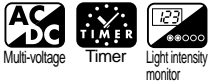


VF SERIES

Terminal Connection Type Multi-voltage Photoelectric Sensor **Power Supply Built-in**



Easy to use terminal connection type



New convenient construction

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

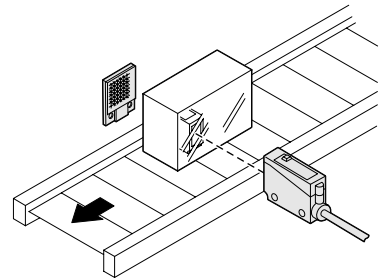


Multi-voltage

The VF series can operate at 24 to 240 V AC or 12 to 240 V DC, which makes it suitable for supply voltages all over the world.

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

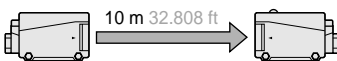
VF-PRM3 ensures reliable sensing even with shiny or specular objects traveling in any direction.



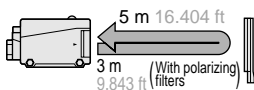
Long sensing range

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

Thru-beam type



Retroreflective type



Diffuse reflective type



Timer function models

The sensing signal can be easily converted into a signal suitable for 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)

Non-contact output type available

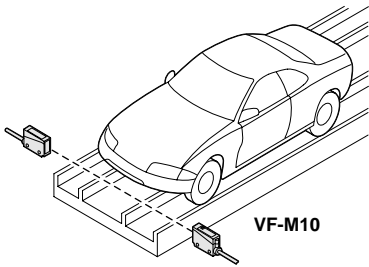
The **VF2** series which incorporates a dual circuit transistor output (NPN and PNP) is also available in the same sensor body. It is suited for fast switching sensing, or applications requiring a fast response.

- Output: NPN universal transistor
PNP open-collector transistor
- Power supply: 12 to 24 V DC \pm 10 %

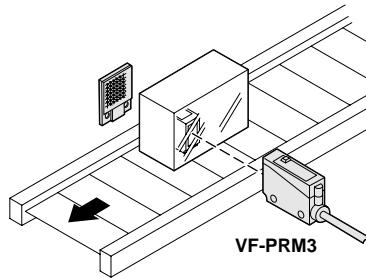
Please refer to [p.1118](#), and contact our office for further details.

APPLICATIONS

Car positioning at parking garage

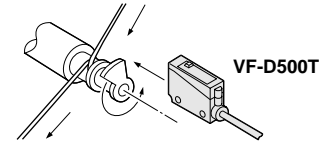


Sensing traveling objects



Sensing coil wire end

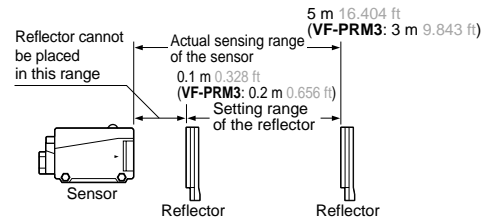
The wire is wound once round a pole having a fin. The sensor detects the rotating fin. By using the OFF-delay timer, an OFF signal can be generated when the wire ends.



ORDER GUIDE

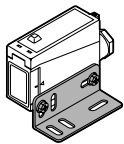
Type	Appearance	Sensing range	Model No.	Timer function	Supply voltage	Output			
Thru-beam			10 m 32.808 ft	VF-M10	—	24 to 240 V AC ± 10 % or 12 to 240 V DC ± 10 % (Note 2)	Relay contact 1a (Note 2)		
			VF-M10T	Incorporated					
Retroreflective			0.1 to 5 m 0.328 to 16.404 ft (Note 1)	VF-RM5	—				
			VF-RM5T	Incorporated					
With polarizing filters			0.2 to 3 m 0.656 to 9.843 ft (Note 1)	VF-PRM3	—				
			VF-D500	—					
Diffuse reflective			500 mm 19.685 in	VF-D500	—				
			VF-D500T	Incorporated					
			Long sensing range		1 m 3.281 ft			VF-D1000	—
					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) Non-contact output type [NPN universal transistor / PNP open-collector transistor (two outputs), supply voltage 12 to 24 V DC] is available. (Four types: VF2-M10, VF2-RM5, VF2-PRM3, VF2-D500)
 Refer to p.1118.



Accessories

- MS-N70 (Sensor mounting bracket)

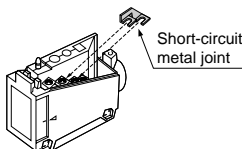


Two M5 (length 30 mm 1.181 in) cross-recessed hexagon bolts and two M5 nuts are attached.

- RF-230 (Reflector)



- VF-SKG (Short-circuit metal joint)



OPTIONS

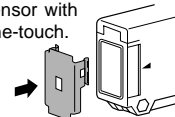
Designation	Model No.	Description
Slit mask (For thru-beam type sensor only)	OS-VF-3 X 6 (Slit size 3 X 6 mm) (0.118 X 0.236 in)	Slit on one side
		Slit on both sides
	OS-VF-6 X 12 (Slit size 6 X 12 mm) (0.236 X 0.472 in)	Slit on one side
		Slit on both sides
Reflector (For retroreflective type sensor 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: ϕ35 mm ϕ1.378 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 p.414~ for details on the sensor checker **CHX-SC2**.

Slit mask

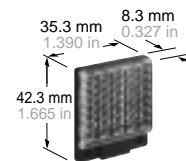
- OS-VF-3 X 6
- OS-VF-6 X 12

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



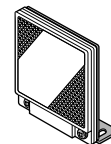
Reflector

- RF-220



Reflector mounting bracket

- MS-RF23
- MS-RF22



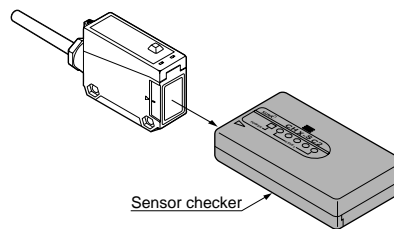
Two M4 (length 10 mm 0.394 in) screws with washers are attached.



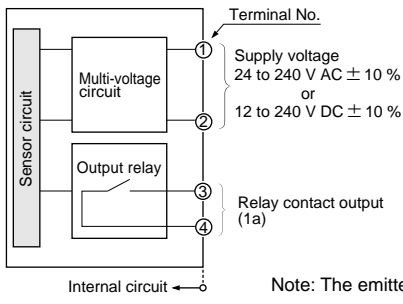
Two M3 (length 8 mm 0.315 in) screws with washers are attached.

Sensor checker

- CHX-SC2



I/O CIRCUIT DIAGRAM

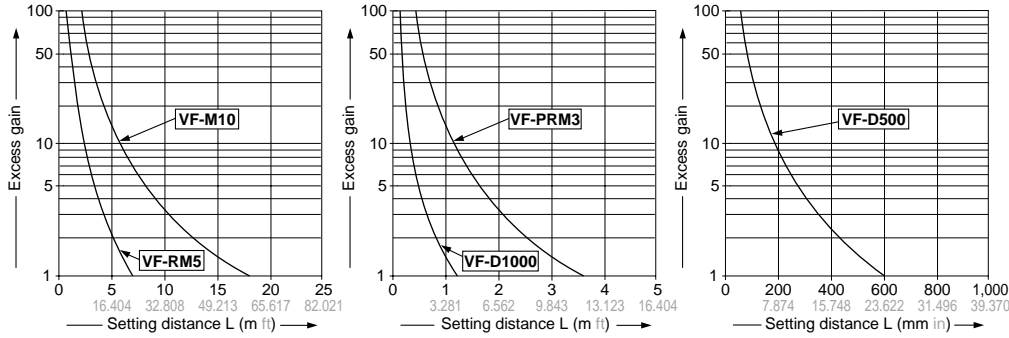


Note: The emitter of the thru-beam type sensor has only two terminals for power supply (① and ②).

SENSING CHARACTERISTICS (TYPICAL)

All models

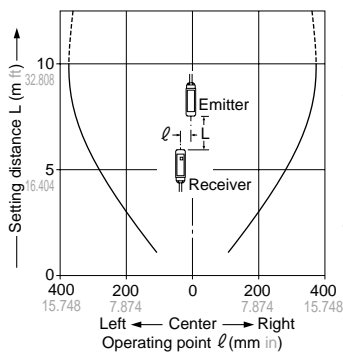
Correlation between setting distance and excess gain



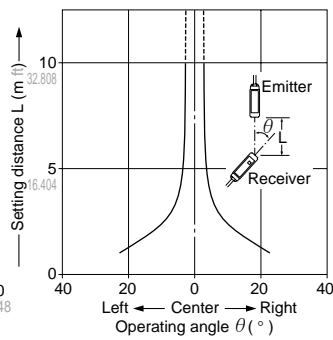
VF-M10
VF-M10T

Thru-beam type

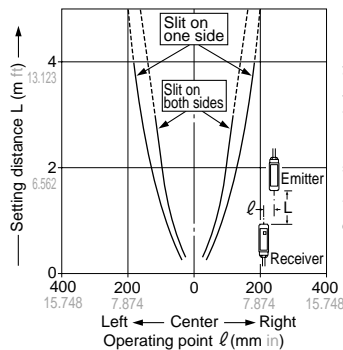
Parallel deviation



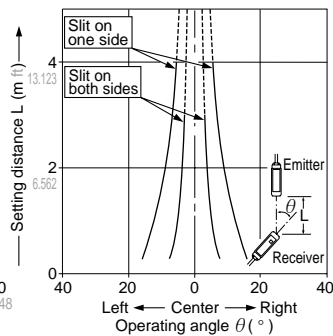
Angular deviation



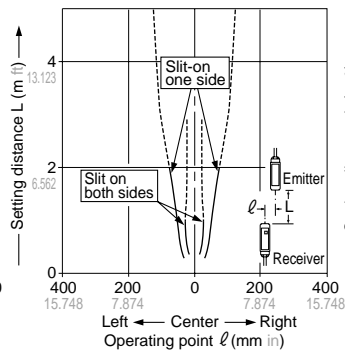
Parallel deviation with slit masks (OS-VF-6 X 12)



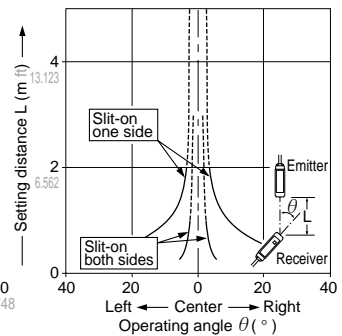
Angular deviation with slit masks (OS-VF-6 X 12)



Parallel deviation with slit masks (OS-VF-3 X 6)



Angular deviation with slit masks (OS-VF-3 X 6)

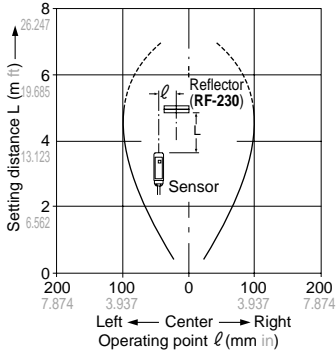


SENSING CHARACTERISTICS (TYPICAL)

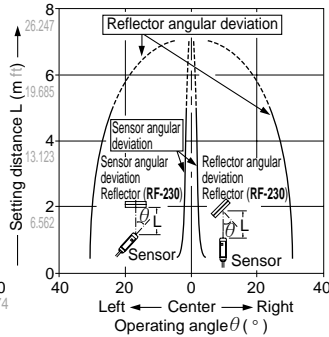
VF-RM5
VF-RM5T

Retroreflective type

Parallel deviation



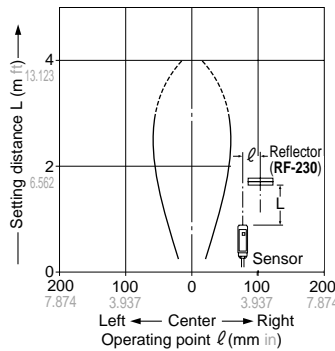
Angular deviation



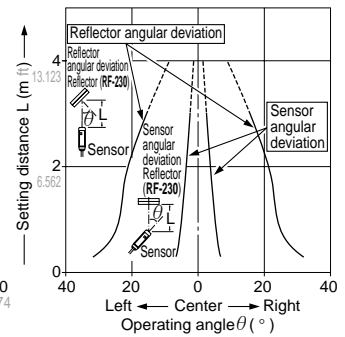
VF-PRM3

Retroreflective type

Parallel deviation



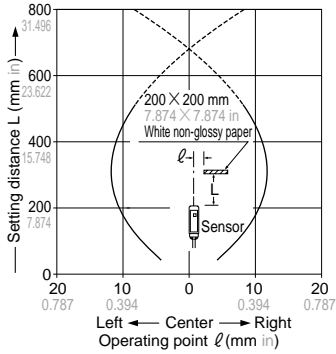
Angular deviation



VF-D500
VF-D500T

Diffuse reflective type

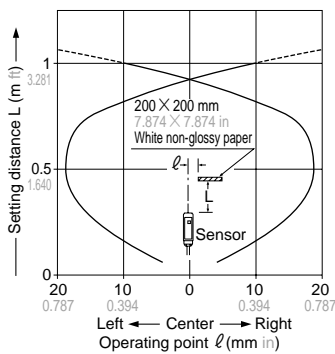
Sensing field



VF-D1000
VF-D1000T

Diffuse reflective type

Sensing field



PRECAUTIONS FOR PROPER USE

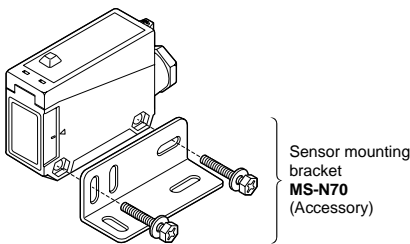
Refer to p.1135~ for general precautions.



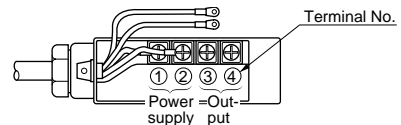
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

Mounting

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



Terminal position



Dimensions of the suitable crimp terminals

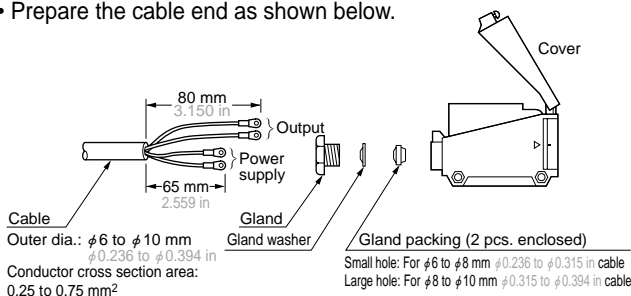
(Unit: mm in)

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

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.



Outer dia.: $\phi 6$ to $\phi 10$ mm
 $\phi 0.236$ to $\phi 0.394$ in
Conductor cross section area:
0.25 to 0.75 mm²

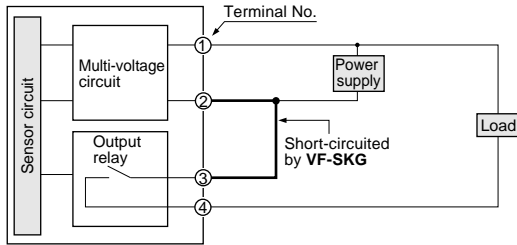
PRECAUTIONS FOR PROPER USE

Refer to p.1135~ for general precautions.

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

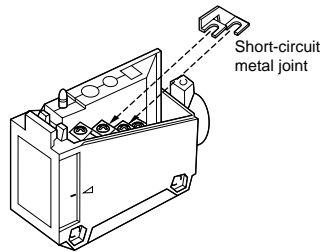
- If the sensor and the load are supplied power from the same power supply, the number of wires can be reduced by one by using the enclosed short-circuit metal joint.

Connection example



Mounting

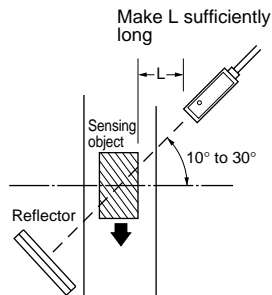
- Loosen the screws on terminals ② and ③. Mount the short-circuit metal joint VF-SKG on the terminals as shown on the right.



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.

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.

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
	1	2	3	4		
Operation indicator (lights up when the output is ON)	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-received normal operation	ON
Sensitivity adjuster (Diffuse reflective type sensor only)	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-received ON-delay	OFF ON
Timer adjuster	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-received OFF-delay	OFF ON
Operation mode switch	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-received ONE SHOT	OFF ON
Timer operation mode switch	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-interrupted normal operation	OFF ON
	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-interrupted ON-delay	OFF ON
	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-interrupted OFF-delay	OFF ON
	Light-ON mode	Dark-ON mode	Light-ON mode	Dark-ON mode	Light-interrupted ONE SHOT	OFF ON

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

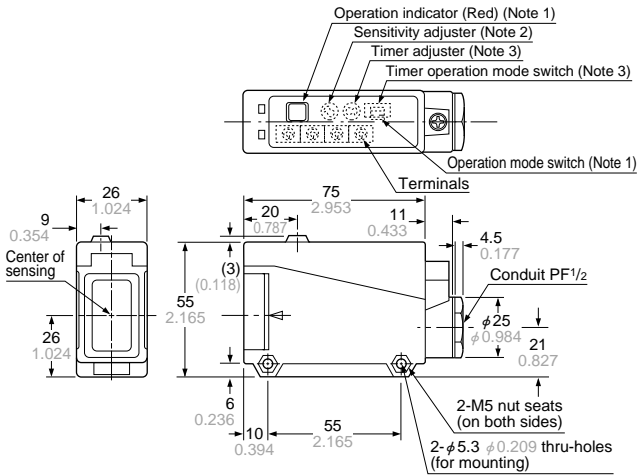
Others

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

DIMENSIONS (Unit: mm in)

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

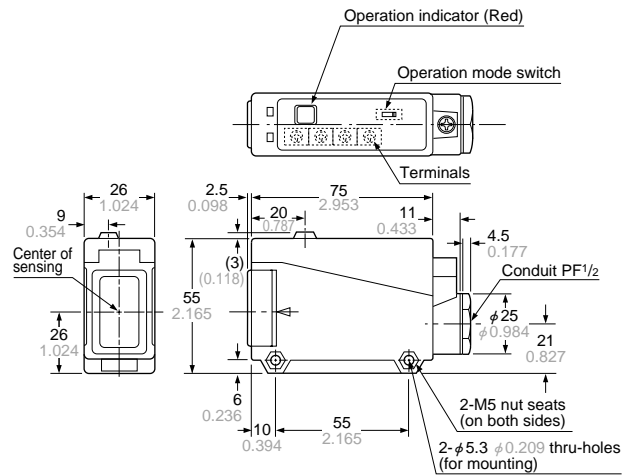
Sensor



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

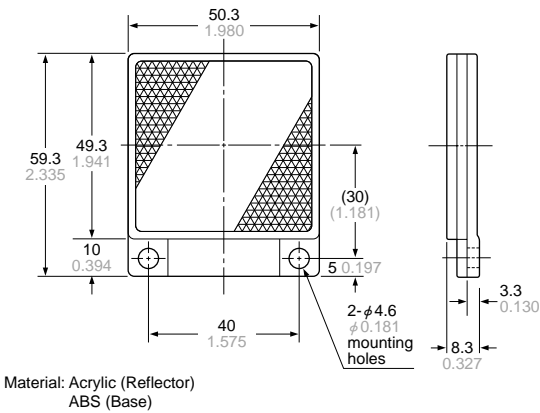
VF-PRM3

Sensor



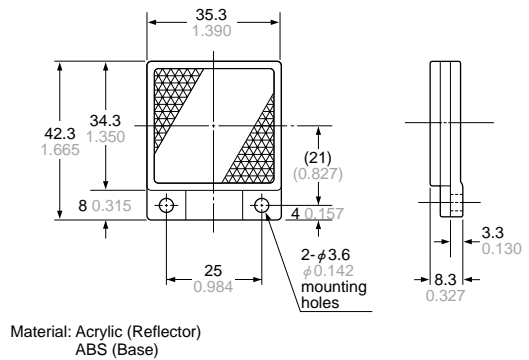
RF-230

Reflector (Accessory for the retroreflective type sensor)



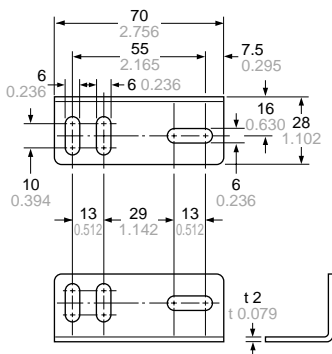
RF-220

Reflector (Optional)



MS-N70

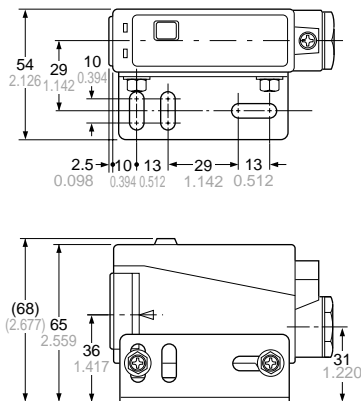
Sensor mounting bracket (Accessory)



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
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



CY

Amplifier Built-in
PX-2

RT-610

Sensor Mounting Stand
MS-AJ

Micro
PM

PM2

NX5

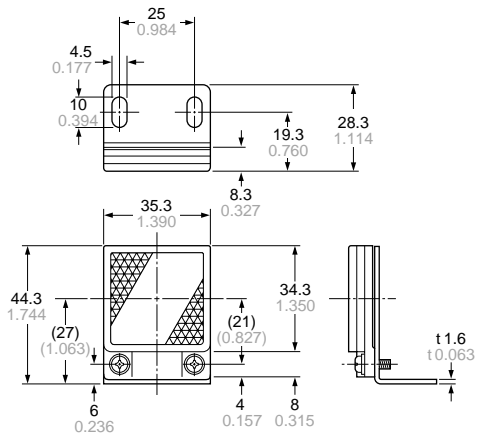
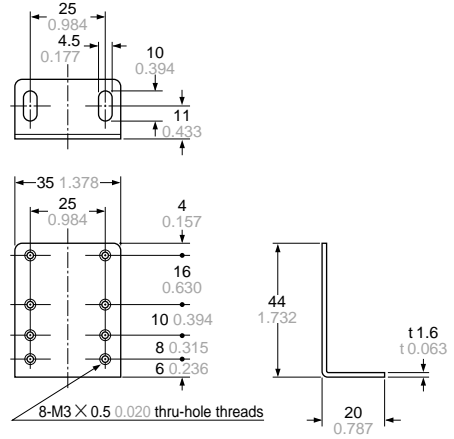
Multi-voltage
VF

EQ-500

DIMENSIONS (Unit: mm in)

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

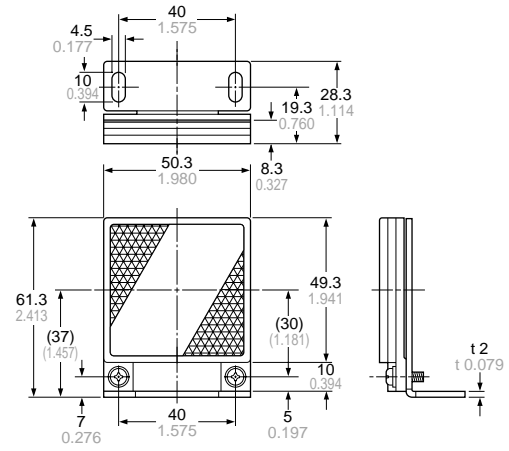
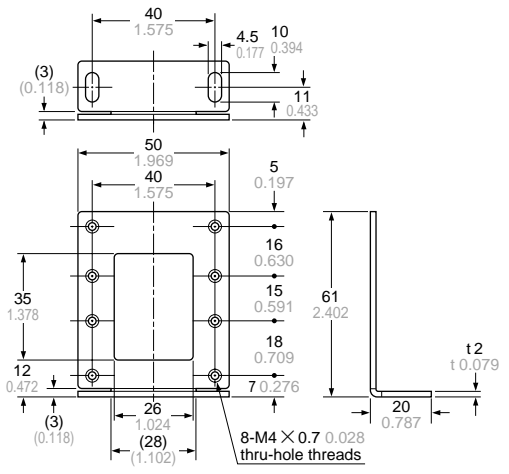
Assembly dimensions



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
Two M3 (length 8 mm 0.315 in) screws with washers are attached.

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

Assembly dimensions



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
Two M4 (length 10 mm 0.394 in) screws with washers are attached.