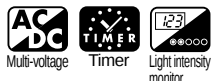


VF SERIES

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

**Easy to use
terminal connection
type**

**New convenient construction**

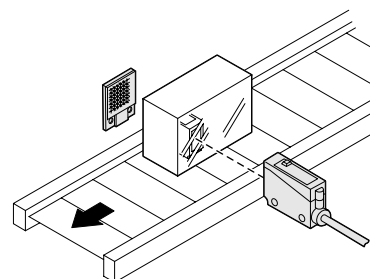
The slanting step-wise terminal enables quick and easy connection.

**Multi-voltage**

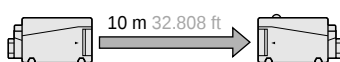
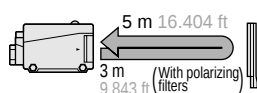
The VF series can operate at 24 to 240 V AC or 12 to 240 V DC, which makes it suitable for supply voltages all over the world.

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

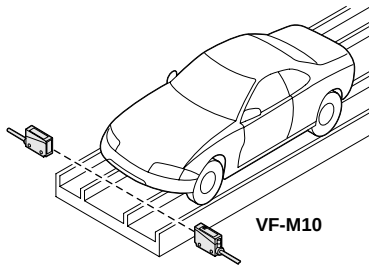
The **VF2** series which incorporates a dual circuit transistor output (NPN and PNP) is also available in the same sensor body. It is suited for fast switching sensing, or applications requiring a fast response.

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

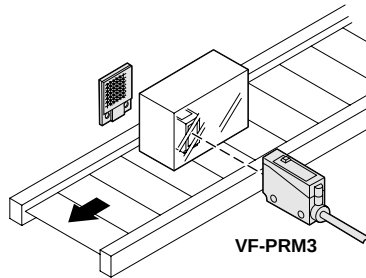
Please refer to [p.1118](#), and contact our office for further details.

APPLICATIONS

Car positioning at parking garage

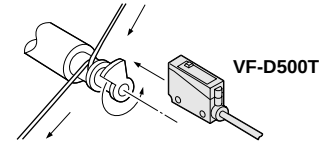


Sensing traveling objects



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.

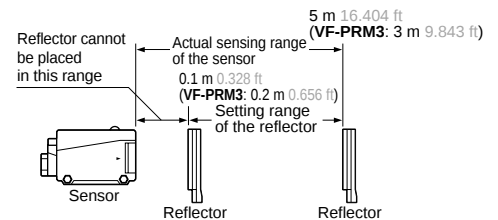


ORDER GUIDE

Type	Appearance	Sensing range	Model No.	Timer function	Supply voltage	Output
Thru-beam		10 m 32.808 ft	VF-M10 VF-M10T	— Incorporated	24 to 240 V AC $\pm 10\%$ or 12 to 240 V DC $\pm 10\%$ (Note 2)	Relay contact 1a (Note 2)
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		
Long sensing range		1 m 3.281 ft	VF-D1000 VF-D1000T	— Incorporated		

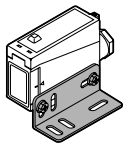
Notes: 1) The sensing range for the retroreflective type sensor is specified for the RF-230 reflector. Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 0.1 m 0.328 ft (VF-PRM3: 0.2 m 0.656 ft) away.

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)

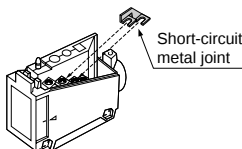


Two M5 (length 30 mm 1.181 in) cross-recessed hexagon bolts and two M5 nuts are attached.

- RF-230 (Reflector)



- VF-SKG (Short-circuit metal joint)



OPTIONS

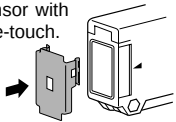
Designation	Model No.	Description
Slit mask (For thru-beam type sensor only)	OS-VF-3 × 6 (Slit size 3 × 6 mm 0.118 × 0.236 in)	Slit on one side • Sensing range: 2 m 6.562 ft • Min. sensing object: ϕ20 mm ϕ0.787 in
		Slit on both sides • Sensing range: 1 m 3.281 ft • Min. sensing object: 3 × 6 mm 0.118 × 0.236 in
	OS-VF-6 × 12 (Slit size 6 × 12 mm 0.236 × 0.472 in)	Slit on one side • Sensing range: 4 m 13.123 ft • Min. sensing object: ϕ20 mm ϕ0.787 in
		Slit on both sides • 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	• 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

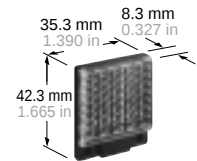
- OS-VF-3 × 6
- OS-VF-6 × 12

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



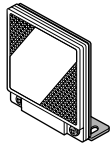
Reflector

- RF-220



Reflector mounting bracket

- MS-RF23
- MS-RF22



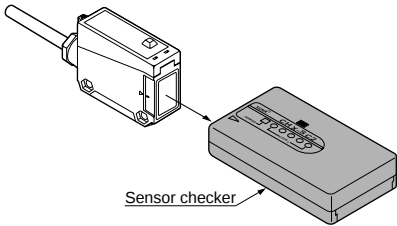
Two M4 (length 10 mm 0.394 in) screws with washers are attached.



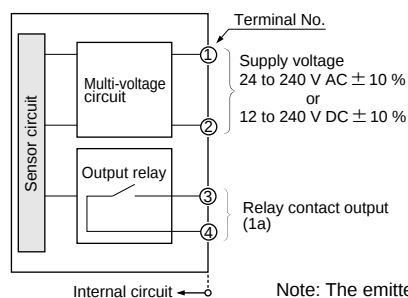
Two M3 (length 8 mm 0.315 in) screws with washers are attached.

Sensor checker

- CHX-SC2



I/O CIRCUIT DIAGRAM

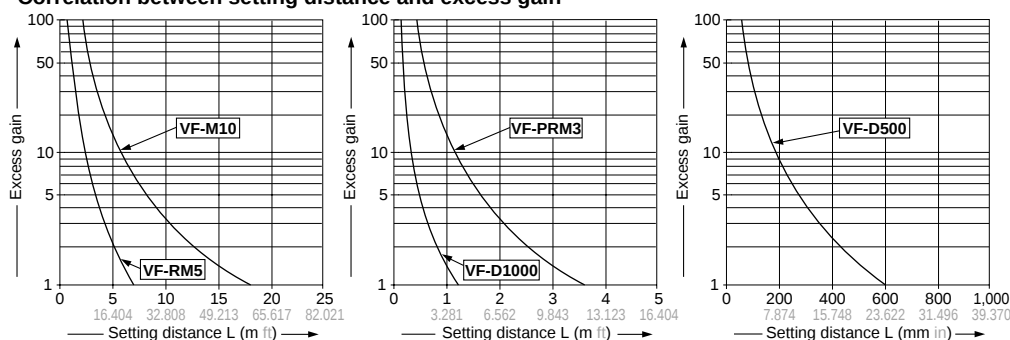


Note: The emitter of the thru-beam type sensor has only two terminals for power supply (① and ②).

SENSING CHARACTERISTICS (TYPICAL)

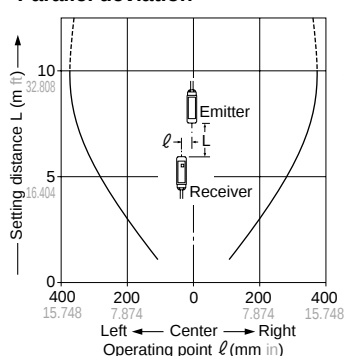
All models

Correlation between setting distance and excess gain

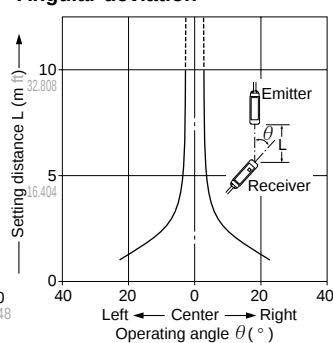
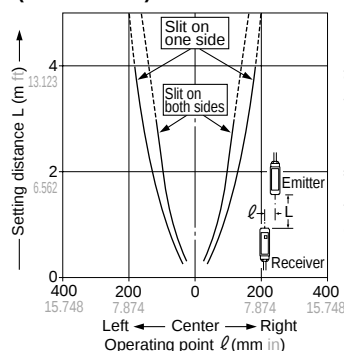
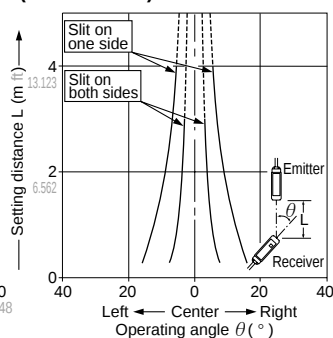
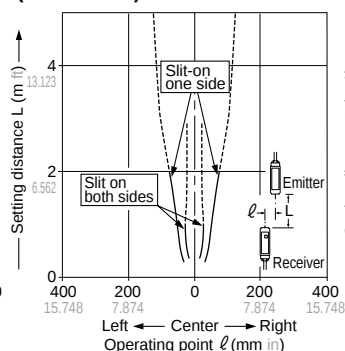
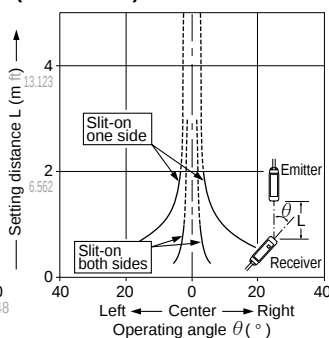
VF-M10
VF-M10T

Thru-beam type

Parallel deviation



Angular deviation

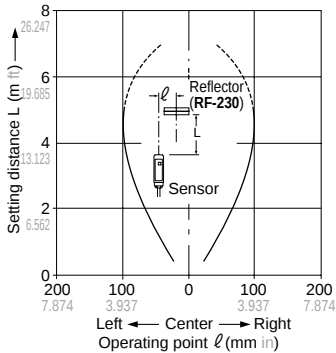
Parallel deviation with slit masks
(OS-VF-6 X 12)Angular deviation with slit masks
(OS-VF-6 X 12)Parallel deviation with slit masks
(OS-VF-3 X 6)Angular deviation with slit masks
(OS-VF-3 X 6)

SENSING CHARACTERISTICS (TYPICAL)

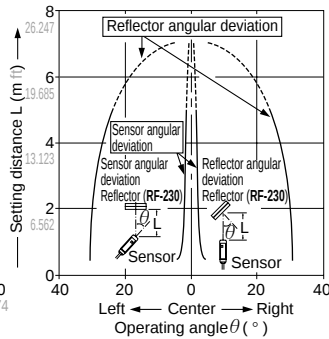
VF-RM5
VF-RM5T

Retroreflective type

Parallel deviation



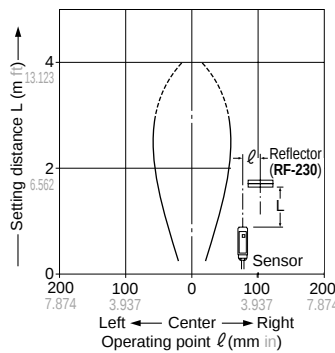
Angular deviation



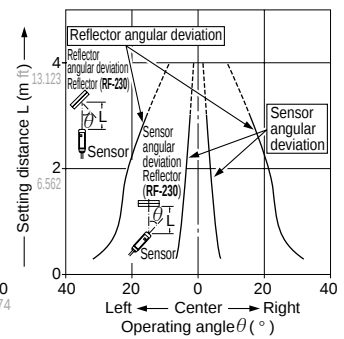
VF-PRM3

Retroreflective type

Parallel deviation

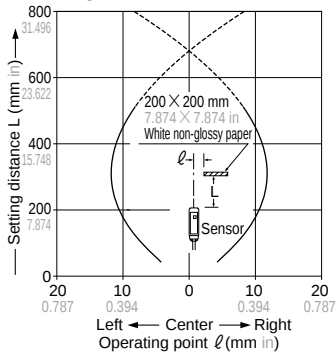


Angular deviation

VF-D500
VF-D500T

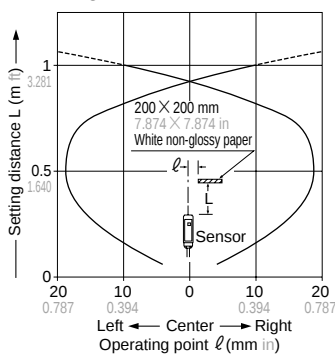
Diffuse reflective type

Sensing field

VF-D1000
VF-D1000T

Diffuse reflective type

Sensing field



PRECAUTIONS FOR PROPER USE

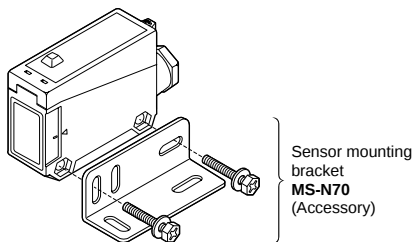
Refer to p.1135~ for general precautions.



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

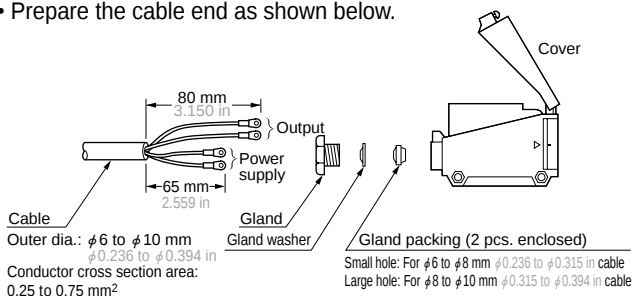
- The tightening torque should be 0.78 N·m or less.



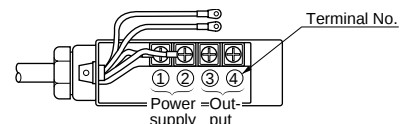
Sensor mounting bracket
MS-N70
(Accessory)

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
$\phi 3.6$ $\phi 0.142$ or more $7.0.276$ or less $10.0.394$ or less $19.0.748$ or less (After crimping)	3.6 $\phi 0.142$ or more $7.0.276$ or less $10.0.394$ or less $19.0.748$ or less (After crimping)

Note: Use crimp terminals with insulating sleeves.

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

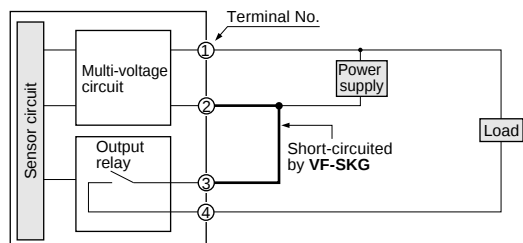
PRECAUTIONS FOR PROPER USE

Refer to [p.1135](#) for general precautions.

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

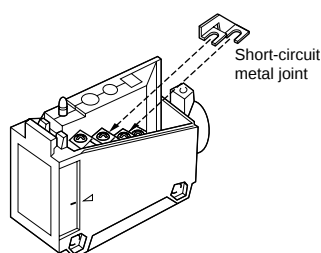
- If the sensor and the load are supplied power from the same power supply, the number of wires can be reduced by one by using the enclosed short-circuit metal joint.

Connection example



Mounting

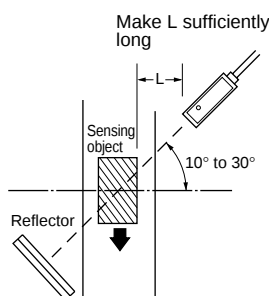
- Loosen the screws on terminals ② and ③. Mount the short-circuit metal joint **VF-SKG** on the terminals as shown on the right.



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

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

- Make L, shown in the diagram, sufficiently long.
- 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.

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

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

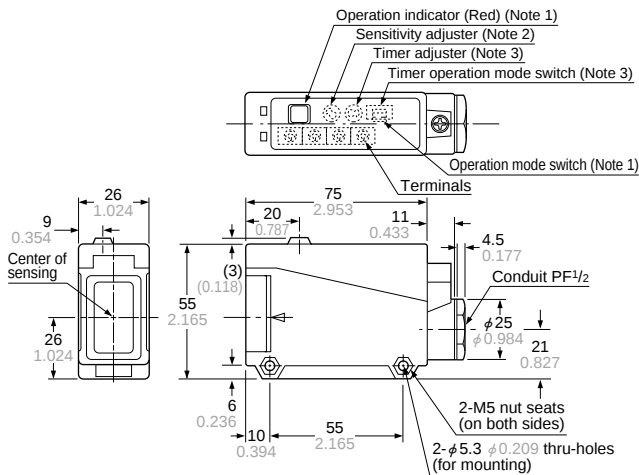
Others

- 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

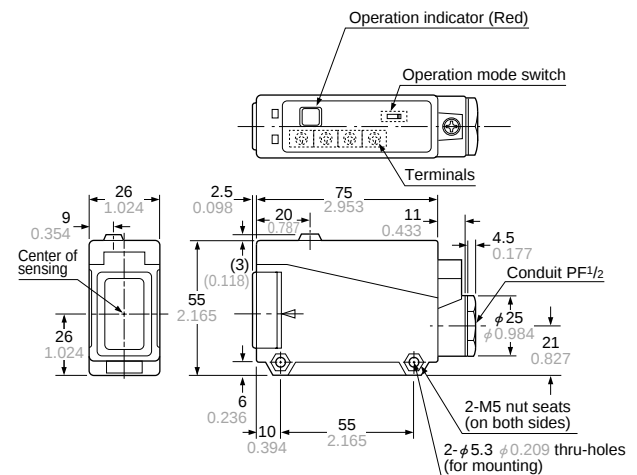
Sensor



- 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.

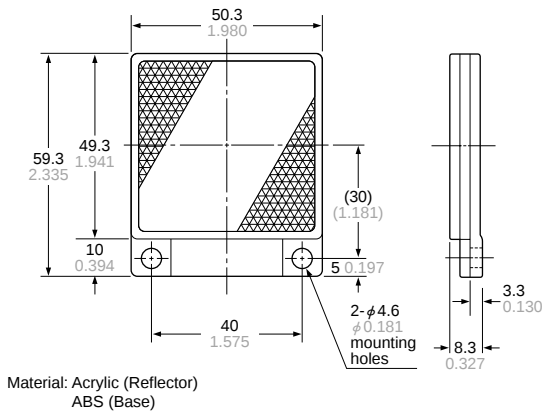
VF-PRM3

Sensor



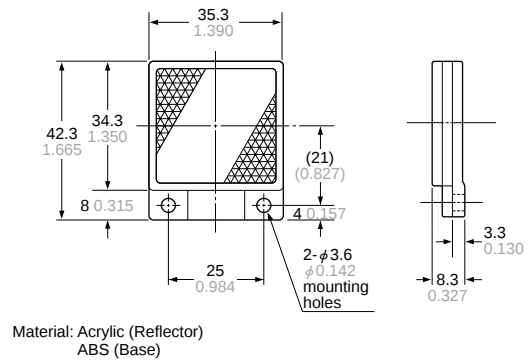
RF-230

Reflector (Accessory for the retroreflective type sensor)



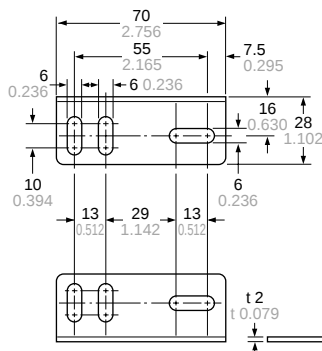
RF-220

Reflector (Optional)



MS-N70

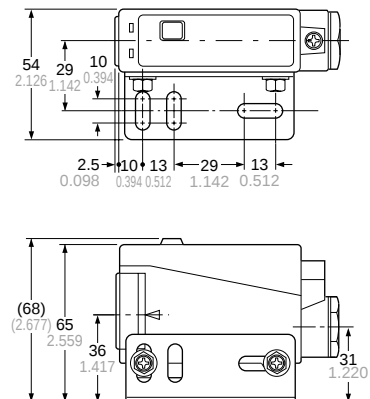
Sensor mounting bracket (Accessory)



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

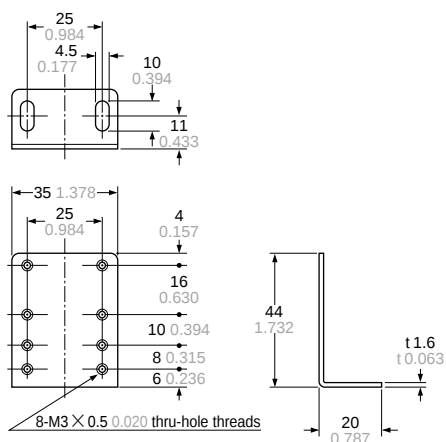


DIMENSIONS (Unit: mm in)

MS-RF22

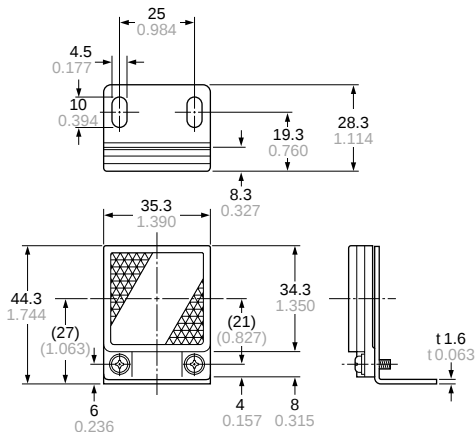
Reflector mounting bracket for RF-220 (Optional)

Assembly dimensions



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

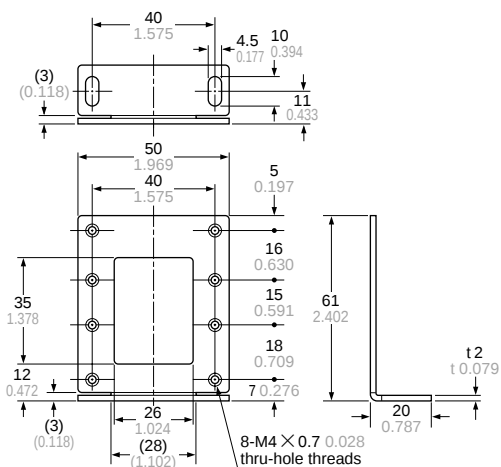
Two M3 (length 8 mm 0.315 in) screws with washers are attached.



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.

