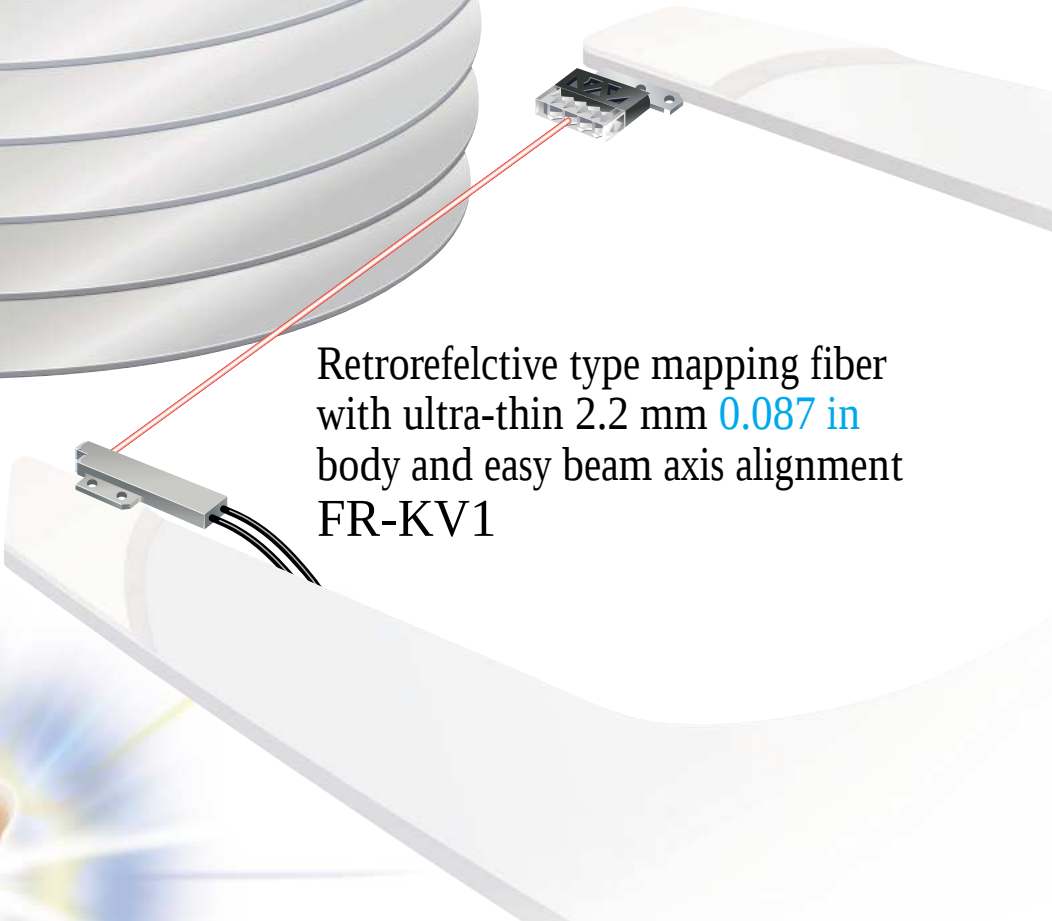


WAFER MAPPING FIBER

New**FR-KV1** Retroreflective Type SERIES**FT-KV1** Thru-beam Type SERIES

ULTRA-COMPACT · FIXED-FOCUS REFLECTIVE FIBER

New**FD-WL48**

Retroreflective type mapping fiber
with ultra-thin 2.2 mm **0.087 in**
body and easy beam axis alignment
FR-KV1



Ultra-compact size
W7.2 × H7.5 × D2 mm **W0.283 × H0.295 × D0.079 in**
FD-WL48

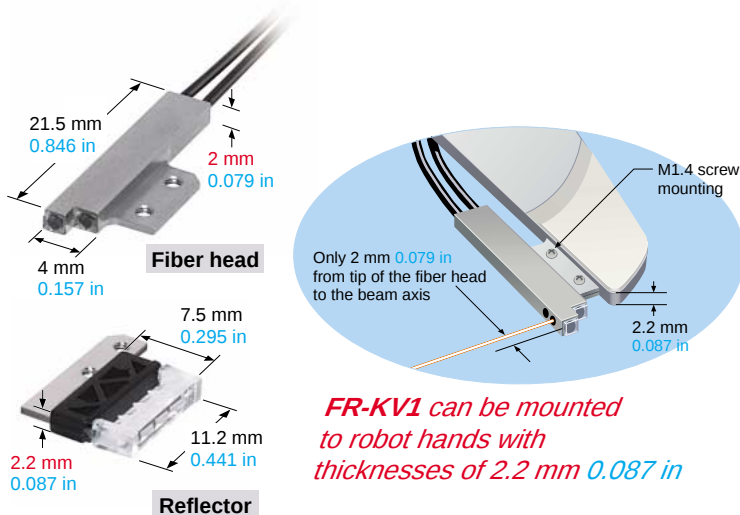
Wafer mapping fiber FR/FT-KV1

NEW Concept !

Retrorefelctive type mapping fiber with ultra-thin 2.2 mm 0.087 in body and easy beam axis alignment

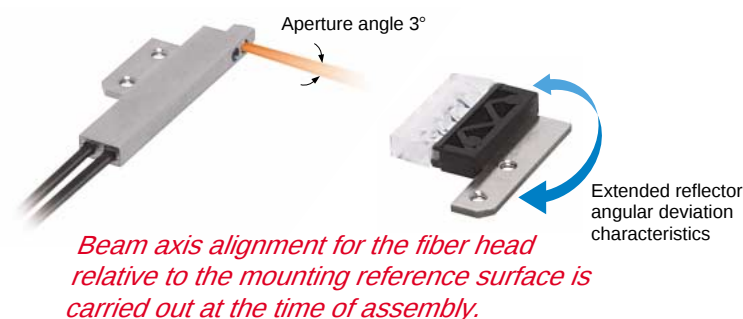
Ultra-thin retroreflective type reduces construction work Retroreflective type

2.0 mm 0.079 in fiber head and an ultra-thin 2.2 mm 0.087 in reflector allow these to be mounted even in thin robot hands. Furthermore, because they are retroreflective type fibers, the amount of wiring needed can be reduced, and the robot hands require less processing and so can be kept strength.



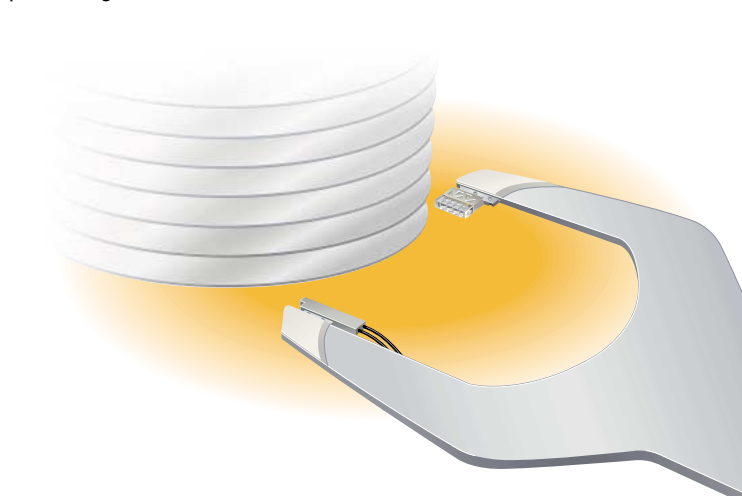
Ultra-narrow beams and extended angular deviation characteristics Retroreflective type

A retroreflective type fiber is used, so that an aperture angle of less than 3° produces an ultra-narrow beam, but still with extended angular deviation characteristics compared to thru-beam types. This allows stronger curvatures in robot hands and reduces the work required for beam axis alignment.



Heat-resistant type available FR-H10-KV1

Resistant to temperatures of +105 °C +221 °F, so that the robots can be used with confidence for wafer transportation immediately after heat processing.



Thru-beam type fiber FT-KV1 / FT-H10-KV1

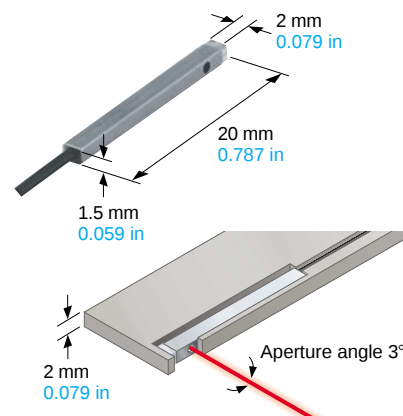
New

Heat-resistant type available FT-H10-KV1

Resistant to temperatures of +105 °C +221 °F, so that it can be used with confidence for wafer transportation immediately after heat processing.

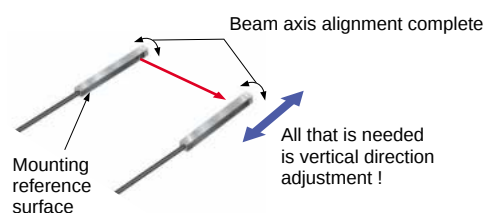
Ultra-compact size

The ultra-compact size of W2 × H1.5 × D20 mm W0.079 × H0.059 × D0.787 in means that mounting is possible even in places such as robot hands where space is limited.



Reduces work required for beam axis alignment

In order to reduce the amount of work required for mounting, beam axis alignment for the fiber head relative to the mounting reference surface is carried out at the time of assembly.



Extended sensing range

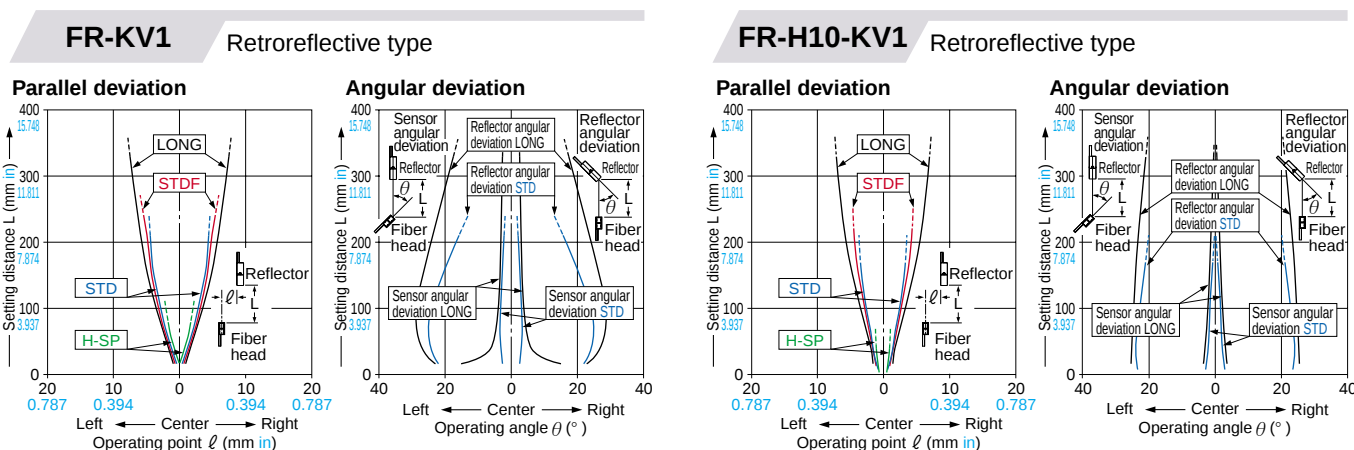
A sensing range of 250 mm 9.843 in (in STD mode) allows easy mapping of 300 mm 11.811 in wafers.

SPECIFICATIONS

Designation		Retroreflective type wafer mapping fiber		Thru-beam type wafer mapping fiber		Fixed-focus reflective type fiber
		Heat-resistant type		Heat-resistant type		
Item	Model No.	FR-KV1	FR-H10-KV1	FT-KV1	FT-H10-KV1	FD-WL48
Applicable amplifiers (Note 1)		FX-301(P)(-HS), FX-305(P), FX-311(P)				
Sensing range (Note 2, 3)	U-LG	370 mm 14.567 in		600 mm 23.622 in		0.5 to 8.5 mm 0.020 to 0.335 in
	LONG	330 mm 12.992 in		500 mm 19.685 in		0.5 to 7.5 mm 0.020 to 0.295 in
	STDF	240 mm 9.449 in	220 mm 8.661 in	300 mm 11.811 in		1 to 6.5 mm 0.039 to 0.256 in
	STD	210 mm 8.268 in	170 mm 6.693 in	250 mm 9.843 in		1 to 5.5 mm 0.039 to 0.217 in
	FAST	170 mm 6.693 in	130 mm 5.118 in	180 mm 7.087 in		1 to 5 mm 0.039 to 0.197 in
	S-D	90 mm 3.543 in	45 mm 1.772 in	100 mm 3.937 in		—
	H-SP	80 mm 3.150 in	40 mm 1.575 in	90 mm 3.543 in		—
Min. sensing object (Note 3, 4)		φ0.12 mm φ0.005 in opaque object		φ0.02 mm φ0.001 in opaque object		φ0.3 mm φ0.012 in copper wire (at maximum sensitivity)
Allowable bending radius		R10 mm R0.394 in or more		R10 mm R0.394 in or more		R1 mm R0.039 in or more
Fiber cable length		2 m 6.562 ft free cut		2 m 6.562 ft free cut		1 m 3.281 ft free cut
Ambient temperature		−40 to +60 °C −40 to +140 °F Strage: −40 to +60 °C −40 to +140 °F	−40 to +105 °C −40 to +221 °F Strage: −40 to +105 °C −40 to +221 °F (Note 5)	−40 to +60 °C −40 to +140 °F Strage: −40 to +60 °C −40 to +140 °F	−40 to +105 °C −40 to +221 °F Strage: −40 to +105 °C −40 to +221 °F (Note 5)	−20 to +60 °C −4 to +140 °F Strage: −20 to +60 °C −4 to +140 °F
Ambient humidity		35 to 85 % RH, Strage: 35 to 85 % RH (No dew condensation or icing allowed)				
Material	Fiber cable	Fiber core: Acrylic Sheath: Polyethylene	Fiber core: Acrylic Sheath: Polypropylene	Fiber core: Acrylic Sheath: Polyethylene	Fiber core: Acrylic Sheath: Polypropylene	Fiber core: Acrylic Sheath: Polyethylene
	Fiber head	End bracket: Stainless steel (SUS303), Lens: Polycarbonate				Case, Prism: Polycarbonate
Net weight		50 g approx.		40 g approx.		2 g approx.
Accessories		FX-AT4 (Fiber attachment for φ1 mm φ0.039 in fiber): 1 set, Reflector: 1 pc. FX-CT2 (Fiber cutter): 1 pc., M1.4 (length 1.6 mm 0.063 in) SUS mounting screw: 4 pcs.		FX-AT4 (Fiber attachment for φ1 mm φ0.039 in fiber): 1 set FX-CT2 (Fiber cutter): 1 pc.		

- Notes: 1) Refer to the catalog of each amplifier or sunx website (<http://www.sunx.co.jp>) for details about the applicable amplifier.
2) The **FX-301(P)(-HS)** is not equipped with U-LG / STDF modes. The sensing range for the **FX-301(P)(-HS)** in H-SP mode also varies from that given, so contact our office for details.
The **FX-305(P)** is not equipped with a S-D mode. The **FX-311(P)** is not equipped with U-LG / STDF / FAST / H-SP modes.
3) The sensing ranges and min. sensing object sizes for the retroreflective type fibers are the values when using the exclusive reflectors. Furthermore, the distance between the fiber head and the reflector should be set to 15 mm 0.591 in or more.
The sensing range for the fixed-focus reflective type fiber is specified for white non-glossy paper (100 × 100 mm 3.937 × 3.937 in).
4) The minimum sensing object size for the retroreflective and the thru-beam type fibers is the value in optimum condition. The Optimum condition is the condition when the sensitivity is set so that the sensing output just changes to light incident operation in the object absent condition.
The minimum sensing object size for the fixed-focus reflective type fiber is the value at maximum sensitivity. Note that the corresponding setting distance is different from the rated sensing distance.
5) The ambient temperatures are the values for dry conditions. The ambient temperatures will vary for environments with high humidity. The ambient temperature for environments with high relative humidity of 85 % is -40 to +50 °C -40 to +122 °F.

SENSING CHARACTERISTICS (TYPICAL)



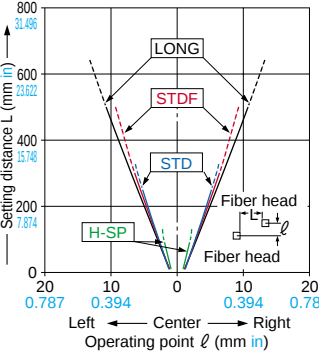
SENSING CHARACTERISTICS (TYPICAL)

FT-KV1

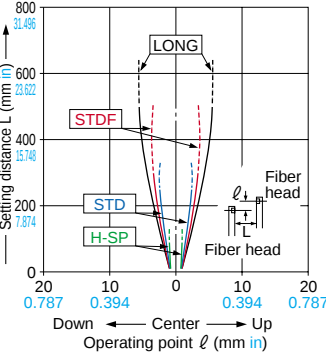
Thru-beam type

Parallel deviation

• Horizontal direction



• Vertical direction

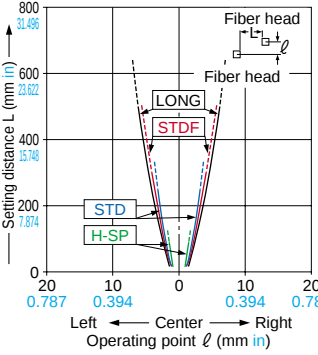


FT-H10-KV1

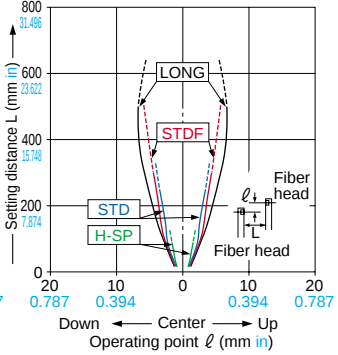
Thru-beam type

Parallel deviation

• Horizontal direction

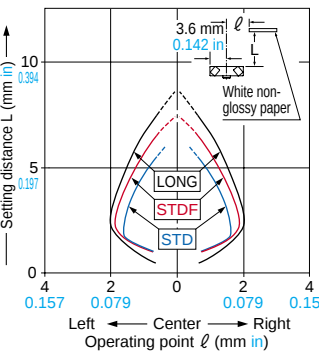


• Vertical direction

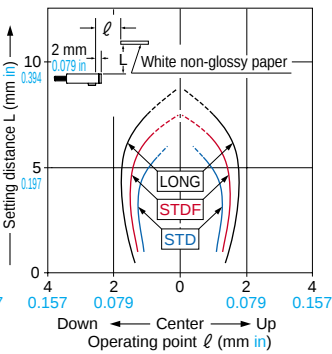


FD-WL48

• Horizontal direction



• Vertical direction



PRECAUTIONS FOR PROPER USE



- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws or standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

Mounting

- Take care that, since the aperture angle of this product is very narrow, the beam may not be received depending upon the setting.

FT-(H10)-KV1

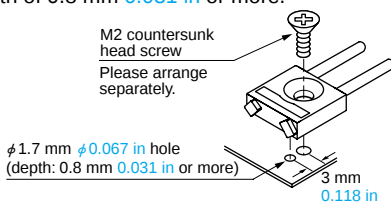
- Mount the fiber head by using M3 or less set screws (cup point). The tightening torque should be 0.19 N·m or less.

FR-(H10)-KV1

- Mount the fiber head by using the attached screws. The tightening torque should be 0.14 N·m or less. If the fiber head is mounted in places subject to vibrations or shocks, use a screw-locking adhesive, etc.

FD-WL48

- Mount the fiber head by using M2 countersunk head screws (please arrange separately). The tightening torque should be 0.15 N·m or less. In addition, the hole for inserting the boss on the bottom should have a diameter of 1.7 mm 0.067 in and a depth of 0.8 mm 0.031 in or more.



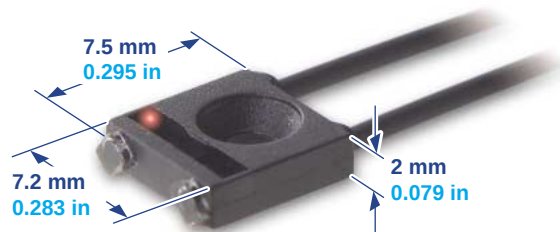
Others

- Do not use the fiber at places having intense vibrations, as this can cause malfunction.
- Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.
- If the sensing surface gets dirty, wipe dirt or stains from the sensing faces with a soft cloth moistened with water. (Do not use organic solvents.)
- Do not expose the fiber to any organic solvents.
- Do not use the fiber head surface in places where it may come in direct contact with water. A water drop on the fiber head surface deteriorates the sensing.
- Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
- Do not apply excessive tensile force to the fiber cable. (The tensile force should be 5.0 N or less.)
- Take care that the fiber is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- Avoid areas prone to vapor or dust as well as corrosive gas environments. Do not expose the fiber directly to water or chemicals.

Ultra compact·fixed-focus reflective fiber **FD-WL48**

Even more compact

W7.2×H7.5×D2 mm **W0.283×H0.295×D0.079 in** ultra-compact size



Ultra-compact size saves space

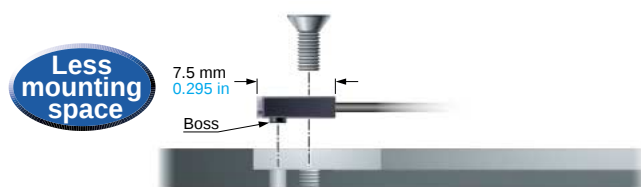
The ultra-compact size of W7.2×H7.5×D2 mm **W0.283×H0.295×D0.079 in** holds a fixed-focus reflective optical system. These fiber heads can now be mounted in locations and devices that were previously impossible because of a lack of space. As a result, an even wider range of applications is now available.

● Mounting in handling arms



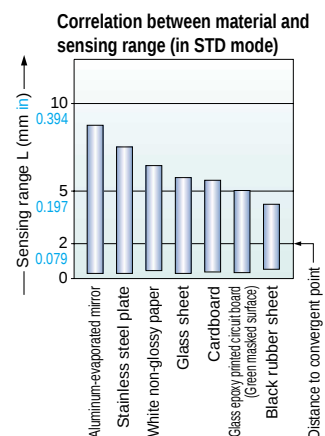
Single boss mounting saves space

The fiber head is mounted by attaching one boss to the back and using a single M2 countersunk head screw, so that the fiber heads can be more compact and take up less mounting space.



Stable sensing regardless of sensing object color and material

The fixed-focus reflective optical system means that sensing is almost completely unaffected by the color and material of the sensing objects. In addition, stable sensing is possible with very little effect from the background.



Minimum bending radius **R1 mm R0.039 in**

Sharp bending fibers are used, so that the fiber cables can be bent to a bending radius of 1 mm **0.039 in**.

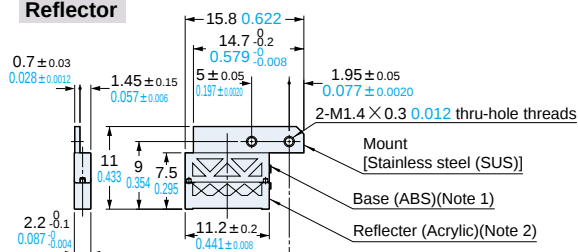


**FR-KV1
FR-H10-KV1**

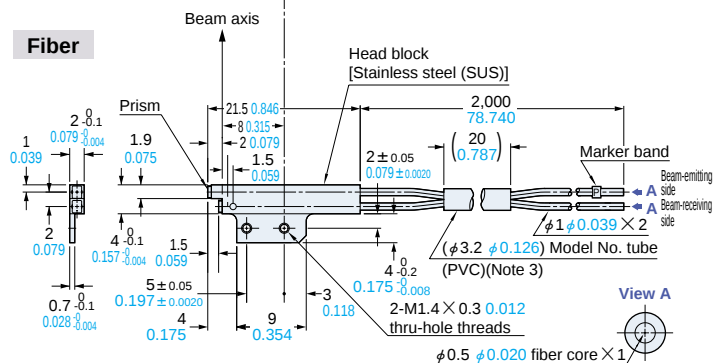
Free-cut

With FX-AT4

Reflector



Fiber

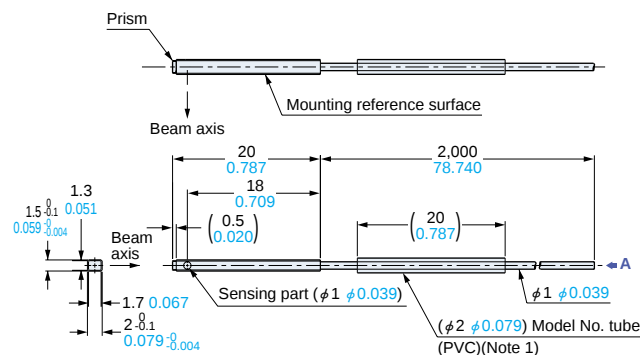


- Notes: 1) The material used for the **FR-H10-KV1** reflector is polycarbonate.
2) The material used for the **FR-H10-KV1** reflector is norbornene plastic.
3) Not equipped with the **FR-H10-KV1**.

**FT-KV1
FT-H10-KV1**

Free-cut

With FX-AT4

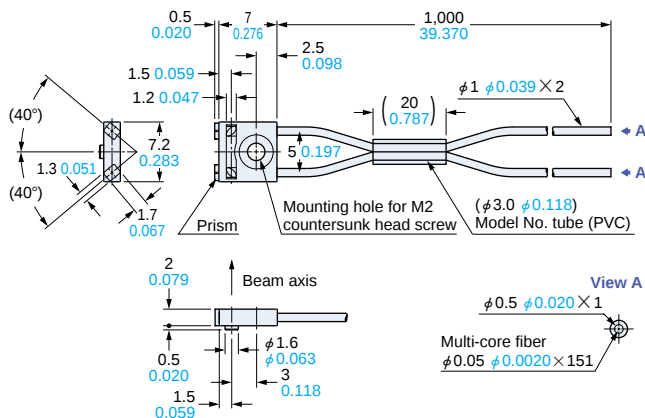


Note: Not equipped with the **FT-H10-KV1**.

FD-WL48

Free-cut

With FX-AT4



All information is subject to change without prior notice.



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