

FA/FU Series - Fiber optic sensors

Sensors

FA/FU Series

Fiber optic sensors

Carlo Gavazzi offers complete fiber optic sensor range that includes the amplifier, myriads of different fiber units, namely the plastic, glass, array, fork, side beam and many other specific usage fiber units as well as different lenses.

The plastic fiber units come with the over-molding protection for better fiber curvature and bending. Available in different diameters, they can detect objects as small as $\varnothing 0.03$. Moreover, the glass fiber is protected by a stainless steel sheath that can be used in applications with high temperatures up to 250° Celcius.

Coupled together with the robust and user friendly fiber optic amplifier, many applications requiring precision detection can now be satisfied.



Complete fiber optic sensor range

Robust and user-friendly amplifier

The multifunction amplifier can be easily configured and comes with two displays, adjustable signal threshold, response time, time delay, NO/NC output and many other features.

Large variety of types

Many different types of fiber units to choose from to satisfy different application needs, for instance plastic, glass, array, fork, side-beam and tube.

Different sensing ranges and detectable object size

By using different fiber units and adjusting the fiber amplifier, different sensing distances and detection of the smallest detectable object can be achieved. Objects as small as $\varnothing 0.03$ can be detected.

Different fiber unit head size and orientation for different mounting needs

Different head sizes, M6, M4 and M3 with straight or angled version to cater for different mounting needs.

Optional sleeve for more convenient mounting at space-restricted applications.

Overmoulding protection

The fiber units are designed with overmoulding protection for better fiber-curvature and bending protection.

High operating temperature

Equipped with a stainless steel sheath, the glass fiber units can operate in temperatures of up to 250° Celcius, and the plastic fiber units can operate in temperatures of up to 70° Celcius.

Approvals

CE (EN60947-5-2)
cULus (UL508)



Applications

Semiconductor

- Detecting PCB boards
- Detecting tiny electronic components



Material handling

- Detecting items on the conveyor
- Detecting items in the feeder bowl



Packaging & wrapping

- Detecting bottles and caps
- Detecting boxes



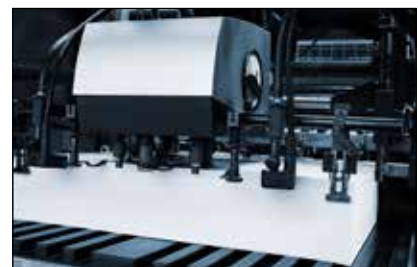
Textile

- Detecting thread in textile machines



Paper mill and printing

- Detecting paper thickness
- Paper alignment in the printing machine



FA/FU Series

Fiber optic sensors

FA1 – Fiber optic amplifier

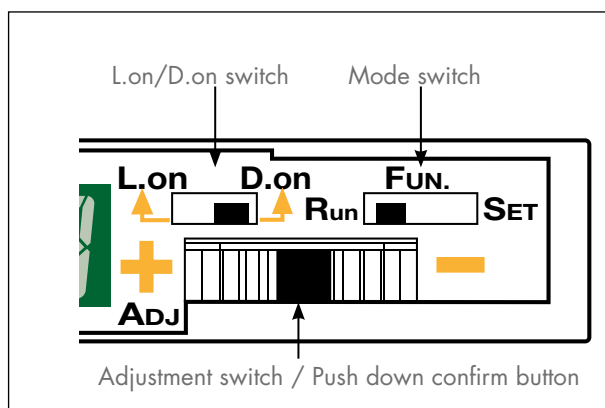
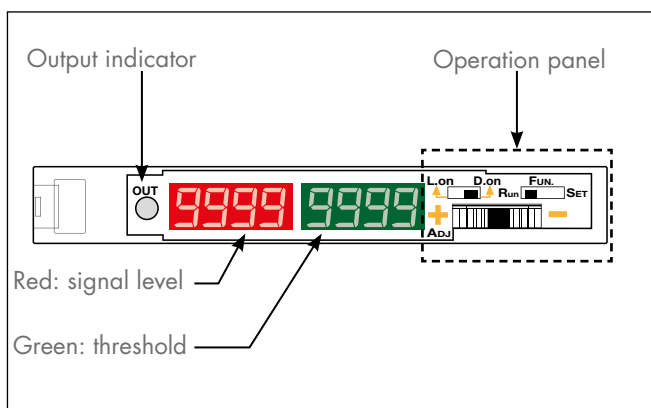
Robust, flexible and user-friendly fiber optic amplifier. Comes with a 2 x 4 digits LED display to show the signal level and threshold.

FA1 is equipped with a 3-way adjustment switch to adjust sensitivity, different response time and time delay functions.



The sensor output is either NPN or PNP and can be selected to be light ON or dark ON.

Features

- 2 x 4 digits displays for threshold and signal level
- Easy adjustment via a 3-way adjustment switch
- Adjustable response time: 200, 500, 1000 and 5000 μ s
- ON, OFF, ON one shot, OFF one shot delay timer
- 100mA NPN or PNP output
- Light ON or dark ON output



Technical data

Operating voltage	12 - 24 VDC
Operating frequency	Max. 2.5 kHz
Response time	Selectable 200, 500, 1000, 5000 μ s
Output	100 mA, NPN or PNP, Light ON/dark ON selectable
Light source	Red LED 660 nm
Operating temperature	0 to +60°C
Housing material	ABS
Connection cable	PVC, black 2m, 3 wires
Degree of protection	IP40
Protection	Short circuit, reverse polarity, transients
Dimension	10 x 33 x 80 mm
Approvals	 

Type selection

NPN Light ON or dark ON swithcing	PNP Light ON or dark ON swithcing
FA1-N	FA1-P

FUR-FUT - Fiber optic units

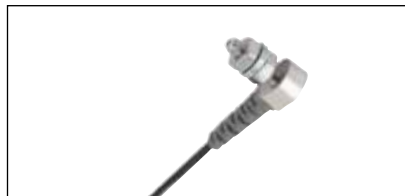
The plastic fiber units come with overmoulding protection for better fiber-unit curvature and bending protection.



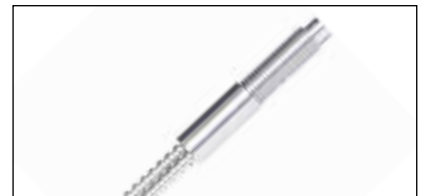
Many varieties to choose from to suit different application needs



Plastic fiber unit



Angled plastic fiber unit



Glass fiber unit



Angled glass fiber unit



Reflective array fiber unit



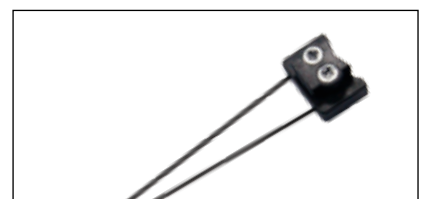
Through-beam array fiber unit



Fork fiber unit



Side beam fiber unit



Tube fiber unit

FA/FU Series

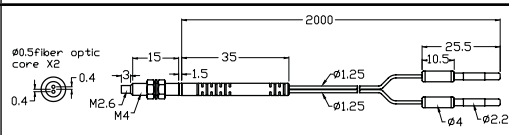
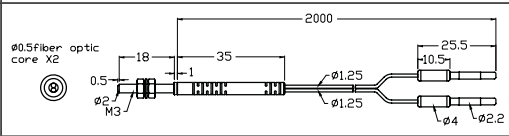
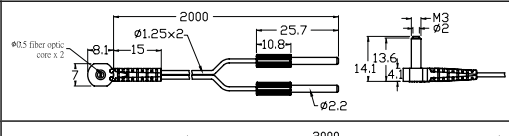
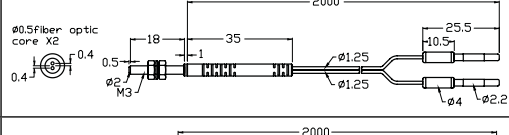
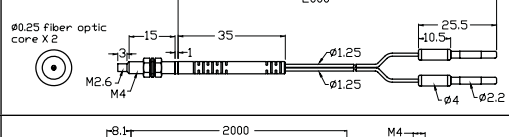
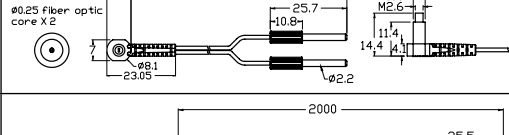
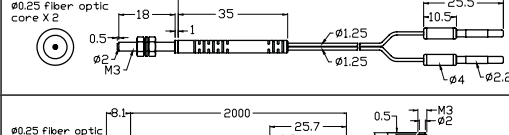
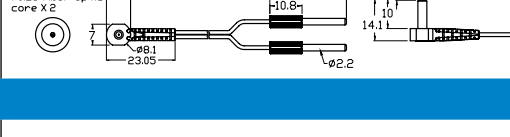
Fiber optic sensors

FUR FUT – Plastic fiber units

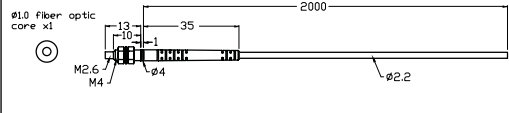
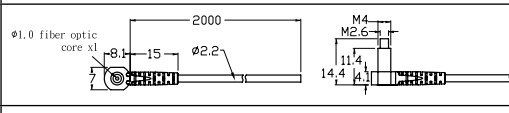
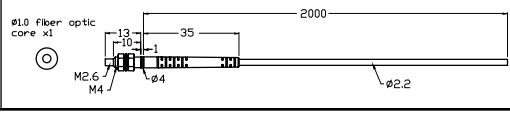
Reflective types							
Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Weight (g)	Ordering key	
Ø1.0 x 2	90	Ø0.50	R25		38	FURO6-20 FURO6-20/S10 FURO6-20/S20 FURO6-20/S40 FURO6-20/S90	
Ø1.0 x 2	60	Ø0.50	R25		30	FURO6-20/A	
Ø1.0 x 2	100	Ø0.50	R25		38	FURO6-20/E***	
Ø1.0 x 1, Ø0.265 x 16	90	Ø0.50	R25		38	FURC6-20 FURC6-20/S10 FURC6-20/S20 FURC6-20/S40 FURC6-20/S90	
Ø0.5 x 1, Ø0.25 x 10	40	Ø0.05	R15		25	FURC4-20 FURC4-20/S10 FURC4-20/S20 FURC4-20/S40 FURC4-20/S90	
Ø0.5 x 1, Ø0.25 x 10	20	Ø0.05	R15		30	FURC4-20/A	
Ø0.5 x 1, Ø0.25 x 10	40	Ø0.05	R15		25	FURC3-20 FURC3-20/S10 FURC3-20/S20 FURC3-20/S40 FURC3-20/S90	
Ø0.5 x 1, Ø0.25 x 10	20	Ø0.05	R15		29	FURC3-20/A	
Ø0.5 x 2	20	Ø0.10	R15		25	FURD4-20 FURD4-20/S10 FURD4-20/S20 FURD4-20/S40 FURD4-20/S90	
Ø0.5 x 2	20	Ø0.10	R15		20	FURD4-20/A	

FUR FUT – Plastic fiber units

Reflective types

Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Weight (g)	Ordering key
Ø0.5 x 2	30	Ø0.10	R15		25	FURD4-20/E***
Ø0.5 x 2	20	Ø0.10	R15		24	FURD3-20 FURD3-20/S10 FURD3-20/S20 FURD3-20/S40 FURD3-20/S90
Ø0.5 x 2	20	Ø0.10	R15		20	FURD3-20/A
Ø0.5 x 2	30	Ø0.10	R15		24	FURD3-20/E***
Ø0.25 x 2	7	Ø0.05	R10		16	FURA4-20 FURA4-20/S10 FURA4-20/S20 FURA4-20/S40 FURA4-20/S90
Ø0.25 x 2	5	Ø0.05	R10		21	FURA4-20/A
Ø0.25 x 2	7	Ø0.05	R10		16	FURA3-20 FURA3-20/S10 FURA3-20/S20 FURA3-20/S40 FURA3-20/S90
Ø0.25 x 2	5	Ø0.05	R10		20	FURA3-20/A

Through-beam types

Ø1.0	440	Ø0.50	R25		38	FUTO4-20 FUTO4-20/S10 FUTO4-20/S20 FUTO4-20/S40 FUTO4-20/S90
Ø1.0	300	Ø0.50	R25		28	FUTO4-20/A
Ø1.0	490	Ø0.50	R25		38	FUTO4-20/E***

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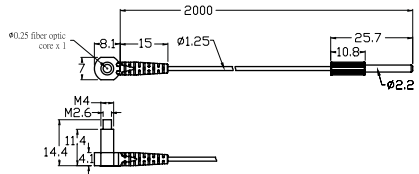
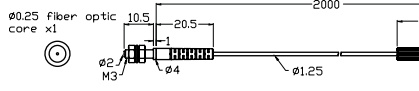
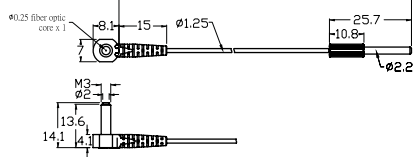
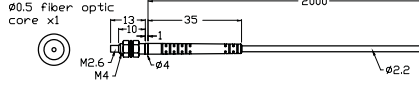
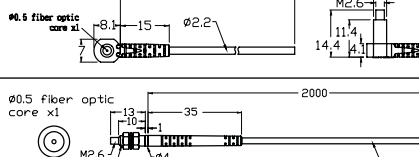
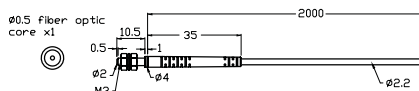
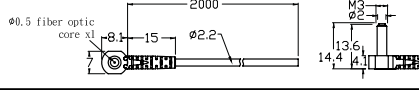
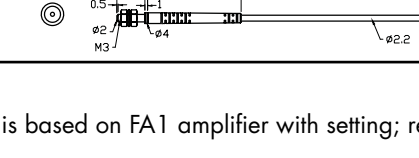

Fiber optic sensors

FUR FUT – Plastic fiber units

Through-Beam types

Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Weight (g)	Ordering key
Ø1.0	440	Ø0.50	R25		36	FUTO3-20 FUTO3-20/S10 FUTO3-20/S20 FUTO3-20/S40 FUTO3-20/S90
Ø1.0	300	Ø0.50	R15		28	FUTO3-20/A
Ø1.0	490	Ø0.50	R25		36	FUTO3-20/E***
Ø0.5	160	Ø0.05	R15		28	FUTD4-20 FUTD4-20/S10 FUTD4-20/S20 FUTD4-20/S40 FUTD4-20/S90
Ø0.5	130	Ø0.05	R15		20	FUTD4-20/A
Ø0.5	180	Ø0.05	R15		28	FUTD4-20/E
Ø0.5	160	Ø0.05	R15		28	FUTD3-20 FUTD3-20/S10 FUTD3-20/S20 FUTD3-20/S40 FUTD3-20/S90
Ø0.5	130	Ø0.05	R15		20	FUTD3-20/A
Ø0.5	180	Ø0.05	R25		28	FUTD3-20/E
Ø0.25	30	Ø0.03	R10		20	FUTA4-20 FUTA4-20/S10 FUTA4-20/S20 FUTA4-20/S40 FUTA4-20/S90

FUR FUT – Plastic fiber units

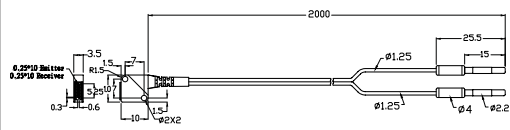
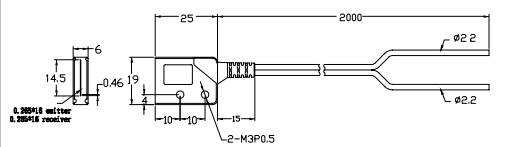
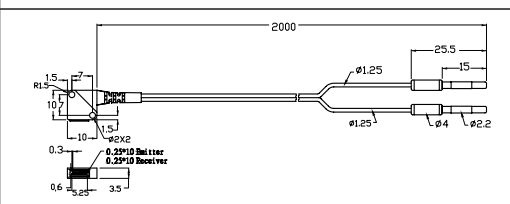
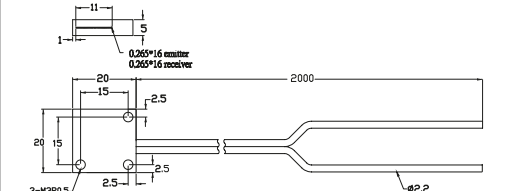
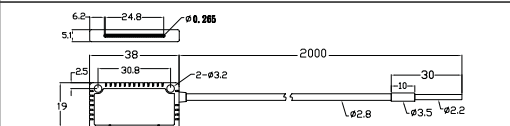
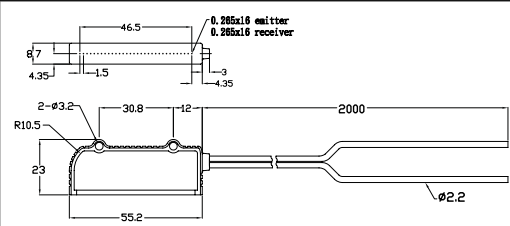
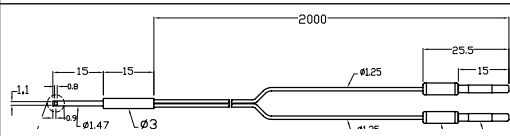
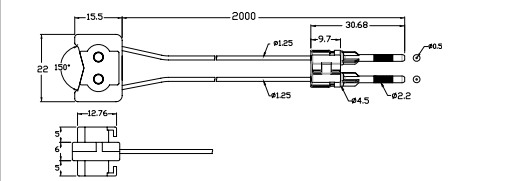
Through-Beam types							
Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Weight (g)	Ordering key	
Ø0.25	20	Ø0.03	R10		25	FUTA4-20/A	
Ø0.25	30	Ø0.03	R10		20	FUTA3-20 FUTA3-20/S10 FUTA3-20/S20 FUTA3-20/S40 FUTA3-20/S90	
Ø0.25	20	Ø0.03	R10		24	FUTA3-20/A	
Ø0.5	160	Ø0.05	R15		25	FUTS4-20 FUTS4-20/S10 FUTS4-20/S20 FUTS4-20/S40 FUTS4-20/S90	
Ø0.5	130	Ø0.05	R15		30	FUTS4-20/A	
Ø0.5	180	Ø0.05	R15		25	FUTS4-20/E	
Ø0.5	160	Ø0.05	R15		25	FUTS3-20 FUTS3-20/S10 FUTS3-20/S20 FUTS3-20/S40 FUTS3-20/S90	
Ø0.5	130	Ø0.05	R15		29	FUTS3-20/A	
Ø0.5	180	Ø0.05	R15		25	FUTS3-20/E	

*note 1 : Detection distance in the table is based on FA1 amplifier with setting; response time at 5000µS and threshold value at 27 (max setting).
 **note 2 : Dimensional drawing shown here is for the standard version (without sleeve).

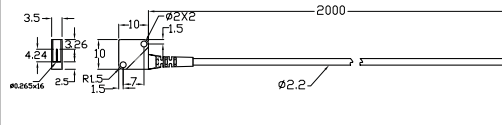
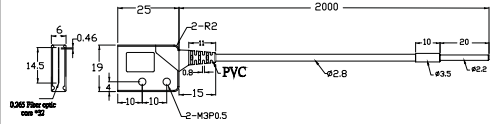
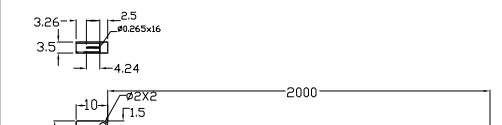
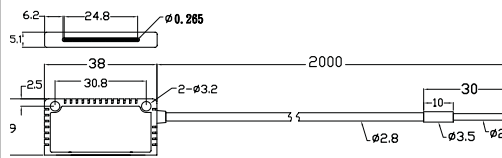
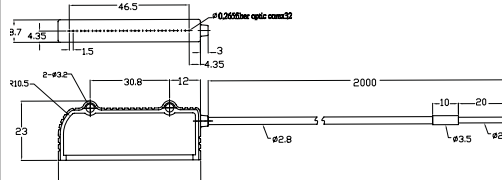
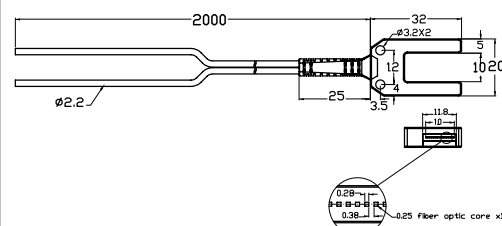
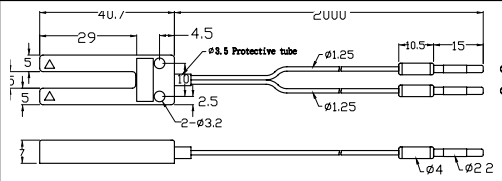
FA/FU Series

Fiber optic sensors

FUR FUT – Array plastic fiber units

Reflective types							
Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Detection head material	Weight (g)	Ordering key
Ø0.25x10/ Ø0.25x10	100	Ø0.30	R15		Stainless steel	20	FUR-FARR10-20
Ø0.265x16/ Ø0.265x16	100	Ø1.00	R5		ABS	20	FUR-FARR25-20
Ø0.25x10/ Ø0.25x10	100	Ø0.30	R15		Stainless steel	20	FUR-SARR10-20
Ø0.265x16/ Ø0.265x16	100	Ø1.00	R5		Ni plated Cu	44	FUR-SARR20-20
Ø0.265x16/ Ø0.265x16	100	Ø1.50	R5		ABS	25	FUR-SARR38-20
Ø0.265x16/ Ø0.265x16	100	Ø2.50	R5		ABS	40	FUR-SARR55-20
Ø0.5	50	Ø1.00	R15		Stainless steel	30	FUR-SBEAM15-20
Ø0.5	3	Water	R15		ABS	9	FUR-TUBE26-20

FUR FUT – Array plastic fiber units

Through-beam types							
Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Detection head material	Weight (g)	Ordering key
Ø0.265x16	350	Ø0.30	R25		Stainless steel	26	FUT-FARR10-20
Ø0.265x32	350	Ø1.00	R5		ABS	48	FUT-FARR25-20
Ø0.265x16	350	Ø0.30	R25		Stainless steel	26	FUT-SARR10-20
Ø0.265x32	350	Ø1.50	R60		ABS	34	FUT-SARR38-20
Ø0.265x32	350	Ø2.50	R60		ABS	76	FUT-SARR55-20
Ø0.265x16	10	Ø0.50	R5		ABS	20	FUT-FORK1032-20
Ø0.25	5	Ø0.50	R5		ABS	26	FUT-FORK0540-20

FA/FU Series

Fiber optic sensors

FUR FUT – Array plastic fiber units

Through-beam types

Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)**	Detection head material	Weight (g)	Ordering key
Ø0.25	10	Ø0.50	R5		ABS	26	FUT-FORK1031-20
Ø1.0	450	Ø0.50	R25		Stainless steel	34	FUTSBEAM30-20
Ø0.5	350	Ø0.50	R15		Stainless steel	25	FUTSBEAM15-20

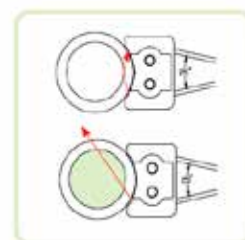
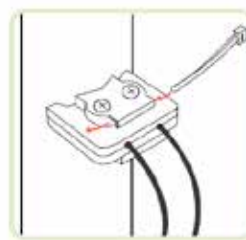
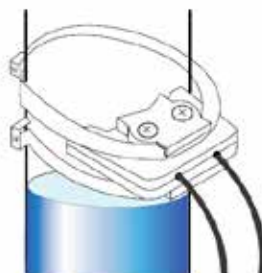
note*: Due to design and engineering limitations, not every model of array fiber unit comes with the overmoulding protection. Please refer to the dimensional drawings.

FUR – Tube26-20

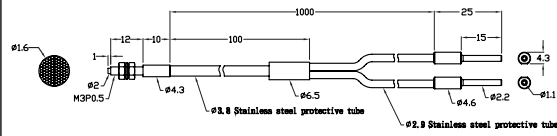
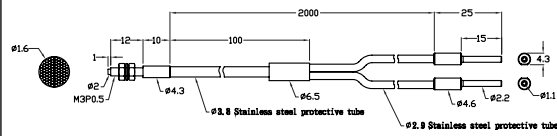
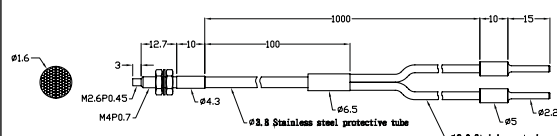
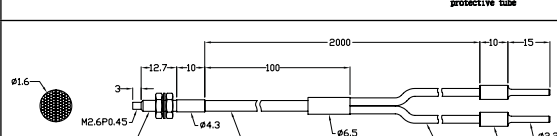
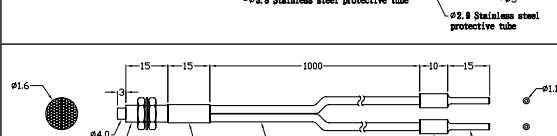
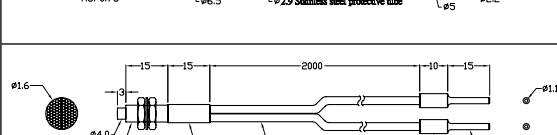
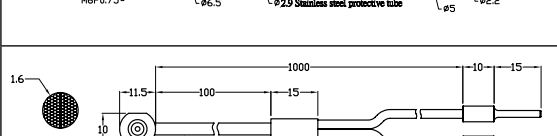
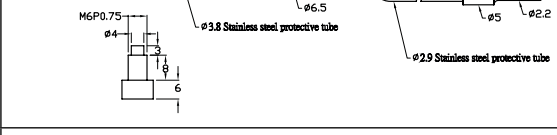
Based on the theory of refraction, this fiber unit can easily be fixed on a tube to detect the liquid level inside the tube.

The fiber unit is light-weight, easy to install and can be attached at a tube from Ø6 to 26mm with a tubewall thickness less than 3mm.

*opaque white liquid is excluded



FUGR FUGT – Glass-fiber units

Reflective types						
Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)	Weight (g)	Ordering key
Ø1.6	120	Ø2.0	R23		62	FUGR3-10
Ø1.6	120	Ø2.0	R23		90	FUGR3-20
Ø1.6	120	Ø2.0	R23		62	FUGR4-10
Ø1.6	120	Ø2.0	R23		90	FUGR4-20
Ø1.6	120	Ø2.0	R23		66	FUGR6-10
Ø1.6	120	Ø2.0	R23		100	FUGR6-20
Ø1.6	100	Ø2.0	R24		75	FUGR6-10/A
Ø1.6	100	Ø2.0	R24		92	FUGR6-20/A

FA/FU Series

Fiber optic sensors

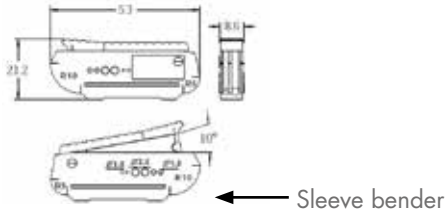
FUGR FUGT – Glass-fiber units

Through-Beam types

Inner diameter	Max. detection distance (mm)*	Smallest detectable object	Min. bend radius	Dimensions (mm)	Weight (g)	Ordering key
Ø1.0	800	Ø1.0	R23		70	FUGT3-10
Ø1.0	800	Ø1.0	R23		88	FUGT3-20
Ø1.0	800	Ø1.0	R23		70	FUGT4-10
Ø1.0	800	Ø1.0	R23		88	FUGT4-20
Ø1.0	700	Ø1.0	R24		75	FUGT4-10/A
Ø1.0	700	Ø1.0	R24		92	FUGT4-20/A


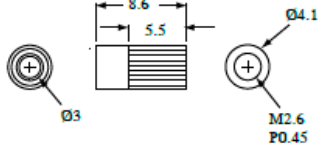

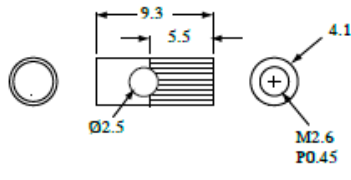

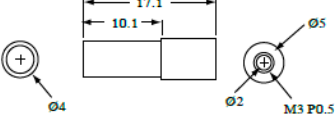

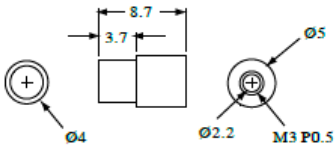

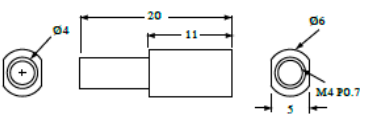
Accessories – Plastic fiber units

FU-Cutter



1. Cutter is not included. Sold separately.
2. The FU-Cutter can also be used as a fiber-unit sleeve bender.

Lenses

Part No	Description	Usage		Dimensions (mm)	Suitable to be used with
FUT-M4LENS	Through-beam M4 fiber lens	Attaching this lens to the transmitter fiber and to the receiver fiber will increase the scanning distance 4 times.			FUTO4-20 FUTO4-20/A FUTO4-20/E FUTD4-20 FUTD4-20A FUTD4-20/E FUTA4-20/A FUTA4-20 FUTS4-20 FUTS4-20/A FUTS4-20/E
FUT-M4SLENS	Through-beam M4 fiber side lens	The axial fiber unit can be changed to a radial type by attaching this unit to the light emitter or receiver of the fiber unit.			FUTO4-20 FUTO4-20/A FUTO4-20/E FUTD4-20 FUTD4-20A FUTD4-20/E FUTA4-20/A FUTA4-20 FUTS4-20 FUTS4-20/A FUTS4-20/E
FUR-M3LENS-2	Reflective M3 fiber lens	The optical signal will converge into a 0.5 mm dia. spot, provided the lens is attached to the fiber at a distance of 8 mm.			FURC3-20 FURC3-20/A FURA3-20 FURA3-20/A FURD3-20 FURD3-20/A FURD3-20/E
FUR-M3LENS-1	Reflective M3 fiber lens	The optical signal will converge into a 2 mm dia. spot, provided the lens is attached to the fiber at a distance of 8 mm.			FURC3-20 FURC3-20/A FURA3-20 FURA3-20/A FURD3-20 FURD3-20/A FURD3-20/E
FUR-M4LENS	Reflective M4 fiber lens	The optical signal will converge into a 0.7 mm dia. spot, provided the lens is attached to the fiber at a distance of 10 mm.			FURD4-20 FURD4-20/A FURD4-20/E FURA4-20/A FURA4-20

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