

OMRON

Model **E3M-VG**

Color Mark Sensor

INSTRUCTION SHEET

Thank you for selecting OMRON product. This sheet primarily describes precautions required in installing and operating the product. Before operating the product, read the sheet thoroughly to acquire sufficient knowledge of the product. For your convenience, keep the sheet at your disposal.

TRACEABILITY INFORMATION: Representative in EU: Omron Europe B.V. Wegalaan 67-69 2132 JD Hoofddorp, The Netherlands. Manufacturer: Omron Corporation, Shiohori Horikawa, Shimogyo-ku, Kyoto 600-8530 JAPAN Ayabe Factory 3-2 Narutani, Nakayama-cho, Ayabe-shi, Kyoto 623-0105 JAPAN

The following notice applies only to products that carry the CE mark: Notice: This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

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PRECAUTIONS FOR SAFE USE

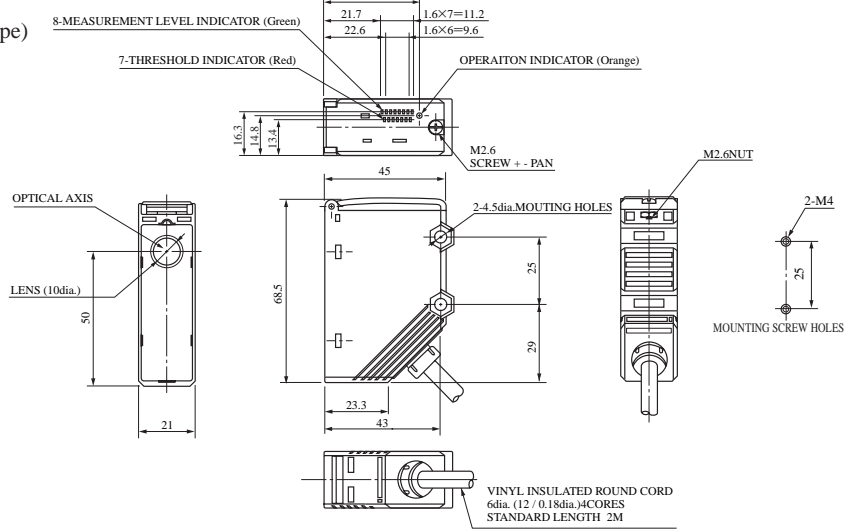
- Be sure to observe the following precautions to secure safety. (1) Do not use the Sensor under the environment with inflammable or explosive gas. (2) Never disassemble, repair nor tamper with the product. (3) Keep the supply voltage within the specified range. Do not connect the Sensor or DC power type to AC power supply. (4) Do not use the sensor over the rated value. (5) Do not short-circuit the load. Though the Sensor is provided with function of load short-circuit protection, short-circuit for long hour should be avoided.

PRECAUTIONS FOR CORRECT USE

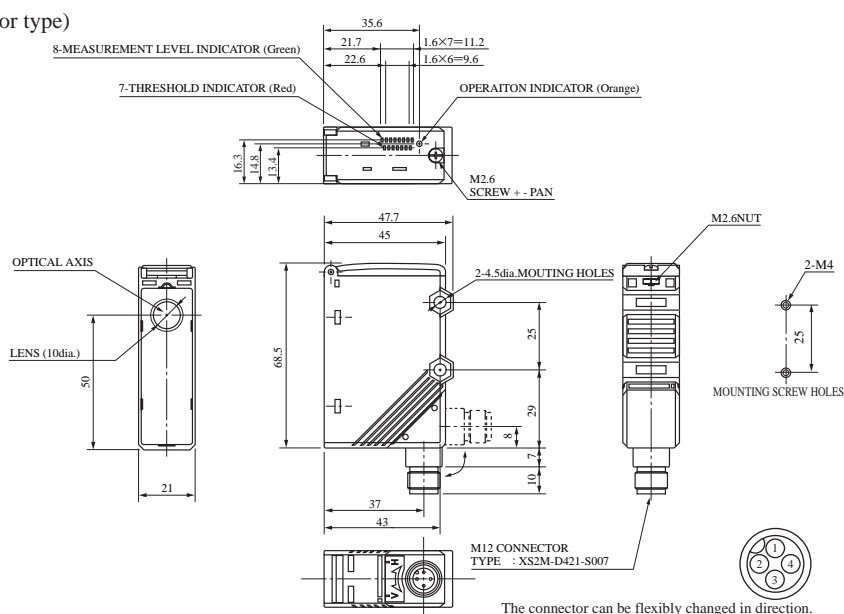
- (1) Do not use the product in the following places. ① Place exposed to direct sunlight. ② Place where humidity is high and condensation may occur. ③ Place where corrosive gas exists. ④ Place where vibration or shock is directly transmitted to the product. (2) Install so that intensive light such as sunbeam, fluorescent lamp, or incandescent lamp may not come in the directing angle of photoelectric switch. (3) Connections ① Make sure that the supply voltage before making supply is less than the maximum voltage. ② Be careful not to make wrong wiring for polarity of terminal. ③ Routing the wires of the photoelectric switch with the high-voltage cable or the power cable may cause malfunction or damage to it because of inductive effects. Be sure to route the switch wires separated from the power lines or through an exclusive conduit. ④ For extending wires, use a cable of 0.3mm² min. and 100m max. length. (4) Cleaning Do not use thinner because it may melt the surface of product. (5) Power supply When using a commercially available switching regulator, be sure to ground the FG (Frame Ground) and G (Ground) terminals. If these terminals are not grounded, the Sensor may malfunction due to switching noise of the regulator. (6) When supplying the power, output pulse may be generated by affect of power supply environment. The sensor is ready to operate within 100ms after the Sensor is turned ON. (7) Water resistance Do not use the Sensor in the water, rain or outdoors. (8) Operation cover To keep water resistance, use tightening torque 0.2 to 0.3N·m of the operation cover screw.

DIMENTION

E3M-VG-2 (Cable type) -VG-7



E3M-VG-1 (Connector type) -VG-6



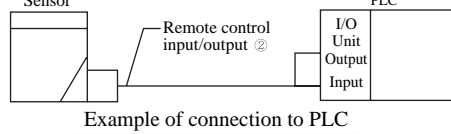
RATINGS

Table with columns for E3M-VG11/12, E3M-VG21/22, E3M-VG16/17, and E3M-VG26/27. Rows include Light source, Detection distance, Spot size, Supply voltage, Current consumption, Response time, Control output, Remote control input, Answer back, Bank selection, Indicator LED, Circuit protection, Ambient temperature, Ambient humidity, Protection structure, and Casing material.

*Remote control input and answer back output share signal line.

OPERATION PROCEDURE

- 1. Mount the amplifier, make wiring and turn on the sensor. (※) 2. Register the mark (Teaching) →Refer to "Registering the mark." 3. Perform fine adjustment of the Threshold value if necessary. →Refer to "Adjusting procedure." 4. Make sure that the mode selection switch is set to RUN. ※ Connect the Sensor to PLC as illustrated below.



Registering the mark (teaching)

Use the best teaching method referring to the followings.

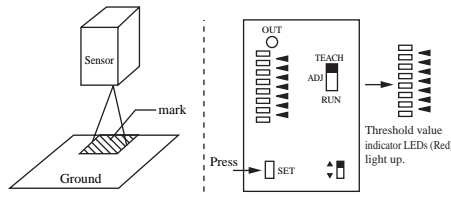
Table with columns for Use, Ground with colored pattern, Ground without colored pattern, and Ground without colored pattern. Rows describe different teaching methods based on mark/ground contrast.

Table with columns for Teaching, 1-point teaching, 2-points teaching, and Automatic teaching. Rows describe threshold values and output behavior for each teaching mode.

Refer to the following teaching method. Operation by remote control is applicable to 3ways for teaching. →Refer to "Remote control function."

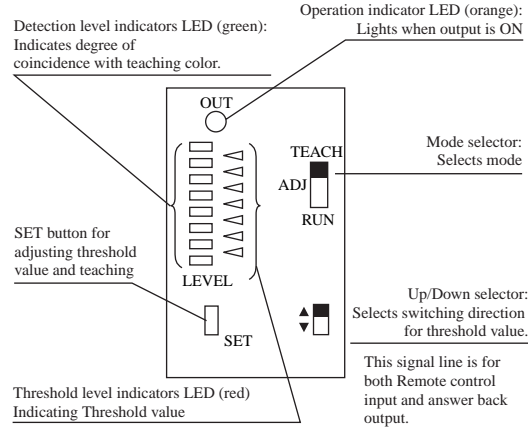
1-point teaching

- 1. Set the mode selection switch to TEACH. 2. Place the mark at the specified position and press SET button. All Threshold value indicator LED (Red) lights up completely.



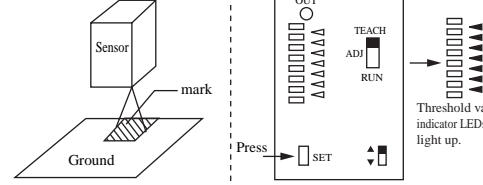
- 3. Set the mode selection switch to RUN. Note: Teaching with ground give opposite output mode (Ground : ON Mark : OFF)

FUNCTION AND NOMENCLATURE

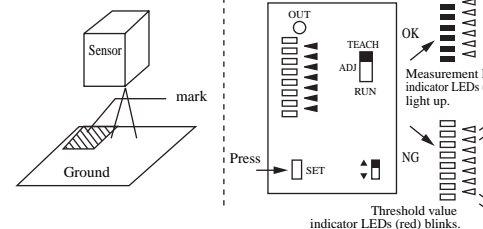


2-points teaching

- 1. Set the mode selection switch to TEACH. 2. Place the mark at the specified position and press SET button. The Threshold value indicator LED (Red) lights up completely.



- 3. When teaching is judged as OK, move the mark and press SET button at the position of the ground. When teaching is judged as OK, All measurement level indicator LEDs (green) lights up. When teaching is judged as NG, all Threshold value indicator LEDs (red) blink.

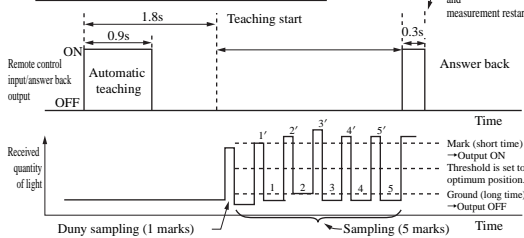


- 4. When teaching is judged as OK, setting is completed. Set the mode selection switch to RUN.

Note: Above procedure is applied for the case to turn ON at the mark side. By reversing the teaching procedure, following OUTPUT is also possible. Ground : ON Mark : OFF

Automatic Teaching

- 1. Make sure that the mode selection switch is set to either of RUN or ADJUST. 2. Input a pulse of 0.9s (Note) to the remote control input/output. 3. By moving the mark, teaching is automatically executed. (Teaching completes when the Sensor detects six marks.) When teaching is judged as OK: Answer back signal of 0.3s is output from the remote control input/output. When teaching is judged as NG: Answer back signal is not output. (If there is not difference of quantity of light between the mark and the ground, teaching is judged as NG.) 4. When answer back signal is detected, the setting is completed. Output is turned ON with (side of shorter passing time) and operation starts.



Note: The error of signal pulse is within +/-0.1s.

ADJUSTING PROCEDURE

Fine adjustment of threshold value can be executed after teaching. Operation by remote control is also possible. →Refer to "Remote control function."

- 1. Set the mode selection switch to ADJUST. 2. In ADJUST mode, select the direction of adjustment with the Up-Down selection switch. Every time the SET button is pressed, the threshold value moves. (At an even number stage of threshold value value, two switches light simultaneously.) Refer to the following chart.

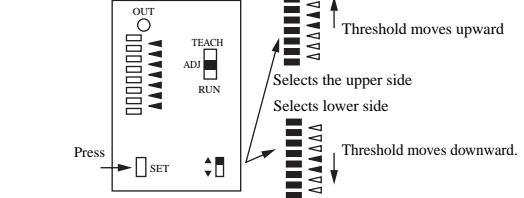
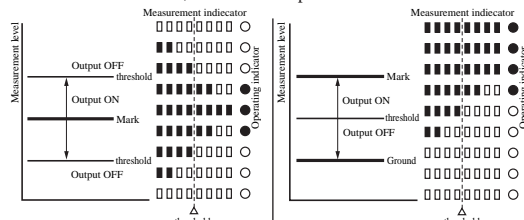


Chart showing threshold value indicators for 13 different threshold levels, with labels for Output OFF, Output ON, and Mark.

- 3. Set the mode selection switch to RUN, then the setting is completed.

Measurement level and threshold

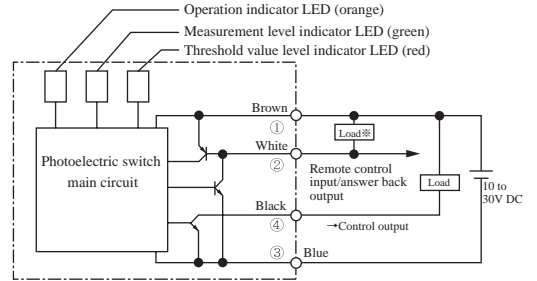
Display content of measurement level is shown in the following diagram, though it varies according to the teaching method. If the measurement level (green) exceeds the threshold (red), the control output is turned ON. If the measurement does not exceed the threshold, the control output is turned OFF.



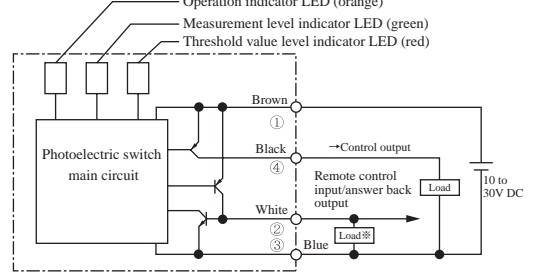
1-point teaching: Set two thresholds at the upper position and lower position of the mark. Coincidence degree for the mark is displayed. 2-point teaching and automatic teaching: Set a threshold between the mark (first registration) and the ground (second registration). Allowance degree between the mark and ground is displayed.

OUTPUT STAGE CIRCUIT DIAGRAM

NPN type (E3M-VG_1, _2)



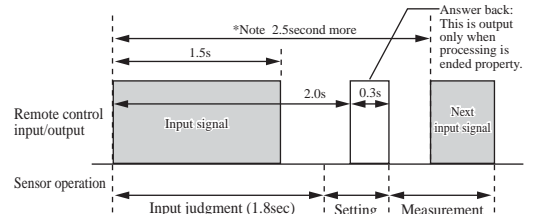
PNP type (E3M-VG_6, _7)



※When using the remote control function, PULL UP and PULL DOWN in accordance with the diagram.

Remote Control Function (Bank switching, mark registration, Threshold value adjustment)

When the signals shown in the table below are input to the remote control input/answer back output, operation by remote control gets possible. When the signal is property received, the answer back output is output for 0.3 seconds. Operation is possible by manual input for 1-point teaching only. (Input for 1.5s or more.)



Note: To transmit the signal continuously, provide interval of 2.5 second or more after inputting the signal as the figure shows.

List of control signal

Table with columns for No., Control signal, and Function. Lists 12 different control signals and their corresponding functions like selecting banks or thresholds.

Suitability for Use

THE PRODUCTS CONTAINED IN THIS SHEET ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used. Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM. See also Product catalog for Warranty and Limitation of Liability.

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