UV Power Monitor | F3UV

Monitor the Output of a UV Light Source through an Optical Fiber Cable

- ■ Head Unit withstands temperatures of up to 300°C.
- ■ Easy-to-read digital display of measurement values.
- ■ Harmful UV light converted to visible light before performing measurements. This feature prevents deterioration of the Amplifier's light receiving element.

CE

Ordering Information

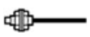
Amplifier

Appearance	Connection method	Outputs	Transistor type	Model number
	Pre-wired cable	• Judgement output • Answer-back output • Analog current or voltage output	NPN	F3UV-XW11
				F3UV-XW11-1 (Five-times higher sensitivity)
			PNP	F3UV-XW41

Head Unit

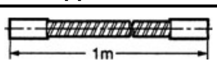
Appearance	Wavelength range of incident light	Max. temperature	Model number	Remarks
	200 to 370 nm	300°C (Use at temperatures below the Fiber Unit's rated operating temperature.)	F3UV-HM	Includes two M8 nuts and one mounting plate.

Fiber Units

Compatible Amplifier Units	Compatible Head Units	Appearance	Max. temperature	Intensity range of incident light (see note)	Model number	Quantity
F3UV-XW11 (-1), F3UV-XW41	F3UV-HM	 M4 threads, 2 m	300°C	10 to 300 mW/cm^2	F32-300	1
		 M4 threads, 2 m	70°C	10 to 300 mW/cm^2	F32-70	

Note: The values given are for a standard UV light source with a central wavelength of 360 nm, measured with a standard illumination meter (and for use in combination with the specified Amplifier and Head Unit). The power range is one for which teaching to 100% is possible.

■ Accessories (Sold Separately)

Appearance	Name	Model number	Quantity	Applicable Fiber Units
	Protective Tube (Protects the fiber.)	F39-FU1M	1	F32-70

Specifications

■ Ratings/Characteristics

Amplifiers

Item		F3UV-XW11 (-1)	F3UV-XW41
Power supply voltage		12 to 24 VDC ±10%	
Current consumption		75 mA max.	
Outputs	Analog output	Current (4 to 20 mA) or voltage (1 to 5 V) (Monitoring mode or integral mode)	
	Judgement output	NPN open collector output, 100 mA max., residual voltage 1 V max. (Monitoring mode or integral mode)	PNP open collector output, 100 mA max., residual voltage 2 V max. (Monitoring mode or integral mode)
	Answer-back output		
Inputs	Remote teaching input	ON: 0 V short-circuit (current 1 mA max.)	ON: Power supply voltage short-circuit or 9 to 24 V (open-circuit current: 3 mA max.)
	Reset input	OFF: Open (open or 9 to 24 V)	OFF: Open (open or 1.5 V max.)
Protective circuits		Reversed power supply polarity protection and output short-circuit protection	
Response time[1]		500 ms max.	
Sensitivity setting		Teaching function	
Indicators		Power supply/Teaching indicator (green/red), Operation indicator (orange), 7-segment digital percentage display (red), 7-segment digital threshold display (red)	
Repetitive accuracy		±2% F.S. max.	
Ambient operating illumination[2]		Fluorescent light 1,000 lx max.	
Temperature drift		±0.1% of F.S./°C max.	
Ambient temperature		Operating: –25 to 55°C (with no icing or condensation) Storage: –40 to 70°C (with no icing or condensation)	
Ambient humidity		Operating or storage: 35% to 85%	
Insulation resistance		20 MΩ min. (at 500 VDC)	
Dielectric strength		1,000 V AC 50/60 Hz between the leads and the case	
Vibration resistance		10 to 150 Hz, 0.1-mm amplitude or 15 m/s^2 in X, Y, and Z directions each for 2 hours	
Shock resistance		150 m/s^2 three times each in the X, Y, and Z directions	
Degree of protection		Conforms to IEC 60529 standards IP30	
Connection method		Pre-wired cable with a standard length of 2 m	
Weight (packed)		Approx. 270 g	
Material		ABS plastic	
Accessories		Operation Manual	

Note:
1. The response time is the rise time or fall time of the output signal to 10 to 90%.
2. The ambient operating illumination is the illumination that changes the analog output +5% F.S. at 200 lx; it is not the operational limit.
3. An analog output of up to 6 V (or 24 mA) can be output. The output is 1 V (or 4 mA) when there is no incident UV light.
4. F.S. stands for full scale. For a current output, full scale is 16 mA (4 to 20 mA). For a voltage output, full scale is 4 V (1 to 5 V).
5. Definition of the luminous energy integral: The physical unit of the luminous energy integral is energy (J: joules) and this value is calculated by multiplying the UV intensity (mV) by the time of exposure (s), but it is dimensionless when this sensor's analog output value (V) is used for the UV intensity. The integral is measured with an 11 ms sampling time.

Head Unit

Item		F3UV-HM
Incident light wavelength range		200 to 370 nm
Temperature drift		–0.15%/°C max.
Ambient temperature		Operating or storage: –40° to 300°C (with no icing or condensation)
Ambient humidity		Operating or storage: 35% to 85% (with no icing or condensation)
Weight (packed)		Approx. 300 g
Vibration resistance		10 to 55 Hz, 0.75-mm amplitude or 10 m/s^2
Shock resistance		500 m/s^2
Material	Protective casing	Stainless steel (SUS303)
	Fluorescent fiber path	Functional fluoroglass
Accessories		M8 nut and mounting bracket

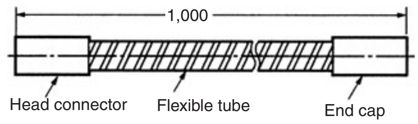
Fiber Units

Item	Model	
	F32-300	F32-70
Ambient temperature (with no icing or condensation)	Operating: –40° to 300°C*1 Storage: –40° to 110°C	Operating: –40° to 70°C Storage: –40° to 70°C
Ambient humidity (with no icing or condensation)	Operating: 35 to 85% Storage: 35 to 95%	
Bending radius	25 mm min.	25 mm min.
Fiber outer sheathing material	SUS	Black polyethylene
Degree of protection	Conforms to IEC IP67	
Standard fiber length	2 m	

Note: The maximum temperature is lower near the amplifier unit. See the Dimensions for details.

Accessories (Sold Separately)

Protective Tube (Protects the Fiber.)

<table>
<tr><th colspan="2" rowspan="2">Item</th><th>F39-FU1M</th></tr>
<tr><td>
</td></tr>
<tr><td colspan="2">Ambient temperature</td><td>–40° to 150°C for operation and storage
(Keep the ambient temperature within the range specified for the fiber within the tube.)</td></tr>
<tr><td colspan="2">Ambient humidity</td><td>Operating: 35 to 85%
Storage: 35 to 95%</td></tr>
<tr><td colspan="2">Bending radius</td><td>30 mm min.</td></tr>
<tr><td colspan="2">Max. pulling force</td><td>1.5 N·m max. between the head connector and tube, 1.5 N·m max. between the end cap and tube, and 2 N·m on the tube itself</td></tr>
<tr><td colspan="2">Crush weight</td><td>29.4 N·m max. on the tube</td></tr>
<tr><td rowspan="3">Material</td><td>Head connector</td><td rowspan="2">Nickel-plated brass</td></tr>
<tr><td>End cap</td></tr>
<tr><td>Tube</td><td>Stainless (SUS304)</td></tr>
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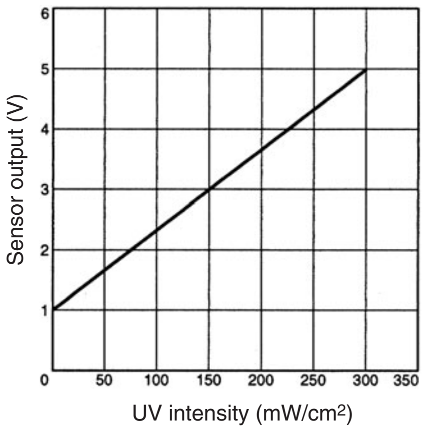
Engineering Data

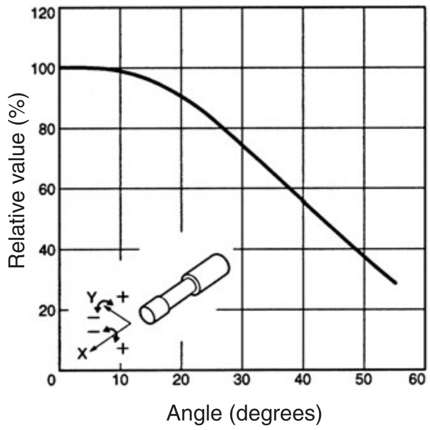
Output Characteristics
F3UV-XW□1 + F3UV-HM + F32-300

(Output characteristics when the sensitivity is set at 300 mW/cm2.)



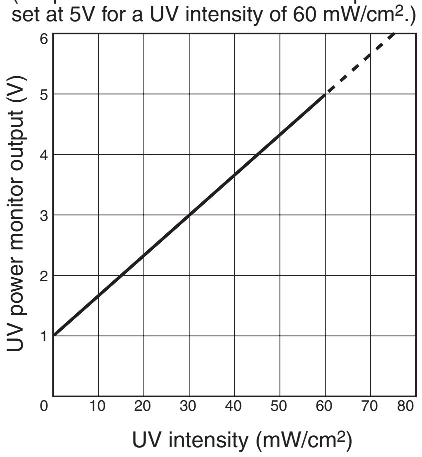
Angular Characteristics (Y-direction)
F3UV-HM

The output variation in the X-direction is less than ±10% of F.S. in a full 360° rotation.

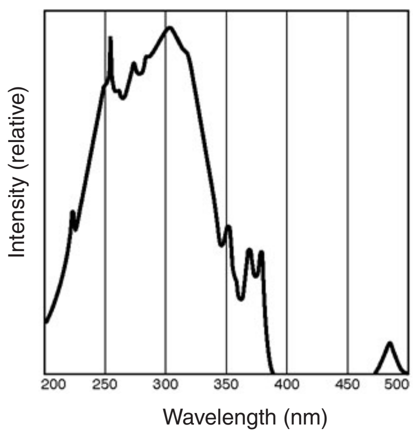


Output Characteristics
F3UV-XW11-1 + F3UV-HM + F32-70

(Output characteristics when the output is set at 5V for a UV intensity of 60 mW/cm2.)



Sensitivity Characteristics
All F3UV Models



Nomenclature

F3UV-XW11 (-1) /-XW41

Measurement/Teaching indicator

Lit green: Teaching OK RUN
Flashing red: Teaching error
Lit red: Start light intensity integration

Operation indicator

Lit orange: Judgement output ON

Processing mode switch
Light intensity monitor mode

TEACH: Zero point setting/ sensitivity setting
ADJ: Threshold adjustment
RUN: Measure light intensity

Light intensity integral mode

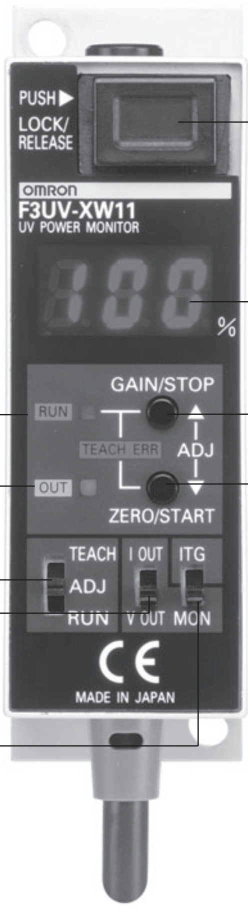
TEACH: Start/stop integration
RUN (ADJ): Light intensity integral

Output selection switch

IOUT: Current output (4 to 20 mA)
VOUT: Voltage output (1 to 5 V)

Operation mode switch

MON: Light intensity monitor mode
TG: Light intensity integral mode



Fiber lock

Digital display

Sensitivity setting/threshold up
Light intensity monitor mode (MON)

TEACH: Sensitivity setting
ADJ: Threshold adjustment (Up button)

Light intensity integral mode (ITG)

TEACH: Stop integration

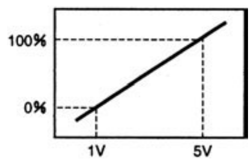
Zero point setting/threshold down
Light intensity monitor mode (MON)

TEACH: Zero point setting
ADJ: Threshold adjustment (Down button)

Light intensity integral mode (ITG)

TEACH: Start integration

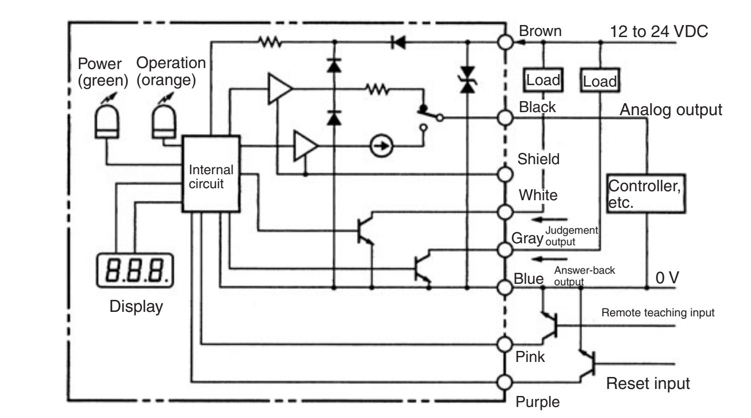
Functions

Name	Function
Indicator functions	
Measurement/teaching indicator	• Lit green: Teaching OK RUN • Flashing red: Teaching error • Lit red: Start light intensity integration
Operation indicator	• Lit orange: Judgement output ON
Digital display	• Percentage display when operating in light intensity monitor mode HI: Greater than 124% LO: Less than 0%
Output functions	
Analog output (switchable)	• Outputs a current (4 to 20 mA) or voltage (1 to 5 V) that is proportional to the incident light intensity. Select current or voltage output with the output selection switch.
Judgement output	• ON when the incident light intensity is below the set threshold value. • OFF when the incident light intensity is above the set threshold value. (Includes a short-circuit protection function.)
Answer-back output	• A one pulse output (1 sec) is generated when remote teaching has been completed normally.
Input functions	
Reset input	• This trigger signal starts integration when the Unit is in integral mode and the processing mode is set to “RUN”.
Remote teaching input	• When the Unit is in monitor mode or integral mode, teaching is performed when a pulse signal is input here.
Threshold setting function (monitor mode only)	• The desired threshold value can be set by pressing the Up and Down buttons. (The digital display will change in 1% increments when the value is set.)
Sensitivity setting function (monitor mode only)	
Zero point setting	• Sets the zero point reference when the UV light source is OFF. After teaching, the digital display will read “0%”.
Sensitivity setting	• Sets the initial sensitivity when the UV light source is ON. After teaching, the digital display will read “100%”.
Max. sensitivity setting	• Sets the sensor sensitivity to the maximum sensitivity.
Min. sensitivity setting	• Sets the sensor sensitivity to the minimum sensitivity.
Light intensity monitor function (Part of the current/voltage output switching function.)	• Displays the digital (%) value corresponding to the incident light intensity and outputs the analog and judgement outputs. 
Light intensity integral function (Part of the current/voltage output switching function.)	• Calculates the light intensity integral value (I) from the incident light intensity (P) and time (T) using the following equation: $I = P \times T$. Also outputs the integral’s analog output simultaneously and displays the digital (%) value. (Output ON at 100%.)

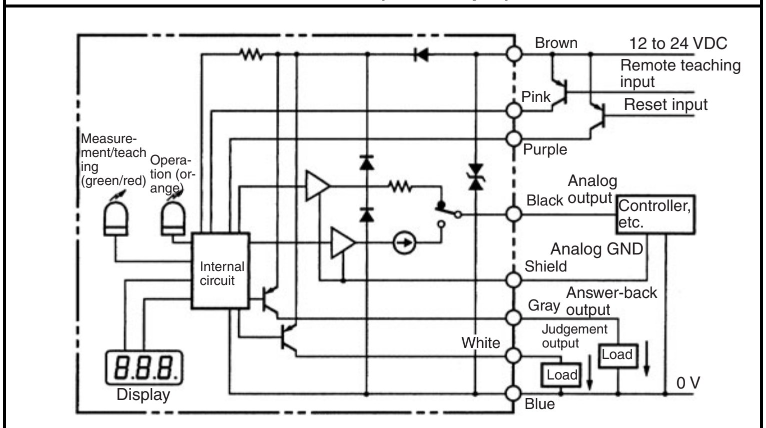
Operation

■ I/O Circuit Configuration

F3UV-XW11 (-1) (NPN Output)



F3UV-XW41 (PNP Output)

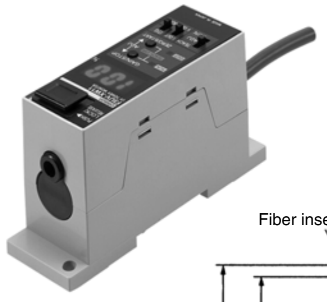


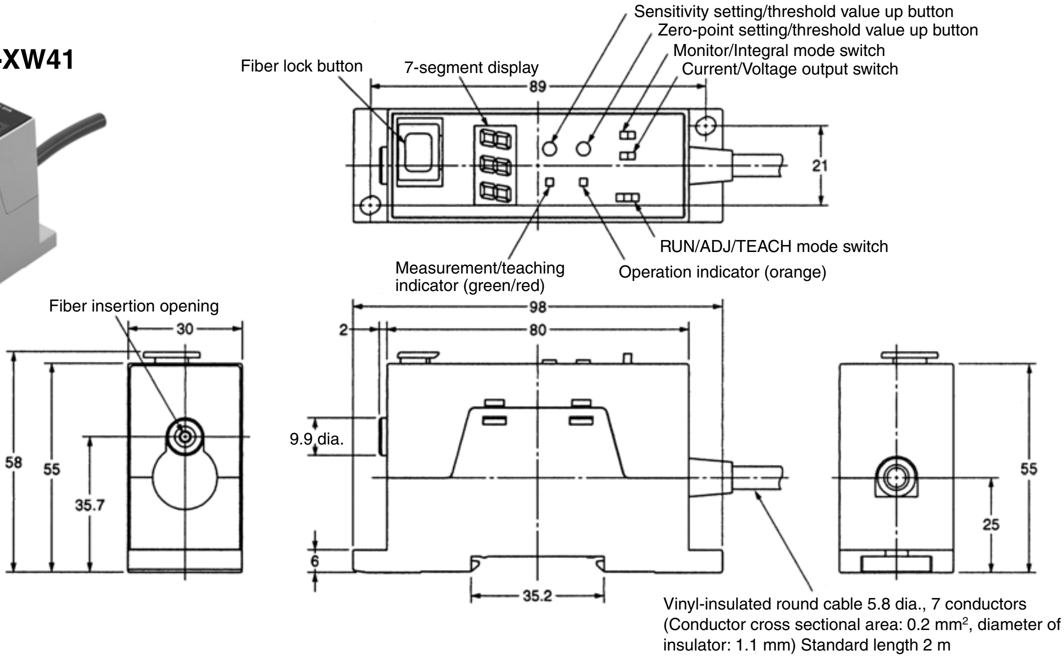
Dimensions

Note: All units are in millimeters unless otherwise indicated.

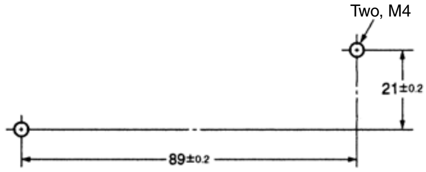
Main Units

Amplifier
F3UV-XW11 (-1) /-XW41

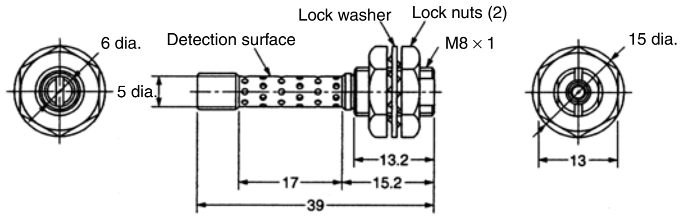




Mounting Hole Dimensions

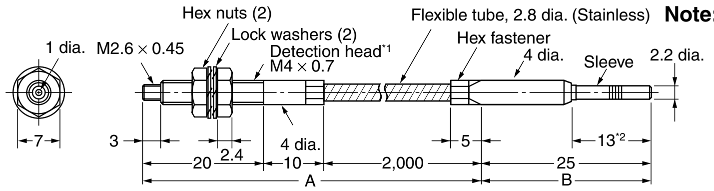


Base Unit
F3UV-HM



Material: Stainless steel (SUS303)

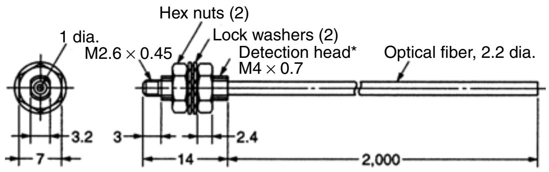
Fiber Unit
F32-300



Note: The max. temperature is 300°C in section A and 110°C in section B, which connects to the Main Unit. The part of section B that is actually inserted into the Main Unit must remain within the Main Unit's rated operating temperature range.

*1: Material: Stainless steel (SUS303)

Fiber Unit
F32-70 (Cuttable)

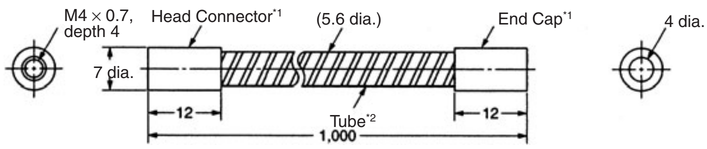


*Material: Nickel-plated brass

Note: The "cuttable" Fiber Units can be cut to length. Units that are not marked "cuttable" cannot be cut to length.

Accessories (Sold Separately)

Protective Tube (Protects the Fiber.)
F32-FU1M



Note: 1. Material: Nickel-plated brass
2. Material: Stainless steel (SUS304)

Precautions

Be sure to observe the precautions listed here. These precautions are essential for safe operation.

- Do not use these Units in locations with flammable or explosive gases.
- Do not use these Units in water.
- Do not attempt to disassemble, repair, or improve these products.
- Always use a power supply voltage that is within the specified operating range. Do not use with an AC power supply.
- Be sure that wiring is correct, such as the polarity of the power supply leads.
- Connect loads properly.
- Do not short-circuit the load's terminals.
- Do not mount the Amplifier Unit in a location where it will be exposed to UV light.

■ Precautions Common to the Amplifiers

Wiring

Connections

Make sure that the power supply voltage is below the maximum voltage before turning the power ON.

Be sure that the terminal polarity and wiring are correct.

Never share a conduit that is used for high-voltage or power lines.

Use extension cords with a minimum thickness of 0.3 mm^2, less than 5 m long, and check operation before using.

Power Supply

When using a commercial switching regulator, ground the FG (frame ground) and G (ground) terminals. Output signal noise will be excessive if the power supply is not grounded.

After turning on the power supply, wait for at least one second until consistent detections can be performed before using the Monitor. If separate power supplies are used for the F3UV and connected devices, always turn ON the F3UV's power supply first.

Installation and Operation

Installation

UV light is harmful, so be sure to turn OFF the UV light source before installing the F3UV.

Sensitivity Setting

The analog output value will change due to temperature drift. If the temperature is rising, wait for the temperature to stabilize before setting the sensitivity.

Installation

1.Installation Torque

Torque the sensor's Main Unit screws to 0.49 N·m max.

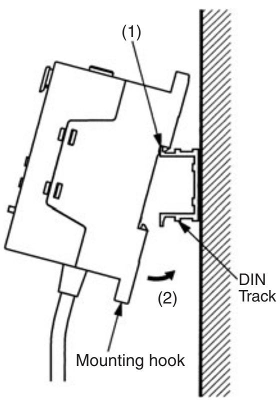
2.Using DIN Track
(Installation)

1. Hook the top of the Unit onto the DIN Track.
2. Snap the bottom of the Unit onto the DIN Track.

Note: Do not reverse steps 1 and 2.

(Removal)

When removing the Unit from the DIN Track, pull the mounting hook forward to release it.



Precautions Regarding UV Light

The Amplifier itself is not protected against UV exposure. Do not install the Amplifier in locations where it will be exposed to UV light.

Adjustment

Basic Operating Procedures

1. Install the Amplifier Unit.
2. Connect the Fiber Unit to the Amplifier Unit.
3. Turn ON the power supply.
4. Select an operating mode with the operation mode switch. (Light intensity monitor mode or light intensity integral mode)
5. When using the analog output, select current or voltage output with the output selection switch.
6. Set the processing mode switch to TEACH and perform the teaching operation.
   - Light Intensity Monitor Mode
     Make the zero-point setting when the indicator is not lit and make the sensitivity setting when the indicator is lit. (Make the sensitivity setting after the temperature has stabilized.)
   - Light Intensity Integral Mode
     Use the start setting at the start of illumination and the stop setting when completed. Teaching can be performed by pressing the buttons or with codes.
7. When changing the threshold value in light intensity monitor mode, set the processing mode switch to ADJ and adjust the threshold value. The judgement output will go ON when the light intensity is below the threshold value. The threshold value is set to 50 at the factory.
8. Set the processing mode switch to RUN to start measurement. In light intensity integral mode, start integration with the Reset input.

Cleaning

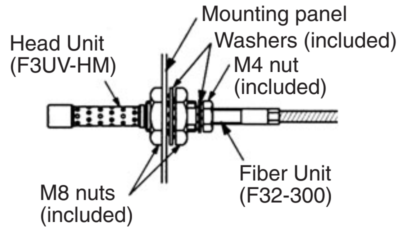
Never use paint thinner or mineral spirits of any kind.

■ Fiber Unit/Base Unit

Installation

Installing the Head Unit

When connecting the Head Unit and Fiber Unit, tighten to a torque of 0.78 N·m max. When installing the Head Unit, be sure to turn OFF the UV light source and check that it is safe to install the Unit.

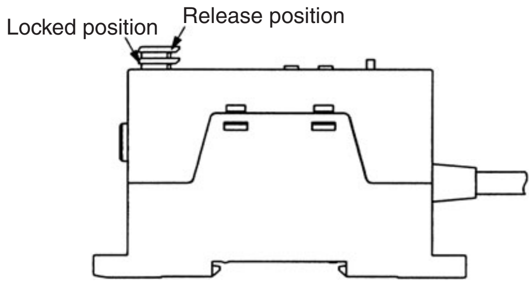


Installing the Fiber Unit and Amplifier Unit

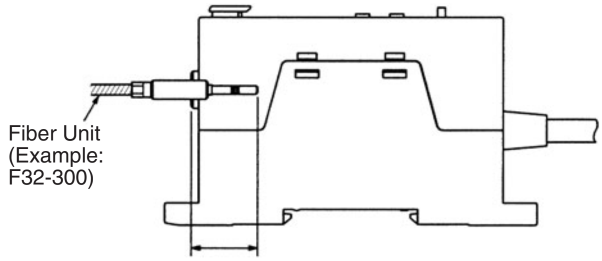
The quality of the connection between the Fiber Unit and Amplifier Unit has a major impact on the operating characteristics, so be sure to connect these Units securely.

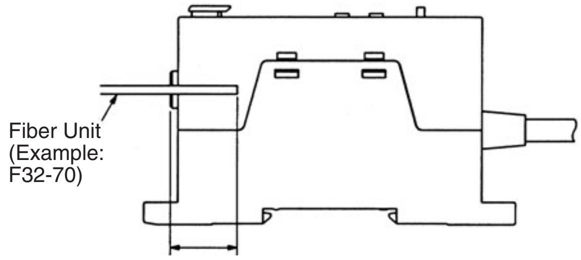
Securing the Fiber Unit

1. Cutting the Fiber (F32-70 only)
   - Insert the fiber into the hole of the cutting tool and set the tool at the desired length.
   - Press down on the blade and cut the fiber. Do not stop when the fiber is only partially cut; make one clean cut.
   - Once a hole has been used to cut a fiber, do not use that hole again. The cut surface may not be clean enough and the detection characteristics may be degraded.
2. Installing the Fiber
   With the lock button in the release position, insert the fiber into the Unit and press the button until you hear a click. This click is the sound of the fiber being locked.



3. Removing the Fiber
   Press the lock button again. The lock will be released, the lock button will pop up, and it will be possible to remove the fiber. Do not force the lock button up by pulling on it. (To maintain the fiber's characteristics, check whether the lock is out of place.)
4. Fiber Insertion Location
   When inserting the Fiber Unit into the Amplifier Unit, always insert the Fiber Unit completely as shown in the following diagram.





5. Fiber Unit Installation/Removal Precautions
   Install and remove the Fiber Unit only when the ambient temperature is between –40 and 40°C.
6. Protecting the Fiber Unit
   When the outer sheathing of a FIber Unit other than the F32-300 will be exposed to UV light, protect the fiber by covering it with the F39-FU1M Protective Tube.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

OMRON

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1. Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
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11. Shipping; Delivery. Unless otherwise expressly agreed in writing by Omron:
    a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
    b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
    c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
    d. Delivery and shipping dates are estimates only; and
    e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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17. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.
18. Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron's written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) Amendment. These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) Definitions. As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

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   (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
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