

KEYENCE

Digital Fiber Optic Sensor
FS-V30 Series



MEGA POWER

Fiber Optic Sensors
The New Standard in Simplicity



MEGA-Power, MEGA-Easy & MEGA-Stable

KEYENCE has further improved the top selling FS fiber sensors.
New features on the FS-V30 will help you to solve your sensing needs.



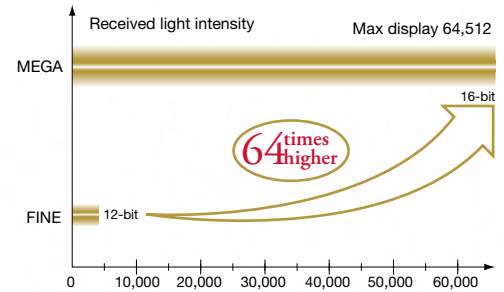
Digital Fiber Optic Sensors

FS-V30

World's most powerful beam

64 times more powerful beam than conventional models

Stable detection in harsh environments.
Longer detecting distance with miniaturized fibers.



World's first power booster switch

Easy power control

The highest power setting can be selected with a DIP switch.

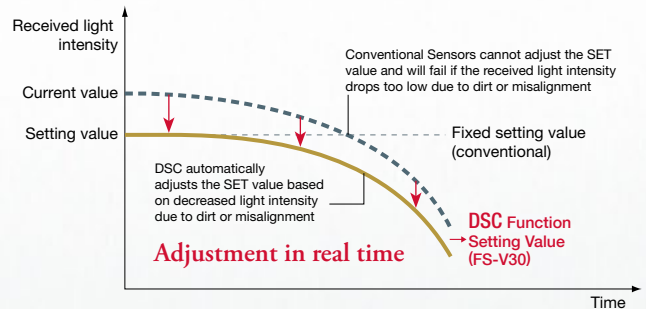


DIP switch

World's first automatic setting value tracking function

Not affected by environmental changes over time

Equipped with the DSC Function which adjusts the setting value as it tracks the current value in real time.



Program memory

Reload your application settings

Operators or users may accidentally change the settings on the FS. In this case, conventional models require resetting. The FS-V30 saves your settings into memory for fast recovery.



Saving your settings



Load the settings

Highly stable detection

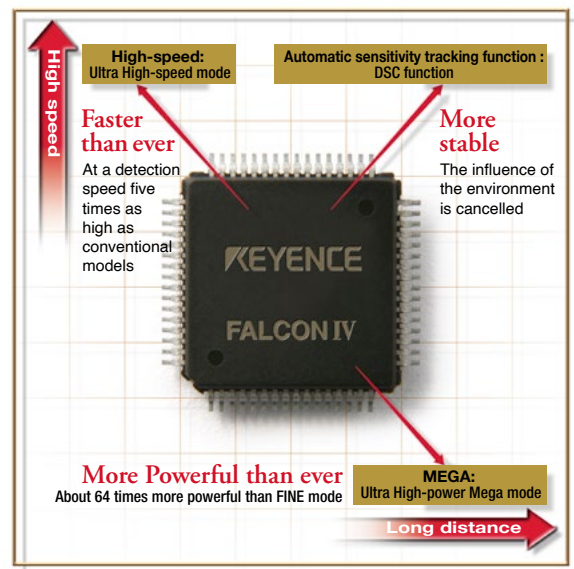
The improved ASIC significantly improves performance.

KEYENCE has developed a special 16-bit CPU for fiber sensors

Powered by the FALCON IV

Dynamic range 64 times higher than conventional models.

Introducing the FALCON IV, our latest upgrade in a revolutionary line of custom CPU's designed by KEYENCE specifically for our fiber optic sensors. The FALCON IV is equipped to simultaneously control several functions: high-speed computing of received light intensity, adjusting the setting value in real time and dual digital display. Compared with conventional CPU's which operate sequentially, the FALCON IV calculates all information in parallel. This achieves higher performance and speed.

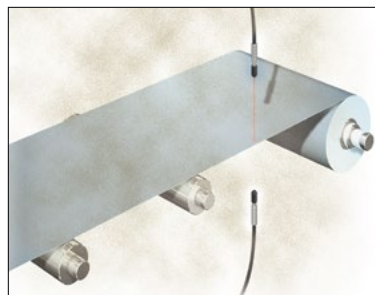


Automatic sensitivity tracking function [WORLD'S BEST]

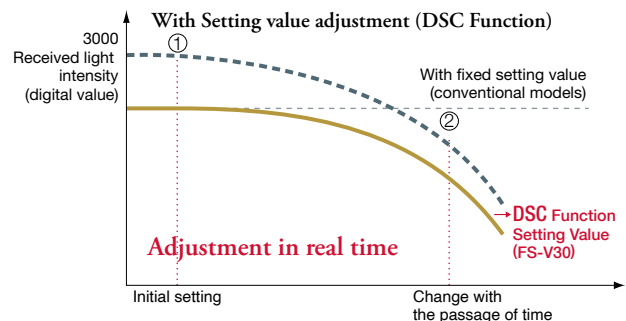
Automatically adjust the setting value.

The DSC (Dynamic Stability Control) Function automatically adjusts the threshold according to received light intensity variations due to dust or dirt in real time. This function allows maintenance free operation over extended periods of time, saving time and money.

Sensitivity is configured by simply pressing the SET button. The sensitivity can be set as a percentage (+/-99%) of the received light intensity.



Detecting a thin target using thru-beam type



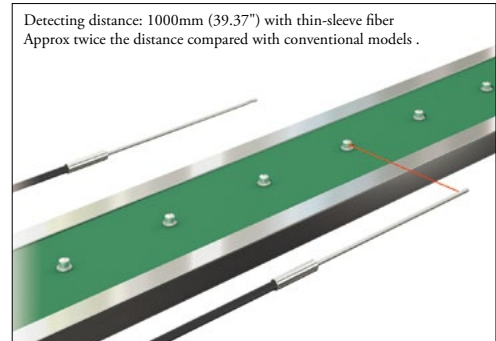
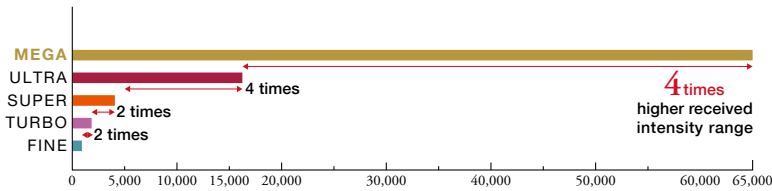
	① Initial setting		② Change with the passage of time	
Conventional models	Setting value: 2000	Current value: 3000	Setting value: 2000	Current value: 1500
DSC Function	Setting value: 2000	Current value: 3000	Setting value: 1000	Current value: 1500

The setting value follows

Highest power [WORLD'S BEST]

More reliable detection in harsh environments. Longer detection distance with thin-sleeve fibers.

The FALCON IV chip provides the highest power - MEGA mode. This power is essential for reliable detection in harsh environments. It also increases the detection range of miniaturized fibers.



Detecting the position of targets using a thin fiber.



Set button

Automatic calibration setting.

Highly visible dual digital display

The dual screen differentiates the size of the setting value and current value for high visibility.

Digital trim pot

More convenient than ever while maintaining an easy single button operation.

Mode button

Monitor and operation mode selection.

Output selection button

Light-ON or Dark-ON output selection.

Bright and clear operation indicator

Twice the size of conventional indicators.

Power booster switch

Quickly switch to MEGA high-power mode using this DIP switch.



Equipped with a Power booster switch

Power selection without a complicated procedure.

Conventional models require complicated menu operations to select the power settings. Power settings can be adjusted using a single DIP switch.



The illustration shows simulated light beams

New Sensor Options

Wide variety

Various amplifier designs applicable to any job.

1-output
M8 connector

FS-V31C(P)
FS-V32C(P)



2-output
M8 connector

FS-V33C(P)
FS-V34C(P)



Analog output
FS-V31M



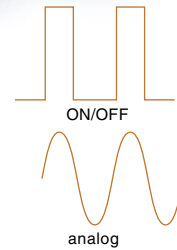
Cable

FS-V31(P)
FS-V32(P)



Cable

FS-V33(P)
FS-V34(P)



2-output type Output 1 is used for detection. Output 2 can be selected to output when a counter, alarm or limit has been reached.

Analog output type Outputs 1 to 5 V according to the detection quantity (digital display). It can be used for a wide range of applications such as position control or multi-level detection.

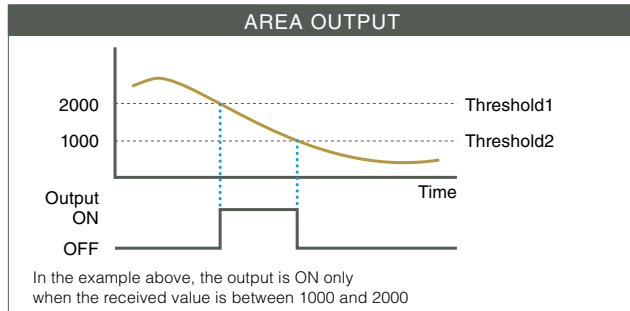
M8 connector type is also available.



Area output

Ignore background interference.

Set an upper and lower detection level.
The FS-V30 will output when the received signal is between the setting limits.



Preventing operational errors

Password lock function

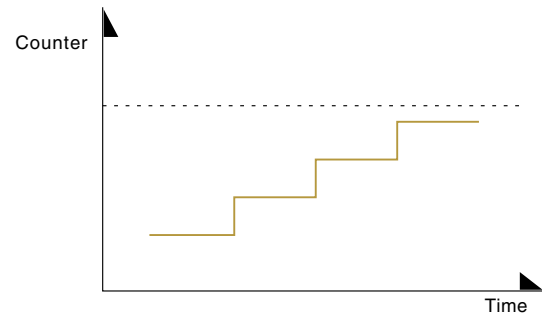
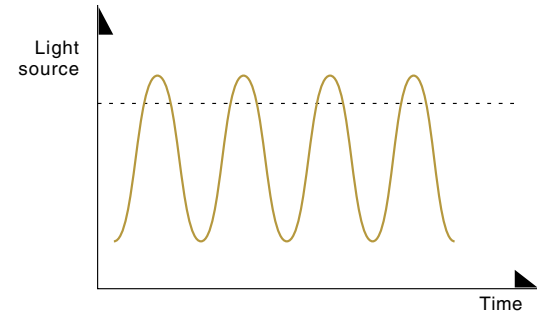
With the Password Lock function, only authorized operators can modify the settings on the FS-V30. Since the Password Levels are selectable, operation errors can be prevented.

	Threshold value settings	MENU Settings	Power modes/ Light-on/Dark-on
LEVEL 1	Locked	Locked	Locked
LEVEL 2	Unlocked	Locked	Locked
LEVEL 3	Unlocked	Unlocked	Locked

Counter mode

Simultaneous count of workpieces

The Counter function can easily count work pieces without the need for external counters or a PLC.

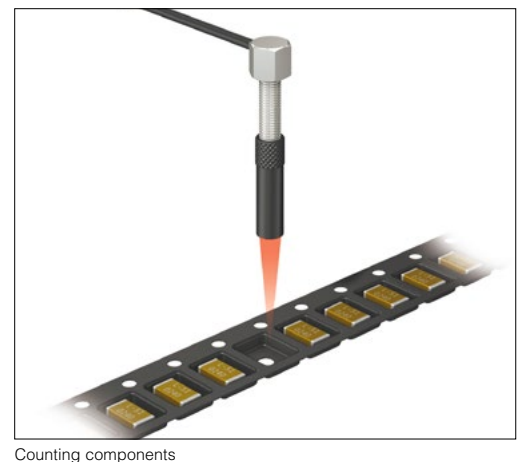
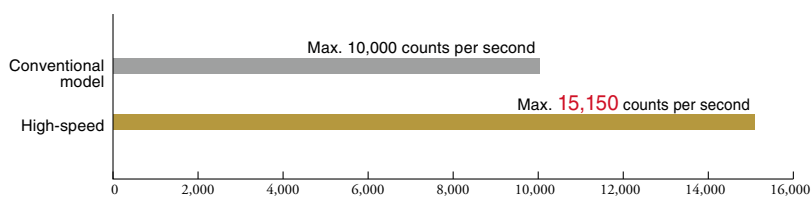


Highest speed [WORLD'S BEST]

Amazing 33 μs response speed!

33 μs response allows the FS-V30 to detect up to 15,150 workpieces per second. In addition, minute targets can be set on-the-fly with simple, one touch calibration.

*Conventional models count max. 10,000 targets per second even in high-speed mode



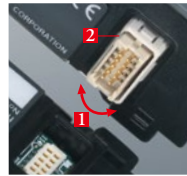
Reliable expansion units

KEYENCE's original 1-Line system is featured on the FS-V30 Series.

[1-Line system]

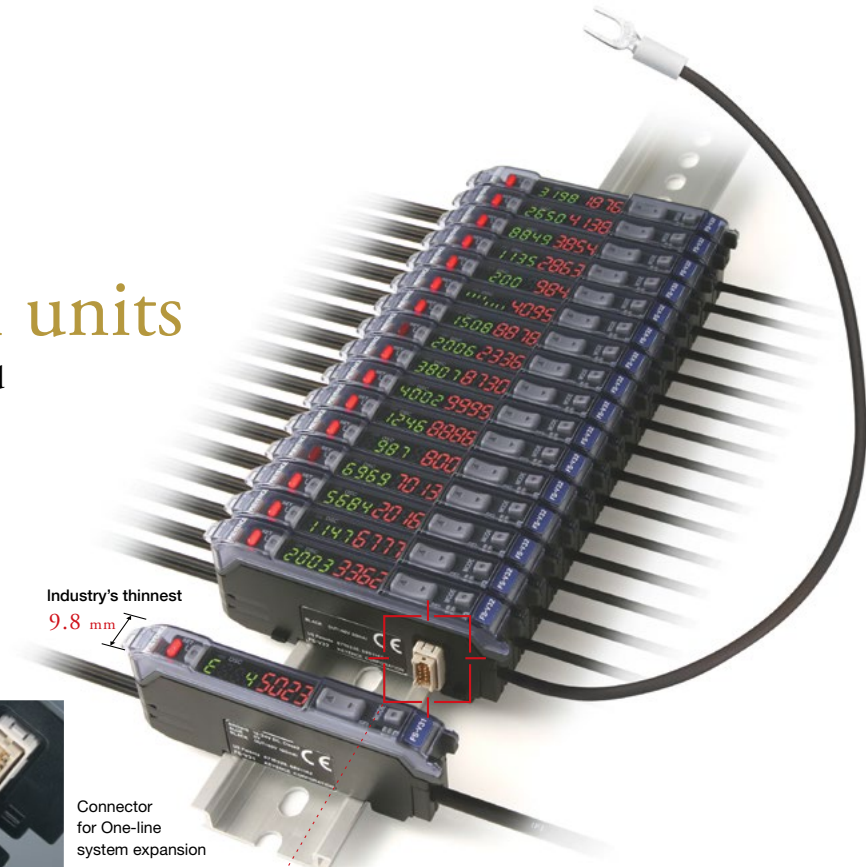
Power is connected through the side connector. Expansion units have a single output wire.

- 1 Shock absorber function incorporated**
The connector is provided with a spring mechanism for shock absorption.
- 2 Dust cover provided**
The dust cover prevents the exposure of the connector pins.



Industry's thinnest
9.8 mm

Connector for One-line system expansion



Interference prevention function up to 16 units

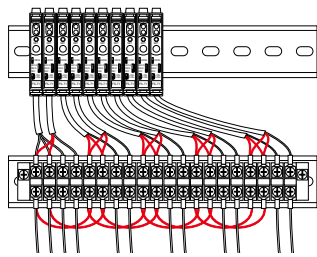
Reliable detection with stable interference prevention.

The FS-V30 electrically delays the timing of light emission between connected units. Up to 16 connected units can utilize the interference prevention function providing stable system performance.

MODE	FinE	Turb	SuPr	ULtr	MEGA
Std (Standard)	4 units			8 units	
dobl (Double)	8 units			16 units	

Wire saving connection method (when 10 units are used)

Conventional method

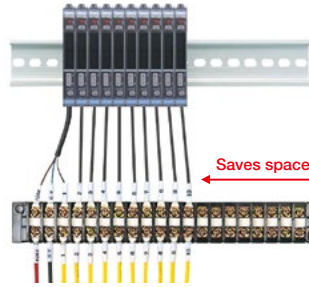


All red wires will be unnecessary

- Number of terminal blocks : 20
- Number of wires : 58
- Number of jumper wires : 8
- Required working time : 120 min.



Single-line method



Saves space

- Number of terminal blocks : 12
- Number of wires : 24
- Number of jumper wires : 0
- Required working time : 50 min.

Combination with other sensor models is possible

A full line of models showing proven results and high reliability.

It is possible to combine the FS-V30 sensors with other KEYENCE 1-line sensors. Fiber, Color, Laser, Photoelectric and Proximity sensors are all available in the 1-line system.

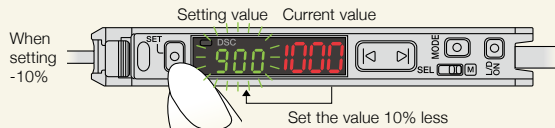


- From left to right
- FS-V31: Fiber optic sensor
- CZ-V22A: RGB digital color sensor
- LV-12SA: Digital laser sensor
- PS-T2: Photoelectric sensor with separate amplifier
- ES-M2: Long-distance separate amplifier proximity sensor

Adjustment/external setting

%Tuning

You can set the sensitivity with just the touch of a button. When light intensity values fluctuate due to dust or misalignment, you can adjust the sensitivity by a fixed percentage. (+/-99%)



[External Input]

Small differences in received light quantity can be compensated via external input. This ability provides continuous and stable detection.

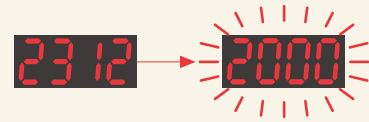
Shift Function

Adjust the current received light intensity to "0". For example, you can zero the received light intensity from a reflective sensor so that the background will display "0". This function is effective when there are only small differences between targets received light intensity.



Display scaling

You can adjust the light intensity on the display. In this way, each amplifier can display the same value for the same target. (1 output type only)



Fiber transmission stop input

When the external input is activated, LED transmission will stop on the Main unit and all connected Sub units.

[Example of use] • Troubleshooting at sensor startup
• Preventing interference with other sensors

External tuning

Sensitivity can also be externally set by a PLC. The external input works the same as the SET button.

Improved operation

Ergonomic button layout

The amplifier was designed for ease of use, and error prevention. The SET value and the Current value on the display are different heights and colors, improving visibility. The SET button and manual buttons are separated to prevent operator error. In addition, the SET button and manual buttons are higher and larger than the other buttons, for easy setup.

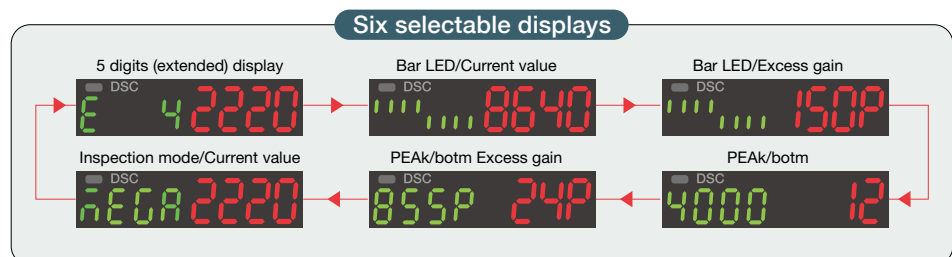
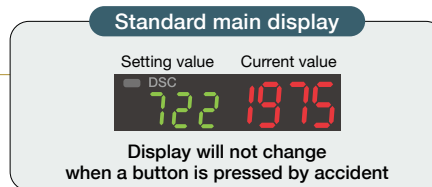


Display customizing Function

Only the main display is active by default.

Conventional models can be easily switched to unwanted display modes by accident, confusing operators.

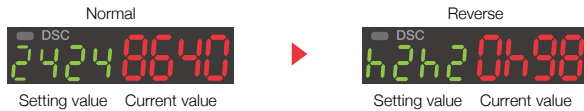
The FS-V30 will only display the Setting Value and the Current Value by default. If operators prefer to display an alternate format, such as Bar LED's, they can select from 6 additional options in the menu.



Useful functions to cope with various applications

Inverted display

Depending on the mounting direction, some displays may be inverted. The digital display on the FS-V30 can be inverted, providing easy to read displays.

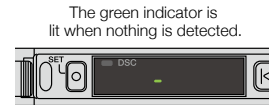


Power saving

POWER SAVING FUNCTION

The lowest power consumption in its class thanks to the MEGA FALCON chip.

The display can be turned off to reduce power consumption

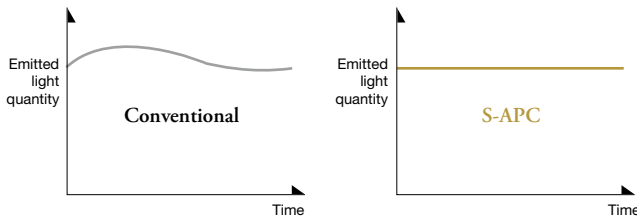


Harsh environments/Changes over time

S-APC MODE + 4-ELEMENT LED

The ultimate in long term stability.

The selectable S-APC function maintains a constant light level over time. The 4-element LED prevents diode deterioration over an extended period of time. Together, these functions make the FS-V30 Series the easy choice for long-term, maintenance-free operation.



EDGE INSPECTION MODE

Unaffected by dirt or temperature change.

This mode ignores slight variations of light intensity by dirt or temperature, and detects only the targets. It can detect slight differences of light intensity without readjustment of the sensitivity.

[Timer Function]

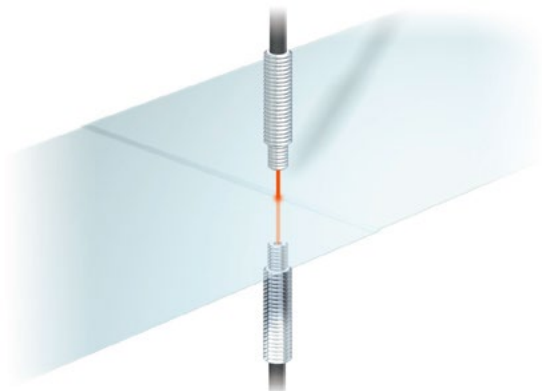
Equipped with 5 timer Functions. The Timer function can be individually set for each output 1 and 2 from 0.1 ms to 9999 ms.

- ON-delay
- OFF-delay
- One-shot
- ON-delay with OFF-delay
- ON-delay with One-shot

Preventing saturation

ATTENUATE FUNCTION

In situations where fiber units have to be mounted in close proximity to a highly reflective background, the amplifier may saturate. The selectable attenuation function adjusts transmission intensity, allowing the FS-V30 Series to be used in close proximity (enabled) or from long distance (disabled)

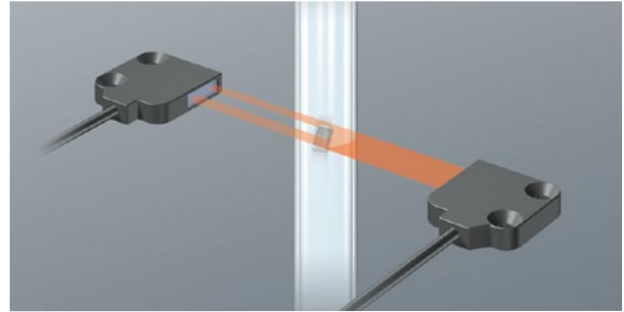


Simple sensitivity settings

FULL AUTOMATIC CALIBRATION

No need to stop targets

When detecting falling or minute targets, it is very difficult to make sensitivity adjustments to manual fiber-optic sensors. Fully automatic calibration is unique to digital sensors. A suitable sensitivity is set by pressing the SET button while the target passes through the sensing area.

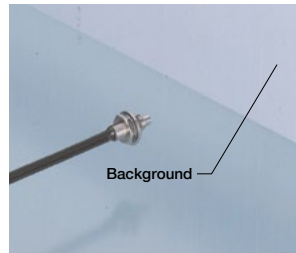


Detecting dropping targets

MAXIMUM SENSITIVITY SETTING

Ignore backgrounds

The sensitivity of the FS-V30 can be set to the maximum level to ignore background surfaces. This feature also makes it possible to detect targets while suppressing the influence of dust.



Background is not detected

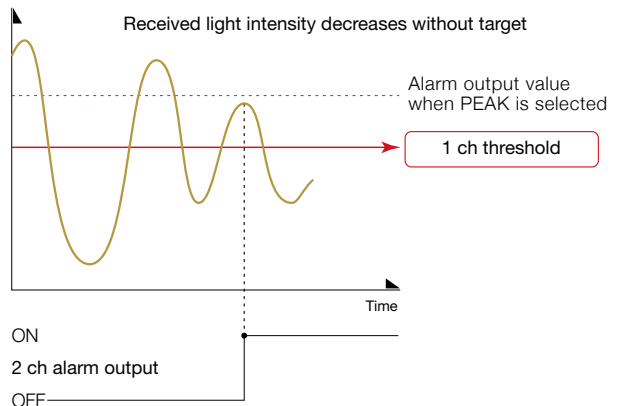
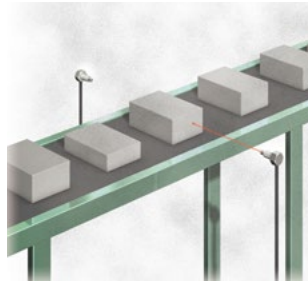


Sensor turns ON when the target enters the sensing area

Application modes for the 2 output type sensors

LIMIT MODE

When dust builds up on the sensor, the maximum light intensity will decrease. This mode sets an alarm value which can notify operators when the peak level of light intensity becomes too low.



ALARM MODE

Conventional models display "END APC" when the APC Function ends. The FS-V30 sends an alarm signal while displaying "END APC". It can also be used as an adjustment alarm output when using the DSC Function.



OTHER FS SENSORS

TRIM-POT TYPE

FS-M Series

- Fine adjustment by using a multi-turn trimmer
- Ultra-high-speed response model FS-M1H is also available



TEACHING TYPE

FS-T Series

- Fully-automatic calibration by pressing a button
- Green LED light source model FS-T1G is also available



All fiber units are available for same-day shipment.

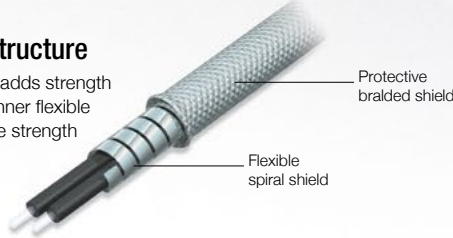
Our technical sales staff will select the best unit for you.

888-KEYENCE

Stainless steel armor

Stainless jacket structure

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



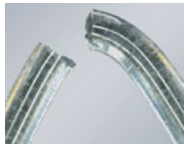
Tough Flex

Conventional fiber

Minimum bending radius : R0.98" 25 mm



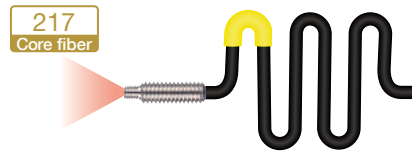
Single-core fiber



A single-core fiber that is exposed to excessive bending will easily break.

ToughFlex fiber

Minimum bending radius : R0.08" 2 mm



217-core fiber



A 217-core fiber is hardly affected by excessive bending.

Super ToughFlex fiber

Minimum bending radius : R0.02" 0.5 mm



613-core fiber



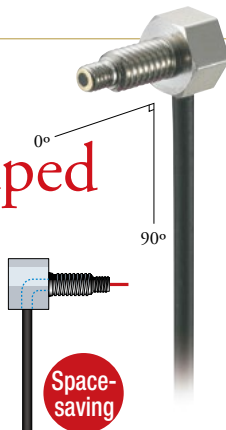
A 613-core fiber offers the best performance.

KEYENCE ONLY

Hex-shaped

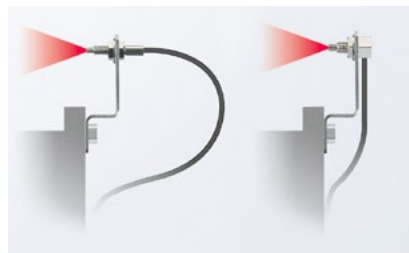
Unbreakable fiber

The cable features a unbreakable fiber with the tip of the fiber bent at a right angle, like a periscope. This design requires far less space than conventional models. (Patent pending)



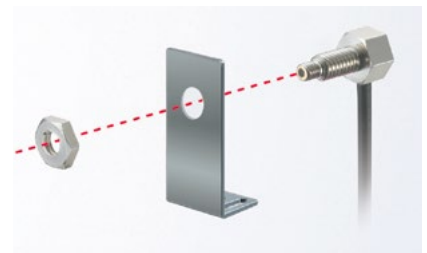
Space-saving, trouble-free

All Hex-shaped fiber units allow neat cable routing and require less space for installation. This eliminates problems such as entangled cables.



Easy mounting

Secure the unit with a single nut. Your current, standard fiber unit can be replaced without additional preparation or modification.



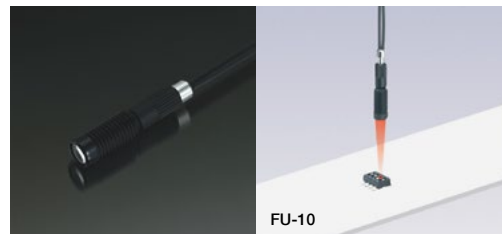
Standard

Reflective
▶ P.14
Thru-beam
▶ P.17



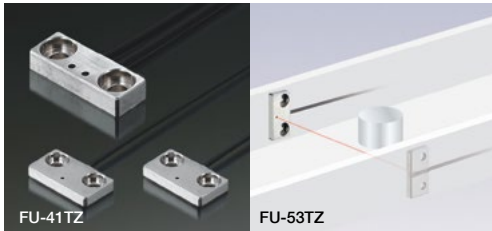
Small Beam Spot

▶ P.17



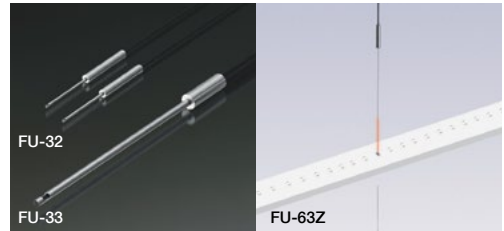
Flat

Reflective
▶ P.14
Thru-beam
▶ P.18



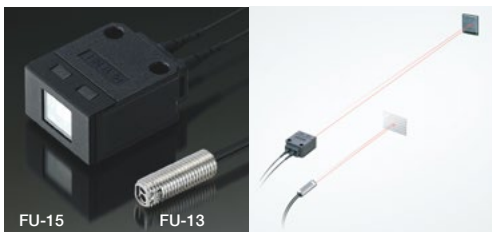
Sleeve

Reflective
▶ P.15
Thru-beam
▶ P.18



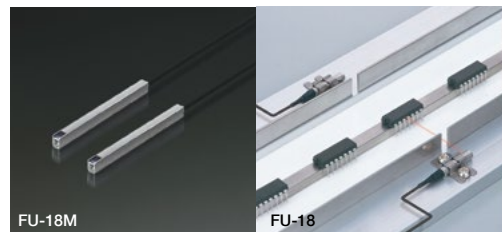
Retro-reflective

▶ P.15



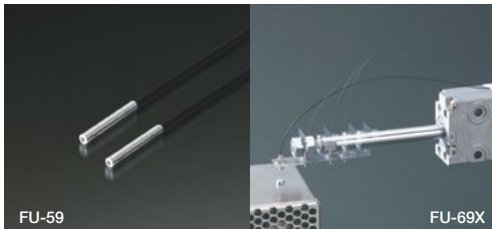
Narrow beam

▶ P.18



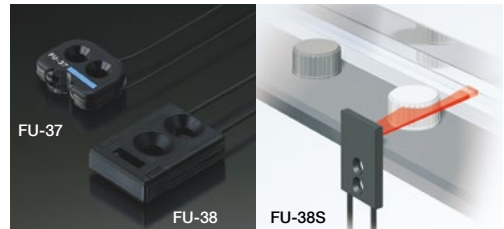
High-Flex

Reflective
▶ P.15
Thru-beam
▶ P.18



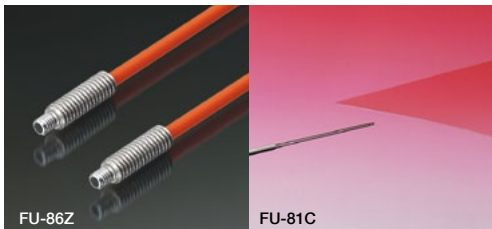
Definite-reflective

▶ P.15



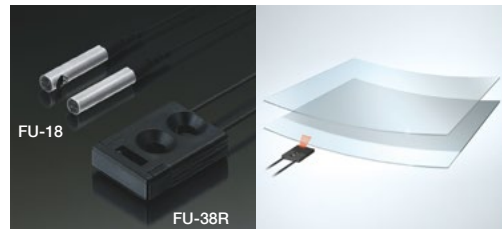
Heat Resistant

Reflective
▶ P.16
Thru-beam
▶ P.19



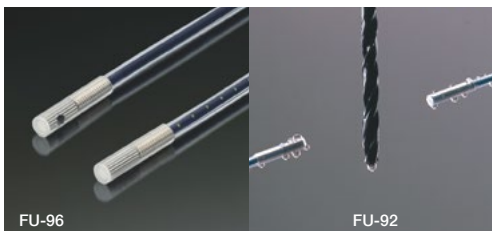
LCD/Semi-conductor

▶ P.15



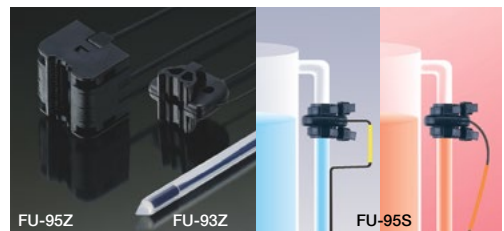
Chemical proof

Reflective
▶ P.16
Thru-beam
▶ P.19



Liquid Level

▶ P.16



Category		Reflective	Standard	Detecting distance 2.		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape	MEGA / FINE		MEGA / FINE					
Standard	ToughFlex	M4	-40 to 122°F (-40 to +50°C)	13.78" 350	1.97" 50	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Hex-shaped (Approx. 10 g)	FU-66TZ Free-cut 6.6 2 m
				19.69" 500	2.95" 75	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Hex-shaped (Approx. 32 g)	FU-67TZ Free-cut 6.6 2 m
		M6	-40 to 122°F (-40 to +50°C)	15.75" 400	2.36" 60	ø0.0002" ø0.005 (gold wire)	R0.08" R2	R0.08" R2 M4 (Approx. 10 g)	FU-66Z Free-cut 6.6 2 m
				19.69" 500	3.35" 85	ø0.0002" ø0.005 (gold wire)	R0.02" R0.5	R0.02" R0.5 M6 (Approx. 25 g)	FU-67V Free-cut 6.6 2 m
		M6	-40 to 122°F (-40 to +50°C)	19.69" 500	3.35" 85	ø0.0002" ø0.005 (gold wire)	R0.08" R2	R0.08" R2 M6 (Approx. 21 g)	FU-67 Free-cut 6.6 2 m
				15.75" 400	2.36" 60	ø0.0002" ø0.005 (gold wire)	R0.08" R2	R0.08" R2 ø0.12" ø3 (Approx. 8 g)	FU-4FZ Free-cut 6.6 2 m
	Armored	M6	-40 to 122°F (-40 to +50°C)	19.69" 500	2.95" 75	ø0.0002" ø0.005 (gold wire)	R0.39" R10	Hex-shaped Armored (Approx. 32 g)	FU-67TG Free-cut 6.6 1 m
				19.69" 500	3.35" 85	ø0.0002" ø0.005 (gold wire)	R0.39" R10	R0.39" R10 Armored (Approx. 29g)	FU-67G Free-cut 6.6 1 m
		M4	-40 to 158°F (-40 to +70°C)	27.56" 700	4.92" 125	ø0.0002" ø0.005 (gold wire)	R0.98" R25	Long-deteting distance M4 (Approx. 10 g)	FU-66 Free-cut 6.6 2 m
				27.56" 700	4.92" 125			Long-deteting distance M6 (Approx. 21 g)	FU-6F Free-cut 6.6 2 m
		M6	-40 to 158°F (-40 to +70°C)	27.56" 700	4.92" 125			Long-deteting distance ø0.12" ø3 (Approx. 8 g)	FU-4F Free-cut 6.6 2 m
				37.40" 950	7.87" 200			Long-deteting distance M6 (Approx. 21 g)	FU-61 Free-cut 6.6 2 m

1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
2. Standard target: White matte paper (Reflective type only.)

Category		Reflective	Flat/Coaxial	Detecting distance 2.		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape	MEGA / FINE		MEGA / FINE					
Flat head (with mounting hole)	Side-view	0.28" 7.2	0.41" 10.5	0.04" to 3.54" 1 to 90	0.04" to 0.98" 1 to 25	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Compact side-view type (Approx. 4 g)	FU-47TZ Free-cut 3.3 1 m
				0.08" to 2.36" 2 to 60	0.08" to 0.39" 2 to 10	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Ultra-thin, flat-ON (Approx. 5 g)	FU-41TZ Free-cut 3.3 1 m
	Top-view	0.16" 4	0.28" 7	0.04" to 12.60" 1 to 320	0.04" to 1.46" 1 to 37	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Flat-on versatile (Approx. 24 g)	FU-42TZ Free-cut 6.6 2 m
				0.31" 8	0.26" 6.5	0.04" to 3.54" 1 to 90	0.04" to 0.98" 1 to 25	ø0.0002" ø0.005 (gold wire)	R0.08" R2
	End-view	M6	-40 to 158°F (-40 to +70°C)	22.05" 560	3.94" 100	ø0.0002" ø0.005 (gold wire)	R0.98" R25	Suitable for positioning M8 (Approx. 18 g)	FU-25 Free-cut 6.6 2 m
				26.77" 680	4.92" 125	ø0.0002" ø0.005 (gold wire)	R0.98" R25	Suitable for positioning ø0.12" ø3 (Approx. 4 g)	FU-23X Free-cut 6.6 30 cm
Coaxial	High-power	M3	-40 to 158°F (-40 to +70°C)	13.39" 340	1.77" 45	ø0.0002" ø0.005 (gold wire)	R0.98" R25	0.016" 0.4 spot diameter with F-2HA (Approx. 6 g)	FU-35FA Free-cut 3.3 1 m
				7.87" 200	1.26" 32	ø0.0002" ø0.005 (gold wire)	R0.39" R10	M3, 0.016" 0.4 spot diameter with F-2HA Armored (Approx. 15 g)	FU-2303 Free-cut 3.3 1 m
	Lens attachment available	M3	-40 to 122°F (-40 to +50°C)	7.09" 180	1.18" 30	ø0.0002" ø0.005 (gold wire)	R0.08" R2	M3, 0.016" 0.4 spot diameter with F-2HA (Approx. 6 g)	FU-35FZ Free-cut 3.3 1 m
				7.09" 180	1.18" 30	ø0.0002" ø0.005 (gold wire)	R0.39" R10	Hex-shaped armored (Approx. 32 g)	FU-35TG Free-cut 3.3 1 m
	M3 M6	-40 to 122°F (-40 to +50°C)	7.09" 180	1.18" 30	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Hex-shaped (Approx. 7 g)	FU-35TZ Free-cut 3.3 1 m	
			3.54" 90	0.59" 15	ø0.0002" ø0.005 (gold wire)	R0.98" R25	0.008" 0.2 spot diameter with F-2HA (Approx. 4 g)	FU-21X Free-cut 6.6 30 cm	
	M3	-40 to 158°F (-40 to +70°C)	2.17" 55	0.31" 8	ø0.0002" ø0.005 (gold wire)	R0.39" R10	0.004" 0.1 spot diameter with F-2HA (Approx. 4 g)	FU-24X Free-cut 6.6 30 cm	

1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
2. Standard target: White matte paper (Reflective type only.)

Category		Reflective	Area/High-power/Retro-reflective/High-Flex	Detecting distance 2.		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape	MEGA / FINE							
Area	-40 to 158°F (-40 to +70°C)	Thickness: 0.28" 7	0.20" to 6.30" 5 to 160	0.20" to 4.72" 5 to 120	0.0002" ø0.005 (gold wire) (Parallel)	R0.98" R25	Area detection width of 0.59" 15 (Approx. 19 g)	FU-11	
		1.10" 28						Free-cut 6.6" 2 m	
High-Power	-40 to 122°F (-40 to +50°C)	Thickness: 0.20" 5.2	1.18" to 5.91" 30 to 150	1.18" to 59.06" 30 to 1500	ø0.012" ø0.3 (copper wire) (Vertical)	R0.08" R2	Long-detecting distance Narrow beam (8type) (Approx. 23 g)	FU-40	
		0.83" 21						Free-cut 6.6" 2 m	
		Thickness: 0.20" 5.2				ø0.012" ø0.3 (copper wire) (Vertical)	R0.39" R10	Long-detecting distance Narrow beam (9type) Armored (Approx. 50 g)	FU-40G
Retro-reflective	-40 to 122°F (-40 to +50°C)	Super small	2.36" to 18.90" 60 to 480 3		—	R0.08" R2	M6 Super small (Approx. 8 g)	FU-13	
		Long-detecting distance	3.94" to 24.80" 100 to 630	3.94" to 125.98" 100 to 3200	—	R0.39" R10	Square-shape, long-distance (Approx. 12 g)	FU-15	
High-Flex	-40 to 158°F (-40 to +70°C)	M4	6.30" 160	1.38" 35	0.0002" ø0.005 (gold wire)	R0.16" R4	High-flex fiber M4 (Approx. 8 g)	FU-68	
		0.59" 15						Free-cut 6.6" 2 m	
	-40 to 158°F (-40 to +70°C)	M3	2.95" 75	0.79" 20	0.0002" ø0.005 (gold wire)	R0.16" R4	High-flex fiber M3 (Approx. 3 g)	FU-69X	
		0.39" 10							
	-40 to 158°F (-40 to +70°C)	ø0.12" ø3	6.30" 160	1.38" 35	0.0002" ø0.005 (gold wire)	R0.16" R4	High-flex fiber ø0.12" ø3 (Approx. 7 g)	FU-48	
0.59" 15							Free-cut 6.6" 2 m		
-40 to 158°F (-40 to +70°C)	ø0.06" ø1.5	2.95" 75	0.79" 20	0.0002" ø0.005 (gold wire)	R0.16" R4	High-flex fiber ø0.06" ø1.5 (Approx. 3 g)	FU-49X		
		0.59" 15					Free-cut 6.6" 2 m		

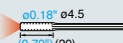



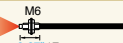



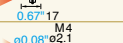

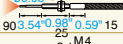

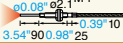

1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
2. Standard target: White matte paper (Reflective type only.)
3. When the R-2 (OP95388) is used: MEGA offers 0.39" to 37.01" 10 to 940 mm and FINE, 0.39" to 4.92" 10 to 125 mm.

Category		Reflective	Thin-sleeve	Detecting distance 2.		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape	MEGA / FINE							
Thin-sleeve	Side-view	Do not bend sleeve. -40 to 158°F (-40 to +70°C)	0.06" ø0.11" 0.2 0.2.8	3.35" 85	0.67" 17	0.0002" ø0.005 (copper wire)	R0.39" R10	Compact Side-view (Approx. 5 g)	FU-31
		Min. bend radius of sleeve: 0.39" 25 -40 to 158°F (-40 to +70°C)	0.08" ø0.19" 0.2 0.4.8	7.09" 180	0.38" 25	0.0002" ø0.005 (copper wire)	R0.98" R25	Long-sleeve Side-view (Approx. 10 g)	FU-33
		2.56" 65	0.59" 15						Free-cut 3.3" 1 m
		Do not bend sleeve. -40 to 158°F (-40 to +70°C)	0.02" ø0.06" 0.5 0.1.5	0.59" 15	0.12" 3	0.0002" ø0.005 (gold wire)	R0.39" R10	Thin-sleeve (Approx. 10 g)	FU-46
		0.12" 3	0.59" 15						
		Do not bend sleeve. -40 to 158°F (-40 to +70°C)	0.03" ø0.12" 0.82 0.3	1.77" 45	0.31" 8	0.0002" ø0.005 (gold wire)	R0.08" R2	Thin-sleeve (Approx. 4 g)	FU-45X
	0.20" 5	0.59" 15						Free-cut 13.69" 50 cm	
	End-view	Do not bend sleeve. -40 to 158°F (-40 to +70°C)	0.06" ø0.16" ø4 0.85 0.1.65	7.09" 180	1.46" 37	0.0002" ø0.005 (gold wire)	R0.98" R25	Thin-sleeve ø0.16" ø4 (Approx. 8 g)	FU-43
		0.87" 22	0.59" 15						Free-cut 6.6" 2 m
		Do not bend sleeve. -40 to 158°F (-40 to +70°C)	0.03" M3 0.82 0.3	1.77" 45	0.31" 8	0.0002" ø0.005 (gold wire)	R0.16" R4	Thin-sleeve (Approx. 8 g)	FU-65X
		0.59" 15	0.59" 15						Free-cut 13.69" 50 cm
		Min. bend radius of sleeve: 0.39" 10 -40 to 158°F (-40 to +70°C)	0.06" ø0.16" ø4 0.85 0.1.65	7.09" 180	1.46" 37	0.0002" ø0.005 (gold wire)	R0.98" R25	Long-sleeve M4 (Approx. 10 g)	FU-63
2.64" 67		0.59" 15						Free-cut 6.6" 2 m	
Coaxial, narrow beam	Do not bend sleeve. -40 to 158°F (-40 to +70°C)	0.07" ø0.10" 0.1.77 0.2.5	1.89" 48	0.39" 10	0.0002" ø0.005 (gold wire)	R0.98" R25	Thin-sleeve Narrow-beam type (Approx. 4 g)	FU-22X	
	2.64" 6	0.55" 14						Free-cut 13.69" 50 cm	



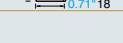





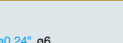


1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
2. Standard target: White matte paper (Reflective type only.)

Category		Reflective	Definite-reflective	Detecting distance 2.		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape	MEGA / FINE							
Definite-reflective	Short-detecting distance	-40 to 158°F (-40 to +70°C)	0.75" 19	0.12" 3	0.0002" ø0.005 (gold wire)	R0.39" R10	Compact, straight (Approx. 6 g)	FU-37	
		14.4" 4						Free-cut 6.6" 2 m	
		-40 to 158°F (-40 to +70°C)	0.47" 12	0.24" 6	0.0002" ø0.005 (gold wire)	R0.39" R10	Thin-profile, standard (Approx. 5 g)	FU-38	
	Long-detecting distance	-40 to 158°F (-40 to +70°C)	0.47" 12	0 to 0.16" 0 to 4	0.0031" ø0.08 (copper wire)	R0.39" R10	Thin-profile, short-detecting distance (Approx. 5 g)	FU-38V	
		0.75" 19						Free-cut 6.6" 2 m	
		-40 to 158°F (-40 to +70°C)	0.81" 20	0 to 1.02" 0 to 26	—	R0.20" R5	Long-detecting distance, definite-reflective (Approx. 20 g)	FU-38S	
Heat-resistant	-40 to 158°F (-40 to +70°C)	0.87" 22	0 to 0.55" 0 to 14	0.012" ø0.3 (copper wire)	R0.98" R25	Thin-profile, long-detecting distance (Approx. 20 g)	FU-38R		
	1.14" 29						Free-cut 6.6" 2 m		
Heat-resistant	-40 to 356°F (-40 to +180°C)	1.06" 27	0.10 to 2.56" 2.5 to 65	—	R1.38" R35	Heat resistance: 356F (180°C) definite reflective (Approx. 45 g)	FU-38H		
	1.46" 37						Free-cut 6.6" 2 m		
-40 to 482°F (-40 to +250°C)	1.46" 37	0.10 to 2.56" 2.5 to 65	0.10 to 0.63" 2.5 to 16	—	R0.98" R25	Heat resistance: 482F (250°C) definite reflective (Approx. 45 g)	FU-38K		
							Free-cut 6.6" 2 m		



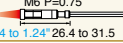

1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
2. Standard target: White matte paper (Reflective type only.)

Category		Reflective	Oil-proof/Chemical proof/Heat-resistant	(MEGA FINE)			
Type	Shape	Detecting distance ²		Smallest ¹ detectable object	Minimum bend radius	Features	Model
		MEGA / FINE					
Oil-proof, Chemical proof		$\phi 0.18^* \phi 4.5$ (0.79") (20)	$2.95^* 75$ $8.66^* 220$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R1.57" R40	FEP fiber (Approx. 32 g)	FU-91  6.6" 2 m
Heat-resistant	212°F (100°C) -40 to 212°F (-40 to +100°C)		$3.15^* 80$ $18.11^* 460$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R0.20" R5	R0.20" R5 Heat resistance: 212°F (100°C) (Approx. 25 g)	FU-85Z  6.6" 2 m
	221°F (105°C) -40 to 221°F (-40 to +105°C)		$4.72^* 120$ $26.77^* 680$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R0.98" R25	Heat resistance: 221°F (105°C), M6 (Approx. 21 g)	FU-85  6.6" 2 m
	356°F (180°C) -76 to 356°F (-60 to +180°C)		$3.54^* 90$ $22.44^* 570$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R1.38" R35	Heat resistance: 356°F (180°C), M6 (Approx. 33 g)	FU-87  6.6" 2 m
	662°F (350°C) -22 to 662°F (-30 to +350°C)		$2.95^* 75$ $15.75^* 400$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R0.98" R25	Heat resistance: 662°F (350°C) with sleeve (Approx. 24 g)	FU-81C  3.3" 1 m
	572°F (300°C) -40 to 572°F (-40 to +300°C)		$3.54^* 90$ $16.54^* 420$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R0.98" R25	Heat resistance: 572°F (300°C) with sleeve (Approx. 29 g)	FU-82C  3.3" 1 m
	572°F (300°C) -40 to 572°F (-40 to +300°C)		$3.54^* 90$	$\phi 0.0002^*$ $\phi 0.005$ (gold wire)	R0.98" R25	Heat resistance: 572°F (300°C), M4 (Approx. 23 g)	FU-83C  3.3" 1 m

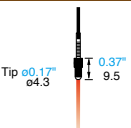
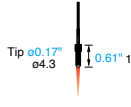
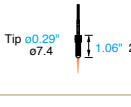
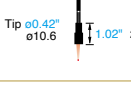
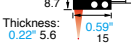
- The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
- Standard target: White matte paper (Reflective type only).

Category		Reflective	Liquid-level	(MEGA FINE)				
Type	Shape	Detecting distance ²		Smallest ¹ detectable object	Minimum bend radius	Features	Model	
		MEGA / FINE						
Liquid-level	Tube-mountable		$0.85^* 21.6$ $0.71^* 18$	Transparent tube of 0.16" to 1.02" 4 to 26 dia.	—	R0.20" R5	16 beam axes (Approx. 23 g)	FU-95S  6.6" 2 m
			$0.61^* 15.4$ $0.79^* 20$			R0.08" R2	R0.08" R2 (Approx. 7 g)	FU-95Z  6.6" 2 m
			$0.61^* 15.4$ $0.79^* 20$			R0.98" R25	Heat resistance: 221°F (105°C) (Approx. 7 g)	FU-95HA  6.6" 2 m
			$0.61^* 15.4$ $0.79^* 20$			R0.39" R10	R0.39" R10 (Approx. 7 g)	FU-95  6.6" 2 m
	Immersion		$\phi 0.24^* \phi 6$	Liquid (except for milky white liquids)	—	R0.02" ² R0.5	Liquid level detection by sensor head immersion. PFA-sheathed (Approx. 78g)	FU-93Z  6.6" 2 m
					R0.98" ² R25	Liquid level detection by sensor head immersion. PFA-sheathed (Approx. 78g)	FU-93  6.6" 2 m	

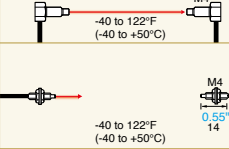



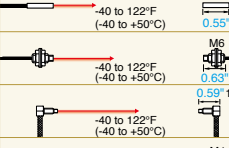



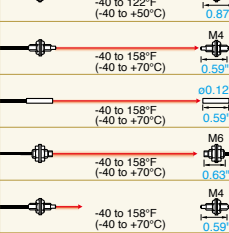





- The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
- The minimum bend radius of the PFA-sheathed section is R1.57" R40 mm. The 3.15" 80 mm section from the tip cannot be bent.

Category		Reflective	Reflective, small beam spot	(MEGA FINE)			
Type	Shape	Detecting distance ²		Smallest ¹ detectable object	Minimum bend radius	Features	Model
		MEGA / FINE					
Ultra-small beam spot		$\phi 0.12^* \phi 3$ (0.71") (18)	$0.20^* \pm 0.04$ 5 ± 1 with beam spot diameter of 0.004" 0.1	—	R0.98" R25	Minute target detection Space saving ($\phi 0.12^* \phi 3$) (Approx. 2 g)	FU-20  3.3" 50 cm
Adjustable beam spot		M6 P=0.75 1.04 to 1.24^* 26.4 to 31.5	0.39^* to 1.18^* 10 to 30 with beam spot diameter of 0.04" to 0.14" 0.9 to 3.5	—	R0.98" R25	Beam spot can be adjusted according to target size. (Approx. 5 g)	FU-10  6.6" 2 m

- The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
- Standard target: White matte paper (Reflective type only).

Category		Reflective	Lens for reflective type		(MEGA FINE)		
Type	Shape	Applicable fiber units	Detecting distance 1.		Features	Model	
			MEGA / FINE				
Parallel beam		FU-35FZ	1.50" 38	1.10" 28	0.16" 4 mm beam spot diameter (within the detecting of 0 to 0.79" 20)	F-3HA	
		FU-2303					
		FU-35TZ	1.38" 35	0.98" 25			
		FU-35TG					
		FU-35FA	1.77" 45	2.56" 65			
Type	Shape	Applicable fiber units	Spot diameter		Features	Model	
Small Beam Spot	Short-detecting distance 	FU-24X	0.28" ±0.08" 7 ±2 with beam spot diameter of 0.004" 0.1 2	—	0.28" ±0.08" 7 ±2 with beam spot diameter of 0.004" 0.1 2	Suitable for small targets (Approx. 1 g)	F-2HA
		FU-21X	0.28" ±0.08" 7 ±2 with beam spot diameter of 0.008" 0.2 2	—	0.28" ±0.08" 7 ±2 with beam spot diameter of 0.008" 0.2 2		
		FU-35FZ					
		FU-2303					
		FU-35TZ	0.28" ±0.08" 7 ±2 with beam spot diameter of 0.016" 0.4 3				
	Medium-detecting distance 	FU-35FZ	0.59" ±0.08" 15 ±2 with beam spot diameter of 0.02" 0.5			Suitable for small targets (Approx. 2 g)	F-4HA
		FU-2303					
		FU-35TG					
	Long-detecting distance 	FU-21X	1.38" ±0.12" 35 ±3 with beam spot diameter of 0.04" 1.0			Long-detecting distance, small beam spot (Approx. 5 g)	F-6HA
		FU-35FZ					
FU-2303		1.38" ±0.12" 35 ±3 with beam spot diameter of 0.08" 2.0					
FU-35FA							
Side-view 	FU-21X	0.31" to 1.18" 8 to 30 with beam spot diameter of 0.02" to 0.12" 0.5 to 3.0 4		—	0.31" to 1.18" 8 to 30 with beam spot diameter of 0.02" to 0.12" 0.5 to 3.0 4	Space-saving, side-view (Approx. 2 g)	F-5HA
	FU-35FZ						
	FU-2303	0.31" to 1.18" 8 to 30 with beam spot diameter of 0.02" to 0.12" 0.5 to 3.0 4					
	FU-35FA						

- When the FS-V30 is used. Standard target: White matte paper (Reflective type only).
- FINE, TURBO, or SUPER must be used.
- FINE, TURBO, SUPER, or HIGH SPEED must be used.
- With the FU-35FA/FZ/FG, FINE, TURBO, SUPER, or ULTRA must be used.

Category		Thrubeam	Standard	(MEGA FINE)				
Type	Shape	Detecting distance		Smallest 1. detectable object	Minimum Bend radius	Features	Model	
		MEGA / FINE						
Standard	ToughFlex 	9.84" 250		55.12" 1400	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Hex-Shaped (Approx. 43 g)	FU-77TZ 
		11.81" 300		66.93" 1700	ø0.0002" ø0.005	R0.02" R0.5	R0.02" R0.5 M4 (Approx. 25 g)	FU-77V 
		11.81" 300		66.93" 1700	ø0.0002" ø0.005	R0.08" R2	□R0.08" R2 M4 (Approx. 21 g)	FU-77 
	Armored 	11.81" 300		66.93" 1700	ø0.0002" ø0.005	R0.08" R2	□R0.08" R2 ø0.12" ø3 (Approx. 19 g)	FU-5FZ 
		17.72" 450		94.49" 2400	ø0.0002" ø0.005	R0.08" R2	□R0.08" R2 M6 (Approx. 25 g)	FU-71Z 
		9.84" 250		55.12" 1400	ø0.0002" ø0.005 (gold wire)	R0.39" R10	Hex-Shaped Armored (Approx. 43 g)	FU-77TG 
	Standard 	11.81" 300		66.93" 1700	ø0.0002" ø0.005	R0.39" R10	□R0.39" R10 Armored (Approx. 39 g)	FU-77G 
		15.75" 400		90.55" 2300	ø0.0002" ø0.005	R0.98" R25	Long-detecting distance M4 (Approx. 21 g)	FU-7E 
		15.75" 400		90.55" 2300	ø0.0002" ø0.005	R0.98" R25	Long-detecting distance ø0.12" ø3 (Approx. 19 g)	FU-5F 
		21.65" 550		102.36" 2600	ø0.0002" ø0.005	R0.98" R25	Long-detecting distance M6 (Approx. 25 g)	FU-71 
		7.48" 190	39.37" 1000	ø0.0002" ø0.005	R0.16" R4	□R0.16" R4 (Approx. 9 g)	FU-78 	

1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

Category		Thrubeam	Flat/Built-in lens, side-view/Top-view		Detecting distance		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape		MEGA / FINE							
Flat head (with mounting hole)	Side-view		-40 to 122°F (-40 to +50°C)	0.24" 6	2.17" 55	12.99" 330	ø0.0002" ø0.005 (gold wire)	R0.08" R2	Compact side-view type (Approx. 5 g)	FU-57TZ 3.3" 1 m
				0.41" 10.5	2.95" 75	14.96" 380	ø0.0002" ø0.005	R0.08" R2	Ultra-thin, side-view (Approx. 5 g)	FU-51TZ 3.3" 1 m
	End-view		-40 to 122°F (-40 to +50°C)	0.39" 10	1.97" 50	9.84" 250	ø0.0002" ø0.005	R0.08" R2	Long-detecting distance, thin, side-view (Approx. 15 g)	FU-52TZ 6.6" 2 m
				0.28" 7	1.97" 50	9.84" 250	ø0.0002" ø0.005	R0.08" R2	Ultra-thin, flat-ON (Approx. 10 g)	FU-53TZ 3.3" 1 m
Top-view		-40 to 122°F (-40 to +50°C)	0.28" 7	1.97" 50	9.84" 250	ø0.0002" ø0.005	R0.08" R2	General-purpose, flat view (Approx. 25 g)	FU-54TZ 6.6" 2 m	
			0.18" 4	1.97" 50	9.84" 250	ø0.0002" ø0.005	R0.08" R2			
Built-in lens, side-view		-40 to 122°F (-40 to +50°C)	ø0.16" ø4	24.80" 630	125.98" 3200	ø0.004" ø0.1	R0.08" R2	Ultra-long-detecting distance, thin, side-view (Approx. 8 g)	FU-16Z 6.6" 2 m	
			ø0.16" ø4	37.40" 950	141.73" 3600*	ø0.004" ø0.1	R0.39" R10	Ultra-narrow-beam, side-view (Approx. 8 g)	FU-16 6.6" 2 m	
			ø0.16" ø4	31.50" 800	125.98" 3200	ø0.0008" ø0.02, (opaque target)	R0.39" R10	Mapping (Approx. 6 g)	FU-18M 6.6" 2 m	
			0.06"x0.08"x0.79" 1.5x2x20	9.45" 240	33.46" 850	ø0.0008" ø0.02, (opaque target)	R0.39" R10			
Built-in lens, end-view		-40 to 122°F (-40 to +50°C)	0.14 x 0.16" 3.6x4	90.55" 2300	141.73" 3600*	ø0.004" ø0.1	R0.08" R2	Long-distance, square-rod head (Approx. 8 g)	FU-50 6.6" 2 m	

- The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
- *141.73" 3600* is assumed as maximum because the fiber cable has the length of 6.6" 2 m.

Category		Thrubeam	Area/Thin-sleeve		Detecting distance		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape		MEGA / FINE							
Area		Do not bend sleeve: -40 to 122°F (-40 to +50°C)	0.79" 20	27.56" 700	66.93" 1700	ø0.05" ø1.2 (TURBO mode) ø0.01" ø0.3 (FINE mode)	R0.08" R2	Area detection fiber with a detecting width of 0.39" 10 (Approx. 23 g)	FU-12 6.6" 2 m	
			0.79" 20	27.56" 700	66.93" 1700	ø0.05" ø1.2 (TURBO mode) ø0.01" ø0.3 (FINE mode)	R0.08" R2			
Thin-sleeve	Side-view	-40 to 158°F (-40 to +70°C)	0.03" 0.82	1.50" 38	11.81" 300	ø0.0002" ø0.005	R0.98" R25	Side-view type with thin sleeve (Approx. 5 g)	FU-32 3.3" 1 m	
			0.39" 10	4.92" 125	25.20" 640	ø0.0002" ø0.005	R0.98" R25	Long-detecting distance, side-view (Approx. 17 g)	FU-34 6.6" 2 m	
			0.03" 0.82	1.50" 38	11.81" 300	ø0.0002" ø0.005	R0.98" R25	Long-detecting distance with sleeve (Approx. 24 g)	FU-73 6.6" 2 m	
	End-view	-40 to 158°F (-40 to +70°C)	0.03" 0.82	3.74" 95	15.75" 400	ø0.0002" ø0.005	R0.39" R10	Thin sleeve (Approx. 10 g)	FU-75F 3.3" 1 m	
			0.03" 0.82	3.74" 95	15.75" 400	ø0.0002" ø0.005	R0.39" R10	Thin sleeve (Approx. 10 g)	FU-76F 6.6" 2 m	
			0.03" 0.82	3.74" 95	15.75" 400	ø0.0002" ø0.005	R0.39" R10	Thin sleeve (Approx. 3 g)	FU-56 3.3" 1 m	

- The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

Category		Thrubeam	High-flex/Extra-thin core fiber		Detecting distance		Smallest 1. detectable object	Minimum bend radius	Features	Model
Type	Shape		MEGA / FINE							
High-flex		-40 to 158°F (-40 to +70°C)	M3	4.92" 125	16.69" 500	ø0.0002" ø0.005	R0.16" R4	High-flex M3 (Approx. 6 g)	FU-79 3.3" 1 m	
			ø0.06	4.92" 125	16.69" 500	ø0.0002" ø0.005	R0.16" R4	High-flex ø0.06" ø1.5 (Approx. 6 g)	FU-59 3.3" 1 m	
			ø1.5	4.92" 125	16.69" 500	ø0.0002" ø0.005	R0.16" R4			
Extra-thin core fiber		-40 to 122°F (-40 to +50°C)	0.24" 6	1.97" 50	12.60" 320	ø0.0002" ø0.005 (gold wire)	R0.16" R4	Compact side-view type (Approx. 5 g)	FU-57TE 3.3" 1 m	
			0.04" ø1.0	1.26" 32	5.91" 150	ø0.0002" ø0.005	R0.39" R10	Ultra thin (Approx. 8 g)	FU-58 6.6" 2 m	
			0.10" ø2.5	0.20" 5	0.98" 25	ø0.0002" ø0.005	R0.39" R10	Thin (Approx. 3 g)	FU-55 6.6" 2 m	

- The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.

Category	Thrubeam	Heat-resistant/Oil-proof,Chemical proof		Detecting distance		Smallest 1. detectable object	Minimum bend radius	Features	Model
		Type	Shape	MEGA / FINE	MEGA / FINE				
Heat-resistant	M4	212°F (100°C) -40 to 212°F (-40 to +100°C)	0.59" 15	11.81" 300	55.12" 1400	0.0002" 0.005	R0.20" R5	Heat resistance: 212°F (100°C), (Approx. 25 g)	FU-86Z 6.6' 2 m
				Lens: F-1, F-2, F-4, F-5					
				15.75" 400	90.55" 2300				FU-86 6.6' 2 m
				Lens: F-1, F-2, F-4, F-5					
Heat-resistant	M4	356°F (180°C) -40 to 356°F (-40 to +180°C)	0.67" 17	9.84" 250	51.18" 1300	0.0002" 0.005	R0.98" R25	Heat resistance: 356°F (180°C), M4 (Approx. 36 g)	FU-88 6.6' 2 m
				Lens: F-2					
Heat-resistant	M4	572°F (300°C) -40 to 572°F (-40 to +300°C)	0.98" 25	7.09" 180	37.40" 950	0.0002" 0.005	R0.98" R25	Heat resistance: 572°F (300°C), M4 (Approx. 66 g)	FU-84C 6.6' 2 m
				Lens: F-2					
Oil-proof, Chemical proof	e0.20" e5 (0.37" (23))	-40 to 158°F (-40 to +70°C)	0.20" e5 (0.91" (23))	141.73" 3600 ²	51.18" 1300	0.008" 0.2	R1.57" R40	FEP fiber (Approx. 71 g)	FU-92 6.6' 2 m
				106.30" 2700	16.93" 430				FU-96 6.6' 2 m

1. The smallest detectable object was determined at the optimal detecting distance and sensitivity setting.
 2. "141.73" 3600" is assumed as maximum because the fiber cable has the length of 6.6' 2 m.

Category	Thrubeam	Lens for thrubeam type		Detecting distance		Features	Model										
		Type	Shape	Applicable fiber units	MEGA / FINE			MEGA / FINE									
Ultra-long detecting distance, narrow beam	e0.17" e4.3 (0.37" 9.5)	FU-77TZ	FU-77	FU-77V	FU-77TG/77G	FU-7F	FU-78	141.73" 3600 ²	125.98" 3200	Greatly increases the detecting distance. Aperture angle: 8 (Approx. 1 g)	F-4 Heat resistance: 158°F (70°C)						
								70.87" 1800	70.87" 1800			141.73" 3600 ²	141.73" 3600 ²				
								141.73" 3600 ²	141.73" 3600 ²			141.73" 3600 ²	141.73" 3600 ²				
								141.73" 3600 ²	98.43" 2500			141.73" 3600 ²	141.73" 3600 ²				
								141.73" 3600 ²	141.73" 3600 ²			141.73" 3600 ²	141.73" 3600 ²				
								141.73" 3600 ²	141.73" 3600 ²			141.73" 3600 ²	141.73" 3600 ²				
Long-detecting distance	e0.16" e4 (0.31" 7.9)	FU-77	FU-77TZ	FU-77V	FU-84C	FU-77TG/77G	FU-78	FU-7F	FU-86	Greatly increases the detecting distance. Aperture angle: 15 (Approx. 2 g)	F-2 Heat resistance: 572°F (300°C)						
												141.73" 3600 ²	74.80" 1900	70.87" 1800	70.87" 1800	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	59.06" 1500	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	90.55" 2300	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	78.74" 2000	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
Side-view	0.37" 9.3 (0.66" 16.7)	FU-77	FU-77V	FU-77G	FU-78	FU-7F	FU-86	FU-86Z	FU-77/77G	Narrow-beam, side-view type (Approx. 10 g)	F-5 Heat resistance: 221°F (105°C)						
												141.73" 3600 ²	90.55" 2300	70.87" 1800	70.87" 1800	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	90.55" 2300	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	98.43" 2500	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
												141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²	141.73" 3600 ²
Side-view	e0.16" e4 (0.37" 9.5)	FU-77	FU-77V	FU-7F	FU-86Z	FU-86Z	FU-78	FU-84C	FU-77/77G	Space-saving, side-view type (Approx. 2 g)	F-1 ¹ Heat resistance: 158°F (70°C)						
												15.75" 400	98.43" 2500	19.69" 500	15.75" 400	74.80" 1900	11.81" 300
												15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400
												15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400
												15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400
												15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400	15.75" 400

1. When using the F-1 at a temperature of 158°F (70°C) or more, specify the "Heat-resistant F-1".
 2. "141.73" 3600" is assumed as maximum because the fiber cable has the length of 6.6' 2 m.

Model	Type	Features	Detecting distance 1: [Unit: inch/mm]						
			MEGA	ULTRA TURBO	SUPER TURBO	TURBO	FINE	HIGH SPEED	
FU-10	Reflective	Small beam spot Adjustable beam spot	0.39" to 1.18" 10 to 30 with beam spot diameter of 0.04" to 0.14" 0.9 to 3.5 (0.39" to 1.18" 10 to 30 with beam spot diameter of 0.04" to 0.14" 0.9 to 3.5)						0.39" to 1.18" (0.39" to 1.18") 10 to 30 (10 to 30)
FU-11	Reflective	Area	0.20" to 6.30" (0.20" to 6.30") 5 to 160 (5 to 160)	0.20" to 6.30" (0.20" to 6.30") 5 to 160 (5 to 160)	0.20" to 5.91" (0.20" to 5.91") 5 to 150 (5 to 150)	0.20" to 5.51" (0.20" to 5.12") 5 to 140 (5 to 130)	0.20" to 4.72" (0.20" to 3.54") 5 to 120 (5 to 90)	0.20" to 2.76" (0.20" to 2.17") 5 to 70 (5 to 55)	
FU-12	Thru-beam	Area	66.93" (55.12") 1700 (1400)	55.12" (43.31") 1400 (1100)	47.24" (37.40") 1200 (950)	37.40" (29.53") 950 (750)	27.56" (21.65") 700 (550)	12.60" (7.09") 320 (180)	
FU-13	Retro-Reflective	Retro-reflective Super small	2.36" to 18.90" (2.36" to 14.96") ² 60 to 480 (60 to 380) ²	2.36" to 14.96" (2.36" to 11.81") ² 60 to 380 (60 to 300) ²	2.36" to 7.48" (2.36" to 5.91") ² 60 to 190 (60 to 150) ²	2.36" to 4.92" (2.36" to 3.94") ² 60 to 125 (60 to 100) ²	—	—	
FU-15	Retro-Reflective	Retro-reflective Long-detecting distance	3.94" to 125.98" (0.39" to 98.43") 100 to 3200 (100 to 2500)	3.94" to 98.43" (0.39" to 78.74") 100 to 2500 (100 to 2000)	3.94" to 48.21" (3.94" to 39.37") 100 to 1250 (100 to 1000)	3.94" to 37.01" (3.94" to 29.53") 100 to 940 (100 to 750)	3.94" to 24.80" (3.94" to 19.69") 100 to 630 (100 to 500)	3.94" to 19.69" (3.94" to 15.75") 100 to 500 (100 to 400)	
FU-16	Thru-beam	Built-in lens, side-view	141.73" (141.73") ³ 3600 (3600) ³	141.73" (118.11") ³ 3600 ³ (3000)	78.74" (59.06") 2000 (1500)	59.06" (47.2") 1500 (1200)	37.40" (29.53") 950 (750)	19.59" (11.02") 500 (280)	
FU-16Z	Thru-beam	Built-in lens, side-view	125.98" (98.43") 3200 (2500)	98.43" (78.74") 2500 (2000)	51.18" (39.37") 1300 (1000)	39.37" (31.50") 1000 (800)	24.80" (19.69") 630 (500)	14.96" (8.66") 380 (220)	
FU-18	Thru-beam	Built-in lens, side-view	125.98" (98.43") 3200 (2500)	98.43" (78.74") 2500 (2000)	59.06" (47.24") 1500 (1200)	47.24" (39.37") 1200 (1000)	31.50" (25.59") 800 (650)	18.90" (10.24") 480 (260)	
FU-18M	Thru-beam	Built-in lens, side-view	33.46" (31.50") 850 (800)	27.56" (25.59") 700 (650)	14.17" (12.99") 360 (330)	11.81" (11.02") 300 (280)	9.45" (8.66") 240 (220)	5.12" (4.33") 130 (110)	
FU-20	Reflective	Small beam spot ø0.004" ø0.1	0.20" ±0.04" 5±1 with beam spot diameter of 0.004" 0.1						—
FU-21X	Reflective	Coaxial Lens attachment available	3.54" (2.76") 90 (70)	2.76" (2.20") 70 (56)	1.38" (1.10") 35 (28)	0.98" (0.79") 25 (20)	0.59" (0.47") 15 (12)	0.39" (0.28") 10 (7)	
FU-22X	Reflective	Sleeve Coaxial, narrow beam	1.89" (1.57") 48 (40)	1.65" (1.34") 42 (34)	0.59" (0.47") 15 (12)	0.51" (0.39") 13 (10)	0.39" (0.31") 10 (8)	0.24" (0.16") 6 (4)	
FU-23X	Reflective	Coaxial High power	26.77" (21.65") 680 (550)	21.65" (17.32") 550 (440)	14.57" (11.81") 370 (300)	9.84" (7.87") 250 (200)	4.92" (3.94") 125 (100)	3.35" (2.36") 85 (60)	
FU-2303	Reflective	Coaxial Lens attachment available	7.87" (6.30") 200 (160)	6.30" (5.12") 160 (130)	3.15" (2.56") 80 (65)	2.36" (1.77") 60 (45)	1.26" (0.98") 32 (25)	0.87" (0.67") 22 (17)	
FU-24X	Reflective	Coaxial Lens attachment available	2.17" (1.77") 55 (45)	1.77" (1.42") 45 (36)	0.87" (0.71") 22 (18)	0.59" (0.47") 15 (12)	0.31" (0.28") 8 (7)	0.24" (0.16") 6 (4)	
FU-25	Reflective	Coaxial High power	22.05" (18.50") 560 (470)	20.47" (16.93") 520 (430)	11.81" (9.45") 300 (240)	7.87" (6.30") 200 (160)	3.94" (3.15") 100 (80)	2.76" (1.97") 70 (50)	
FU-31	Reflective	Sleeve Side-view	3.35" (2.68") 85 (68)	2.68" (2.13") 68 (54)	1.34" (1.06") 34 (27)	0.98" (0.79") 25 (20)	0.67" (0.51") 17 (13)	0.43" (0.31") 11 (8)	
FU-32	Thru-beam	Sleeve Side-view	11.81" (9.06") 300 (230)	9.06" (7.09") 230 (180)	3.94" (2.95") 100 (75)	2.95" (2.36") 75 (60)	1.50" (1.18") 38 (30)	0.98" (0.59") 25 (15)	
FU-33	Reflective	Sleeve Side-view	7.09" (5.91") 180 (150)	5.91" (4.72") 150 (120)	2.95" (2.36") 75 (60)	1.97" (1.57") 50 (40)	0.98" (0.79") 25 (20)	0.71" (0.55") 18 (14)	
FU-34	Thru-beam	Sleeve Side-view	25.20" (20.47") 640 (520)	19.69" (15.75") 500 (400)	12.60" (9.84") 320 (250)	9.84" (7.87") 250 (200)	4.92" (3.94") 125 (100)	3.54" (1.97") 90 (50)	
FU-35FA	Reflective	Coaxial Lens attachment available	13.39" (10.63") 340 (270)	10.63" (8.66") 270 (220)	5.51" (4.33") 140 (110)	3.54" (2.76") 90 (70)	1.77" (1.38") 45 (35)	1.18" (0.98") 30 (25)	
FU-35FZ	Reflective	Coaxial Lens attachment available	7.87" (6.30") 200 (160)	6.30" (5.12") 160 (130)	3.15" (2.56") 80 (65)	2.36" (1.77") 60 (45)	1.26" (0.98") 32 (25)	0.87" (0.67") 22 (17)	
FU-35TG	Reflective	Coaxial Lens attachment available	7.09" (5.51") 180 (140)	5.51" (4.33") 140 (110)	2.95" (2.36") 75 (60)	2.17" (1.65") 55 (42)	1.18" (0.91") 30 (23)	0.79" (0.63") 20 (16)	
FU-35TZ	Reflective	Coaxial Lens attachment available	7.09" (5.51") 180 (140)	5.51" (4.33") 140 (110)	2.95" (2.36") 75 (60)	2.17" (1.65") 55 (42)	1.18" (0.91") 30 (23)	0.79" (0.63") 20 (16)	
FU-37	Reflective	Definite-reflective Short-detecting distance	0.12" 3 (center of detecting distance)						
FU-38	Reflective	Definite-reflective Short-detecting distance	0.24" 6 (center of detecting distance)						
FU-38H	Reflective	Definite-reflective Heat-resistant	0.10" to 2.56" (0.10" to 2.17") 2.5 to 65 (2.5 to 55)	0.10" to 2.17" (0.10" to 1.73") 2 to 55 (2.5 to 44)	0.10" to 1.06" (0.10" to 0.87") 2.5 to 27 (2.5 to 22)	0.10" to 0.87" (0.10" to 0.75") 2.5 to 22 (2.5 to 19)	0.10" to 0.63" (0.10" to 0.47") 2.5 to 16 (2.5 to 12)	0.10" to 0.39" (0.10" to 0.28") 2.5 to 10 (2.5 to 7)	
FU-38K	Reflective	Definite-reflective Heat-resistant	0.10" to 2.56" (0.10" to 2.17") 2.5 to 65 (2.5 to 55)	0.10" to 2.17" (0.10" to 1.73") 2 to 55 (2.5 to 44)	0.10" to 1.06" (0.10" to 0.87") 2.5 to 27 (2.5 to 22)	0.10" to 0.87" (0.10" to 0.75") 2.5 to 22 (2.5 to 19)	0.10" to 0.63" (0.10" to 0.47") 2.5 to 16 (2.5 to 12)	0.10" to 0.39" (0.10" to 0.28") 2.5 to 10 (2.5 to 7)	
FU-38R	Reflective	Definite-reflective Long detecting distance	0" to 0.55" (0" to 0.55") 0 to 14 (0 to 14)						0" to 0.47" (0" to 0.35") 0 to 12 (0 to 9)
FU-38S	Reflective	Definite-reflective Long detecting distance	0" to 1.02" (0" to 1.02") 0 to 26 (0 to 26)						0" to 0.59" (0" to 0.39") 0 to 15 (0 to 10)
FU-38V	Reflective	Definite-reflective Short-detecting distance	0" to 0.16" (0" to 0.16") 0 to 4 (0 to 4)						0.08" 0.06" (0.08" 0.06") 2 ±1.4 (2 ±1.4)
FU-40	Reflective	High-power	1.18" to 59.06" (1.18" to 47.24") 30 to 1500 (30 to 1200)	1.18" to 43.31" (1.18" to 33.46") 30 to 1100 (30 to 850)	1.18" to 15.75" (1.18" to 12.60") 30 to 400 (30 to 320)	1.18" to 10.24" (1.18" to 8.66") 30 to 260 (30 to 220)	1.18" to 5.91" (1.18" to 4.72") 30 to 150 (30 to 120)	1.18" to 3.94" (1.18" to 3.15") 30 to 100 (30 to 80)	
FU-40G	Reflective	High-power	1.18" to 59.06" (1.18" to 47.24") 30 to 1500 (30 to 1200)	1.18" to 43.31" (1.18" to 33.46") 30 to 1100 (30 to 850)	1.18" to 15.75" (1.18" to 12.60") 30 to 400 (30 to 320)	1.18" to 10.24" (1.18" to 8.66") 30 to 260 (30 to 220)	1.18" to 5.91" (1.18" to 4.72") 30 to 150 (30 to 120)	1.18" to 3.94" (1.18" to 3.15") 30 to 100 (30 to 80)	
FU-41TZ	Reflective	Flat head (with mounting hole) Flat-view	0.08" to 2.36" (0.08" to 1.97") 2 to 60 (2 to 50)	0.08" to 1.97" (0.08" to 1.57") 2 to 50 (2 to 40)	0.08" to 0.98" (0.08" to 0.79") 2 to 25 (2 to 20)	0.08" to 0.74" (0.08" to 0.63") 2 to 20 (2 to 16)	0.08" to 0.34" (0.08" to 0.31") 2 to 10 (2 to 8)	0.08" to 0.24" (0.08" to 0.16") 2 to 6 (2 to 4)	
FU-42TZ	Reflective	Flat head (with mounting hole) Flat-view	0.04" to 12.60" (0.04" to 9.84") 1 to 320 (1 to 250)	0.04" to 9.84" (0.04" to 7.87") 1 to 250 (1 to 200)	0.04" to 4.72" (0.04" to 3.94") 1 to 120 (1 to 100)	0.04" to 2.95" (0.04" to 2.36") 1 to 75 (1 to 60)	0.04" to 1.46" (0.04" to 1.18") 1 to 37 (1 to 30)	0.04" to 0.98" (0.04" to 0.87") 1 to 30 (1 to 25)	
FU-43	Reflective	Sleeve Top-view	7.04" (5.91") 180 (150)	5.91" (4.72") 150 (120)	3.35" (2.76") 85 (70)	2.36" (1.97") 60 (50)	1.46" (1.18") 37 (30)	0.94" (0.63") 24 (16)	
FU-44TZ	Reflective	Flat head (with mounting hole) Top-view	0.04" to 3.54" (0.04" to 2.95") 1 to 90 (1 to 75)	0.04" to 2.95" (0.04" to 2.36") 1 to 75 (1 to 60)	0.04" to 1.77" (0.04" to 1.46") 1 to 45 (1 to 37)	0.04" to 1.46" (0.04" to 1.18") 1 to 37 (1 to 30)	0.04" to 0.98" (0.04" to 0.79") 1 to 25 (1 to 20)	0.04" to 0.35" (0.04" to 0.24") 1 to 9 (1 to 6)	
FU-45X	Reflective	Sleeve Top-view	1.77" (1.38") 45 (35)	1.38" (1.10") 35 (28)	0.71" (0.55") 18 (14)	0.51" (0.39") 13 (10)	0.31" (0.24") 8 (6)	0.20" (0.16") 5 (4)	
FU-46	Reflective	Sleeve Top-view	0.59" (0.47") 15 (12)	0.49" (0.39") 12 (10)	0.31" (0.28") 8 (7)	0.24" (0.20") 6 (5)	0.12" (0.08") 3 (2)	0.06" (0.04") 1.6 (1.1)	

NOTE: Standard target: White matte paper (Reflective type only).
 1. Each detecting distance in parentheses shows the data when the S-APC function is ON. S-APC will be always turned ON when the high-resolution or high-speed mode is selected.
 2. When the R-2 (OP-95388) is used, MEGA (0.39" to 37.00" 10 to 940 mm)/ULTRA (0.39" to 29.53" 10 to 750 mm)/SURER (0.39" to 14.96" 10 to 380 mm)/TURBO (0.39" to 9.84" 10 to 250 mm)/FINE (0.39" to 4.92" 10 to 125 mm)
 3. "141.73" 3600" is assumed as maximum because the fiber cable has the length of 6.6' 2 m.

Model	Type	Features	Detecting distance ¹ : [Unit: inch/mm]					
			MEGA	ULTRA TURBO	SUPER TURBO	TURBO	FINE	HIGH SPEED
FU-47TZ	Reflective	Flat head (with mounting hole) Side-view	0.04" to 3.54" (0.04" to 2.95") 1 to 90 (1 to 75)	0.04" to 2.95" (0.04" to 2.36") 1 to 75 (1 to 60)	0.04" to 1.77" (0.04" to 1.46") 1 to 45 (1 to 37)	0.04" to 1.46" (0.04" to 1.18") 1 to 37 (1 to 30)	0.04" to 0.98" (0.04" to 0.79") 1 to 25 (1 to 20)	0.04" to 0.47" (0.04" to 0.31") 1 to 12 (1 to 8)
FU-48	Reflective	High-Flex ø0.12" ø3	6.30" (5.12") 160 (130)	5.12" (4.33") 130 (110)	2.76" (2.17") 70 (55)	1.97" (1.57") 50 (40)	1.38" (1.10") 35 (28)	0.87" (0.67") 22 (17)
FU-49X	Reflective	High-Flex ø0.06" ø1.5	2.95" (2.36") 75 (60)	2.36" (1.97") 60 (50)	1.26" (0.98") 32 (25)	0.98" (0.79") 25 (20)	0.79" (0.63") 20 (16)	0.51" (0.39") 13 (10)
FU-4F	Reflective	Standard	27.56" (20.87") 700 (530)	20.47" (16.93") 520 (430)	13.78" (9.84") 350 (250)	9.06" (7.09") 230 (180)	4.92" (3.94") 125 (100)	3.15" (2.17") 80 (55)
FU-4FZ	Reflective	Standard Unbreakable	15.75" (12.60") 400 (320)	12.60" (10.24") 320 (260)	6.30" (5.12") 160 (130)	4.72" (3.54") 120 (90)	2.36" (1.77") 60 (45)	1.57" (1.18") 40 (30)
FU-50	Thru-beam	Built-in lens, Top-view	141.73" (141.73") ² 3600 (3600) ²	141.73" (141.73") ² 3600 (3600) ²	141.73" (141.73") ² 3600 (3600) ²	141.73" (125.98") 3600 ² (3200)	90.55" (70.87") 2300 (1800)	59.06" (33.46") 1500 (850)
FU-51TZ	Thru-beam	Flat head (with mounting hole) Top-view	14.96" (11.02") 380 (280)	11.81" (9.06") 300 (230)	7.09" (5.91") 180 (150)	5.91" (4.72") 150 (120)	2.95" (2.36") 75 (60)	1.77" (0.98") 45 (25)
FU-52TZ	Thru-beam	Flat head (with mounting hole) Top-view	51.18" (39.37") 1300 (1000)	43.31" (33.46") 1100 (850)	24.41" (19.69") 620 (500)	19.69" (15.75") 500 (400)	9.84" (7.87") 250 (200)	6.30" (3.94") 160 (100)
FU-53TZ	Thru-beam	Flat head (with mounting hole) Flat-view	9.84" (7.87") 250 (200)	7.87" (5.91") 200 (150)	5.12" (3.94") 130 (100)	3.94" (3.15") 100 (80)	1.97" (1.57") 50 (40)	1.57" (0.98") 40 (25)
FU-54TZ	Thru-beam	Flat head (with mounting hole) Flat-view	51.18" (39.37") 1300 (1000)	43.31" (33.46") 1100 (850)	24.41" (19.69") 620 (500)	19.69" (15.75") 500 (400)	9.84" (7.87") 250 (200)	6.30" (3.94") 160 (100)
FU-55	Thru-beam	Extra-thin core fiber ø0.10" ø2.5	0.98" (0.79") 25 (20)	0.79" (0.63") 20 (16)	0.59" (0.39") 15 (10)	0.39" (0.28") 10 (7)	0.20" (0.16") 5 (4)	—
FU-56	Thru-beam	Sleeve Top-view	0.98" (0.79") 25 (20)	0.79" (0.63") 20 (16)	0.59" (0.39") 15 (10)	0.39" (0.28") 10 (7)	0.20" (0.16") 5 (4)	—
FU-57TE	Thru-beam	High-Flex Side-view	12.60" (9.84") 320 (250)	9.84" (7.87") 250 (200)	5.51" (4.33") 140 (110)	3.94" (3.15") 100 (80)	1.97" (1.57") 50 (40)	1.18" (0.79") 30 (20)
FU-57TZ	Thru-beam	Flat head (with mounting hole) Side-view	12.99" (9.84") 330 (250)	9.84" (7.87") 250 (200)	5.91" (4.72") 150 (120)	4.33" (3.54") 110 (90)	2.17" (1.77") 55 (45)	1.38" (0.98") 35 (25)
FU-58	Thru-beam	Extra-thin core fiber ø0.04" ø1.0	5.91" (4.72") 150 (120)	5.12" (3.94") 130 (100)	2.56" (1.97") 65 (50)	1.97" (1.57") 50 (40)	1.26" (0.98") 32 (25)	0.79" (0.47") 20 (12)
FU-59	Thru-beam	High-Flex ø0.06" ø1.5	19.69" (14.96") 500 (380)	16.54" (12.99") 420 (330)	10.63" (7.87") 270 (200)	8.66" (6.69") 220 (170)	4.92" (3.94") 125 (100)	2.76" (1.38") 70 (35)
FU-5F	Thru-beam	Standard	90.55" (55.12") 2300 (1400)	62.99" (43.31") 1600 (1100)	39.40" (31.50") 950 (800)	31.50" (23.62") 800 (600)	15.75" (12.60") 400 (320)	8.66" (5.91") 220 (150)
FU-5FZ	Thru-beam	Standard Unbreakable	66.93" (51.18") 1700 (1300)	51.18" (43.31") 1300 (1100)	29.53" (23.62") 750 (600)	23.62" (18.11") 600 (460)	11.81" (9.06") 300 (230)	7.87" (5.51") 200 (140)
FU-61	Reflective	Standard	37.40" (30.71") 950 (780)	35.43" (28.35") 900 (720)	19.69" (15.75") 500 (400)	14.17" (11.02") 360 (280)	7.87" (5.91") 200 (150)	4.72" (3.15") 120 (80)
FU-61Z	Reflective	Standard Unbreakable	26.77" (21.65") 680 (550)	21.65" (17.72") 550 (450)	14.57" (11.02") 370 (280)	9.84" (7.87") 250 (200)	4.92" (3.94") 125 (100)	3.15" (2.36") 80 (60)
FU-63	Reflective	Sleeve Top-view	7.09" (5.91") 180 (150)	5.91" (4.72") 150 (120)	3.35" (2.76") 85 (70)	2.36" (1.97") 60 (50)	1.46" (1.18") 37 (30)	0.94" (0.63") 24 (16)
FU-63T	Reflective	Sleeve Top-view	7.09" (5.91") 180 (150)	5.91" (4.72") 150 (120)	3.35" (2.76") 85 (70)	2.36" (1.97") 60 (50)	1.46" (1.18") 37 (30)	0.94" (0.63") 24 (16)
FU-63Z	Reflective	Sleeve Top-view	5.12" (4.33") 130 (110)	4.33" (3.54") 110 (90)	2.17" (1.77") 55 (45)	1.69" (1.38") 43 (35)	0.98" (0.79") 25 (20)	0.51" (0.31") 13 (8)
FU-65X	Reflective	Sleeve Top-view	1.77" (1.38") 45 (35)	1.38" (1.10") 35 (28)	0.71" (0.55") 18 (14)	0.51" (0.39") 13 (10)	0.31" (0.24") 8 (6)	0.20" (0.16") 5 (4)
FU-66	Reflective	Standard	27.56" (20.87") 700 (530)	20.47" (16.93") 520 (430)	13.78" (9.84") 350 (250)	9.06" (7.09") 230 (180)	4.92" (3.94") 125 (100)	3.15" (2.17") 80 (55)
FU-66TZ	Reflective	Standard Unbreakable	13.78" (11.02") 350 (280)	11.02" (9.06") 280 (230)	5.91" (4.72") 150 (120)	3.94" (3.15") 100 (80)	1.97" (1.57") 50 (40)	1.38" (1.10") 35 (28)
FU-66Z	Reflective	Standard Unbreakable	15.75" (12.60") 400 (320)	12.60" (10.24") 320 (260)	6.30" (5.12") 160 (130)	4.72" (3.54") 120 (90)	2.36" (1.77") 60 (45)	1.57" (1.18") 40 (30)
FU-67	Reflective	Standard Unbreakable	19.69" (15.75") 500 (400)	12.60" (12.60") 400 (320)	8.66" (7.09") 220 (180)	6.69" (5.12") 170 (130)	3.35" (2.56") 85 (65)	1.97" (1.42") 50 (36)
FU-67G	Reflective	Standard ToughFlex	19.69" (15.75") 500 (400)	15.75" (12.60") 400 (320)	8.66" (7.09") 220 (180)	6.69" (5.12") 170 (130)	3.35" (2.56") 85 (65)	1.97" (1.42") 50 (36)
FU-67TG	Reflective	Standard ToughFlex	19.69" (15.75") 500 (400)	15.75" (12.60") 400 (320)	7.87" (6.30") 200 (160)	5.91" (4.72") 150 (120)	2.95" (2.36") 75 (60)	1.77" (1.30") 45 (33)
FU-67TZ	Reflective	Standard Unbreakable	19.69" (15.75") 500 (400)	15.75" (12.60") 400 (320)	7.87" (6.30") 200 (160)	5.91" (4.72") 150 (120)	2.95" (2.36") 75 (60)	1.77" (1.30") 45 (33)
FU-67V	Reflective	Standard Unbreakable	19.69" (15.75") 500 (400)	15.75" (12.60") 400 (320)	8.66" (7.09") 220 (180)	6.69" (5.12") 170 (130)	3.35" (2.56") 85 (65)	1.97" (1.42") 50 (36)
FU-68	Reflective	High-Flex M4	6.30" (5.12") 160 (130)	5.12" (4.33") 130 (110)	2.76" (2.17") 70 (55)	1.97" (1.57") 50 (40)	1.38" (1.10") 35 (28)	0.87" (0.67") 22 (17)
FU-69X	Reflective	High-Flex M3	2.95" (2.36") 75 (60)	2.36" (1.97") 60 (50)	1.26" (0.98") 32 (25)	0.98" (0.79") 25 (20)	0.79" (0.63") 20 (16)	0.51" (0.39") 13 (10)
FU-6F	Reflective	Standard	27.56" (20.87") 700 (530)	20.47" (16.93") 520 (430)	13.78" (9.84") 350 (250)	9.06" (7.09") 230 (180)	4.92" (3.94") 125 (100)	3.15" (2.17") 80 (55)
FU-71	Thru-beam	Standard	102.36" (74.80") 2600 (1900)	78.74" (62.99") 2000 (1600)	53.15" (39.37") 1350 (1000)	39.37" (33.46") 1000 (850)	21.65" (17.72") 550 (450)	12.99" (7.87") 330 (200)
FU-71Z	Thru-beam	Standard Unbreakable	94.49" (66.93") 2400 (1700)	74.80" (51.18") 1900 (1300)	43.31" (35.43") 1100 (900)	35.43" (27.56") 900 (700)	17.72" (13.78") 450 (350)	10.63" (6.30") 270 (160)
FU-73	Thru-beam	Sleeve Top-view	90.55" (55.12") 2300 (1400)	62.99" (43.31") 1600 (1100)	37.40" (31.50") 950 (800)	31.50" (23.62") 800 (600)	15.75" (12.60") 400 (320)	8.66" (5.91") 220 (150)
FU-75F	Thru-beam	Sleeve Top-view	15.75" (11.81") 400 (300)	13.39" (10.24") 340 (260)	7.09" (5.91") 180 (150)	5.91" (4.72") 150 (120)	3.74" (2.95") 95 (75)	1.97" (1.18") 50 (30)

NOTE: Standard target: White matte paper (Reflective type only).

1. Each detecting distance in parentheses shows the data when the S-APC function is ON. S-APC will be always turned ON when the high-resolution or high-speed mode is selected.

2. "141.73" 3600" is assumed as maximum because the fiber cable has the length of 6.6' 2 m.

Model	Type	Features	Detecting distance 1. [Unit: inch/mm]						
			MEGA	ULTRA TURBO	SUPER TURBO	TURBO	FINE	HIGH SPEED	
FU-76F	Thrubeam	Sleeve Top-view	6.30" (5.12") 160 (130)	5.12" (3.94") 130 (100)	2.56" (1.97") 65 (50)	1.97" (1.57") 50 (40)	1.26" (0.98") 32 (25)	0.71" (0.39") 18 (10)	
FU-77	Thrubeam	Standard Unbreakable	66.93" (51.18") 1700 (1300)	51.18" (43.31") 1300 (1100)	29.53" (23.62") 750 (600)	23.62" (18.11") 600 (460)	11.81" (9.06") 300 (230)	7.87" (5.51") 200 (140)	
FU-77G	Thrubeam	Standard Tough Flex	66.93" (51.18") 1700 (1300)	51.18" (43.31") 1300 (1100)	29.53" (23.62") 750 (600)	23.62" (18.11") 600 (460)	11.81" (9.06") 300 (230)	7.87" (5.51") 200 (140)	
FU-77TG	Thrubeam	Standard Tough Flex	55.12" (43.31") 1400 (1100)	43.31" (34.65") 1100 (880)	25.59" (19.69") 650 (500)	19.69" (15.75") 500 (400)	9.84" (7.87") 250 (200)	6.69" (4.33") 170 (110)	
FU-77TZ	Thrubeam	Standard Unbreakable	55.12" (43.31") 1400 (1100)	43.31" (34.65") 1100 (880)	25.59" (19.69") 650 (500)	19.69" (15.75") 500 (400)	9.84" (7.87") 250 (200)	6.69" (4.33") 170 (110)	
FU-77V	Thrubeam	Standard Unbreakable	66.93" (51.18") 1700 (1300)	51.18" (43.31") 1300 (1100)	29.53" (23.62") 750 (600)	23.62" (18.11") 600 (460)	11.81" (9.06") 300 (230)	7.87" (5.51") 200 (140)	
FU-78	Thrubeam	Standard	39.37" (29.53") 1000 (750)	31.50" (23.62") 800 (600)	18.11" (14.57") 460 (370)	14.57" (11.81") 370 (300)	7.48" (5.91") 190 (150)	5.12" (2.95") 130 (75)	
FU-79	Thrubeam	High-Flex M3	19.69" (14.96") 500 (380)	16.54" (12.99") 420 (330)	10.63" (7.87") 270 (200)	8.66" (6.69") 220 (170)	4.92" (3.94") 125 (100)	2.76" (1.38") 70 (35)	
FU-7F	Thrubeam	Standard	90.55" (55.12") 2300 (1400)	62.99" (43.31") 1600 (1100)	37.40" (31.50") 950 (800)	31.50" (23.62") 800 (600)	15.75" (12.60") 400 (320)	8.66" (5.91") 220 (150)	
FU-81C	Reflective	Heat-resistant 662°F (350°C)	15.75" (14.17") 400 (360)	14.17" (11.02") 360 (280)	8.27" (6.69") 210 (170)	5.91" (4.72") 150 (120)	2.95" (2.36") 75 (60)	1.77" (1.38") 45 (35)	
FU-82C	Reflective	Heat-resistant 572°F (300°C)	16.54" (13.39") 420 (340)	16.54" (13.39") 420 (340)	10.24" (8.27") 260 (210)	7.09" (5.51") 180 (140)	3.54" (2.76") 90 (70)	2.17" (1.77") 55 (45)	
FU-83C	Reflective	Heat-resistant 572°F (300°C)	16.54" (13.39") 420 (340)	16.54" (13.39") 420 (340)	10.24" (8.27") 260 (210)	7.09" (5.51") 180 (140)	3.54" (2.76") 90 (70)	2.17" (1.77") 55 (45)	
FU-84C	Thrubeam	Heat-resistant 572°F (300°C)	37.40" (29.53") 950 (750)	29.53" (23.62") 750 (600)	18.11" (14.96") 460 (380)	14.96" (11.81") 380 (300)	7.09" (5.91") 180 (150)	5.12" (2.95") 130 (75)	
FU-85	Reflective	Heat-resistant 221°F (105°C)	26.77" (22.05") 680 (560)	22.05" (17.72") 560 (450)	14.57" (11.81") 370 (300)	9.84" (7.87") 250 (200)	4.72" (3.94") 120 (100)	3.15" (2.36") 80 (60)	
FU-85Z	Reflective	Heat-resistant 212°F (100°C)	18.11" (14.96") 460 (380)	14.96" (11.81") 380 (300)	8.66" (7.09") 220 (180)	6.30" (5.12") 160 (130)	3.15" (2.56") 80 (65)	1.97" (1.57") 50 (40)	
FU-86	Thrubeam	Heat-resistant 221°F (105°C)	90.55" (55.12") 2300 (1400)	62.99" (43.31") 1600 (1100)	37.40" (31.50") 950 (800)	31.50" (23.62") 800 (600)	15.75" (12.60") 400 (320)	8.66" (5.91") 220 (150)	
FU-86Z	Thrubeam	Heat-resistant 212°F (100°C)	55.12" (43.31") 1400 (1100)	43.31" (34.46") 1100 (850)	31.50" (23.62") 800 (600)	21.65" (17.31") 550 (440)	11.81" (9.84") 300 (250)	7.48" (4.33") 190 (110)	
FU-87	Reflective	Heat-resistant 356°F (180°C)	22.44" (18.11") 570 (460)	18.11" (14.17") 460 (360)	10.24" (8.27") 260 (210)	7.09" (5.51") 180 (140)	3.54" (2.76") 90 (70)	2.17" (1.77") 55 (45)	
FU-88	Thrubeam	Heat-resistant 356°F (180°C)	51.18" (39.37") 1300 (1000)	39.37" (31.50") 1000 (800)	24.41" (19.69") 620 (500)	19.69" (15.75") 500 (400)	9.84" (7.87") 250 (200)	7.09" (4.33") 180 (110)	
FU-91	Reflective	Oil-proof, Chemical proof	8.66" (7.09") 220 (180)	8.66" (7.09") 220 (180)	5.31" (4.33") 135 (110)	4.33" (3.35") 110 (85)	2.95" (2.36") 75 (60)	1.77" (1.38") 45 (35)	
FU-92	Thrubeam	Oil-proof, Chemical proof	141.73" (141.73") ² 3600 (3600) ²	141.73" (141.73") ² 3600 (3600) ²	118.11" (94.49") 3000 (2400)	102.36" (78.74") 2600 (2000)	51.18" (39.37") 1300 (1000)	29.53" (15.75") 750 (400)	
FU-93	Reflective	Liquid-level Immersion	Liquid (except for milky white liquids)						—
FU-93Z	Reflective	Liquid-level Immersion	Liquid (except for milky white liquids)						—
FU-95	Reflective	Liquid-level Tube-mountable	Transparent tube of 0.16" to 1.02" 4 to 26 dia.						—
FU-95HA	Reflective	Liquid-level Tube-mountable	Transparent tube of 0.16" to 1.02" 4 to 26 dia.						—
FU-95S	Reflective	Liquid-level Tube-mountable	Transparent tube of 0.16" to 1.02" 4 to 26 dia.						—
FU-95Z	Reflective	Liquid-level Tube-mountable	Transparent tube of 0.16" to 1.02" 4 to 26 dia.						—
FU-96	Thrubeam	Oil-proof, Chemical proof	106.30" (86.61") 2700 (2200)	86.61" (66.93") 2200 (1700)	43.31" (34.65") 1100 (880)	34.65" (27.56") 880 (700)	16.93" (13.78") 430 (350)	9.45" (6.30") 240 (160)	

NOTE: Standard target: White matte paper (Reflective type only).

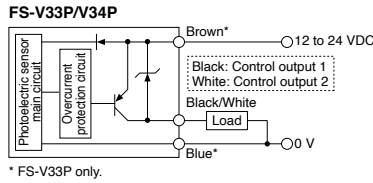
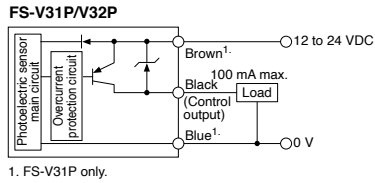
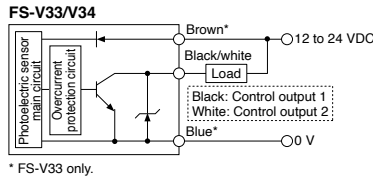
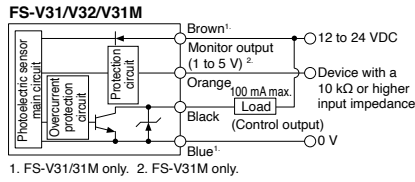
1. Each detecting distance in parentheses shows the data when the S-APC function is ON. S-APC will be always turned ON when the high-resolution or high-speed mode is selected.

2. "141.73" 3600" is assumed as maximum because the fiber cable has the length of 6.6' 2 m.

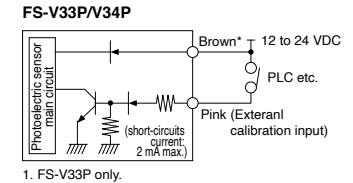
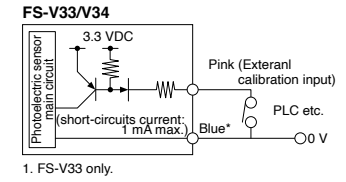
Input/Output Circuits

Cable type

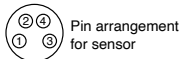
Output circuit



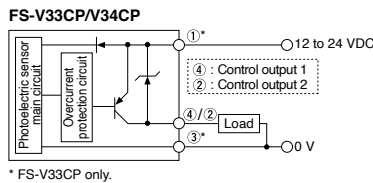
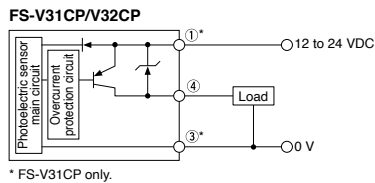
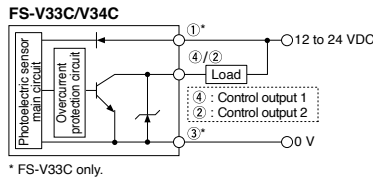
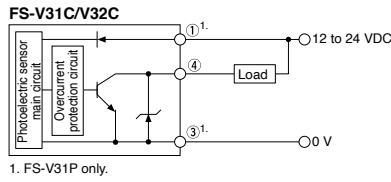
Input circuit



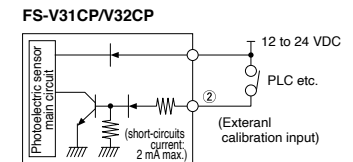
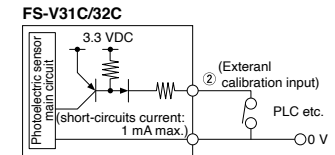
Connector type



Output circuit



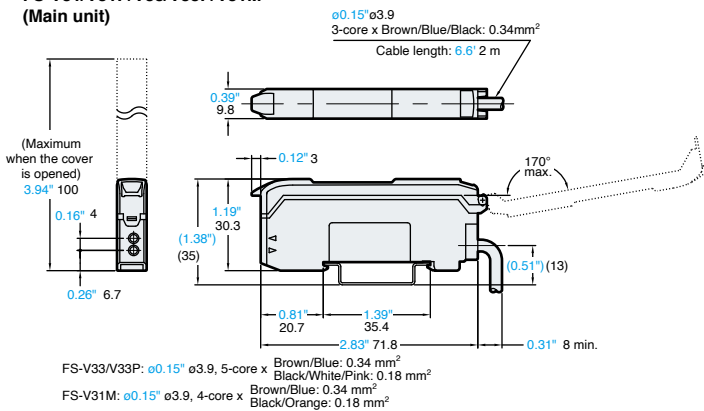
Input circuit



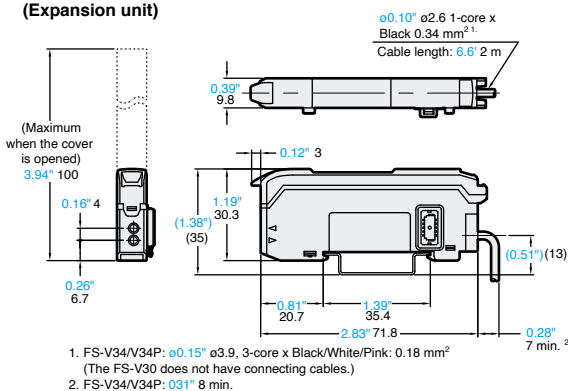
Dimensions

Unit: inch mm

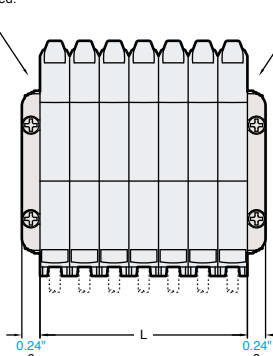
FS-V31/V31P/V33/V33P/V31M (Main unit)



FS-V32/V32P/V34/V34P/V30 (Expansion unit)

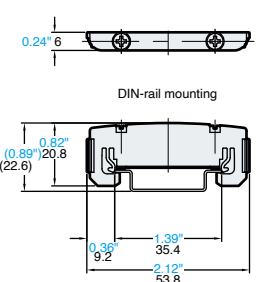


When several units are connected: End unit

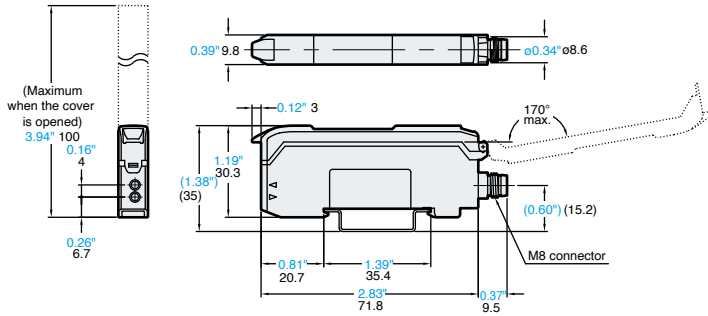


No. of units	L
1	0.77" 19.6
2	1.16" 29.4
3	1.54" 39.2
4	1.93" 49.0
5	2.31" 58.8
6	2.70" 68.6
7	3.09" 78.4
8	3.47" 88.2
9	3.86" 98.0
10	4.24" 107.8
11	4.63" 117.6
12	5.02" 127.4
13	5.40" 137.2
14	5.79" 147.0
15	6.17" 156.8
16	6.56" 166.6

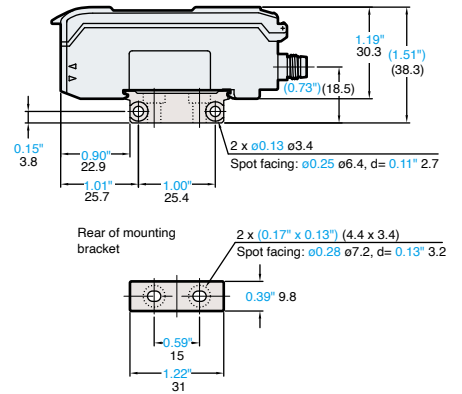
End unit (Optional) OP-26751



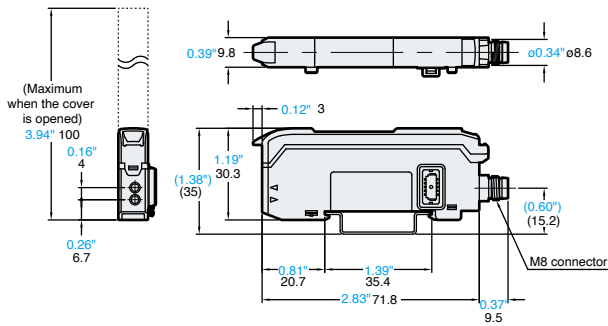
FS-V31C/V31CP/V33C/V33CP (Main unit)



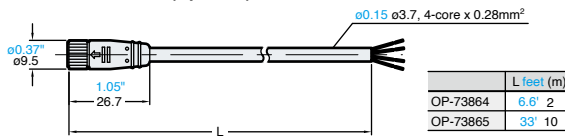
When the mounting bracket (Optional) **OP-73880** is attached:



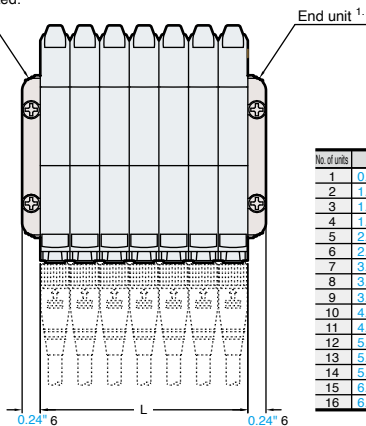
FS-V32C/V32CP/V34C/V34CP (Expansion unit)



M8 connector cable (Optional)

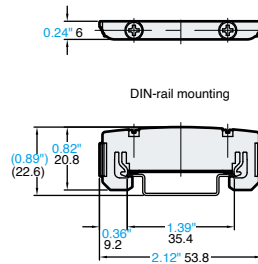


When several units are connected:
End unit



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

End unit (Optional) OP-26751



Specifications

Type		1-output with cable		1-output + 1-input with M8 connector		2-output + 1-input with cable		2-output with M8 connector		Monitor output	0-line
Model	NPN	FS-V31	FS-V32	FS-V31C	FS-V32C	FS-V33	FS-V34	FS-V33C	FS-V34C	FS-V31M	FS-V30
	PNP	FS-V31P	FS-V32P	FS-V31CP	FS-V32CP	FS-V33P	FS-V34P	FS-V33CP	FS-V34CP	–	–
Main unit/Expansion unit		Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit
Control output		1 output		1 output		2 outputs		2 outputs		1 output	N/A
Monitor output (1 to 5 V)		N/A		N/A		N/A		N/A		1 output	N/A
External input		N/A		1 input		1 input		N/A		N/A	N/A
Connector		–		M8		–		M8		–	–
Light source		Red, 4-element LED (Wavelength: 640 nm)									
Response time		33 μs (HIGH SPEED)/250 μs (FINE)/500 μs (TURBO)/1 ms (SUPER TURBO)/4 ms (ULTRA TURBO)/16 ms (MEGA TURBO)									193 μs to 16.7 ms
Output selection		LIGHT-ON/DARK-ON (switch-selectable)									
Display indicator		Operation indicator: Red LED/Dual digital monitor: Dual 7-segment display, Preset Value (4-digit green LED indicator) and Current Value (4-digit red LED indicator) illuminated together. Current Value range: 0 to 64,512; Excess gain: OP to 999P, Hold function: Possible to display both peak and bottom hold values, selectable from 5 variations Bar LED monitor: Excess gain displayed (85% to 115% in 7 steps), Scaling display									
Detection mode		Light intensity (area detection possible, automatic sensitivity-tracking function provided)/ [Limited light intensity/Count check/Abnormality detection] ¹									
Timer function		OFF-delay timer/ON-delay timer/One-shot timer/ON-delay timer + OFF-delay timer/ON-delay timer + One-shot timer, selectable Timer duration selectable: 0.1 ms to 9,999 ms, Maximum error against the setting value: ±10% max.									
Counter function		N/A				65,535 max. count				N/A	
Control output	NPN	NPN open-collector 24 V, 100 mA max. ² (main unit only)/20 mA max. (when the expansion unit(s) is connected), Residual voltage: 1 V max.									
	PNP	PNP open-collector 24 V, 100 mA max. ² (main unit only)/20 mA max. (when the expansion unit(s) is connected), Residual voltage: 1 V max.									
Monitor output (FS-V31M only)		Voltage output: 1 to 5 V ³ , Load resistance: 10 kΩ min., Repeatability: ±0.5% of F.S., Response time: 1 ms									
External input ⁵		Input time: 2 ms (ON)/20 ms (OFF) min.									
Unit expansion		Up to 16 expansion units can be connected (a total of 17 units). Note that the 2-output type should be counted as two units.									
Power supply		12 to 24 VDC (±10%), ripple (p-p): 10% max., Class 2									
Current consumption ⁶	NPN	Normal: 710 mW max. (Using 24 V, 29 mA max., using 12 V, 40 mA max.)/Power saving: 540 mW max. (Using 24 V, 22 mA max., using 12 V, 28 mA max.)									
	PNP	750 mW max. (Using 24 V, 31 mA max., using 12 V, 40 mA max.)/Power saving 580 mW max. (Using 24 V, 24 mA max., using 12 V, 28 mA max.)				830 mW max. (Using 24 V, 35 mA max., using 12 V, 45 mA max.)/Power saving 660 mW max. (Using 24 V, 27 mA max., using 12 V, 32 mA max.)				–	–
Ambient illumination		Incandescent lamp: 20,000 lux max., Sunlight: 30,000 lux max.									
Ambient temperature		-10 to +55°C (14 to 131°F), No condensation ⁴									
Relative humidity		35 to 85%, No condensation									
Vibration resistance		10 to 55 Hz, double amplitude: 1.5 mm 0.06", 2 hours each in the X, Y and Z axis									
Shock resistance		500 m/s ² in X, Y, and Z directions, 3 times respectively									
Housing		Polycarbonate									
Size		30.3 mm (H) x 9.8 mm (W) x 71.8 mm (D) 1.19" (H) x 0.39" (W) x 2.83" (D)									
Weight		Approx. 80 g	Approx. 45 g	Approx. 80 g	Approx. 45 g	Approx. 80 g	Approx. 70 g	Approx. 22 g	Approx. 22 g	Approx. 80 g	Approx. 25 g
Accessory		N/A									

1. Only 2-output type.

2. Total current of two outputs should be less than 100 mA.

3. Output range: 1 to 5 V for the display value 0 to 4,095 at HIGH SPEED/FINE/TURBO mode.

4. 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.

1 to 2 Units: -10 to +55°C (14 to 131°F), 3 to 10 Units: -10 to +50°C (14 to 122°F), 11 to 16 Units: -10 to +45°C (14 to 113°F)

5. Only available on certain models.

6. When using the HIGH SPEED mode, the power consumption increases by 160 mW (7 mA).

Options

Type	Amplifier securing bracket (for main unit)		End unit (for expansion unit)		M8 connector cable (6.6' 2 m) ¹	M8 connector cable (33.0' 10 m) ¹
Model	OP-73880		OP-26751		OP-73864	OP-73865
Shape						

Note: To use the main unit only, use a DIN-rail or purchase the OP-73880 securing bracket. To add expansion units, use a DIN-rail and purchase the OP-26751 end unit, which should be placed at both ends of the connected units.

1. To use the FS-V31C(P)/V32C(P)/V33C(P)/V34C(P), purchase the OP-73864 or the OP-73865.

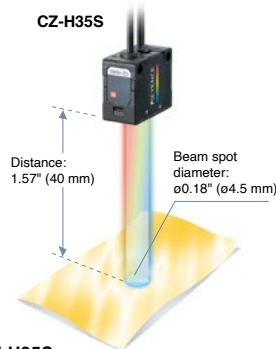
OPTICAL SENSOR LINEUP

SUPER RGB SENSOR



- 4 outputs x 2 ch
- UV Sensorhead available

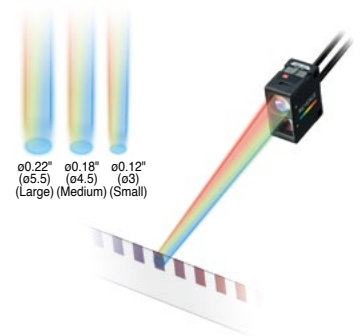
Powerful, RGB Sensor, Transparent Targets, 16 bit Accuracy, Color Differentiation



CZ-H35S Luster-cancel, Reflective Type

Less affected by shape, position, inclination, and surface luster (Patent-pending)

The CZ-H35S maintains accurate detection despite changing target conditions.



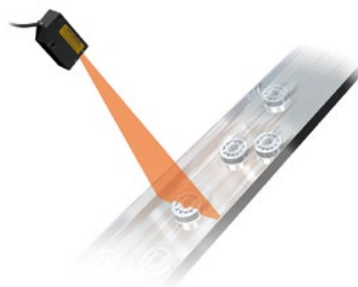
CZ-H32 Adjustable Spot, Reflective Type

Three beam spot sizes can be easily selected by adjusting the slide switch, allowing a wide range of targets to be inspected.

LASER SENSOR (Hi-Power)

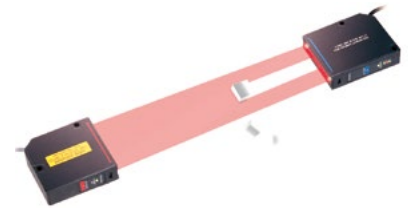


World's Smallest, Long Range, High Accuracy, Fast Response, Two Digital Displays



LV-H42 Series Long Distance Straight-beam, Retro-reflective

- Easy optical axis alignment
- Detection range up to 275.59" (7,000 mm)
- Spot diameter of 0.06" (1.5 mm) at a distance of up to 39.37" (1m)
- High-power mode with 16-bit resolution for high accuracy detection



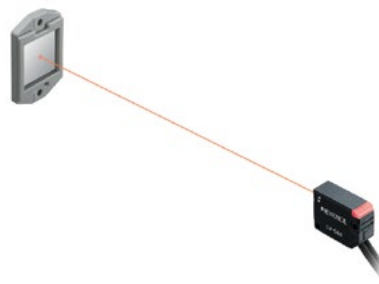
LV-H300/100 Series Wide Area Thru-beam Laser Sensor

- Wide Area Thru-beam Laser Sensor
- World's smallest size
- Linear area beam (Transmitter)
- Light diffusion sheet (Receiver)
- Easy adjustment of beam axis

LASER SENSOR (Compact)



World's Smallest, Long Range, High Accuracy, Fast Response, Two Digital Displays



LV-S61 Series Straight beam, Retro-reflective Laser

- 1/3 the Volume of Conventional Models
- Built in P.R.O. Function
- 0.10" (0.25 mm) Spot Diameter



LV-S41/S41L Series Reflective Laser

- Smallest Diffuse Reflective Red Laser Sensor
- Bright output indicator
- 0.05" (1.2 mm) Spot Diameter
- Side-view model (LV-S41L)

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