KEYENCE

NEW **Digital Fiberoptic Sensor**

FS-N Series

勝 特 力 材 料 886-3-5753170
胜特力电子(上海) 86-21-34970699
胜特力电子(深圳) 86-755-83298787
Http://www.100y.com.tw

In addition to its MEGA power,
the FS-N Series introduces unprecedented setup ease
with one click operation.

FS-neo

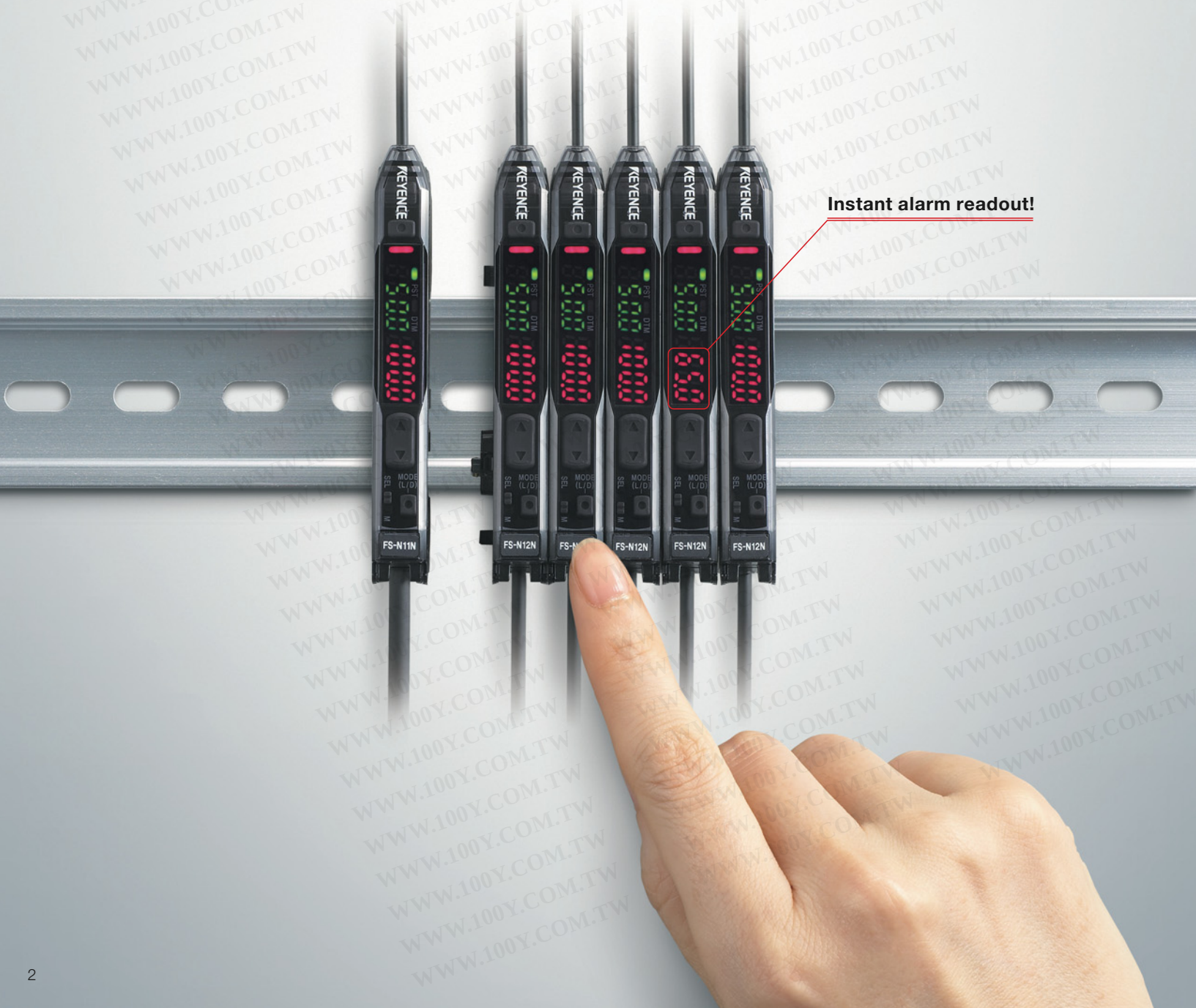
NEO-MEGA
ONE CLICK PRESET
DATUM

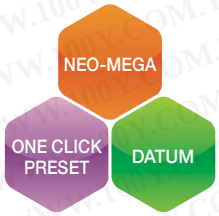
Certainty and simplicity

There are two major qualities that are important in fiber sensors.

First, the sensor must have improved basic performance, including ample beam power and accuracy, for greater detection stability.

Second, the sensor must be easy for anyone to setup and operate.





FS-neo

New Concept

Complete setting in just one click

ONE CLICK PRESET

An entirely new concept in setup ease. Just one click calibrates the sensitivity and resets the display.

New Concept

Automatic maintenance

DATUM

The sensor automatically detects reduced light intensity due to debris build-up and automatically re-calibrates to the original display state.

Simple, Convenient

High power reduces labor hours

NEO-MEGA

Increased sensor power greatly reduces maintenance and setup time.

NEO is supported by the world's highest level of performance

World's most powerful beam	World's most accurate	World's highest ambient-light resistance
Achieves 250 times more light intensity	Detects wire as small as ø0.6 µm (0.024 mil)	Unaffected up to 30,000 lux

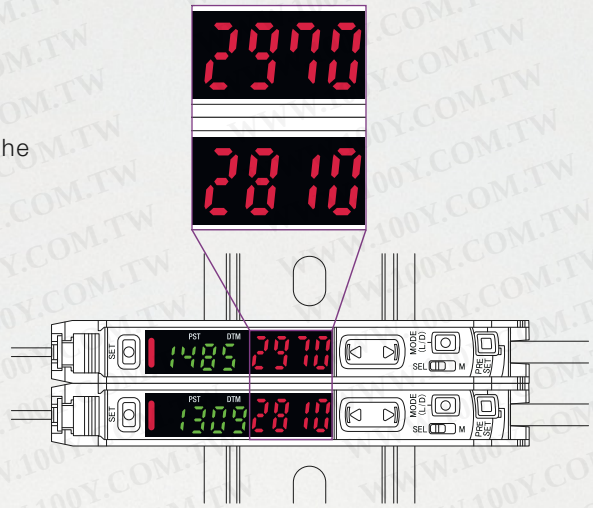
New Concept

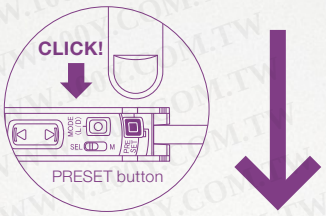
Complete setting in just one click

Click the button once to simultaneously set the sensitivity and reset the display value to 100.

What customers are saying

"I usually just set the sensitivity.
It would be nice if I could reset all of the settings and current values,
but I wouldn't use this feature if it's complicated."





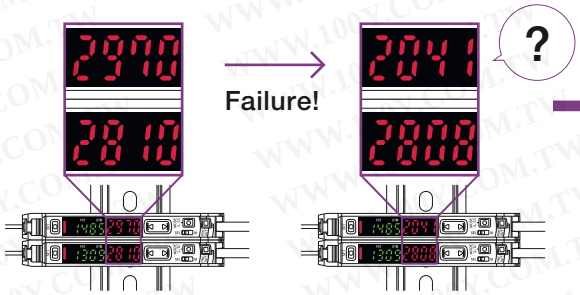
"With the NEO, just one click
sets the sensitivity and resets the display!"

Point 1 Easy to detect changes (preventive maintenance)

The NEO provides an easy-to-read indication when the light intensity drops due to dirt or other environment related causes.

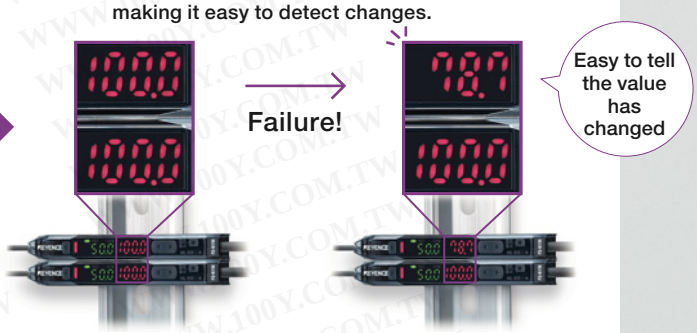
Conventional problem

Light intensity reduction is difficult to grasp due to individual differences in numeric values.



FS-NEO

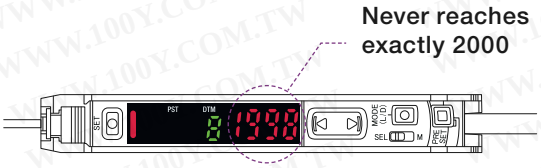
All sensors initially display 100, making it easy to detect changes.



Point 2 The digital value resets to exactly 100

Conventional problem

The value easily shifted and the initial value of 2000 was arbitrary.



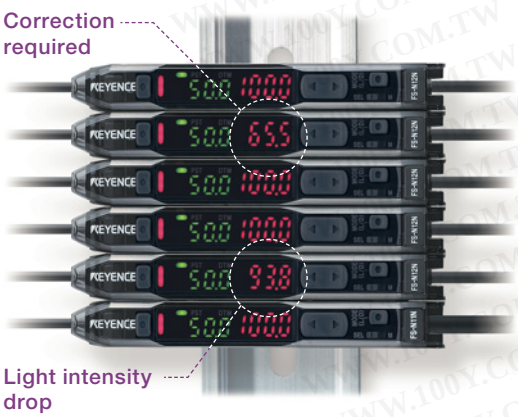
Setting the value to an easier to read value of 1000 required a complicated operation. The ability to change the target value made it difficult to keep track of the original value.

FS-NEO

The numbers reset to exactly 100. The set values are reset to 50.

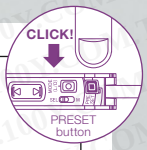
Resetting numeric values with one click offers unprecedented operating ease.

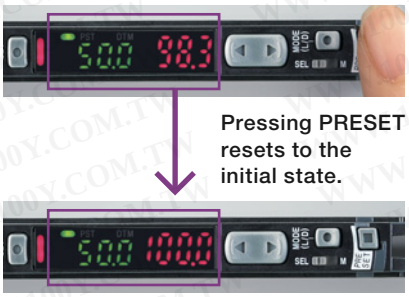
Point 3 Greater convenience when using multiple sensors



The preset function is even more useful when using multiple sensors. Quickly and easily locate sensors that have become dirty or misaligned. Main and expansion unit sensors can be reset with one click by pressing PRESET on the main unit.

If the light intensity drops



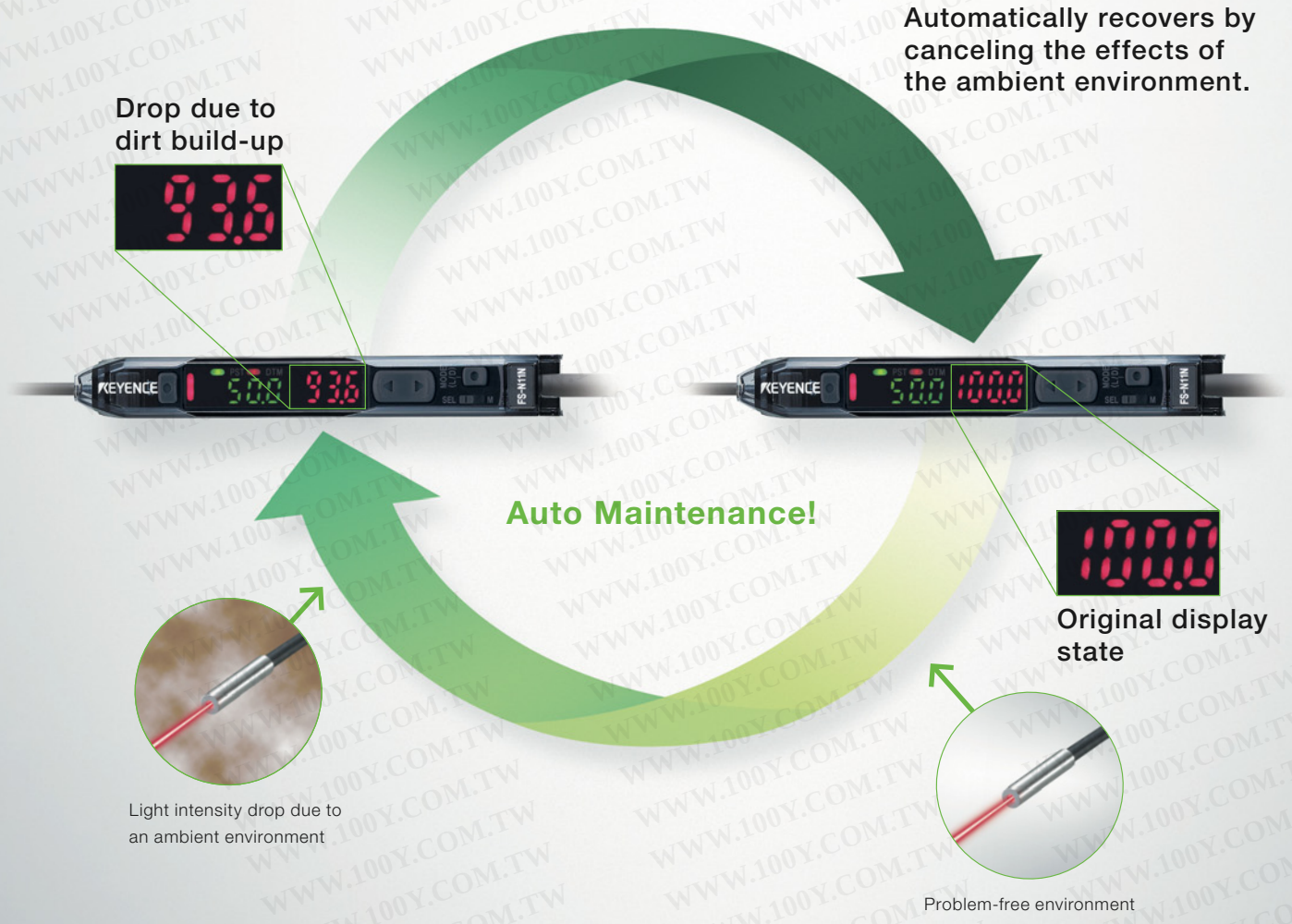


If the light intensity drops significantly it will not return to 100.0, making it easy to detect the problem. The 2-output type can be used to provide a low light intensity signal to a PLC or similar controller.

New Concept

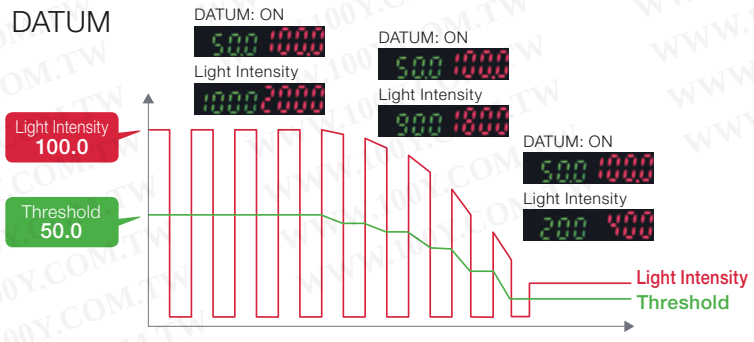
Automatic maintenance

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 the sensor to continue to perform highly accurate detections.



Automatic maintenance function: DATUM

The setting value changes according to the intensity as shown in the figure to the right. This function corrects the setting value based on a running average of the received light intensity value. The correction cycle is the same as the sampling cycle and can be selected from three levels.



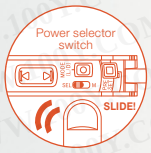
Simple, Convenient

World's highest power reduces maintenance time

"High power" = "large excess gain" that not only reduces the need for maintenance but also expands sensor head capabilities, which reduces setup time.

1 Switch selectable MEGA power

Hassle-free operation allows easy changeover between standard and high power.



Long distance [MEGA]

Short distance [FINE]

2 Reduced light intensity variations

With conventional models, amplifying the projected beam of condensed light causes the focus of the beam to be sensitive to minute positioning errors in the light-emitting device. The NEO-LED solves this positioning problem by using a reflector around the light emitting source. The reflector reduces light intensity variations.

The circular reflector helps compensate for light positioning errors by redirecting any stray light back into the fiber.

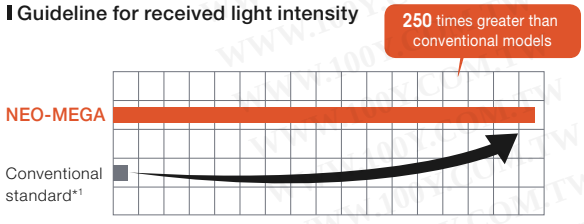
3 Prevent light saturation with a simple operation

Strong light may result in reduced contrast. In this case, simply press the "**MODE**" + "**SET**" buttons to automatically adjust the NEO to the proper light intensity.

Detecting the seam between transparent films

World's most powerful beam: NEO-MEGA

Guideline for received light intensity

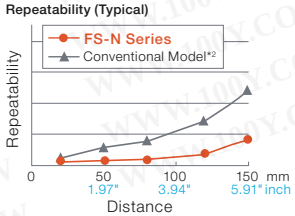


The emitted light intensity is about 4 times stronger than conventional models.

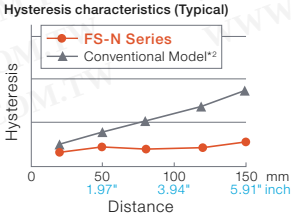
*1. FS-V30 Series in FINE mode

NEO-MEGA, the world's most powerful beam, allows for significant improvement of repeatability and hysteresis.

Repeatability (Typical)



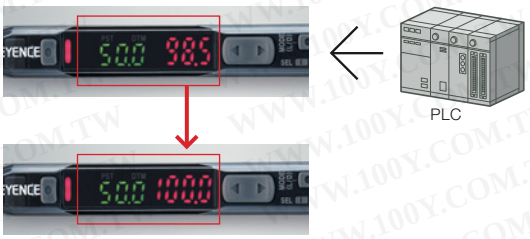
Hysteresis characteristics (Typical)



*2. FS-V30 Series

Convenient functionality designed for ease of use in the field

Using the external calibration input*



The sensor can be calibrated from a PLC or other external device. Regularly executing the Preset function from an external input ensures uninterrupted, stable detection, even in harsh environments. The 2-output type can be used to provide a low light intensity signal if the sensor becomes extremely dirty.

* Available on models with external input support.

Easy sensitivity setting (two-point tuning)

Set by simply pressing the SET button once with the target present, and once without it.

Wire saving when adding sensors

When adding sensors, the power is supplied from the connector on the side. This reduces wiring by two cables per sensor, allowing for a neater, quicker installation.

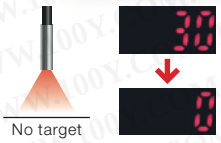
Note: Only supports FS-N Series amplifiers.

Reliable even when using multiple sensors

All models equipped with a standard heat sink. The heat sink reduces the temperature of the amplifier, and reduces the stress on the LED light source as well as other internal parts.

Zero Shift

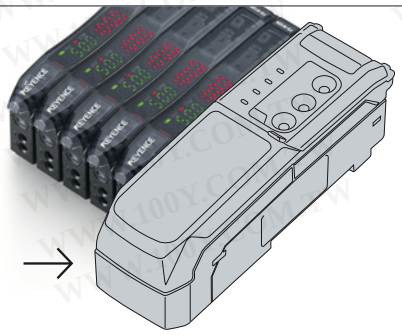
Setting the current value to "0" just got easier. Simply press the PRESET and RIGHT button at the same time.



Using a NEO amplifier with an external input, the Zero Shift adjustment can be performed on a regular basis using a PLC or other external device.

Network support COMING SOON

KEYENCE engineers are currently developing a communication unit that will connect the FS-NEO directly to an open field network. This will provide easy read and write access for various settings.



Complete lineup

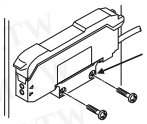
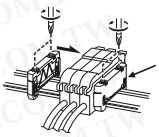
Cable Type

Type		Model		Control outputs	External input	Analog output
		NPN output	PNP output			
Standard	Main unit	**FS-N11N**	**FS-N11P**	1	0	0
	Expansion unit	**FS-N12N**	**FS-N12P**			
2-output	Main unit	**FS-N13N**	**FS-N13P**	2	1	
	Expansion unit	**FS-N14N**	**FS-N14P**			
Analog	Main unit	**FS-N11MN**	—	1	0	1

Connector Type (M8)

Type		Model		Control outputs	External input	Analog output
		NPN output	PNP output			
Standard	Main unit	**FS-N11CN**	**FS-N11CP**	1	1	0
	Expansion unit	**FS-N12CN**	**FS-N12CP**			
2-output	Main unit	—	**FS-N13CP**	2	0	
	Expansion unit	—	**FS-N14CP**			

Optional (sold separately)

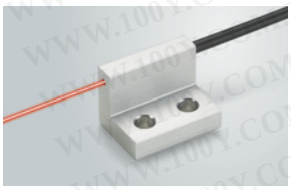
	Description	Model
Amplifier securing bracket (for main unit)	Can be installed without a DIN-rail. Can be installed from above or from the side.  **OP-73880**	**OP-73880**
End unit (when using expansion units)	Used to secure the main and expansion units. (Two per set)  **OP-26751** (Two per set)	**OP-26751**
M8 connector cable (2 m (6.56')/10 m (32.81'))	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 (6.56') type OP-73864** **10 m (32.81') type OP-73865**

Fiber Unit FU Series

Fiber Unit [FU Series]

Choose from our selection of more than 100 types of fiber units.

Standard Type

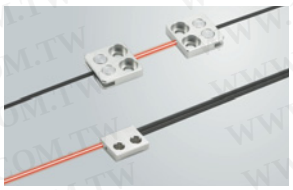


Integrated Bracket

The sensor is integrated into an L-shaped bracket, which simplifies installation.

P.13

Standard Type



Flat

This thin profile sensor comes with mounting holes for installation where space is limited.

P.13

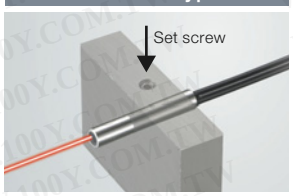
Standard Type

Threaded and Hex-shaped Fibers

Threaded for easy mounting onto brackets and machine equipment.

P.14

Standard Type



Cylinder

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

P.16

Standard Type

Sleeve

The fiber tip is a thin sleeve. Eliminate problems caused by limited mounting space. Lineup includes side-view and bendable sleeve types.

P.17

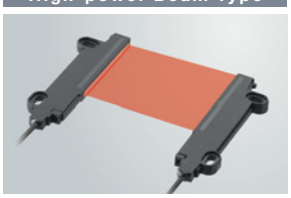
Focused Beam Type

Small Spot Reflective

Ideal for detecting small objects. Spot size and focal distance are adjustable, so there is no need to change the distance between the sensor and the target.

P.18

High-power Beam Type



Area

This sensor forms a wide-area beam, making it ideal for moving-target applications, such as detection of falling objects.

P.19

High-power Beam Type

Retro-reflective

The use of a reflector in place of the receiver used with thrubeam sensors simplifies installation and optical axis alignment. This sensor is suitable for detecting transparent objects.

P.19

High-power Beam Type

Narrow Beam/High-power

Narrow field of view based on focused aperture angle. This sensor reduces stray light for stable target detection. The high-power reflective type with an 8° aperture angle is suitable for detecting objects at longer distances.

P.20

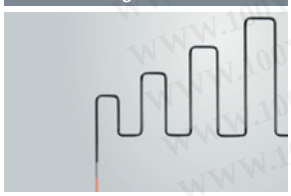
Fixed Range Type

Definite-reflective

Detects within a fixed distance. Reduces the effect of background, and features a space-saving thin-profile design.

P.20

High-flex



High-flex*

The R2 (R0.08") ToughFlex fiber achieves excellent flexing characteristics with the same bend radius.
* 10 million bends

P.21

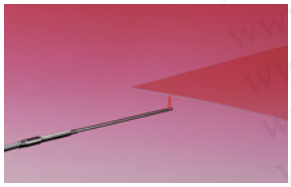
Oil/Chemical Resistant

Oil/Chemical Resistant

The PTFE coating allows these fibers to be used in almost any environment, including oil- or chemical-splash conditions.

P.21

Heat Resistant



Heat Resistant

Ideal for use in high temperature applications. Withstands temperatures up to 350°C (662°F).

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Application-specific Type

Liquid-level

Detects liquid levels when immersed or attached to a transparent tube.

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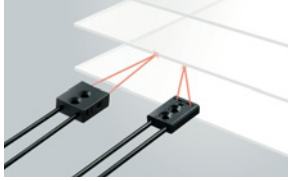
Application-specific Type



Liquid Crystal/ Semiconductors

Perfect for glass substrate detection. Lineup offers distance alignment, edge detection, and wafer mapping types.

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Integrated Bracket

Integrated bracket and sensor simplifies installation.

Thrubeam/reflective types

Type: Detecting method	Type: Beam emitting direction	Type: Optical axis height (mm inch)	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model / Weight
Thrubeam	Top	10 0.39"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex	MEGA: 2200 86.61" FINE: 450 17.72"	ULTRA: 1700 66.93" SUPER: 1000 39.37" TURBO: 760 29.92" HSP: 290 11.42"	ø1.13 ø0.04"	**FU-L51Z** Approx. 30 g
		15 0.59"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F					**FU-L52Z** Approx. 30 g
		20 0.79"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F					**FU-L53Z** Approx. 30 g
	Top (lens)	10 0.39"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F		MEGA: 3600 141.73" FINE: 3100 122.05"	ULTRA: 3600 141.73" SUPER: 3600 141.73" TURBO: 3600 141.73" HSP: 2100 82.68"	ø3.5 ø0.14"	**FU-L50Z** Approx. 30 g
	Side	10 0.39"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F		MEGA: 1900 74.80" FINE: 410 16.14"	ULTRA: 1500 59.06" SUPER: 900 35.43" TURBO: 700 27.56" HSP: 270 10.63"	ø1.13 ø0.04"	**FU-L54Z** Approx. 30 g
Reflective	Top	10 0.39"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex	MEGA: 760 29.92" FINE: 170 6.69"	ULTRA: 580 22.83" SUPER: 430 16.93" TURBO: 320 12.60" HSP: 90 3.54"	–	**FU-L41Z** Approx. 25 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Flat

Mount directly in locations where space is limited.

Thrubeam/reflective types

Type: Detecting method	Type: Beam emitting direction	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model / Weight
Thrubeam	Top	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex	MEGA: 810 31.89" FINE: 170 6.69"	ULTRA: 520 20.47" SUPER: 340 13.39" TURBO: 260 10.24" HSP: 90 3.54"	ø0.5 ø0.02"	**FU-51TZ** Approx. 5 g
		2 m 6.56' Free-cut (ø1.3 ø0.05") -40 to +50°C -40 to +122°F		MEGA: 2900 114.17" FINE: 610 24.02"	ULTRA: 1900 74.80" SUPER: 1200 47.24" TURBO: 850 33.46" HSP: 260 10.24"	ø1 ø0.04"	**FU-52TZ** Approx. 15 g
	Side	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F		MEGA: 740 29.13" FINE: 140 5.51"	ULTRA: 480 18.90" SUPER: 280 11.02" TURBO: 200 7.87" HSP: 70 2.76"	ø0.5 ø0.02"	**FU-57TZ** Approx. 5 g
	Flat	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F		MEGA: 500 19.69" FINE: 140 5.51"	ULTRA: 340 13.39" SUPER: 230 9.06" TURBO: 180 7.09" HSP: 80 3.15"		**FU-53TZ** Approx. 10 g
		2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F		MEGA: 2900 114.17" FINE: 610 24.02"	ULTRA: 1900 74.80" SUPER: 1200 47.24" TURBO: 850 33.46" HSP: 260 10.24"	ø1 ø0.04"	**FU-54TZ** Approx. 25 g
Reflective	Top	1 m 3.28' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex	MEGA: 1 to 160 0.04" to 6.30" FINE: 1 to 36 0.04" to 1.42"	ULTRA: 1 to 120 0.04" to 4.72" SUPER: 1 to 81 0.04" to 3.19" TURBO: 1 to 60 0.04" to 2.36" HSP: 1 to 13 0.04" to 0.51"	–	**FU-44TZ** Approx. 3 g
	Side	1 m 3.28' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F		MEGA: 1 to 160 0.04" to 6.30" FINE: 1 to 36 0.04" to 1.42"	ULTRA: 1 to 120 0.04" to 4.72" SUPER: 1 to 81 0.04" to 3.19" TURBO: 1 to 60 0.04" to 2.36" HSP: 1 to 18 0.04" to 0.71"		**FU-47TZ** Approx. 4 g
	Flat	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F		MEGA: 2 to 120 0.08" to 4.72" FINE: 2 to 24 0.08" to 0.94"	ULTRA: 2 to 77 0.08" to 3.03" SUPER: 2 to 50 0.08" to 1.97" TURBO: 2 to 32 0.08" to 1.26" HSP: 2 to 8 0.08" to 0.32"		**FU-41TZ** Approx. 5 g
		2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +50°C -40 to +122°F		MEGA: 1 to 500 0.04" to 19.69" FINE: 1 to 70 0.04" to 2.76"	ULTRA: 1 to 320 0.04" to 12.60" SUPER: 1 to 190 0.04" to 7.48" TURBO: 1 to 130 0.04" to 5.12" HSP: 1 to 50 0.04" to 1.97"		**FU-42TZ** Approx. 24 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Threaded and Hex-shaped Fibers

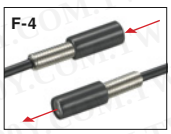
Most common fiber sensor.
Easily mounts onto brackets or machine equipment.

Thrubeam

Type: Detecting method	Type: Size/Shape		Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch): MEGA FINE	Detecting distance (mm inch): Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model Weight
Thrubeam	M4	Hex-shaped	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F 0.57" 14.4 M4	R2 R0.08" ToughFlex	MEGA: 3100 122.05" FINE: 640 25.20"	ULTRA: 2100 82.68" SUPER: 1300 51.18" TURBO: 880 34.65" HSP: 320 12.60"	ø1.13 ø0.04"	**FU-77TZ** Approx. 43 g
			1 m 3.28' cut not allowed. -40 to +50°C -40 to +122°F 0.59" 15 M4	R10 R0.39" Stainless Steel	MEGA: 1800 70.87" FINE: 640 25.20"	ULTRA: 1800 70.87" SUPER: 1300 51.18" TURBO: 880 34.65" HSP: 320 12.60"		**FU-77TG** Approx. 43 g
		Threaded	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F M4 14 0.55"	R0.5 R0.02" ToughFlex	MEGA: 3600 141.73" FINE: 880 34.65"	ULTRA: 3000 118.11" SUPER: 1800 70.87" TURBO: 1300 51.18" HSP: 430 16.93"		**FU-77V** Approx. 25 g
				R2 R0.08" ToughFlex				**FU-77** Approx. 21 g
			1 m 3.28' cut not allowed. -40 to +50°C -40 to +122°F M4 22 0.87"	R10 R0.39" Stainless Steel	MEGA: 1800 70.87" FINE: 880 34.65"	ULTRA: 1800 70.87" SUPER: 1800 70.87" TURBO: 1300 51.18" HSP: 430 16.93"		**FU-77G** Approx. 39 g
			2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F M4 15 0.59"	R25 R0.98"	MEGA: 3600 141.73" FINE: 1100 43.31"	ULTRA: 3200 125.98" SUPER: 2200 86.61" TURBO: 1500 59.06" HSP: 540 21.26"	ø1 ø0.04"	**FU-7F** Approx. 21 g
			2 m 6.56' Free-cut (ø1.3 ø0.05") -40 to +70°C -40 to +158°F M4 15 0.59"	R4 R0.16"	MEGA: 2200 86.61" FINE: 440 17.32"	ULTRA: 1400 55.12" SUPER: 860 33.86" TURBO: 600 23.62" HSP: 220 8.66"		**FU-78** Approx. 9 g
	M6	Threaded	2 m 6.56' Free-cut (ø2.2 ø0.09") FU-71Z: -40 to +50°C -40 to +122°F FU-71: -40 to +70°C -40 to +158°F M6 16 0.63"	R2 R0.07" ToughFlex	MEGA: 3600 141.73" FINE: 1100 43.31"	ULTRA: 3600 141.73" SUPER: 2300 90.55" TURBO: 1600 62.99" HSP: 590 23.23"	ø1.5 ø0.06"	**FU-71Z** Approx. 25 g
				R25 R0.98"	MEGA: 3600 141.73" FINE: 1300 51.2"	ULTRA: 3600 141.73" SUPER: 2600 90.55" TURBO: 1800 70.87" HSP: 650 25.59"		**FU-71** Approx. 25 g

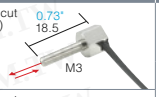
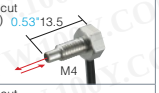
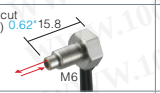
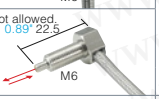
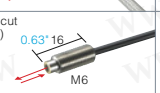
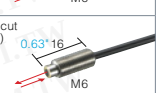
Thrubeam Lenses

Type	Ambient temperature Appearance (mm inch)	Model Weight	Applicable fiber units	Detecting distance (mm inch)*1: MEGA	ULTRA	SUPER	TURBO	FINE	HSP
Ultra-long detecting distance Narrow field of view Aperture Angle: Approx. 8°	Heat Resistance: 70°C 158°F ø0.17" Tip: ø4.3 9.5 0.37"	**F-4** Approx. 1 g	**FU-77TZ/77V/77**	3600 141.73"					2700 106.30"
			FU-7F						3200 125.98"
			FU-78						2200 86.61"
			FU-77G/77TG	1800 70.87"					
Long-detecting distance Aperture Angle: Approx. 15°	Heat Resistance: 300°C 572°F ø0.16" Tip: ø4 7.9 0.31"	**F-2** Approx. 2 g	**FU-77TZ/77V/77/84C/88K**	3600 141.73"					2100 82.68
			FU-7F/86A	3600 141.73"					2500 98.43"
			FU-86Z	3600 141.73"					1900 74.80"
			FU-78	3600 141.73"				3300 129.92"	1600 62.99"
			FU-77G/77TG	1800 70.87"					
Side-view with mounting holes	Heat Resistance: 105°C 221°F Fixing Nut 9.3 0.37" 16.7 0.66" 5.6 0.22"	**F-5** Approx. 10 g	**FU-77V/77**	3600 141.73"					2600 102.36"
			FU-7F/86A						3100 122.05"
			FU-86Z						2900 114.17"
			FU-78						2300 90.55"
			FU-77G	1800 70.87"					
Side-view	Heat Resistance: 70°C 158°F*2 ø0.16" Tip: ø4 9.5 3.74"	**F-1** Approx. 2 g	**FU-77V/77**	3600 141.73"	3100 122.05"	1900 74.80"	1300 51.18"	900 35.43"	530 20.87"
			FU-77G	1800 70.87"			1300 51.18"	900 35.43"	530 20.87"
			FU-7F/86A	3600 141.73"		3100 122.05"	2100 82.68"	1300 51.18"	630 24.80"
			FU-86Z	3600 141.73"	3300 129.92"	2300 90.55"	1500 59.06"	1100 43.31"	500 19.69"
			FU-78/84C/88K	3200 125.98"	2500 98.43"	1600 62.99"	1100 43.31"	800 31.50"	360 14.17"



*1 The maximum sensing distance of 3600 mm 141.73" (1800 mm 70.87") is possible because the fiber length on each side is 2 m 6.56' (1 m 3.28').
*2 When using the F-1 at 70°C 158°F or more, specify the "Heat-resistant F-1".Be sure to use the "Heat-resistant F-1" at a constant temperature.

Reflective

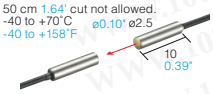
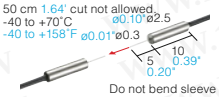
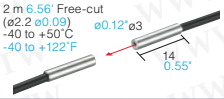
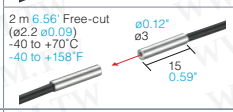
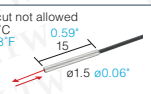
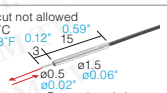
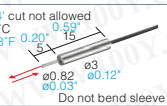
Type: Detecting method	Type: Size/Shape		Type: Detecting arrangement	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Model Weight
Reflective	M3	Hex-shaped	Coaxial	1 m 3.28' Free-cut (ø1.3 ø0.05 x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 400 15.75" FINE: 70 2.76" Lens attachment: P.18	ULTRA: 270 10.63" SUPER: 170 6.69" TURBO: 110 4.33" HSP: 32 1.26"	**FU-35TZ** Approx. 7 g
		Threaded		1 m 3.28' Free-cut (ø1.3 ø0.05 x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 450 17.72" FINE: 72 2.76" Lens attachment: P.18	ULTRA: 290 11.42" SUPER: 190 7.48" TURBO: 115 4.53" HSP: 36 1.42"	**FU-35FZ** Approx. 6 g
				1 m 3.28' Free-cut (ø1.3 ø0.05 x 2) Spiral 30 cm -40 to +50°C -40 to +122°F 	R10 R0.39" Stainless Steel			**FU-35FG** Approx. 15 g
				1 m 3.28' Free-cut (ø1.3 ø0.05 x 2) -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 550 21.65" FINE: 110 4.33" Lens attachment: P.18	ULTRA: 400 15.75" SUPER: 250 9.84" TURBO: 160 6.30" HSP: 45 1.77"	**FU-35FA** Approx. 6 g
				50 cm 1.64' cut not allowed. FU-21X: -40 to +70°C -40 to +158°F FU-24X: -40 to +50°C -40 to +122°F 	R25 R0.98"	MEGA: 130 5.12" FINE: 36 1.42" Lens attachment: P.18	ULTRA: 90 3.54" SUPER: 54 2.13" TURBO: 40 1.57" HSP: 23 0.91"	**FU-21X** Approx. 4 g
					R10 R0.39"	MEGA: 100 3.94" FINE: 13 0.51" Lens attachment: P.18	ULTRA: 72 2.83" SUPER: 32 1.26" TURBO: 23 0.91" HSP: 8 0.32"	**FU-24X** Approx. 4 g
	M4	Hex-shaped	Parallel	2 m 6.56' Free-cut (ø1.3 ø0.05 x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 640 25.2" FINE: 140 5.51"	ULTRA: 420 16.54" SUPER: 320 12.60" TURBO: 220 8.66" HSP: 70 2.76"	**FU-66TZ** Approx. 10 g
		Threaded		2 m 6.56' Free-cut (ø1.3 ø0.05 x 2) FU-66Z: -40 to +50°C -40 to +122°F FU-66: -40 to +70°C -40 to +158°F 	R2 R0.08" ToughFlex	MEGA: 770 30.32" FINE: 190 7.48"	ULTRA: 560 22.05" SUPER: 380 14.96" TURBO: 260 10.24" HSP: 80 3.15"	**FU-66Z** Approx. 10 g
					R25 R0.98"	MEGA: 1100 43.31" FINE: 300 11.81"	ULTRA: 860 33.86" SUPER: 570 22.44" TURBO: 410 16.14" HSP: 140 5.51"	**FU-66** Approx. 10 g
	M6	Hex-shaped	Parallel	2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 710 27.95" FINE: 210 8.27"	ULTRA: 550 21.65" SUPER: 470 18.50" TURBO: 310 12.20" HSP: 90 3.54"	**FU-67TZ** Approx. 32 g
				1 m 3.28' cut not allowed. -40 to +50°C -40 to +122°F 	R10 R0.39" Stainless Steel			**FU-67TG** Approx. 32 g
			Coaxial	1 m 3.28' cut not allowed. -40 to +50°C -40 to +122°F 		MEGA: 400 15.75" FINE: 70 2.76" Lens attachment: P.18	ULTRA: 270 10.63" SUPER: 170 6.69" TURBO: 110 4.33" HSP: 32 1.26"	**FU-35TG** Approx. 32 g
		Threaded	Parallel	2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +50°C -40 to +122°F 	R0.5 R0.02" ToughFlex	MEGA: 900 35.43" FINE: 210 8.27"	ULTRA: 740 29.13" SUPER: 490 19.29" TURBO: 320 12.60" HSP: 110 4.33"	**FU-67V** Approx. 25 g
				2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 1200 47.24" FINE: 300 11.81"	ULTRA: 900 35.43" SUPER: 590 23.23" TURBO: 430 16.93" HSP: 140 5.51"	**FU-61Z** Approx. 22 g
				2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +50°C -40 to +122°F 		MEGA: 900 35.43" FINE: 210 8.27"	ULTRA: 740 29.13" SUPER: 490 19.29" TURBO: 320 12.60" HSP: 110 4.33"	**FU-67** Approx. 21 g
				1 m 3.28' cut not allowed. -40 to +50°C -40 to +122°F 	R10 R0.39" Stainless Steel			**FU-67G** Approx. 29 g
				2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 1300 51.18" FINE: 380 14.96"	ULTRA: 1000 39.37" SUPER: 820 32.28" TURBO: 500 19.69" HSP: 160 6.30"	**FU-61** Approx. 21 g
				2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +70°C -40 to +158°F 		MEGA: 1100 43.31" FINE: 300 11.81"	ULTRA: 860 33.86" SUPER: 570 22.44" TURBO: 410 16.14" HSP: 140 5.51"	**FU-6F** Approx. 21 g
			Coaxial	2 m 6.56' Free-cut (ø2.2 ø0.09 x 2) -40 to +70°C -40 to +158°F 		MEGA: 720 28.35" FINE: 160 6.30"	ULTRA: 630 24.8" SUPER: 410 16.14" TURBO: 270 10.63" HSP: 130 5.12"	**FU-25** Approx. 18 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Cylinder

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

Thrubeam/reflective types

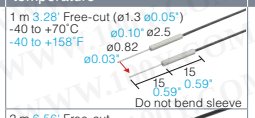
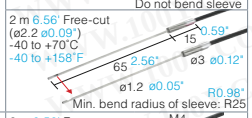
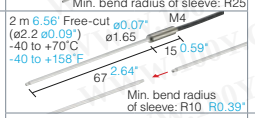
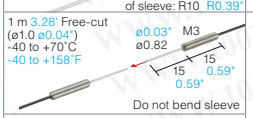
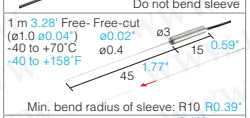
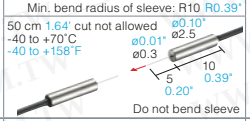
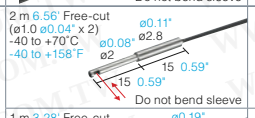
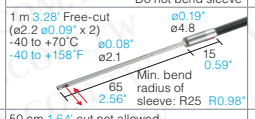
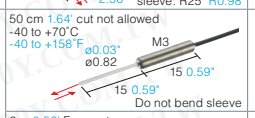
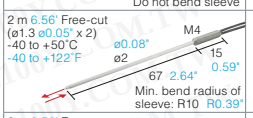
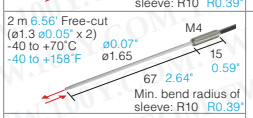
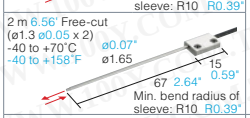
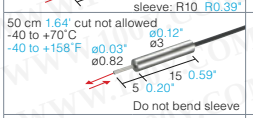
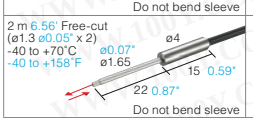
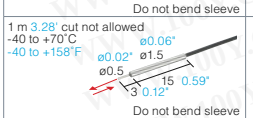
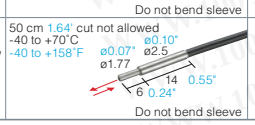
Type		Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1		Optical axis diameter (mm inch) (Standard target to be detected)	Model Weight
Detecting method	Size (mm inch)			MEGA FINE	Other power modes		
Thrubeam	ø1.0 ø0.04"	50 cm 1.64' cut not allowed. -40 to +50°C -40 to +122°F 	R10 R0.39"	MEGA: 380 14.96" FINE: 85 3.35"	ULTRA: 270 10.63" SUPER: 180 7.09" TURBO: 120 4.72" HSP: 40 1.57"	ø0.265 ø0.01"	**FU-58** Approx. 8 g
	ø1.5 ø0.06"	1 m 3.28' Free-cut (ø1.0 ø0.04) -40 to +70°C -40 to +158°F 	R4 R0.16" High-flex	MEGA: 1200 47.24" FINE: 230 9.06"	ULTRA: 810 31.89" SUPER: 590 23.23" TURBO: 410 16.14" HSP: 130 5.12"	ø0.7 ø0.03"	**FU-59** Approx. 3 g
	ø2.5 ø0.10"	50 cm 1.64' cut not allowed. -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 45 1.77" FINE: 13 0.51"	ULTRA: 32 1.26" SUPER: 23 0.91" TURBO: 18 0.71" HSP: – –	ø0.125 ø005"	**FU-55** Approx. 3 g
		50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F ø0.01"ø0.3  Do not bend sleeve					**FU-56** Approx. 3 g
	ø3 ø0.12"	2 m 6.56' Free-cut (ø2.2 ø0.09) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 3600 171.73" FINE: 880 34.65"	ULTRA: 3000 118.11" SUPER: 1800 70.87" TURBO: 1300 51.18" HSP: 430 16.93"	ø1.13 ø0.04"	**FU-5FZ** Approx. 19 g
		2 m 6.56' Free-cut (ø2.2 ø0.09) -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 3600 171.73" FINE: 1100 43.30"	ULTRA: 3200 125.98" SUPER: 2200 86.61" TURBO: 1500 59.06" HSP: 540 21.26"	ø1 ø0.04"	**FU-5F** Approx. 19 g
Reflective	ø1.5 ø0.06"	1 m 3.28' cut not allowed -40 to +70°C -40 to +158°F 	R4 R0.16" High-flex	MEGA: 150 5.91" FINE: 32 1.26"	ULTRA: 100 3.94" SUPER: 80 3.15" TURBO: 54 2.13" HSP: 22 0.87"	–	**FU-49X** Approx. 3 g
		1 m 3.28' cut not allowed -40 to +70°C -40 to +158°F  Do not bend sleeve	R10 R0.39"	MEGA: 27 1.06" FINE: 4.8 0.19"	ULTRA: 18 0.71" SUPER: 13 0.51" TURBO: 10 0.39" HSP: 2.4 0.09"		**FU-46** Approx. 2 g
	ø2.5 ø0.10"	50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F Do not bend sleeve	R25 R0.98"	MEGA: 72 2.83" FINE: 23 0.91"	ULTRA: 59 2.32" SUPER: 45 1.77" TURBO: 32 1.26" HSP: 12 0.47"		**FU-22X** Approx. 4 g
	ø3 ø0.12"	2 m 6.56' Free-cut (ø1.3 ø0.05 x 2) FU-4FZ: -40 to +50°C -40 to +122°F FU-4F: -40 to +70°C -40 to +158°F 	R2 R0.08" ToughFlex	MEGA: 770 30.32" FINE: 190 7.48"	ULTRA: 560 22.05" SUPER: 380 14.96" TURBO: 260 10.24" HSP: 80 3.15"	–	**FU-4FZ** Approx. 8 g
			R25 R0.98"	MEGA: 1100 43.30" FINE: 300 11.81"	ULTRA: 860 33.86" SUPER: 570 22.44" TURBO: 410 16.14" HSP: 140 5.51"		**FU-4F** Approx. 8 g
		2 m 6.56' Free-cut (ø1.0 ø0.04 x 2) -40 to +70°C -40 to +158°F 	R4 R0.16" High-flex	MEGA: 290 11.42" FINE: 63 2.48"	ULTRA: 200 7.87" SUPER: 130 5.12" TURBO: 80 3.15" HSP: 32 1.26"		**FU-48** Approx. 7 g
		50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 830 32.68" FINE: 180 7.09"	ULTRA: 680 26.77" SUPER: 470 18.50" TURBO: 320 12.60" HSP: 130 5.12"		**FU-23X** Approx. 4 g
		50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F  Do not bend sleeve	R4 R0.16"	MEGA: 68 2.68" FINE: 18 0.71"	ULTRA: 54 2.13" SUPER: 40 1.57" TURBO: 27 1.06" HSP: 8 0.32"		**FU-45X** Approx. 4 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Sleeve

Eliminate problems caused by limited mounting space.

Thrubeam/reflective types

Type: Detecting method	Type: Beam emitting direction	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model Weight
Thrubeam	Side-view	1 m 3.28' Free-cut (ø1.3 ø0.05") -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 520 20.47" FINE: 100 3.94"	ULTRA: 380 14.96" SUPER: 230 9.06" TURBO: 160 6.30" HSP: 55 2.17"	ø0.6 ø0.02"	**FU-32** Approx. 5 g
		2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F 		MEGA: 1600 62.99" FINE: 330 12.99"	ULTRA: 1100 43.31" SUPER: 660 25.98" TURBO: 470 18.50" HSP: 140 5.51"	ø1 ø0.04"	**FU-34** Approx. 17 g
	Top view	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F 		MEGA: 3600 141.73" FINE: 1100 43.31"	ULTRA: 3200 125.98" SUPER: 2200 86.61" TURBO: 1500 59.06" HSP: 540 21.26"		**FU-73** Approx. 24 g
		1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 690 27.17" FINE: 170 6.69"	ULTRA: 500 19.69" SUPER: 340 13.39" TURBO: 240 9.45" HSP: 72 2.83"	ø0.5 ø0.02"	**FU-75F** Approx. 10 g
		1 m 3.28' Free- Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F 		MEGA: 370 14.57" FINE: 85 3.35"	ULTRA: 260 10.24" SUPER: 180 7.09" TURBO: 120 4.72" HSP: 40 1.57"	ø0.265 ø0.01"	**FU-76F** Approx. 10 g
		50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F 		MEGA: 45 1.77" FINE: 13 0.51"	ULTRA: 32 1.26" SUPER: 23 0.91" TURBO: 18 0.71" HSP: – –	ø0.125 ø0.004"	**FU-56** Approx. 3 g
Reflective	Side	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 180 7.09" FINE: 32 1.26"	ULTRA: 130 5.12" SUPER: 81 3.19" TURBO: 50 1.97" HSP: 18 0.71"	–	**FU-31** Approx. 5 g
		1 m 3.28' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 320 12.60" FINE: 45 1.77"	ULTRA: 250 9.84" SUPER: 140 5.51" TURBO: 90 3.54" HSP: 32 1.26"		**FU-33** Approx. 10 g
	Top	50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F 	R4 R0.16"	MEGA: 68 2.68" FINE: 18 0.71"	ULTRA: 54 2.13" SUPER: 40 1.57" TURBO: 27 1.06" HSP: 8 0.32"		**FU-65X** Approx. 5 g
		2 m 6.56' Free-cut (ø1.3 ø0.05" x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 290 11.42" FINE: 54 2.13"	ULTRA: 190 7.48" SUPER: 120 4.72" TURBO: 80 3.15" HSP: 23 0.91"		**FU-63Z** Approx. 10 g
		2 m 6.56' Free-cut (ø1.3 ø0.05" x 2) -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 330 12.99" FINE: 72 2.83"	ULTRA: 230 9.06" SUPER: 150 5.91" TURBO: 100 3.94" HSP: 36 1.42"	–	**FU-63** Approx. 10 g
		2 m 6.56' Free-cut (ø1.3 ø0.05 x 2) -40 to +70°C -40 to +158°F 					**FU-63T** Approx. 10 g
		50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F 	R4 R0.16"	MEGA: 68 2.68" FINE: 18 0.71"	ULTRA: 54 2.13" SUPER: 40 1.57" TURBO: 27 1.06" HSP: 8 0.32"		**FU-45X** Approx. 4 g
		2 m 6.56' Free-cut (ø1.3 ø0.05" x 2) -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 330 12.99" FINE: 72 2.83"	ULTRA: 230 9.06" SUPER: 150 5.91" TURBO: 100 3.94" HSP: 36 1.42"		**FU-43** Approx. 8 g
		1 m 3.28' cut not allowed -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 27 1.06" FINE: 4.8 0.19"	ULTRA: 18 0.71" SUPER: 13 0.51" TURBO: 10 0.39" HSP: 2.4 0.09"		**FU-46** Approx. 2 g
	Coaxial, narrow beam 10°	50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F 	R25 R0.98"	MEGA: 72 2.83" FINE: 23 0.91"	ULTRA: 59 2.32" SUPER: 45 1.77" TURBO: 32 1.26" HSP: 12 0.47"		**FU-22X** Approx. 4 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Small Spot Reflective

Ideal for detecting small objects.
Select the sensor according to the size of the object.

Parallel Beam Spot

Lens + Fiber Unit

Type	Beam spot diameter (mm inch)	Lens: Appearance (mm inch) Weight	Lens: Model	Fiber units: Minimum bend radius (mm inch) Appearance	Fiber units: Model	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes
Parallel beam	Approx. ø4 ø0.16" (within the detecting distance of 0 to 20 mm 0" to 0.79")	ø0.17" Tip: ø4.3; 9.5 0.37"; Approx. 2 g	F-3HA	R2 R0.08" ToughFlex	FU-35FZ	MEGA: 45 1.77" FINE: 36 1.42"	ULTRA: 45 1.77" SUPER: 45 1.77" TURBO: 40 1.57" HSP: 27 1.06"
				R10 R0.39" Stainless Steel	FU-35FG		
				R25 R0.98"	FU-35FA	MEGA: 65 2.56" FINE: 54 2.13"	ULTRA: 65 2.56" SUPER: 65 2.56" TURBO: 60 2.36" HSP: 45 1.77"
				R2 R0.08" ToughFlex	FU-35TZ	MEGA: 40 1.57" FINE: 27 1.06"	ULTRA: 40 1.57" SUPER: 40 1.57" TURBO: 32 1.26" HSP: 23 0.91"
				R10 R0.39" Stainless Steel	FU-35TG		

F-3HA

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Small Beam Spot

Lens + Fiber Unit

Type	Beam spot diameter (mm inch)	Focal distance (mm inch)	Lens: Appearance (mm inch) Weight	Lens: Model	Fiber units: Minimum bend radius (mm inch) Appearance	Fiber units: Model
Small spot	Approx. ø0.1 ø0.004"	7±2 0.28"±0.08"	ø0.17" Tip: ø4.3; 15.6 0.61"; Approx. 1 g	F-2HA	R10 R0.39"	FU-24X
	Approx. ø0.2 ø0.008"				R25 R0.98"	FU-21X
	Approx. ø0.4 ø0.02"				R2 R0.08" ToughFlex	FU-35FZ
					R10 R0.39" Stainless Steel	FU-35FG
					R25 R0.98"	FU-35FA
					R2 R0.08" ToughFlex	FU-35TZ
					R10 R0.39" Stainless Steel	FU-35TG
	Approx. ø0.5 ø0.02"	15±2 0.59"±0.08"	ø0.29" Tip: ø7.4; 27 1.06"; Approx. 2 g	F-4HA	R2 R0.08" ToughFlex	FU-35FZ
					R10 R0.39" Stainless Steel	FU-35FG
					R2 R0.08" ToughFlex	FU-35TZ
					R10 R0.39" Stainless Steel	FU-35TG
					R25 R0.98"	FU-35FA
	Approx. ø1.0 ø0.04"	35±3 1.38"±0.12"	ø0.42" Tip: ø10.6; 26 1.02"; Approx. 5 g	F-6HA	R25 R0.98"	FU-21X
	Approx. ø2.0 ø0.08"				R2 R0.08" ToughFlex	FU-35FZ
					R10 R0.39" Stainless Steel	FU-35FG
					R2 R0.08" ToughFlex	FU-35TZ
					R25 R0.98"	FU-35FA

F-2HA

F-4HA

F-6HA

Built-in Lens Fiber Unit

Type	Beam spot diameter (mm inch)	Focal distance (mm inch)	Fiber unit length (Diameter) Ambient temperature	Appearance (mm inch)	Model Weight	Minimum bend radius (mm inch)
Small spot	Approx. ø0.1 ø0.004"	5 0.20"	50 cm 1.64' cut not allowed -40 to +70°C -40 to +158°F	Tip: ø3 ø0.12"; 18 0.71"	FU-20 Approx. 2 g	R25 R0.98"

Adjustable Beam Spot

Built-in Lens Fiber Unit

Type	Beam spot diameter (mm inch)	Focal distance (mm inch)	Fiber unit length (Diameter) Ambient temperature	Appearance (mm inch)	Model Weight	Minimum bend radius (mm inch)
Adjustable beam spot	ø0.9 to 3.5 ø0.04" to 0.14"	10 to 30 0.39" to 1.18"	2 m 6.56' Free-cut (ø1.3 ø0.05 x 2) -40 to +70°C -40 to +158°F	M6; 26.4 1.04" to 31.5 1.24"	FU-10 Approx. 5 g	R25 R0.98"

Lens + Fiber Unit

Type	Beam spot diameter (mm inch)	Focal distance (mm inch)	Lens: Appearance (mm inch) Weight	Lens: Model	Fiber units: Minimum bend radius (mm inch) Appearance	Fiber units: Model
Side-view adjustable spot	ø0.5 to 3 ø0.02" to 0.12"	8 to 30 0.32" to 1.18"	8.7 0.34"; 5.6 0.22"; 15 0.59"; Approx. 2 g	F-5HA	R2 R0.08" ToughFlex	FU-35FZ
					R10 R0.39" Stainless Steel	FU-35FG
					R25 R0.98"	FU-35FA

F-5HA

Area

Great for applications where target position varies or
for detecting targets with complicated shapes or rough surface finish.

Thrubeam/reflective types

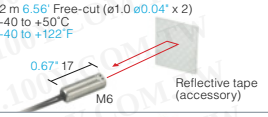
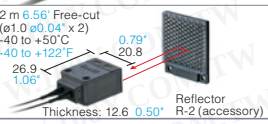
Type			Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1		Optical axis diameter (mm inch)	Model Weight
Detecting method	Type	Optical axis width (mm inch)			MEGA FINE	Other power modes		
Thrubeam	Area	10 0.39"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex	MEGA: 3400 133.86" FINE: 1400 55.12"	ULTRA: 2800 110.24" SUPER: 2400 94.49" TURBO: 1700 66.93" HSP: 640 25.20"	10×3 0.39"×0.12"	**FU-12** Approx. 23 g
		11 0.43"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F		MEGA: 3600 141.73" FINE: 2700 106.30"	ULTRA: 3600 141.73" SUPER: 3600 141.73" TURBO: 3600 141.73" HSP: 1300 51.18"	11×2 0.43"×0.08"	**FU-E11** Approx. 20 g
		40 1.57"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +50°C -40 to +122°F		MEGA: 3600 141.73" FINE: 3600 141.73"	ULTRA: 3600 141.73" SUPER: 3600 141.73" TURBO: 3600 141.73" HSP: 2500 98.43"	40×3 1.57"×0.12"	**FU-E40** Approx. 30 g
	Array	5 0.20"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F	R4 R0.16"	MEGA: 2200 86.61" FINE: 440 17.32"	ULTRA: 1400 55.12" SUPER: 840 33.07" TURBO: 540 21.25" HSP: 200 7.87"	Approx. 6 x 0.3 0.24"×0.01"	**FU-A05** Approx. 20 g
		10 0.39"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F				Approx. 11 x 0.3 0.43"×0.01"	**FU-A10** Approx. 20 g
Reflective	Area	15 0.59" (at distance 15 0.59")	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F	R25 R0.98"	MEGA: 5 to 200 0.20" to 7.87" FINE: 5 to 140 0.20" to 5.51"	ULTRA: 5 to 200 0.20" to 7.87" SUPER: 5 to 200 0.20" to 7.87" TURBO: 5 to 160 0.20" to 6.30" HSP: 5 to 110 0.20" to 4.33"	–	**FU-11** Approx. 19 g
	Array	10 0.39" (at distance 4 0.16")	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F	R4 R0.16"	MEGA: 740 29.13" FINE: 140 5.51"	ULTRA: 460 18.11" SUPER: 260 10.24" TURBO: 180 7.09" HSP: 60 2.36"	–	**FU-A05D** Approx. 20 g
		15 0.59" (at distance 4 0.16")	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F				–	**FU-A10D** Approx. 20 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Retro-reflective

Useful for detecting transparent objects.

Retro-reflective type

Type		Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1		Model Weight
Detecting method	Beam emitting direction			MEGA FINE	Other power modes	
Retro-Reflective	M6	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 10 to 960 0.39" to 37.80" FINE: 10 to 120 0.39" to 4.72"	ULTRA: 10 to 760 0.39" to 29.92" SUPER: 10 to 380 0.39" to 14.96" TURBO: 10 to 230 0.39" to 9.06" HSP: – –	**FU-13** Approx. 8 g
	Square type	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F 	R10 R0.39"	MEGA: 100 to 6400 4.72" to 251.97" FINE: 100 to 1260 4.72" to 49.61"	ULTRA: 100 to 5000 4.72" to 196.85" SUPER: 100 to 2500 4.72" to 98.43" TURBO: 100 to 1690 4.72" to 66.54" HSP: 100 to 1000 4.72" to 39.37"	**FU-15** Approx. 12 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Reflector/Reflective Tape Specifications (Optional Parts)

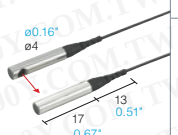
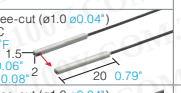
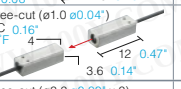
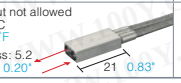
Model	Power modes	Detecting distance (mm inch)*1							
		R-2 (OP-95388) 51.2 x 61 (2.02" x 2.40")		R-3 (OP-96436) 35 x 42 (1.38" x 1.65")		R-5 14 x 36 (0.55" x 1.42")		Reflective tape (OP-96629) 40 x 30 (1.57" x 1.18")	
FU-13	MEGA	10 to 1880	0.39" to 74.02"	10 to 1540	0.39" to 60.63"	10 to 1060	0.39" to 41.73"	10 to 960	0.39" to 37.80"
	ULTRA	10 to 1500	0.39" to 59.06"	10 to 1240	0.39" to 48.82"	10 to 860	0.39" to 33.86"	10 to 760	0.39" to 29.92"
	SUPER	10 to 760	0.39" to 29.92"	10 to 640	0.39" to 25.20"	10 to 440	0.39" to 17.32"	10 to 380	0.39" to 14.96"
	TURBO	10 to 450	0.39" to 17.72"	10 to 360	0.39" to 14.17"	10 to 230	0.39" to 9.06"	10 to 230	0.39" to 9.06"
	FINE	10 to 250	0.39" to 9.84"	10 to 200	0.39" to 7.87"	10 to 130	0.39" to 5.12"	10 to 120	0.39" to 4.72"
	HSP	–		–		–		–	
FU-15*2	MEGA	100 to 6400	3.94" to 251.97"	100 to 4400	3.94" to 173.23"	100 to 2600	3.94" to 102.36"	–	
	ULTRA	100 to 5000	3.94" to 196.85"	100 to 3600	3.94" to 141.73"	100 to 2200	3.94" to 86.61"		
	SUPER	100 to 2500	3.94" to 98.43"	100 to 2000	3.94" to 78.74"	100 to 1500	3.94" to 59.06"		
	TURBO	100 to 1690	3.94" to 66.54"	100 to 1350	3.94" to 53.15"	100 to 1200	3.94" to 47.24"		
	FINE	100 to 1260	3.94" to 47.61"	100 to 1000	3.94" to 39.37"	100 to 1000	3.94" to 39.37"		
	HSP	100 to 1000	3.94" to 39.37"	100 to 860	3.94" to 33.86"	100 to 860	3.94" to 33.86"		

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.
*2 Reflective tape cannot be used.

Narrow Beam/High-power

Built-in lens reduces beam width and helps reduce stray light.

Thrubeam/reflective types

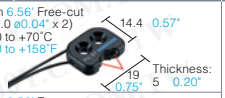
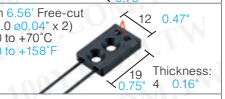
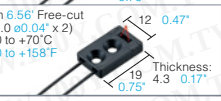
Type: Detecting method	Type: Beam emitting direction	Type: Aperture angle	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model / Weight
Thrubeam	Side	Approx. 6°	2 m 6.56' Free-cut (ø1.0 ø0.04") FU-16Z: -40 to +50°C -40 to +122°F FU-16/18: -40 to +70°C -40 to +158°F 	R2 R0.08" ToughFlex	MEGA: 3600 141.73" FINE: 1260 49.61"	ULTRA: 3600 141.73" SUPER: 2600 102.36" TURBO: 1800 70.87" HSP: 760 29.92"	ø2.5 ø0.10"	**FU-16Z** Approx. 8 g
				R10 R0.39"	MEGA: 3600 141.73" FINE: 1900 74.80"	ULTRA: 3600 141.73" SUPER: 3600 141.73" TURBO: 2700 106.30" HSP: 1000 39.37"		**FU-16** Approx. 8 g
		Approx. 2°			MEGA: 3600 141.73" FINE: 1600 62.99"	ULTRA: 3600 141.73" SUPER: 3000 118.11" TURBO: 2100 92.68" HSP: 960 37.80"		**FU-18** Approx. 8 g
		Approx. 3°	2 m 6.56' Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F 		MEGA: 1300 51.18" FINE: 330 12.99"	ULTRA: 900 35.43" SUPER: 680 26.77" TURBO: 530 20.87" HSP: 210 8.27"	ø1 ø0.04"	**FU-18M** Approx. 6 g
	Top	Approx. 6°	2 m 6.56' Free-cut (ø1.0 ø0.04") -40 to +50°C 0.16" -40 to +122°F 	R2 R0.08" ToughFlex	MEGA: 3600 141.73" FINE: 3600 141.73"	ULTRA: 3600 141.73" SUPER: 3600 141.73" TURBO: 3600 141.73" HSP: 2400 94.49"	ø2.8 ø0.11"	**FU-50** Approx. 8 g
Reflective	Top	Approx. 8°	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +50°C -40 to +122°F Thickness: 5.2 0.20"	R2 R0.08" ToughFlex	MEGA: 30 to 2300 1.18" to 90.55" FINE: 30 to 290 1.18" to 11.42"	ULTRA: 30 to 1600 1.18" to 62.99" SUPER: 30 to 760 1.18" to 29.92" TURBO: 30 to 410 1.18" to 16.14" HSP: 30 to 160 1.18" to 6.30"	–	**FU-40** Approx. 23 g
			1 m 3.28' cut not allowed -40 to +50°C -40 to +122°F Thickness: 5.2 0.20" 	R10 R0.39" Stainless Steel				**FU-40G** Approx. 50 g

*1 3600 mm 141.73" is assumed as maximum because the fiber cable has a length of 2 m 6.56'.
Detecting distance for reflective fibers is based on a standard target: White matte paper.

Definite-reflective

Helps reduce the effect of target background.
The thin, small design requires less space.

Definite-reflective types

Type: Detecting method	Type: Beam emitting direction	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Beam spot diameter (mm inch)	Model / Weight
Definite-reflective	Side	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 3 (0.12") center of detecting distance FINE: 3 (0.12") center of detecting distance	ULTRA: 3 (0.12") center of detecting distance SUPER: 3 (0.12") center of detecting distance TURBO: 3 (0.12") center of detecting distance HSP: 3 (0.12") center of detecting distance	Approx. ø4.5 ø0.18 ⟷ Approx. ø3.5 ø0.14 (at distance of 3 0.12")	**FU-37** Approx. 6 g
	Top	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F 		MEGA: 6 (0.24") center of detecting distance FINE: 6 (0.24") center of detecting distance	ULTRA: 6 (0.24") center of detecting distance SUPER: 6 (0.24") center of detecting distance TURBO: 6 (0.24") center of detecting distance HSP: 6 (0.24") center of detecting distance	Approx. ø1.5 ø0.06" (at distance of 6 0.24")	**FU-38** Approx. 5 g
		2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F 		MEGA: 0 to 4 0" to 0.16" FINE: 0 to 4 0" to 0.16"	ULTRA: 0 to 4 0" to 0.16" SUPER: 0 to 4 0" to 0.16" TURBO: 0 to 4 0" to 0.16" HSP: 2±1.4 0.08"±0.06"	–	**FU-38V** Approx. 5 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

High-flex

Provides higher flexibility than electric wire.
R2 (R0.08") types are resistant to repeated bends up to 10 million bends.

Thrubeam/reflective types

Type: Detecting method	Type: Size (mm inch)	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model Weight
Thrubeam	ø1.5 ø0.06"	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F	R4 R0.16" High-flex	MEGA: 1200 47.24" FINE: 230 9.06"	ULTRA: 810 31.89" SUPER: 590 23.23" TURBO: 410 16.14" HSP: 130 5.12"	ø0.7 ø0.03"	**FU-59** Approx. 3 g
	M3	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F					**FU-79** Approx. 6 g
	6×10.5×2.5 0.24"×0.41"×0.10"	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F		MEGA: 630 24.80" FINE: 110 4.33"	ULTRA: 490 19.29" SUPER: 290 11.42" TURBO: 180 7.09" HSP: 65 2.56"		**FU-57TE** Approx. 5 g
	ø1.0 ø0.04"	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex High-flex	MEGA: 590 23.23" FINE: 140 5.51"	ULTRA: 430 16.93" SUPER: 300 11.81" TURBO: 180 7.09" HSP: 55 2.17"	ø0.5 ø0.02"	**FU-58U** Approx. 4 g
	ø1.5 ø0.06"	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F					**FU-59U** Approx. 4 g
	M3	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F					**FU-79U** Approx. 4 g
	M4 Built-in lens	1 m 3.28' Free-cut (ø1.0 ø0.04") -40 to +50°C -40 to +122°F		MEGA: 1800 70.87" FINE: 850 33.46"	ULTRA: 1800 70.87" SUPER: 1800 70.87" TURBO: 1200 47.24" HSP: 370 14.57"	ø2.3 ø0.09"	**FU-70U** Approx. 5 g
Reflective	ø1.5 ø0.06"	1 m 3.28' cut not allowed -40 to +70°C -40 to +158°F	R4 R0.16" High-flex	MEGA: 150 5.91" FINE: 32 1.26"	ULTRA: 100 3.94" SUPER: 80 3.15" TURBO: 54 2.13" HSP: 22 0.87"	–	**FU-49X** Approx. 3 g
	M3	1 m 3.28' cut not allowed -40 to +70°C -40 to +158°F					**FU-69X** Approx. 3 g
	ø3 ø0.12"	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F		MEGA: 290 11.42" FINE: 63 2.48"	ULTRA: 200 7.87" SUPER: 130 5.12" TURBO: 80 3.15" HSP: 32 1.26"		**FU-48** Approx. 7 g
	M4	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F					**FU-68** Approx. 8 g
	ø2 ø0.08"	1 m 3.28' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F	R2 R0.08" ToughFlex High-flex	MEGA: 140 5.51" FINE: 40 1.57"	ULTRA: 110 4.33" SUPER: 80 5.12" TURBO: 60 2.36" HSP: 13 0.51"		**FU-49U** Approx. 4 g
	ø3 ø0.12"	1 m 3.28' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F					**FU-48U** Approx. 4 g
	M3	1 m 3.28' Free-cut (ø1.0 ø0.04" x 2) -40 to +50°C -40 to +122°F					**FU-69U** Approx. 4 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.

Oil/Chemical Resistant

PTFE coating allows for use in almost any environment.

Thrubeam/Reflective types

Type: Detecting method	Type: Beam emitting direction	Type: Size (mm inch)	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model Weight
Thrubeam	Top	ø5 ø0.20"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F	R40 R1.57"	MEGA: 3600 141.73" FINE: 2800 110.24"	ULTRA: 3600 141.73" SUPER: 3600 141.73" TURBO: 3600 141.73" HSP: 1400 55.12"	ø3.7 ø0.15"	**FU-92** Approx. 71 g
	Side	ø5 ø0.20"	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +70°C -40 to +158°F	R40 R1.57"	MEGA: 3600 141.73" FINE: 1100 43.31"	ULTRA: 3600 141.73" SUPER: 3000 118.11" TURBO: 2200 86.61" HSP: 510 20.08"	ø2.8 ø0.11"	**FU-96** Approx. 71 g
Reflective	Top	ø4.5 ø0.18"	2 m 6.56' Free-cut (ø1.3 ø0.05" x 2) -40 to +70°C -40 to +158°F	R40 R1.57"	MEGA: 310 12.20" FINE: 140 5.51"	ULTRA: 290 11.42" SUPER: 250 9.84" TURBO: 200 7.87" HSP: 80 3.15"	–	**FU-91** Approx. 32 g

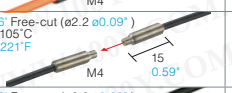
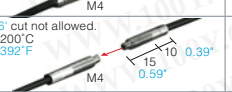
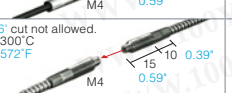
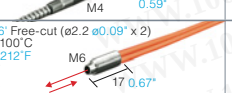
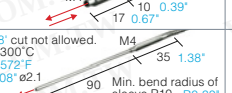
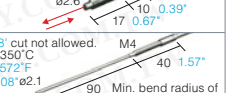
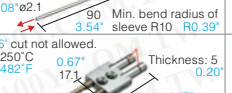
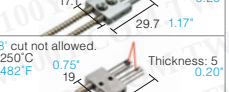
*1 3600 mm 141.73" is assumed as maximum because the fiber cable has a length of 2 m 6.56'. Detecting distance for reflective fibers is based on a standard target: White matte paper.

Heat Resistant

Resists temperatures up to 350°C (662°F).

A wide variety of heat-resistant types are available, including the easy-to-install R5(R0.20") type and the high-temperature type, resistant to temperatures up to 350°C (662°F). Fibers used in sensors resistant to temperatures of 200°C (392°F) or more are made from multi-component glass.

Thrubeam/reflective types

Type		Fiber unit length (Diameter) Ambient temperature	Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1		Optical axis diameter (mm inch) (Standard target to be detected)	Model Weight
Detecting method	Heat resistant temperatures*2				MEGA FINE	Other power modes		
Thrubeam	100°C 212°F*3	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +100°C -40 to +212°F		R5 R0.20" ToughFlex	MEGA: 3600 141.73" FINE: 680 26.77" Lens attachment: P14	ULTRA: 2200 86.61" SUPER: 1600 62.99" TURBO: 900 35.43" HSP: 390 15.35"	ø1 ø0.04"	**FU-86Z** Approx. 25 g
	105°C 221°F*3	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +105°C -40 to +221°F		R25 R0.98"	MEGA: 3600 141.73" FINE: 1100 43.31" Lens attachment: P14	ULTRA: 3200 125.98" SUPER: 2200 86.61" TURBO: 1500 59.06" HSP: 540 21.26"		**FU-86A** Approx. 22 g
	150°C 302°F*4	2 m 6.56' Free-cut (ø2.2 ø0.09") -40 to +150°C -40 to +302°F		R20 R0.79"	MEGA: 2700 106.30" FINE: 520 20.47"	ULTRA: 1800 70.87" SUPER: 1100 43.31" TURBO: 720 28.35" HSP: 340 13.39"	ø1.5 ø0.06"	**FU-86H** Approx. 35 g
	180°C 356°F*5	2 m 6.56' Free-cut (ø2.2 ø0.09") -60 to +180°C -76 to +356°F		R35 R1.38"	MEGA: 2700 106.30" FINE: 570 22.44"	ULTRA: 1900 74.80" SUPER: 1200 47.24" TURBO: 790 31.10" HSP: 380 14.96"		**FU-88** Approx. 36 g
	200°C 392°F	2 m 6.56' cut not allowed. -40 to +200°C -40 to +392°F		R8 R0.32"	MEGA: 1800 70.87" FINE: 390 15.35" Lens attachment: P14	ULTRA: 1300 51.18" SUPER: 900 35.43" TURBO: 680 26.77" HSP: 250 9.84"	ø1 ø0.04"	**FU-88K** Approx. 30 g
	300°C 572°F	2 m 6.56' cut not allowed. -40 to +300°C -40 to +572°F		R25 R0.98"				**FU-84C** Approx. 66 g
Reflective	100°C 212°F*3	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +100°C -40 to +212°F		R5 R0.20" ToughFlex	MEGA: 740 29.13" FINE: 160 6.30"	ULTRA: 580 22.83" SUPER: 410 16.14" TURBO: 320 12.60" HSP: 90 3.54"	–	**FU-85Z** Approx. 25 g
	105°C 221°F*3	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +105°C -40 to +221°F		R25 R0.98"	MEGA: 1100 43.31" FINE: 230 9.06"	ULTRA: 860 33.86" SUPER: 590 23.23" TURBO: 410 16.14" HSP: 140 5.51"		**FU-85A** Approx. 21 g
	150°C 302°F*4	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +150°C -40 to +302°F		R20 R0.79"	MEGA: 720 28.35" FINE: 160 6.30"	ULTRA: 560 22.05" SUPER: 410 16.14" TURBO: 320 12.60" HSP: 90 3.54"		**FU-85H** Approx. 35 g
	180°C 356°F*5	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -60 to +180°C -76 to +356°F		R35 R1.38"	MEGA: 860 33.86" FINE: 200 7.87"	ULTRA: 710 27.95" SUPER: 470 18.50" TURBO: 350 13.78" HSP: 100 3.94"		**FU-87** Approx. 33 g
	200°C 392°F	1 m 3.28' cut not allowed. -40 to +200°C -40 to +392°F		R8 R0.32"	MEGA: 770 30.32" FINE: 190 7.48"	ULTRA: 650 25.59" SUPER: 450 17.72" TURBO: 340 13.38" HSP: 100 3.94"		**FU-87K** Approx. 15 g
	300°C 572°F	1 m 3.28' cut not allowed. -40 to +300°C -40 to +572°F ø0.08" ø2.1		R25 R0.98"				**FU-82C** Approx. 29 g
		1 m 3.28' cut not allowed. -40 to +300°C -40 to +572°F ø0.10" ø2.6						**FU-83C** Approx. 23 g
	350°C 662°F	1 m 3.28' cut not allowed. -30 to +350°C -22 to +572°F ø0.08" ø2.1			MEGA: 650 25.59" FINE: 140 5.51"	ULTRA: 560 22.05" SUPER: 390 15.35" TURBO: 290 11.42" HSP: 86 3.39"		**FU-81C** Approx. 24 g
	250°C 482°F	2 m 6.56' cut not allowed. -40 to +250°C -40 to +482°F		R25 R0.98"	MEGA: 8 to 37 0.32" to 1.46" FINE: 8 to 30 0.32" to 1.18"	ULTRA: 8 to 34 0.32" to 1.34" SUPER: 8 to 32 0.32" to 1.26" TURBO: 8 to 30 0.32" to 1.18" HSP: 10 to 18 0.39" to 0.71"		**FU-38LK** Approx. 70 g
		1 m 3.28' cut not allowed. -40 to +250°C -40 to +482°F			MEGA: 2.5 to 65 0.10" to 2.56" FINE: 2.5 to 16 0.10" to 0.63"	ULTRA: 2.5 to 55 0.10" to 2.17" SUPER: 2.5 to 27 0.10" to 1.06" TURBO: 2.5 to 22 0.10" to 0.87" HSP: 2.5 to 10 0.10" to 0.39"		**FU-38K** Approx. 45 g
	180°C 356°F	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -60 to +180°C -76 to +356°F		R35 R1.38"				**FU-38H** Approx. 45 g

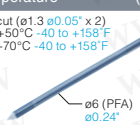
*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.(For the FU-38LK, the distances are based on a glass substrate (t = 0.7 mm 0.03") detected in the planar direction.)
*2 Use the fiber sensor under dry conditions. Allow some margin for the temperature upper limit when selecting a heat-resistant fiber unit.
*3 The recommended maximum ambient temperature during operation is 90°C 194°F when constantly using a fiber unit in a high-temperature environment.
*4 The recommended maximum ambient temperature during operation is 130°C 266°F when constantly using a fiber unit in a high-temperature environment.
*5 The recommended maximum ambient temperature during operation is 150°C 302°F when constantly using a fiber unit in a high-temperature environment.

Liquid-level

Liquid-level detection sensors.
Available in tube-mountable and immersible types.

Reflective

Type: Detecting method	Type: Transparent tube diameter (mm inch)	Type: Beam axis	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Accessory	Model / Weight
Tube-mountable type	ø4 to 26 ø0.16" to 1.02"	16	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F	R5 R0.20"	Binding band x 2 Nonslip rubber x 2	**FU-95S** Approx. 23 g
		1	2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) FU-95Z: -40 to +50°C -40 to +122°F FU-95HA: -40 to +105°C -40 to +221°F FU-95: -40 to +70°C -40 to +158°F	R2 R0.08" ToughFlex	Binding band x 2 Nonslip rubber x 2 Spacer x 2 Screw x 2 Nut x 2	**FU-95Z** Approx. 7 g
				R25 R0.98"		**FU-95HA** Approx. 7 g
				R10 R0.39"		**FU-95** Approx. 7 g
	ø26 ø1.02" or more recommended	16	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F	R5 R0.20"	None (Optionally available)	**FU-95W** Approx. 20 g

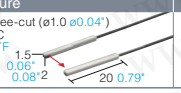
Type: Detecting method	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch): PFA-sheathed section	Minimum bend radius (mm inch): Fiber	Model / Weight
Immersion	2 m 6.56' Free-cut (ø1.3 ø0.05" x 2) FU-93Z: -40 to +50°C -40 to +158°F FU-93 : -40 to +70°C -40 to +158°F 	R40 R1.57"*	R0.5 R0.02" ToughFlex	**FU-93Z** Approx. 78 g
			R25 R0.98"	**FU-93** Approx. 78 g

* Not bendable up to 80 mm (3.15") from the tip.

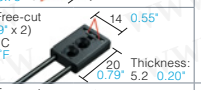
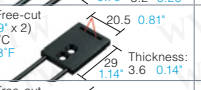
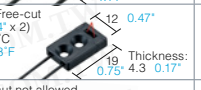
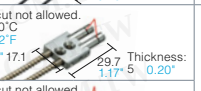
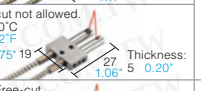
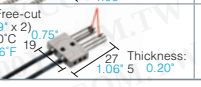
Liquid Crystal/Semiconductors

Perfect for detecting glass substrates.
Lineup offers distance alignment, edge detection, and wafer mapping types.

Thrubeam

Type: Application	Type: Beam emitting direction	Type: Aperture angle	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Optical axis diameter (mm inch) (Standard target to be detected)	Model / Weight
Mapping	Side	Approx. 3°	2 m 6.56' Free-cut (ø1.0 ø0.04") -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 1300 51.18" FINE: 330 12.99"	ULTRA: 900 35.43" SUPER: 680 26.77" TURBO: 530 20.87" HSP: 210 8.27"	ø1 ø0.04"	**FU-18M** Approx. 6 g

Reflective

Type: Application	Type: Beam emitting direction	Type: Heat resistant*2 temperatures	Fiber unit length (Diameter) Ambient temperature / Appearance (mm inch)	Minimum bend radius (mm inch)	Detecting distance (mm inch)*1: MEGA FINE	Detecting distance (mm inch)*1: Other power modes	Model / Weight
Glass substrate mapping	Top	–	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F	R25 R0.98"	MEGA: 15 to 70 0.59" to 2.76" FINE: 15 to 30 0.59" to 1.18"	ULTRA: 15 to 60 0.59" to 2.36" SUPER: 15 to 46 0.59" to 1.81" TURBO: 15 to 38 0.59" to 1.50" HSP: – –	**FU-40S** Approx. 25 g
Glass substrate alignment	Flat		2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -10 to +60°C 14 to +140°F 		MEGA: 8 to 38 0.32" to 1.50" FINE: 8 to 32 0.32" to 1.26"	ULTRA: 8 to 36 0.32" to 1.42" SUPER: 8 to 35 0.32" to 1.38" TURBO: 8 to 34 0.32" to 1.34" HSP: 10 to 26 0.39" to 1.02"	**FU-38L** Approx. 20 g
			2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F 	R5 R0.20"	MEGA: 0 to 25 0" to 0.98" FINE: 0 to 25 0" to 0.98"	ULTRA: 0 to 25 0" to 0.98" SUPER: 0 to 25 0" to 0.98" TURBO: 0 to 25 0" to 0.98" HSP: – –	**FU-38S** Approx. 20 g
			2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +70°C -40 to +158°F	R25 R0.98"	MEGA: 0 to 14 0" to 0.55" FINE: 0 to 14 0" to 0.55"	ULTRA: 0 to 14 0" to 0.55" SUPER: 0 to 14 0" to 0.55" TURBO: 0 to 14 0" to 0.55" HSP: 0 to 12 0" to 0.47"	**FU-38R** Approx. 20 g
Seating check			2 m 6.56' Free-cut (ø1.0 ø0.04" x 2) -40 to +70°C -40 to +158°F 	R10 R0.39"	MEGA: 0 to 4 0" to 0.16" FINE: 0 to 4 0" to 0.16"	ULTRA: 0 to 4 0" to 0.16" SUPER: 0 to 4 0" to 0.16" TURBO: 0 to 4 0" to 0.16" HSP: 2±1.4 0.08"±0.06"	**FU-38V** Approx. 5 g
Heat-resistant glass substrate alignment	Flat	250°C 482°F	2 m 6.56' cut not allowed. -40 to +250°C -40 to +482°F 	R25 R0.98"	MEGA: 8 to 37 0.32" to 1.46" FINE: 8 to 30 0.32" to 1.46"	ULTRA: 8 to 34 0.32" to 1.34" SUPER: 8 to 32 0.32" to 1.26" TURBO: 8 to 30 0.32" to 1.18" HSP: 10 to 18 0.39" to 0.71"	**FU-38LK** Approx. 70 g
Heat-resistant seating, presence check			1 m 3.28' cut not allowed. -40 to +250°C -40 to +482°F 		MEGA: 2.5 to 65 0.10" to 2.56" FINE: 2.5 to 16 0.10" to 0.63"	ULTRA: 2.5 to 55 0.10" to 2.17" SUPER: 2.5 to 27 0.10" to 1.06" TURBO: 2.5 to 22 0.10" to 0.87" HSP: 2.5 to 10 0.10" to 0.39"	**FU-38K** Approx. 45 g
		180°C 356°F*3	2 m 6.56' Free-cut (ø2.2 ø0.09" x 2) -40 to +180°C -40 to +356°F 	R35 R1.38"			**FU-38H** Approx. 45 g

*1 Detecting distance for reflective fibers is based on a standard target: White matte paper.(For the FU-38LK, the distances are based on a glass substrate (t = 0.7 mm 0.03") detected in the planar direction.)
*2 Use the fiber sensor under dry conditions. Allow some margin for the temperature upper limit when selecting a heat-resistant fiber unit.
*3 The recommended maximum ambient temperature during operation is 150°C 302°F when constantly using a fiber unit in a high-temperature environment.

Specifications

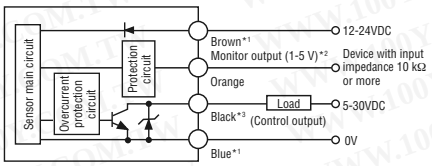
Type		Standard 1 output				High functionality 2 output				Monitor output
		Cable		M8 connector*1		Cable		M8 connector*1		Cable
Model	NPN	**FS-N11N**	**FS-N12N**	**FS-N11CN**	**FS-N12CN**	**FS-N13N**	**FS-N14N**	**–**	**–**	**FS-N11MN**
	PNP	**FS-N11P**	**FS-N12P**	**FS-N11CP**	**FS-N12CP**	**FS-N13P**	**FS-N14P**	**FS-N13CP**	**FS-N14CP**	**–**
Main unit/Expansion unit		Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Main unit
Control output		1	1	1	1	2	2	2	2	1
Monitor output (1-5 V)		–	–	–	–	–	–	–	–	1
External input		–	–	1	1	1	1	–	–	–
Response time		50 µs (HIGH SPEED)/250 µs (FINE)/500 µs (TURBO)/1 ms (SUPER)/4 ms (ULTRA)/16 ms (MEGA)								
Control output	NPN output	NPN open collector 30 V; 1 output max: 100 mA or less; 2 output total: 100 mA or less (used stand-alone)/ 20 mA or less (multiple connections); residual voltage 1 V or less								
	PNP output	PNP open collector 30 V; 1 output max: 100 mA or less; 2 output total: 100 mA or less (used stand-alone)/ 20 mA or less (multiple connections); residual voltage 1 V or less								
Monitor output*2		1 to 5 V voltage output; load resistance 10 kΩ or more; repeat precision ±0.5% of F.S.; 1 ms response time (HIGH SPEED, FINE, TURBO)*3								
External input		input time 2 ms (ON)/20 ms (OFF) or more								
Multiple connections to Expansion units		Up to 16 units can be connected total (two output type is treated as two units)								
Light source		Red, 4-element LED								
APC		ON/OFF switchable (Factory setting: OFF)								
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 - 24 V DC ±10% ripple (P-P) 10% or less								
	NPN Amplifier Current Consumption	Normal: 900 mW or less (36 mA max. at 24 V, 48 mA max. at 12 V)*4 Eco on mode: 800 mW or less (32 mA max. at 24 V, 39 mA max. at 12 V)*4 Eco Full mode: 470 mW or less (19 mA max. at 24 V, 23 mA max. at 12 V)								
	PNP Amplifier Current Consumption	Normal: 950 mW or less (39 mA max. at 24 V, 52 mA max. at 12 V)*4 Eco on mode: 850 mW or less (35 mA max. at 24 V, 44 mA max. at 12 V)*4 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)*4 Eco on mode: 950 mW or less (38 mA max. at 24 V, 47 mA max. at 12 V)*4 Eco Full mode: 600 mW or less (24 mA max. at 24 V, 29 mA max. at 12 V)				–
Environmental resistance	Operating ambient luminance	Incandescent lamp: 20000 lux or less; Sunlight: 30000 lux or less								
	Operating ambient temperature	-20 to +55 °C -4 to +131 °F (no freezing)*5								
	Operating ambient humidity	35 to 85% RH (no condensation)								
	Vibration resistance	10 to 55 Hz Compound amplitude 1.5 mm 0.06", 2 hours for each of X,Y,Z axis								
	Shock resistance	500 m/s² 3 times for each of X,Y,Z axis								
Case material		Both main unit and expansion unit housing material: Polycarbonate								
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

*1 Use a cable length of 30m (98.43') or less for M8 connector types.
*2 FS-N11MN only
*3 SUPER: 1.2 ms, ULTRA: 1.8 ms, MEGA: 4.2 ms
*4 Increases 100 mW (4.0 mA) for High Speed mode
*5 One or two more units connected: -20 to +55°C (-4 to +131°F); 3 to 10 more units connected: -20 to +50°C (-4 to +122°F); 11 to 16 more units connected: -20 to +45°C (-4 to +113°F). 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.

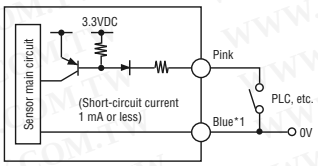
Input and Output Circuit Diagrams

FS-N11N / N12N / N11MN / N13N / N14N

Output Circuit Diagram



Input Circuit Diagram (**FS-N13N/N14N** only)



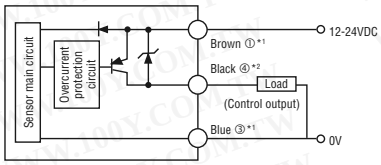
*1 FS-N11N/N11MN/N13N only

*2 FS-N11MN only

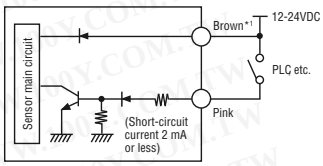
*3 The FS-N13N/N14N has a white cable as separate output 2.

FS-N11P / N12P / N13P / N14P / N13CP / N14CP

Output Circuit Diagram



Input Circuit Diagram (**FS-N13P/N14P** only)



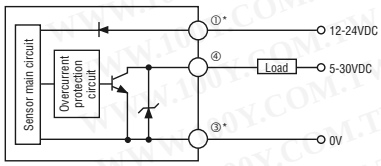
M8 connector pin layout

*1 FS-N11P/N13P/N13CP only

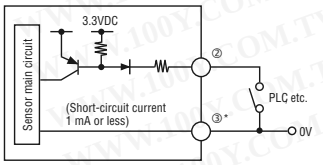
*2 The FS-N13P/N14P has a white cable as separate output
The FS-N13CP/N14CP has pin ② as separate output 2.

FS-N11CN / N12CN

Output Circuit Diagram



Input Circuit Diagram

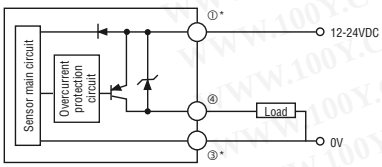


M8 connector pin layout

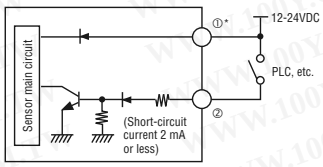
* FS-N11CN only

FS-N11CP / N12CP

Output Circuit Diagram



Input Circuit Diagram

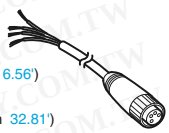


M8 connector pin layout

* FS-N11CP only

Socket Cable (sold separately)

For FS-N11CN / N11CP / N12CN /N12CP / N13CP / N14CP



OP-73864
(Cable length: 2 m 6.56')

OP-73865
(Cable length: 10 m 32.81')

Pin – wire color

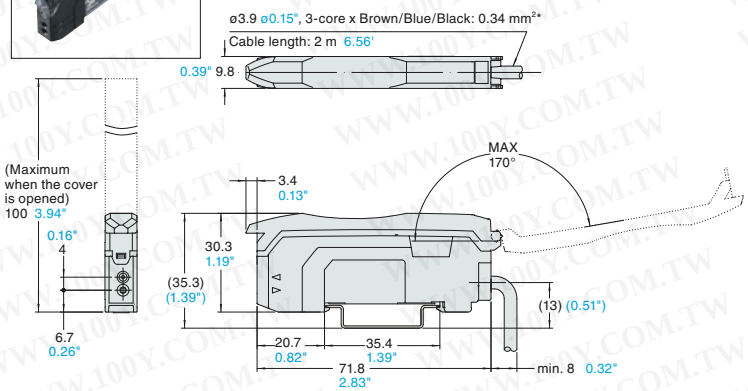
Connected pin number	Core wire cover color
①	Brown
②	White
③	Blue
④	Black

Dimensions

Unit: mm inch

FS-N11N / N11P / N13N / N13P / N11MN

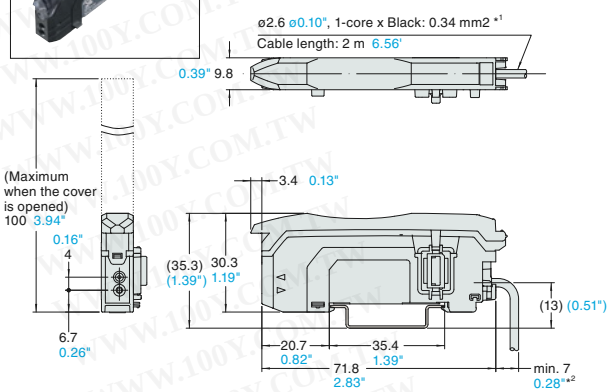
Main unit (lead wire type)



* FS-N11MN: ø3.9 ø0.15", 4-core x Brown/Blue: 0.34 mm² Black/Orange: 0.18 mm²
FS-N13N/N13P: ø3.9 ø0.15", 5-core x Brown/Blue: 0.34 mm² Black/White/Pink: 0.18 mm²

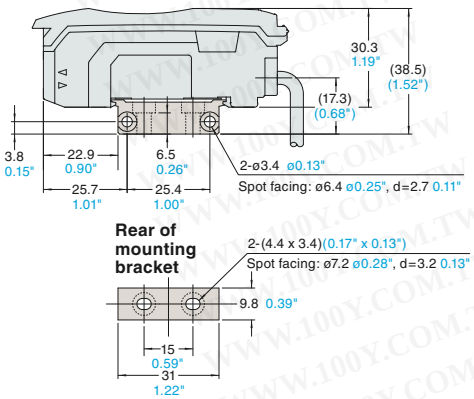
FS-N12N / N12P / N14N / N14P

Expansion unit (lead wire type)

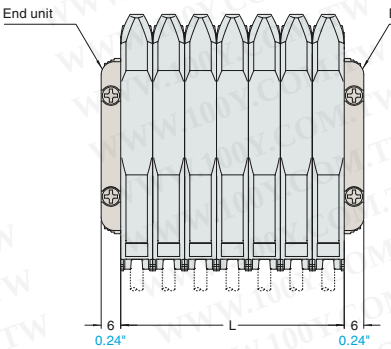


*1 FS-N14N/N14P: ø3.9 ø0.15", 3-core x Black/White/Pink: 0.18 mm²
*2 FS-N14N/N14P: min. 8 0.32"

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



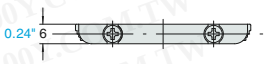
When several units are connected



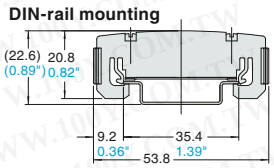
Number of units	L (mm inch)
1	9.8 0.39"
2	19.6 0.77"
3	29.4 1.16"
4	39.2 1.54"
5	49.0 1.93"
6	58.8 2.32"
7	68.6 2.70"
8	78.4 3.09"
9	88.2 3.47"
10	98.0 3.86"
11	107.8 4.24"
12	117.6 4.63"
13	127.4 5.02"
14	137.2 5.40"
15	147.0 5.79"
16	156.8 6.17"
17	166.6 6.56"

*1 When using expansion units, be sure to use the end unit. (Optional)

End unit (OP-26751 sold separately)



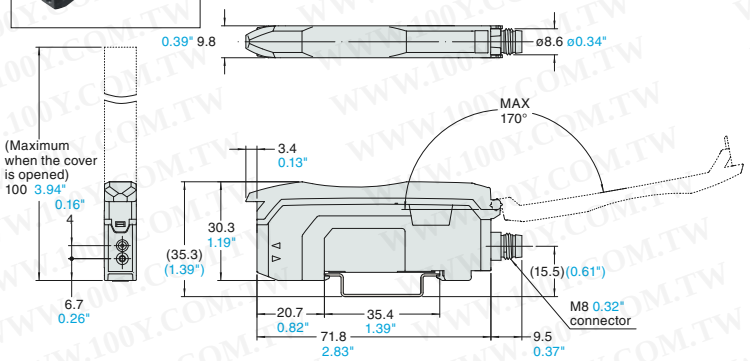
DIN-rail mounting



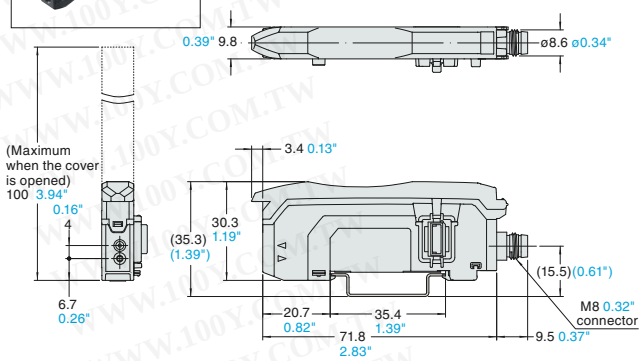
勝 特 力 材 料 886-3-5753170
胜特力电子(上海) 86-21-34970699
胜特力电子(深圳) 86-755-83298787
Http://www.100y.com.tw

Unit: mm inch

FS-N11CN / N11CP / N13CP
Main unit (M8 connector type)

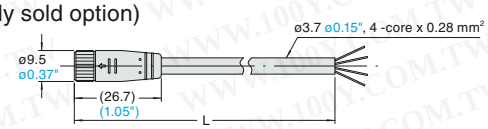


FS-N12CN / N12CP / N14CP
Expansion unit (M8 connector type)

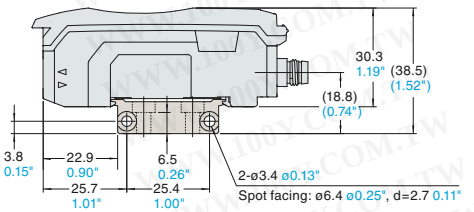


M8 socket cable (separately sold option)

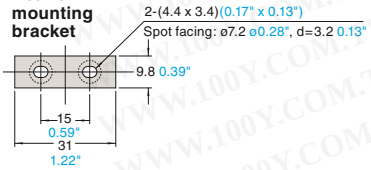
Cable length	L (m foot)
OP-73864	2 6.56'
OP-73865	10 6.56'



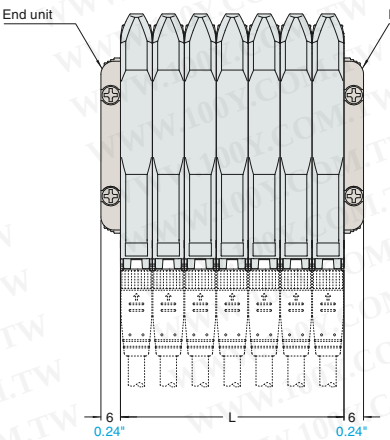
When the mounting bracket is attached (OP-73880 sold separately)



Rear of mounting bracket



When several units are connected



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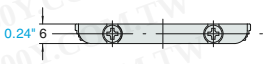
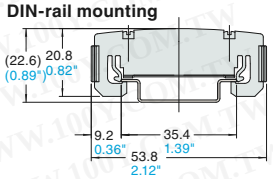
15	147.0 5.79"
16	156.8 6.17"
17	166.6 6.56"

*1 When using expansion units, be sure to use the end unit. (Optional)

End unit (OP-26751 sold separately)



DIN-rail mounting