Panasonic
INDUSTRY

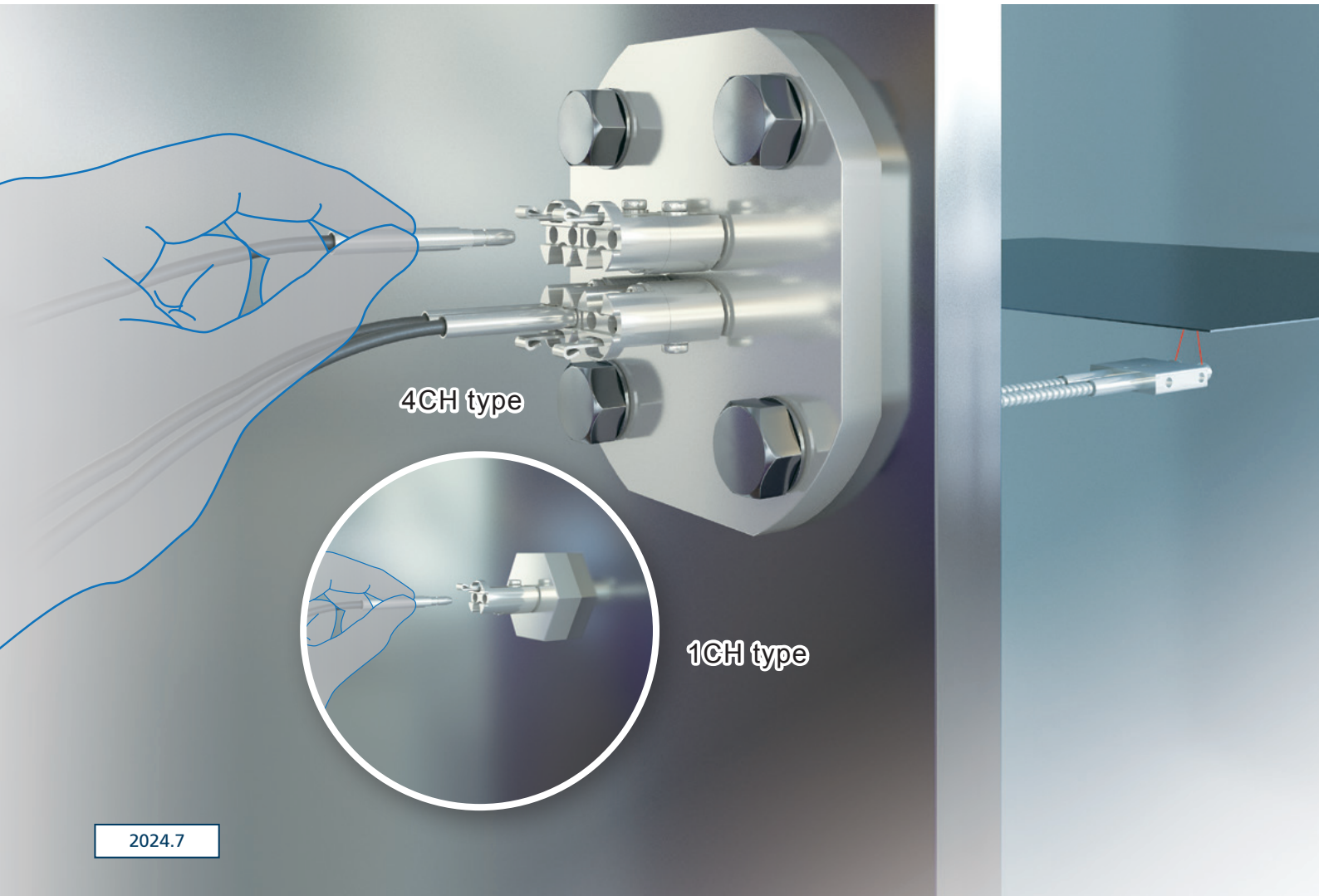
One-Touch Connection System Compatible with 4CH / 1CH Flange

Vacuum-resistant Fibers

Breakthrough in vacuum-resistant fibers

One-Touch Connection Just in 1 Second*

* Time required to connect one fiber to the flange.



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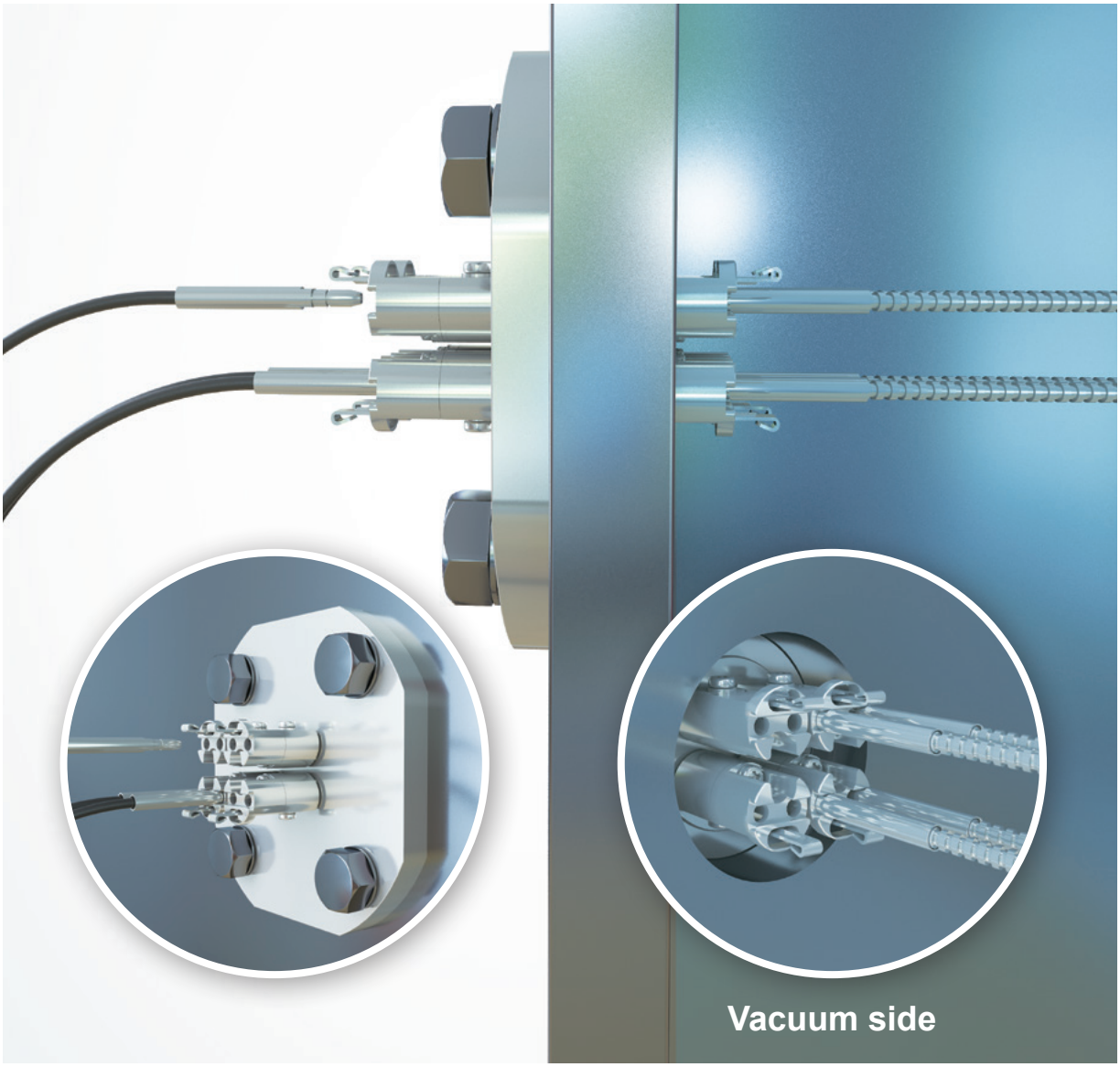
Easier and simpler

Amazingly easy to connect!

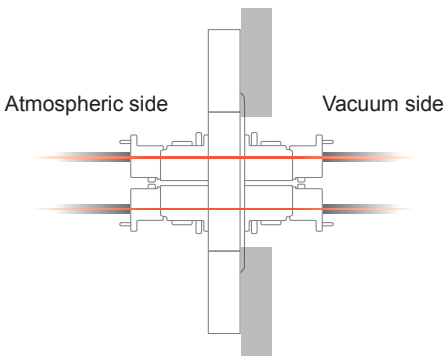
Vacuum-resistant fiber flange designed to enable easy connection (one-touch connection) and disconnection of fibers one by one or at the same time.



Leakage seal construction

The leakage seal construction has built-in glass wires inside the flange and allows transmission of only light to the vacuum side. Leakage remains unchanged even when fiber is not connected.

* Leakage from 4CH / 1CH flange: 1.0×10^{-10} Pa·m^3/s [He] or less

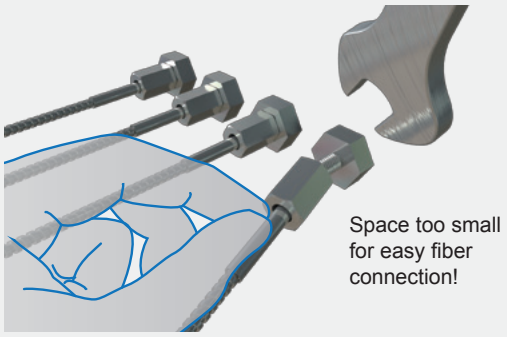


One-touch connection just in 1 second

Simply insert the fiber into the flange

The newly developed one-touch connection system allows easy connection of a fiber by simply positioning the fiber in the specified direction and inserting. The fiber can be disconnected by pulling the holding bracket up. The one-touch connection system helps reduce working hours dramatically.

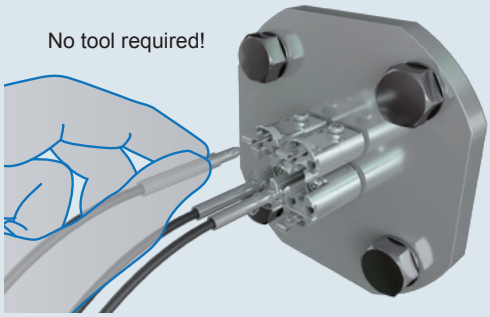
Before



Thread fastening type

- It is difficult to tighten with a glove-covered hand.
- Small parts can be easily lost.
- Excessive tightening can break or bend the wire.

After



One-touch type

- One-touch connection system reduces working hours and workload dramatically.
- Connection is as easy as inserting the fiber into the flange.
- Easy connection without a tool or torque management.

* The disconnection prevention structure uses a holding bracket that engages securely with the joint bracket.

Vacuum-resistant 4CH / 1CH flange

Requires drilling of only one hole

The flange connection system requires less space for the fiber lead-in section and fewer holes to drill. Previously, one installation hole had to be drilled for each fiber. The vacuum-resistant flange requires only one hole even for multiple fibers, thus reducing the hole drilling cost and the possibility of leakage.

Before

Conventional fiber lead-in section

- A hole must be drilled for each fiber at the lead-in section.
- An ample space is needed for inserting a hand and using a tool.

After

Fiber lead-in section of the vacuum-resistant flange

- Only one hole needs to be drilled even for the connection of eight fibers. This reduces the processing cost and the worries for leakage to 1/8.
- Saves space at the lead-in section because fibers can be grouped and connected.

Fiber Lineup

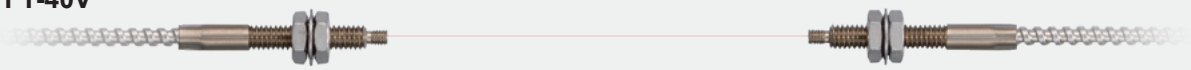
Vacuum side fiber

* Sensing ranges are for **FX-500** series amplifiers.

Vacuum-resistant thru-beam type fiber

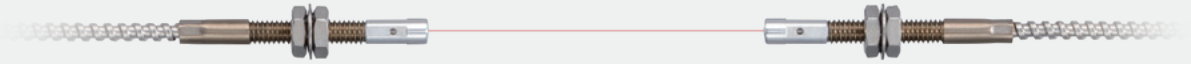
FT-40V

Sensing range: STD mode 270 mm 10.630 in
HYPER mode 1,000 mm 39.370 in
Ambient temperature: -30 to +300 °C -22 to +572 °F



FT-40V + FV-LE1
(Expansion lens)

Sensing range: STD mode 1,500 mm 59.055 in
HYPER mode 1,800 mm 70.866 in
Ambient temperature: -30 to +300 °C -22 to +572 °F

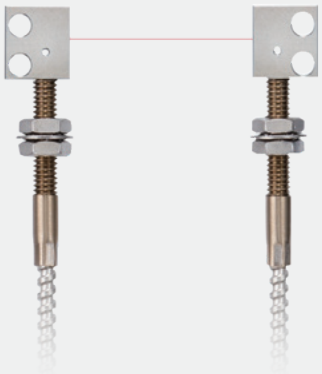


FT-40V + FV-SV1
(Vacuum-resistant compact side-view lens)

Sensing range:
STD mode 450 mm 17.717 in
HYPER mode 1,800 mm 70.866 in
Ambient temperature:
-30 to +300 °C -22 to +572 °F

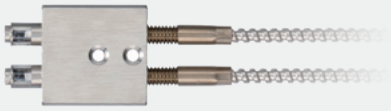
FT-40V + FV-SV2
(Vacuum-resistant side-view lens)

Sensing range:
STD mode 1,500 mm 59.055 in
HYPER mode 1,800 mm 70.866 in
Ambient temperature:
-30 to +300 °C -22 to +572 °F



Vacuum-resistant convergent reflective type fiber

FD-L10V



Sensing range:
STD mode 0 to 8 mm 0 to 0.315 in
HYPER mode 0 to 18 mm 0 to 0.709 in
Ambient temperature:
-30 to +300 °C -22 to +572 °F

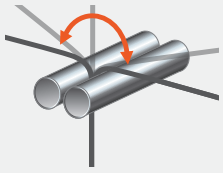
Vacuum-resistant long range reflective type fiber

FD-KZ50V

Sensing range:
STD mode 20 to 200 mm 0.787 to 7.874 in
HYPER mode 5 to 500 mm 0.197 to 19.685 in
Ambient temperature:
-30 to +300 °C -22 to +572 °F

Atmospheric side fiber

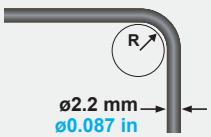
FT-J9



Bending durability

10 million times or more (Typical)

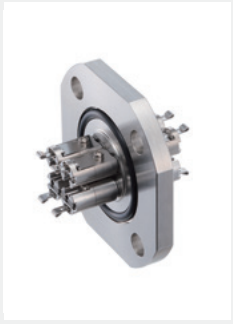
Bending conditions
Bending radius: R10 mm R0.394 in,
Reciprocating bending: 180°



More flexible

R4 mm R0.157 in

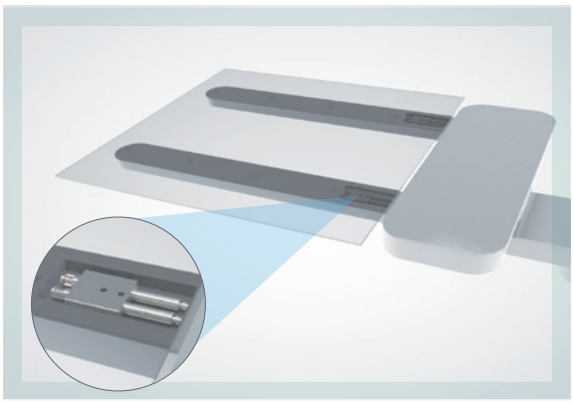
Vacuum-resistant flange



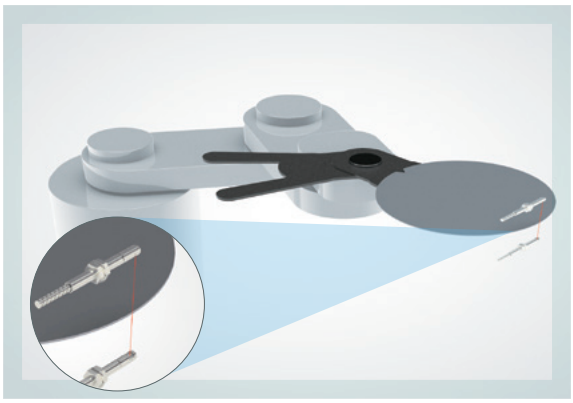
Vacuum-resistant flange 4CH
FV-FR4

Vacuum-resistant flange 1CH
FV-FR1

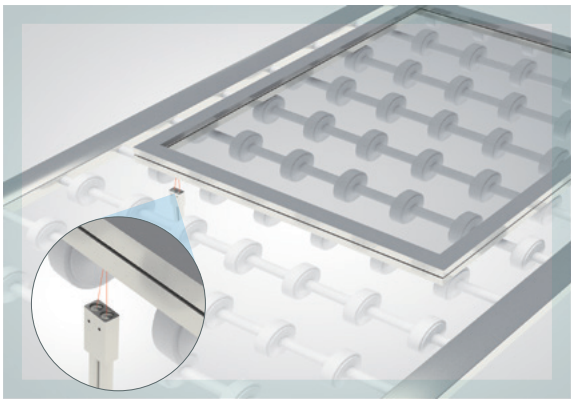
Applications



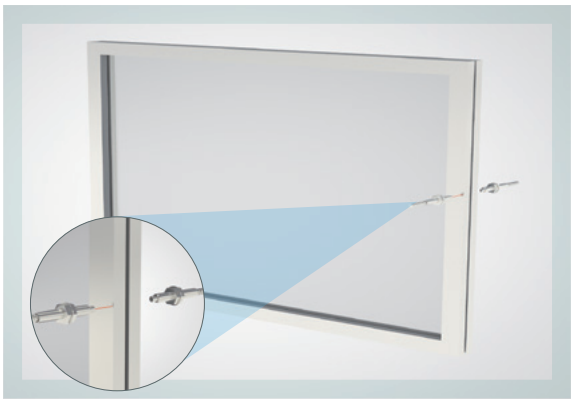
Detection of glass seating on robot hand



Detection of semiconductor wafer



Detection of passing glass



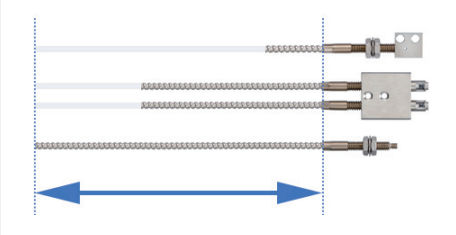
Detection of presence / absence of glass

Contributes to your product quality improvement and workload reduction

Using the integrated manufacturing system established in our factory, we conduct all processes ranging from product development to production, quality control, packaging and shipping.

Vacuum baking for the reduction of outgas

The vacuum side fiber and flange are cleaned and baked, and then seal-packed and double-packed for shipping.



Customizable fiber length

We offer semi-custom products in which the fiber length can be specified in 100 mm 3.937 in increments. Different fiber lengths can be specified for the emitting side and receiving side. Contact our sales office for semi-custom products.

VACUUM-RESISTANT FIBER SET CONTENTS

Vacuum-resistant thru-beam type fiber
FT-40V

Vacuum-resistant reflective type fiber
• Long range reflective type
FD-KZ50V

• Convergent reflective type
FD-L10V

Vacuum-resistant flange 1CH
FV-FR1

Vacuum-resistant flange 4CH
FV-FR4

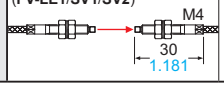
Atmospheric side fiber
FT-J9

Amplifier

LIST OF FIBERS

Vacuum-resistant thru-beam type (one pair set)

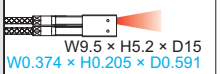
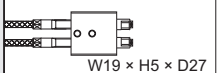
Atmospheric side fiber is optional and sold separately.

Type		Shape of fiber head (mm in)	Model No.	Bending radius (mm in)	Fiber cable length	Sensing range (mm in) (Note 2) FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 / FX-550L series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	Beam axis dia. (mm in)	Ambient temp.
Vacuum-resistant	Thru-beam	300 °C 572 °F, Lens mountable (**FV-LE1/SV1/SV2**) 	**FT-40V**	R25 R0.984	1 m 3.281 ft (Note 1)	STD 270 10.630 HYPR 1,000 39.370		590 23.228 470 18.504 160 6.299 55 2.165	STD 400 15.748 HYPR 1,400 55.118		950 37.402 620 24.409 250 9.843	110 4.331 280 11.024	ø1.3 ø0.051	-30 to +300 °C -22 to +572 °F

Notes: 1) This is not a “free-cut” type. We offer only semi-custom products in which the fiber length can be specified in 100 mm 3.937 in increments. For details, please contact our sales office.
2) **FX-550L** series does not have FAST mode.

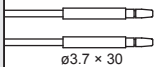
Vacuum-resistant reflective type

Atmospheric side fiber is optional and sold separately.

Type		Shape of fiber head (mm in)	Model No.	Bending radius (mm in)	Fiber cable length	Sensing range (mm in) (Note 2, 3) FX-500 series	Other modes	U-LG LONG FAST H-SP	FX-550 / FX-550L series	Other modes	U-LG LONG FAST	FX-101 (Upper value) FX-102 (Lower value)	Ambient temp.
Vacuum-resistant	Long range reflective	300 °C 572 °F, Rectangular head 	**FD-KZ50V**	R25 R0.984	1 m 3.281 ft (Note 1)	STD 20 to 200 0.787 to 7.874 HYPR 5 to 500 0.197 to 19.685		10 to 340 0.394 to 13.386 15 to 270 0.591 to 10.630 20 to 120 0.787 to 4.724 20 to 45 0.787 to 1.772	STD 20 to 450 0.787 to 17.717 HYPR 5 to 1,500 0.197 to 59.055		10 to 1,000 0.394 to 39.370 15 to 650 0.591 to 25.591 20 to 300 0.787 to 11.811	25 to 80 0.984 to 3.150 10 to 220 0.394 to 8.661	-30 to +300 °C -22 to +572 °F
	Convergent reflective	300 °C 572 °F, Glass substrate detection 	**FD-L10V**		3 m 9.843 ft (Note 1)	STD 0 to 8 0 to 0.315 HYPR 0 to 18 0 to 0.709		0 to 12 0 to 0.472 0 to 10 0 to 0.394 0 to 5.5 0 to 0.217 1.5 to 3 0.059 to 0.118	STD 0 to 11 0 to 0.433 HYPR 0 to 27 0 to 1.063		0 to 19 0 to 0.748 0 to 13 0 to 0.512 0 to 7.5 0 to 0.295	2.5 to 6.5 0.098 to 0.256 0 to 11 0 to 0.433	

Notes: 1) This is not a “free-cut” type. We offer only semi-custom products in which the fiber length can be specified in 100 mm 3.937 in increments. For details, please contact our sales office.
2) The sensing range is the value for transparent glass 100 × 100 × t0.7 mm 3.937 × 3.937 × t0.028 in.
3) **FX-550L** series does not have FAST mode.

Atmospheric side (one pair set)

Type	Shape of fiber head (mm in)	Model No.	Bending radius (mm in)	Fiber cable length ✂: Free-cut	Ambient temp.
Atmospheric side		Tough Bending durability **FT-J9**	R4 R0.157	✂ 2 m 6.562 ft (Note)	-30 to +80 °C -22 to +176 °F

Note: We offer only semi-custom products in which the fiber length can be specified in 1m 3.281 ft increments. For details, please contact our sales office.

Tough : Refers to a fiber which possesses both unbreakable (bending radius: R10 mm R0.394 in, reciprocating bending: 180°) and more flexible (bending radius: R4 mm R0.157 in or less) features.
Bending durability : Refers to a fiber which possesses unbreakable bending resistant feature (bending radius: R10 mm R0.394 in, reciprocating bending: 180°).

FIBER OPTIONS

Vacuum-resistant flange

Applicable fibers are **FT-40V**, **FD-KZ50V**, **FD-L10V** and **FT-J9**.

Designation	Model No.	Description
Vacuum-resistant flange 1CH	**FV-FR1**	
Vacuum-resistant flange 4CH	**FV-FR4**	

Atmospheric side and vacuum side are isolated.

Main specifications

Model No.	FV-FR1	FV-FR4
Applicable fibers	**FT-40V**, **FD-KZ50V**, **FD-L10V**, **FT-J9**	
Leakage	1.0×10^{-10} Pa·m³/s [He] or less (* Measured with a He detector)	
Ambient temperature	-30 to +120°C -22 to +248°F (Same for storage. Up to +40 °C +104°F when humidity is high. However, no dew condensation or icing allowed.)	
Ambient humidity	35 to 85% RH (Same for storage)	
Tightening torque	Nut: 14.7 N·m or less (M14 nut)	9.8 N·m or less (M8 screw)
Tensile strength	20 N or less (Atmospheric / vacuum side fiber joint)	
O-ring size	V15	V40
Weight	100 g approx.	410 g approx.
Material	Main unit: Stainless steel (SUS303), Holding bracket: Stainless steel (SUS301), Fiber: Quartz glass, O-ring: Fluororubber	

Recommended thickness of vacuum chamber wall
- For **FV-FR1**: 3.0 to 40.0 mm 0.118 to 1.575 in (Note 1)
- For **FV-FR4**: 3.0 mm 0.118 in or more (Note 2)

Notes: 1) Confirm the wall thickness in advance since the **FV-FR1** cannot be installed to a vacuum chamber with a wall thickness outside the recommended thickness range.
2) If the vacuum chamber wall is too thick, the **FV-FR4** may not be able to connect to the vacuum side fiber. In that case, connect the **FV-FR4** to the vacuum side fiber before the installation.

Vacuum-resistant lens (For thru-beam type fiber)

Designation		Model No.	Description
For thru-beam type fiber	Vacuum-resistant expansion lens (Note 1)	**FV-LE1**	
	Vacuum-resistant compact side-view lens (Note 1)	**FV-SV1**	
	Vacuum-resistant side-view lens (Note 1)	**FV-SV2**	

FV-LE1

Increases the sensing range 4 times or more.
- Ambient temperature: -60 to +350 °C -76 to +662 °F (Note 2)
- Beam axis dia: ø3.6 mm ø0.142 in

Sensing range (mm in) [Lens on both sides] (Note 3) (Note 4)

Fiber \ Amplifier / Mode	FX-500 series (Upper value) FX-550 / FX-550L series (Lower value) HYPR	U-LG	LONG	STD	FAST	H-SP	FX-100 series FX-101	FX-102
FT-40V	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	1,500 59.055 1,800 (Note 5) 70.866	900 35.433 1,650 64.961	370 14.567 —	450 17.717	1,600 62.992

FV-SV1

Beam axis is bent by 90°.
- Ambient temperature: -30 to +300 °C -22 to +572 °F (Note 2)
- Beam axis dia: ø3 mm ø0.118 in

Sensing range (mm in) [Lens on both sides] (Note 3) (Note 4)

Fiber \ Amplifier / Mode	FX-500 series (Upper value) FX-550 / FX-550L series (Lower value) HYPR	U-LG	LONG	STD	FAST	H-SP	FX-100 series FX-101	FX-102
FT-40V	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	900 35.433 1,800 (Note 5) 70.866	700 27.559 1,050 41.339	450 17.717 720 28.346	290 11.417 430 16.929	90 3.543 —	150 5.906	460 18.110

FV-SV2

Beam axis is bent by 90°.
- Ambient temperature: -60 to +300 °C -76 to +572 °F (Note 2)
- Beam axis dia: ø3.7 mm ø0.146 in

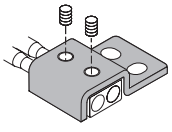
Sensing range (mm in) [Lens on both sides] (Note 3) (Note 4)

Fiber \ Amplifier / Mode	FX-500 series (Upper value) FX-550 / FX-550L series (Lower value) HYPR	U-LG	LONG	STD	FAST	H-SP	FX-100 series FX-101	FX-102
FT-40V	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	1,800 (Note 5) 70.866 1,800 (Note 5) 70.866	1,500 59.055 1,800 (Note 5) 70.866	900 35.433 1,100 43.307	370 14.567 —	450 17.717	1,600 62.992

Notes: 1) Be careful when installing the thru-beam type fiber equipped with the lens, as the beam envelope becomes narrow and alignment is difficult.
2) Refer to previous page for the ambient temperature of fibers to be used in combination.
3) **FX-550L** series does not have FAST mode.
4) The fiber cable length for the **FT-40V** is 1 m 3.281 ft. The sensing ranges take into account the length of the **FT-J9** atmospheric side fiber.
5) The fiber cable length practically limits the sensing range.

Accessory

- Mounting bracket for **FD-KZ50V**
  MS-FD-2



OPTIONS

Amplifiers

Type		Appearance	Model No.	Emitting element	Output
FX-500 series	Standard type		**FX-501** (Note 1)	Red LED	NPN open-collector transistor
			FX-501P (Note 1)		PNP open-collector transistor
	2-output type		**FX-502** (Note 1)		NPN open-collector transistor 2 outputs
			FX-502P (Note 1)		PNP open-collector transistor 2 outputs
	Cable type		**FX-505-C2**		NPN open-collector transistor 2 outputs, analog output
			FX-505P-C2		PNP open-collector transistor 2 outputs, analog output
FX-550 series	Connector type		**FX-551** (Note 1)		NPN open-collector transistor
			FX-551P (Note 1)		PNP open-collector transistor
	Cable type		**FX-551-C2**		NPN open-collector transistor
			FX-551P-C2		PNP open-collector transistor
FX-550L series	Discrete wire type		**FX-551L3-P-C2**		PNP open-collector transistor
	M12 connector type		**FX-551L3-P-J**		
FX-100 series	Standard type — Cable set		**FX-101-CC2**		NPN open-collector transistor
			FX-101P-CC2		PNP open-collector transistor
			FX-101 (Note 1)		NPN open-collector transistor
			FX-101P (Note 1)		PNP open-collector transistor
	Long sensing range type — Cable set		**FX-102-CC2**		NPN open-collector transistor
			FX-102P-CC2		PNP open-collector transistor
			FX-102 (Note 1)		NPN open-collector transistor
			FX-102P (Note 1)		PNP open-collector transistor

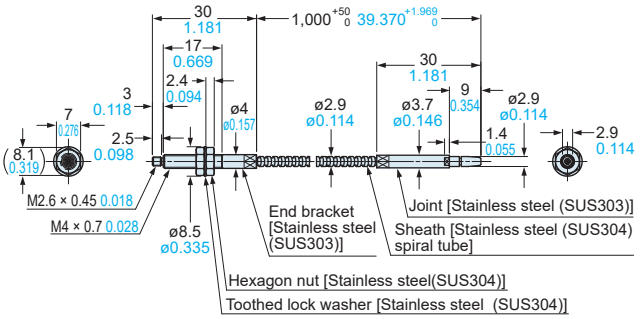
Notes: 1) The amplifier is not provided with a quick-connection cable / connector attached cable. Be sure to purchase an optional quick-connection cable / connector attached cable.
2) Refer to the catalog of applicable amplifier or visit our website for the details of the amplifier.

DIMENSIONS (Unit: mm in)

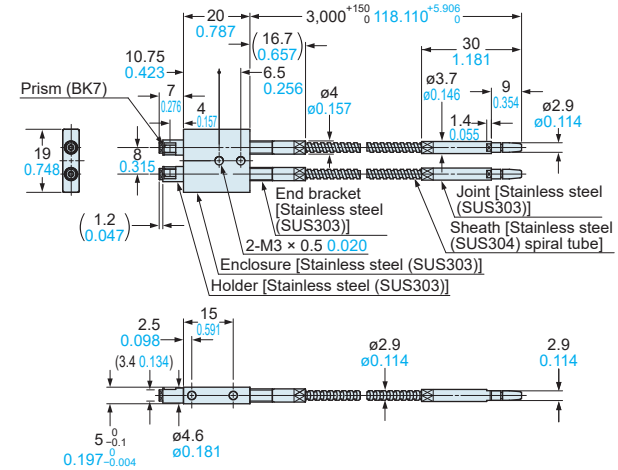
The CAD data can be downloaded from our website.

Refer to the catalog of the applicable product series or visit our website for dimensions of the amplifier.

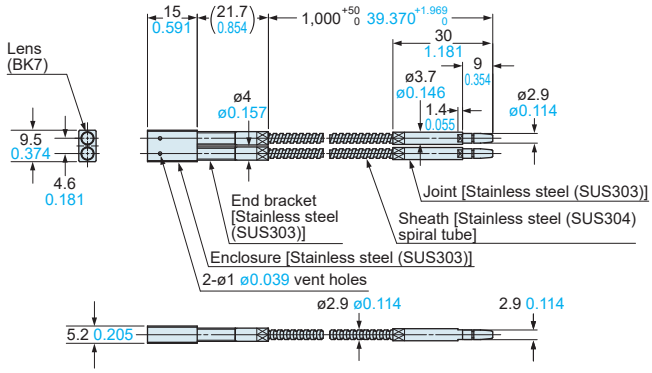
FT-40V — Vacuum-resistant thru-beam type fiber



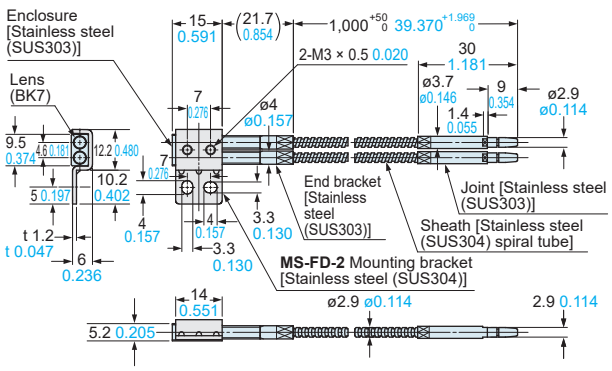
FD-L10V — Vacuum-resistant convergent reflective type fiber



FD-KZ50V — Vacuum-resistant long range reflective type fiber



Assembly dimensions with MS-FD-2 (attached mounting bracket)

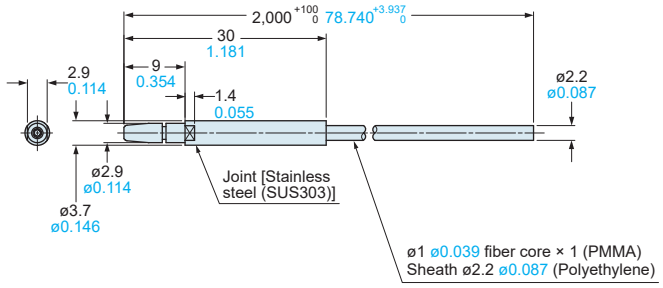


DIMENSIONS (Unit: mm in)

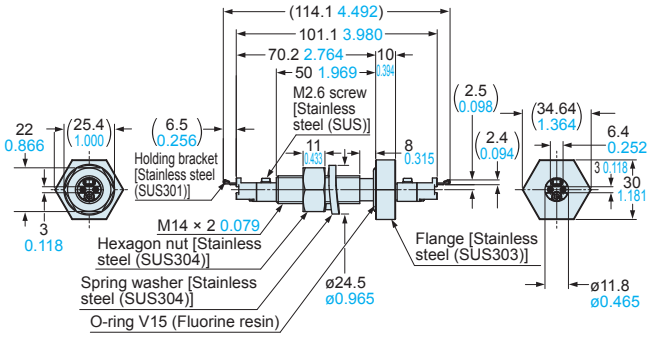
The CAD data can be downloaded from our website.

Refer to the catalog of the applicable product series or visit our website for dimensions of the amplifier.

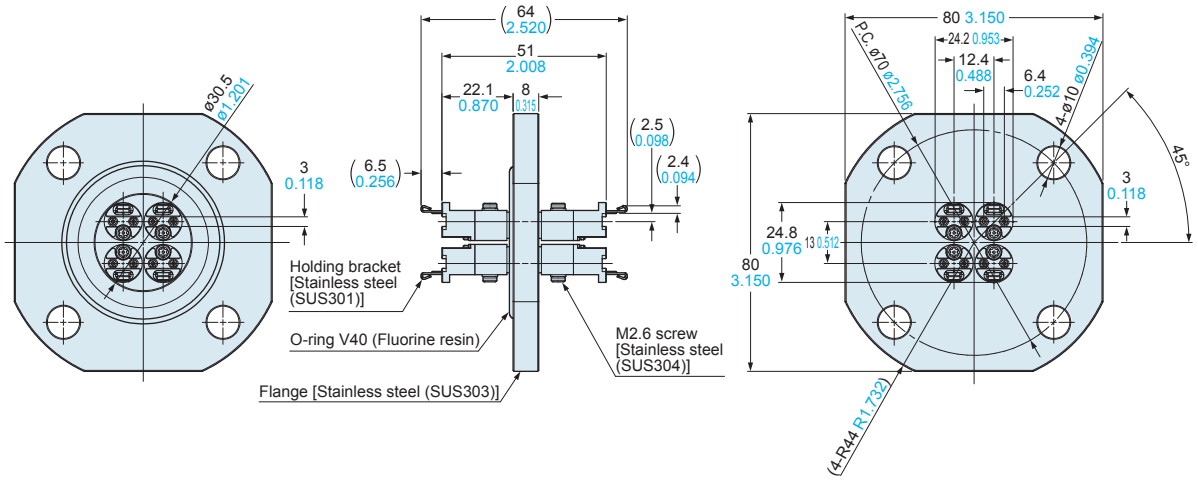
FT-J9 Atmospheric side fiber (Optional)



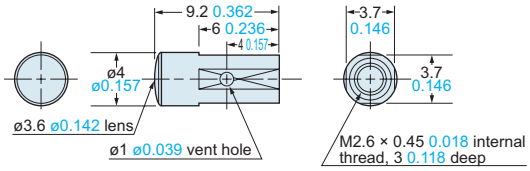
FV-FR1 Vacuum-resistant flange 1CH (Optional)



FV-FR4 Vacuum-resistant flange 4CH (Optional)

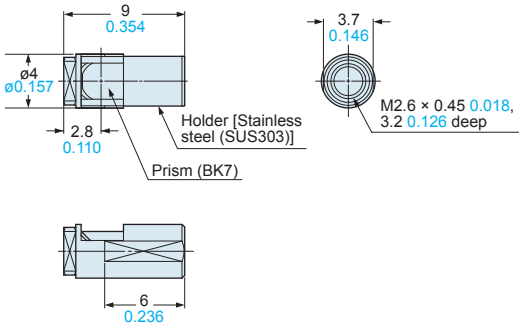


FV-LE1 Vacuum-resistant expansion lens (Optional)

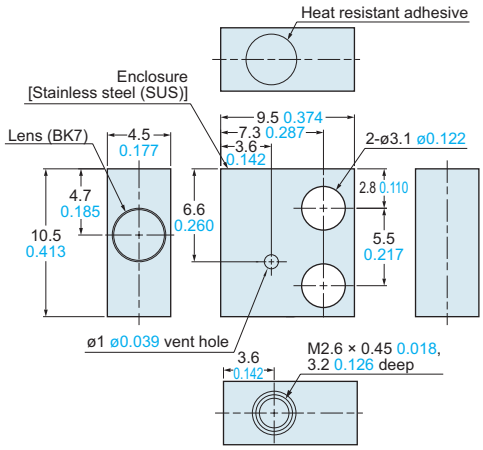


Material: Enclosure.....Aluminum alloy (A6061-T6)
Lens.....BK-7

FV-SV1 Vacuum-resistant compact side-view lens (Optional)



FV-SV2 Vacuum-resistant side-view lens (Optional)



Fiber Sensor and Communication Unit

Digital Fiber Sensor

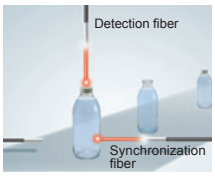
FX-500 SERIES Ver.2

CE | UKCA (Excluding **FX-551**□) | cULus Listing (Excluding **FX-551**□)

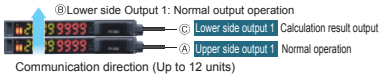
Built-in logic functions
No PLC necessary, saving material and programming costs

■ Logical calculation functions

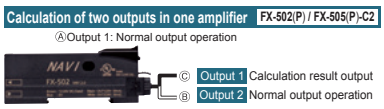
3 logical calculations (AND, OR, XOR) are available with fiber sensor only. 3 logical operations can be selected against Output 1. Additional controller is not required so both wire-saving and cost reduction can be achieved.



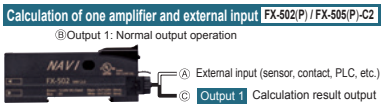
Calculation of two neighboring amplifiers



Calculation of two outputs in one amplifier FX-502(P) / FX-505(P)-C2



Calculation of one amplifier and external input FX-502(P) / FX-505(P)-C2

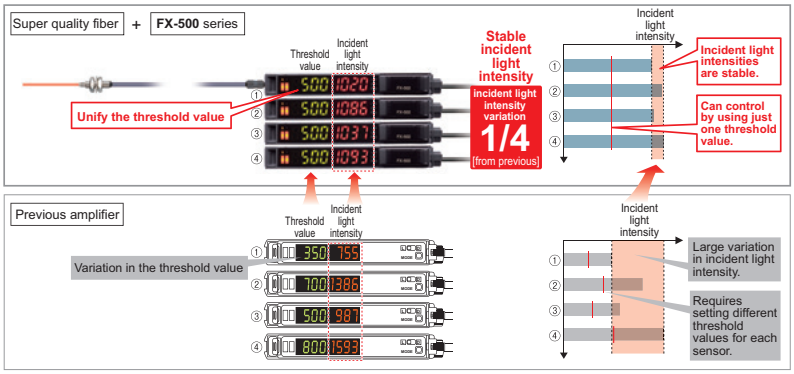


Truth table

A	B	Logical calculation output (C)		
		AND	OR	XOR
ON	ON	ON	ON	OFF
OFF	ON	OFF	ON	ON
ON	OFF	OFF	ON	ON
OFF	OFF	OFF	OFF	OFF

Reduces individual fiber sensor differences and improves stability noticeably!

When the **FX-500** series is used together with our super quality fiber, the incident light intensity variation among units is decreased to only 1/4 of that of conventional models.
By being close to absolute values instead of modified digital values, changes in detection that could not be found in the past can now be monitored.



Communication Unit for Open Network

SC-GU3 SERIES

CE | UKCA

Direct connection of digital sensors to open network!

High reliability
Remote monitoring capability

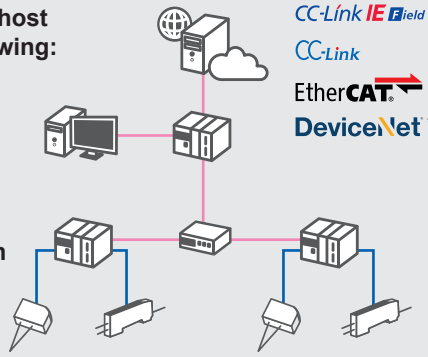
High operating rate
Improved maintainability

Reduced installation time
Wire-saving and space-saving

The SC-GU3 connects to the host system and enables the following:

- Saves traceability data
- Enables the change of threshold data all at once
- Acquires current values for use in predictive maintenance
- Remote control of equipment

Contributes to the acquisition of digital data of equipment status and application of IoT technology.



*: The order for the DeviceNet communication unit **SC-GU3-02** is scheduled to end on September 30, 2024.

Disclaimer

The applications described in the catalog are all intended for examples only. The purchase of our products described in the catalog shall not be regarded as granting of a license to use our products in the described applications. We do NOT warrant that we have obtained some intellectual properties, such as patent rights, with respect to such applications, or that the described applications may not infringe any intellectual property rights, such as patent rights, of a third party.

Panasonic INDUSTRY

Panasonic Industry Co., Ltd.
Industrial Device Business Division
7-1-1, Morofuku, Daito-shi, Osaka 574-0044, Japan
industry.panasonic.com

Specifications are subject to change without notice.
No. PCE-VRFIBER-1
2024.7