High-flex	MEGA :140 FINE :40	ULTRA :110 SUPER :80 TURBO :60 HSP :13		FU-49U Approx. 4 g	[P.46]
ø2.5	50 cm cut not allowed -40 to +70°C 	R25	MEGA :72 FINE :23	ULTRA :59 SUPER :45 TURBO :32 HSP :12		FU-22X Approx. 2 g	[P.44]
ø3	2 m Free-cut (ø1.3x2) FU-4FZ: -40 to +50°C FU-4F: -40 to +70°C 	R2 ToughFlex	MEGA :770 FINE :190	ULTRA :560 SUPER :380 TURBO :260 HSP :80		FU-4FZ Approx. 8 g	[P.45]
	1 m Free-cut (ø1.0x2) -40 to +50°C 	R2 ToughFlex High-flex	MEGA :140 FINE :40	ULTRA :110 SUPER :80 TURBO :60 HSP :13		FU-48U Approx. 4 g	[P.46]
	2 m Free-cut (ø1.0x2) -40 to +70°C 	R4 High-flex	MEGA :290 FINE :63	ULTRA :200 SUPER :130 TURBO :80 HSP :32		FU-48 Approx. 7 g	[P.46]
	50 cm cut not allowed -40 to +70°C 	R25	MEGA :830 FINE :180	ULTRA :680 SUPER :470 TURBO :320 HSP :130		FU-23X Approx. 4 g	[P.44]
	50 cm cut not allowed -40 to +70°C 	R4	MEGA :68 FINE :18	ULTRA :54 SUPER :40 TURBO :27 HSP :8	FU-45X Approx. 4 g	[P.46]	

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only.)

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

### Integrated Bracket



The bracket and sensor are integrated.

Beam emitting direction	Optical axis height	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
				MEGA FINE	Other power modes			
Top	10 mm	2 m Free-cut (ø2.2) -40 to +50°C 	R2 ToughFlex	MEGA :760 FINE :170	ULTRA :580 SUPER :430 TURBO :320 HSP :90	ø0.005	FU-L41Z Approx. 25 g	[P.50]

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only.)

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

### Benefits!

Eliminate concerns about bracket design, bracket and sensor assembly, or loose brackets. Integrated designs reduce space requirements.


**Reflective model Small Spot/Focused Beam Type**

**Small Spot Reflective**

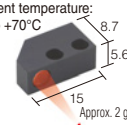


Great for small object detection.

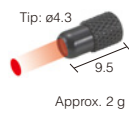
**Adjustable Beam Spot/Built-in Lens Fibre Unit**

Type	Spot diameter (mm)	Focal distance (mm)	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Model / Weight	Minimum bend radius (mm)	Dimensions
Adjustable beam spot	ø0.9 to 3.5	10 to 30	2 m Free-cut (ø1.3x2) -40 to +70°C 	<b>FU-10</b> Approx. 5 g	R25	[P.44]

**Adjustable Beam Spot/Lens + Fibre Unit**

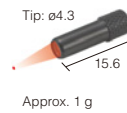
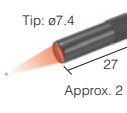
Type	Spot diameter (mm)	Focal distance (mm)	Lens			Dimensions	Fibre Unit		Dimensions
			Appearance (mm)	Weight	Model		Minimum bend radius (mm) Appearance	Model	
Side view Adjustable beam spot	ø0.5 to 3	8 to 30		Approx. 2 g	<b>F-5HA</b>	[P.50]	R2 ToughFlex R10 Stainless Steel R25	<b>FU-35FZ</b> <b>FU-35FG</b> <b>FU-35FA</b>	[P.51]

**Parallel Beam Spot/Lens + Fibre Unit**

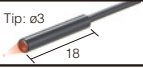
Type	Spot diameter (mm)	Lens			Dimensions	Fibre Unit		Detecting distance (mm) <sup>*1</sup>		Dimensions	
		Appearance (mm)	Weight	Model		Minimum bend radius (mm) Appearance	Model	MEGA FINE	Other power modes		
Parallel beam	Approx. ø4 (at 0 to 20 mm distance)	Ambient temperature: -30 to +70°C		Approx. 2 g	<b>F-3HA</b>	[P.50]	R2 ToughFlex	<b>FU-35FZ</b>	MEGA :45 FINE :36	ULTRA :45 SUPER :45 TURBO :40 HSP :27	[P.51]
							R10 Stainless steel	<b>FU-35FG</b>			
							R25	<b>FU-35FA</b>	MEGA :65 FINE :54	ULTRA :65 SUPER :65 TURBO :60 HSP :45	
							R2 ToughFlex	<b>FU-35TZ</b>	MEGA :40 FINE :27	ULTRA :40 SUPER :40 TURBO :32 HSP :23	
							R10 Stainless Steel	<b>FU-35TG</b>			

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only)

**Small Beam Spot/Lens + Fibre Unit**

Type	Spot diameter (mm)	Focal distance (mm)	Lens			Dimensions	Fibre Unit		Dimensions	
			Appearance (mm)	Weight	Model		Minimum bend radius (mm) Appearance	Model		
Small spot	Approx. ø0.1	7±2	Ambient temperature: -30 to +70°C		Approx. 1 g	<b>F-2HA</b>	[P.50]	R10	<b>FU-24X</b>	[P.51]
	Approx. ø0.2							R25	<b>FU-21X</b>	
	Approx. ø0.4							R2 ToughFlex	<b>FU-35FZ</b>	
								R10 Stainless Steel	<b>FU-35FG</b>	
								R25	<b>FU-35FA</b>	
								R2 ToughFlex	<b>FU-35TZ</b>	
	Approx. ø0.5	15±2	Ambient temperature: -30 to +70°C		Approx. 2 g	<b>F-4HA</b>	[P.50]	R2 ToughFlex	<b>FU-35FZ</b>	
		Approx. ø1.0						R10 Stainless Steel	<b>FU-35FG</b>	
								R2 ToughFlex	<b>FU-35TZ</b>	
		Approx. ø2.0						35±3	Ambient temperature: -40 to +70°C	
	Approx. ø0.1		R25	<b>FU-21X</b>						
			R2 ToughFlex	<b>FU-35FZ</b>						
Approx. ø0.2	R10 Stainless Steel		<b>FU-35FG</b>							
	R2 ToughFlex	<b>FU-35TZ</b>								
Approx. ø0.4	R25	<b>FU-35FA</b>								
	R25	<b>FU-35FA</b>								

**Small Beam Spot/Built-in Lens Fibre Unit**

Type	Spot diameter (mm)	Focal distance (mm)	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Model / Weight	Minimum bend radius (mm)	Dimensions
Small spot	Approx. ø0.1	5	50 cm cut not allowed Tip: ø3 -40 to +70°C 	<b>FU-20</b> Approx. 2 g	R25	[P.44]

\* Cannot be used with the FS-N Series HIGH SPEED mode.

### Focused Beam/ High power



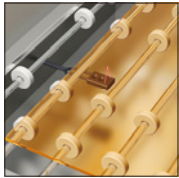
Use of a lens reduces beam width and helps avoid deflection.

Beam emitting direction	Aperture angle	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
				MEGA FINE	Other power modes			
Top	Approx. 8°	2 m Free-cut (ø2.2x2) -40 to +50°C Thickness 5.2 21	R2 ToughFlex	MEGA : 30 to 2300 FINE : 30 to 290	ULTRA : 30 to 1600 SUPER : 30 to 760 TURBO : 30 to 410 HSP : 30 to 160	ø0.3 Copper wire (vertical)	FU-40 Approx. 23 g	[P.45]
		1 m cut not allowed (ø1.0x2) -40 to +50°C Thickness 5.2 21	R10 Stainless Steel				FU-40G Approx. 50 g	[P.45]

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

**Reflective model** Transparent object detection type

### Definite-reflective



Features a limited detection range.

#### Benefits!

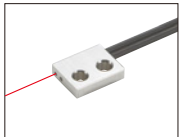
Thin size allows installation where space is limited. Since the effects of the background are minimized, stable detection is possible in complex environments. The FU-38 is a small spot type, which is great for small object detection.

Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Spot diameter (mm)	Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes				
Top	2 m Free-cut (ø2.2x2) -40 to +70°C 19 7.4 17	R25	MEGA : 15 to 70 FINE : 15 to 30	ULTRA : 15 to 60 SUPER : 15 to 46 TURBO : 15 to 38 HSP : -	-	-	FU-40S Approx. 25 g	[P.45]
Side	2 m Free-cut (ø1.0x2) -40 to +70°C Thickness 5 14.4 19	R10	MEGA : 3 center of detecting distance FINE : 3 center of detecting distance	ULTRA : 3 center of detecting distance SUPER : 3 center of detecting distance TURBO : 3 center of detecting distance HSP : 3 center of detecting distance	Approx. 4.5 Approx. 3.5 (At 3 mm distance)	ø0.005 Gold wire	FU-37 Approx. 6 g	[P.45]
Flat	2 m Free-cut (ø1.0x2) -40 to +70°C Thickness 4 12 19		MEGA : 6 center of detecting distance FINE : 6 center of detecting distance	ULTRA : 6 center of detecting distance SUPER : 6 center of detecting distance TURBO : 6 center of detecting distance HSP : 6 center of detecting distance	Approx. ø1.5 (At 6 mm distance)	-	FU-38 Approx. 5 g	[P.45]
	2 m Free-cut (ø1.0x2) -40 to +70°C Thickness 4.3 12 19	MEGA : 0 to 4 FINE : 0 to 4	ULTRA : 0 to 4 SUPER : 0 to 4 TURBO : 0 to 4 HSP : 2±1.4	-	ø0.08 Copper wire	FU-38V Approx. 5 g	[P.45]	
	2 m Free-cut (ø2.2x2) -40 to +60°C Thickness 5.2 14 20	R25	MEGA : 8 to 38 FINE : 8 to 32	ULTRA : 8 to 36 SUPER : 8 to 35 TURBO : 8 to 34 HSP : 10 to 26	-	-	FU-38L Approx. 20 g	[P.45]
Flat	2 m Free-cut (ø2.2x2) -40 to +70°C Thickness 3.6 20.5 29	R5	MEGA : 0 to 25 FINE : 0 to 25	ULTRA : 0 to 25 SUPER : 0 to 25 TURBO : 0 to 25 HSP : -	-	-	FU-38S Approx. 20 g	[P.45]
	2 m Free-cut (ø1.0x2) -40 to +70°C Thickness 3.8 22 29	R25	MEGA : 0 to 14 FINE : 0 to 14	ULTRA : 0 to 14 SUPER : 0 to 14 TURBO : 0 to 14 HSP : 0 to 12	-	-	FU-38R Approx. 20 g	[P.45]

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

**Reflective model** Space-Saving Type

### FlatB racket Fibres



Bracket-shaped design is thinner than ever.

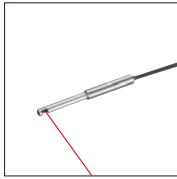
#### Benefits!

Metal housing eliminates concern about damaged sensors. The sensor and case form a flat surface, so there are no openings where dust and other foreign matter can enter.

Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes			
Top	1 m Free-cut (ø1.0x2) -40 to +50°C 2-ø2.1 6.5 8 Thickness 2	R2 ToughFlex	MEGA : 1 to 160 FINE : 1 to 36	ULTRA : 1 to 120 SUPER : 1 to 81 TURBO : 1 to 60 HSP : 1 to 13	ø0.005 Gold wire	FU-44TZ Approx. 3 g	[P.46]
Side	1 m Free-cut (ø1.0x2) -40 to +50°C 10.5 7.2 2-ø2.1 Thickness 2.5		MEGA : 1 to 160 FINE : 1 to 36	ULTRA : 1 to 120 SUPER : 1 to 81 TURBO : 1 to 60 HSP : 1 to 18		FU-47TZ Approx. 4 g	[P.45]
Flat	1 m Free-cut (ø1.0) -40 to +50°C 13 2-ø2.1 7 Thickness 2		MEGA : 2 to 120 FINE : 2 to 24	ULTRA : 2 to 77 SUPER : 2 to 50 TURBO : 2 to 32 HSP : 2 to 8		FU-41TZ Approx. 5 g	[P.45]
	2 m Free-cut (ø2.2x2) -40 to +50°C 20 2-ø3.2 7 Thickness 4		MEGA : 1 to 500 FINE : 1 to 70	ULTRA : 1 to 320 SUPER : 1 to 190 TURBO : 1 to 130 HSP : 1 to 50		FU-42TZ Approx. 24 g	[P.45]

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).  
\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

### Sleeve



The fibre tip is incorporated into a thin sleeve.

### Benefits!

When determining the smallest detectable object, positioning the sensor too closely to the object causes the object to disappear, making alignment difficult. With the sleeve type, the sensor itself does not become an obstruction and alignment is much easier.

Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes			
Side	2 m Free-cut (ø1.0x2) -40 to +70°C Sleeve part Do not bend 	R10	MEGA :180 FINE :32	ULTRA :130 SUPER :81 TURBO :50 HSP :18	ø0.005 Gold wire	FU-31 Approx. 5 g	[P.44]
	1 m Free-cut (ø2.2x2) -40 to +70°C Sleeve part bend R25 	R25	MEGA :320 FINE :45	ULTRA :250 SUPER :140 TURBO :90 HSP :32		FU-33 Approx. 10 g	[P.44]
Top	50 cm cut not allowed -40 to +70°C Sleeve part Do not bend 	R4	MEGA :68 FINE :18	ULTRA :54 SUPER :40 TURBO :27 HSP :8		FU-65X Approx. 5 g	[P.47]
	2 m Free-cut (ø1.3x2) -40 to +50°C 	R2 ToughFlex	MEGA :290 FINE :54	ULTRA :190 SUPER :120 TURBO :80 HSP :23		FU-63Z Approx. 10 g	[P.47]
	2 m Free-cut (ø1.3x2) -40 to +70°C 	R25	MEGA :330 FINE :72	ULTRA :230 SUPER :150 TURBO :100 HSP :36		FU-63 Approx. 10 g	[P.47]
	2 m Free-cut (ø1.3x2) -40 to +70°C 					FU-63T Approx. 10 g	[P.47]
	50 cm cut not allowed -40 to +70°C Sleeve part Do not bend 	R4	MEGA :68 FINE :18	ULTRA :54 SUPER :40 TURBO :27 HSP :8		FU-45X Approx. 4 g	[P.46]
	2 m Free-cut (ø1.3x2) -40 to +70°C Sleeve part Do not bend 	R25	MEGA :330 FINE :72	ULTRA :230 SUPER :150 TURBO :100 HSP :36		FU-43 Approx. 8 g	[P.46]
	1 m cut not allowed -40 to +70°C Sleeve part Do not bend 	R10	MEGA :27 FINE :4.8	ULTRA :18 SUPER :13 TURBO :10 HSP :2.4	FU-46 Approx. 2 g	[P.46]	
Coaxial narrow beam 10° 50 cm cut not allowed -40 to +70°C Sleeve part Do not bend 	R25	MEGA :72 FINE :23	ULTRA :59 SUPER :45 TURBO :32 HSP :12	FU-22X Approx. 4 g	[P.44]		

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

### Reflective model Environment-proof

### Oil-proof, Chemical Proof



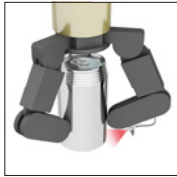
Sensor is encased in fluorocarbon resin.

Beam emitting direction	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Standard Detectable object (mm)	Model / Weight	Dimensions
			MEGA FINE	Other power modes			
Top	2 m Free-cut (ø1.3x2) -40 to +70°C 	R40	MEGA :310 FINE :140	ULTRA :290 SUPER :250 TURBO :200 HSP :80	-	FU-91 Approx. 32 g	[P.48]
	2 m Free-cut (ø1.3x2) -40 to +60°C Thickness 9.6 (width of ø4.1 mounting hole seating surface) 		MEGA :8 to 20 FINE :8 to 20	ULTRA :8 to 20 SUPER :8 to 20 TURBO :8 to 20 HSP :8 to 16	200x200 t = 0.7 Glass substrate	FU-97P NEW Approx. 75 g	[P.49]
	2 m Free-cut (ø1.3x2) -40 to +85°C 						FU-97S NEW Approx. 90 g

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).

Reflective/Environment-proof

### High-flex



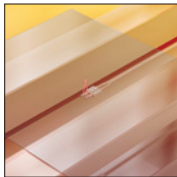
Suited for use with moving object detection.

Size (mm)	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes			
ø2	1 m Free-cut (ø1.0x2) -40 to +50°C	R2 ToughFlex High-flex	MEGA :140 FINE :40	ULTRA :110 SUPER :80 TURBO:60 HSP :13	ø0.005 Gold wire	FU-49U Approx. 4 g	[P.46]
ø3	1 m Free-cut (ø1.0x2) -40 to +50°C					FU-48U Approx. 4 g	[P.46]
M3	1 m Free-cut (ø1.0x2) -40 to +50°C					FU-69U Approx. 4 g	[P.47]
ø1.5	1 m cut not allowed -40 to +70°C	R4 High-flex	MEGA :150 FINE :32	ULTRA :100 SUPER :80 TURBO:54 HSP :22		FU-49X Approx. 3 g	[P.46]
M3	1 m cut not allowed -40 to +70°C					FU-69X Approx. 3 g	[P.47]
ø3	2 m Free-cut (ø1.0x2) -40 to +70°C					FU-48 Approx. 7 g	[P.46]
M4	2 m Free-cut (ø1.0x2) -40 to +70°C				FU-68 Approx. 8 g	[P.47]	

\*1 When using the FS-N Series, Standard target: White mat paper (Reflective type only.)

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

### HeatResistant



Suited for use at high object detection temperatures of up to 350°C.

Heat resistant temperature <sup>*3</sup>	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
			MEGA FINE	Other power modes			
100°C <sup>*4</sup>	2 m Free-cut (ø2.2x2) -40 to +100°C	R5 ToughFlex	MEGA :740 FINE :160	ULTRA :580 SUPER :410 TURBO:320 HSP :90	ø0.005 Gold wire	FU-85Z Approx. 25 g	[P.48]
105°C <sup>*4</sup>	2 m Free-cut (ø2.2x2) -40 to +105°C	R25	MEGA :1100 FINE :230	ULTRA :860 SUPER :590 TURBO:410 HSP :140		FU-85A Approx. 21 g	[P.48]
150°C <sup>*5</sup>	2 m Free-cut (ø2.2x2) -40 to +150°C	R20	MEGA :720 FINE :160	ULTRA :560 SUPER :410 TURBO:320 HSP :90		FU-85H Approx. 35 g	[P.48]
180°C <sup>*6</sup>	2 m Free-cut (ø2.2x2) -60 to +180°C	R35	MEGA :860 FINE :200	ULTRA :710 SUPER :470 TURBO:350 HSP :100		FU-87 Approx. 33 g	[P.48]
200°C	1 m cut not allowed -40 to +200°C	R8	MEGA :770 FINE :190	ULTRA :650 SUPER :450 TURBO:340 HSP :100		FU-87K Approx. 15 g	[P.48]
300°C	1 m cut not allowed -40 to +300°C	R25				FU-82C Approx. 29 g	[P.48]
	1 m cut not allowed -40 to +300°C				FU-83C Approx. 23 g	[P.48]	
350°C	1 m cut not allowed -30 to +350°C		MEGA :650 FINE :140	ULTRA :560 SUPER :390 TURBO:290 HSP :86	FU-81C Approx. 24 g	[P.48]	
180°C <sup>*6</sup>	2 m Free-cut (ø2.2x2) -40 to +180°C	R35	MEGA :2.5 to 65 FINE :2.5 to 16	ULTRA :2.5 to 55 SUPER :2.5 to 27 TURBO:2.5 to 22 HSP :2.5 to 10	FU-38H Approx. 45 g	[P.45]	
250°C	1 m cut not allowed -40 to +250°C	R25			FU-38K Approx. 45 g	[P.45]	
	2 m cut not allowed -40 to +250°C				FU-38LK Approx. 70 g	[P.45]	

\*1 When using the FS-N Series, Standard target: White mat paper (Reflective type only). (FU-38LK shows values for t=0.7 mm glass substrate (horizontal direction).)

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

\*3 Use the fibreoptic sensor under dry conditions. Allow some margin for the temperature upper limit when selecting a heat-resistant fibre unit.

\*4 The recommended maximum ambient temperature during operation is 90°C when constantly using a fibre unit in a high-temperature environment.

\*5 The recommended maximum ambient temperature during operation is 130°C when constantly using a fibre unit in a high-temperature environment.

\*6 The recommended maximum ambient temperature during operation is 150°C when constantly using a fibre unit in a high-temperature environment.

neoPRESET

LV-neo

Specifications

Dimensions

FS-neo&FU

Specifications

Dimensions

PS-neo

Specifications

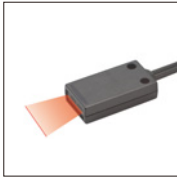
Dimensions

NU series

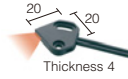
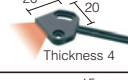
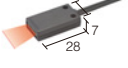


## Reflective model Dedicated application type

### Area



Useful in situations where target position varies.

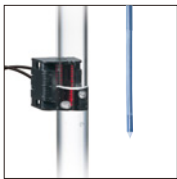
Type	Detecting width	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
				MEGA FINE	Other power modes			
Array	10 mm (Detecting distance is 4 mm)	2 m Free-cut (ø2.2x2) -40 to +70°C 	R4 <sup>*3</sup>	MEGA : 740 FINE : 140	ULTRA : 460 SUPER : 260 TURBO : 180 HSP : 60	ø0.005 Gold wire	FU-A05D Approx. 20 g	[P.49]
	15 mm (Detecting distance is 4 mm)	2 m Free-cut (ø2.2x2) -40 to +70°C 					FU-A10D Approx. 20 g	[P.49]
Area	15 mm (At detecting distance of 15 mm)	2 m Free-cut (ø2.2x2) -40 to +70°C 	R25	MEGA : 5 to 200 FINE : 5 to 140	ULTRA : 5 to 200 SUPER : 5 to 200 TURBO : 5 to 160 HSP : 5 to 110	ø0.1 Gold wire	FU-11 Approx. 19 g	[P.44]

\*1 When using the FS-N Series. Standard target: White mat paper (Reflective type only).




\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

\*3 R10 for the first 10 mm of cable from the housing.

### Liquid-level



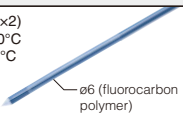
Liquid-level sensors are available in tube-mountable and immersible types.

Detecting method	Transparent tube diameter (mm)	Beam axis	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Accessory	Model / Weight	Dimensions
Tube mountable	ø4 to 26	16	2 m Free-cut (ø2.2x2) -40 to +70°C 	R5	Binding bandx2 Nonslip rubberx2	FU-95S Approx. 23 g	[P.48]
		1	2 m Free-cut (ø1.0x2) -40 to +50°C FU-95Z : -40 to +50°C FU-95HA : -40 to +105°C* FU-95 : -40 to +70°C 	R2 ToughFlex	Binding bandx2 Nonslip rubberx2 Spacerx2 Screwx2 Nutx2	FU-95Z Approx. 7 g	[P.48]
			R10	FU-95HA Approx. 7 g		[P.48]	
	R10	FU-95 Approx. 7 g	[P.48]				
	More than ø26 is recommended	16	2 m Free-cut (ø2.2x2) -40 to +70°C 	R5	None (Optionally available)	FU-95W Approx. 20 g	[P.49]

\* The recommended maximum ambient temperature during operation is 90°C when constantly using a fibre unit in a high-temperature environment.

### Benefits!

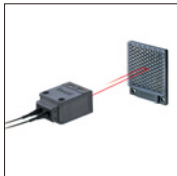
Though a single beam axis was utilised in the past, this resulted in mis-detection caused by air bubbles, droplets, and other problems. The 16 beam axis is a suitable countermeasure for these types of problems.

Detecting method	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Minimum bend radius (mm)		Model / Weight	Dimensions
		PFA-sheathed section	Fibre		
Immersion	2 m Free-cut (ø1.3x2) -40 to +50°C FU-93Z : -40 to +50°C FU-93 : -40 to +70°C 	R40*	R0.5 ToughFlex	FU-93Z Approx. 78 g	[P.48]
			R25	FU-93 Approx. 78 g	[P.48]

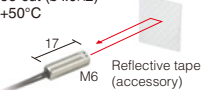
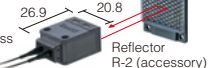
\* Not bendable up to 80 mm from the tip.

## Retro-reflective Type Transparent object detection type

### Retro-reflective



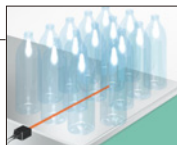
Reflectors enable stable detection with reduced installation time.

Appearance	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm)*		Model / Weight	Dimensions
			MEGA FINE	Other power modes		
M6	2 m Free-cut (ø1.0x2) -40 to +50°C 	R2 ToughFlex	MEGA : 10 to 960 FINE : 10 to 120	ULTRA : 10 to 760 SUPER : 10 to 380 TURBO : 10 to 230 HSP : -	FU-13 Approx. 8 g	[P.44]
Square type	2 m Free-cut (ø1.0x2) -20 to +55°C Thickness 12.6 	R10	MEGA : 100 to 6400 FINE : 100 to 1260	ULTRA : 100 to 5000 SUPER : 100 to 2500 TURBO : 100 to 1690 HSP : 100 to 1000	FU-15 Approx. 12 g	[P.44]

\* When using the FS-N Series.

### Benefits!

The optics of the FU-15 suppress the effects of refraction and deflection for stable detection of liquid-filled PET bottles and other objects. The FU-15 has an IP67 enclosure rating.



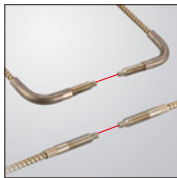
Retro-reflective/Transparent Object Detection

Reflector/Reflective Tape Specifications (Optional Parts)

Model	Power mode	R-2 (OP-95388) 51.2x61 mm	R-3 (OP-96436) 35x42 mm	R-5 14x36 mm	Reflective tape (OP-96629) 40x30 mm
FU-13	MEGA (mm)	10 to 1880	10 to 1540	10 to 1060	10 to 960
	ULTRA (mm)	10 to 1500	10 to 1240	10 to 860	10 to 760
	SUPER (mm)	10 to 760	10 to 640	10 to 440	10 to 380
	TURBO (mm)	10 to 450	10 to 360	10 to 230	10 to 230
	FINE (mm)	10 to 250	10 to 200	10 to 130	10 to 120
	HSP (mm)	-	-	-	-
FU-15 <sup>*1</sup>	MEGA (mm)	100 to 6400	100 to 4400	100 to 2600	-
	ULTRA (mm)	100 to 5000	100 to 3600	100 to 2200	-
	SUPER (mm)	100 to 2500	100 to 2000	100 to 1500	-
	TURBO (mm)	100 to 1690	100 to 1350	100 to 1200	-
	FINE (mm)	100 to 1260	100 to 1000	100 to 1000	-
	HSP (mm)	100 to 1000	100 to 860	100 to 860	-

\*1 Reflective tape cannot be used.

Vacuum environment type (Thrubeam)



Previously requested vacuum type is added to the lineup.

Detecting method	Type	Heat resistant temperature	Fibre unit length (Diameter) Ambient temperature Appearance (mm)	Cable bend radius (mm)	Detecting distance (mm) <sup>*1</sup>		Minimum Detectable object (mm) <sup>*2</sup>	Model / Weight	Dimensions
					MEGA FINE	Other power modes			
Thrubeam type	Vacuum side	350°C	1 m cut not allowed -40 to +350°C 	R25	MEGA : 1300 FINE : 270	ULTRA : 720 SUPER : 500 TURBO : 360 HSP : 135	ø0.005 Opaque	FU-V84 <b>NEW</b> Approx. 55 g	[P.50]
		350°C	1 m cut not allowed -40 to +350°C 					FU-V84L <b>NEW</b> Approx. 60 g	[P.50]
	Atmosphere side	70°C	2 m Free-cut (ø2.2) -40 to +70°C 					FU-V7FN <b>NEW</b> Approx. 30 g	[P.50]

\*1 Common for APC ON/OFF when the FS-N Series is used.

\*2 The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

Detecting method	Heat resistant temperature	Ambient temperature Appearance (mm)	Material	Accessory	Model / Weight	Dimensions
Optical integrator thrubeam 1 set connection type	200°C	-10 to +200°C 	Unit housing: SUS304 Fibre: Multicomponent glass	·M5 nut, spring washer, washer: 2 each: SUS304 ·2 O-rings: Fluoro-rubber	FU-VJ1 <b>NEW</b> Approx. 25 g	[P.50]

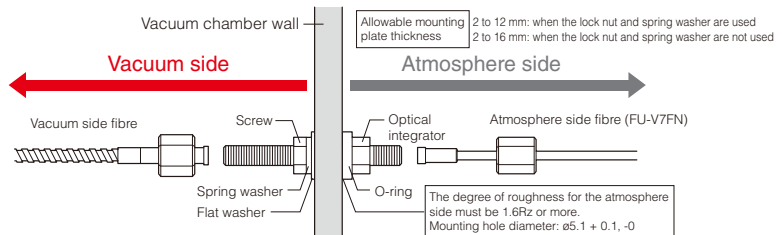
Detecting method	Heat resistant temperature	Ambient temperature Appearance (mm)	Applicable fibre units	Detecting distance (mm) <sup>*3</sup>						Model / Weight	Dimensions
				MEGA	ULTRA	SUPER	TURBO	FINE	HSP		
For vacuum long-distance Lens	350°C	-10 to +350°C 	FU-V84 FU-V84L	5600	4000	2600	1800	1200	600	F-V2 <b>NEW</b> Approx. 2 g	[P.50]

\*3 Common for APC ON/OFF when the FS-N Series is used.

Detecting method	Heat resistant temperature	Ambient temperature Appearance (mm)	Features	Material/Accessory	Model / Weight	Dimensions
2 channel chamber flange	200°C	-10 to +200°C 	·2 sets of optical integrators are connectable. ·External diameter ø70 and O-ring ø40. Refer to the dimensions for the appearance.	[Material] SUS304 [Accessory] 1xO-ring Material: Fluoro-rubber	FU-VJ2 <b>NEW</b> Approx. 280 g	[P.50]


How to mount the optical integrator

The optical integrator seals and isolates the vacuum and atmosphere sides while still transmitting light from the vacuum fibre to the atmosphere fibre. All optical integrators have been leak tested. (Leak amount: 1x10<sup>-10</sup>Pa·m<sup>3</sup>/sec max, at helium leak test)




# Amplifier


## Cable type

Type		Appearance	Model		Control outputs	External input	Monitor output	Dimensions
			NPN output	PNP output				
Standard	Main unit		FS-N11N	FS-N11P	1	0	0	[P.52]
	Expansion unit		FS-N12N	FS-N12P				
2 output	Main unit		FS-N13N	FS-N13P	2	1	0	
	Expansion unit		FS-N14N	FS-N14P				
Monitor output	Main unit	FS-N11MN	-	1	0	1		

## M8 connector type

Type		Appearance	Model		Control outputs	External input	Monitor output	Dimensions
			NPN output	PNP output				
Standard	Main unit		FS-N11CN	FS-N11CP	1	1	0	[P.52]
	Expansion unit		FS-N12CN	FS-N12CP				
2 output	Main unit		-	FS-N13CP	2	0	0	
	Expansion unit		-	FS-N14CP				

## Zero line type

Type	Appearance	Model	Control outputs	External input	Monitor output	Dimensions
Expansion unit (No output line)		FS-N10	None*1	0	0	[P.53]

\*1 Counted as one output when added to a NU Series communication unit.

## Specifications

Type		Standard 1 output				High functionality 2 output				Monitor output	Zero line
Cable/M8 connector		Cable		M8 connector *1		Cable		M8 connector *1		Cable	-
Main/Expansion unit		Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit (No output wire)
Model	NPN	FS-N11N	FS-N12N	FS-N11CN	FS-N12CN	FS-N13N	FS-N14N	-	-	FS-N11MN	FS-N10
	PNP	FS-N11P	FS-N12P	FS-N11CP	FS-N12CP	FS-N13P	FS-N14P	FS-N13CP	FS-N14CP	-	
I/O	Control outputs	1 output	1 output	1 output	1 output	2 output	2 output	2 output	2 output	1 output	None*2
	Monitor output (1 to 5 V)	-	-	-	-	-	-	-	-	1 output	-
	External input	-	-	1 input	1 input	1 input	1 input	-	-	-	-
Light source LED		Red, 4-element LED (Wavelength: 630 nm)									
Response time		50 μs (HIGH SPEED)/250 μs (FINE)/500 μs (TURBO)/1 ms (SUPER)/4 ms (ULTRA)/16 ms (MEGA)									
Output selection		LIGHT-ON/DARK-ON (switch-selectable)									
Timer function		Timer OFF/OFF-delay timer/ON-delay timer/One-shot timer									
Control outputs	NPN output	NPN open connector 24 V, (without expansion) for one output: 100 mA max., two output total: 100 mA max., (with expansion) 20 mA max for one output, residual voltage 1 V max.									
	PNP output	PNP open connector 24 V, (without expansion) for one output: 100 mA max., two output total: 100 mA max., (with expansion) 20 mA max for one output, residual voltage 1 V max.									
Monitor output*3		1 to 5 V voltage output; load resistance 10 kΩ or more; repeat precision ±0.5% of F.S.; response time: 1 ms (HIGH SPEED, FINE, TURBO)*4									
External input		Input time 2 ms (ON)/20 ms (OFF) or more*5									
Multiple connections to expansion units		Up to 16 units can be connected in total (two-output type is treated as two units)									
Protection circuit		Reverse polarity protection, Over-current protection, Surge absorber									
Number of interference prevention units		0 for HIGH SPEED; 4 for FINE; 8 for TURBO/SUPER/ULTRA/MEGA (When set to DOUBLE, the number of interference-prevention units will be doubled.)									
Rating	Power voltage	12 to 24 VDC ±10% ripple (P-P) 10% or less									
	NPN	Normal: 900 mW or less (36 mA max. at 24 V, 48 mA max. at 12 V)*6 Eco on mode: 800 mW or less (32 mA max. at 24 V, 39 mA max. at 12 V)*6 Eco Full mode: 470 mW or less (19 mA max. at 24 V, 23 mA max. at 12 V)									
	PNP	Normal: 950 mW or less (39 mA max. at 24 V, 52 mA max. at 12 V)*6 Eco on mode (ALL): 850 mW or less (35 mA max. at 24 V, 44 mA max. at 12 V)*6 Eco Full mode: 520 mW or less (21 mA max. at 24 V, 26 mA max. at 12 V)					Normal: 1050 mW or less (42 mA max. at 24 V, 56 mA max. at 12 V)*6 Eco on mode (ALL): 950 mW or less (38 mA max. at 24 V, 47 mA max. at 12 V)*6 Eco Full mode: 600 mW or less (24 mA max. at 24 V, 29 mA max. at 12 V)				
Environmental resistance	Ambient light	Incandescent lamp: 20,000 lux max., Sunlight: 30,000 lux max.									
	Ambient temperature	-20°C to +55°C (No freezing)*7									
	Relative humidity	35 to 85% RH (No condensation)									
	Vibration resistance	10 to 55 Hz, double amplitude 1.5 mm, 2 hours for each of X,Y,Z axis									
	Shock resistance	500 m/s <sup>2</sup> 3 times for each of X,Y and Z axis									
Case material		Main unit and cover material: Polycarbonate									
Case size		H 30.3 mm x W 9.8 mm x L 71.8 mm									
Weight		Approx. 75 g	Approx. 45 g	Approx. 22 g	Approx. 22 g	Approx. 80 g	Approx. 70 g	Approx. 22 g	Approx. 22 g	Approx. 75 g	Approx. 20 g

\*1 Use a cable length of 30 m or less for M8 connector type. \*2 Counted as one output when added to a NU Series communication unit.

\*3 FS-N11MN only. \*4 SUPER : 1.2 ms, ULTRA : 1.8 ms, MEGA : 4.2 ms. \*5 Input time is 25 ms (ON)/25 ms (OFF) when external calibration time is selected.

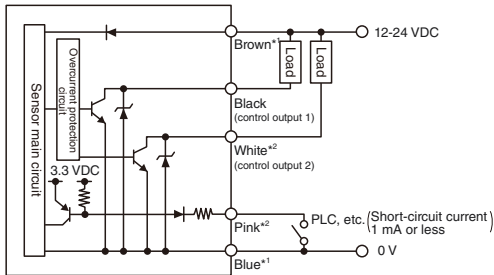
\*6 Increases 100 mW (4.0 mA) for HIGH SPEED mode.

\*7 One or two more units connected: -20 to +55°C ; 3 to 10 more units connected: -20 to +50°C; 11 to 16 more units connected: -20 to +45°C. When using 2-outputs, one unit is counted as two units. All temperature regulations are for when the unit is mounted on a DIN rail and installed on metal sheeting.

I/O Circuit Diagram

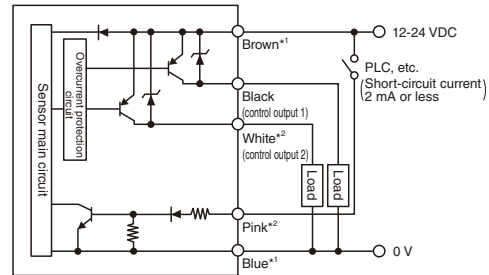
Cable type

FS-N11N / N12N / N13N / N14N



\*1 FS-N11N / N13N only  
\*2 FS-N13N / N14N only

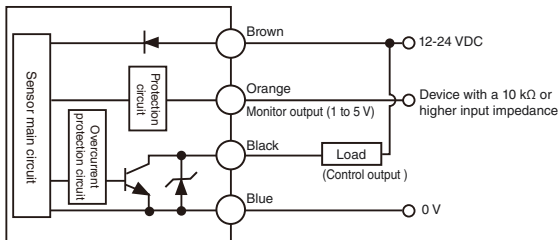
FS-N11P / N12P / N13P / N14P



\*1 FS-N11P / N13P only  
\*2 FS-N13P / N14P only

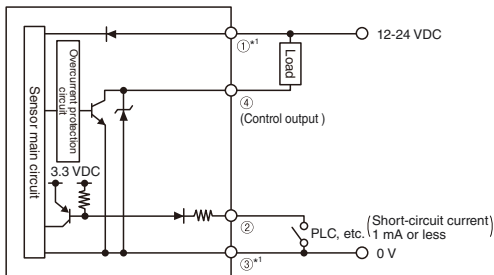
Monitor output type

FS-N11MN



M8 connector type

FS-N11CN / N12CN

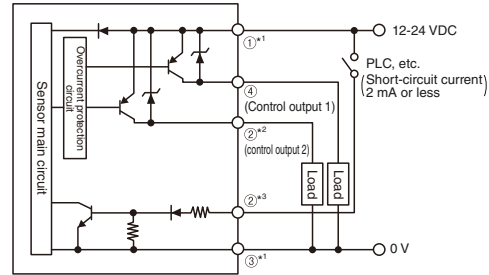


\*1 FS-N11CN only

M8 connector pin layout



FS-N11CP / N12CP / N13CP / N14CP



\*1 FS-N11CP/N13CP only  
\*2 FS-N13CP/N14CP only  
\*3 FS-N11CP/N12CP only

M8 connector pin layout

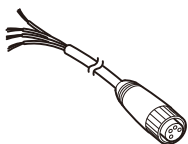


M8 Connector Cable (sold separately)

FS-N11Cx / N12Cx / N13CP / N14CP

OP-73864 (Cable length: 2 m)

OP-73865 (Cable length: 10 m)



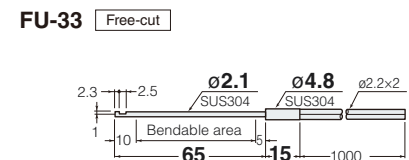
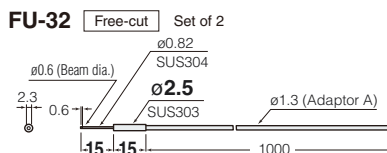
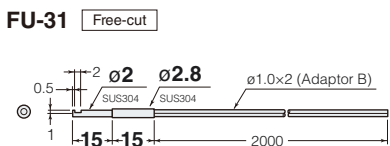
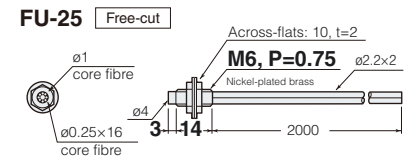
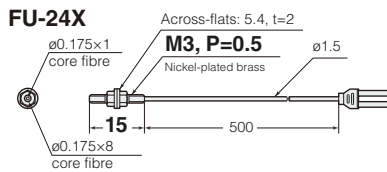
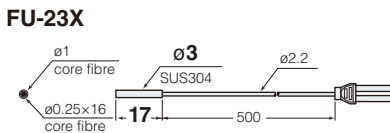
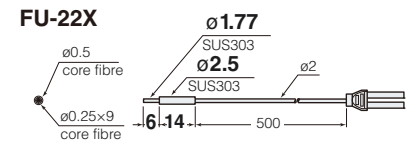
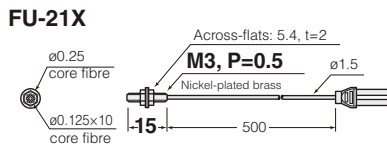
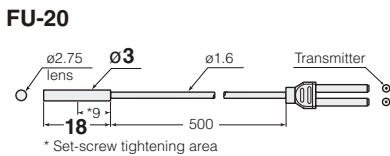
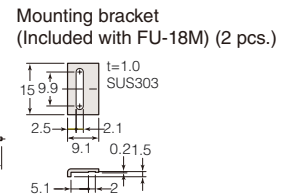
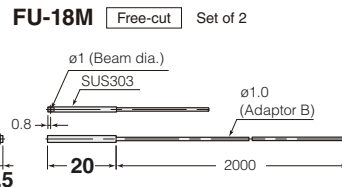
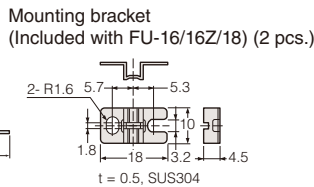
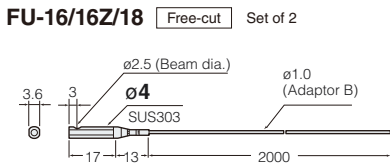
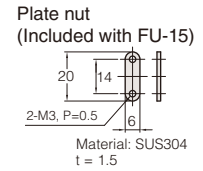
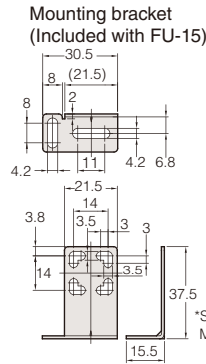
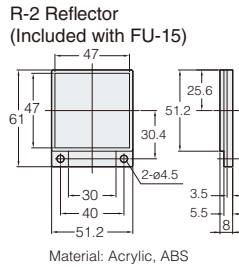
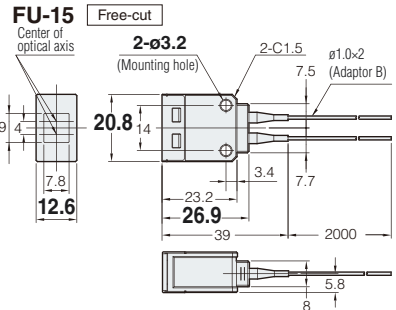
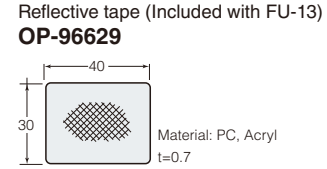
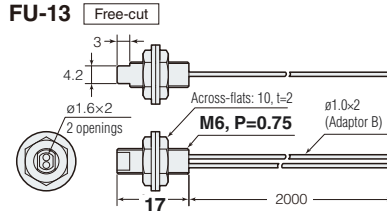
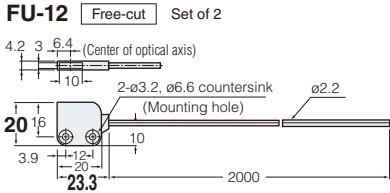
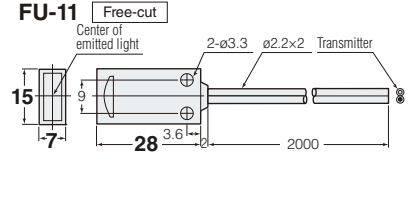
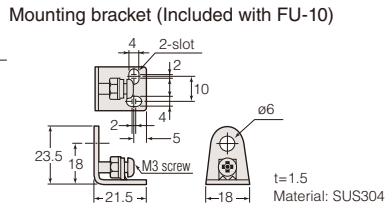
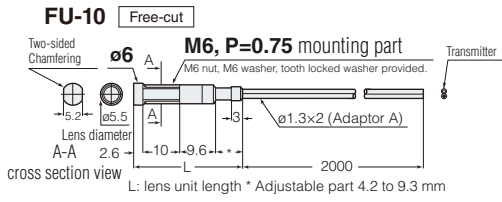
Pin - wire color

Connected pin number	Core wire cover color
①	Brown
②	White
③	Blue
④	Black

M8 connector junction cable (sold separately)

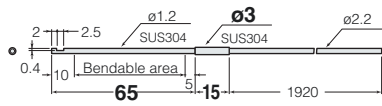
OP-85498



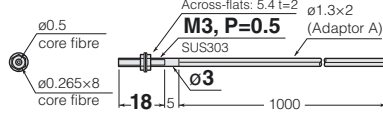




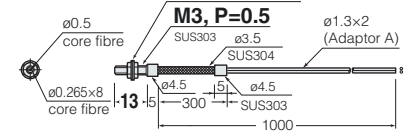
**FU-34** Free-cut Set of 2



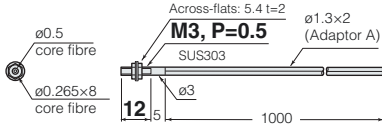
**FU-35FA** Free-cut



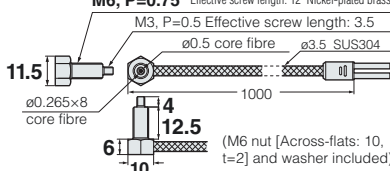
**FU-35FG** Free-cut



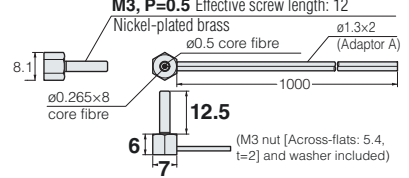
**FU-35FZ** Free-cut



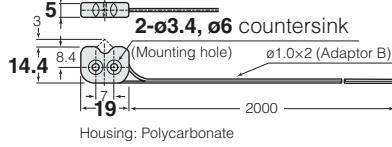
**FU-35TG**



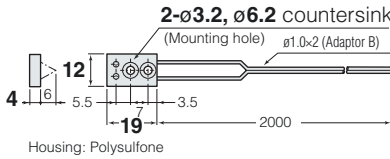
**FU-35TZ** Free-cut



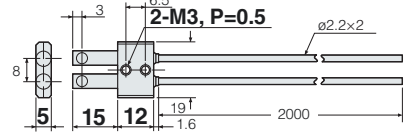
**FU-37** Free-cut



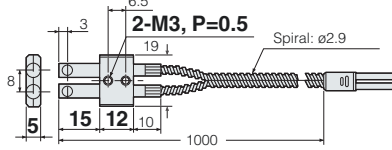
**FU-38** Free-cut



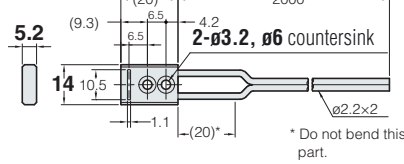
**FU-38H** Free-cut



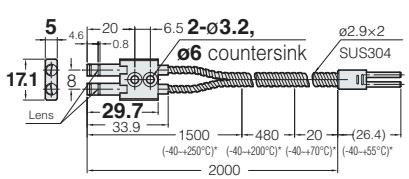
**FU-38K**



**FU-38L** Free-cut

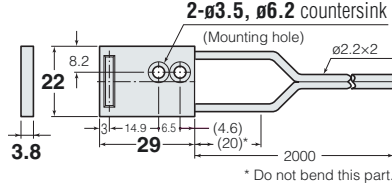


**FU-38LK**

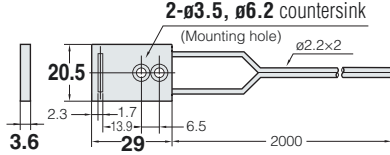


\* Maximum temperature resistance for each part is shown in ( ).

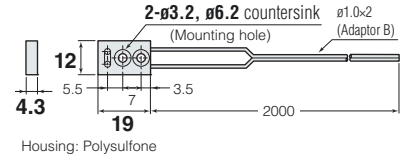
**FU-38R** Free-cut



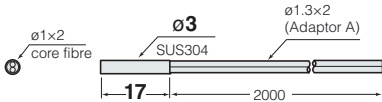
**FU-38S** Free-cut



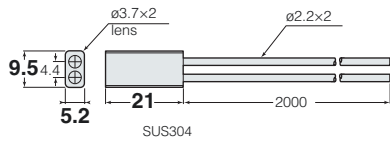
**FU-38V** Free-cut



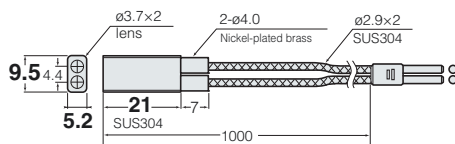
**FU-4F/4FZ** Free-cut



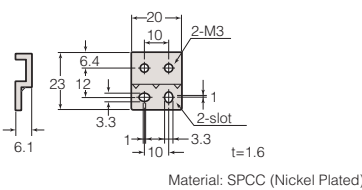
**FU-40** Free-cut



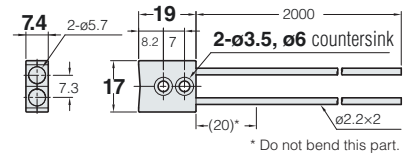
**FU-40G**



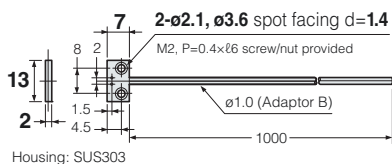
Mounting bracket (Included with FU-40/40G)



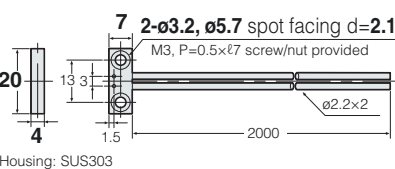
**FU-40S** Free-cut



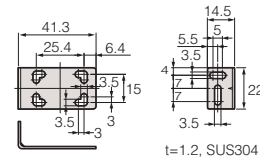
**FU-41TZ** Free-cut



**FU-42TZ** Free-cut



Mounting bracket (Included with FU-42TZ)



neoPRESET

LV-neo

Specifications  
Dimensions

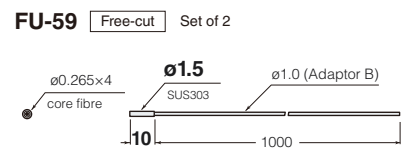
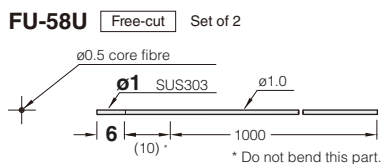
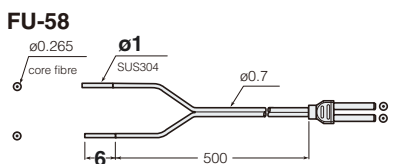
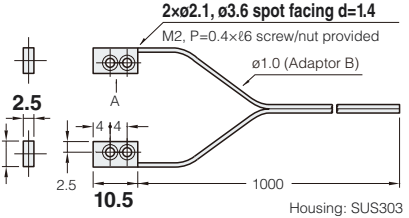
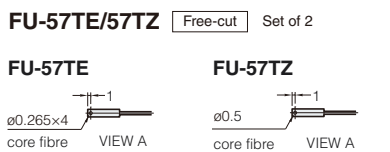
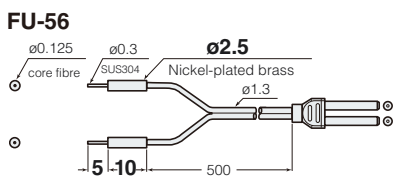
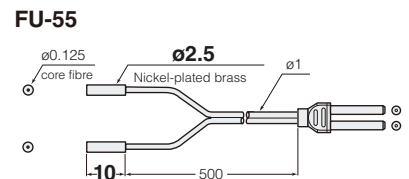
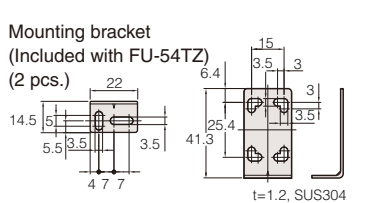
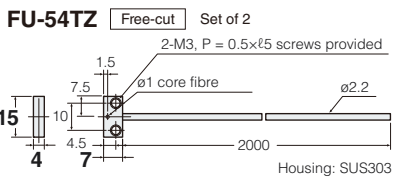
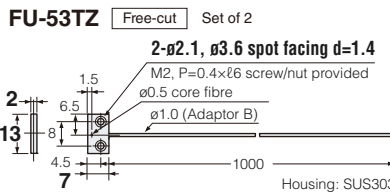
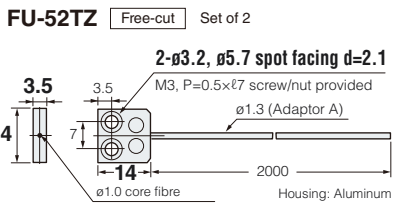
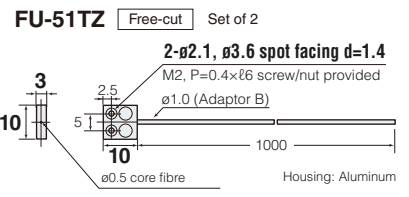
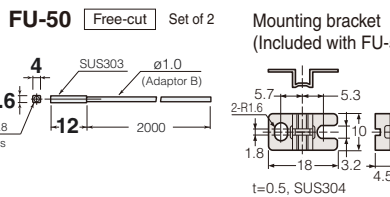
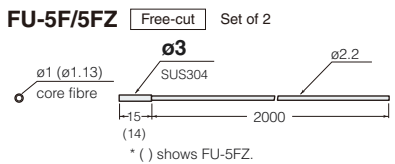
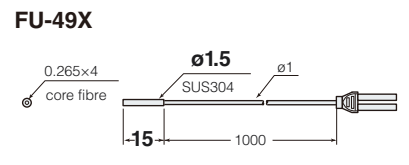
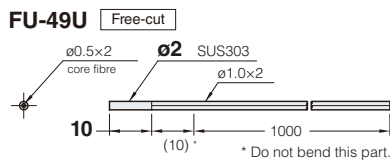
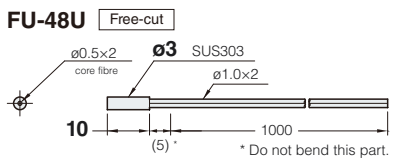
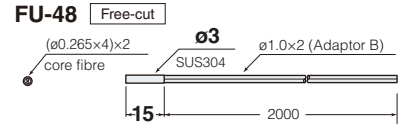
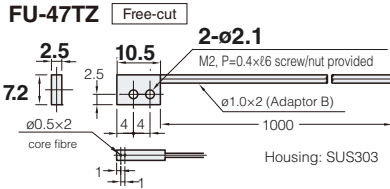
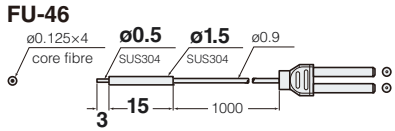
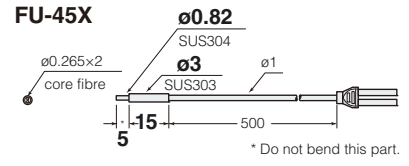
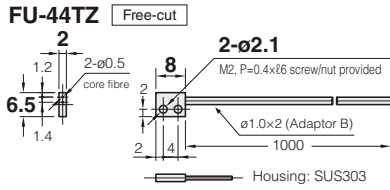
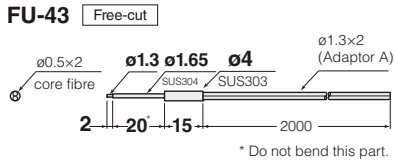
FS-neo&FU

Specifications  
Dimensions

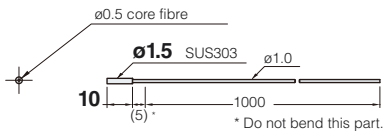
PS-neo

Specifications  
Dimensions

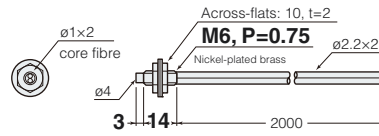
NU series



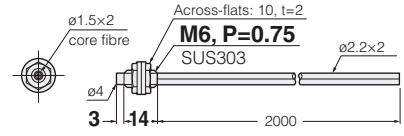
**FU-59U** Free-cut Set of 2



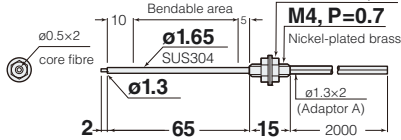
**FU-6F** Free-cut



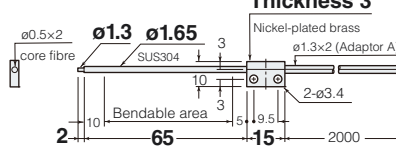
**FU-61/61Z** Free-cut



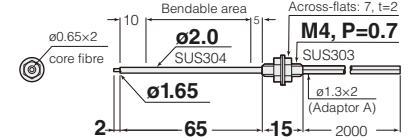
**FU-63** Free-cut



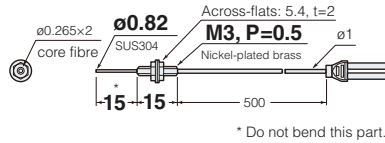
**FU-63T** Free-cut



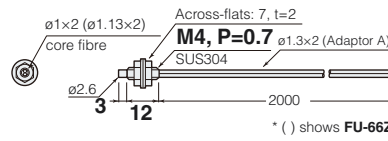
**FU-63Z** Free-cut



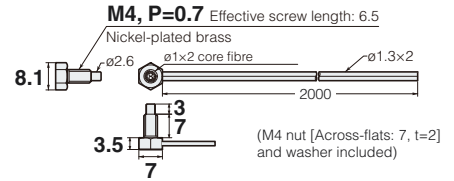
**FU-65X**



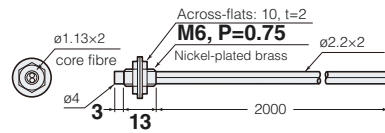
**FU-66/66Z** Free-cut



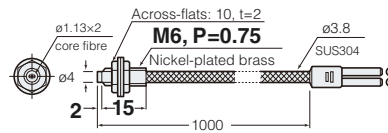
**FU-66TZ** Free-cut



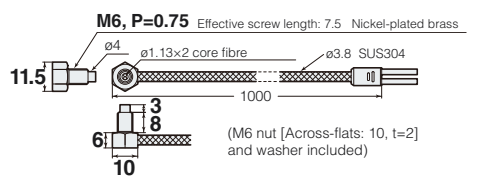
**FU-67/67V** Free-cut



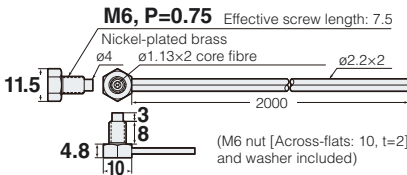
**FU-67G**



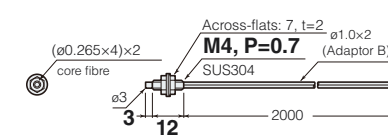
**FU-67TG**



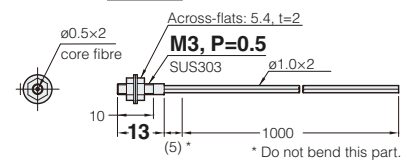
**FU-67TZ** Free-cut



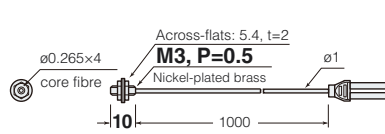
**FU-68** Free-cut



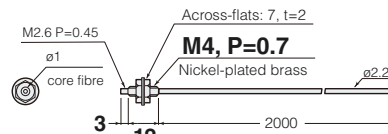
**FU-69U** Free-cut



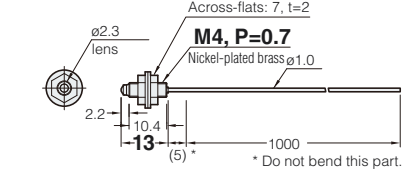
**FU-69X**



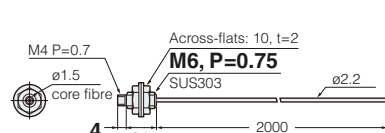
**FU-7F** Free-cut Set of 2



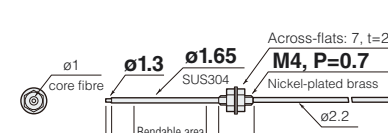
**FU-70U** Free-cut Set of 2



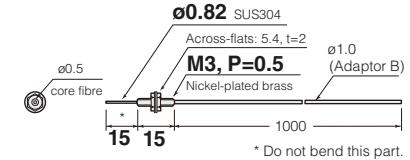
**FU-71/71Z** Free-cut Set of 2



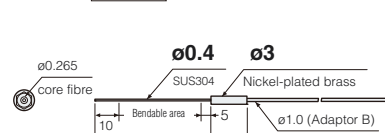
**FU-73** Free-cut Set of 2



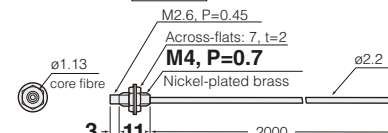
**FU-75F** Free-cut Set of 2



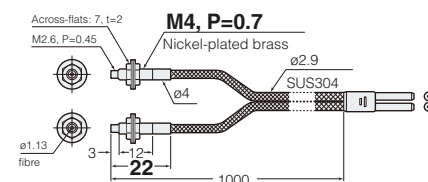
**FU-76F** Free-cut Set of 2



**FU-77/77V** Free-cut Set of 2



**FU-77G**



neoPRESET

LV-neo

Specifications

Dimensions

FS-neo&FU

Specifications

Dimensions

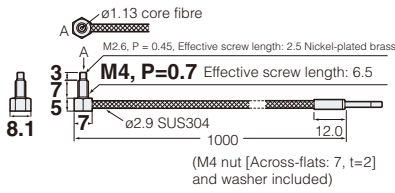
PS-neo

Specifications

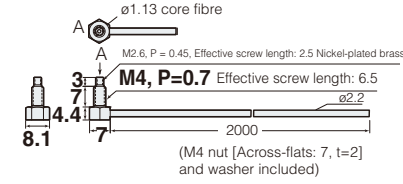
Dimensions

NU series

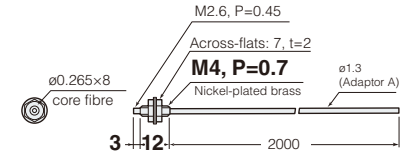
**FU-77TG** Set of 2



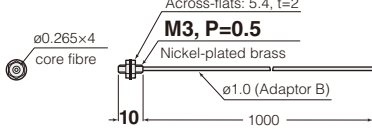
**FU-77TZ** Free-cut Set of 2



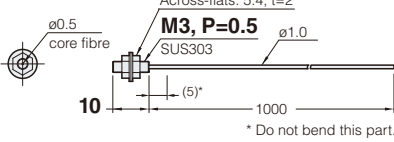
**FU-78** Free-cut Set of 2



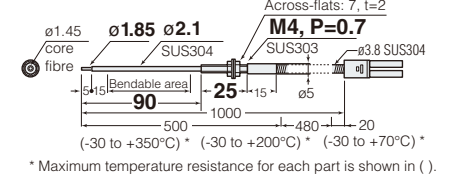
**FU-79** Free-cut Set of 2



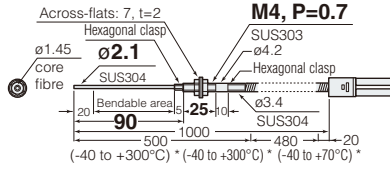
**FU-79U** Set of 2



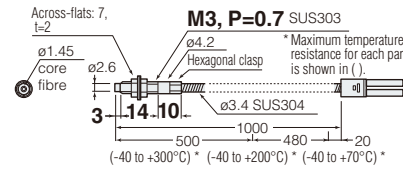
**FU-81C**



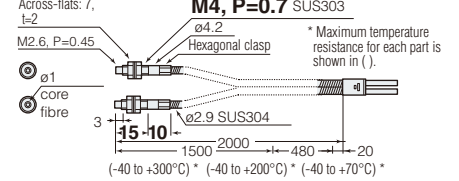
**FU-82C**



**FU-83C**

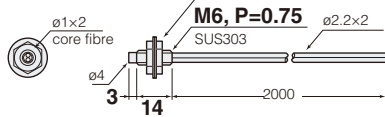


**FU-84C**

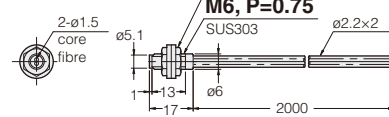


\* Maximum temperature resistance for each part is shown in ( ).

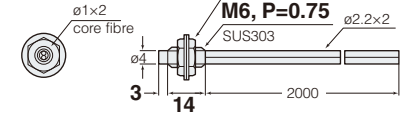
**FU-85A** Free-cut



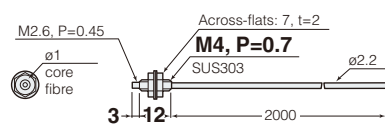
**FU-85H** Free-cut



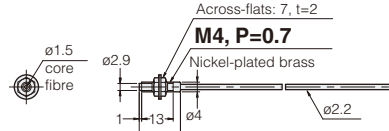
**FU-85Z** Free-cut



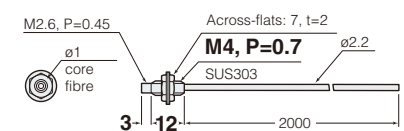
**FU-86A** Free-cut Set of 2



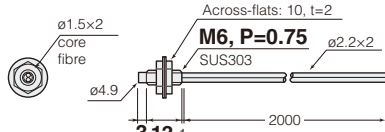
**FU-86H** Free-cut Set of 2



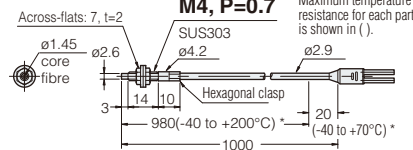
**FU-86Z** Free-cut Set of 2



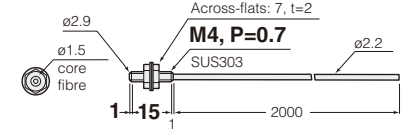
**FU-87** Free-cut



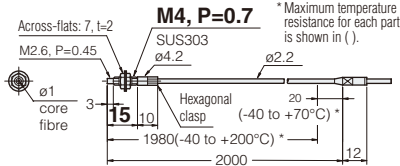
**FU-87K**



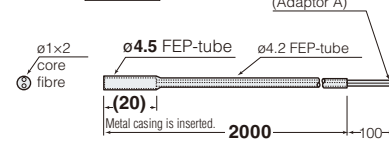
**FU-88** Free-cut Set of 2



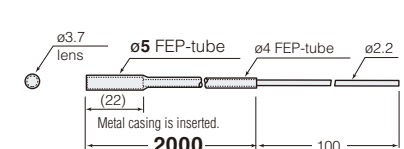
**FU-88K**



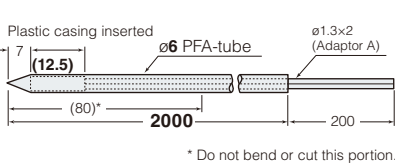
**FU-91** Free-cut



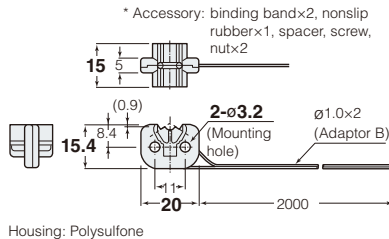
**FU-92** Free-cut Set of 2



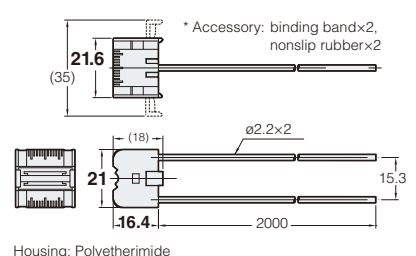
**FU-93/93Z** Free-cut



**FU-95/95HA/95Z** Free-cut

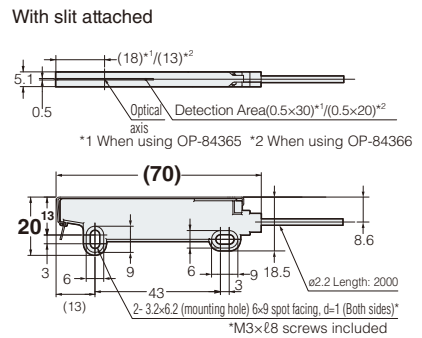
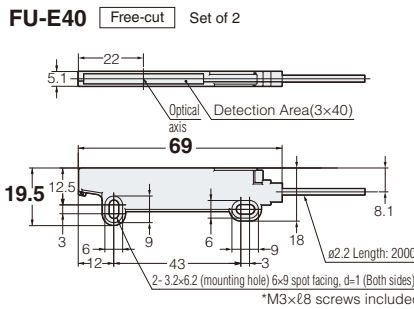
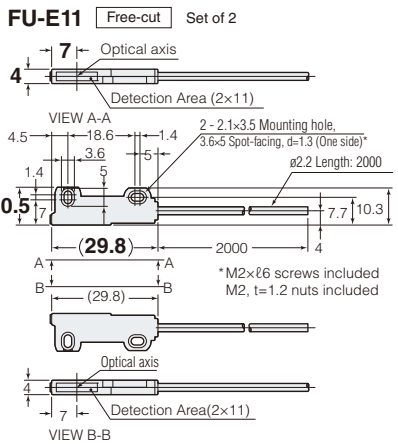
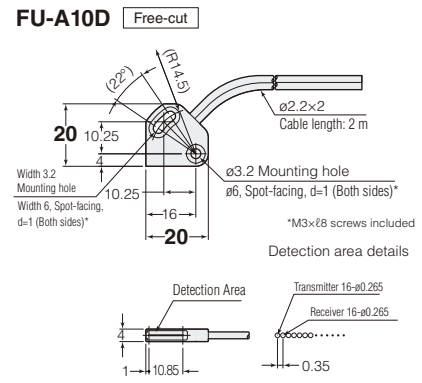
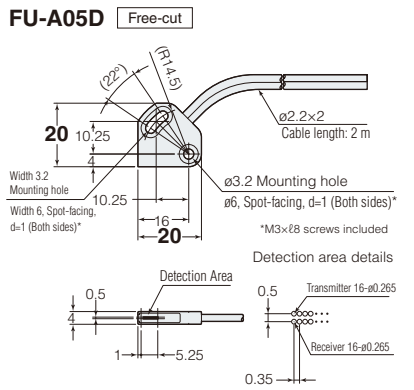
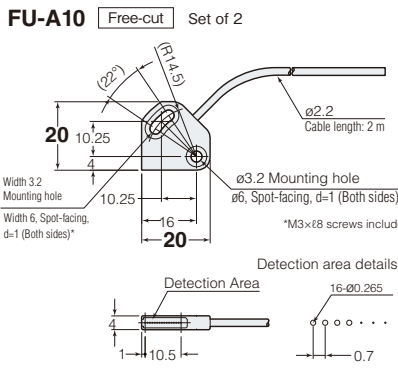
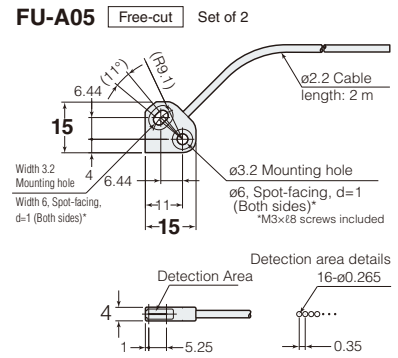
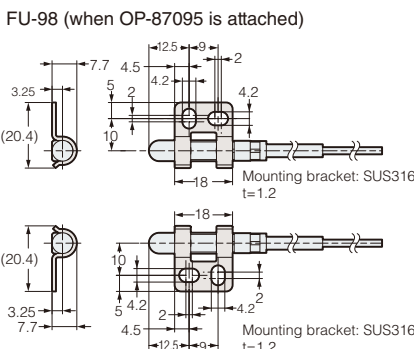
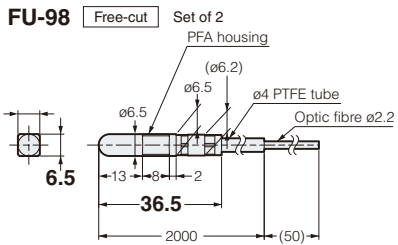
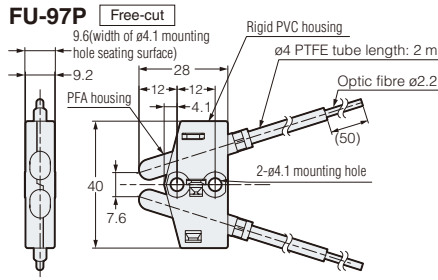
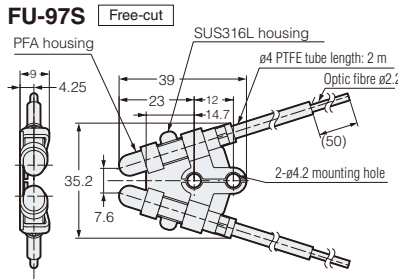
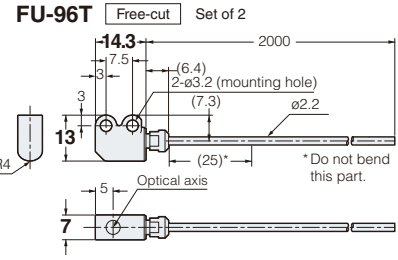
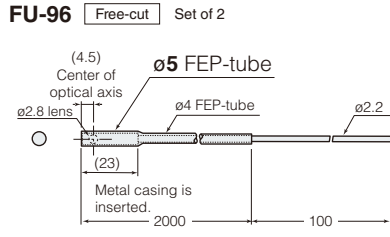
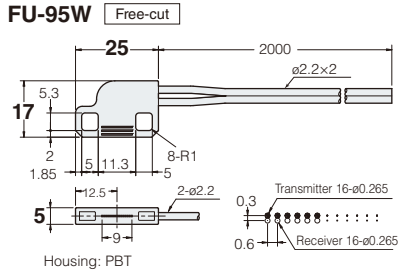


**FU-95S** Free-cut



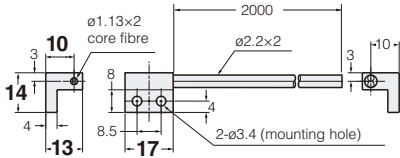
Housing: Polysulfone

Housing: Polyetherimide

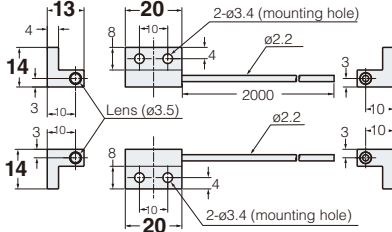




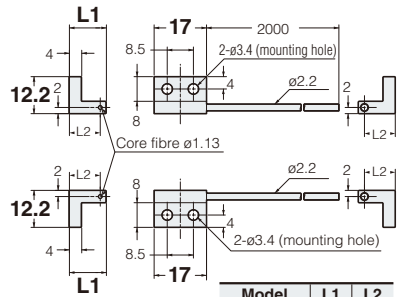
**FU-L41Z** Free-cut



**FU-L50Z** Free-cut Set of 2

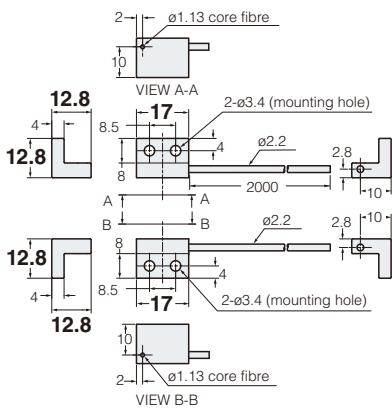


**FU-L51Z/L52Z/L53Z** Free-cut Set of 2

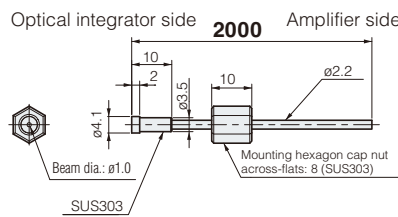


Model	L1	L2
FU-L51Z	12.2	10
FU-L52Z	17	15
FU-L53Z	22	20

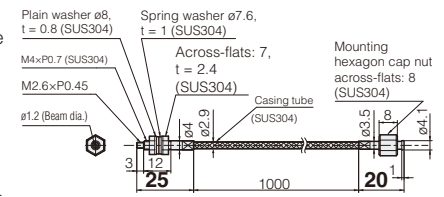
**FU-L54Z** Free-cut Set of 2



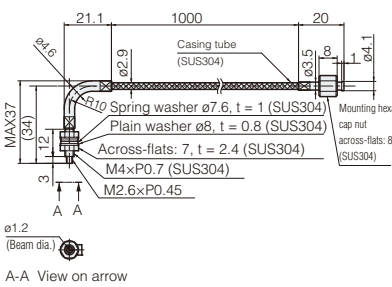
**FU-V7FN**



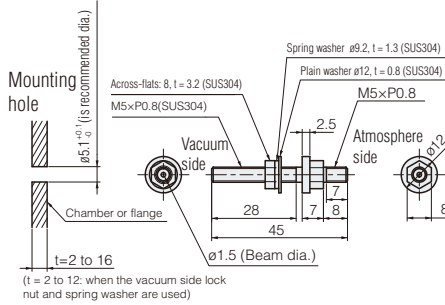
**FU-V84**



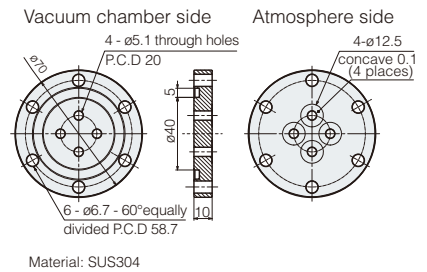
**FU-V84L**



**FU-VJ1**



**FU-VJ2**



**F-1** 2 per set

Housing: Nickel-plated brass  
Lens: Acrylic



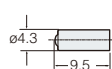
**F-2** 2 per set

Housing: Nickel-plated brass  
Lens: Glass



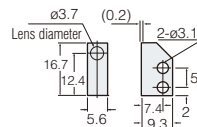
**F-4** 2 per set

Housing: Aluminum  
Lens: Glass



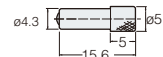
**F-5** 2 per set

Housing: Aluminum  
Lens: Glass



**F-2HA**

Housing: Aluminum  
Lens: Plastic



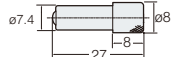
**F-3HA**

Housing: Aluminum  
Lens: Plastic



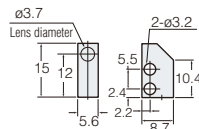
**F-4HA**

Housing: Aluminum  
Lens: Glass



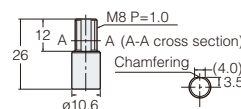
**F-5HA**

Housing: Aluminum  
Lens: Glass



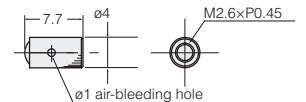
**F-6HA**

Housing: Aluminum  
Lens: Plastic



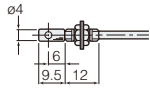
**F-V2** 2 per set

Housing: SUS304  
Lens: BK-7

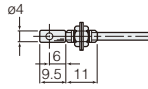


With lenses

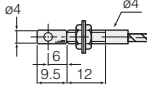
**F-1+  
FU-7F/86A/86Z**



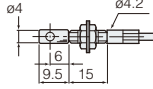
**F-1+  
FU-77/77V**



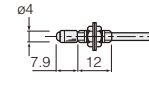
**F-1+  
FU-77G**



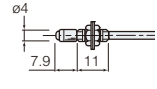
**F-1+  
FU-84C/88K**



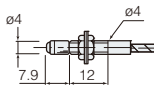
**F-2+  
FU-7F/86A/86Z**



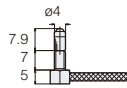
**F-2+  
FU-77/77V**



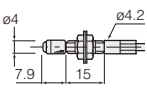
**F-2+  
FU-77G**



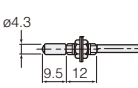
**F-2+  
FU-77TG**



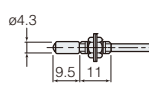
**F-2+  
FU-84C/88K**



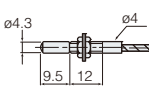
**F-4+  
FU-7F**



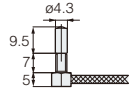
**F-4+  
FU-77/77V**



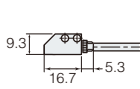
**F-4+  
FU-77G**



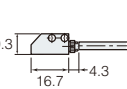
**F-4+  
FU-77TG**



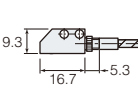
**F-5+  
FU-7F/86A/86Z**



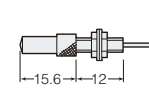
**F-5+  
FU-77/77V**



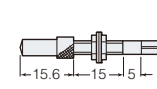
**F-5+  
FU-77G**



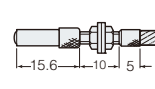
**F-2HA+  
FU-21X/FU-24X**



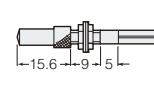
**F-2HA+  
FU-35FA**



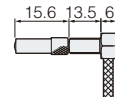
**F-2HA+  
FU-35FG**



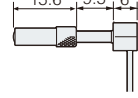
**F-2HA+  
FU-35FZ**



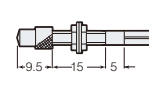
**F-2HA+  
FU-35TG**



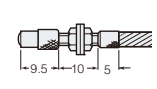
**F-2HA+  
FU-35TZ**



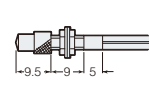
**F-3HA+  
FU-35FA**



**F-3HA+  
FU-35FG**



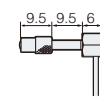
**F-3HA+  
FU-35FZ**



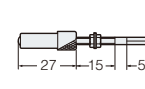
**F-3HA+  
FU-35TG**



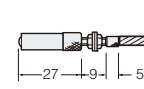
**F-3HA+  
FU-35TZ**



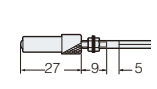
**F-4HA+  
FU-35FA**



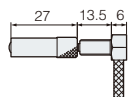
**F-4HA+  
FU-35FG**



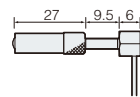
**F-4HA+  
FU-35FZ**



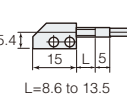
**F-4HA+  
FU-35TG**



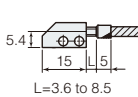
**F-4HA+  
FU-35TZ**



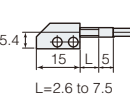
**F-5HA+  
FU-35FA**



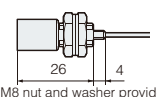
**F-5HA+  
FU-35FG**



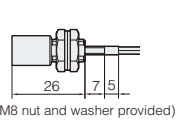
**F-5HA+  
FU-35FZ**



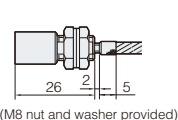
**F-6HA+  
FU-21X**



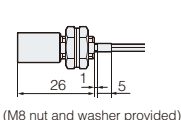
**F-6HA+  
FU-35FA**



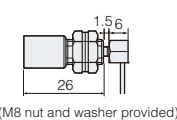
**F-6HA+  
FU-35FG**



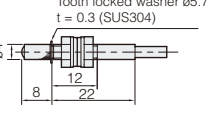
**F-6HA+  
FU-35FZ**



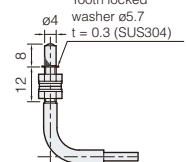
**F-6HA+  
FU-35TZ**



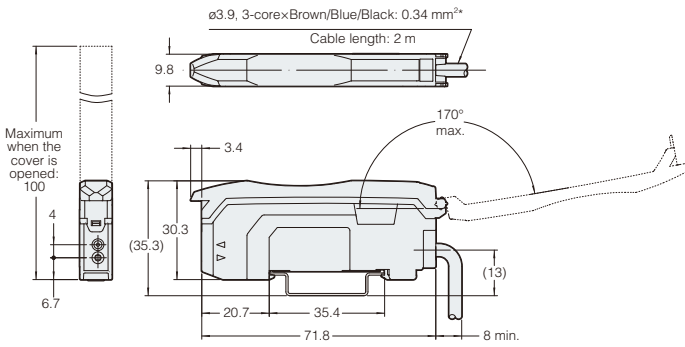
**F-V2+  
FU-V84**



**F-V2+  
FU-V84L**

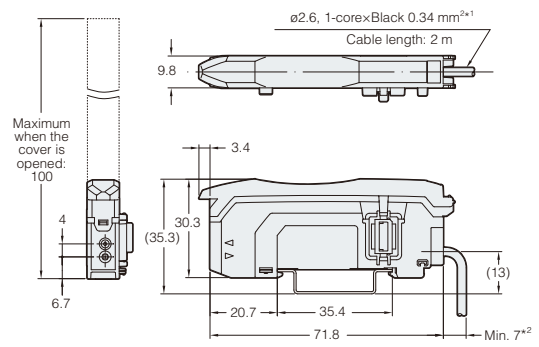


**FS-N11N / N11P / N13N / N13P / N11MN**  
Cable type, Main unit



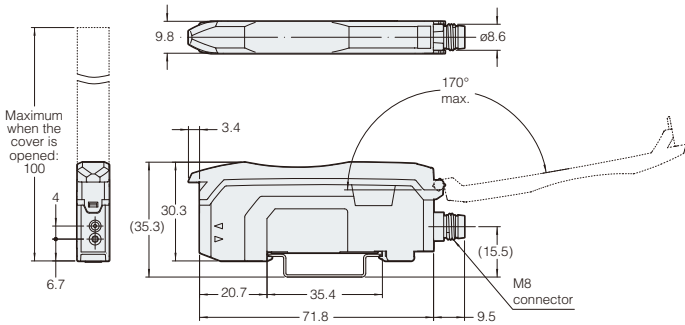
\*FS-N11MN:  $\phi 3.9$ , 4-core x Brown/Blue: 0.34 mm<sup>2</sup>, Black/Orange 0.18 mm<sup>2</sup>  
FS-N13N/N13P:  $\phi 3.9$ , 5-core x Brown/Blue: 0.34 mm<sup>2</sup>, Black/White/Pink 0.18 mm<sup>2</sup>

**FS-N12N / N12P / N14N / N14P**  
Cable type, Expansion unit

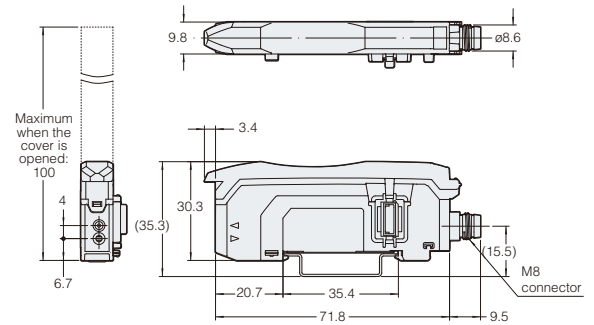


\*1 FS-N14N/N14P:  $\phi 3.9$ , 3-core x Black/White/Pink: 0.18 mm<sup>2</sup>  
\*2 FS-N14N/N14P: min. 8

**FS-N11CN / N11CP / N13CP**  
M8 connector type, Main unit

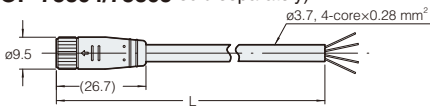


**FS-N12CN / N12CP / N14CP**  
M8 connector type, Expansion unit

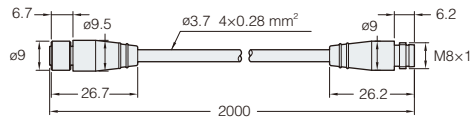


M8 connector cable (**OP-73864/73865** sold separately)

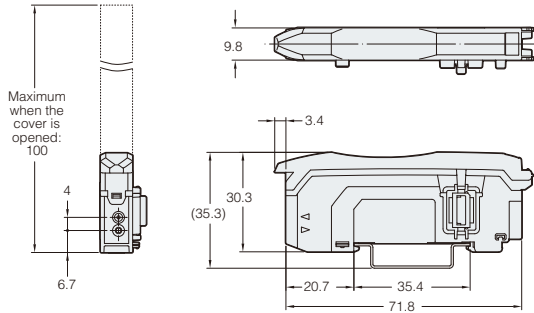
Cable length	L(m)
OP-73864	2
OP-73865	10



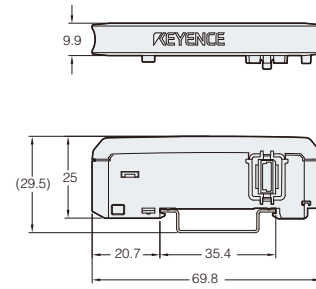
M8 connector junction cable (**OP-85498** sold separately)



**FS-N10**  
Zero line type, Expansion unit

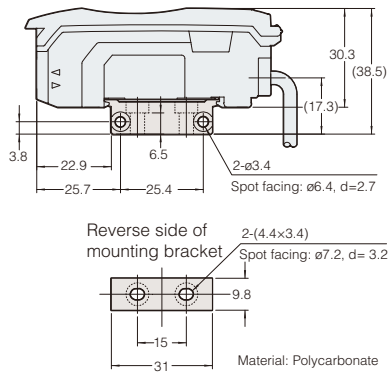


**OP-87199**  
Conversion adaptor

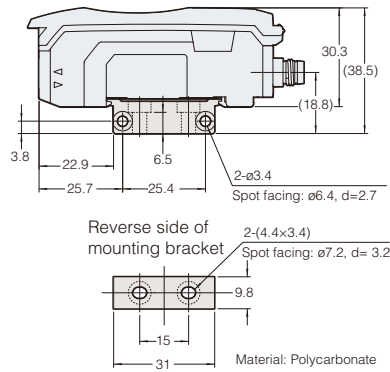


When the mounting bracket is attached (**OP-73880** sold separately)

**Cable type**

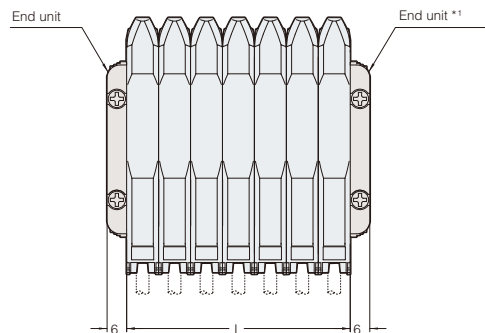


**M8 connector type**



**Common for all types**

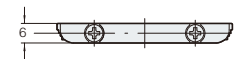
When several units are connected:



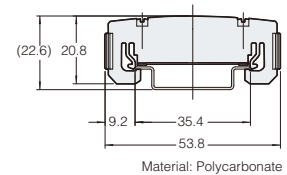
No. of units	L (mm)
1	9.8
2	19.6
3	29.4
4	39.2
5	49.0
6	58.8
7	68.6
8	78.4
9	88.2
10	98.0
11	107.8
12	117.6
13	127.4
14	137.2
15	147.0
16	156.8
17	166.6

\*1 End units must be used when several units are connected. (OP-26751)

**End unit**  
(**OP-26751** sold separately)



**DIN-rail mounting**

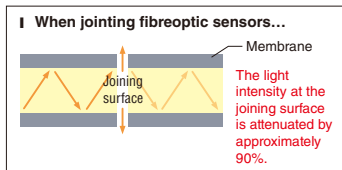


High environmental resistance & cable extension capabilities provide increased installation versatility



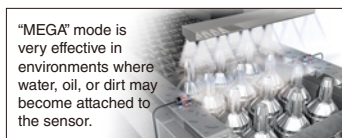
## Extendable sensor head cable

Because the sensor head cable is a simple power cable, it can be extended to the desired length. By soldering or using a metal connector, it can be extended to a maximum of 10 m.



## Small size yet high power

While the conventional PS Series had only "FINE" and "TURBO" modes, it is now equipped with additional power modes including "MEGA" mode, like the FS-N Series. This allows the PS Series to be used in applications where strong light intensity is required.



## Wide range of sensor head options



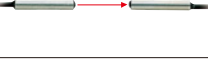



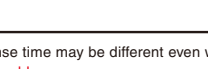
The PS Series lineup includes a broad range of sensor heads that have a wide variety of special characteristics, such as the environmentally resistant models that are encased in PFA for protection, or the limited range reflective models that are able to avoid the effects of background light.

## PS-NEO FUNCTION

- NEO Preset
- NEO MEGA
- Application function
- DATUM function
- Open field network compatibility
- Reduced wiring
- Interference prevention function
- Pause function
- Sleep function





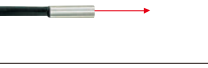



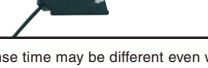
Thrubeam type

Type	Appearance	Detecting distance (mm) <sup>*1</sup>	Features	Model (C means with connector)	Dimensions	
Thrubeam type		MEGA : 3600 (6000) ULTRA : 2800 (5000) SUPER : 2200 (4200) TURBO : 2000 (4000)	Compact body and long-detecting distance	PS-55 (PS-55C)	[P.59]	
		MEGA : 3600 (6000) ULTRA : 2800 (5000) SUPER : 2200 (4200) TURBO : 2000 (4000)	Compact body and long-detecting distance easy optical-axis alignment	PS-05	[P.58]	
		MEGA : 1000 ULTRA : 900 SUPER : 750 TURBO : 700	Cylindrical, embedded type	PS-58	[P.59]	
		MEGA : 1200 (1500) ULTRA : 800 (1000) SUPER : 400 (650) TURBO : 300 (600)	Side-to-side type, 3 mm thickness	PS-52 (PS-52C)	[P.59]	
		MEGA : 750 (900) ULTRA : 500 (600) SUPER : 400 (450) TURBO : 300 (400)	Flat-to-flat type 2.8 mm thickness	PS-56	[P.59]	
	Environment-proof		MEGA : 3600 (6000) ULTRA : 2800 (5000) SUPER : 2200 (4200) TURBO : 2000 (4000)	PFA-sheath type, oil-proof, chemical proof	PS-201 (PS-201C)	[P.59]
			MEGA : 900 (1000) ULTRA : 700 (900) SUPER : 600 (800) TURBO : 500 (750)	PFA-sheath type, Slit <sup>**</sup> built-in	PS-202	[P.59]

<sup>\*1</sup> Depends on the mode, response time may be different even with the same detecting distance. Detecting distance in parentheses is a value when enabling the long distance detection mode with a 5 m sensor head cable.

<sup>\*\*</sup> 2.5x1 mm slits for both transmitter/receiver.

Reflective model

Type	Appearance	Detecting distance (mm) <sup>*1</sup>	Features	Model (C means with connector)	Dimensions	
Diffuse-reflective		MEGA : 600 (900) ULTRA : 400 (600) SUPER : 250 (450) TURBO : 200 (400)	Compact body and long-detecting distance	PS-45	[P.58]	
		MEGA : 200 (250) ULTRA : 150 (200) SUPER : 120 (160) TURBO : 100 (140)	Flat-to-flat type 2.8 mm thickness	PS-46	[P.58]	
		MEGA : 75 ULTRA : 45 SUPER : 30 TURBO : 25	Cylindrical, embedded type	PS-48	[P.58]	
	Environment-proof		MEGA : 600 (900) ULTRA : 400 (600) SUPER : 250 (450) TURBO : 200 (400)	PFA-sheath type, oil-proof, chemical proof	PS-205	[P.59]
			MEGA : 250 ULTRA : 180 SUPER : 100 TURBO : 70	PFA-sheath type, Focused beam small spot	PS-206	[P.59]
Definite-reflective		10±4 <sup>*</sup> Common for all power modes	Small Spot ø0.8 mm almost unaffected by target background	PS-47 (PS-47C)	[P.58]	
		32 to 53 <sup>*</sup> Common for all power modes	Long distance small spot almost unaffected by target background	PS-49 (PS-49C)	[P.58]	

<sup>\*1</sup> Depends on the mode, response time may be different even with the same detecting distance. Detecting distance in parentheses is a value when enabling the long distance detection mode.

## Sensor head specifications

### Thrubeam sensor head

Type		Thrubeam type						
		General purpose				Environment-proof		
Model		Long-detecting distance	Free-positioning	Cylindrical	Thin	Long-detecting distance	Slit built-in	
		PS-55(C)	PS-05	PS-58	PS-52 (C)	PS-56	PS-201 (C)	PS-202
Detecting distance*1 (mm)	MEGA	3600 (6000)	3600 (6000)	1000	1200 (1500)	750 (900)	3600 (6000)	900 (1000)
	ULTRA	2800 (5000)	2800 (5000)	900	800 (1000)	500 (600)	2800 (5000)	700 (900)
	SUPER	2200 (4200)	2200 (4200)	750	400 (650)	400 (450)	2200 (4200)	600 (800)
	TURBO	2000 (4000)	2000 (4000)	700	300 (600)	300 (400)	2000 (4000)	500 (750)
Light source		Infrared LED						
Smallest detectable object*2		ø1.0 mm Opaque	ø1.0 mm Opaque	ø0.5 mm Opaque	ø0.3 mm Opaque	ø0.3 mm Opaque	ø0.8 mm Opaque	ø0.5 mm Opaque
Environmental resistance		Protective structure	IP64	IP64	IP67	–	–	IP67
		Ambient light	Incandescent lamp: 4000 lux max., Sunlight: 12000 lux max.					
		Ambient temperature/ Relative humidity	-10 to +60°C (No freezing)/35 to 85% RH (No condensation)					
Dimensions		[P.59]	[P.58]	[P.59]	[P.59]	[P.59]	[P.59]	[P.59]

\*1 Depends on the mode, response time may be different even with the same detecting distance. Detecting distance in parentheses is a value when enabling the long distance detection mode with a 5 m sensor head cable.

\*2 With thrubeam sensors, the smallest detectable object indicates the size of a detectable object from the maximum detecting distance.

### Reflective sensor head

Type		Diffuse-reflective				Definite-reflective			
		General purpose			Environment-proof		General purpose		
Model		Long-detecting distance	Thin	Cylindrical	Long-detecting distance	Narrow-beam	Small spot	Long-detecting distance	
		PS-45	PS-46	PS-48	PS-205	PS-206	PS-47 (C)	PS-49 (C)	
Detecting distance*1 (mm)	MEGA	600 (900)	200 (250)	75	600 (900)	250	10±4	32 to 53	
	ULTRA	400 (600)	150 (200)	45	400 (600)	180			
	SUPER	250 (450)	120 (160)	30	250 (450)	100			
	TURBO	200 (400)	100 (140)	25	200 (400)	70			
Light source		Infrared LED				Red LED			
Detectable object		Transparent and opaque							
Smallest detectable object*2		–	–	–	–	–	ø0.03 mm Copper wire	ø0.1 mm Copper wire	
Spot diameter		–	–	–	–	ø6 mm At detecting distance of 70 mm	ø8 mm At detecting distance of 10 mm	ø1.5 mm At detecting distance of 50 mm	
Hysteresis (of detecting distance)		15% max.	10% max.	20% max.	15% max.			3% max.	6% max.
Environmental resistance		Protective structure	IP64	–	IP67		–		
		Ambient light	Incandescent lamp: 4000 lux max., Sunlight: 12000 lux max.				Incandescent lamp: 4000 lux max., Sunlight: 5000 lux max.		
		Ambient temperature	-10 to +60°C (No freezing)					-10 to +50°C (No freezing)	
		Relative humidity	35 to 85% RH (No condensation)						
Dimensions		[P.58]	[P.58]	[P.58]	[P.59]	[P.59]	[P.58]	[P.58]	

\*1 Depends on the mode, response time may be different even with the same detecting distance. Detecting distance in parentheses is a value when enabling the long distance detection mode.


\*2 With reflective sensors, the smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

## Options


Model number	Applicable model	Type
OP-2555	PS-55	Slit (detecting distance: 700 mm) (transmitter/receiver set)
OP-93672	PS-05	
OP-0162	PS-45 (accessory)	PS-45 mounting bracket set
OP-0230	PS-56 , 52 (accessory)	Mounting nut set for PS-56
OP-2812	PS-55	Mounting bracket set for PS-55
OP-6349	PS-48 (accessory)	PS-48 mounting bracket
OP-6350	PS-58 (accessory)	PS-58 mounting bracket
OP-6800	PS2-61 (accessory)	PS2 mounting bracket
OP-7080	PS-201 , 202 (accessory)	PS-201 mounting bracket (one side only)
OP-27934	Amplifier (accessory)	Connector for sensor head (2)
OP-42113	PS-55, 05, 52, 56, 58	Thrubeam transmitter side cable (20 m)
OP-42114	PS-55, 05, 52, 56, 58	Thrubeam receiver side cable (20 m)
OP-42115	PS-45, 46, 47, 49	Reflective (except PS-48) cable (20 m)
OP-42116	PS-201, 202	PFA thrubeam transmitter side cable (20 m)
OP-42117	PS-201, 202	PFA thrubeam receiver side cable (20 m)
OP-42118	PS-205, 206	PFA Reflective cable (20 m)

Amplifier


Cable type

Type	Appearance	Model		Control outputs	External input	Monitor output	Dimensions
		NPN output	PNP output				
Standard	Main unit		PS-N11N <b>NEW</b>	PS-N11P <b>NEW</b>	1	0	[P.60]
	Expansion unit		PS-N12N <b>NEW</b>	PS-N12P <b>NEW</b>			

M8 connector type

Type	Appearance	Model		Control outputs	External input	Monitor output	Dimensions
		NPN output	PNP output				
Standard	Main unit		PS-N11CN <b>NEW</b>	PS-N11CP <b>NEW</b>	1	1	[P.60]
	Expansion unit		PS-N12CN <b>NEW</b>	PS-N12CP <b>NEW</b>			

Zero line type

Type	Appearance	Model	Control outputs	External input	Monitor output	Dimensions
Standard		PS-N10 <b>NEW</b>	None*1	0	0	[P.60]

\*1 Counted as one output when added to a NU Series communication unit.

Specifications

Type	Cable		M8 connector		Zero line
Main/Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Expansion unit
Model	NPN PS-N11N PNP PS-N11P	PS-N12N PS-N12P	PS-N11CN PS-N11CP	PS-N12CN PS-N12CP	PS-N10
I/O	Control outputs External input	1 output None	1 output 1 input	1 output 1 input	None*1 None
Response time	500 μs (TURBO)/1 ms (SUPER)/4 ms (ULTRA)/16 ms (MEGA)				
Output selection	LIGHT-ON/DARK-ON (switch-selectable)				
Timer function	Timer OFF/OFF-delay timer/ON-delay timer/One-shot timer, Timer duration selectable: 1 ms to 9999 ms, Maximum error against the setting value: ±10% max.				
Control outputs	NPN output	NPN open connector 30 V, (without expansion) 100 mA max., (with expansion) 20 mA max, residual voltage 1 V max. (when the out current is 10 mA or less)/2 V max. (when the output current is 10 to 100 mA)			-
	PNP output	PNP open connector 30 V, (without expansion) 100 mA max., (with expansion) 20 mA max, residual voltage 1.2 V max. (when the output current is 10 mA or less)/2.2 V max. (when the output current is 10 to 100 mA)			
External input	Input time 2 ms (ON)/20 ms (OFF) or more*2				
Multiple connections to expansion units	Up to 17 main units can be connected				
Protection circuit	Reverse polarity protection, Over-current protection, Surge absorber				
Number of interference prevention units	4 for TURBO/SUPER/ULTRA/MEGA (When set to DOUBLE, the number of interference-prevention units will be doubled)				
Power voltage	24 VDC (operating voltage 10-30 VDC (with ripple)), ripple (P-P) 10% or less, Class 2 or LPS				
Power consumption	NPN	Normal: 810 mW or less (at 30 V, 28 mA max. at 24 V, 34 mA max. at 12 V) Eco on mode: 700 mW or less (at 30 V, 24 mA max. at 24 V, 27 mA max. at 12 V) Eco Full mode: 490 mW or less (at 30 V, 17 mA max. at 24 V, 20 mA max. at 12 V)			-
	PNP	Normal: 860 mW or less (at 30 V, 30 mA max. at 24 V, 35 mA max. at 12 V) Eco on mode (ALL): 750 mW or less (at 30 V, 26 mA max. at 24 V, 28 mA max. at 12 V) Eco Full mode: 540 mW or less (at 30 V, 19 mA max. at 24 V, 21 mA max. at 12 V)			
Environmental resistance	Ambient temperature	-20°C to +55°C (No freezing)*3			
	Relative humidity	35 to 85% RH, (No condensation)			
	Vibration resistance	10 to 55 Hz, double amplitude: 1.5 mm, 2 hours each in the X, Y and Z axis			
	Shock resistance	500 m/s <sup>2</sup> 3 times for each of X, Y and Z axis			
Material	Case	Main unit and cover material: Polycarbonate			
	Cable	PVC			
Case size	H 32.6 mm × W 9.8 mm × L 78.7 mm				
Weight	Approx. 75 g	Approx. 65 g	Approx. 20 g	Approx. 20 g	Approx. 20 g

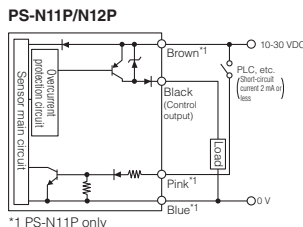
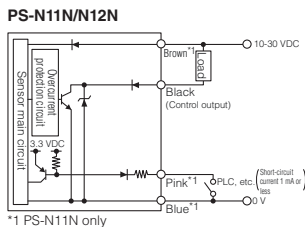
\*1 Counted as one output when added to a NU Series communication unit. \*2 Input time is 25 ms (ON)/25 ms (OFF) when the external calibration time is selected.

\*3 If more than one unit is used together, the ambient temperature varies with the conditions below. Mount the units on the DIN rail with mounting brackets and check that the output current is 20 mA or less for a unit.

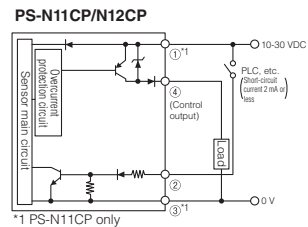
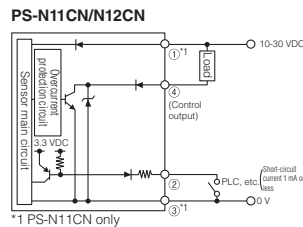
One or two more units connected: -20°C to +55°C ; 3 to 10 more units connected: -20°C to +50°C; 11 to 16 more units connected: -20°C to +45°C.

I/O Circuit Diagram

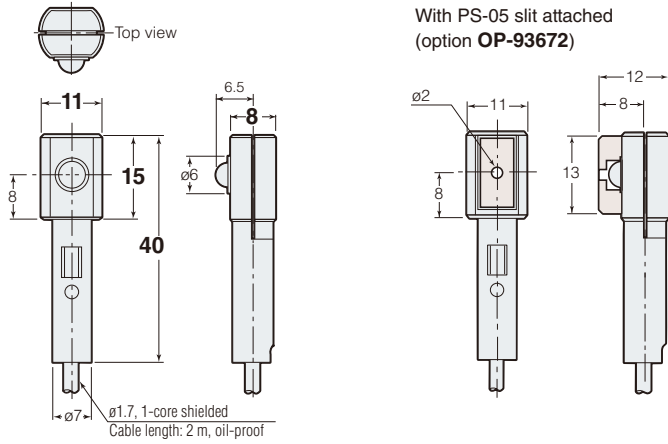
Cable type



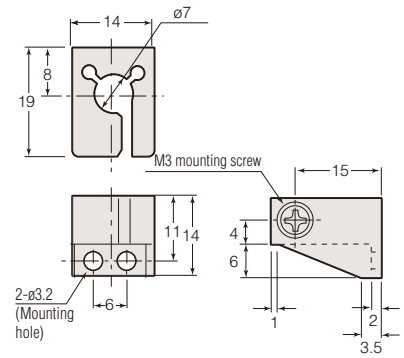
M8 connector type



**PS-05**

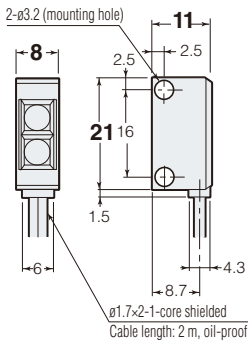


**Holder (accessory)  
PS-05**

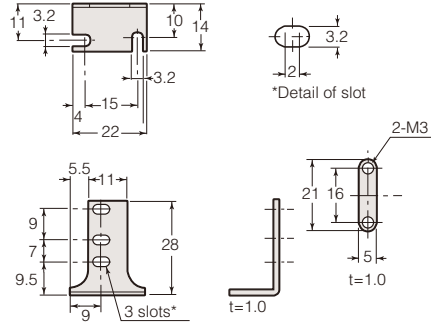


Accessory  
Screw (M3x14) flat washer, spring washer, nut } 2 each (to secure head)  
Screw (M3x10) spring washer 4 each (to secure holder)

**PS-45**

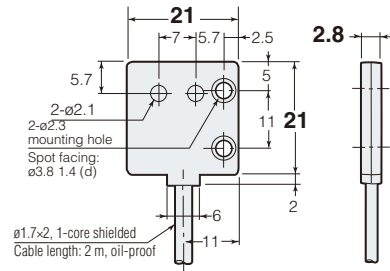


**Mounting bracket (accessory)  
for PS-45 (option OP-0162)**



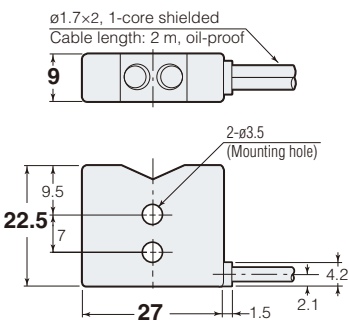
Accessory  
Screws (M3x12), 2 pieces

**PS-46**

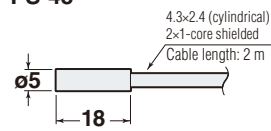


Accessory  
Screws (M2x10), 2 pieces  
Nut, spring washer, flat washer: 2 each

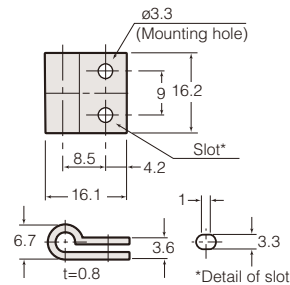
**PS-47 (C)**



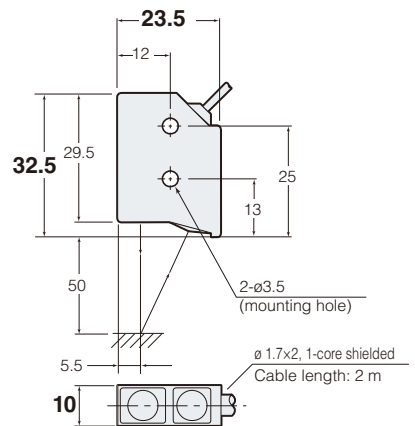
**PS-48**



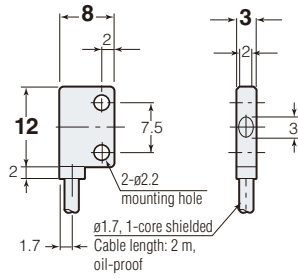
**Mounting bracket (accessory)  
for PS-48 (option OP-6349)**



**PS-49 (C)**

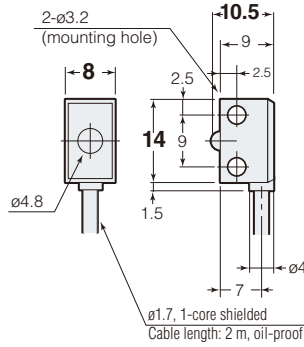


**PS-52 (C)**

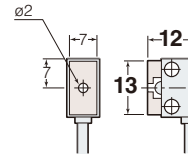


Accessory  
Screws (M2×10), 4 pieces  
Nut, spring washer, flat washer: 4 each

**PS-55 (C)**

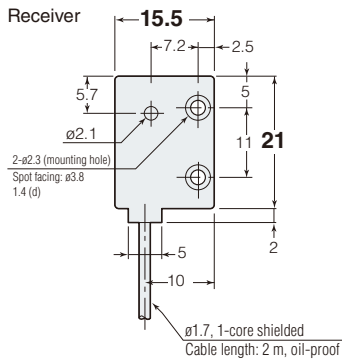


With PS-55 (C) slit attached (option **OP-2555**)



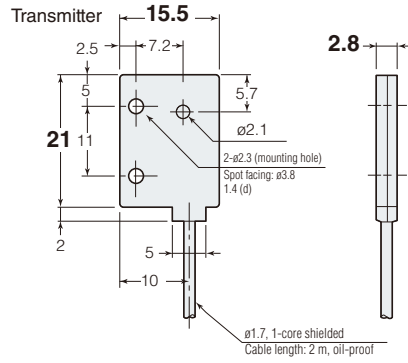
**PS-56**

Receiver

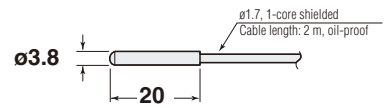


Accessory  
Screws (M2×10), 4 pieces  
Nut, spring washer, flat washer: 4 each

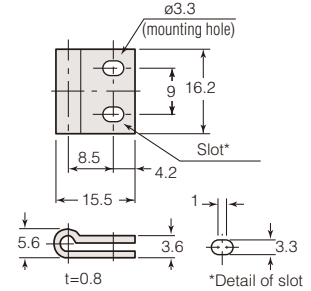
Transmitter



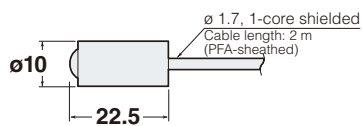
**PS-58**



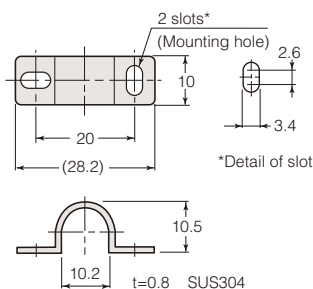
Mounting bracket (accessory) for PS-58  
(option for one side only: **OP-6350**)



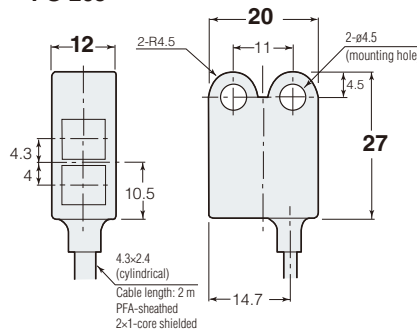
**PS-201 (C)/PS-202**



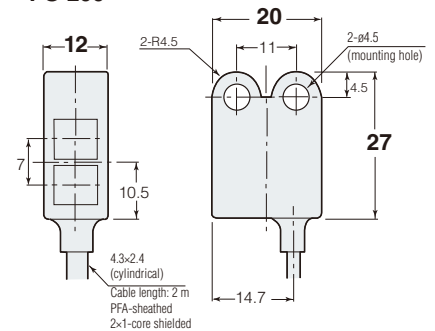
Mounting bracket (accessory)  
for PS-201 (C)/PS-202  
(option for one side only: **OP-7080**)



**PS-205**

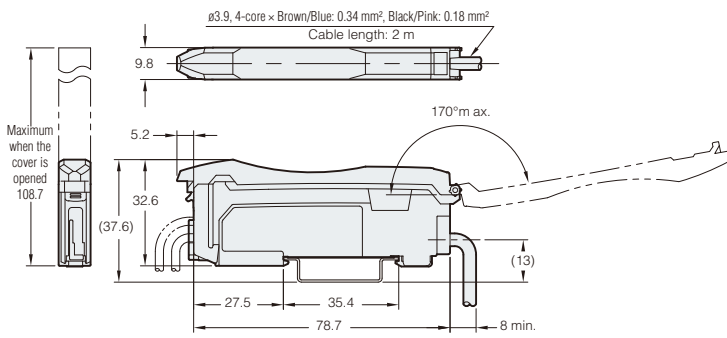


**PS-206**

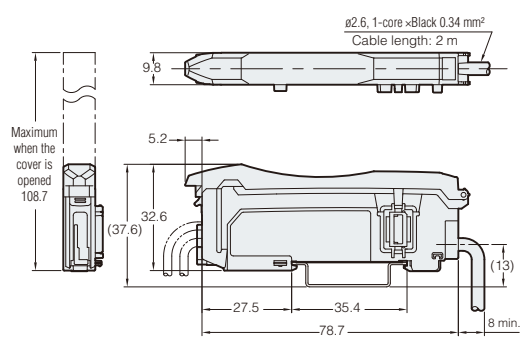




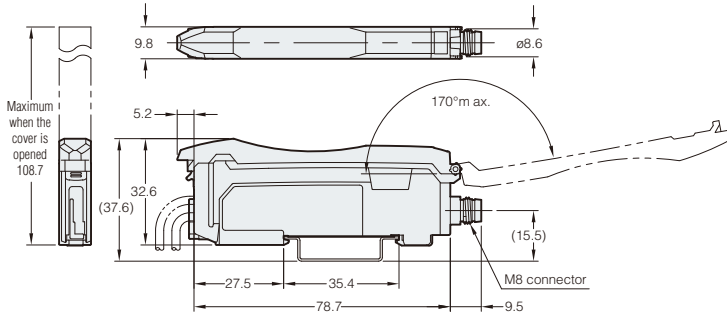
**PS-N11N/N11P** Cable type, Main unit



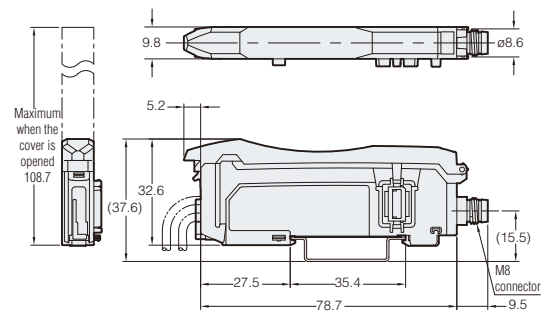
**PS-N12N/N12P** Cable type, Expansion unit



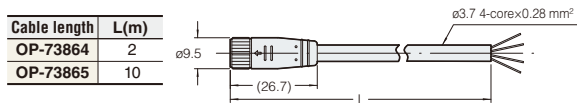
**PS-N11CN/N11CP** M8 connector type, Main unit



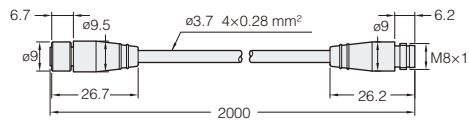
**PS-N12CN/N12CP** M8 connector type, Expansion unit



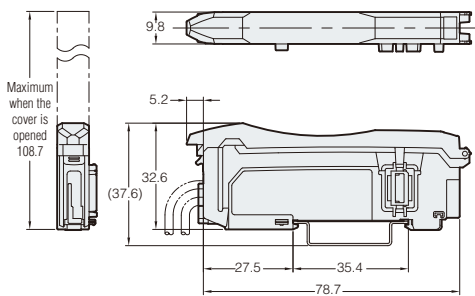
M8 connector cable (**OP-73864/73865** sold separately)



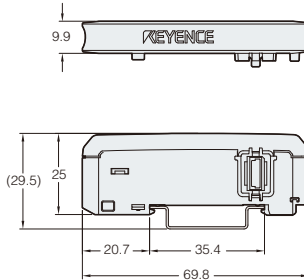
M8 connector junction cable (**OP-85498** sold separately)



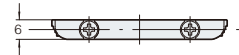
**PS-N10** Zero line type, Expansion unit



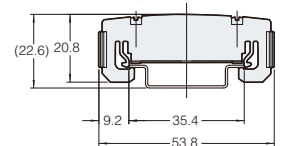
**OP-87199** Conversion adaptor



When the end unit is attached (**OP-26751** sold separately)



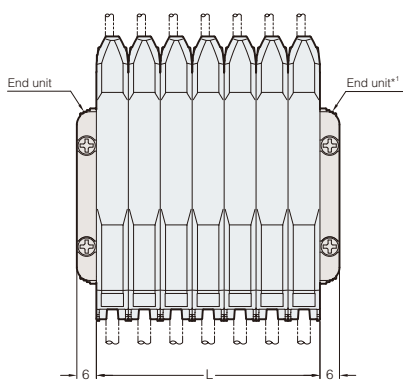
DIN-rail mounting



Material: Polycarbonate

**Common for all types**

When several units are connected:

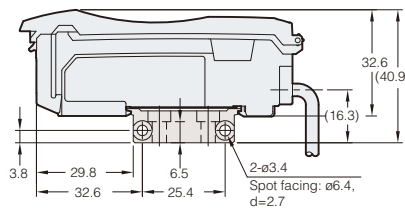


No. of units	L (mm)
1	9.8
2	19.6
3	29.4
4	39.2
5	49.0
6	58.8
7	68.6
8	78.4
9	88.2
10	98.0
11	107.8
12	117.6
13	127.4
14	137.2
15	147.0
16	156.8
17	166.6

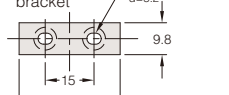
\*1 End units must be used when several units are connected.(OP-26751)

When the mounting bracket is attached (**OP-73880** sold separately)

Cable type

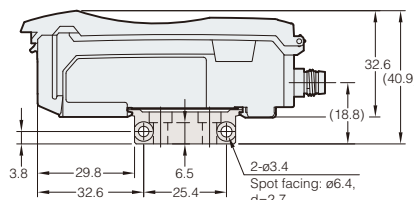


Reverse side of mounting bracket







Material: Polycarbonate

M8 connector type




**Common options for LV-NEO/FS-NEO/PS-NEO**

Type	Appearance	Description	Model	Dimensions
Amplifier securing bracket (for main unit)		Can be installed without a DIN-rail. Can be installed from above or side as shown in right.	OP-73880	[P.23]
End unit (when using expansion units)	 2 per set	Used to secure the main and expansion units.	OP-26751	[P.23]
M8 connector cable (2 m/10 m)		Used to connect to the M8 connector type amplifier (model numbers end with a "CN" or "CP"). Connector cables are not included with the amplifier.	2 m type OP-73864  10 m type OP-73865	[P.23]
M8 connector junction cable (2 m)		Used to extend the M8 connector cable.	OP-85498	[P.23]
Expansion Converter Unit		The LV-NEO / FS-NEO / PS-NEO Series has different amplifier connectors than the FS-V30, LV, and CZ series. This is an adapter to connect these models. It supplies power from the main unit to the expansion unit and prevents interference. *Communication is not supported.	OP-87199	[P.23]

## Incorporate the NEO Series with an open field network for complete interfacing versatility



CC-Link Network Communication unit  
**NU-CL1**  




DeviceNet Network Communication unit  
**NU-DN1**  




EtherNet/IP Network Communication unit  
**NU-EP1**  

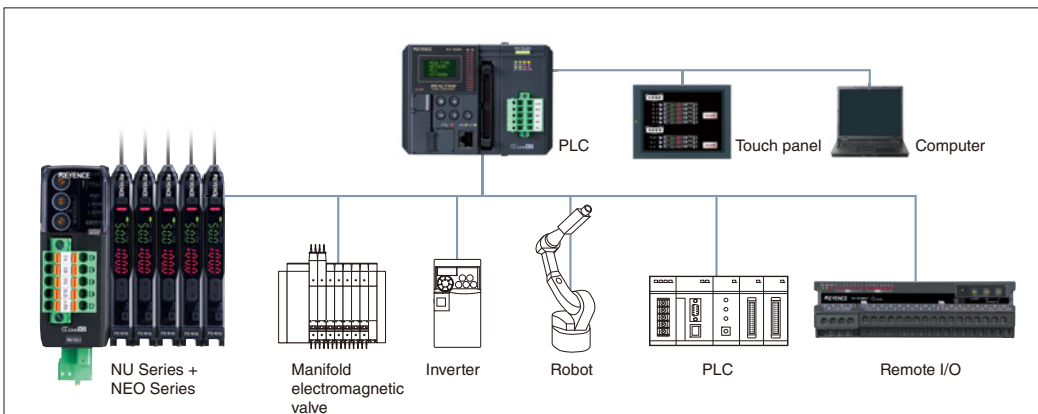



EtherCAT Network Communication unit  
**NU-EC1**  


In addition to saving space and achieving a dramatic reduction in wiring, the remote management of multiple sensors significantly improves convenience and functionality.

## Compatible with multiple open field networks

KEYENCE has developed 4 communication units that are compatible with open field networks (CC-Link, DeviceNet, EtherNet/IP, EtherCAT). These units enable the NEO Series sensors to be installed and used on the same network as a variety of devices from other manufacturers.



## Dramatic reduction in wiring and installation time

Only a single communication cable is required between the PC/PLC ↔ and the NU Series for wiring. This achieves a dramatic reduction in wiring and saves a significant amount of space. In addition, wiring work that conventionally requires a great deal of time and effort has been greatly reduced.

Reduced production costs by introducing the NU Series

- ▶ No need for a complicated cable layout
- ▶ No need to trim the cables
- ▶ No additional wiring required when replacing sensors
- ▶ No need for a terminal block



## Multiple sensors can be simultaneously managed

By utilising the network, multiple sensors that exist on the same line can be simultaneously managed, significantly increasing convenience and ease-of-use in the field.

The status of the sensors can be monitored and settings for all of the sensors can be modified together from a touch panel or computer.

### Monitoring

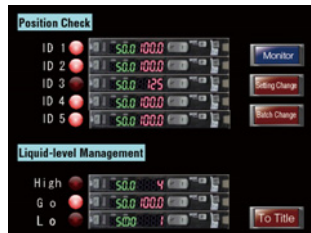
<Conventional>

I want to check on the sensors before a detection error stops production, but it is too troublesome to go and look at each individual sensor....

<NU Series>

**Easy monitoring from the display!**

The sensor status can be monitored on an HMI, PLC, or PC, making it easier to detect problems before an error occurs.



### Product change

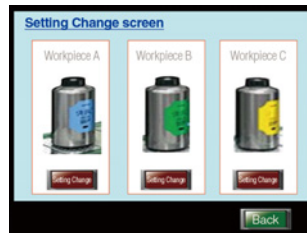
<Conventional>

Because multiple products are manufactured on the same line, settings need to be adjusted frequently, but it is time consuming to have to adjust each individual sensor every time...

<NU Series>

**Product change with the push of a button!**

The NU allows for settings to be changed externally from an HMI, PLC, or PC. As a result, changeover time can be reduced, even where sensor settings must be changed frequently.



### Sensor status log

<Conventional>

A sensor malfunction has occurred and I want to check it, but it doesn't seem to reoccur.... I cannot waste time just watching and waiting.

<NU Series>

**Troubleshooting made easy!**

If sensor information (light intensity/setting values/error output) is stored in the log, the cause of minor errors is easily identified.



## New lineup of sensor input units






The e-CON connection unit can be used for sensors, electromagnetic valves, and cylinder switches other than the NEO Series models. The ON/OFF status can be displayed and checked on a touch panel or computer.



e-CON Network Communication Input Unit  
**NU-EN8N**

## Lineup

### Open Field Network Units

Type	Appearance	Network	Model	Dimensions
Communication unit		CC-Link	NU-CL1	[P.66]
		DeviceNet	NU-DN1	
		EtherNet/IP	NU-EP1	
		EtherCAT	NU-EC1	
e-CON Input unit		-	NU-EN8N	

### Option

Model	Type
OP-79426	Ver.1.10 compatible CC-Link dedicated 20 m cable
OP-79427	Ver.1.10 compatible CC-Link dedicated 100 m cable
OP-51504	STP (Shielded twisted pair) 0.2 m cable
OP-51505	STP (Shielded twisted pair) 0.5 m cable
OP-51506	STP (Shielded twisted pair) 1 m cable
OP-51507	STP (Shielded twisted pair) 3 m cable
OP-51508	STP (Shielded twisted pair) 5 m cable
OP-51509	STP (Shielded twisted pair) 10 m cable
OP-84338*1	e-CON connector (2 per set)

\*1 Use shield outer diameter 1.15 to 1.35 mm, wire range 0.1 to 0.5 mm<sup>2</sup> cable.

## Specifications

### CC-Link compatible communication unit: NU-CL1

Model	NU-CL1	
CC-Link Specifications	Compatible version	Ver.2.00/Ver.1.10 (switchable)
	Number of occupied stations	Ver.2.00: 3 stations, Ver.1.10: 1/2/3/4 stations (switchable)
	Type of station	Remote device station
	Transmission speed	156 kbps/625 kbps/2.5 Mbps/5 Mbps/10 Mbps
	Setting of station numbers	1 to 64
Sensor connection specifications	Connectable sensors	Sensor amplifiers with N-bus support*1
	Number of connectable sensor units	Up to 16 units *2
	Power supply	Power is supplied from the unit via a wiring-saving connector.
	Maximum passing current	Total 1200 mA max.*3
Power voltage	24 VDC ±10%, ripple (p-p) 10% or less	
Power consumption	1400 mW or less (55 mA max. at 24 V)*4	
Weight (including connector)	Approx. 80 g	
Accessory	Instruction manual, CC-Link connector, power connector, termination resistor, end unit × 2	

\*1 "N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers. \*2 Depends on the sensor amplifiers connected.

\*3 Value for the current which can be supplied to this product or a sensor amplifier unit connected to this product. \*4 Current to be supplied to the connected sensor amplifier is not included.

### DeviceNet compatible communication unit: NU-DN1

Model	NU-DN1			
DeviceNet Specifications	Supported functions	I/O Message (polling), Explicit Message		
	Address setting	0 to 63 (PGM compatible)		
	Baud rate (automatically switched)	500 kbps	250 kbps	125 kbps
	Maximum cable length	100 m (thick cable) 100 m (thin cable)	250 m (thick cable) 100 m (thin cable)	500 m (thick cable) 100 m (thin cable)
Sensor connection specifications	Connectable sensors	Sensor amplifiers with N-bus support*1		
	Number of connectable sensor units	Up to 16 units *2		
	Power supply	Power is supplied from the DeviceNet communication power supply via the unit.		
	Maximum passing current	Total 1200 mA max.*3		
Power voltage	11 to 25 VDC			
Power consumption	1480 mW or less (60 mA max. at 24 V, 106 mA max. at 12 V)*4			
Weight (including connector)	Approx. 65 g			
Accessory	Instruction manual, DeviceNet connector, end unit × 2			

\*1 "N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers. \*2 Depends on the sensor amplifiers connected.

\*3 Value for the current which can be supplied to this product or a sensor amplifier unit connected to this product. \*4 Current to be supplied to the connected sensor amplifier is not included.

**EtherNet/IP compatible communication unit: NU-EP1**

Model		NU-EP1
Ethernet specifications	Compliance	IEEE802.3 (10BASE-T) IEEE802.3u (100BASE-TX) IEEE802.3af (Power over Ethernet, Class3)
	Transmission rate	10 Mbps (10BASE-T) 100 Mbps (100BASE-TX)
	Transmission media	STP cable or category 3 or higher UTP cable (10BASE-T)*1 STP cable or category 5 or higher UTP cable (100BASE-TX)
	Maximum cable length	100 m (distance between the unit and Ethernet switch)
	Maximum number of connectable hubs*2	4 (10BASE-T) 2 (100BASE-TX)
EthreNet/IP Specifications	Compatible functions	Cyclic communication Compatible with UCMM and Class3 messaging (Explicit messaging)
	Number of connections	64
	RPI (transmission cycle)	0.5 to 10000 ms (in units of 0.5 ms)
	Tolerable communication bandwidth for Cyclic communication	6000 pps
	Conformance test	Compatible with Version A7
Sensor connection specifications	Connectable sensors	Sensor amplifiers with N-bus support*3
	Number of connectable sensor units	Up to 16 units*4
	Power supply	Power is supplied from the unit via a sensor amplifier connection connector.
	Allowable passing current*5	Total 1200 mA max.
	Power during PoE power receiving*6	Supply voltage: 24 V±10%, supply current: 360 mA or less*7
Power voltage		24 VDC ±10%, ripple (p-p) 10% or less (with power supply connector) 48 VDC (Max.57 VDC) (During PoE power receiving)
Power consumption		1500 mW or less (60 mA max. at 24 V)*8
Weight (including connector)		Approx. 80 g
Accessory		Instruction manual, power connector, 2 end units

\* Cannot connect to the following KEYENCE's PoE power supply devices: [DT-100A], [DT-500], [NE-V08]

\*1 When using the power PoE power receiving function, use the STP cable or Category 5 or higher UTP cable. \*2 The number of connectable units is not limited when using a switch.

\*3 "N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers. \*4 Depends on the sensor amplifiers connected. \*5 Value for the current which can be supplied to this unit or to a sensor amplifier unit connected to this unit. \*6 Power which can be supplied to the sensor amplifier when using the PoE power receiving function. \*7 Varies according to the working ambient temperature. (-20 to 45°C: 360 mA or less, 45 to 50°C: 260 mA or less, 50 to 55°C: 140 mA or less) \*8 Current to be supplied to the connected sensor amplifier is not included.

**EtherCAT compatible communication unit: NU-EC1**

Model		NU-EC1
Ethernet specifications	Compliance	IEEE802.3u (100BASE-TX)
	Transmission rate	100 Mbps (100BASE-TX)
	Transmission media	Category 5e or higher STP cable
	Distance between nodes	100 m
	Communication port	RJ-45 × 2
EtherCAT communication specifications	Compatible functions	Process data object communication (cyclic communication) Mailbox communication (message communication) CoE compatible
Sensor connection specifications	Connectable sensors	Sensor amplifiers with N-bus support*1
	Number of connectable sensor units	Up to 16 units*2
	Power supply	Power is supplied from the unit via a wiring-saving connector
	Allowable passing current*3	Total 1200 mA max.
Power voltage		24 VDC ±10%, ripple (p-p) 10% or less
Power consumption		1700 mW or less (70 mA max. at 24 V)*4
Weight (including connector)		Approx. 80 g
Accessory		Instruction manual, power connector, 2 end units

\* EtherCAT is a registered trade name of BECKHOFF.

\*1 "N-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers. \*2 Depends on the sensor amplifiers connected.

\*3 Value for the current which can be supplied to this product or a sensor amplifier unit connected to this product. \*4 Current to be supplied to the connected sensor amplifier is not included.

**Communication unit compatible e-CON network input unit: NU-EN8N**

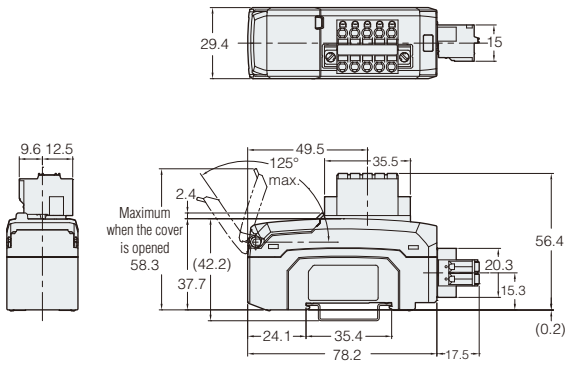
Model		NU-EN8N
Connectable communication unit		NU-CL1, NU-DN1, NU-EP1, NU-EC1
Number of connectable sensor units		Up to 2 units (occupied ID number: 8)*1
I/O	Connector	e-CON connector (4 pin)
	Inputs	8
	Supply voltage for equipment	Supplied from the communication unit
	Supply current	520 mA or less (total for 8 ports)
	Input signal	NPN open collector output, contact output
	Input response time	20 µs or less
	Internal input voltage	8 VDC (Reference value of input current: 3.1 mA)
	Input resistance	2.4 kΩ
Power voltage		12 to 24 VDC, ripple (p-p) 10% or less*2
Weight (including tag)		Approx. 55 g
Accessory		Instruction manual, tag, index seal

\*1 To connect the NU-EN8N to a communication unit, connect it after the sensor amplifier. Sensor amplifier connected after this unit will not be recognized by the communication unit.

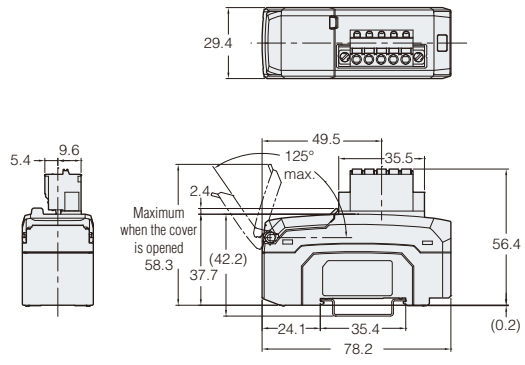
\*2 Power to the NU-EN8N is supplied from the connected communication unit.



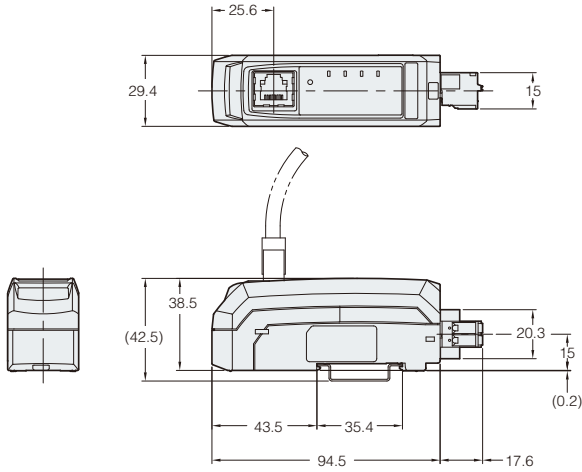
**NU-CL1**



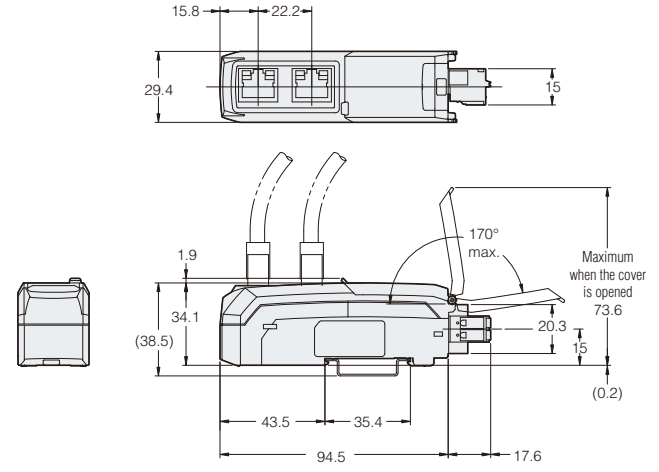
**NU-DN1**



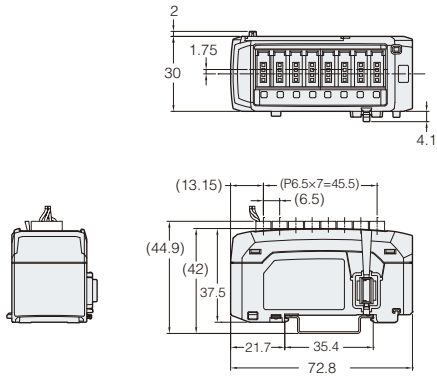
**NU-EP1**



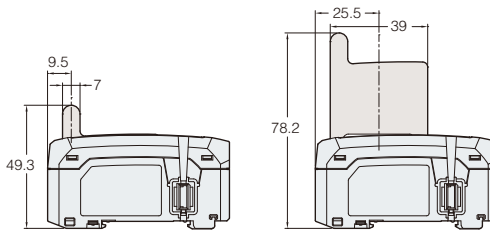
**NU-EC1**



**NU-EN8N**



When the tag (supplied with NU-EN8N) is attached.



## < Considerations when using the NEO Series >



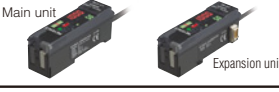
### To replace the LV Series with the LV-N Series

When you replace your LV-Hxx sensor head with the LV-N Series, be aware of the following:

- ( 1 ) The LV-N Series sensor heads must be used with the LV-N Series amplifiers.
- ( 2 ) If the desired LV sensor head is not available with the LV-N Series, you must use the LV-H Series amplifier.

Type	LV Series sensor head	LV-N Series sensor head	Remarks
Diffuse-reflective	LV-H32	LV-NH32 <span style="border: 1px solid red; padding: 1px;">NEW</span>	-
	LV-H35	LV-NH35 <span style="border: 1px solid red; padding: 1px;">NEW</span>	
	LV-H35F	-	Use LV-21A(P) / 22A(P) for an amplifier.
	LV-H37	LV-NH37 <span style="border: 1px solid red; padding: 1px;">NEW</span>	-
	LV-H41	-	Use LV-11A for an amplifier.
	LV-H42	LV-NH42 <span style="border: 1px solid red; padding: 1px;">NEW</span>	-
	LV-H47	-	Use LV-21A(P) / 22A(P) for an amplifier.
	LV-H51		Use LV-11A for an amplifier.
LV-H52	Use LV-21A(P) / 22A(P) for an amplifier.		
Retro-reflective Type	LV-H62	LV-NH62 <span style="border: 1px solid red; padding: 1px;">NEW</span>	-
	LV-H62F	-	Use LV-21A(P) / 22A(P) for an amplifier.
	LV-H64		
	LV-H65		
	LV-H67		
Thru-beam type	LV-H100	LV-NH100 <span style="border: 1px solid red; padding: 1px;">NEW</span>	-
	LV-H110	LV-NH110 <span style="border: 1px solid red; padding: 1px;">NEW</span>	
	LV-H300	LV-NH300 <span style="border: 1px solid red; padding: 1px;">NEW</span>	

\* All sensor head LV-Sxx can be used with the LV-N Series amplifiers.

Type		Appearance	Model		Control outputs	Calibration external input	Laser transmission stop input	Monitor output
			NPN output	PNP output				
For reflective/retro-reflective	Main unit		LV-21A	LV-21AP	2	1	1	0
	Expansion unit		LV-22A	LV-22AP	2	0	0	0
For infrared LV-H41/H51	Main unit		LV-11A	-	2	1	1	0
Thru-beam type	Main unit		LV-51M	LV-51MP	2	0	1	1
	Expansion unit		LV-52	LV-52P	2	0	0	0

### Number of connectable amplifiers

To expand the LV-N, FS-N, or PS-N Series, up to 16 expansion units and 1 main unit can be connected. Therefore up to 17 total units can be connected. However, be aware that the number of connectable units is dependent upon the number of control outputs for each amplifier.

Series	Model	Number of control outputs
LV-N	LV-N11N (P) / N12N (P)	2
	Others	1
FS-N	FS-N13x/N14x	2
	Others	1
PS-N	All models	1

### Number of mutual interference prevention units

When the NEO Series main and expansion units are connected, the mutual interference prevention function enables the following number of units to closely operate without interference with respect to each power mode.

Power mode		HSP	FINE	TURBO	SUPER	ULTRA	MEGA
LV-N10	Normal	x	2	2 <sup>*2</sup>	2 <sup>*2</sup>	4	4
	DOUBLE <sup>*1</sup>	x	4	4 <sup>*2</sup>	4 <sup>*2</sup>	8	8
FS-N10	Normal	x	4	8	8	8	8
	DOUBLE <sup>*1</sup>	x	8	16	16	16	16
PS-N10	Normal	-	-	4	4	4	4
	DOUBLE <sup>*1</sup>	-	-	8	8	8	8

(This depends on the Series with the smallest number of units, when LV-N, FS-N, and PS-N are mixed in a system.)

\*1 Can be switched to DOUBLE mode by the amplifier mode setting. When DOUBLE mode is used, all connected amplifiers must be in DOUBLE mode.

# neo series



Please visit: [www.keyence.com](http://www.keyence.com)



#### SAFETY INFORMATION

Please read the instruction manual carefully in order to safely operate any KEYENCE product.

#### KEYENCE GLOBAL HEADQUARTERS

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku, Osaka, 533-8555, Japan Phone: +81-6-6379-2211

##### AUSTRIA

Phone: +43 22 36-3782 66-0 Fax: +43 22 36-3782 66-30

##### BELGIUM

Phone: +32 1 528 1222 Fax: +32 1 520 1623

##### CANADA

Phone: +1-905-696-9970 Fax: +1-905-696-8340

##### CHINA

Phone: +86-21-68757500 Fax: +86-21-68757550

##### CZECH REPUBLIC

Phone: +420 222 191 483 Fax: +420 222 191 505

##### FRANCE

Phone: +33 1 56 37 78 00 Fax: +33 1 56 37 78 01

##### GERMANY

Phone: +49 61 02 36 89-0 Fax: +49 61 02 36 89-100

##### HONG KONG

Phone: +852-3104-1010 Fax: +852-3104-1080

##### HUNGARY

Phone: +36 1 802 73 60 Fax: +36 1 802 73 61

##### ITALY

Phone: +39-02-6688220 Fax: +39-02-66825099

##### JAPAN

Phone: +81-6-6379-2211 Fax: +81-6-6379-2131

##### KOREA

Phone: +82-31-642-1270 Fax: +82-31-642-1271

##### MALAYSIA

Phone: +60-3-2092-2211 Fax: +60-3-2092-2131

##### MEXICO

Phone: +52-81-8220-7900 Fax: +52-81-8220-9097

##### NETHERLANDS

Phone: +31 40 20 66 100 Fax: +31 40 20 66 112

##### POLAND

Phone: +48 71 36861 60 Fax: +48 71 36861 62

##### SINGAPORE

Phone: +65-6392-1011 Fax: +65-6392-5055

##### SLOVAKIA

Phone: +421 2 5939 6461 Fax: +421 2 5939 6200

##### SLOVENIA

Phone: +386 1-4701-666 Fax: +386 1-4701-699

##### SWITZERLAND

Phone: +41 43-45577 30 Fax: +41 43-45577 40

##### TAIWAN

Phone: +886-2-2718-8700 Fax: +886-2-2718-8711

##### THAILAND

Phone: +66-2-369-2777 Fax: +66-2-369-2775

##### UK & IRELAND

Phone: +44-1908-696900 Fax: +44-1908-696777

##### USA

Phone: +1-201-930-0100 Fax: +1-201-930-0099

