

Area Sensor for Workpiece Detection

# F3WN-X

*Equipped with incident level display and error code display functions for greater ease of use.*

- Minimum beam gap: 9 mm. (Detection of capability: 14 mm dia.)
- Minimum sensor length: 187 mm (11 beams).
- Maximum sensor length: 1,822 mm (120 beams).

Note: In addition, customized models can be produced on request. Consult your OMRON representative for details.



## Available Models

### Main Units

Infrared

Sensing method	Appearance	Operating range	Detection capability	Beam gap	Number of beams	Protective height	Output	Model (See note.)
Through-beam		0.2 to 7 m	14 mm dia.	9 mm	17, 27	153, 243 mm	NPN transistor output	F3WN-X□□□□N14
			25 mm dia.	15 mm	11 to 119	187 to 1,807 mm		F3WN-X□□□□N25
		0.2 to 10 m	40 mm dia.	30 mm	6 to 60	187 to 1,807 mm		F3WN-X□□□□N40
			70 mm dia.	60 mm	5 to 30	277 to 1,777 mm		F3WN-X□□□□N70

\*The □□□□ in the model numbers indicates the protective height (in mm). Refer to *Available Models* on page 2 for model number details.

### Accessories (Sold Separately)

#### Single-ended Connector Cable (Set of 2 for Emitter and Receiver)

Appearance	Cable length	Specification	Model	Remarks
	3 m	M12 connector	F39-JC3A	Color of emitter cable: Gray Color of receiver cable: Black
	7 m		F39-JC7A	
	10 m		F39-JC10A	
	15 m		F39-JC15A	

## Available Models

### F3WN-X□□□□N14 (Detection Capability: 14mm dia., Beam Gap: 9 mm)

Model	Protective height	Number of beams
F3WN-X0153N14	153	17
F3WN-X0243N14	243	27

### F3WN-X□□□□N25 (Detection Capability: 25 mm dia., Beam Gap: 15 mm)

Model	Protective height	Number of beams
F3WN-X0187N25	187	11
F3WN-X0247N25	247	15
F3WN-X0307N25	307	19
F3WN-X0367N25	367	23
F3WN-X0427N25	427	27
F3WN-X0487N25	487	31
F3WN-X0547N25	547	35
F3WN-X0607N25	607	39
F3WN-X0667N25	667	43
F3WN-X0727N25	727	47
F3WN-X0787N25	787	51
F3WN-X0847N25	847	55
F3WN-X0907N25	907	59
F3WN-X0967N25	967	63

Model	Protective height	Number of beams
F3WN-X1027N25	1,027	67
F3WN-X1087N25	1,087	71
F3WN-X1147N25	1,147	75
F3WN-X1207N25	1,207	79
F3WN-X1267N25	1,267	83
F3WN-X1327N25	1,327	87
F3WN-X1387N25	1,387	91
F3WN-X1447N25	1,447	95
F3WN-X1507N25	1,507	99
F3WN-X1567N25	1,567	103
F3WN-X1627N25	1,627	107
F3WN-X1687N25	1,687	111
F3WN-X1747N25	1,747	115
F3WN-X1822N25	1,822	120

### F3WN-X□□□□N40 (Detection Capability: 40 mm dia. Beam Gap: 30mm)

Model	Protective height	Number of beams
F3WN-X0187N40	187	6
F3WN-X0247N40	247	8
F3WN-X0307N40	307	10
F3WN-X0367N40	367	12
F3WN-X0397N40	397	13
F3WN-X0487N40	487	16
F3WN-X0547N40	547	18
F3WN-X0607N40	607	20
F3WN-X0667N40	667	22
F3WN-X0727N40	727	24
F3WN-X0787N40	787	26
F3WN-X0847N40	847	28
F3WN-X0907N40	907	30
F3WN-X0967N40	967	32

Model	Protective height	Number of beams
F3WN-X1027N40	1,027	34
F3WN-X1087N40	1,087	36
F3WN-X1147N40	1,147	38
F3WN-X1207N40	1,207	40
F3WN-X1267N40	1,267	42
F3WN-X1327N40	1,327	44
F3WN-X1387N40	1,387	46
F3WN-X1447N40	1,447	48
F3WN-X1507N40	1,507	50
F3WN-X1567N40	1,567	52
F3WN-X1627N40	1,627	54
F3WN-X1687N40	1,687	56
F3WN-X1747N40	1,747	58
F3WN-X1807N40	1,807	60

### F3WN-X□□□□N70 (Detection Capability: 70 mm dia, Beam Gap: 60 mm)

Model	Protective height	Number of beams
F3WN-X0217N70	217	4
F3WN-X0277N70	277	5
F3WN-X0337N70	337	6
F3WN-X0397N70	397	7
F3WN-X0457N70	457	8
F3WN-X0517N70	517	9
F3WN-X0577N70	577	10
F3WN-X0637N70	637	11
F3WN-X0697N70	697	12
F3WN-X0757N70	757	13
F3WN-X0817N70	817	14
F3WN-X0877N70	877	15
F3WN-X0937N70	937	16
F3WN-X0997N70	997	17

Model	Protective height	Number of beams
F3WN-X1057N70	1,057	18
F3WN-X1117N70	1,117	19
F3WN-X1177N70	1,177	20
F3WN-X1237N70	1,237	21
F3WN-X1297N70	1,297	22
F3WN-X1357N70	1,357	23
F3WN-X1417N70	1,417	24
F3WN-X1477N70	1,477	25
F3WN-X1537N70	1,537	26
F3WN-X1597N70	1,597	27
F3WN-X1657N70	1,657	28
F3WN-X1717N70	1,717	29
F3WN-X1777N70	1,777	30

Note: Models with a different number of beams to those given above can also be produced. Consult your OMRON representative for details.

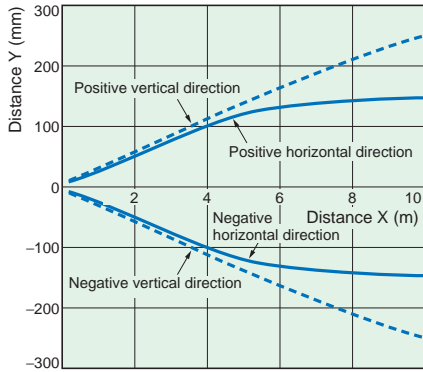
## Ratings and Performance

Item	Model	F3WN-X□□□□N14	F3WN-X□□□□N25	F3WN-X□□□□N40	F3WN-X□□□□N70
Operating range		0.2 to 7 m	0.2 to 10.0 m		
Beam gap (P)		9 mm	15 mm	30 mm	60 mm
Number of beams (n)		17, 27	11 to 119	6 to 60	5 to 30
Protective height (PH)		153, 243 mm (PH = n × P)	187 to 1,807 mm (PH = (n - 1) × P + 37)	187 to 1,807 mm (PH = (n - 1) × P + 37)	277 to 1,777 mm (PH = (n - 1) × P + 37)
Detection capability		Non-transparent: 14 mm in diameter	Non-transparent: 25 mm in diameter	Non-transparent: 40 mm in diameter	Non-transparent: 70 mm in diameter
Light source (luminous wavelength)		Infrared LED (870 nm)			
Supply voltage		24 VDC ±10%; ripple (p-p): 10% max.			
Current consumption (under no-load conditions)	Emitter	Up to 50 beams: 140 mA max., 51 to 85 beams: 155 mA max., 86 beams or more: 170 mA max.			
	Receiver	Up to 50 beams: 100 mA max., 51 to 85 beams: 110 mA max., 86 beams or more: 120 mA max.			
Control output		Load supply voltage: 24 VDC max.; NPN transistor output (load current: 50 mA max.) Control output 1: Turns ON when light is incident; Control output 2: Turns ON when light is interrupted Note: Determined by the selection of output lines.			
External diagnosis functions		If external diagnosis input line voltage is between 0 and 1.5 V: No emission (short-circuit current: 3 mA max.) If external diagnosis input line is open or the voltage is 9 to 24 V: Normal emission			
Indicators	Emitter	Incident level indicators (green): 5 LED indicators that turn ON/OFF according to the amount of incident light. Error indicators (red): 3 LED indicators that turn ON/OFF according to the type of errors that occur. Power indicator (green): Turns ON for normal operation; flashes when errors occur. External diagnosis indicator (orange): Turns ON in response to external diagnosis input.			
	Receiver	Incident level indicators (green): 5 LED indicators that turn ON/OFF according to the amount of incident light. Error indicators (red): 3 LED indicators that turn ON/OFF according to the type of errors that occur. Control output 1 operation indicator (orange): Turns ON when light is incident. Control output 2 operation indicator (orange): Turns ON when light is interrupted. Power indicator (green): Turns ON for normal operation; flashes when errors occur. Function indicator (green): Turns ON when option is set.			
Protection		Reverse polarity protection (for power supply) and output short-circuit protection			
Response time		Refer to page 6 for details.			
Ambient light intensity		Light intensity on the receiver surface: Incandescent lamp: 3,000 lx max. Sunlight: 1,000 lx max.			
Ambient temperature		Operating: -10 to 55°C, storage: -30 to 70°C (with no icing or condensation)			
Ambient humidity		Operating/storage: 30 to 95% RH (with no condensation)			
Insulation resistance		20 MΩ min. (at 500 VDC)			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min			
Vibration resistance	Destruction	10 to 55 Hz with 1.5-mm double amplitude for 2 h each in X, Y, and Z directions			
	Malfunction	10 to 55 Hz with 0.7-mm double amplitude for 50 min each in X, Y, and Z directions			
Shock resistance	Destruction	300m/s <sup>2</sup> , 3 times each in X, Y, and Z directions			
	Malfunction	100m/s <sup>2</sup> , 1,000 times each in X, Y, and Z directions			
Degree of protection		IP65 (IEC)			
Connection method		M12 connector			
Weight (in packaging)		Calculated with the following formulae: Weight (g) of models with a protective height between 150 and 738 mm = (Protective height + 100) × 2 + 1,300 Weight (g) of models with a protective height between 747 and 1,402 mm = (Protective height + 100) × 2 + 1,700 Weight (g) of models with a protective height between 1,417 and 1,822 mm = (Protective height + 100) × 2 + 2,100			
Materials	Case	Aluminum			
	Front cover	Acrylic (PMMA resin)			
	Cable	Oil-resistant PVC			
Accessories		Top and bottom mounting brackets, intermediate mounting brackets (The number depends on the length of the Sensor.), mounting screws, instruction manual			

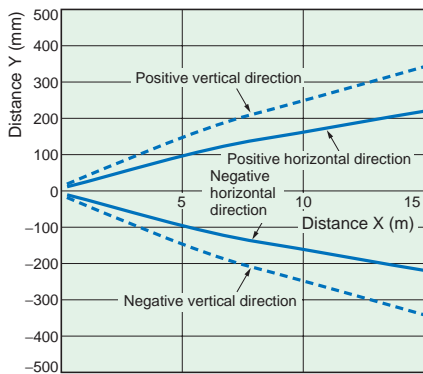
Engineering Data (Typical Examples)

Parallel Operating Range

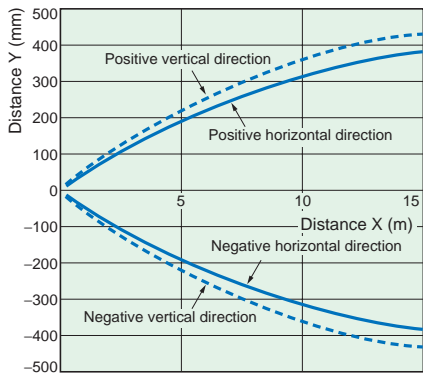
F3WN-X□□□□N14



F3WN-X□□□□N25  
F3WN-X□□□□N40

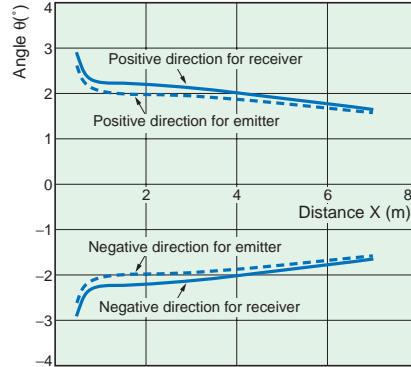


F3WN-X□□□□N70

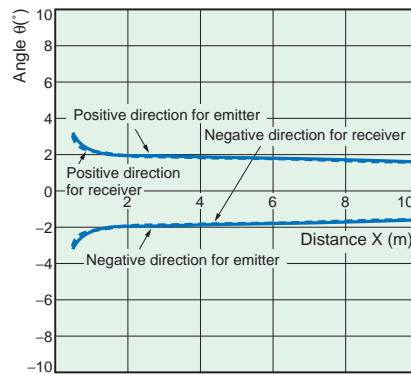


Angular Range (Angle of Elevation)

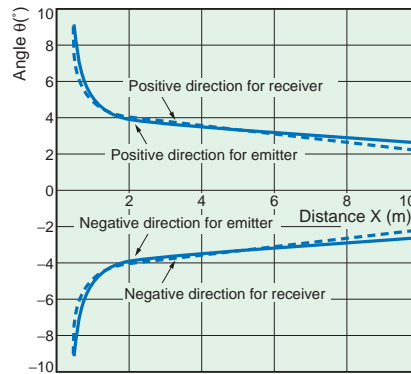
F3WN-X□□□□N14



F3WN-X□□□□N25  
F3WN-X□□□□N40

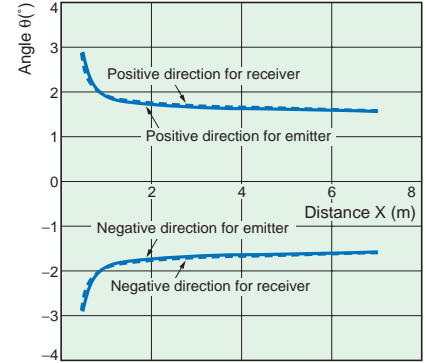


F3WN-X□□□□N70

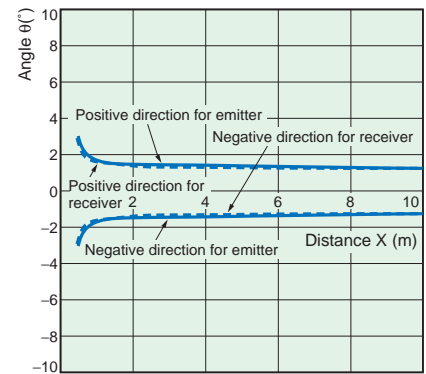


Angular Range (Angle of Rotation)

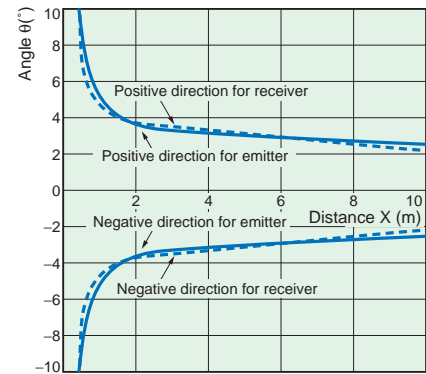
F3WN-X□□□□N14



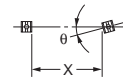
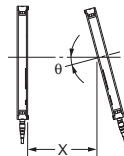
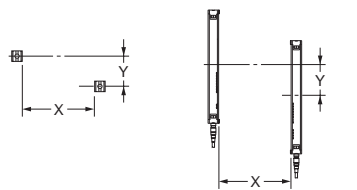
F3WN-X□□□□N25  
F3WN-X□□□□N40



F3WN-X□□□□N70

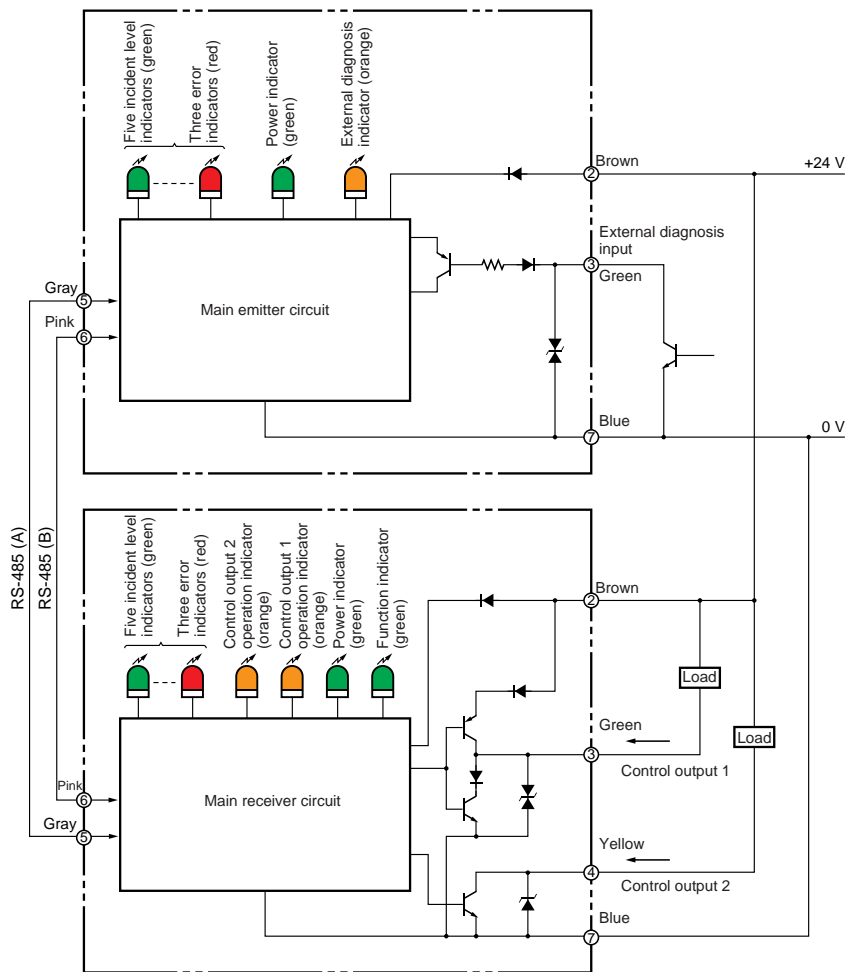


Horizontal Direction Vertical Direction



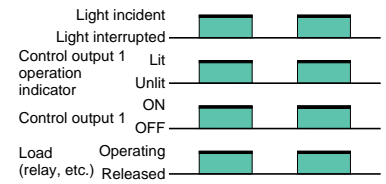
# I/O Block Circuit Diagram

## Circuit Diagram

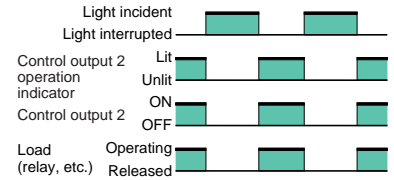


## Timing Chart

### Control Output 1



### Control Output 2



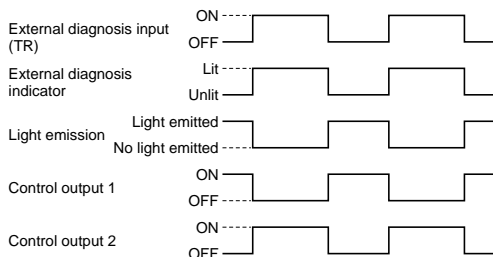
## Single-ended Connector Cable

Model	Internal wiring	Pin No.	Color of core sheath	Signal name	
				Receiver	Emitter
F39-JC3A (3 m) F39-JC7A (7 m) F39-JC10A (10 m) F39-JC15A (15 m)		1	White	NC	NC
		2	Brown	+24 V	+24 V
		3	Green	Control output 1	External diagnosis input
		4	Yellow	Control output 2	NC
		5	Gray	RS-485 (A)	RS-485 (A)
		6	Pink	RS-485 (B)	RS-485 (B)
		7	Blue	0 V	0 V
		8	Red	NC	NC

## External Diagnosis Function

If the external diagnosis input line is connected to 0 V, it can be used to stop the emission of light from the emitter.

### Timing Chart for External Diagnosis Function (Stable Incidence)



## Response Times

Model	Beam gap	Number of beams	Response time (control output 1)		Response time (control output 2)	
			ON to OFF	OFF to ON	ON to OFF	OFF to ON
F3WN-X□□□□N14	9 mm	17, 27	10.0 ms max.	40.0 ms max.	50.0 ms max.	20.0 ms max.
F3WN-X□□□□N25	15 mm	11 to 50	10.0 ms max.	40.0 ms max.	50.0 ms max.	20.0 ms max.
		51 to 85	12.5 ms max.	50.0 ms max.	62.5 ms max.	25.0 ms max.
		86 to 120	15.0 ms max.	60.0 ms max.	75.0 ms max.	30.0 ms max.
F3WN-X□□□□N40	30 mm	6 to 24	10.0 ms max.	40.0 ms max.	50.0 ms max.	20.0 ms max.
		25 to 42	12.5 ms max.	50.0 ms max.	62.5 ms max.	25.0 ms max.
		43 to 60	15.0 ms max.	60.0 ms max.	75.0 ms max.	30.0 ms max.
F3WN-X□□□□N70	60 mm	5 to 13	10.0 ms max.	40.0 ms max.	50.0 ms max.	20.0 ms max.
		14 to 22	12.5 ms max.	50.0 ms max.	62.5 ms max.	25.0 ms max.
		23 to 30	15.0 ms max.	60.0 ms max.	75.0 ms max.	30.0 ms max.

## Precautions

Refer to ntlp on page ntlp.

### WARNING

Do not use the Scanner as a safety device in pressing machines or as a safety device for protecting the human body in any other kind of installation.



- (1) The Scanner cannot be used as a safety device for protecting the operator's hands or any other part of the body in pressing machines, shears, rolling machines, spinning machines, cotton mill machines, or robots.
- (3) This product is designed for applications such as detecting the entrance of human bodies into the operator area and detecting moving objects. It is not designed for use as a safety device.
- (4) If this product is used in exported equipment in any of the ways 1) to 4) listed below, OMRON shall accept no responsibility for any problems concerning local law or product liability.
  - 1) Application as a safety device for preventing injury resulting from the operator's hands or any other part of the body entering a dangerous area
  - 2) Application in interlocks in machinery or installations
  - 3) Application as a safety device that detects the presence of the operator's hands or any other part of the body in a dangerous area and stops the machinery or installation in which it is incorporated
  - 4) Application as a sensing device in installations for preventing access to dangerous areas by detecting the operator's hands or any other part of the body, and opening/closing a window or door

### Caution

When using more than one Scanner installed close together, in order to prevent malfunctions due to mutual interference, be sure to observe the points mentioned under *Preventing Mutual Interference* on page 6.

### Application Precautions

In order to ensure safety, be sure to observe the points described below.

- Do not attempt to disassemble, repair, or modify the product.
- Be sure to turn OFF power to the system before installing or replacing the product.

### Correct Use

#### • Designing the System

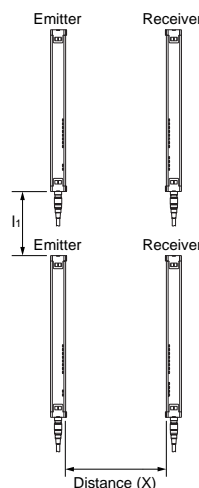
##### Operation at Power-ON

After turning ON the power, one second must elapse before the Sensor can perform sensing. Therefore, do not use other related devices until at least one second has elapsed after turning the power ON. If the load and the Sensor are connected to different power supplies, be sure to turn ON the power to the Sensor first.

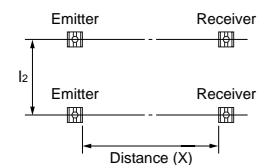
##### Preventing Mutual Interference

- When using more than one Sensor installed close together, separate them by the distances  $l_1$  or  $l_2$  (at least 1.5 times the distances shown under *Parallel Operating Range* on page 4) in the way shown below.

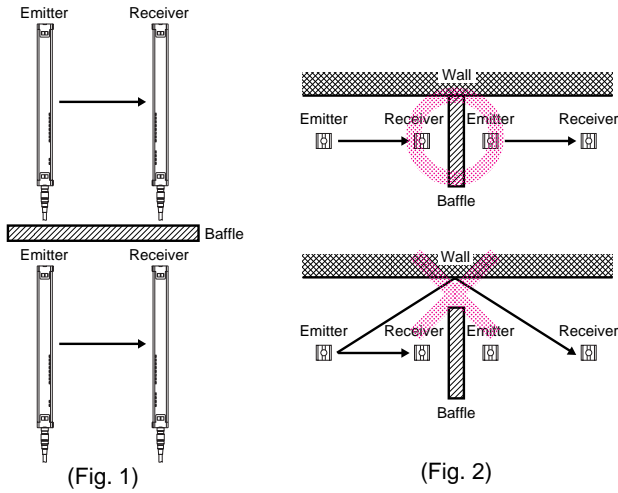
Installed End-to-end



Installed in Parallel



- Install baffles to block out light from other emitters. (See Fig. 1.)  
In addition to direct light, light may also be reflected off walls, the floor, and other surfaces. Install the baffles so that all light from other emitters, including reflected light, is blocked. (See Fig. 2.)



**• Wiring Connection**

- To extend the connection distance, use lines with a cross-sectional area of at least 0.3 mm<sup>2</sup>, and do not extend to a distance exceeding 100 m. Use a shielded cable, and connect the shield line to the 0-V line.
- Incorrect wiring may result in damage to devices. Ensure that connectors and cables do not come loose by giving careful consideration to the cable length and installation arrangement.

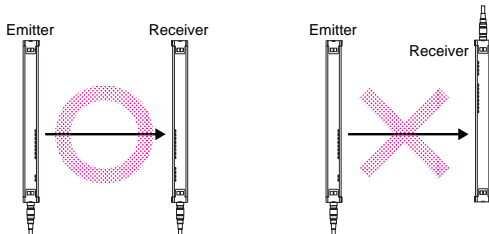
**Cables**

Cable's minimum bending radius: 36 mm.

**• Installation**

**Installation Precautions**

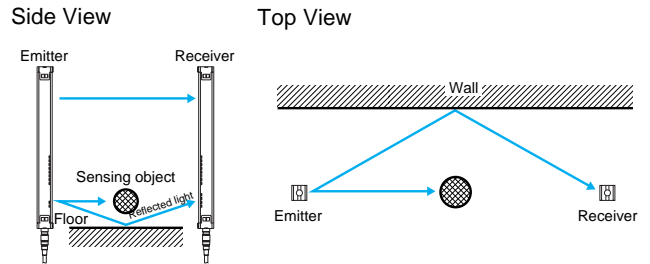
- Install the Sensor so that no beams of strong light, such as sunlight, fluorescent light, or incandescent light can enter at an angle less than the effective aperture angle of the Sensor.
- Do not strike the Sensor with a hammer during installation. Doing so may damage the internal structure.
- Install the Sensor so that the cables on the emitter and receiver point in the same direction. (See below.)



- Secure the Controller using M4 screws.
- Secure the case using a tightening torque of 1.2 N·m max.

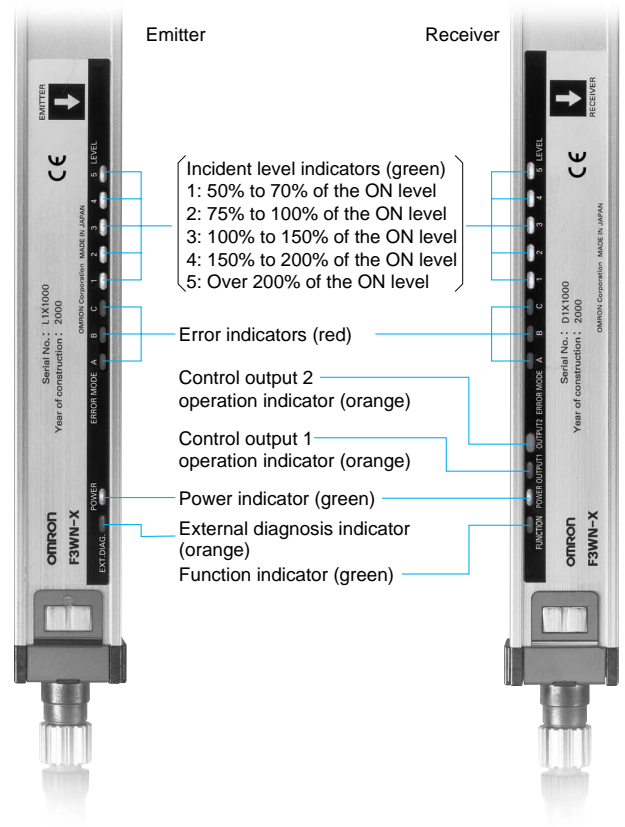
**Reflection off Walls and Floors**

If the Sensor is installed in the way shown below, the beam may not be blocked properly due to the reflection of light off the floor. The same problem can also occur with light reflected off walls. Check that the sensing object can be detected properly before starting actual operation.



**• Adjustment Operation/Stability Indicators**

- The indicators operate according to the incident level in the way shown below.
- Set the Scanner so that all the incident level indicators are lit.



**Error Display (Red Only)**

Flashing (red)    Not lit

Error indicators	Meaning
A B C	
Not lit Not lit Flashing	Disconnection or error in communications lines
Flashing Not lit Not lit	Wiring error in control output
Not lit Flashing Flashing	Mutual interference
Flashing Not lit Flashing	Incorrect Sensor model
Flashing Flashing Flashing	Noise or Sensor damage

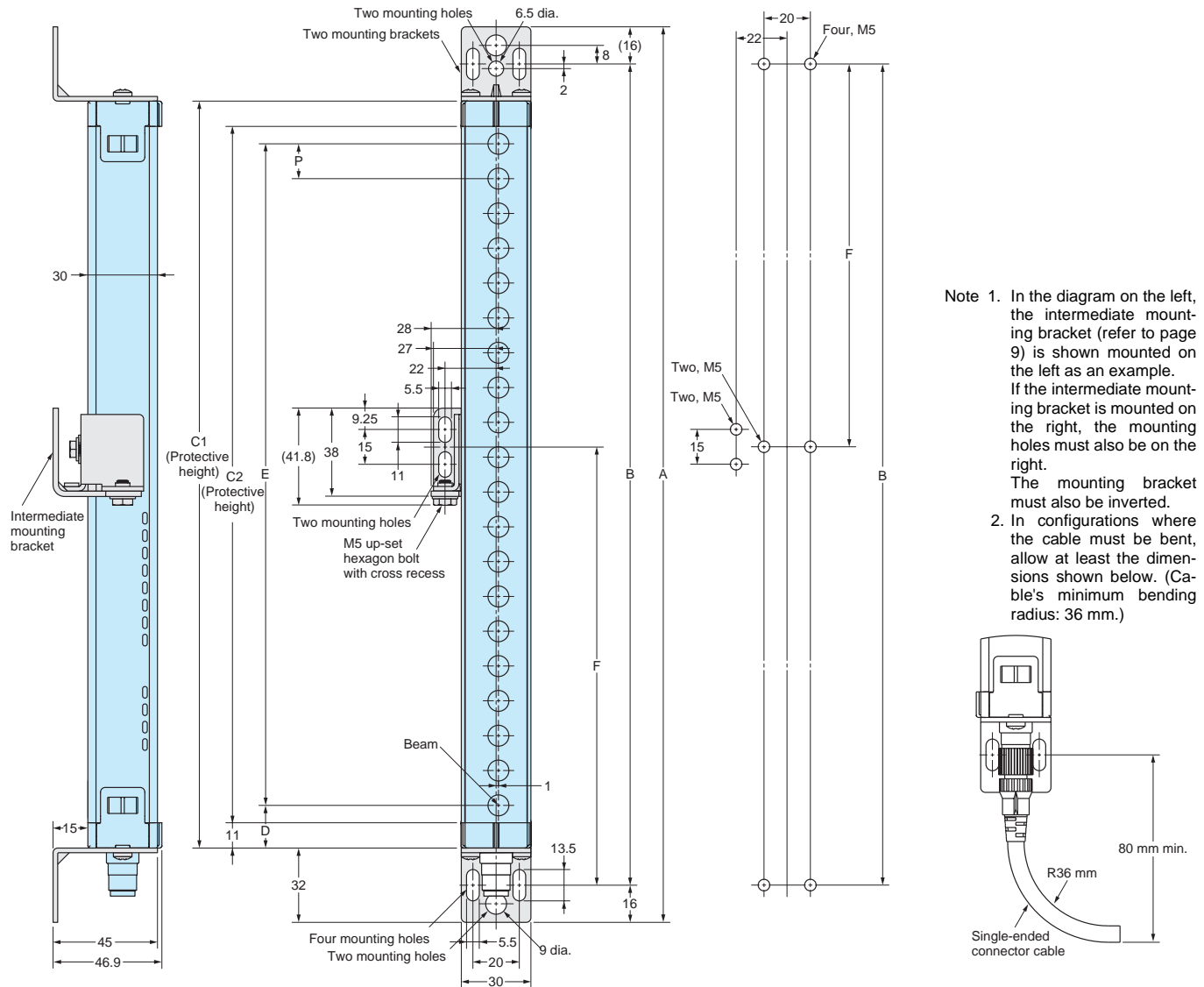
Dimensions

(Unit: mm)

Main Units

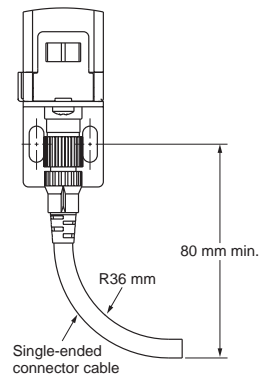
F3WN-X□□□□N□□

Mounting Hole Dimensions



Note 1. In the diagram on the left, the intermediate mounting bracket (refer to page 9) is shown mounted on the left as an example. If the intermediate mounting bracket is mounted on the right, the mounting holes must also be on the right. The mounting bracket must also be inverted.

2. In configurations where the cable must be bent, allow at least the dimensions shown below. (Cable's minimum bending radius: 36 mm.)



The dimensions for different model numbers can be calculated using the following formulae.

- F3WN-X□□□□N14  
 Dimension C2 (protective height) = The 4 digits in the model number  
 Dimension A = C2 + 86  
 Dimension B = C2 + 54  
 Dimension D = 15.5  
 Dimension E = C2 - 9  
 Dimension F = See table below.  
 Dimension P = 9
- F3WN-X□□□□N25/N40/N70  
 Dimension C1 (protective height) = The 4 digits in the model number  
 Dimension A = C1 + 64  
 Dimension B = C1 + 32  
 Dimension D = 18.5  
 Dimension E = C1 - 37  
 Dimension F = See table below.  
 Dimension P = 15

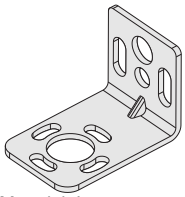
Protective height (C2)	Number of intermediate mounting brackets	Dimension F (See note.)
Up to 0620	0	---
0621 to 1125	1	F = B/2

Protective height (C1)	Number of intermediate mounting brackets	Dimension F (See note.)
Up to 0640	0	---
0641 to 1280	1	F = B/2
1281 to 1822	2	F = B/3

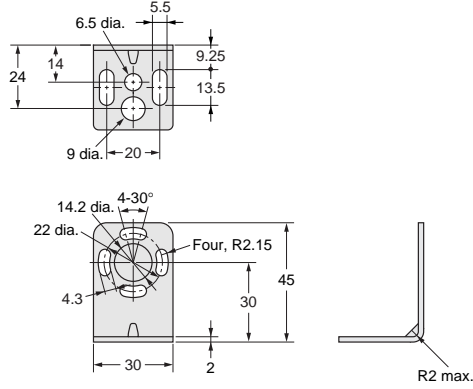
Note: When not using the value of F obtained with the above calculation, use a value not exceeding 670 mm.



**Top and Bottom Mounting Brackets**

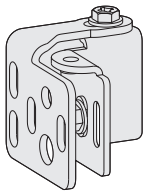


Material: Iron

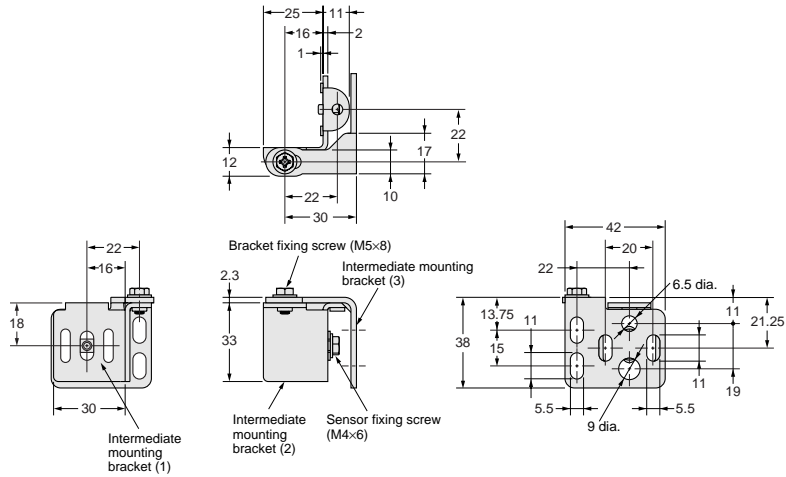


Note: Provided with the product.

**Intermediate Mounting Bracket**



Material: Iron

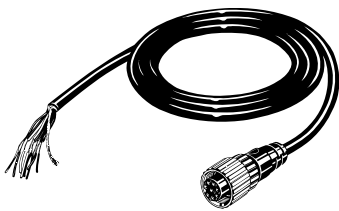


Note: Provided with the product. The number of brackets required depends on the total length of the Sensor.

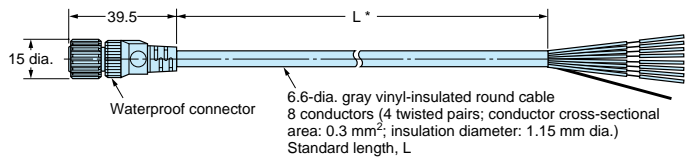
**Accessories (Sold Separately)**

**Single-ended Connector Cable**

- F39-JC3A (L = 3 m)
- F39-JC7A (L = 7 m)
- F39-JC10A (L = 10 m)
- F39-JC15A (L = 15 m)



Color:  
 Emitter: Gray  
 Receiver: Black



\*Available in the following dimensions: L = 3, 7, 10, and 15 m.

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

Cat. No. E517-E1-01 In the interest of product improvement, specifications are subject to change without notice.