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OMRON

F10 Vision Sensor

F10

Affordable F10 Vision Sensor with One-Touch Setup Requires No Programming

- Ensures fast, accurate inspections such as label pattern match, print verification, label placement, and conformity (rejects upside-down, tilted or double labels)
- Offers adaptability with 3 selectable inspection areas
- F10 Sensor includes a controller, camera, light source, and light guide



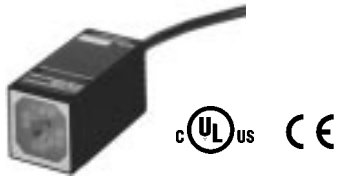
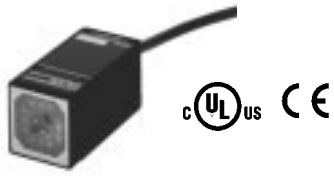
Ordering Information

PATTERN MATCHING AMPLIFIER

Item	Description	Output type	Part number
F10-C10/-C15 Pattern Matching Amplifier 	Pattern measurement	NPN	**F10-C10**
		PNP	**F10-C15**
F10-C11/-C16 Pattern Matching Amplifier 	Pattern measurement only, or selectable pattern and plain measurement	NPN	**F10-C11**
		PNP	**F10-C16**

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■ HEAD

Item	Sensing area	Setting distance	Part number
F10-S30 Head 	25 mm x 20 mm (0.98 in x 0.79 in)	100 ± 10 mm (3.94 ± 0.39 in)	**F10-S30**
F10-S15 Head 	12 mm x 10 mm (0.47 in x 0.39 in)	50 ± 5 mm (1.96 in x 0.20 in)	**F10-S15**

Specifications

■ PERFORMANCE SPECIFICATIONS — F10-C10/-C15 AMPLIFIERS



Item	F10-C10	F10-C15
Output type	NPN	PNP
Measurement item	Pattern measurement	
Number of models	1	
Automatic teaching function	Yes	
Model size	Normal or wide mode (selectable)	
Measurement processing time	3.6 ms in normal mode and 10.8 ms in wide mode (continuous operation)	
Output signal (2 points)	Control output and enable output: NPN open collector with load current of 50 mA max. and residual voltage of 1.2 V max.	Control output and enable output: PNP open collector with load current of 50 mA max. and residual voltage of 2.0 V max.
Input signal (4 points)	External trigger input (with minimum pulse width of 1 ms), continuous measurement input, moving object teaching input, or stationary object teaching input. Input is ON: Short-circuited to 0 V with short-circuit current of 1 mA max. or 1.5 V max. Input is OFF: Open or input voltage of 5 V min. (Max. input voltage: 26.4 VDC)	External trigger input (with minimum pulse width of 1 ms), continuous measurement input, moving object teaching input, or stationary object teaching input. Input is ON: Short-circuited to Vcc or 9 V min. with max. input voltage of 26.4 VDC. Input is OFF: Open or input voltage of 5 V max.
Head interface (1 channel)	Available Head: F10-S30 or F10-S15	
Indicators	Result indicator: 1 orange LED Level indicators: 8 green LEDs Threshold indicators: 7 red LEDs	
Operation interface	Teaching button (TEACH), SELECT buttons (UP/DOWN), mode selector (TEACH/MON/RUN), auto-teaching selector (OFF/ON), and model size selector (NORMAL/WIDE)	

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■ PERFORMANCE SPECIFICATIONS — F10-C11/-C16 AMPLIFIERS



Item	F10-C11	F10-C16
Output type	NPN	PNP
Measurement item	Pattern measurement only or pattern or plain measurement (selectable)	
Number of models	1	
Automatic teaching function	Yes	
Model size	Normal or wide mode (selectable), disabled in plain measurement operation	
Measurement processing time	Pattern measurement: 3.6 ms in normal mode and 10.8 ms in wide mode (continuous operation) Plain measurement: 7.2 ms in continuous operation	
Output signal (2 points)	Control output and enable output: NPN open collector with load current of 50 mA max. and residual voltage of 1.2 V max.	Control output and enable output: PNP open collector with load current of 50 mA max. and residual voltage of 2.0 V max.
Input signal (4 points)	External trigger input (with minimum pulse width of 1 ms), continuous measurement input, moving object teaching input, or stationary object teaching input. Input is ON: Short-circuited to 0 V with short-circuit current of 1 mA max. or 1.5 V max. Input is OFF: Open or input voltage of 5 V min. (Max. input voltage: 26.4 VDC)	External trigger input (with minimum pulse width of 1 ms), continuous measurement input, moving object teaching input, or stationary object teaching input. Input is ON: Short-circuited to Vcc or 9 V min. with max. input voltage of 26.4 VDC. Input is OFF: Open or input voltage of 5 V max.
Head interface (1 channel)	Available Head: F10-S30 or F10-S15	
Indicators	Result indicator: 1 orange LED Level indicators: 8 green LEDs Threshold indicators: 7 red LEDs Status indicators: 3 green LEDs	
Operation interface	Teaching and display button (TEACH/DISPLAY), SELECT buttons (UP/DOWN), measurement item selector (PATT/PLN or PATT), mode selector (TEACH/MON/RUN), auto-teaching selector (OFF/ON), and model size selector (NORMAL/WIDE)	

■ GENERAL SPECIFICATIONS — F10-C10/-C15 OR F10-C11/-C16 AMPLIFIERS

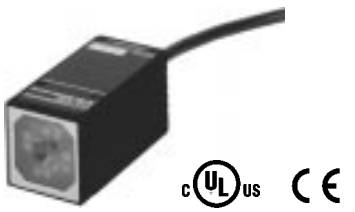
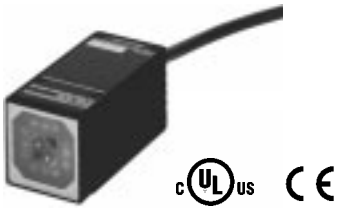
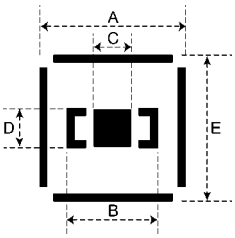
Operating temperature	0°C to 50°C (32°F to 122°F)
Operating humidity	35% to 85% (with no condensation)
Storage temperature	–25°C to 65°C (–13°F to 149°F) with no icing
Operating environment	With no corrosive gas
Input power supply	24 VDC ± 10% (with ripple)
Current consumption	300 mA max.
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	1,000 VAC at 50/60 Hz for 1 min
Degree of protection	IEC60529 IP40
Vibration resistance	10 to 150 Hz, 0.75-mm single amplitude or 100 m/s^2 (10G) max. for 32 min each in X, Y, and Z directions
Shock resistance	Peak acceleration: 300 m/s^2 (30G) 3 times each in X, Y, and Z directions
Cable length	2 m
Casing material	ABS
Weight	Approx. 200 g (including cable)

Note: An F10-C10/-C15 or F10-C11/-C16 Amplifier connects to one F10-S30 or F10-S15 Head. Teach and threshold level adjustments will be required again if the Head is replaced.

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■ HEADS

Optical and Lighting System Specifications

Item	F10-S30	F10-S15
Appearance		
Sensing distance	100 ± 10 mm	50 ± 5 mm
Sensing area	25 mm x 20 mm	12 mm x 10 mm
Guide light projection size 	A: 25 mm (0.98 in) B: 20 mm (0.79 in) C: 8 mm (0.31 in) D: 6 mm (0.24 in) E: 20 mm (0.79 in)	A: 12 mm (0.47 in) B: 10 mm (0.39 in) C: 4 mm (0.16 in) D: 3 mm (0.12 in) E: 10 mm (0.39 in)
Built-in lens	Focus: f9.8 (fixed) Diaphragm: F2.8 (fixed)	
Object lighting method	Pulse lighting (pulse width is synchronized with electronic shutter in operation)	
Object light source	8 red LEDs	8 green LEDs
Main object color combination	Black and white, green and white, blue and white, and red and black	Black and white, red and white, green and white, blue and white, green and black, and blue and black
Guide light projection source	1 green LED	1 blue LED
Guide light projection method	Pulse lighting	

Camera Image Performance Specification

Item	F10-S30	F10-S15
Camera image element	1/5-inch CCD	
Shutter function	Electronic shutter at a speed range between 1/34722 and 1/2894 s (automatically set during teaching)	

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■ GENERAL SPECIFICATIONS — F10-S30/-S15 HEADS

Operating temperature	0°C to 40°C (32°F to 104°F)
Operating humidity	35% to 85% (with no condensation)
Storage temperature	–25°C to 60°C (–13°F to 140°F) with no icing
Operating environment	With no corrosive gas
Input power supply	18 VDC ± 10% (provided from amplifier)
Current consumption	150 mA max.
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	1,000 VAC at 50/60 Hz for 1 min
Degree of protection	IEC60529 IP64
Vibration resistance (with mounting bracket attached)	10 to 150 Hz, 0.75-mm single amplitude or 100 m/s^2 (10G) max. for 32 min each in X, Y, and Z directions
Shock resistance (with mounting bracket attached)	Peak acceleration: 300 m/s^2 (30G) 3 times each in X, Y, and Z directions
Cable length	2 m
Casing material	Case: Aluminum die cast Front cover: Acrylic resin
Weight	Approx. 300 g (including cable)
Accessories provided	A dedicated mounting bracket, two M4 screws, and two M4 washers

Application Examples

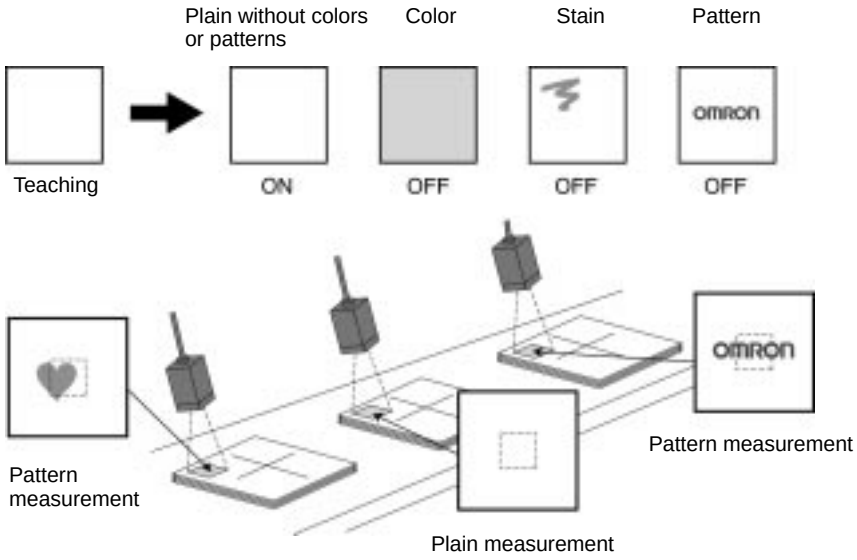
■ F10-C11/-C16 AMPLIFIER

Measures Plain Objects Without Colors or Patterns

Each object is discriminated according to the deviation and average density. A plain object without colors or patterns will be detected if a sample of the plain object is registered as a model by teaching.

Discriminates Improper Objects

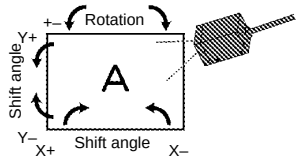
Plain or pattern measurement is applicable to the discrimination of improper objects. If a sample of a plain or patterned object is registered as a model by teaching, the Sensor will operate and automatically detect objects identical to the model.



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Engineering Data

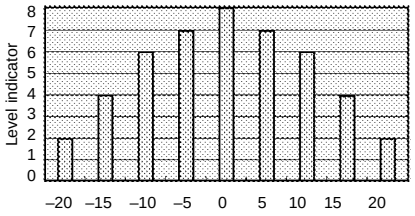
■ F10-S30 DATA CHARACTERISTICS



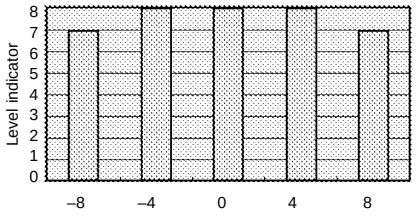


- The following data is obtained on the basis of sample target objects, each of which is as large as this size (A). (Typical example)
- The Head is inclined 15° to the target object.

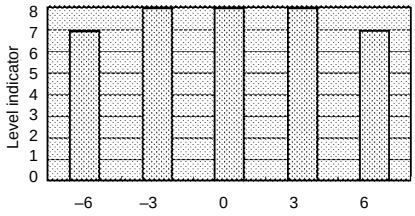
Rotation Characteristics



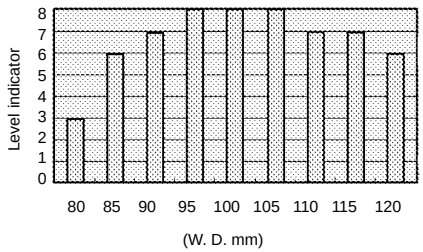
Area Position Characteristics (in X Direction)



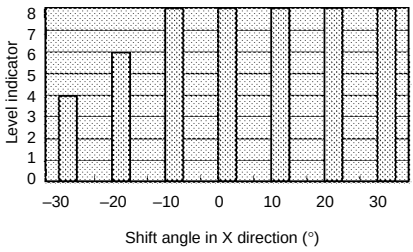
Area Position Characteristics (in Y Direction)



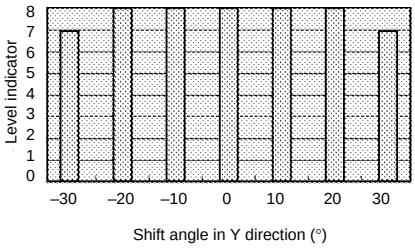
Distance Characteristics



Shift Angle Characteristics (in X Direction)

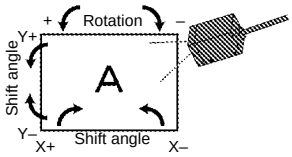


Shift Angle Characteristics (in Y Direction)



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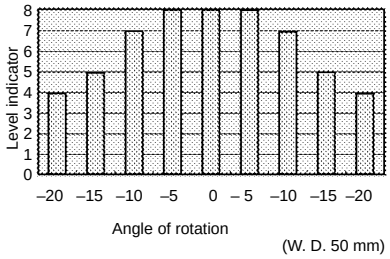
■ F10-S15 DATA CHARACTERISTICS



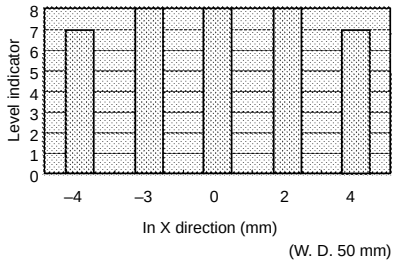


- The following data is obtained on the basis of sample target objects, each of which is as large as this size (A). (Typical example)
- The Head is inclined 15° to the target object.

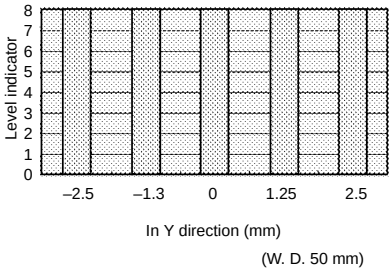
Rotation Characteristics



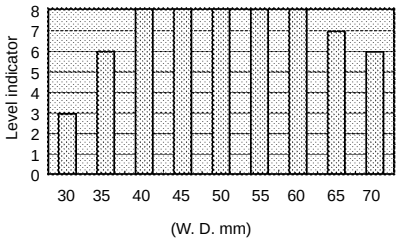
Area Position Characteristics (in X Direction)



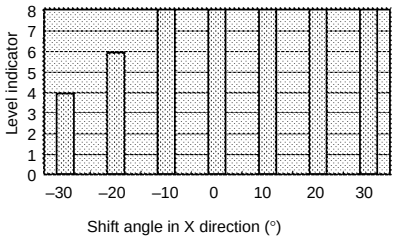
Area Position Characteristics (in Y Direction)



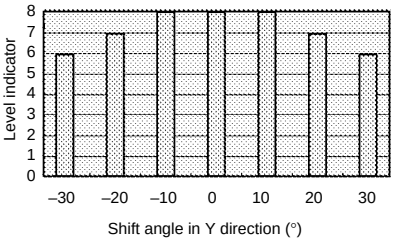
Distance Characteristics



Shift Angle Characteristics (in X Direction)



Shift Angle Characteristics (in Y Direction)

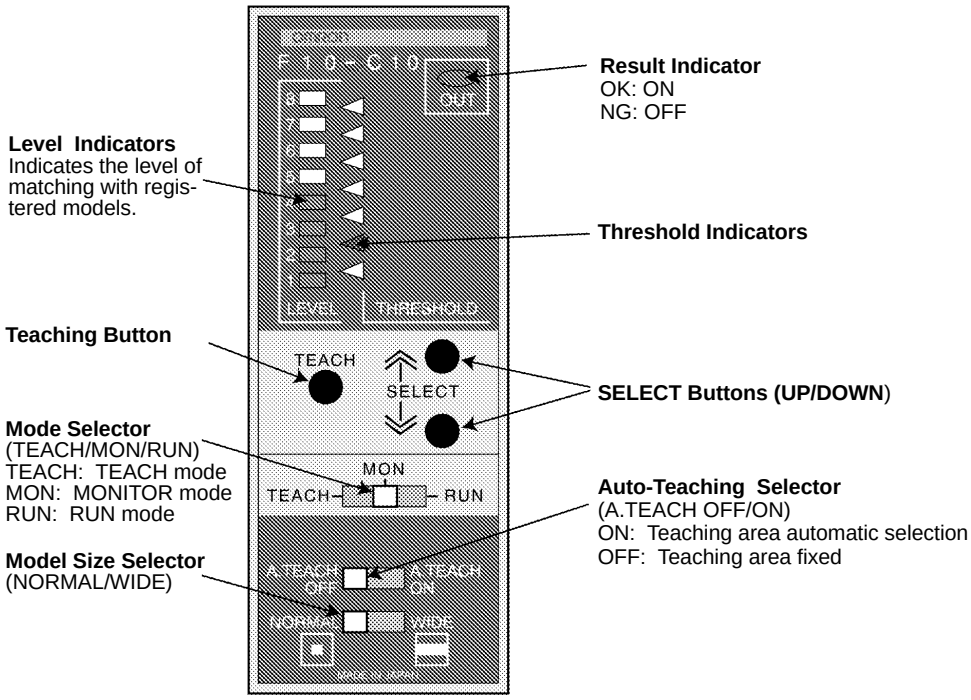


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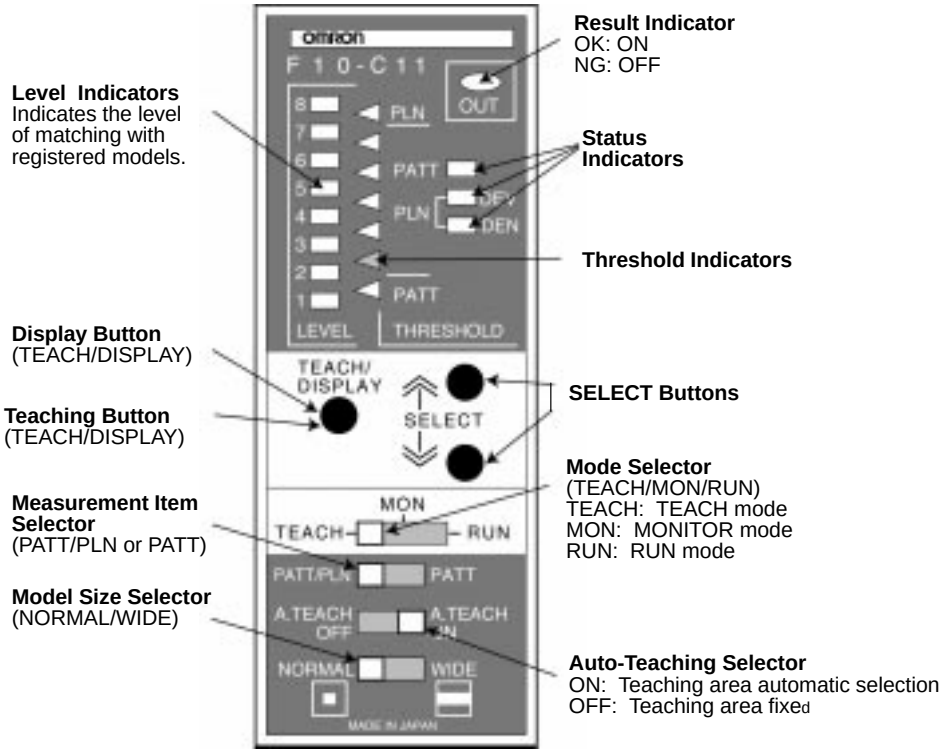
Nomenclature

Note: 1. An F10-C10/-C15 or F10-C11/-C16 Amplifier connects to a single F10-S30 or F10-S15 Head.
2. If the Head is replaced, teaching and threshold-level adjustments will be required again. (This applies to an F10-C10/-C15 or F10-C11/-C16 Amplifier.)

■ F10-C10/-C15 AMPLIFIER

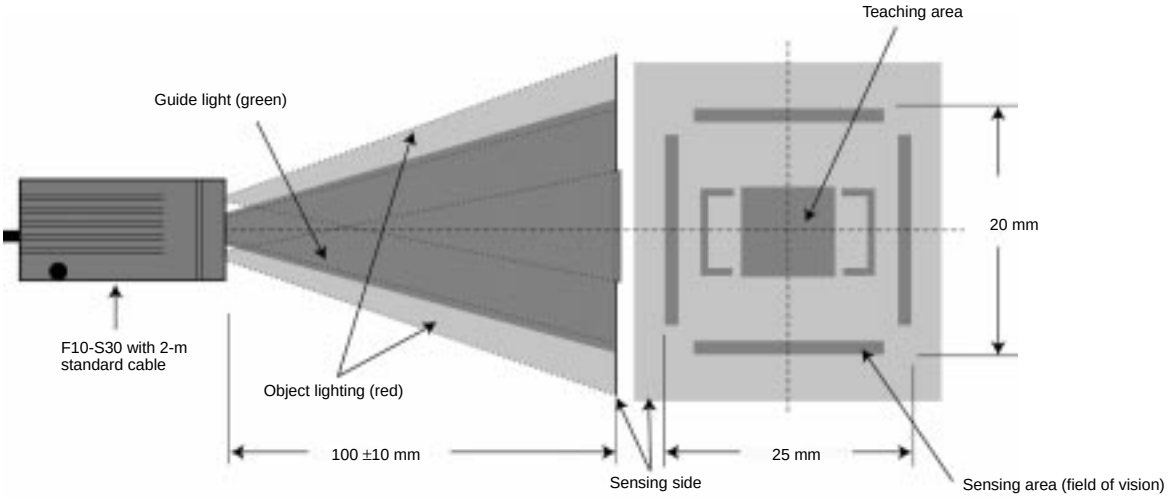


■ F10-C11/-C16 AMPLIFIER

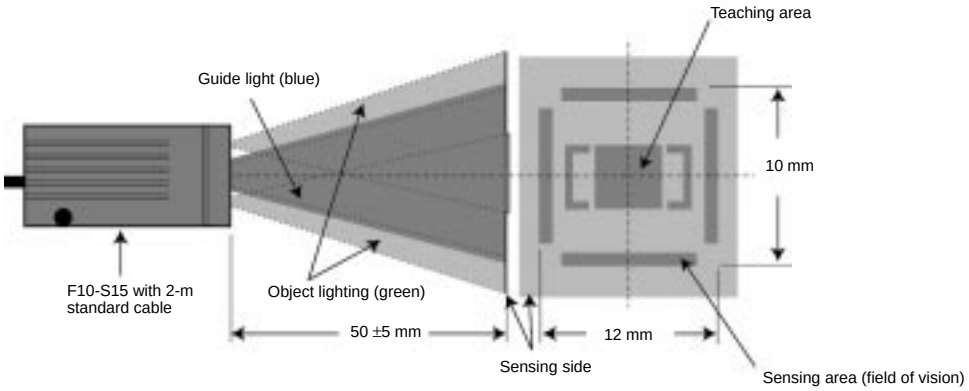


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■ F10-S30 HEAD



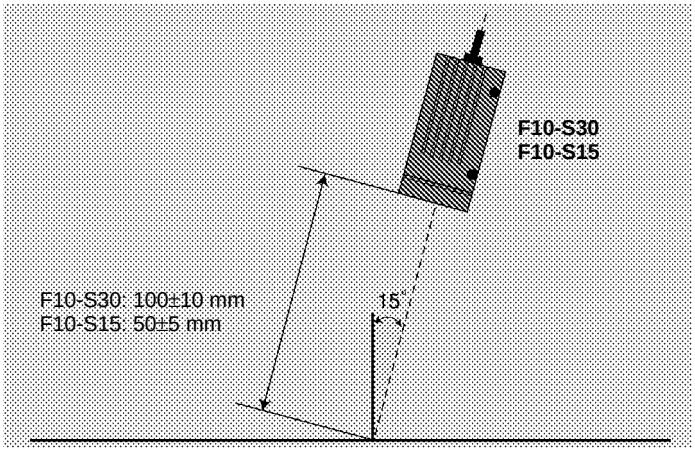
■ F10-S15 HEAD



Installation

■ MOUNTING ANGLE

- Incline the Head by 15° and mount the Head so that no regular reflected light affects the Sensor.
- To mount the Head, use the Mounting Bracket provided.

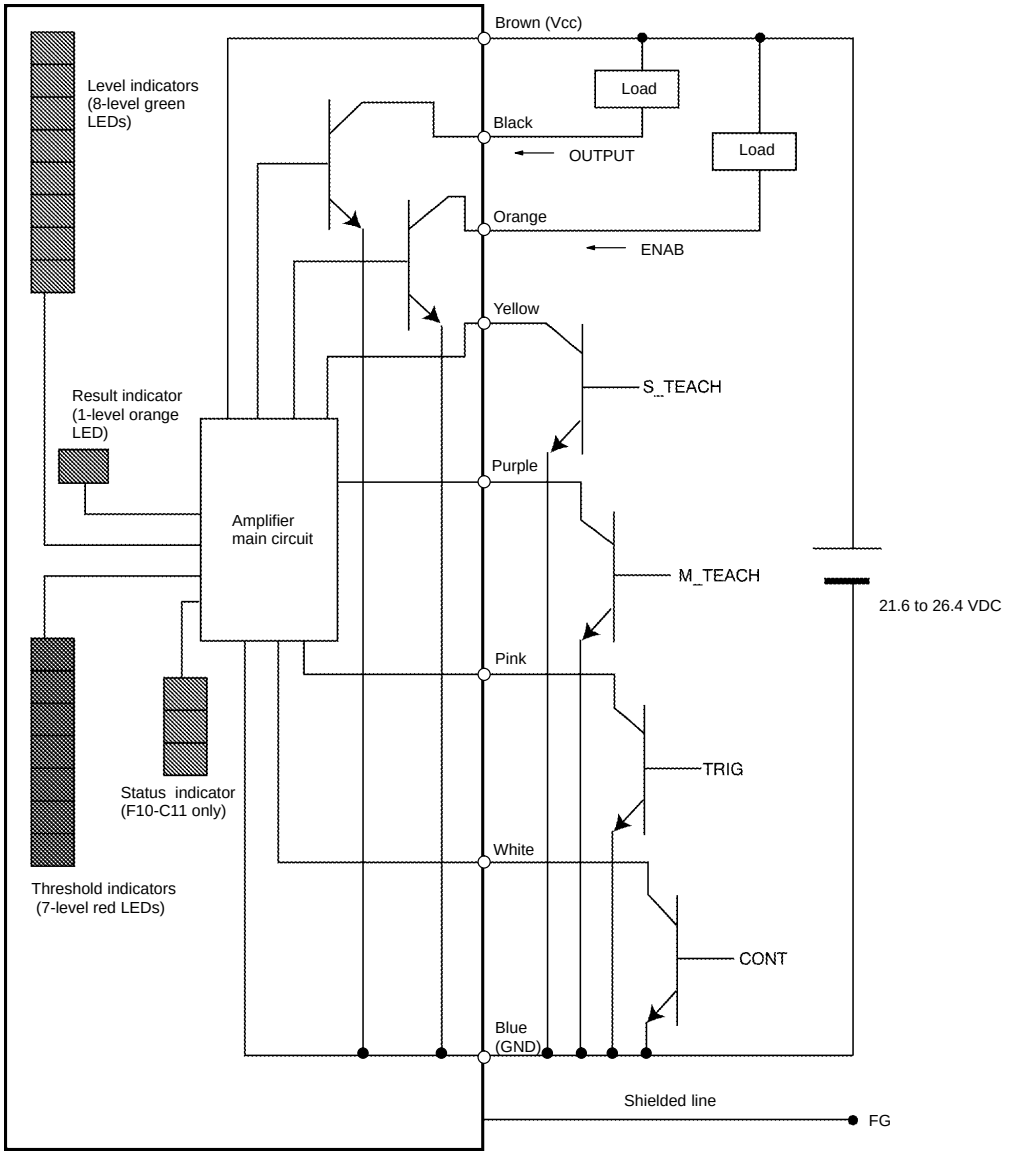


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Operation

■ I/O CIRCUIT DIAGRAM

F10–C10/-C11 NPN Amplifier Models



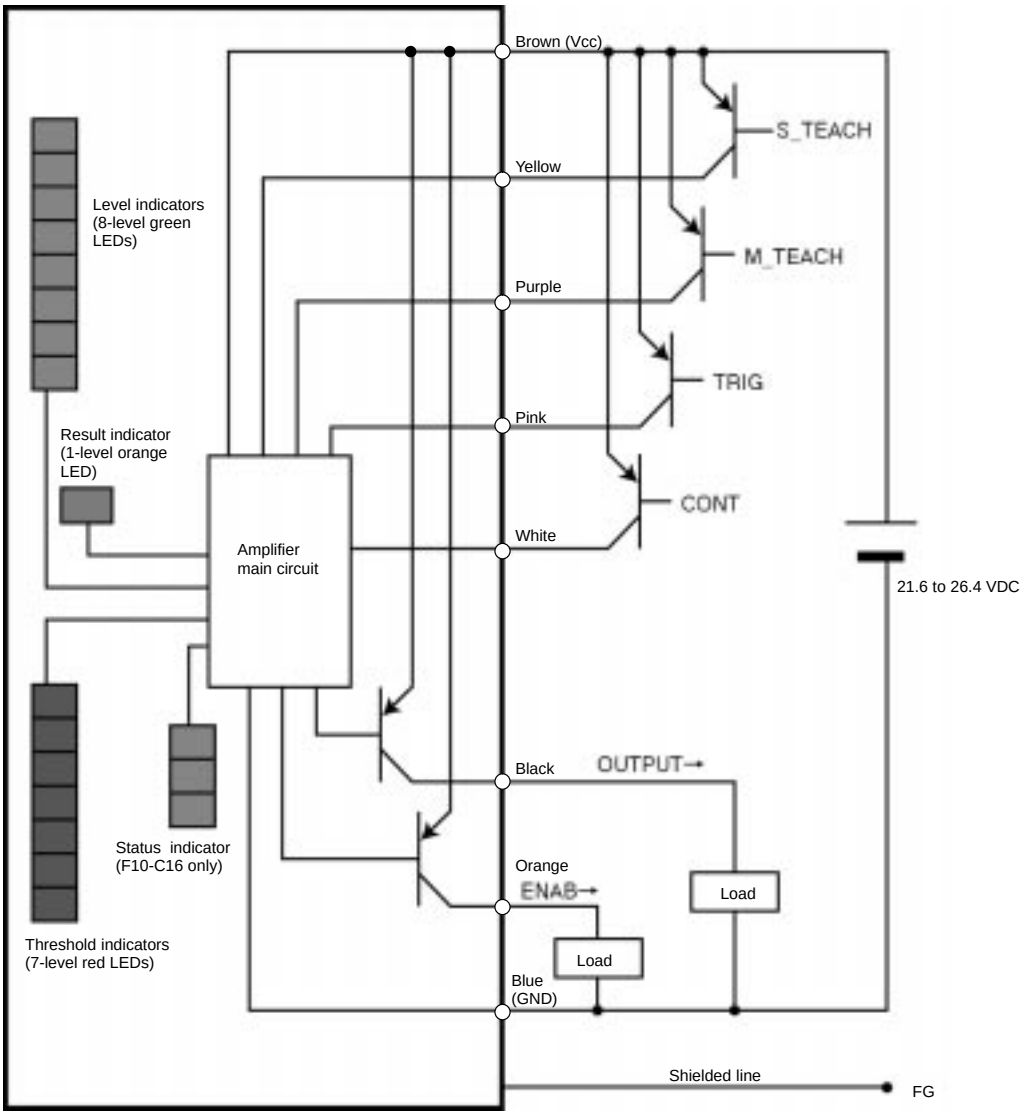
For normal operation, ground or connect the GND terminal to 0 V.

Signal	Function	Reference
OUTPUT	Control output	*Setting Procedure, RUN Mode*
ENAB	Enabled output	
S_TEACH	Stationary object teaching input	
M_TEACH	Moving object teaching input	
TRIG	Measurement trigger input	
CONT	Continuous measurement input	

- All input signals are enabled in RUN mode only.
- The shielded wire is not connected to the interior or casing.

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F10-C15/-C16 PNP Amplifier Models



For normal operation, ground or connect the shielded cable to 0 V.

Signal	Function	Reference page
OUTPUT	Control output	*Setting Procedure, RUN Mode*
ENAB	Enabled output	
S_TEACH	Stationary object teaching input	
M_TEACH	Moving object teaching input	
TRIG	Measurement trigger input	
CONT	Continuous measurement input	

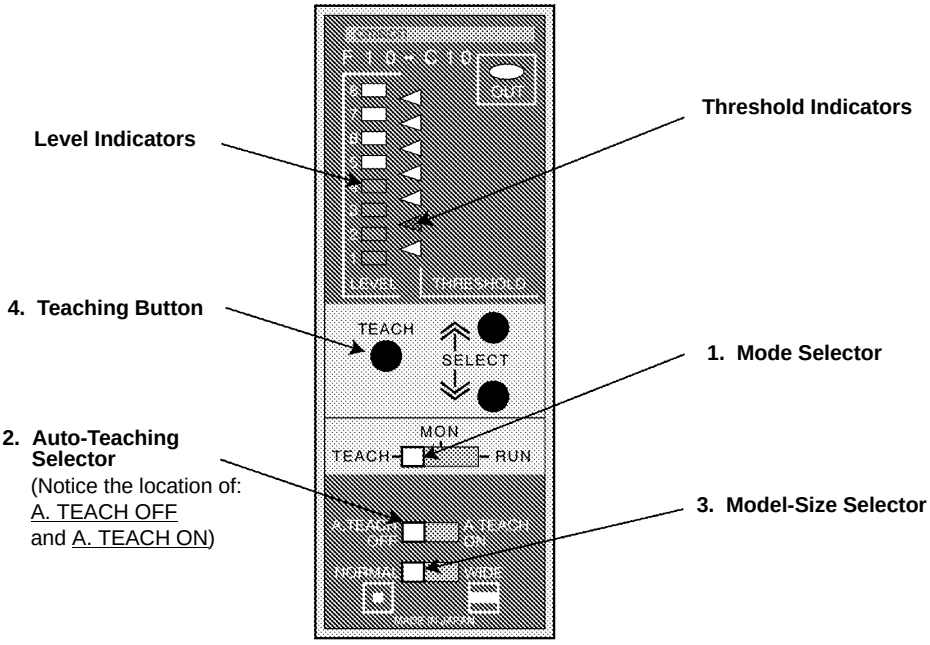
- All input signals are enabled in RUN mode only.
- The shielded wire is not connected to the interior or casing.

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■ F10-C10/-C15 AMPLIFIER SETTING PROCEDURE

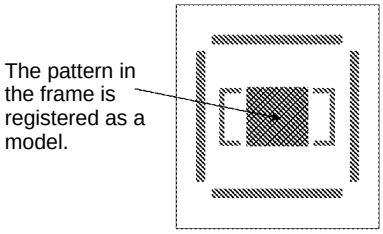
Pattern Registration (TEACH Mode)

Necessary image data as measurement criteria is registered in TEACH mode by using the various selectors and the Teaching Button (numbered 1 through 4 in the following illustration).

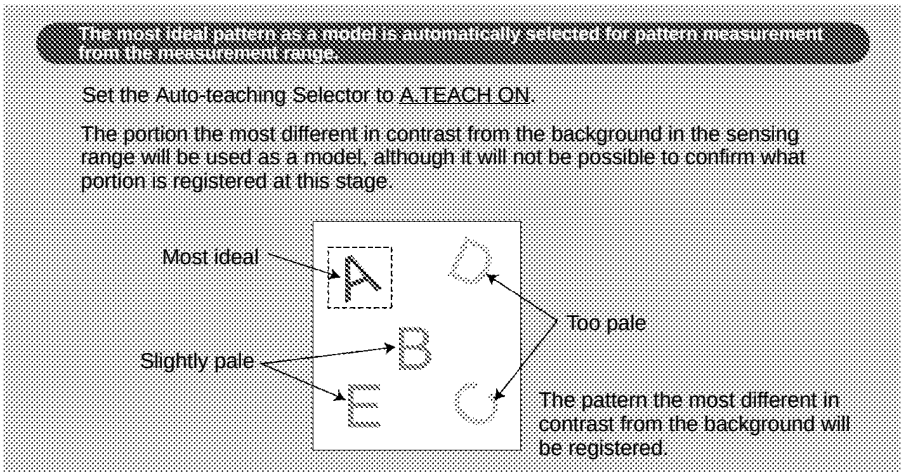


Procedure

1. Set the Mode Selector to TEACH.
2. Set the Auto-Teaching Selector to: A.TEACH OFF**.**
   Fixed-area teaching will be performed. Only the pattern in the teaching area will be registered.

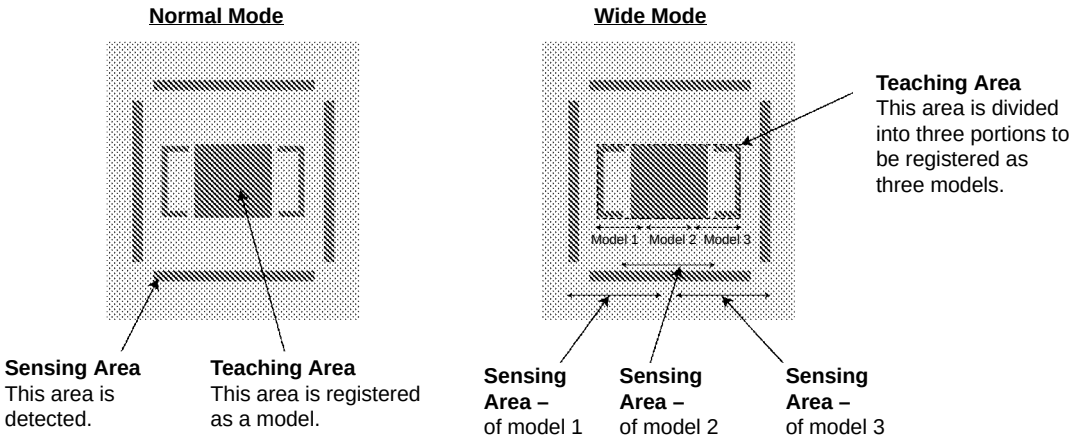


Or, set the Auto-teaching Selector to: A.TEACH ON**.**



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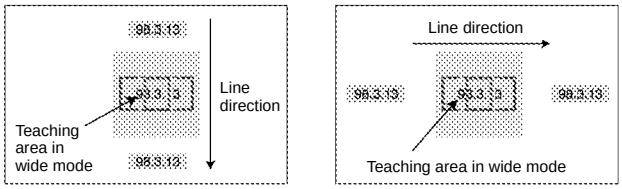
3. Set the Model-Size Selector to select the mode.



Note: Operate the Sensor in wide mode if the pattern is relatively long in a single direction, such as a manufacturing date, month, and year. Since three models are consecutively processed in the wide mode, the required processing time will be three times that of the normal mode.

Mounting Direction of Sensor in Wide Mode

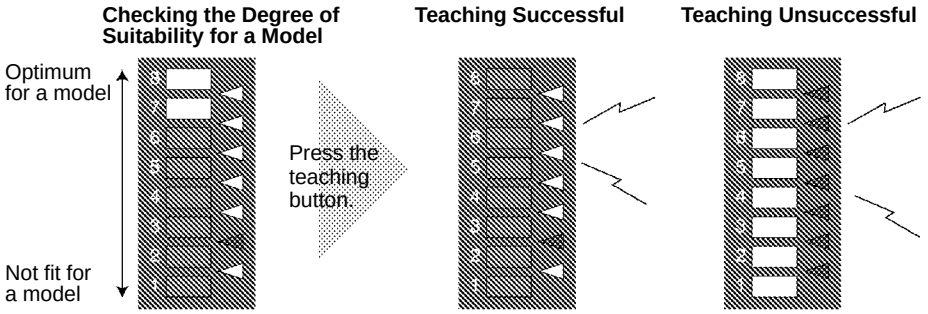
For target objects that are moving, use the Sensor as shown on the left side in this illustration.



Recommended **Not Recommended**

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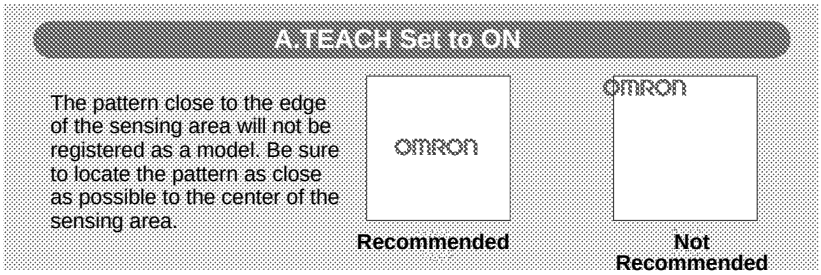
4. Press the Teaching Button after locating the target object in the sensing area.



Locate the target object in the sensing area so that the degree of suitability for a model will be indicated.

The level indicators are all lit for 0.5 s and the buzzer beeps twice.

The threshold indicators all flash while the buzzer beeps four times. The contrast is insufficient. Change the location of the Sensor and try again.



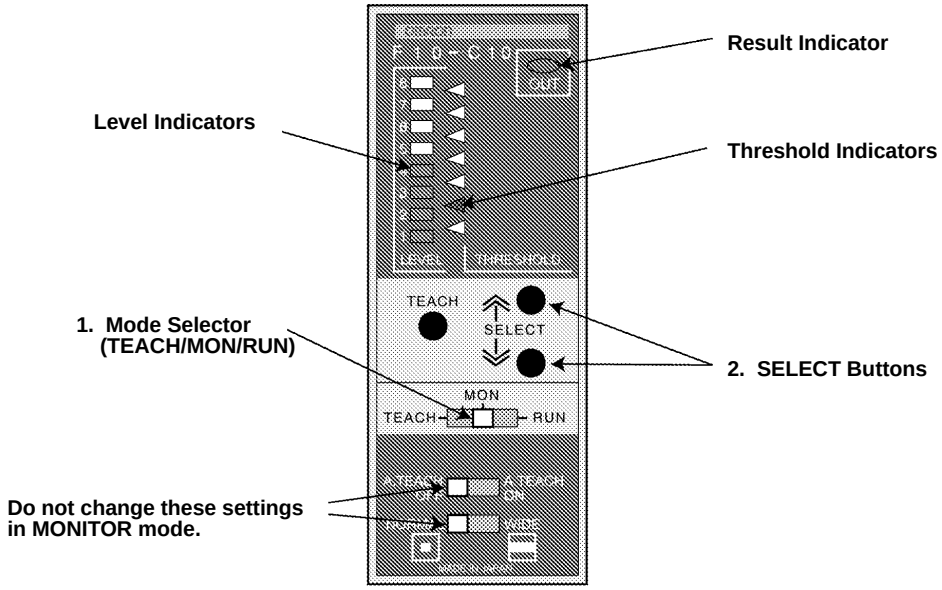
After the teaching operation, set the Sensor to MONITOR mode for threshold adjustments.

→ Go to *Threshold Adjustment/Sample Test (MONITOR Mode).*

Note: Do not turn OFF the Sensor before the Sensor is set to MONITOR mode, or the teaching data will be lost.

Threshold Adjustment/Sample Test (MONITOR Mode)

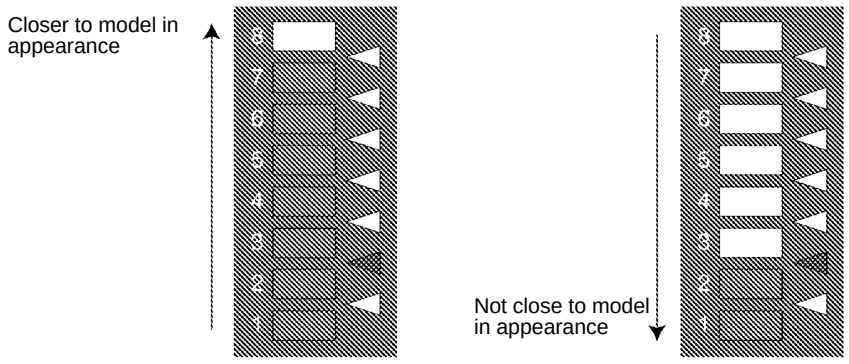
The Sensor operates in MONITOR mode for threshold level adjustments and desktop sample tests for object discrimination with no signal output. No external output operation signal or input signal is accepted in MONITOR mode.



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Procedure

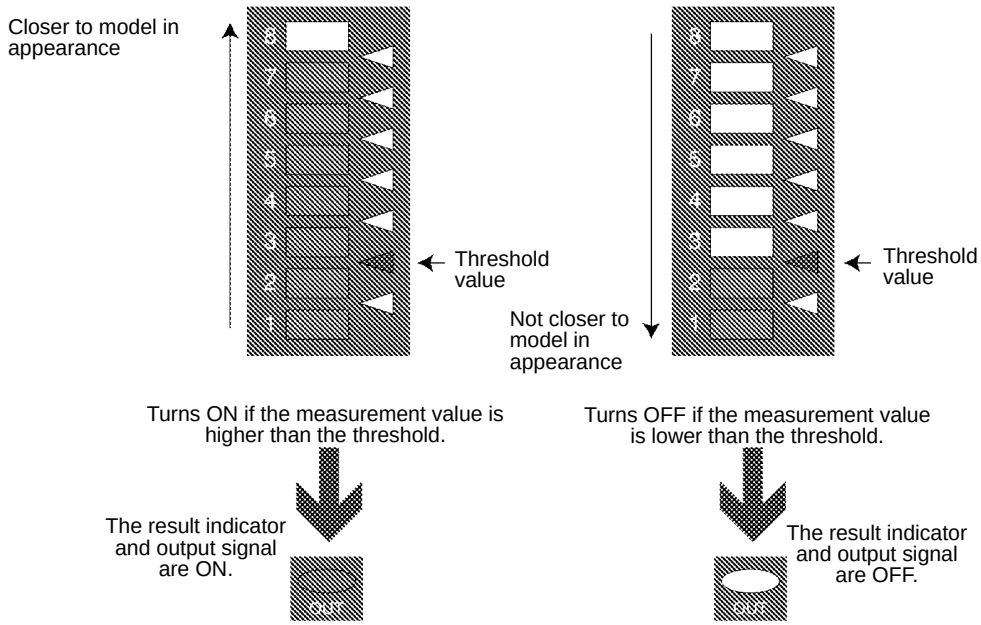
1. Set the Mode Selector to MON. Measurement continues as long as the selector is set to MON. On the basis of the registered model, the level indicator indicates the degree of conformance of the target object.



The closer to the model in appearance, the higher the level.

If no target object is within the sensing area or if the target object is greatly different from the model, the level will be lower.

2. Press the SELECT Buttons to adjust the threshold. Adjust the threshold to the most suitable level by monitoring the level indicator.



Note: 1. Any threshold changed will be entered only when the Mode Selector is set to RUN or TEACH.
2. In wide mode, the model with the lowest degree of conformance out of the three models is used for discrimination.

After the above threshold adjustments, return to TEACH mode again if the models have not been registered correctly.

→ Go to *Pattern Registration (TEACH Mode). Details are in previous subsection.*

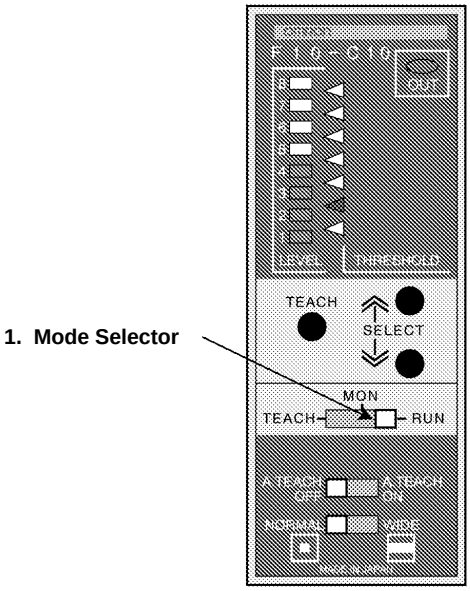
If the adjustments are OK, the Sensor is ready to operate in RUN mode.

→ Go to *Measurement Execution (RUN Mode). Explanation follows.*

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Measurement Execution (RUN Mode)

The Sensor performs measurement according to the external signal input in RUN mode.



Procedure

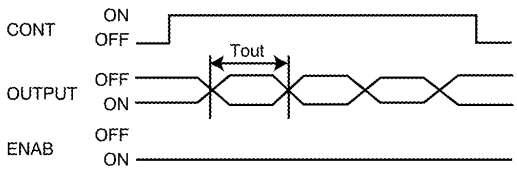
1. Set the Mode Selector to RUN.

Relationship between the F10 I/O terminal operations and ON/OFF indications in the timing charts are as shown in the following table.

Signal	Indication in timing charts	NPN (F10-C10/-C11)	PNP (F10-C15/-C16)
Input TRIG (pink) CONT (white) S_TEACH (yellow) M_TEACH (purple)	ON	GND	Vcc
	OFF	OPEN	OPEN
Output OUTPUT (black) ENAB (orange)	ON	GND	Vcc
	OFF	Vcc	GND

CONT Mode

In CONT mode, the Sensor is in sensing operation repeatedly while the CONT signal is ON. The measurement result is renewed once per measurement cycle, and output.



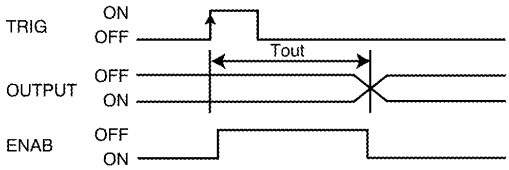
Measurement cycle: Tout

Normal mode: 3.6 ms
Wide mode: 10.8 ms

TRIG Mode

The Sensor in TRIG mode is used for object measurement only once in synchronization with the rising edge of the TRIG signal and the result is output.

Note: 1. The minimum ON width of the TRIG signal is 1 ms.
2. The OUTPUT signal is kept on hold until the next measurement result is renewed.



In TRIG measurement operation, the ENAB signal is ON when the measurement result is renewed.

Period from trigger input to output refreshment: Tout

Normal mode: 14.4 ms
Wide mode: 21.6 ms

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External Teaching in RUN Mode

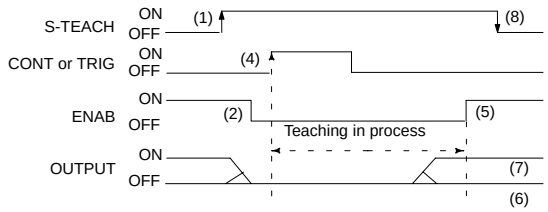
In RUN mode, a model can be registered by external signal input using either of the two methods described below.

Note: The data of the model is stored in the EEPROM when the teaching process of the Sensor completes. **Do not** turn OFF the Sensor during the teaching process. If the Sensor is turned OFF, an EEPROM data error will result when the Sensor is turned ON again. In this case, perform proper teaching and threshold level adjustments again.

Stationary Object Teaching (S_TEACH)

Stationary object teaching is performed with the TRIG signal input or CONT signal input after external S_TEACH signal input. Because of this, do not move the object until teaching is completed.

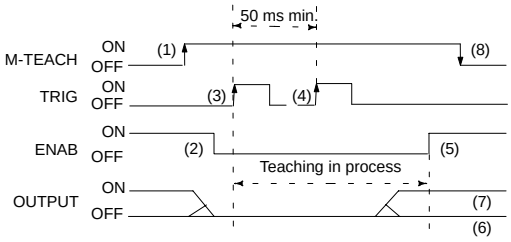
1. Provide S_TEACH signal input.
2. Check that the ENAB signal is OFF.
3. Check that the stationary object is in the teaching area (or in the sensing area if A.TEACH is set to ON).
4. Provide external CONT or TRIG signal input.
5. After teaching is completed, the ENAB signal will turn ON. At that time, check the status of the OUTPUT signal.
6. The OUTPUT signal will be ON if teaching is successfully completed.
7. The OUTPUT signal will be OFF if teaching is unsuccessful.
8. Turn the S_TEACH signal OFF to complete the teaching process. If teaching has been unsuccessful, the Sensor will remain in the previous status, so you must perform teaching again.



Moving Object Teaching (M_TEACH)

Moving object teaching is performed by using more than one object. Perform this teaching if the target objects cannot be stopped. After M_TEACH signal input, this teaching requires six processes in synchronization with external trigger input. The Sensor will not be in detection operation during the teaching process. External trigger input is ignored after it turned ON six times.

1. Provide external M_TEACH signal input.
2. Check that the ENAB signal is OFF.
3. Provide TRIG signal input in synchronization with the measurement timing of the target objects used for teaching.
4. Repeat step 3 six times.
5. After teaching is completed, the ENAB signal will turn ON. At that time, check the status of the OUTPUT signal.
6. The OUTPUT signal will be ON if teaching is successfully completed.
7. The OUTPUT signal will be OFF if teaching is unsuccessful.
8. Turn the M_TEACH signal OFF to complete the teaching process. If the teaching has been unsuccessful, the Sensor will remain in the previous status; so, you must perform teaching again. The teaching operation will be disabled if the M_TEACH signal is turned OFF during the teaching process.



Enable Output

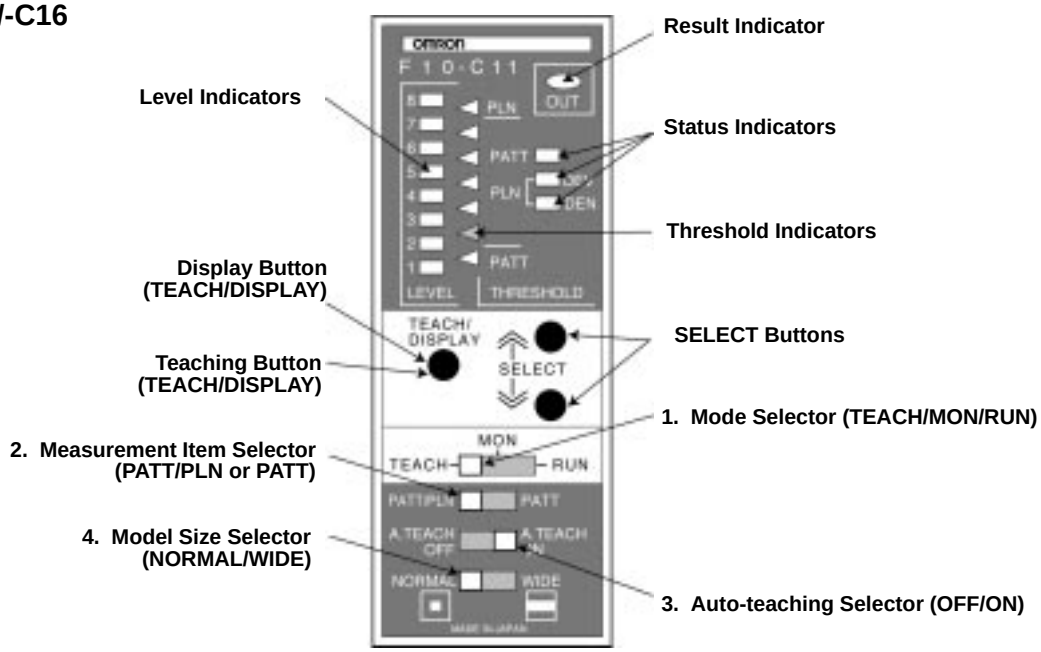
Enable output turns ON when the Sensor is ready to be in sensing operation. For this reason, enable output will turn OFF if the mode selector is set to TEACH or MON.

Enable output is OFF in the following cases in RUN mode.

1. The Sensor is in teaching process with external teaching input.
2. The Sensor is in sensing operation with TRIG signal input.
3. No teaching data has been registered.
4. The hardware fails.

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■ F10-C11/-C16

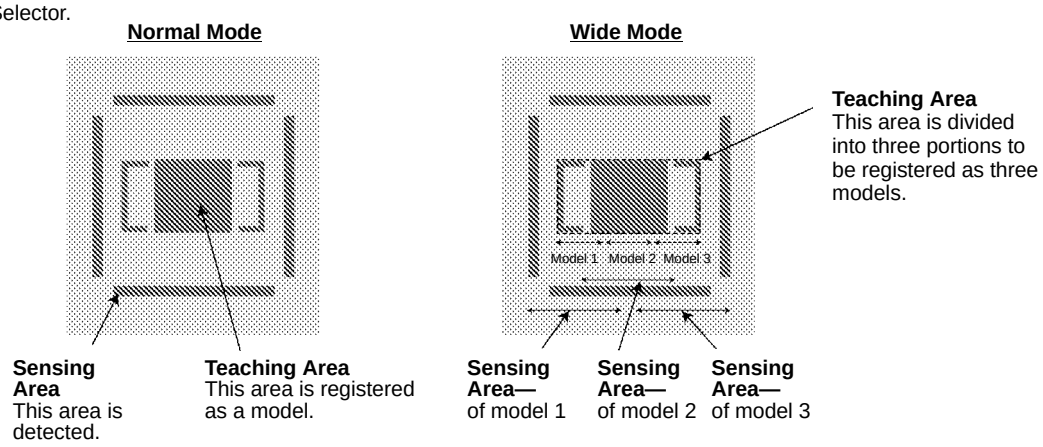


TEACH Mode

Necessary image data, as measurement criteria, is registered in the TEACH mode.

Procedure

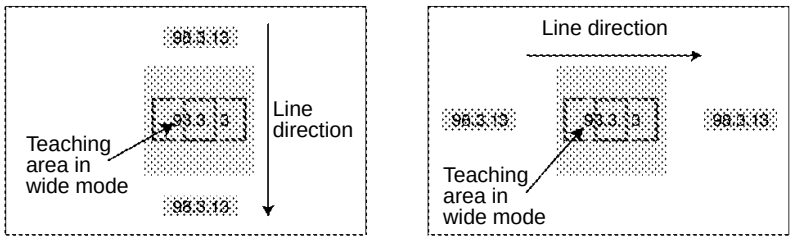
1. Set the Mode Selector to TEACH.
2. Set the Measurement Item Selector to PATT/PLN.
   Pattern measurement or plain measurement will be selected automatically (according to the registered model), if the selector is set to PATT/PLN. The F10-C11/-C16 will be in pattern measurement operation like the F10-C10/-C15 if the selector is set to PATT.
3. Set the Auto-teaching Selector to A.TEACH ON.
   The most ideal pattern as a model will be selected automatically for pattern measurement from the measurement range.
4. Set the Model size Selector.



Mounting Direction of Sensor in Wide Mode

For target objects that are moving, use the Sensor, as shown on the left side below.

Note: Operate the Sensor in wide mode if the pattern is relatively long in a single direction, such as a manufacturing date, month, and year. Since three models are consecutively processed in the wide mode, the required processing time will be three times that of the normal mode.

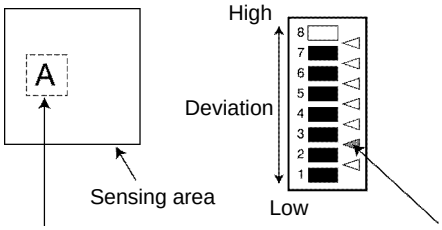


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5. After locating the target object in the sensing area, press the Teaching Button. Pattern measurement or plain measurement is automatically determined from the background of the sensing area and the deviation of the target object.

Pattern Measurement

The deviation level will become high if the target object has a pattern. If the deviation level is higher than the set level of measurement item selection, pattern measurement will be performed.



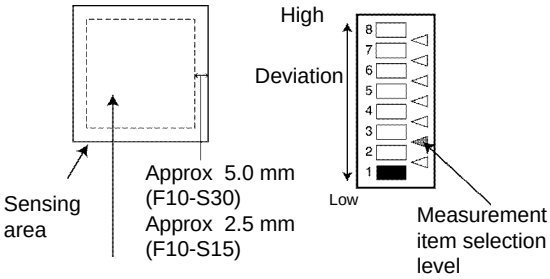
The portion with the highest deviation is registered as a model.

Measurement item selection level

Automatic selection

Plain Measurement

The deviation level will be set to low if the target object has no pattern. If the set level of measurement item selection is higher than the deviation level, plain measurement will be performed.



The deviation and average density in the area enclosed by dotted lines are registered. The dotted lines are not projected.

Teaching OK

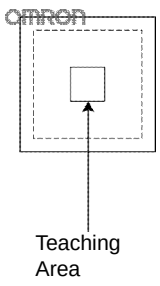
The level indicators are all lit for 0.5 s, and the buzzer sounds twice.

Teaching NG

The threshold indicators all flash while the buzzer sounds four times.

- The set level of measurement item selection is increased or decreased by pressing the SELECT buttons. Adjust the level according to the background and deviation. The level is factory-set between 2 and 3.
- If the object has some light-color lines or light-color patterns, pattern measurement may be performed. In this case, by increasing the set level of measurement item selection, plain measurement will be performed.

Plain measurement will be performed if the pattern is close to the edge of the sensing area.



Teaching is performed in the area enclosed by dotted lines inside the sensing area. The pattern close to the edge of the sensing area is not registered as a model because such a pattern may not be always located in the sensing area and accurate measurement cannot be performed. In this example, the deviation level in the area enclosed by the dotted lines is small. Therefore, plain measurement will be performed.

The deviation and average density in the teaching area are registered in the above example. In other words, the sensing area is restricted so that the pattern close to the edge will not influence the results of object discrimination.

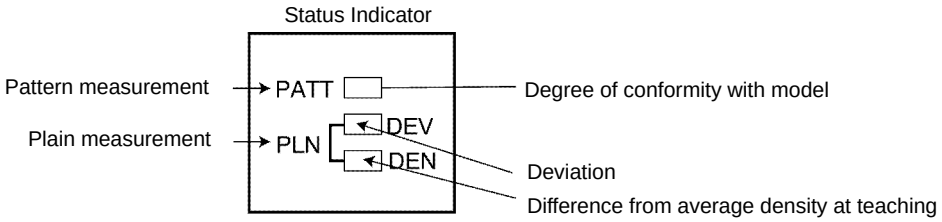
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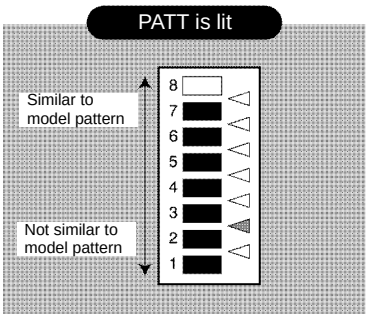
MONITOR Mode

The F10-C11/-C16 operates in MONITOR mode for threshold level adjustments and desktop sample tests for object discrimination with no signal output. No external input is accepted in MONITOR mode.

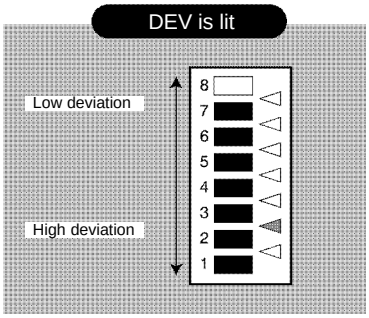
Procedure

1. Set the operation mode selector to MON. Measurement continues as long as the selector is set to MON.
2. In plain measurement operation, the Level Indicator is switched over from DEV to DEN or DEN to DEV whenever the display button is pressed.

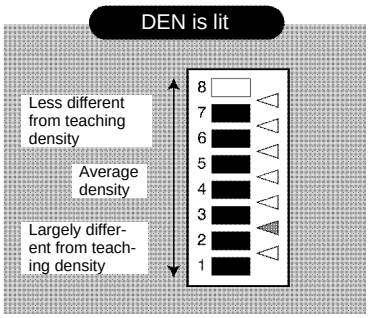




The more similar to the model pattern the object is, the higher the level indicator reading will be.



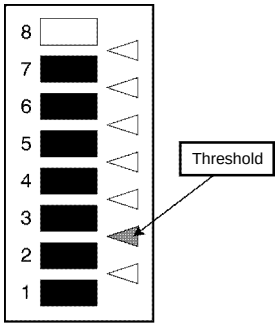
The lower the deviation is, the higher the level indicator reading will be.



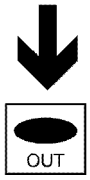
The smaller the difference is from the teaching average density, the higher the level indicator reading will be.

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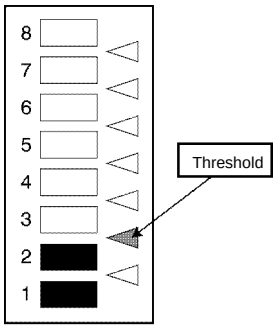
3. Press the SELECT Buttons to adjust the threshold. Adjust the threshold to the most suitable level by monitoring the level indicator.



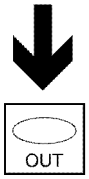
Will turn ON if the measurement value is higher than the threshold.



The result indicator and output signal are ON.



Will turn OFF if the measurement value is lower than the threshold.



The result indicator and output signal are OFF.

Pattern measurement: The model with the lowest conformity level out of the three models is used for discrimination in wide mode.

Plain measurement: Set both deviation (DEV) threshold and average density (DEN) threshold. The result indicator and output signal will be OFF if either one of the sensing objects is lower than the threshold.

Any threshold changes will not be saved unless the mode selector is set to RUN or TEACH.

RUN Mode

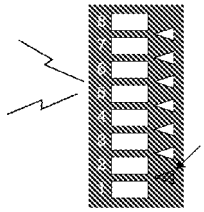
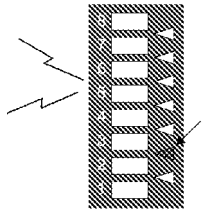
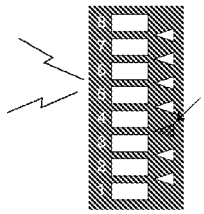
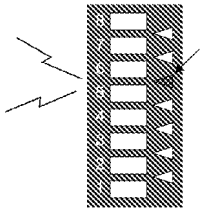
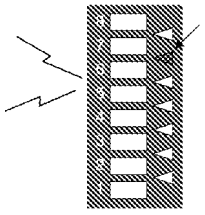
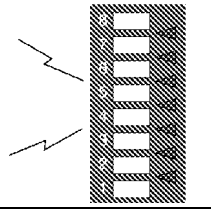
Measurement is performed according to the external signal input in RUN mode. Operate in CONT mode for object detection. TRIG mode is used for object inspection in combination with a timing switch.

Procedure

1. Set the Mode Selector to RUN to start measurement. There is no difference in operation between the F10-C11/-C16 and F10-C10/-C15 in RUN mode.

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Troubleshooting

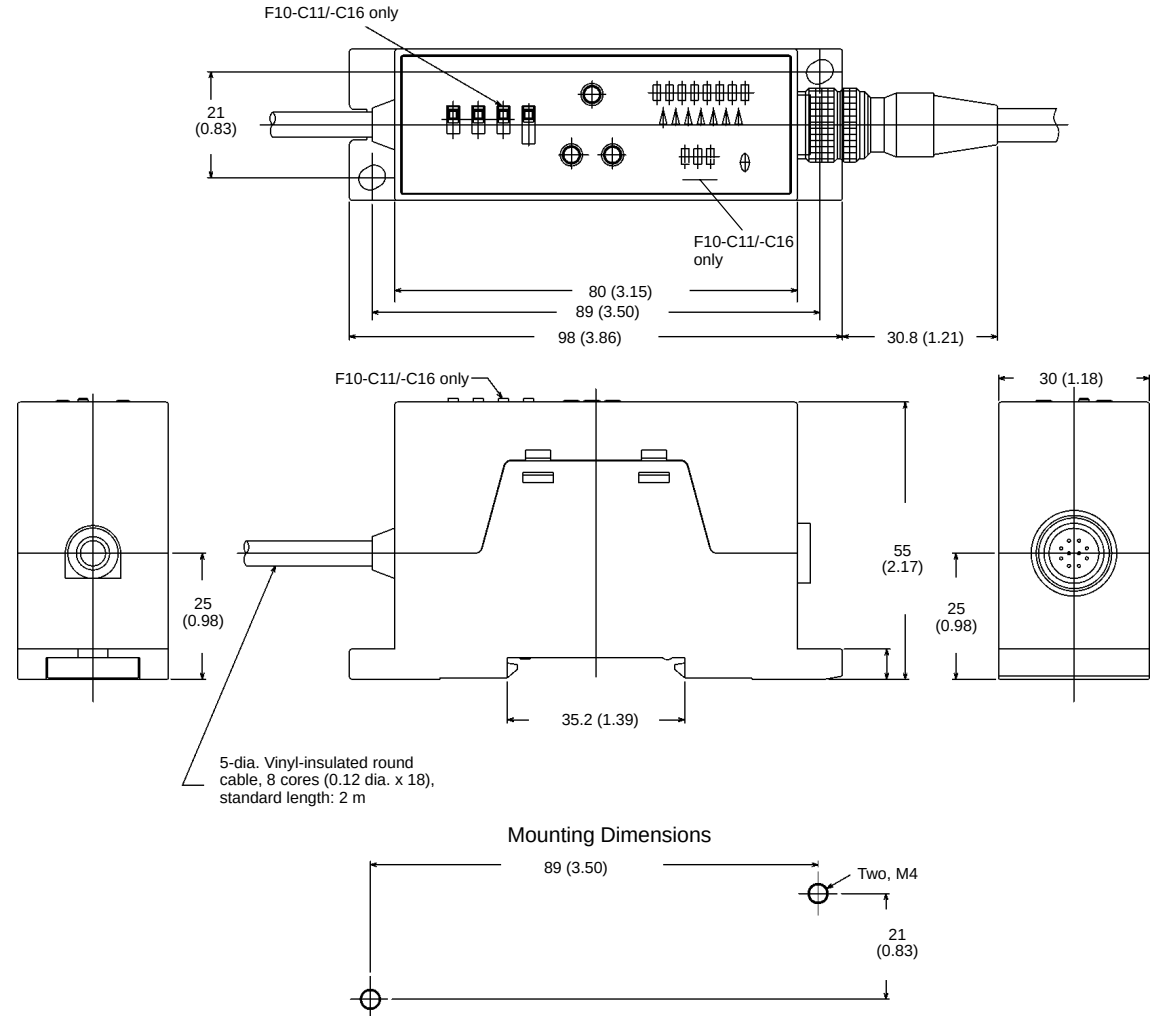
Problem	Probable cause	Remedy
	Head disconnection error The Head is not connected properly, and no image signal is obtainable.	Connect the Head and turn the Sensor OFF and ON. Note: If the same error occurs again, the Head may be broken. Consult your OMRON representative.
	Hardware error A hardware failure, such as CPU runaway, has resulted.	Consult your OMRON representative.
	Head data read error 1. The EEPROM data of the Head is not readable. 2. The data is illegal.	
	Amplifier data read error 1. The EEPROM data of the Amplifier is not readable. 2. The data is illegal.	Turn the Sensor OFF and ON. Note: All internal data of the Amplifier may be cleared. Note: If the same error occurs again after turning the Sensor OFF and ON, consult your OMRON representative.
	Amplifier data write error 1. No EEPROM data is written to the Amplifier. 2. The data is illegal.	
	Teaching data setting error The Sensor was set to MONITOR or RUN mode before teaching completed.	Perform the teaching of the Sensor in TEACH mode. → Refer to *Pattern Registration (TEACH Mode)* within the *Operation Section* of this data sheet.
Control output (OUTPUT) and enable output are OFF, and will not turn ON.	A current exceeding the rated value has flowed to the output transistor, and the overcurrent protective circuit has been triggered.	Reduce the current, so it will not exceed the rated value.

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Dimensions

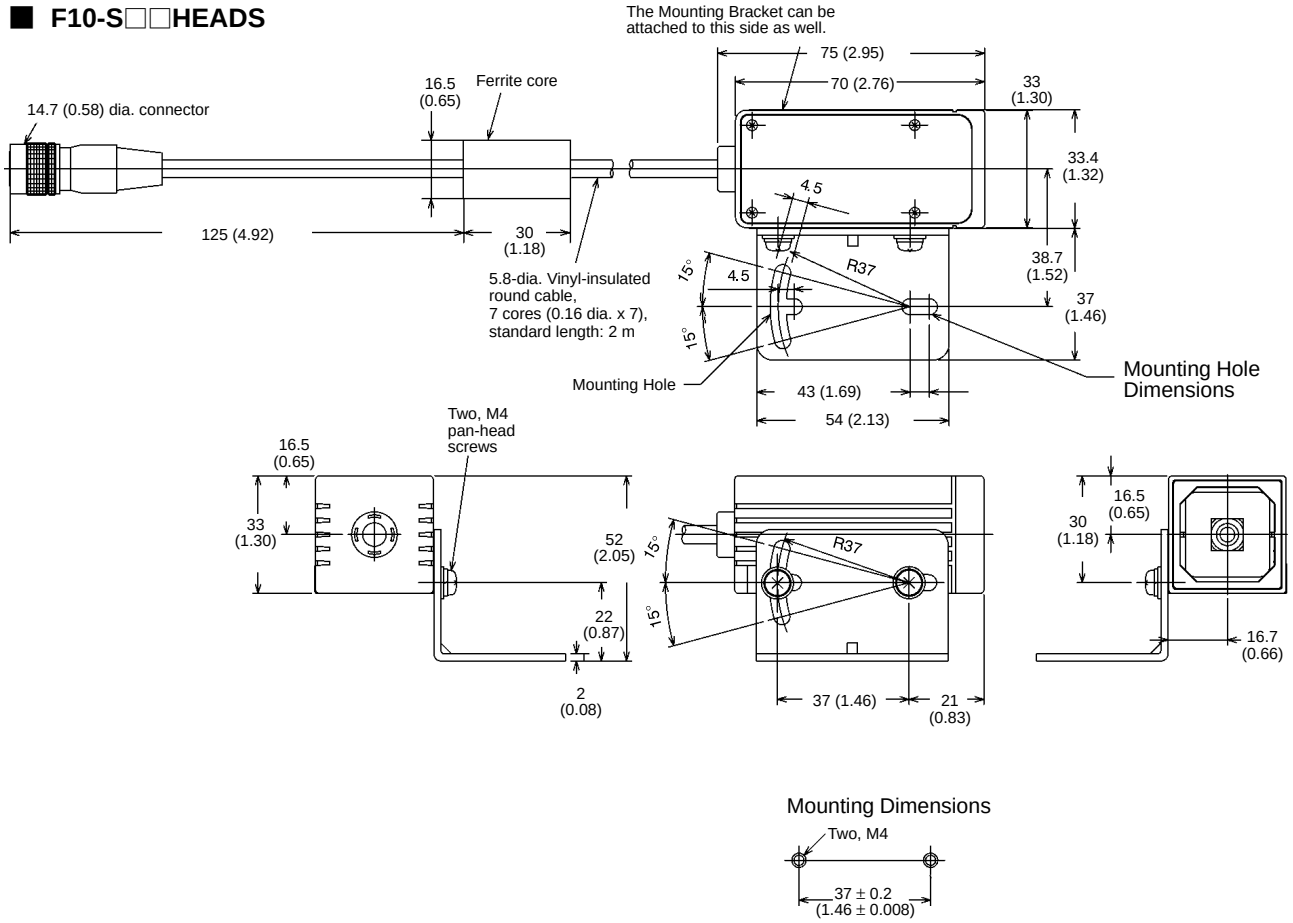
Unit: mm (inch)

■ F10-C□□ AMPLIFIERS

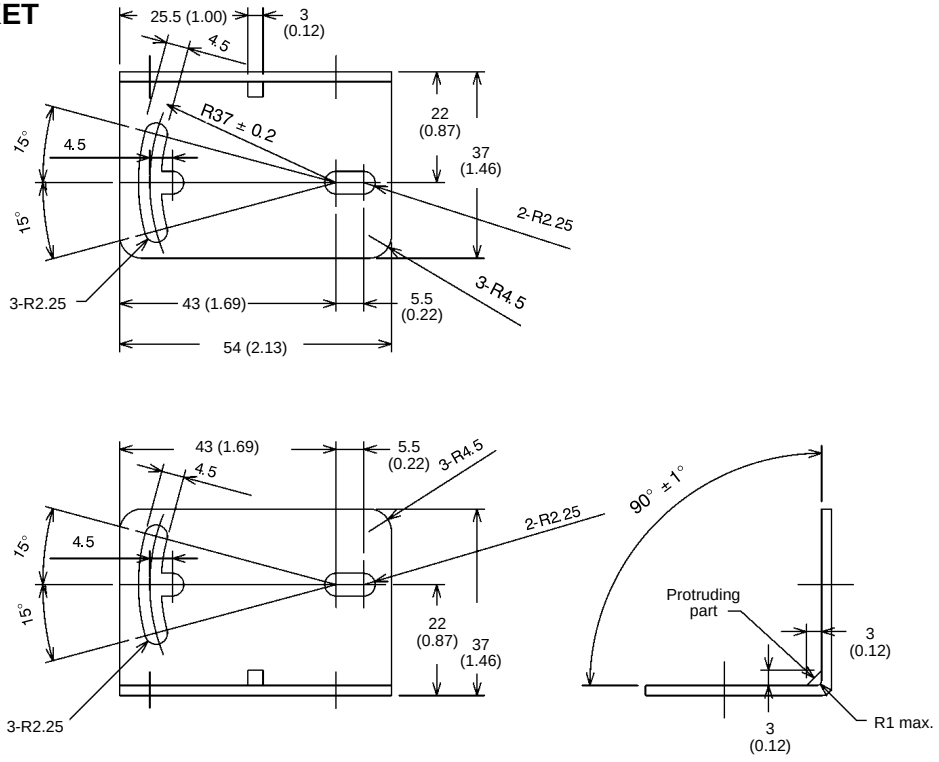


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■ F10-S□□HEADS



■ MOUNTING BRACKET (INCLUDED)



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Precautions

■ APPROPRIATE USE

This product must be operated according to the performance specifications described in the operation manuals.

Applications Not Described in the Manuals

Consult your OMRON representative *before* using the product under conditions which are not described in the manual(s) or before applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly. Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

! Caution

Guidelines for Avoiding Sensor Damage or Malfunction

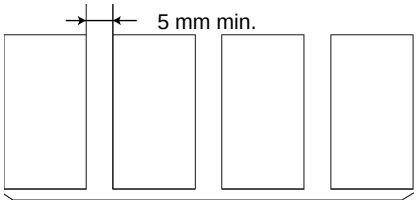
- Do not make mistakes in wiring, such as mistakes in polarity.
- Do not apply voltage exceeding the rated range.
- Do not short-circuit the load.
- Organic solvents may damage the casing of the Amplifier, (which is made of ABS resin) and the transparent front panel of the Head (made of acrylic resin). Do not use paint thinner or any other organic solvent to clean the product.
- Be sure that the cables, Units, and other items with locking devices are properly locked into place. (Improper locking may result in malfunction.)

■ CONNECTION

- The connector on the Amplifier and the metal screws on the bottom of the Amplifier are connected internally to 0-V terminal of the Amplifier.
- Make sure that the length of the Amplifier cable is no longer than 20 m.
- Make sure that the tightening torque of each screw on the Head and Amplifier is no greater than 1.2 N • m.

■ CORRECT OPERATION

- Do not disconnect or connect the Head while the Sensor is turned ON.
- The F10-S30 cannot detect red objects with white backgrounds. Use the F10-S15 instead.
- The F10-S15 cannot detect green objects with white backgrounds. Use the F10-S30 instead.
- The F10-C□□ Amplifier radiates heat. If more than one Unit is installed side-by-side, make sure that there is a minimum space of 5 mm between adjacent Units, as shown below.



Amplifiers

■ AMBIENT OPERATING TEMPERATURE

The ambient operating temperature range of the Amplifier is between 0°C and 50°C under the following conditions:

- Provide enough ventilation to the Amplifier. If more than one Unit is installed side-by-side, provide a ventilation fan for efficient ventilation.
- Do not install the Amplifier close to heat-radiating devices such as heaters, transformers, and high-capacity resistors.
- If power lines with high current for motors are wired close to the Amplifier, make sure that the Amplifier operates normally and take proper measures, so the power lines will not have a bad influence on the operation of the Amplifier.

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NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

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