



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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**SHORT FORM
SENSORS**



A new performance class of innovative sensor technology

■ The delivery program: Innovative and extensive.

Besides through-beam and retroreflective types, reflective sensors and optical fiber photoelectric sensors, we also offer laser and eddy current analog sensors that provide precise measurement results even in the most complicated of applications. Our delivery program also includes safety sensors, photoelectric sensors for special applications, inductive proximity switches and miniature pressure sensors for relative or differential pressure measurement, and ionizers for Electro Static Discharge applications.







■ Service has priority.

We are constantly striving to optimize our service sector to enable us to react quickly to customer requests. Whether you have specific application requests or you simply want technical information, we are always ready to advise and assist you; you only have to call.

Our current delivery program is assembled for you in this sensor overview. Besides the most important technical data, you will find numerous illustrations of possible applications. Of course, detailed data sheets are available on our homepage www.panasonic-electric-works.com. Our product managers, sales and application engineers will be happy to advise you.



www.panasonic-electric-works.com

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FX-100



FX-100

Excellent price/performance ratio

Features

■ Easy to read

The digital dual-display allows you to check both the threshold value and incident light intensity at the same time, and it also makes the procedures for setting the various values much easier.

■ Multipurpose, M8 connector type

The connectors used are commercially-available M8 connectors, so that processing costs and lead time required for carrying out processing after purchase of the sensors can be greatly reduced.

■ Designed in a 3-layer structure to accommodate basic settings through to advanced settings.

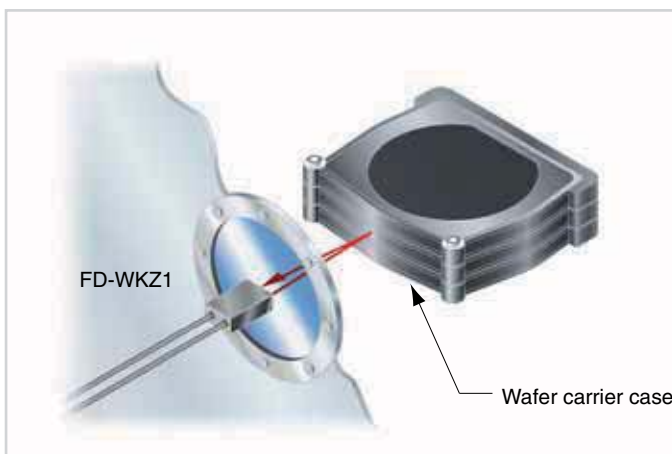
Setting details are divided into three levels for clearer operation, so that setting for normal operation are made in 'RUN mode', basic settings are made in 'SET mode', and advanced functions are set in 'PRO mode'. This makes setting operations much easier to understand and carry out.

Typical Applications

■ Wafer detection

FD-WKZ + FX 10□

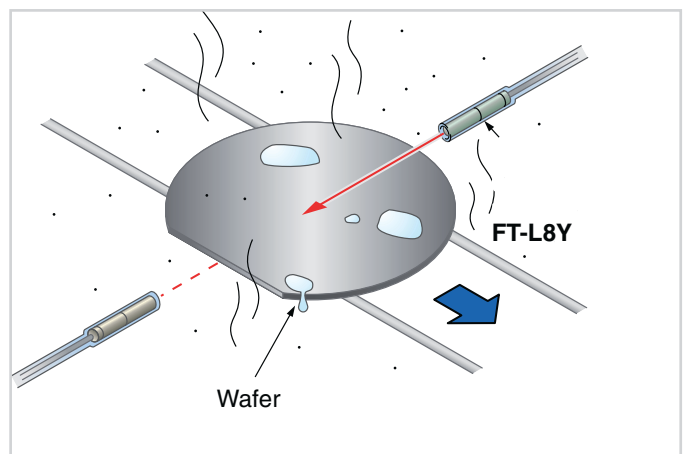
Detects wafer carrier cases through vacuum chamber's view port.



■ Wafer detection

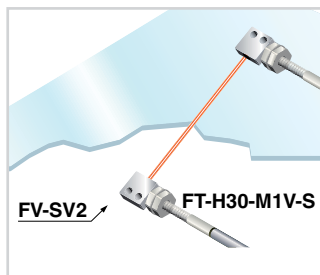
FT-L80Y + FX10□

Sensing possible in corrosive environment. Lenses at the ends of the fiber heads expand the sensing range.



Detection of break / crack of glass

FV-SV2 + FX10□



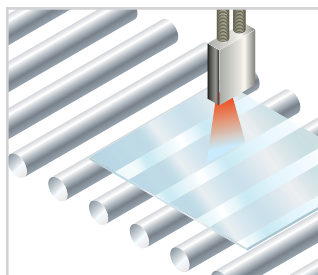
Detection over long ranges

FT-LE1 + FX10□



Detection of glass substrate in vacuum chamber

FD-H30-KZ1V + FX10□



Detection of glass substrate on robot hand

FD-H30-L32V + FX10□



Technical Specifications

Model no.	Type	Standard type		Long sensing range type	
		Connector type	Cable set	Connector type	Cable set
		NPN output	FX-101 (-Z) (Note 2)	FX-101-CC2	FX-102 (-Z) (Note 2)
PNP output	FX-101P (-Z) (Note 2)	FX-101P-CC2	FX-102P (-Z) (Note 2)	FX-102P-CC2	
Supply voltage	12 to 24VDC±10%, Ripple P-P 10% or less				
Power consumption	Normal operation: 720mW or less (Current consumption 30mA or less at 24V supply voltage) ECO mode: 600mW or less (Current consumption 25mA or less at 24V supply voltage)				
Output	<NPN output type> NPN open-collector transistor		<PNP output type> PNP open-collector transistor		
Output operation	Selectable either Light-ON or Dark-ON, at SET mode				
Short-circuit protection	Incorporated				
Response time	Response time 0:	250µs or less	Response time 1:	2.5ms or less	
	Response time 1:	450µs or less	Response time 2:	2.8ms or less	
	Response time 2:	500µs or less	Response time 3:	3.2ms or less	
	Response time 3:	600µs or less	Response time 4:	5.0ms or less	
Sensitivity setting	2-level teaching/Limit teaching/Full-auto teaching				
Digital display	4 digit green + 4 digit red LCD display				
Timer function	ON-delay/OFF-delay timer, switchable either effective or ineffective. [Timer period:1ms, 5ms, 10ms, 20ms, 40ms, 50ms, 100ms, 500ms, 1000ms]				
Interference prevention function	Incorporated Selectable response time method (Note 1) (Functions at response time 1, 2 or 3)		Incorporated Selectable response time method (Note 1) (Functions at response time 1, 2, 3 or 4)		
Ambient temperature	-10 to +55°C (if 4 to 7 units are mounted close together: -10 to +50°C; if 8 to 16 units are mounted close together: -10 to +45°C (no dew condensation or icing allowed); Storage: -20 to +70°C				
Emitting element (modulated)	Red LED (Peak emission wavelength : 632nm)				
Material	Enclosure: polycarbonate; key switch: polycarbonate; fiber lock lever: PBT				
Connecting method	Connector (Note 2)				
Cable extension	Extension up to total 100m is possible with 0.3mm ² , or more, cable.				
Weight	Net weight: 15g approx. Gross weight: 35g approx.	Net weight: 15g approx. Gross weight: 75g approx.	Net weight: 15g approx. Gross weight: 35g approx.	Net weight: 15g approx. Gross weight: 75g approx.	
Accessory	—	CN-14A-C2 (connector attached cable, 2m long): 1pc	—	CN-14A-C2 (connector attached cable, 2m long): 1pc	

Notes: 1) When using the interference prevention function, set the response time for the amplifiers to be covered by the interference prevention function to different response time values. However, the interference prevention function does not operate at response time 0 (factory default setting) for the FX-101(P)(-Z)/FX-101(P)-CC2.
2) Connector attached cable CN-14A-C2 is not attached to the models that have no '-CC2' at the end of the model names.
Make sure to use the optional cable with connector CN-14A-CM.
Model n°s. having the suffix '-Z' are M8 plug-in connector type. Make sure to use the optional M8 plug-in connector cable, UZZ808xx.



FX-301

Enhanced functions and performance but still easy to use

Features

■ FX-301(P) (red LED type) version upgrade

We improved the standard model by enhancing its sensing stability and equipping it with handy functions such as the light-emitting amount selection function.

■ Super short response time of 35 μ s

The FX-301(P)-HS model is the digital type fiber sensor realizing a super short response time of 35 μ s rendering it capable of sensing minute objects moving at high speeds.

■ Stable sensing over long and short periods

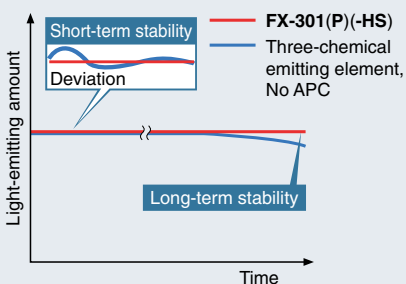
In addition to a light emitting element for fiber optic sensors a new APC (Auto Power Control) circuit has also been adopted. Both support a stable level of light emission over long periods. Because fluctuations over short periods of time have also been suppressed, stable sensing is possible very quickly once the power is turned back on after setup changes.

■ Sensing range has been greatly increased

All models use a *double coupling lens* that enables a much wider sensing range and maximization in the light emission efficiency. Sensing ranges with small diameter fibers and ultra small diameter fibers, which have become very popular due to the miniaturization of chip components, have been increased by 50% over previous values achieved with other amplifiers.



● Stable sensing comparison

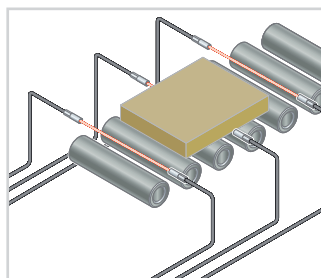


Typical Applications

Red LED type – FX-301(P)(-HS)

Workpiece detection

This standard type of FX-301(P)(-HS) using red light has a four-chemical emitting element for stable sensing over long periods.



Blue LED type – FX-301B(P)

Sensing translucent stickers

The blue LED type greatly reduces the damping rate, making it ideal for delicate sensing.



Green LED type – FX-301G(P)

Sensing register marks

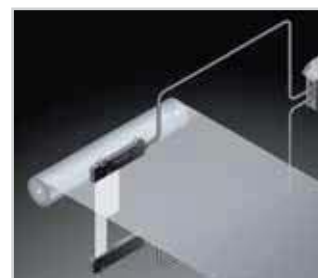
The green LED type greatly reduces the damping rate, making it ideal for delicate sensing.



Infrared LED type – FX-301H(P)

Sensing film meandering

Infrared LED type is ideal for sensing environments with light restrictions, such as places where light-sensitive film is being handled.



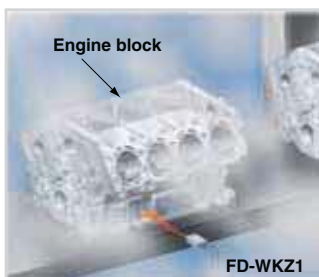
Object sensing during the painting process

Due to a sensing range of 19.5m (FX-301 long range mode) and a 10m fiber length, it can be lead through explosive atmospheres freely.



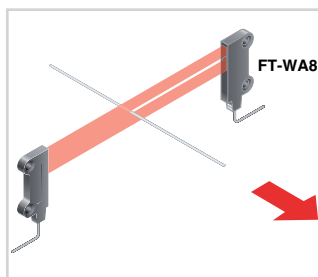
Engine block passage confirmation

FD-WKZ1 has realized a sensing range of 480mm (FX-301 long range mode). In addition, due to its powerful beam, it can even work in adverse environments such as in areas prone to dust.



Wire breakage detection

The blue LED type greatly reduces the damping rate, making it ideal for delicate sensing.



Technical Specifications

Type		Standard type ¹⁾	High speed
Model. no.	NPN output	FX-301□	FX-301-HS
	PNP output	FX-301□P	FX-301P-HS
Sensing range (Red LED type)		Thru-beam type (FT-B8): 1100mm (LONG), 530mm (STD), 400mm (FAST), 200mm (H-SP), 180mm (S-D) Reflective type (FD-B8): 480mm (LONG), 220mm (STD), 160mm (FAST), 85mm (H-SP), 75mm (S-D)	Thru-beam type (FT-B8): 1100mm (LONG), 530mm (STD), 400mm(FAST), 160mm (H-SP), 180mm (S-D) Reflective type (FD-B8): 480mm (LONG), 220mm (STD), 160mm (FAST), 60mm (H-SP), 75mm (S-D)
Supply voltage		12 to 24VDC ±10%	
Output		NPN output type: NPN open-collector transistor PNP output type: PNP open-collector transistor	
Output operation		Selectable either Light-ON or Dark-ON, with jog switch	
Response time		65µs or less [H-SP (Red LED type only)]; 150µs or less (FAST); 250µs or less [STD/S-D] (Red LED type only); 2ms or less (LONG) selectable with jog switch	35µs or less (H-SP); 150µs or less (FAST); 250µs or less (STD/S-D); 2ms or less (LONG) selectable with jog switch

Type		Standard type ¹⁾	High speed
Model. no.	NPN output	FX-301□	FX-301-HS
	PNP output	FX-301□P	FX-301P-HS
Sensitivity setting		2-level teaching/Limit teaching/Manual adjustment/Full-auto teaching	
Digital display		4-digit red LED display	
Automatic interference prevention function		Incorporated [(Up to 4 sets of fiber heads can be mounted close together.) (However, H-SP mode is 2 sets.)]	
Ambient temperature		-10 to +55°C (If 4 to 7 units are connected in cascade: -10 to +50°C, if 8 to 16 units are connected in cascade: -10 to +45°C)	
Emitting element (modulated)		FX-301(P): Red LED, FX-301B(P): Blue LED, FX-301G(P): Green LED, FX-301H(P): Infrared LED	Red LED
Dimensions (W×H×D)		10×30.5×64.5mm	

Note: 1) The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cable given below.

- Main cable (3-core): CN-73-C1 (cable length 1m), CN-73-C2 (cable length 2m), CN-73-C5 (cable length 5m)
- Sub cable (1-core): CN-71-C1 (cable length 1m), CN-71-C2 (cable length 2m), CN-71-C5 (cable length 5m)



FX-311

Remarkably easy to use, yet employs the latest in technology

Features

■ 12-turn potentiometer with visible indicator

12-turn potentiometer has been incorporated for fine adjustments. It enables very fine differences to be detected. Since the potentiometer is illuminated, you can even make adjustments easily in dark areas.

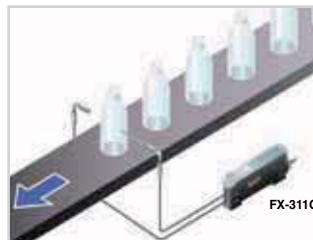
■ Three light source types (red, green, blue) are made available for expanding applications

Rapid blinking 'assist function' eases adjustment for optimum sensitivity.

Typical Applications

Detecting transparent PET bottles

The green LED type is ideal for stably sensing objects such as transparent bottles which yield only small amounts of light fluctuation.



Register mark detection

The blue LED type can accurately sense yellow marks on white backgrounds that are difficult to sense using the red LED type.



Technical Specifications

Model no.	NPN output	FX-311
	PNP output	FX-311P
Supply voltage	12 to 24VDC±10%, Ripple P-P 10% or less	
Power consumption	840mW or less (Current consumption 35mA or less at 24V supply voltage)	
Output	<NPN output type> NPN open-collector transistor (FX-311) <PNP output type> PNP open-collector transistor (FX-311P)	
Output operation	Selectable either Light-ON or Dark-ON, with selection switch	
Short-circuit protection	Incorporated	
Response time	250µs or less (STD / S-D), 2ms or less (LONG) selectable with selection switch	
Operation indicator	Orange LED (lights up when the output is ON)	
Timer function	Incorporated with OFF-delay timer, selectable either effective (approx. 10ms or 40ms) or ineffective	
Automatic interference prevention function	Incorporated (Up to 4 sets of fiber heads can be mounted closely.) (Note 1)	
Ambient temperature	-10 to +55°C (if 4 to 7 units are mounted close together: -10 to +50°C; if 8 to 16 units are mounted close together: -10 to +45°C (no dew condensation or icing allowed); Storage: -20 to +70°C	
Emitting element (modulated)	Red LED	
Material	Enclosure: Heat-resistant ABS, Case cover: Polycarbonate	
Connecting method	Connector (Note 2)	
Cable extension	Extension up to total 100m is possible with 0.3mm ² , or more, cable	
Weight	15g approx.	

Notes: 1) When the power supply is switched on, the emission timing are automatically set for interference prevention.
2) The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cable given below.
Main cable (3-core): CN-73-C1 (cable length 1m), CN-73-C2 (cable length 2m), CN-73-C5 (cable length 5m).
Sub cable (1-core): CN-71-C1 (cable length 1m), CN-71-C2 (cable length 2m), CN-71-C5 (cable length 5m).

40th Anniversary MODEL



New

FX-500

FX-500

The highest performance available

Features

A different stability

When used with the super quality fiber as a set, the incident light intensity variation among units is decreased to only 1/4 of that of conventional models.

High performance

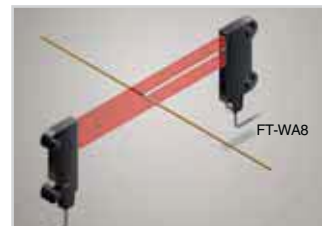
FX-500 with its ultra short response time improves productivity.

HYPER mode incorporated

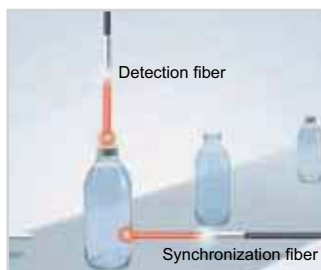
FX-500 in combination with the small diameter fiber can handle challenging detections over a super long sensing range.

A new accuracy!

FX-500 with its accurate detection catches fractional difference in light intensity, fulfilling high precision and low-hysteresis applications.

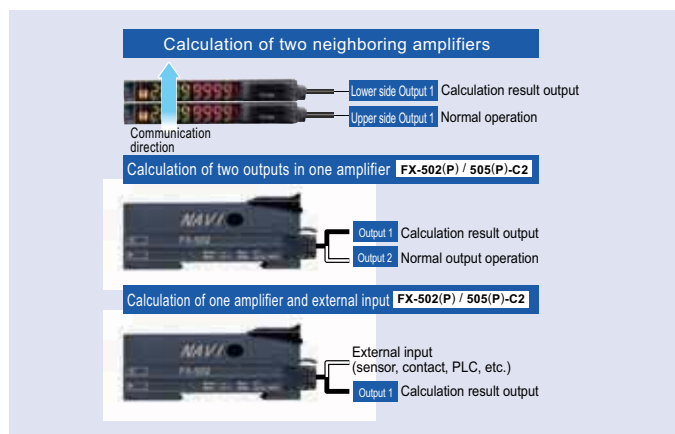


No PLC necessary saving material and programming costs



Logical calculation functions

Three logical calculations (AND, OR, XOR), are selectable using Output 1 of multiple FX-500 series amplifiers. A PLC is not required which helps to reduce material and programming and costs.



Analog output cable type FX505

Edge tracking of film or sheet

Actual position
Drift position

Drifting path can be tracked as the light intensity changes.

FX-500 Technical Specifications

	Standard type	Two outputs type	Analog output type
NPN output PNP output	FX-501 FX-501P	FX-502 FX-502P	FX-505-C2 FX-505P-C2
Type of amplifier	Digital		
Timer function	Adjustable: 0.1ms to 999.9ms in 0.1ms steps, 1 to 9999ms in 1ms steps, 1 to 32s in 1s steps		
Interference prevention function	Auto interference prevention function for up to 12 units or selectable response time method		
Sensing range	Depends on fiber type used		
Response time	25μs/60μs/250μs/2ms/4ms/24ms or less		
Analogue output			4 to 20mA
Output transistor	Max. 100mA		
Emitting element	Red LED (Peak emission wavelength: 650nm)		
Material	Enclosure: ABS; switch TPEE		
Rated current consumption	Normal operation: 40mA or less at 24V supply voltage Eco mode: 30mA or less at 24V supply voltage		
Protection	IP40		
Physical size (HxWxL)	34x10x75mm		
Connection method	Connector attached cable (note)		cable, 2m
Operating voltage	12-24V DC (±10%)		
Usable ambient temp.	-10°C to +55°C		
Weight approx.	70g		100g

Note: The cable for amplifier connection is not supplied as an accessor. Make sure to use the optional quick-connection cable given below.

For FX-501(P)

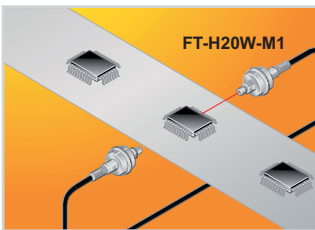
Main cable (3-core): CN-73-C1 (1m), CN-73-C2 (2m), CN-73-C5 (5m)
Sub cable (1-core): CN-71-C1 (1m), CN-71-C2 (2m), CN-71-C5 (5m)

For FX-502(P)

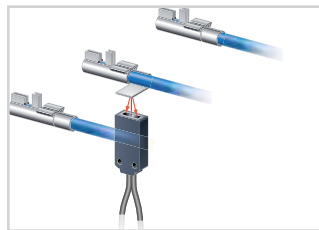
Main cable (4-core): CN-74-C1 (1m), CN-74-C2 (2m), CN-74-C5 (5m)
Sub cable (2-core): CN-72-C1 (1m), CN-72-C2 (2m), CN-72-C5 (5m)

Typical Applications

Counting of IC pins



Check crimping



Detection of glass substrate



■ A quality that surpassed standard fiber

Stable emission intensity ±10%

Variation in emission intensity of the fiber core is controlled down to less than ±10%, achieving a stable detection.



Integrated high-precision plug

The centering precision of the fiber core attached to the inserting plug is doubled. As the insertion precision is increased, the variation among units can be greatly suppressed.



More flexible!

Bending radius = R4mm
[Previous was R25mm]



More bendable!

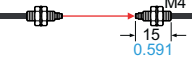
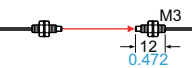
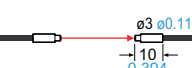

Bending durability = 10 million times
[Previous was 1,000 times]



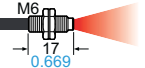
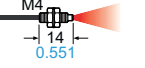
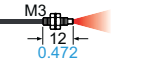
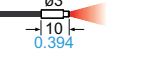
■ Super Quality Fibers

LIST OF SUPER QUALITY FIBERS

Thru-beam type (one pair set)

Type	Shape of fiber head (mm in)	Sensing range (mm in)			U-LG LONG FAST	Beam axis dia. (mm in)	Fiber cable length	Bending radius	Ambient temperature	Model No.	
		■ : HYPR	■ : STD	■ : H-SP							
Threaded	M4		3,600 (Note) 141.732	1,200 47.244	190 7.480	U-LG: 2,200 86.614 LONG: 1,700 66.929 FAST: 530 20.866	ø1 ø0.039	2 m 6.562 ft	R4 mm R0.157 in Allowable bending radius	-55 to +80 °C -67 to +176 °F	FT-40
	M3		1,350 53.150	400 15.748	75 2.953	U-LG: 810 31.890 LONG: 650 25.591 FAST: 210 8.268	ø0.5 ø0.020				FT-30
Cylindrical	ø3 ø0.118		3,600 (Note) 141.732	1,200 47.244	190 7.480	U-LG: 2,200 86.614 LONG: 1,700 66.929 FAST: 530 20.866	ø1 ø0.039				FT-S30
	ø1.5 ø0.059		1,350 53.150	400 15.748	75 2.953	U-LG: 810 31.890 LONG: 650 25.591 FAST: 210 8.268	ø0.5 ø0.020				FT-S20

Reflective type

Type	Shape of fiber head (mm in)	Sensing range (mm in)			U-LG LONG FAST	Fiber cable length	Bending radius	Ambient temperature	Model No.	
		■ : HYPR	■ : STD	■ : H-SP						
Threaded	M6		1,550 61.024	520 20.472	90 3.543	U-LG: 900 35.433 LONG: 740 29.134 FAST: 260 10.236	2 m 6.562 ft	R4 mm R0.157 in Allowable bending radius	-55 to +80 °C -67 to +176 °F	FD-60
	M4		600 23.622	160 6.299	25 0.984	U-LG: 330 12.992 LONG: 250 9.843 FAST: 80 3.150				FD-40
	M3		600 23.622	160 6.299	25 0.984	U-LG: 330 12.992 LONG: 250 9.843 FAST: 80 3.150				FD-30
Cylindrical	ø3 ø0.118		600 23.622	160 6.299	25 0.984	U-LG: 330 12.992 LONG: 250 9.843 FAST: 80 3.150				FD-S30

SUPER QUALITY FIBER SPECIFICATIONS

Type		Thru-beam type	Reflective type
Item	Model No.	FT-40, FT-30, FT-S30, FT-S20	FD-60, FD-40, FD-30, FD-S30
Variation of fiber head		Within ±10 %	
Beam axis precision		Beam axis position: Within ±150 μm, Inclination of beam axis: Within ±2 °	Beam axis position: Within ±150 μm, Inclination of beam axis: Within ±3 °
Allowable bending radius		R4 mm R0.157 in or more	
Bending durability		10 million times or more	
Ambient temperature		-55 to +80 °C -67 to +176 °F (No dew condensation or icing allowed), Storage: -55 to +80 °C -67 to +176 °F	
Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH	
Material	Fiber core	Acrylic	
	Sheath	Polyethylene	
	Fiber head	Stainless steel (SUS303)	
	Plug	ABS	
Accessories		All fibers: FX-AT2 (fiber attachment) 1 pc. Threaded head fibers: Nuts 2 pcs. (Thru-beam type: 4 pcs.) and toothed lock washer 1 pc. (Thru-beam type: 2 pcs.)	

Fiber Optic Sensors

FX-500

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Thru-beam type (one pair set)



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Beam axis dia. (mm in)	Fiber cable length ✂️: Free-cut	Bending radius	Ambient temperature	Model No.
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST					
Threaded type	Lens mountable (FX-LE1/LE2/SV1) 	3,600 141.732	U-LG : 2,400 94.488	Fiber cable length ✂️: Free-cut R25 mm R0.984 in Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in 2 m 6.562 ft	R25 mm R0.984 in R1 mm R0.039 in R4 mm R0.157 in Flexible R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F	FT-B8 FT-FM2 FT-FM2S FT-FM2S4	
	Metal-free	1,250 49.213	LONG : 2,100 82.677					
	Lens mountable (FX-LE1/LE2/SV1)	180 7.087	FAST : 570 22.441					
	Sleeve 90 mm 3.543 in	3,300 129.921	U-LG : 2,000 78.740					
	Sleeve 40 mm 1.575 in	150 5.906	LONG : 1,550 61.024					
	Lens mountable (FX-LE1/LE2/SV1)	790 31.102	FAST : 445 17.520					
	Lens mountable (FX-LE1/LE2/SV1)	3,300 129.921	U-LG : 1,800 70.866					
	Lens mountable (FX-LE1/LE2/SV1)	810 31.890	LONG : 1,400 55.118					
	Lens mountable (FX-LE1/LE2/SV1)	1,600 62.992	FAST : 420 16.535					
	Lens mountable (FX-LE1/LE2/SV1)	880 34.646	U-LG : 2,000 78.740					
Square head type	Tough flexible	160 6.299	LONG : 1,500 59.055	1 m 3.281 ft 2 m 6.562 ft	R1 mm R0.039 in R4 mm R0.157 in Flexible R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FT-W8 FT-P80 FT-P81X	
	Lens mountable (FX-LE1/LE2/SV1)	160 6.299	FAST : 470 18.504					
	Lens mountable (FX-LE1/LE2/SV1)	1,200 47.244	U-LG : 640 25.197					
	Lens mountable (FX-LE1/LE2/SV1)	350 13.780	LONG : 560 22.047					
	Lens mountable (FX-LE1/LE2/SV1)	60 2.362	FAST : 210 8.268					
	Lens mountable (FX-LE1/LE2/SV1)	2,600 102.362	U-LG : 1,300 51.181					
	Lens mountable (FX-LE1/LE2/SV1)	660 25.984	LONG : 1,100 43.307					
	Lens mountable (FX-LE1/LE2/SV1)	130 5.118	FAST : 410 16.142					
	Lens mountable (FX-LE1/LE2/SV1)	3,600 141.732	U-LG : 3,600 141.732					
	Lens mountable (FX-LE1/LE2/SV1)	2,200 86.614	LONG : 3,300 129.921					
Elbow	With lens	470 18.504	FAST : 1,300 51.181	2 m 6.562 ft	R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F	FT-WR80 FT-WR80L	
	Lens mountable (FX-LE1/LE2)	3,500 137.795	U-LG : 1,750 68.898					
M3	Lens mountable (FX-LE1/LE2)	780 30.709	LONG : 1,100 43.307	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-R80	
	Lens mountable (FX-LE1/SV1)	140 5.512	FAST : 450 17.717					
	Lens mountable (FX-LE1/SV1)	3,300 129.921	U-LG : 2,000 78.740					
M3	Lens mountable (FX-LE1/SV1)	1,100 43.307	LONG : 1,550 61.024	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-T80 FT-NFM2	
	Lens mountable (FX-LE1/SV1)	150 5.906	FAST : 445 17.520					
	Lens mountable (FX-LE1/SV1)	1,220 48.031	U-LG : 740 29.134	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-T80 FT-NFM2	
	Lens mountable (FX-LE1/SV1)	310 12.205	LONG : 545 21.457					
	Lens mountable (FX-LE1/SV1)	63 2.480	FAST : 192 7.559					

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Thru-beam type (one pair set)



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Beam axis dia. (mm in)	Fiber cable length	Bending radius	Ambient temperature	Model No.
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST					
Threaded type	Sleeve 90 mm 3.543 in 	1,220 48.031 310 12.205	U-LG : 740 29.134 LONG : 545 21.457 FAST : 192 7.559	\varnothing 0.5 \varnothing 0.020	 2 m	Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F	FT-NFM2S
		63 2.480	U-LG : 590 23.228 LONG : 440 17.323 FAST : 150 5.906					FT-NFM2S4
	Sleeve 40 mm 1.575 in 	960 37.795 250 9.843 53 2.087	U-LG : 590 23.228 LONG : 440 17.323 FAST : 150 5.906	\varnothing 0.6 \varnothing 0.024	 2 m	R1 mm R0.039 in R4 mm R0.157 in Flexible	-40 to +60 °C -40 to +140 °F -40 to +70 °C -40 to +158 °F	FT-W4
		160 6.299 30 1.181	U-LG : 360 14.173 LONG : 270 10.630 FAST : 95 3.740					FT-P40
Long sensing range	With lens 	19,600 771.652 19,600 771.652 4,000 157.480	U-LG : 19,600 771.652 LONG : 19,600 771.652 FAST : 13,000 511.810	\varnothing 10 \varnothing 0.394	 10 m 32.808 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-FM10L
Cylindrical type	With lens • Long sensing range 	3,600 141.732 3,300 129.921 640 25.197	U-LG : 3,600 141.732 LONG : 3,500 137.795 FAST : 1,700 66.929	\varnothing 2 \varnothing 0.079	 2 m 6.562 ft	R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F	FT-WS8L
		3,300 129.921 790 31.102 150 5.906	U-LG : 1,900 74.803 LONG : 1,400 55.118 FAST : 460 18.110					FT-WS3
	With lens • Long sensing range 	3,600 141.732 2,600 102.362 440 17.323	U-LG : 3,600 141.732 LONG : 3,500 137.795 FAST : 1,400 55.118	\varnothing 2 \varnothing 0.079	 2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-SFM2L
		3,300 129.921 1,100 43.307 150 5.906	U-LG : 2,000 78.740 LONG : 1,550 61.024 FAST : 445 17.520					FT-SFM2
		3,300 129.921 790 31.102 140 5.512	U-LG : 1,800 70.866 LONG : 1,400 55.118 FAST : 420 16.535					FT-WS8
	With lens • Long sensing range 	1,220 48.031 310 12.205 63 2.480	U-LG : 740 29.134 LONG : 545 21.457 FAST : 192 7.559	\varnothing 0.5 \varnothing 0.020	 2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-SNFM2
		960 37.795 250 9.843 53 2.087	U-LG : 590 23.228 LONG : 440 17.323 FAST : 150 5.906					FT-WS4
		1,200 47.244 330 12.992 70 2.756	U-LG : 770 30.315 LONG : 570 22.441 FAST : 200 7.874					FT-P2
		350 13.780 90 3.543 19 0.748	U-LG : 210 8.268 LONG : 160 6.299 FAST : 60 2.362					FT-PS1

Fiber Optic Sensors

FX-500

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Thru-beam type (one pair set)



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Beam axis dia. (mm in)	Fiber cable length ✂️: Free-cut	Bending radius	Ambient temperature	Model No.		
		■: HYPR ■: STD ■: H-SP	U-LG LONG FAST							
Cylindrical type Side-view		3,600 141.732	3,600 141.732	U-LG: 3,600 LONG: 3,600 FAST: 2,400	ø2.5 ø0.098	2 m 6.562 ft	-40 to +60 °C -40 to +140 °F	FT-V10		
		2,200 86.614	570 22.441	U-LG: 1,300 LONG: 1,000 FAST: 360	ø1.1 ø0.043	R25 mm R0.984 in	-20 to +70 °C -4 to +158 °F	FT-SFM2SV2		
		1,200 47.244	300 11.811	U-LG: 600 LONG: 490 FAST: 200	ø0.8 ø0.031	1 m 3.281 ft	-20 to +60 °C -4 to +140 °F	FT-V22		
		790 31.102	200 7.874	U-LG: 450 LONG: 360 FAST: 130	ø0.55 ø0.022	2 m 6.562 ft	-40 to +60 °C -40 to +140 °F	FT-V41		
		380 14.961	100 3.937	U-LG: 220 LONG: 170 FAST: 60	ø0.5 ø0.020	R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F	FT-WV42		
Rectangular Compact	Easy mounting • Top sensing W3 × H8 × D12 W0.118 × H0.315 × D0.472	3,600 141.732	3,300 129.921	U-LG: 3,600 LONG: 3,500 FAST: 1,800	2.2 × 3 0.087 × 0.118	2 m 6.562 ft	-40 to +60 °C -40 to +140 °F	FT-WZ8H		
		3,600 141.732	2,100 82.677	U-LG: 3,600 LONG: 3,300 FAST: 1,300				R4 mm R0.157 in Flexible	FT-Z8H	
	Easy mounting • Side sensing W3 × H12 × D8 W0.118 × H0.472 × D0.315	3,600 141.732	3,400 133.858	U-LG: 3,600 LONG: 3,600 FAST: 1,850				R1 mm R0.039 in	FT-WZ8E	
		3,600 141.732	2,000 78.740	U-LG: 3,600 LONG: 3,300 FAST: 1,300				R4 mm R0.157 in Flexible	FT-Z8E	
	Easy mounting • Front sensing W8.5 × H12 × D3 W0.335 × H0.472 × D0.118	3,600 141.732	1,300 51.181	U-LG: 3,100 LONG: 2,300 FAST: 830				R1 mm R0.039 in	FT-WZ8	
		3,600 141.732	1,200 47.244	U-LG: 2,700 LONG: 2,100 FAST: 750				R4 mm R0.157 in Flexible	FT-Z8	
	Front sensing W10 × H7 × D2 W0.394 × H0.276 × D0.079	1,600 62.992	530 20.866	U-LG: 1,100 LONG: 900 FAST: 330				ø1.5 ø0.059	1 m 3.281 ft	FT-WZ4
	Fiber bending type W2 × H10 × D10 W0.079 × H0.394 × D0.394	800 31.496	210 8.268	U-LG: 460 LONG: 370 FAST: 130				ø0.5 ø0.020	R1 mm R0.039 in	FT-WZ4HB
	Front sensing W14 × H7 × D3.5 W0.551 × H0.276 × D0.138	3,500 137.795	1,400 55.118	U-LG: 3,300 LONG: 2,300 FAST: 890				ø1.5 ø0.059	2 m 6.562 ft	FT-WZ7
	Fiber bending type W3.5 × H14 × D11 W0.138 × H0.551 × D0.433	3,500 137.795	790 31.102	U-LG: 1,700 LONG: 1,300 FAST: 490				ø1 ø0.039	2 m 6.562 ft	FT-WZ7HB

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Thru-beam type (one pair set)



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Beam axis dia. (mm in)	Fiber cable length Free-cut	Bending radius	Ambient temperature	Model No.
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST					
Narrow beam		3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 2,700	ø2.2 ø0.087		R25 mm R0.984 in		FT-K8
	Side-view type with small light dispersion 	3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 2,400	ø2.5 ø0.098	2 m 6.562 ft	R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F	FT-WKV8
		3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 2,700			R25 mm R0.984 in		FT-KV8
		2,400 94.488	U-LG : 1,100 LONG : 850 FAST : 430	ø1 ø0.039		R10 mm R0.394 in		FT-KV1
Wide beam	Wide area sensing 	3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 3,300	3.2 x 3.2 0.126 x 1.260		R1 mm R0.039 in	-40 to +55 °C -40 to +131 °F	FT-WA30
	Wide area sensing 	3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 3,300		2 m 6.562 ft	R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FT-A30
	Wide area sensing 	3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 3,300	2.2 x 1.1 0.087 x 0.433		R1 mm R0.039 in	-40 to +55 °C -40 to +131 °F	FT-WA8
Special	Wide area sensing 	3,600 141.732	U-LG : 3,600 LONG : 3,600 FAST : 3,300			R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F	FT-A8
	Top sensing 	3,500 137.795	U-LG : 2,000 LONG : 1,500 FAST : 490	0.265 x 5.5 0.010 x 0.217	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FT-AFM2
Array	Side sensing 	860 33.858	FAST : 490					FT-AFM2E
	Side sensing 	160 6.299						
Heat-resistant	350 °C 662 °F Lens mountable (FX-LE1/LE2/SV1) 	1,200 47.244	U-LG : 880 LONG : 670 FAST : 250	ø1.2 ø0.047	2 m 6.562 ft	R25 mm R0.984 in	-60 to +350 °C -76 to +662 °F	FT-H35-M2
	350 °C 662 °F Sleeve 60 mm 2.362 in 	430 16.929	FAST : 250			Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in		FT-H35-M2S6
	Allows flexible wiring 200 °C 392 °F Lens mountable (FX-LE1/LE2/SV1) 	1,600 62.992	U-LG : 1,000 LONG : 840 FAST : 300	ø0.8 ø0.031	1 m 3.281 ft	R10 mm R0.394 in	-60 to +200 °C	FT-H20W-M1
	200 °C 392 °F Lens mountable (FX-LE1/LE2/SV1) 	470 18.504	FAST : 300					
	200 °C 392 °F Lens mountable (FX-LE1/LE2/SV1) 	1,600 62.992	U-LG : 1,300 LONG : 960 FAST : 330	ø1.2 ø0.047		R25 mm R0.984 in	-76 to +392 °F	FT-H20-M1
Heat-resistant	130 °C 266 °F Lens mountable (FX-LE2 only) 	540 21.260	FAST : 330					
	130 °C 266 °F Lens mountable (FX-LE2 only) 	3,300 129.921	U-LG : 1,900 LONG : 1,300 FAST : 410	ø1.5 ø0.059	2 m 6.562 ft		-60 to +130 °C -76 to +266 °F	FT-H13-FM2

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Thru-beam type (one pair set)



Type	Shape of fiber head (mm in)	Sensing range (mm in)			U-LG LONG FAST	Beam axis dia. (mm in)	Fiber cable length : Free-cut	Bending radius	Ambient temperature	Model No.
		■ : HYPR	■ : STD	■ : H-SP						
Heat-resistant • Joint	Lens mountable (FX-LE1/LE2/SV1) 	■ 1,600 62.992	■ 470 18.504	■ 90 3.543	U-LG : 1,000 39.370 LONG : 790 31.102 FAST : 300 11.811	ø1.2 ø0.047	200 mm 7.874 in	Heat-resistant fiber R18 mm R0.709 in	-60 to +200 °C -76 to +392 °F	FT-H20-J20-S
		300 mm 11.811 in	FT-H20-J30-S							
		500 mm 19.685 in	FT-H20-J50-S							
	Side-view 	■ 2,100 82.677	■ 600 23.622	■ 120 4.724	U-LG : 1,300 51.181 LONG : 980 38.583 FAST : 390 15.354		500 mm 19.685 in			FT-H20-VJ50-S
		800 mm 31.496 in	FT-H20-VJ80-S							
Special	Easy mounting • Rectangular head SEMI S2 compliant W7 × H15 × D13 W0.276 × H0.591 × D0.512 	■ 3,600 141.732	■ 3,100 122.047	■ 470 18.504	U-LG : 3,600 141.732 LONG : 3,600 141.732 FAST : 1,900 74.803	ø3.7 ø0.146	2 m 6.562 ft	R25 mm R0.984 in	0 to +60 °C 32 to +140 °F	FT-Z802Y
		Chemical-resistant 115 °C 239 °F 	■ 3,600 141.732	■ 3,600 141.732	■ 740 29.134		U-LG : 3,600 141.732 LONG : 3,600 141.732 FAST : 2,300 90.551	2 m 6.562 ft	R30 mm R1.181 in	-40 to +115 °C -40 to +239 °F
	■ 3,600 141.732		■ 3,600 141.732	■ 920 36.220	U-LG : 3,600 141.732 LONG : 3,600 141.732 FAST : 2,800 110.236		FT-L80Y			
	Side-view 		■ 3,600 141.732	■ 1,300 51.181	■ 240 9.449		U-LG : 2,800 110.236 LONG : 2,200 86.614 FAST : 800 31.496		ø2.8 ø0.110	-40 to +70 °C -40 to +158 °F
	Vacuum-resistant 300 °C 572 °F Lens mountable (FV-LE1/SV2 only) 	■ 1,000 39.370	■ 270 10.630	■ 55 2.165	U-LG : 590 23.228 LONG : 470 18.504 FAST : 160 6.299		ø1.2 ø0.047	1 m 3.281 ft	R18 mm R0.709 in	-30 to +300 °C -22 to +572 °F

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Retroreflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Fiber cable length ✂ : Free-cut 2 m 6.562 ft	Bending radius R1 mm R0.039 in	Ambient temperature -25 to +55 °C -13 to +131 °F	Model No.
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST				
Sharp bending With polarizing filters			U-LG : 100 to 1,400 3.937 to 74.803 LONG : 100 to 1,200 3.937 to 47.244 FAST : 100 to 780 3.937 to 30.709		R1 mm R0.039 in	-25 to +55 °C -13 to +131 °F	FR-WKZ11
Narrow beam	Top sensing 		U-LG : 200 7.874 LONG : 200 7.874 FAST : 200 7.874		R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FR-KZ21
	Side sensing 		U-LG : 200 7.874 LONG : 200 7.874 FAST : 200 7.874				FR-KZ21E
Water mapping			U-LG : 20 to 460 0.787 to 18.110 LONG : 20 to 410 0.787 to 16.142 FAST : 20 to 220 0.787 to 8.661		R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FR-KV1

Fiber Optic Sensors

FX-500

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Reflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in)			U-LG LONG FAST	Fiber cable length ✂ : Free-cut	Bending radius	Ambient temperature	Model No.		
		■ : HYPR	■ : STD	■ : H-SP							
Threaded type	M6		1,450 57.087	490 19.291	100 3.937	U-LG : 960 LONG : 860 FAST : 330 12.992	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FD-B8		
		Metal-free • Coaxial	1,000 39.370	420 16.535	60 2.362	U-LG : 680 LONG : 600 FAST : 200 7.874			FD-G60		
		Coaxial	1,400 55.118	420 16.535	60 2.362	U-LG : 800 LONG : 650 FAST : 200 7.874			FD-FM2		
		Sleeve 90 mm 3.543 in	1,100 43.307	380 14.961	70 2.756	U-LG : 700 LONG : 540 FAST : 220 8.661			✂ 2 m 6.562 ft	Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	FD-FM2S
		Sleeve 40 mm 1.575 in	870 34.252	250 9.843	45 1.772	U-LG : 560 LONG : 420 FAST : 140 5.512			R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F	FD-W8
			820 32.283	280 11.024	55 2.165	U-LG : 610 LONG : 480 FAST : 160 6.299					R4 mm R0.157 in Flexible
	Elbow	Tough flexible	450 17.717	270 10.630	50 1.969	U-LG : 370 LONG : 330 FAST : 160 6.299	1 m 3.281 ft	R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F	FD-P81X	
			890 35.039	220 8.661	40 1.575	U-LG : 500 LONG : 370 FAST : 130 5.118	✂ 2 m 6.562 ft	R25 mm R0.984 in		FD-R80	
	M4		1,100 43.307	380 14.961	70 2.756	U-LG : 700 LONG : 540 FAST : 220 8.661	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FD-T80		
			510 20.079	120 4.724	22 0.866	U-LG : 280 LONG : 215 FAST : 70 2.756			✂ 2 m 6.562 ft	Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	FD-NFM2
		Sleeve 90 mm 3.543 in	1,100 43.307	380 14.961	70 2.756	U-LG : 700 LONG : 540 FAST : 220 8.661					FD-NFM2S
		Sleeve 40 mm 1.575 in	330 12.992	80 3.150	12 0.472	U-LG : 180 LONG : 140 FAST : 45 1.772			R1 mm R0.039 in Sleeve R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FD-NFM2S4
		Sleeve 40 mm 1.575 in	870 34.252	250 9.843	45 1.772	U-LG : 560 LONG : 420 FAST : 140 5.512					R1 mm R0.039 in
			870 34.252	250 9.843	45 1.772	U-LG : 560 LONG : 420 FAST : 140 5.512			R1 mm R0.039 in		FD-WT8

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Reflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in) (Note 1)		Fiber cable length	Bending radius	Ambient temperature	Model No.								
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST												
M4	Minute objects can be detected due to the small spot beam. Coaxial • Lens mountable (FX-MR1/MR2/MR3/MR5/MR6)	590 23.228	U-LG : 340 LONG : 13.386 FAST : 11.024	Free-cut	R2 mm R0.079 in	-40 to +60 °C -40 to +140 °F	FD-WG4								
		150 5.906	U-LG : 330 LONG : 12.992 FAST : 10.630												
		25 0.984	U-LG : 270 LONG : 10.630 FAST : 80												
			U-LG : 80 LONG : 3.150												
M4	Metal-free • Coaxial	550 21.654	U-LG : 330 LONG : 12.992 FAST : 10.630	2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FD-G4								
		140 5.512	U-LG : 270 LONG : 10.630 FAST : 80												
		27 1.063	U-LG : 80 LONG : 3.150												
			U-LG : 3.150												
M4		490 19.291	U-LG : 250 LONG : 9.843 FAST : 7.480	Free-cut	R4 mm R0.157 in Flexible	-40 to +60 °C -40 to +140 °F	FD-P60								
		120 4.724	U-LG : 190 LONG : 7.480 FAST : 2.953												
		22 0.866	U-LG : 75 LONG : 2.953												
			U-LG : 2.953												
Threaded type	Small diameter	510 20.079	U-LG : 280 LONG : 11.024 FAST : 8.465	Free-cut	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FD-T40								
		120 4.724	U-LG : 215 LONG : 8.465 FAST : 70												
		22 0.866	U-LG : 70 LONG : 2.756												
			U-LG : 2.756												
		330 12.992	U-LG : 180 LONG : 7.087 FAST : 5.512												
		80 3.150	U-LG : 140 LONG : 5.512 FAST : 45												
		12 0.472	U-LG : 45 LONG : 1.772 FAST : 1.772												
			U-LG : 1.772												
		190 7.480	U-LG : 100 LONG : 3.937 FAST : 3.346												
		45 1.772	U-LG : 85 LONG : 3.346 FAST : 20												
		7 0.276	U-LG : 20 LONG : 0.787 FAST : 0.787												
			U-LG : 0.787												
	M3	Lens mountable (FX-MR3, FX-MR6) Coaxial	550 21.654					U-LG : 330 LONG : 12.992 FAST : 10.630	2 m 6.562 ft	R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F	FD-G6			
		140 5.512	U-LG : 270 LONG : 10.630 FAST : 80												
		27 1.063	U-LG : 80 LONG : 3.150												
			U-LG : 3.150												
Tough flexible Lens mountable (FX-MR3, FX-MR6) Coaxial		630 24.803	U-LG : 370 LONG : 14.567 FAST : 12.205	1 m 3.281 ft	R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FD-G6X								
		170 6.693	U-LG : 310 LONG : 12.205 FAST : 95												
		27 1.063	U-LG : 95 LONG : 3.740												
			U-LG : 3.740												
High precision Lens mountable (FX-MR3, FX-MR6) Coaxial		170 6.693	U-LG : 100 LONG : 3.937 FAST : 3.150					500 mm 19.685 in					R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F	FD-EG1
		40 1.575	U-LG : 80 LONG : 3.150 FAST : 24												
	7.5 0.295	U-LG : 24 LONG : 0.945													
		U-LG : 0.945													
High precision Lens mountable (FX-MR3, FX-MR6) Coaxial	130 5.118	U-LG : 100 LONG : 3.937 FAST : 80	Free-cut						R10 mm R0.394 in	-20 to +60 °C -4 to +140 °F	FD-EG2				
	24 0.945	U-LG : 80 LONG : 3.150 FAST : 19													
	3 0.118	U-LG : 19 LONG : 0.748 FAST : 0.748													
		U-LG : 0.748													
High precision Lens mountable (FX-MR3, FX-MR6) Coaxial	85 3.346	U-LG : 45 LONG : 1.772 FAST : 1.378		1 m 3.281 ft	R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F	FD-EG3								
	20 0.787	U-LG : 35 LONG : 1.378 FAST : 12													
	3.5 0.138	U-LG : 12 LONG : 0.472 FAST : 0.472													
		U-LG : 0.472													
Coaxial	190 7.480	U-LG : 110 LONG : 4.331 FAST : 3.543						Free-cut				R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F	FD-ENM1S1	
	50 1.969	U-LG : 90 LONG : 3.543 FAST : 28													
	9 0.354	U-LG : 28 LONG : 1.102 FAST : 1.102													
		U-LG : 1.102													
Cylindrical type	ø3 ø0.118	1,100 43.307	U-LG : 700 LONG : 27.559 FAST : 21.260						2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F				FD-S80
		380 14.961	U-LG : 540 LONG : 21.260 FAST : 220												
		70 2.756	U-LG : 220 LONG : 8.661 FAST : 8.661												
			U-LG : 8.661												
Cylindrical type	ø3 ø0.118	960 37.795	U-LG : 550 LONG : 21.654 FAST : 16.142	Free-cut	R1 mm R0.039 in	-40 to +60 °C -40 to +140 °F	FD-WS8								
		250 9.843	U-LG : 410 LONG : 16.142 FAST : 140												
		45 1.772	U-LG : 140 LONG : 5.512 FAST : 5.512												

Fiber Optic Sensors

FX-500

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Reflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Fiber cable length ✂ : Free-cut	Bending radius	Ambient temperature	Model No.			
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST							
Cylindrical type	Coaxial 		590 23.228 150 5.906 25 0.984	U-LG : 340 13.386 LONG : 280 11.024 FAST : 90 3.543	 2 m 6.562 ft	R2 mm R0.079 in	-40 to +60 °C -40 to +140 °F	FD-WSG4		
			490 19.291 120 4.724 22 0.866	U-LG : 250 9.843 LONG : 190 7.480 FAST : 75 2.953					R4 mm R0.157 in Flexible	FD-P50
	Coaxial 		510 20.079 120 4.724 22 0.866	U-LG : 280 11.024 LONG : 215 8.465 FAST : 70 2.756	 2 m 6.562 ft	R25 mm R0.984 in	-40 to +70 °C -40 to +158 °F	FD-SNFM2		
			260 10.236 80 3.150 20 0.787	U-LG : 170 6.693 LONG : 140 5.512 FAST : 55 2.165					R4 mm R0.157 in Flexible	FD-P2
	Ultra-small diameter Sleeve part cannot be bent.		45 1.772 12 0.472 2 0.079	U-LG : 25 0.984 LONG : 22 0.866 FAST : 7 0.276	 1 m 3.281 ft	R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FD-E12		
			210 8.268 55 2.165 11 0.433	U-LG : 130 5.118 LONG : 110 4.331 FAST : 32 1.260					R25 mm R0.984 in	FD-E22
	Side-view	Small diameter Sleeve part cannot be bent.		260 10.236 65 2.559 14 0.551	U-LG : 140 5.512 LONG : 110 4.331 FAST : 35 1.378	 2 m 6.562 ft	R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F	FD-V41	
			60 2.362 16 0.630 2 0.079	U-LG : 35 1.378 LONG : 25 0.984 FAST : 8 0.315	R1 mm R0.039 in					FD-WV42
			370 14.567 120 4.724 25 0.984	U-LG : 250 9.843 LONG : 210 8.268 FAST : 75 2.953	R25 mm R0.984 in					FD-SFM2SV2
	Rectangular	Glass substrate detection • Mapping W25 × H7.3 × D30 W0.584 × H0.287 × D1.161		1 to 110 0.039 to 4.331 1 to 56 0.039 to 2.205 Cannot use	U-LG : 1 to 87 0.039 to 3.425 LONG : 1 to 74 0.039 to 2.913 FAST : 1 to 38 0.039 to 1.496	 4 m 13.123 ft	R25 mm R0.984 in	-40 to +60 °C -40 to +140 °F	FD-L46	
Glass substrate detection • Alignment W20 × H29 × D3.8 W0.787 × H1.142 × D0.150			43 1.693 40 1.575 24 0.945	U-LG : 43 1.693 LONG : 43 1.693 FAST : 40 1.575	 3 m 9.843 ft	R4 mm R0.157 in	-40 to +60 °C -40 to +140 °F	FD-L45		
Glass substrate detection • Alignment W23.5 × H29 × D4.5 W0.925 × H1.142 × D0.177			3 to 51 0.118 to 2.008 4 to 44 0.157 to 1.732 5 to 38 0.197 to 1.496	U-LG : 4 to 47 0.157 to 1.850 LONG : 4 to 46 0.157 to 1.811 FAST : 4 to 42 0.157 to 1.654	 2 m 6.562 ft	R25 mm R0.984 in	0 to +70 °C 32 to +158 °F	FD-L45A		
Glass substrate detection • Alignment W17 × H29 × D3.8 W0.669 × H1.142 × D0.150			31 1.220 24 0.945 18 0.709	U-LG : 25 0.984 LONG : 24 0.945 FAST : 24 0.945					R4 mm R0.157 in	FD-L43
Glass substrate detection • Seating confirmation W18 × H29 × D3.8 W0.709 × H1.142 × D0.150			30 1.181 29 1.142 1.5 to 24 0.059 to 0.945	U-LG : 30 1.181 LONG : 30 1.181 FAST : 28 1.102	 3 m 9.843 ft	R4 mm R0.157 in	-20 to +70 °C -4 to +158 °F	FD-L47		

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Reflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Fiber cable length ☒ : Free-cut	Bending radius	Ambient temperature	Model No.	
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST					
Rectangular	Glass substrate detection • Seating confirmation W12 × H19 × D3 W0.472 × H0.748 × D0.118	■ 11.5 0.453 ■ 9.5 0.374 ■ 8 0.315	U-LG : 10.5 0.413 LONG : 10 0.394 FAST : 9 0.354		R10 mm R0.394 in	-40 to +60 °C -40 to +140 °F	FD-L44	
		■ 6 0.236 ■ 5 0.197 ■ 4 0.157	U-LG : 5.5 0.217 LONG : 5.5 0.217 FAST : 4.5 0.177				FD-L44S	
	Glass substrate detection W24 × H21 × D4 W0.945 × H0.827 × D0.157	■ 1.5 to 15 0.059 to 0.591 ■ 2.5 to 14 0.098 to 0.551 ■ 6.5 to 10 0.256 to 0.394	U-LG : 2 to 14.5 0.079 to 0.571 LONG : 2 to 14.5 0.079 to 0.571 FAST : 5.5 to 13.5 0.217 to 0.531	☒ 2 m 6.562 ft	R1 mm R0.039 in			FD-WL41
		■ 1 to 19 0.039 to 0.748 ■ 1.5 to 16 0.059 to 0.630 ■ 8 to 11 0.315 to 0.433	U-LG : 1 to 18 0.039 to 0.709 LONG : 1.5 to 16 0.059 to 0.630 FAST : 3 to 15 0.118 to 0.591			R10 mm R0.394 in		
	 W6 × H18 × D14 W0.236 × H0.709 × D0.551	■ 21.5 0.846 ■ 15.5 0.610 ■ 5 to 7.5 0.197 to 0.295	U-LG : 19.5 0.768 LONG : 18.5 0.728 FAST : 3 to 13 0.118 to 0.512					FD-L4
 W7.2 × H7.5 × D2 W0.283 × H0.295 × D0.079		■ 16 0.630 ■ 7.5 0.295 ■ 0.5 to 4 0.020 to 0.157	U-LG : 12.5 0.492 LONG : 11.5 0.453 FAST : 0.5 to 6 0.020 to 0.236	☒ 1 m 3.281 ft	R1 mm R0.039 in			FD-WL48
Small	Front sensing W10 × H7 × D2 W0.394 × H0.276 × D0.079	■ 1 to 230 0.039 to 9.055 ■ 2 to 65 0.079 to 2.559 ■ 5 to 13 0.197 to 0.512	U-LG : 1 to 110 0.039 to 4.331 LONG : 1 to 85 0.039 to 3.346 FAST : 3 to 35 0.118 to 1.378	☒ 1 m 3.281 ft			FD-WZ4	
		Fiber bending type W2 × H10 × D10 W0.079 × H0.394 × D0.394	■ 1 to 190 0.039 to 7.480 ■ 2.5 to 65 0.098 to 2.559 ■ 3 to 11 0.118 to 0.433	U-LG : 1 to 130 0.039 to 5.118 LONG : 1 to 90 0.039 to 3.543 FAST : 2.5 to 40 0.098 to 1.575		R1 mm R0.039 in		FD-WZ4HB
	Front sensing W14 × H7 × D3.5 W0.551 × H0.276 × D0.138	■ 430 16.929 ■ 110 4.331 ■ 3 to 25 0.118 to 0.984	U-LG : 230 9.055 LONG : 180 7.087 FAST : 1.5 to 65 0.059 to 2.559	☒ 2 m 6.562 ft			FD-WZ7	
		Fiber bending type W3.5 × H14 × D11 W0.138 × H0.551 × D0.433	■ 0.5 to 560 0.020 to 22.047 ■ 1 to 150 0.039 to 5.906 ■ 2.5 to 30 0.098 to 1.181	U-LG : 0.5 to 320 0.020 to 12.598 LONG : 0.5 to 270 0.020 to 10.630 FAST : 1 to 90 0.039 to 3.543				FD-WZ7HB
Special	Long sensing range • Rectangular head W5.2 × H9.5 × D15 W0.205 × H0.374 × D0.591	■ 20 to 1,700 0.787 to 66.929 ■ 20 to 490 0.787 to 19.291 ■ 20 to 100 0.787 to 3.937	U-LG : 20 to 1,000 0.787 to 39.370 LONG : 20 to 820 0.787 to 32.283 FAST : 20 to 310 0.787 to 12.205	☒ 2 m 6.562 ft	R1 mm R0.039 in		FD-WKZ1	
		■ 200 7.874 ■ 200 7.874 ■ 75 2.953	U-LG : 200 7.874 LONG : 200 7.874 FAST : 140 5.512	☒ 2 m 6.562 ft		R25 mm R0.984 in		FD-A15
	Top sensing W5 × H20 × D20 W0.197 × H0.787 × D0.787	■ 660 25.984 ■ 280 11.024 ■ 50 1.969	U-LG : 510 20.079 LONG : 430 16.929 FAST : 160 6.299	☒ 2 m 6.562 ft				FD-AFM2
		Side sensing W5 × H20 × D20 W0.197 × H0.787 × D0.787						

Fiber Optic Sensors

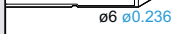













FX-500

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

Reflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Fiber cable length ✂️ : Free-cut	Bending radius	Ambient temperature	Model No.		
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST						
Liquid level sensing	Heat resistant 125 °C 257 °F Fluorine resin coating 	ø6 mm ø0.236 in	720 28.346 260 10.236 45 1.772	U-LG : 540 LONG : 460 FAST : 150 5.906	✂️ 2 m 6.562 ft	Protective tube R40 mm R1.575 in Fiber R15 mm R0.591 in	-40 to +125 °C -40 to +257 °F	FD-F8Y	
	Heat resistant 105 °C 221 °F Fluorine resin coating 	ø4 mm ø0.157 in				Protective tube R20 mm R0.787 in	-40 to +105 °C -40 to +221 °F	FD-HF40Y	
	Heat resistant 70 °C 158 °F Fluorine resin coating throughout the fiber 	ø4 mm ø0.157 in			✂️ 2 m 6.562 ft	Fiber R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F	FD-F41Y	
	Mountable on pipe • Standard 	W25 × H13 × D20 W0.984 × H0.512 × D0.787	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe						FD-F41
	Mountable on pipe • For PFA, wall thickness 1 mm 0.039 in pipe 	W25 × H13 × D20 W0.984 × H0.512 × D0.787	Applicable pipe diameter: Outer dia. ø6 to ø26 mm ø0.236 to ø1.024 in transparent pipe						FD-F4
Liquid sensing	Mountable on pipe • Array fiber 	W6.5 × H28.3 × D17 W0.256 × H1.114 × D0.669	Applicable pipe diameter: Outer dia. ø8 mm ø0.315 in or more transparent pipe (When used with the tying bands: ø8 to ø80 mm ø0.315 to ø3.150 in) [PFA (fluorine resin), including translucent] Liquid absent: Beam received, Liquid present: Beam interrupted		✂️ 2 m 6.562 ft	Fiber R10 mm R0.394 in	-40 to +70 °C -40 to +158 °F	FD-FA90	
	Mountable on pipe SEMI S2 compliant 	W23 × H20 × D17 W0.906 × H0.787 × D0.669	Applicable pipe diameter: Outer dia. ø3 to ø10 mm ø0.118 to ø0.394 in transparent pipe			Protective tube R20 mm R0.787 in Fiber R4 mm R0.157 in	-20 to +60 °C -4 to +140 °F	FT-F902	
Liquid leak detection	SEMI S2 compliant 	W20 × H30 × D10 W0.787 × H1.181 × D0.394	Liquid leak detection Leak absent: Beam received, Leak present: Beam interrupted		✂️ 5 m 16.404 ft Protective tube: 3 m 9.843 ft	Protective tube R20 mm R0.787 in Fiber R4 mm R0.157 in	-20 to +50 °C -4 to +122 °F	FD-F705	
Heat-resistant	350 °C 662 °F • Coaxial 			U-LG : 540 LONG : 460 FAST : 150 5.906	2 m 6.562 ft	R25 mm R0.984 in	-60 to +350 °C -76 to +662 °F	FD-H35-M2	
	350 °C 662 °F • Sleeve 60 mm 2.362 in 					Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in		FD-H35-M2S6	
	200 °C 392 °F • Coaxial 			U-LG : 550 LONG : 500 FAST : 200 7.874		R25 mm R0.984 in	-60 to +200 °C -76 to +392 °F	FD-H20-M1	
	350 °C 662 °F • Sleeve 90 mm 3.543 in 			U-LG : 550 LONG : 440 FAST : 140 5.512	1 m 3.281 ft	Fiber R25 mm R0.984 in Sleeve R10 mm R0.394 in	-60 to +350 °C -76 to +662 °F	FD-H35-20S	
	200 °C 392 °F • Coaxial 			U-LG : 500 LONG : 380 FAST : 130 5.118		R25 mm R0.984 in	-60 to +200 °C -76 to +392 °F	FD-H20-21	
	300 °C 572 °F • Glass substrate detection Convergent reflective type 	W19 × H27 × D5 W0.748 × H1.063 × D0.197		U-LG : 30 LONG : 25 FAST : 12 0.472	2 m 6.562 ft		-60 to +300 °C -76 to +572 °F	FD-H30-L32	

LIST OF FIBERS

Pliable fibers (flexible and sharp bending fibers) are marked in light blue in the table.

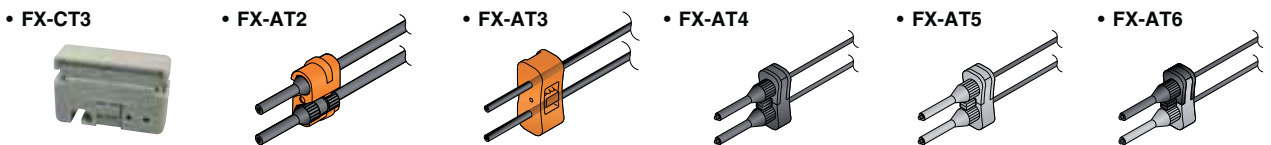
Reflective type



Type	Shape of fiber head (mm in)	Sensing range (mm in)		Fiber cable length ✂️: Free-cut	Bending radius	Ambient temperature	Model No.
		■ : HYPR ■ : STD ■ : H-SP	U-LG LONG FAST				
Special	Heat-resistant 250 °C 482 °F • Glass substrate detection Convergent reflective type W21×H33.2×D5 W0.827×H1.307×D0.197	■ : 1 to 31 ■ : 0.039 to 1.220 ■ : 1.5 to 26 ■ : 0.059 to 1.024 ■ : 2 to 18 ■ : 0.079 to 0.709	U-LG : 1 to 30 ■ : 0.039 to 1.181 LONG : 1 to 28 ■ : 0.039 to 1.102 FAST : 1.5 to 24 ■ : 0.059 to 0.945	3 m 9.843 ft	R25 mm R0.984 in	-20 to +250 °C -4 to +482 °F (Ordinary temperature side: -20 to +70 °C -4 to +158 °F)	FD-H25-L43
		■ : 4 to 43.5 ■ : 0.157 to 1.713 ■ : 5 to 42 ■ : 0.197 to 1.654 ■ : 6.5 to 34 ■ : 0.256 to 1.339	U-LG : 4 to 43 ■ : 0.157 to 1.693 LONG : 4.5 to 43 ■ : 0.177 to 1.693 FAST : 5 to 40 ■ : 0.197 to 1.575				FD-H25-L45
	180 °C 356 °F • Glass substrate detection Convergent reflective type W19 × H27 × D5 W0.748 × H1.063 × D0.197	■ : 60 ■ : 2.362 ■ : 16 ■ : 0.630 ■ : 2 to 6.5 ■ : 0.079 to 0.256	U-LG : 32 ■ : 1.260 LONG : 24 ■ : 0.945 FAST : 13 ■ : 0.512	2 m 6.562 ft		-60 to +180 °C -76 to +356 °F	FD-H18-L31
	130 °C 266 °F M6 21 0.827	■ : 880 ■ : 34.646 ■ : 350 ■ : 13.780 ■ : 65 ■ : 2.559	U-LG : 640 ■ : 25.197 LONG : 600 ■ : 23.622 FAST : 200 ■ : 7.874			-60 to +130 °C -76 to +266 °F	FD-H13-FM2
	Vacuum-resistant 300 °C 572 °F • Rectangular head W9.5 × H5.2 × D15 W0.374 × H0.205 × D0.591	■ : 1 to 500 ■ : 0.039 to 19.685 ■ : 2 to 200 ■ : 0.079 to 7.874 ■ : 10 to 25 ■ : 0.394 to 0.984	U-LG : 1 to 340 ■ : 0.039 to 13.386 LONG : 1 to 270 ■ : 0.039 to 10.630 FAST : 3 to 120 ■ : 0.118 to 4.724	1 m 3.281 ft	R18 mm R0.709 in	-30 to +300 °C -22 to +572 °F	FD-H30-KZ1V-S
300 °C 572 °F • Glass substrate detection Convergent reflective type W19 × H5 × D27 W0.748 × H0.197 × D1.063	■ : 18 ■ : 0.709 ■ : 8 ■ : 0.315 ■ : 1.5 to 3 ■ : 0.059 to 0.118	U-LG : 12 ■ : 0.472 LONG : 10 ■ : 0.394 FAST : 5.5 ■ : 0.217	3 m 9.843 ft			FD-H30-L32V-S	

Accessories (attached with fibers)

- RF-003 (FR-KZ21/KZ21E exclusive reflector)
- RF-13 (Reflective tape)
- FX-CT1 (Fiber cutter)
- FX-CT2 (Fiber cutter)
- FX-CT3 (Fiber cutter)
- FX-AT2 (Attachment for fixed-length fiber, Orange)
- FX-AT3 (Attachment for ø2.2 mm ø0.087 in fiber, Clear orange)
- FX-AT4 (Attachment for ø1 mm ø0.039 in fiber, Black)
- FX-AT5 (Attachment for ø1.3 mm ø0.051 in fiber, Gray)
- FX-AT6 Attachment for ø1 mm ø0.039 in / ø1.3 mm ø0.051 in mixed fiber, Black / Gray





FX-CH2

External input unit for digital sensor

Features

■ Up to 16 sensors can be set/switched simultaneously by an external signal

Up to 16 digital fiber sensors can be set/switched simultaneously not by directly operating the sensors but from a PLC, a touch panel, a push button, or some other external signal generating device.

■ Simultaneous teaching

- Full-auto teaching
- 2-level teaching

■ Key lock setting

Even the enable/disable command for the key lock setting, a function designed to prevent operational mistakes, can be effectuated simultaneously from an external signal.

■ Batch loading and saving of bank settings

The bank settings for 3 previously set channels can be loaded and saved all together using an external signal.

Technical Specifications

Type	NPN input type	PNP input type
Model no.	FX-CH2	FX-CH2-P
Applicable sensor	FX-301(P) (Version upgrade), FX-305(P)	
Supply voltage	12 to 24VDC±10%	
Input	Low: 0 to +2VDC High: +5V to +VDC, or open	Low: 4V to +VDC High: 0 to +0.6VDC, or open
Power indicator	Green LED	
Transmission operation indicator	Green LED (lights up when loaded, and 2-level/limit teaching blinks lights up when saved, and full-auto teaching)	
Ambient temperature	-10 to +55°C (if 4 to 7 sensors are mounted close together: -10 to +50°C, If 8 to 16 sensors are mounted close together: -10 to +45°C)	
Dimensions	10×27×68.5mm	

Typical Applications

■ Setup changes (external automatic teaching/ data bank switching)

Digital fiber settings can be changed using input from a touch screen or switch, so that production line setup changes can be carried out more easily.

■ External teaching

Full auto-teaching is recommended for teaching when the sensing object is changed without stopping the line.

■ Data bank switching

Settings such as output operations (L-ON/D-ON) and timer operations can be recorded in the digital fiber sensor's data bank, and switching can be carried out externally.

