

VF SERIES

Related Information

- General terms and conditions..... F-17
- Sensor selection guide..... P.283~
- Glossary of terms.....P.1359~
- General precautions P.1405



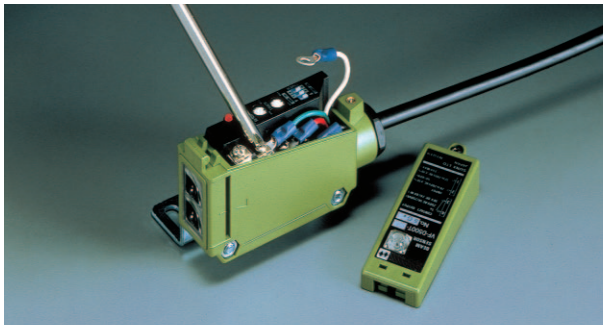
panasonic-electric-works.net/sunx



Easy to use terminal connection type

New convenient construction

The slanted step-wise terminal enables quick and easy connection.



Multi-voltage

The VF series can operate at 24 to 240 V AC or 12 to 240 V DC, which is suitable for supply voltages around the world.

Timer function models

The sensing signal can be easily converted to suit your control process. It is also suitable for PLC input.

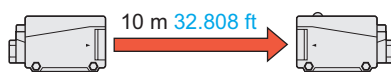
- Timer duration: 0.1 to 5 sec. (Variable)
- Operation: ON-delay
OFF-delay
ONE SHOT(Normal)

BASIC PERFORMANCE

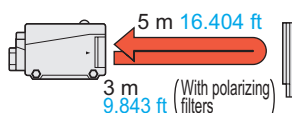
Long sensing range

The VF series ensures stable detection with its long sensing range.

Thru-beam type



Retroreflective type



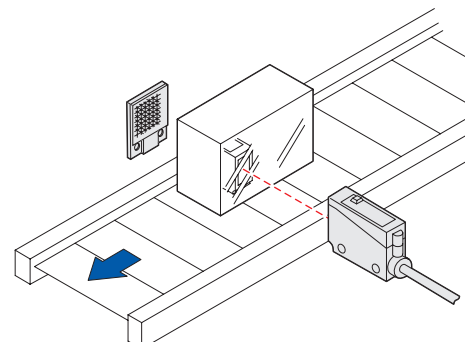
Diffuse reflective type



VARIETIES

Retroreflective sensor with polarizing filters **VF-PRM3**

VF-PRM3 ensures reliable sensing even with shiny or specular objects that travel in different direction.



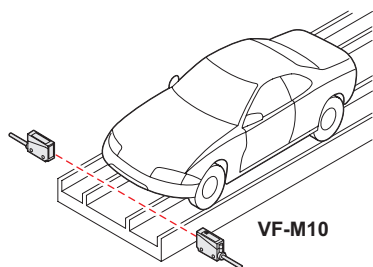
- FIBER SENSORS
- LASER SENSORS
- PHOTOELECTRIC SENSORS
- MICRO PHOTOELECTRIC SENSORS
- AREA SENSORS
- LIGHT CURTAINS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
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- LASER MARKERS
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- HUMAN MACHINE INTERFACES
- ENERGY CONSUMPTION VISUALIZATION COMPONENTS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS

- Selection Guide
- Amplifier Built-in
- Power Supply Built-in
- Amplifier-separated

- NX5
- VF

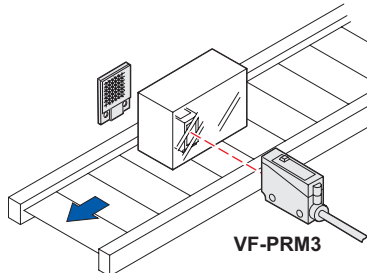
APPLICATIONS

Car positioning at parking garage



VF-M10

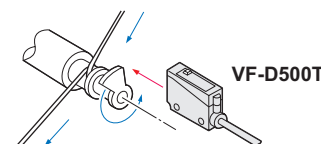
Sensing traveling objects



VF-PRM3

Sensing coil wire end

The wire is wound once around a pole with a fin. The sensor detects the rotating fin. By using the OFF-delay timer, an OFF signal can be generated when the wire comes to an end.



VF-D500T

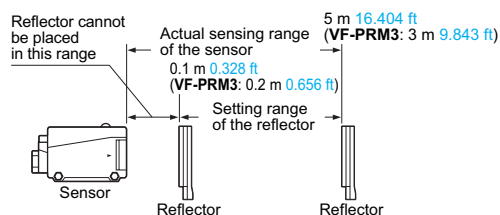
ORDER GUIDE

Type	Appearance	Sensing range	Model No. (Note 2)	Timer function	Supply voltage	Output
Thru-beam		10 m 32.808 ft	VF-M10	—	24 to 240 V AC $+10\%$ -15% or 12 to 240 V DC $+10\%$ -15%	Relay contact 1a
			VF-M10T	Incorporated		
Retroreflective		0.1 to 5 m 0.328 to 16.404 ft (Note 1)	VF-RM5	—		
			VF-RM5T	Incorporated		
With polarizing filters		0.2 to 3 m 0.656 to 9.843 ft (Note 1)	VF-PRM3	—		
Diffuse reflective		500 mm 19.685 in	VF-D500	—		
			VF-D500T	Incorporated		
			VF-D1000	—		
Long sensing range		1 m 3.281 ft	VF-D1000T	Incorporated		

Notes: 1) The sensing range for the retroreflective type sensor is specified for the **RF-230** reflector.

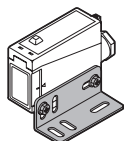
Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 0.1 m 0.328 ft (VF-PRM3: 0.2 m 0.656 ft) away.

2) The model No. with "P" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver. (e.g.) Emitter of VF-M10: VF-M10P, Receiver of VF-M10: VF-M10D



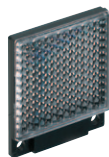
Accessories

• **MS-N70** (Sensor mounting bracket)

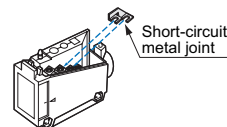


Two M5 (length 30 mm 1.181 in) cross-recessed hexagon bolts and two M5 nuts are attached.

• **RF-230** (Reflector)



• **VF-SKG** (Short-circuit metal joint)



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PARTICULAR USE SENSORS

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FA COMPONENTS

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Power Supply Built-in

Amplifier-separated

NX5

VF

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OPTIONS

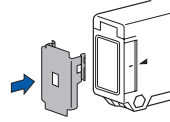
Designation	Model No.	Description
Slit mask (For thru-beam type sensor only)	OS-VF-3×6 (Slit size 3 × 6 mm) (0.118 × 0.236 in)	Slit on one side <ul style="list-style-type: none"> • Sensing range: 2 m 6.562 ft • Min. sensing object: $\varnothing 20$ mm $\varnothing 0.787$ in
		Slit on both sides <ul style="list-style-type: none"> • Sensing range: 1 m 3.281 ft • Min. sensing object: 3 × 6 mm 0.118 × 0.236 in
	OS-VF-6×12 (Slit size 6 × 12 mm) (0.236 × 0.472 in)	Slit on one side <ul style="list-style-type: none"> • Sensing range: 4 m 13.123 ft • Min. sensing object: $\varnothing 20$ mm $\varnothing 0.787$ in
		Slit on both sides <ul style="list-style-type: none"> • Sensing range: 3 m 9.843 ft • Min. sensing object: 6 × 12 mm 0.236 × 0.472 in
Reflector (For retroreflective type sensor only)	RF-220	<ul style="list-style-type: none"> • Sensing range: 0.1 to 4 m 0.328 to 13.123 ft (VF-RM5□) 0.2 to 2 m 0.656 to 6.562 ft (VF-PRM3) • Sensing object: $\varnothing 35$ mm $\varnothing 1.378$ in, or more, opaque object
Reflector mounting bracket	MS-RF22	For RF-220
	MS-RF23	For RF-230
Sensor checker (Note)	CHX-SC2	It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as an audio signal.

Note: Refer to the sensor checker **CHX-SC2** pages for details.

Slit mask

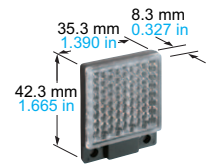
- OS-VF-3×6
- OS-VF-6×12

Fitted on the front face of the sensor with one-touch.



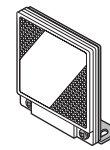
Reflector

- RF-220



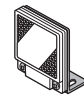
Reflector mounting bracket

- MS-RF23



Two M4 (length 10 mm **0.394 in**) screws with washers are attached.

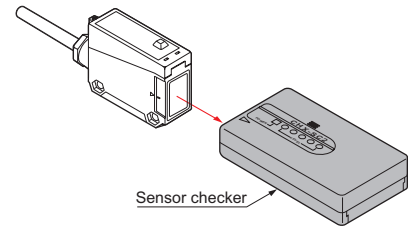
- MS-RF22



Two M3 (length 8 mm **0.315 in**) screws with washers are attached.

Sensor checker

- CHX-SC2



- Selection Guide
- Amplifier Built-in
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- Amplifier-separated

NX5

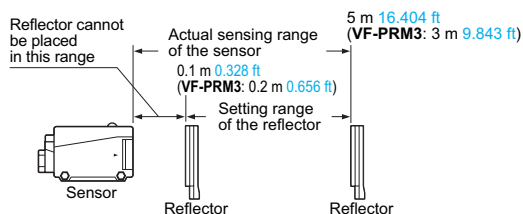
VF

SPECIFICATIONS

Item	Type Model No.	Thru-beam		Retroreflective			Diffuse reflective				
		VF-M10	VF-M10T	VF-RM5	VF-RM5T	VF-PRM3	VF-D500	VF-D500T	VF-D1000	VF-D1000T	
Sensing range		10 m 32.808 ft		0.1 to 5 m 0.328 to 16.404 ft (Note 2)		0.2 to 3 m 0.656 to 9.843 ft (Note 2)	500 mm 19.685 in (Note 3)		1 m 3.281 ft (Note 3)		
Sensing object		ø20 mm ø0.787 in or more opaque object (Note 4)		ø50 mm ø1.969 in or more opaque or translucent object (Note 2, 5)		ø50 mm ø1.969 in or more opaque, translucent or specular object (Note 2, 5)	Opaque, translucent or transparent object (Note 5)				
Hysteresis		—————						15 % or less of operation distance (Note 3)			
Supply voltage		24 to 240 V AC $^{+10}_{-15}$ % or 12 to 240 V DC $^{+10}_{-15}$ %									
Power consumption		Emitter: 3 VA or less (Average: 1.5 W or less) Receiver: 3 VA or less (Average: 1.5 W or less)		3 VA or less (Average: 1.5 W or less)							
Output		Relay contact 1a • Switching capacity: 250 V 1 A AC (resistive load) 30 V 2 A DC (resistive load) • Electrical life: 500,000 or more switching operations (switching frequency 3,600 operations/hour) • Mechanical life: 100 million or more switching operations (switching frequency 36,000 operations/hour)									
	Output operation	Switchable either Light-ON or Dark-ON									
Response time		20 ms or less									
Operation indicator		Red LED (lights up when the output is ON)									
Sensitivity adjuster		—————					Continuously variable adjuster				
Timer function (0.1 to 5 sec. variable)		—————	Selectable from ON- delay, OFF-delay & ONE SHOT	—————	Selectable from ON- delay, OFF-delay & ONE SHOT	—————	Selectable from ON- delay, OFF-delay & ONE SHOT	—————	Selectable from ON- delay, OFF-delay & ONE SHOT	—————	
		—————									
Environmental resistance	Pollution degree	3 (Industrial environment)									
	Protection	IP66 (IEC)									
	Ambient temperature	-10 to +60 °C +14 to +140 °F (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F									
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH									
	Ambient illuminance	Incandescent light: 3,500 lx at the light-receiving face									
	EMC	EN 61000-6-2, EN 61000-6-4									
	Voltage withstandability	1,500 V AC for one min. between the power supply and output terminals, 1,000 V AC for one min. between the relay contact terminals									
	Insulation resistance	20 MΩ, or more, with 500 V DC megger between the power supply and output terminals, and between the relay contact terminals									
	Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each									
Shock resistance	100 m/s ² acceleration (10 G approx.) in X, Y and Z directions for three times each										
Emitting element (modulated)		Infrared LED				Red LED		Infrared LED			
	Peak emission wavelength	950 nm 0.037 mil				660 nm 0.026 mil		950 nm 0.037 mil			
Material	Enclosure: PBT, Lens: Acrylic (front surface of VF-PRM3 : Triacetate)										
Connection method	Screw-on terminal connection										
Cable	Suitable for round cable ø6 to ø10 mm ø0.236 to ø0.394 in (Conductor cross-section area: 0.25 to 0.75 mm ²).										
Cable length	Total length up to 100 m 328.084 ft is possible with 0.3 mm ² , or more, cabtyre cable (thru-beam type: both emitter and receiver).										
Net weight		Emitter: 75 g approx. Receiver: 95 g approx.				95 g approx.					
Accessories	MS-N70 (Sensor mounting bracket): 1 set, Gland and gland washer: 1 set, Gland packing (large / small 1 pc. each): 1 set VF-SKG (Short-circuit metal joint): 1 pc., RF-230 (Reflector): 1 pc. for the retroreflective type sensor Adjusting screwdriver: 1 pc. for the diffuse reflective type sensor and for sensors with timer functions (suffixed with "T") (2 sets of sensor mounting bracket, gland, gland washer and gland packing are attached for the thru-beam type sensors.)										

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73.4 °F**.

2) The sensing range and the sensing object for the retroreflective type sensor are specified for the **RF-230** reflector. Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 0.1 m **0.328 ft** (**VF-PRM3**: 0.2 m **0.656 ft**) away.



3) The sensing range and the hysteresis of the diffuse reflective type sensor are specified for white non-glossy paper (200 × 200 mm **7.874 × 7.874 in**) as the object.

4) If slit masks (optional) are fitted, even an object of 3 × 6 mm **0.118 × 0.236 in** can be detected.

5) Make sure to confirm detection with an actual sensor before use.

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Amplifier Built-in

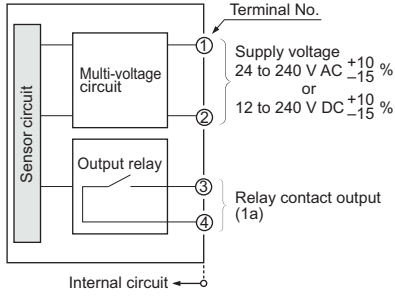
Power Supply Built-in

Amplifier-separated

NX5

VF

I/O CIRCUIT DIAGRAM



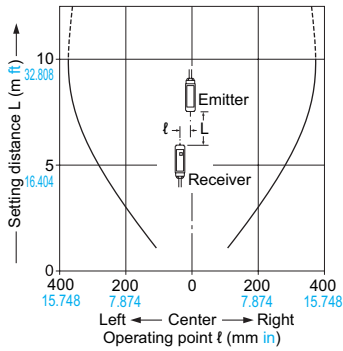
Note: The emitter of the thru-beam type sensor has only two terminals for power supply (① and ②).

SENSING CHARACTERISTICS (TYPICAL)

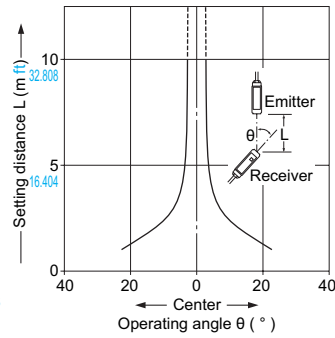
VF-M10 VF-M10T

Thru-beam type

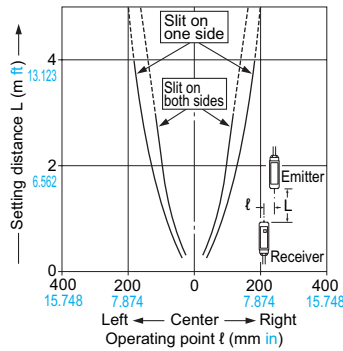
Parallel deviation



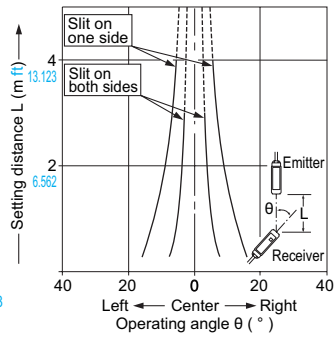
Angular deviation



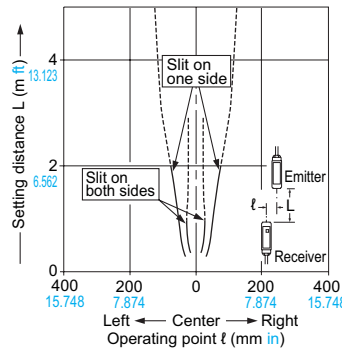
Parallel deviation with slit masks (OS-VF-6x12)



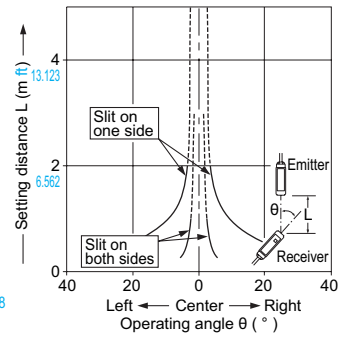
Angular deviation with slit masks (OS-VF-6x12)



Parallel deviation with slit masks (OS-VF-3x6)



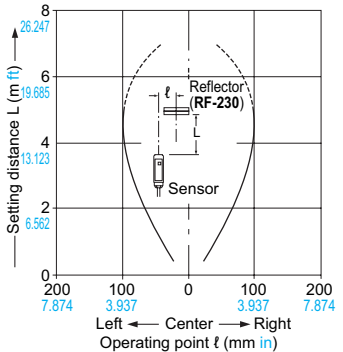
Angular deviation with slit masks (OS-VF-3x6)



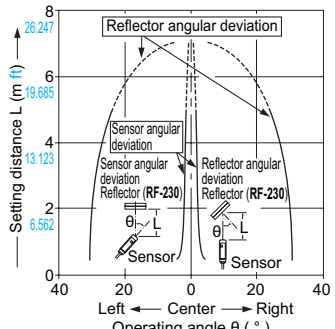
VF-RM5 VF-RM5T

Retroreflective type

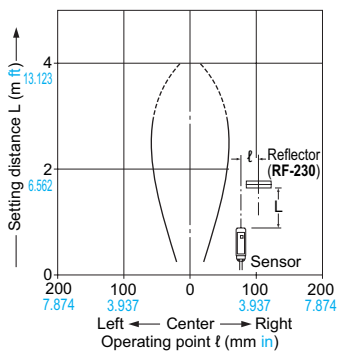
Parallel deviation



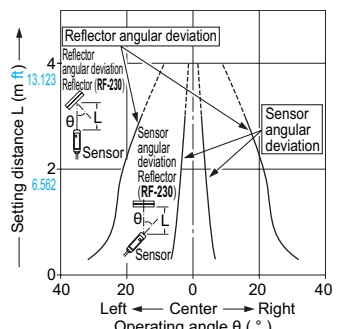
Angular deviation



Parallel deviation

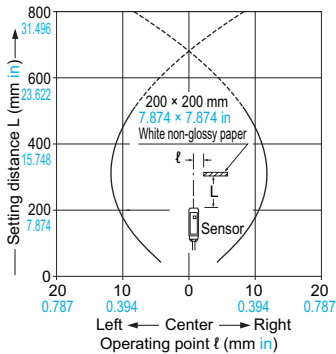


Angular deviation

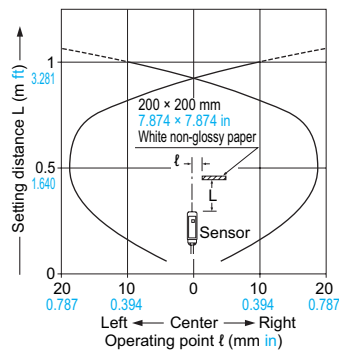


SENSING CHARACTERISTICS (TYPICAL)**VF-D500 VF-D500T**

Diffuse reflective type

Sensing field**VF-D1000 VF-D1000T**

Diffuse reflective type

Sensing field**PRECAUTIONS FOR PROPER USE**

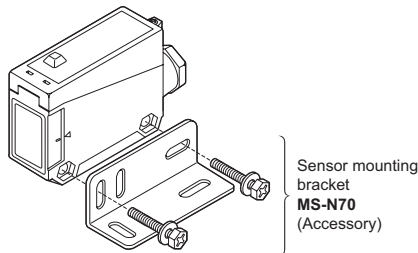
Refer to General precautions.



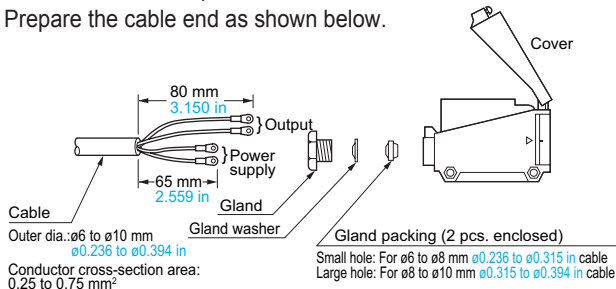
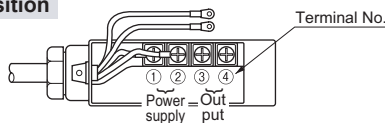
- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

Mounting

- The tightening torque should be 0.78 N·m or less.

**Wiring**

- Cable must be circular and $\phi 6$ to $\phi 10$ mm $\phi 0.236$ to $\phi 0.394$ in in diameter. If the cable has a diameter other than the specified or is distorted, waterproofness cannot be maintained.
- Prepare the cable end as shown below.

**Terminal position****Dimensions of the suitable crimp terminals**

(Unit: mm/in)

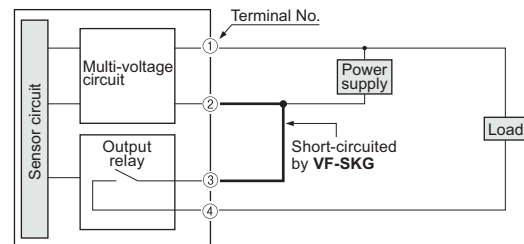
Round type	Y-shaped type
(After crimping)	(After crimping)

Note: Use crimp terminals with insulating sleeves.

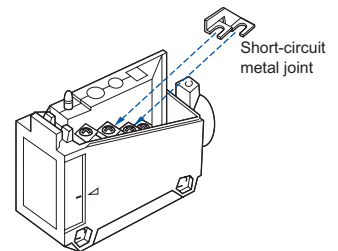
Recommended crimp terminal: Nominal size 1.25 × 3.5 0.049 × 0.138

Mounting the short-circuit metal joint (VF-SKG)

- If the sensor and the load are supplied power from the same power supply, the number of wires can be reduced by one by using the enclosed short-circuit metal joint.

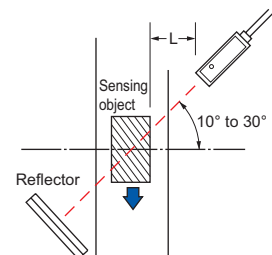
Connection example**Mounting**

- Loosen the screws on terminals ② and ③. Mount the short-circuit metal joint **VF-SKG** on the terminals as shown on the right.

**Retroreflective type sensor (VF-RM5 and VF-RM5T)**

- Please take care of the following points when detecting materials having a gloss.

- ① Make L, shown in the diagram, sufficiently long.
- ② Install at an angle of 10 to 30 degrees to the sensing object.

* **VF-PRM3** does not need the above adjustment.

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NX5

VF

PRECAUTIONS FOR PROPER USE

Refer to General precautions.

Retroreflective type sensor with polarizing filters (VF-PRM3)

• If a shiny object is covered or wrapped with a transparent film, such as those described below, the retroreflective type sensor with polarizing filters may not be able to detect it. In that case, follow the steps given below.

Example of sensing objects

- Can wrapped by clear film
- Aluminum sheet covered by plastic film
- Gold or silver color (specular) label or wrapping paper

Steps

- Tilt the sensor with respect to the sensing object while fitting.
- Reduce the sensitivity.
- Increase the distance between the sensor and the sensing object.

Timer functions and output operation

• The timer incorporated models have three types of convenient timer functions.

ON-delay (OND)

Function: Neglects short output signals.

Application: As only long signals are extracted, this function is useful for detecting if a line is clogged, or for sensing only objects taking a long time to travel.

OFF-delay (OFD)

Function: Extends the output signal for a fixed period of time.

Application: This function is useful if the output signal is so short that the connected device cannot respond.

ONE SHOT (OSD)

Function: Outputs a fixed width signal upon sensing.

Application: This function is useful when the input specifications of the connected device require a signal of fixed width. Of course, it is also useful for extending a short width signal to a desired width.

Various other applications are possible.

Selection switch and timer operation

Position of switches	Output mode selection	Timer mode selection	Sensing condition	Operation	Waveform
	LIGHT ON	1 2 3 4	Light-received normal operation	ON	[ON pulse]
		1 2 3 4	Light-received ON-delay	OFF	[ON pulse with delay]
		1 2 3 4	Light-received OFF-delay	OFF	[ON pulse with delay]
	DARK ON	1 2 3 4	Light-received ONE SHOT	ON	[Fixed width pulse]
		1 2 3 4	Light-interrupted normal operation	OFF	[OFF pulse]
		1 2 3 4	Light-interrupted ON-delay	ON	[OFF pulse with delay]

Timer period: T = 0.1 to 5 sec. (variable)

Others

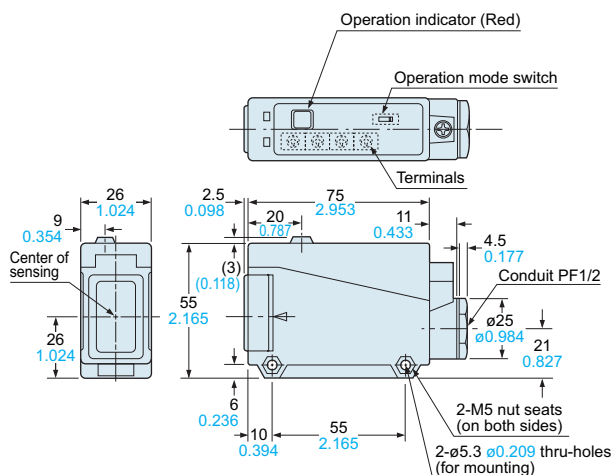
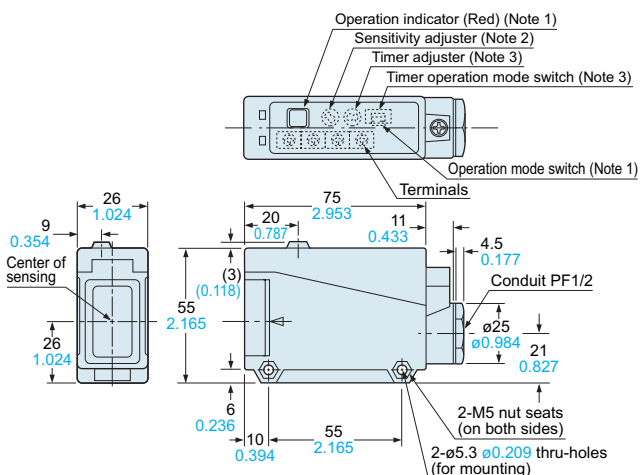
- Do not use during the initial transient time (200 ms) after the power supply is switched on.

DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

VF-M10 □ VF-RM5 □ VF-D500 □ VF-D1000 □ Sensor

VF-PRM3 Sensor



- Notes: 1) All units, except emitters, are incorporated with an operation indicator.
 2) Only the diffuse reflective type sensors are incorporated with a sensitivity adjuster.
 3) Only the timer incorporated type sensors have a timer adjuster and a timer operation mode switch.

FIBER SENSORS
 LASER SENSORS
 PHOTO-ELECTRIC SENSORS
 MICRO PHOTO-ELECTRIC SENSORS
 AREA SENSORS
 LIGHT CURTAINS
 PRESSURE / FLOW SENSORS
 INDUCTIVE PROXIMITY SENSORS
 PARTICULAR USE SENSORS
 SENSOR OPTIONS
 SIMPLE WIRE-SAVING UNITS
 WIRE-SAVING SYSTEMS
 MEASUREMENT SENSORS
 STATIC CONTROL DEVICES
 ENDOSCOPE
 LASER MARKERS
 PLC / TERMINALS
 HUMAN MACHINE INTERFACES
 ENERGY CONSUMPTION VISUALIZATION COMPONENTS
 FA COMPONENTS
 MACHINE VISION SYSTEMS
 UV CURING SYSTEMS

Selection Guide
 Amplifier Built-in
 Power Supply Built-in
 Amplifier-separated

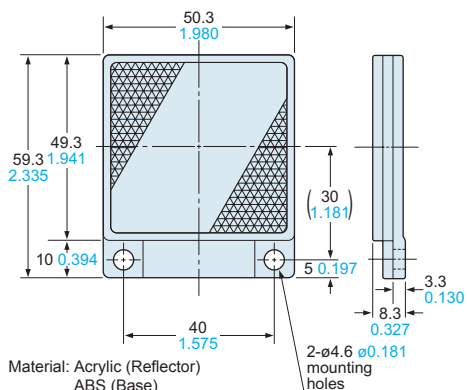
NX5

VF

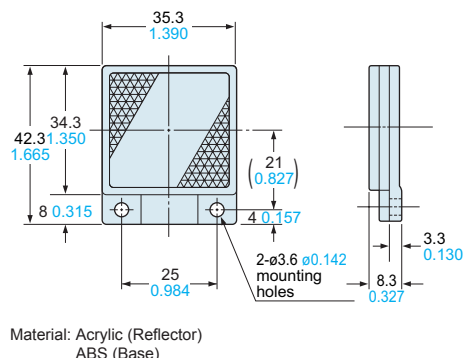
DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

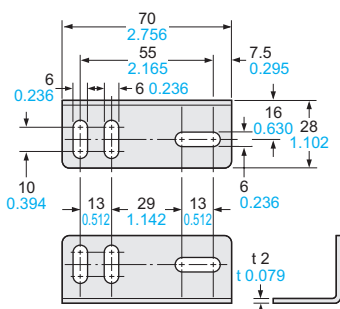
RF-230 Reflector (Accessory for the retroreflective type sensor)



RF-220 Reflector (Optional)

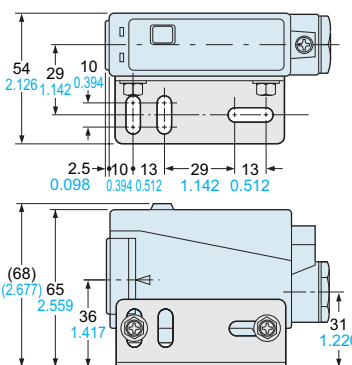


MS-N70 Sensor mounting bracket (Accessory)

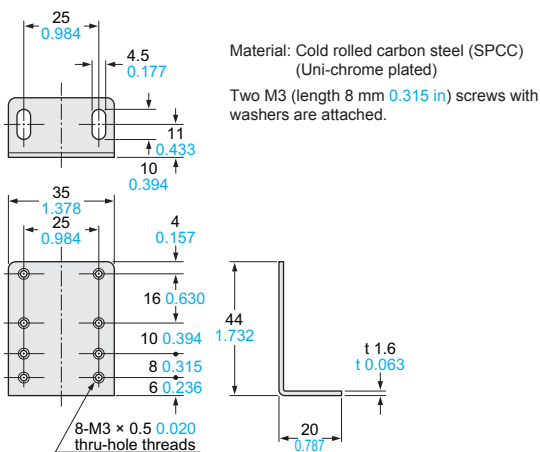


Two M5 (length 30 mm 1.181 in) cross-recessed hexagon bolts (with spring washers and plain washers) and two M5 nuts are attached.

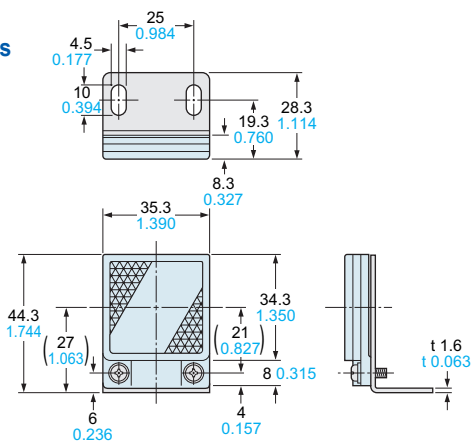
Assembly dimensions
Mounting drawing with VF-PRM3



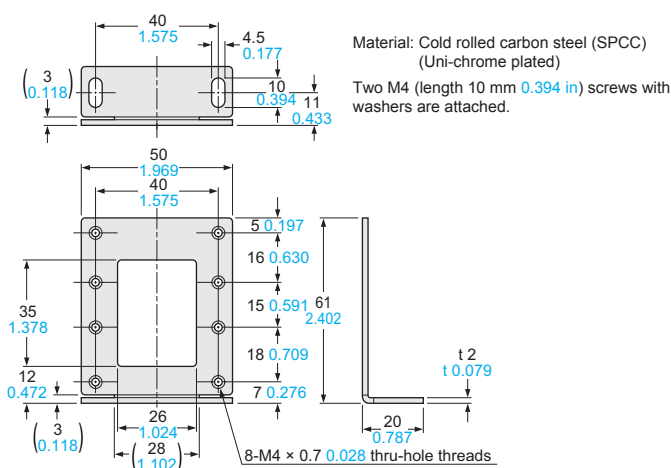
MS-RF22 Reflector mounting bracket for RF-220 (Optional)



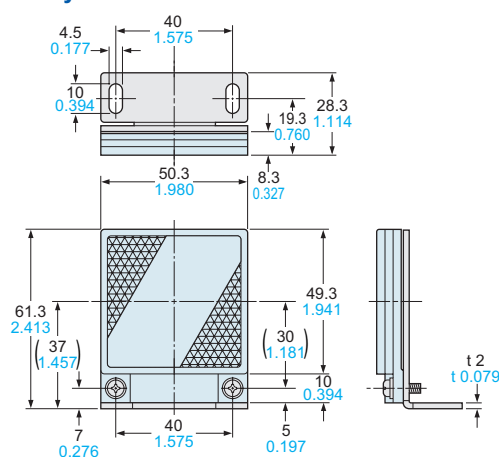
Assembly dimensions



MS-RF23 Reflector mounting bracket for RF-230 (Optional)



Assembly dimensions



FIBER SENSORS
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MICRO PHOTO-ELECTRIC SENSORS
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NX5

VF