

OMRON

Color Mark Sensor

E3S-DC□□Series

INSTRUCTION SHEET

Thank you for selecting an OMRON product. This sheet primarily describes precautions required in installing and operating the product.

- A specialist who has the knowledge of electricity must treat the product.
- Please read this manual carefully, and use it correctly after thoroughly understanding the product.
- Please keep this manual properly for future reference whenever it is necessary.

TRACEABILITY INFORMATION:
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Manufacturer:
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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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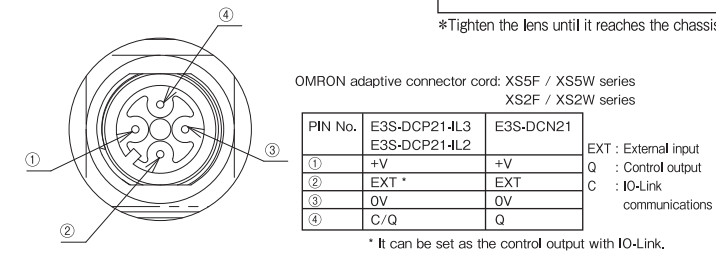
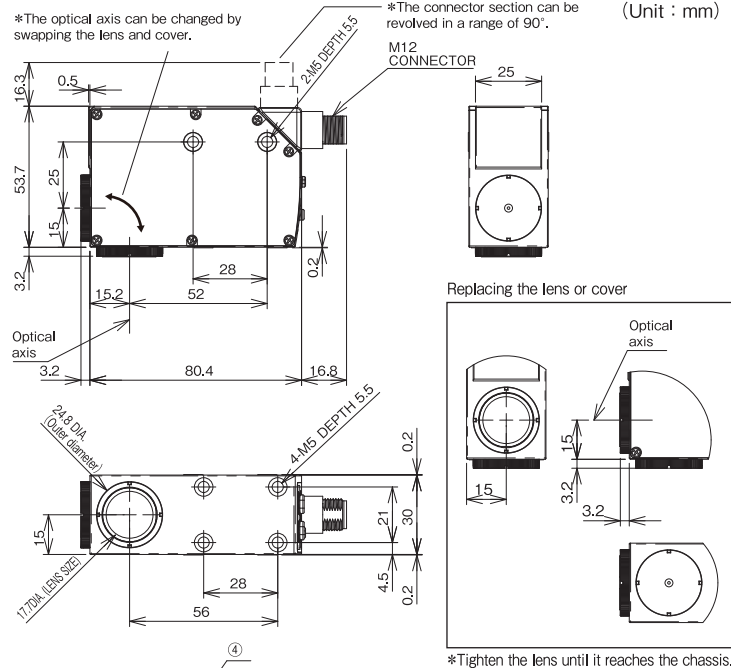


PRECAUTIONS FOR CORRECT USE

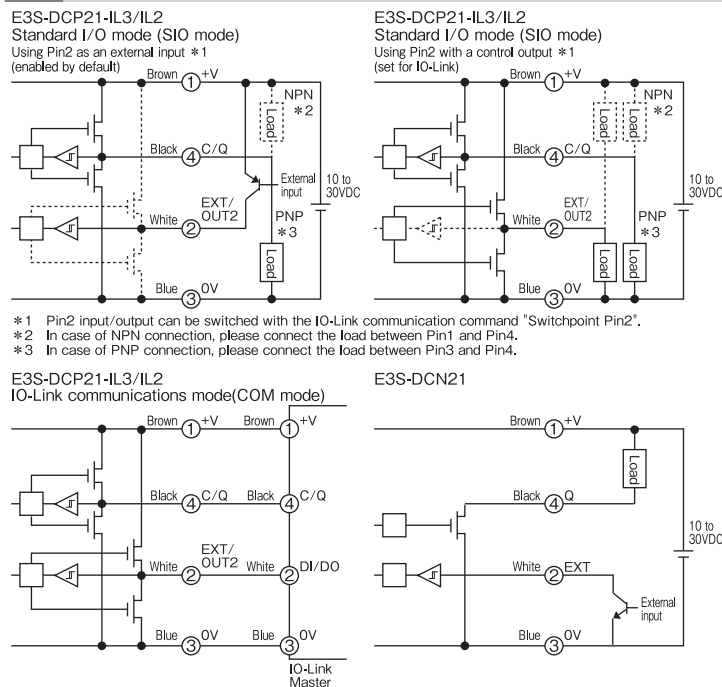
- Note that the water-resistant function is impaired if installing the photoelectric sensor by hitting it with a hammer and so on.
- If the Sensor wiring is placed in the same conduits or ducts as high-voltage or high-power lines, inductive noise may cause malfunction or damage. Wire the cables separately or use a shielded cable.
- To extend a cord in the standard I/O mode, use a cable of 0.3mm² or more and keep the length 100m or less. Keep the length 20m or less if using the sensor in the IO-Link mode.
- Apply a screw tightening torque of 2.0N•m or less.
- If a commercial switching regulator is used, ground the FG (frame ground) terminal.
- The Sensor will be able to detect objects 100 ms after the power supply is tuned ON. Start using the Sensor 100 ms or more after turning ON the power supply.If the load and the sensor are connected to separate power supplies,be sure to turn ON the sensor first.
- Do not press the button with anything sharp such as a screwdriver because it might be damaged.
- Output pulses may occur when the power supply is turned OFF. We recommend that you turn OFF the power supply to the load or load line first.

1 Installation

1-1 Dimensions



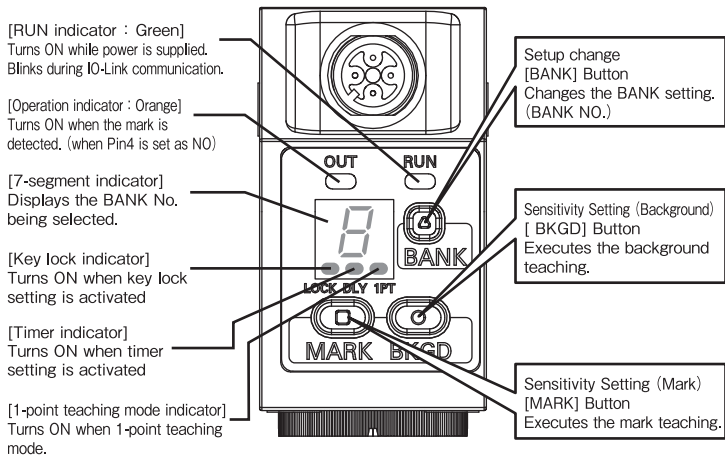
1-2 Input/Output Circuit Diagram



2 Settings

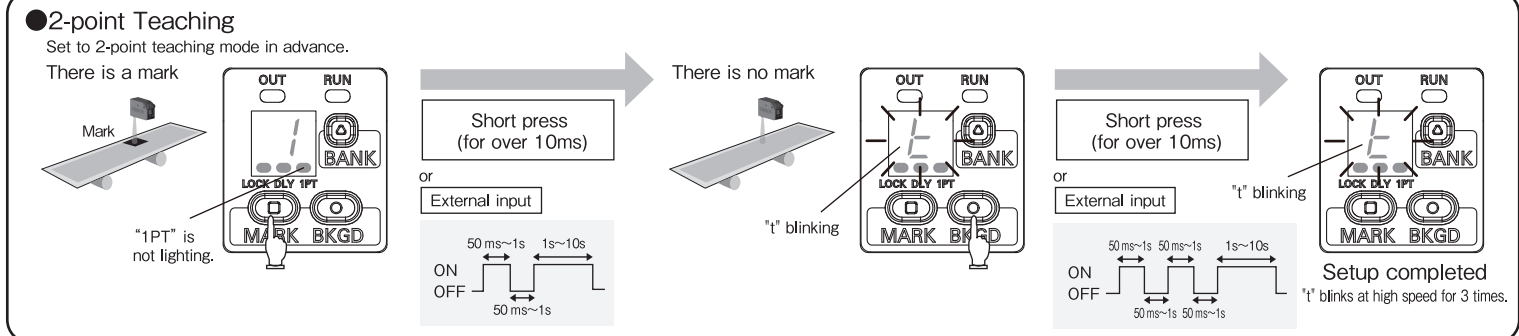
For E3S-DCP21-IL3/IL2, setting can be performed with IO-Link communication.
Refer to the separate index list

2-1 Setting and Display Overview

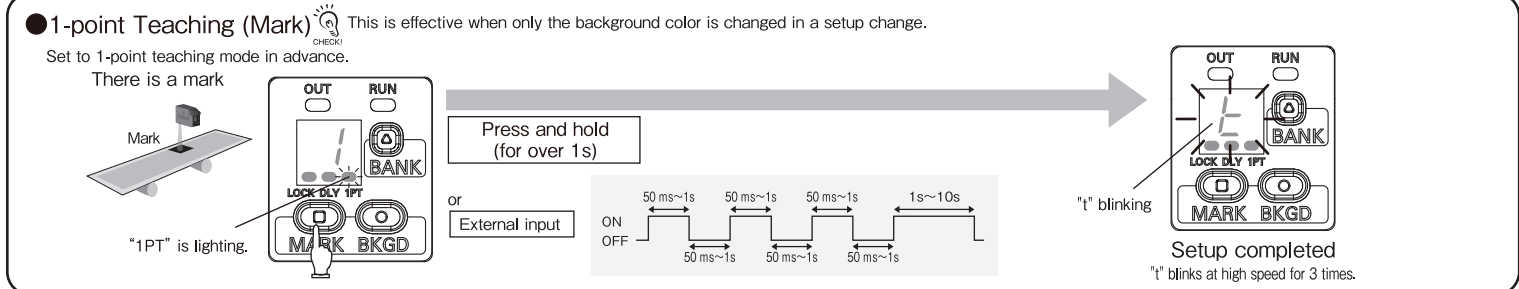


2-3 Teaching

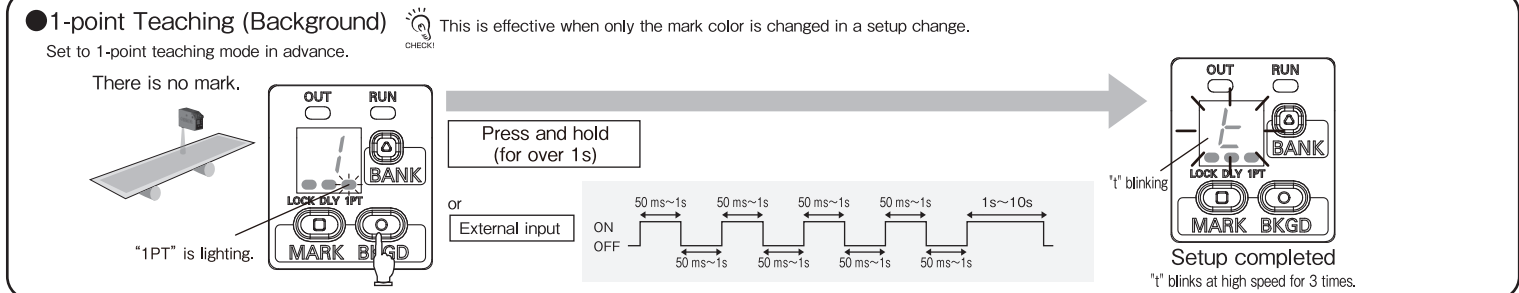
① Detecting if there is a mark



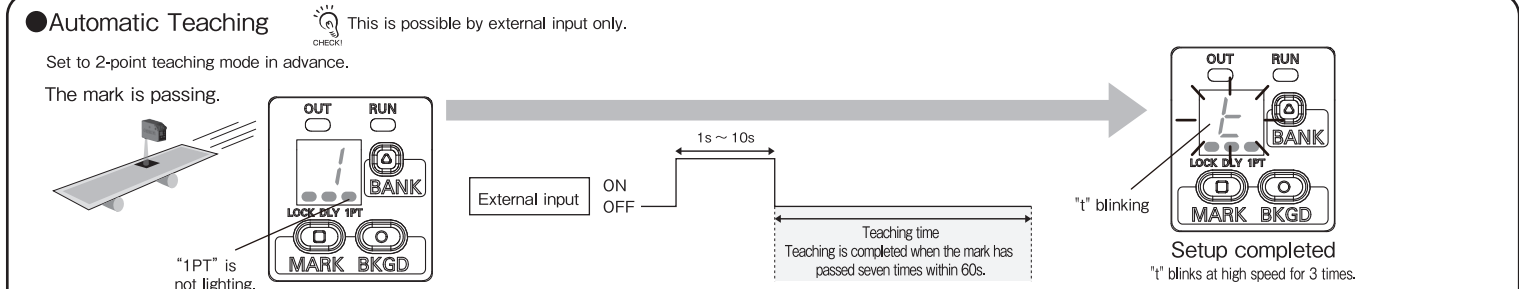
② Detecting only the certain-colored mark



③ Detecting only the certain-colored background



④ Adjusting the setup using a moving mark without stopping the line



3 Convenient Setting Features

For E3S-DCP21-IL3/IL2, setting can be performed with IO-Link communication.
Refer to the separate index list

3-1 Preventing Malfunction

● Key Lock Function Switches enable/disable for the button input.

The key lock can be deactivated with the same steps.

Press and hold (for over 3s)

"LOCK" is lighting

3-2 Delaying the output time

● Off-delay Sets the delay time until the output is turned OFF.

The Off-delay can be deactivated with the same steps.

Press and Hold both (for 1 sec. or longer)

"DLY" is lighting.

Sensing object

Mark

Background

Output

ON

OFF

10ms

3-3 Using multiple settings separately for change-over etc.

● BANK switching Up to 9 (9 BANKs) of the configuring operation modes and teaching results can be saved and these settings can be switched.

A BANK is being selected.

Short press (less than 1s)

Short press (less than 1s)

After 2s

Switching completed

or

External input Input pulse for the number of times of BANK number setup.

(Ex.) Set to BANK 3

ON

OFF

50ms~1s

50ms~1s

50ms~1s

50ms~1s

50ms~1s

50ms~1s

The BANK is determined after 1s or more.

Switching completed

Settings of key lock, off-delay and others are common to each BANK.

3-4 Initializing settings of each BANK

● BANK Reset Initialize the settings of the BANK selected(Initialization for each BANK)

Change to the desired BANK to be initialized.

A BANK is being selected.

Setup completed

Short press (less than 1s)

Press and Hold both (for 1 sec. or longer)

3-5 Factory-default

● Factory-default Initialize all settings to the Factory-default. (Initialization for all BANKs)

Initialization confirmation screen

7-segment indication blinking

7-segment indication blinking

Initialization completed

Press and Hold both (for 1 sec. or longer)

Press and Hold both (for 1 sec. or longer)

4 Maintenance

4-1 Error Display

Error Name / Display※	Cause	Remedy
Internal communication error OUT RUN Blinking alternately [E-SPL]	An error has occurred on the system.	Start up the sensor again. If the error occurs again, replace the sensor.
EPPROM system area data error OUT RUN Blinking alternately [E-SYS]	Reading out or writing in the internal data has failed	Start up the sensor again. If the error occurs again, replace the sensor.
EPPROM user setup area data error OUT RUN Not lighting Blinking [E-dRL]	Reading out or writing in the internal data has failed	Start up the sensor again. If the sensor is not recovered, initialize the setting.
Output short circuit detection error OUT RUN Blinking Not lighting [E-SUL]	Over current flowing to the control output	Check wiring and connection of the connector again.
IO-Link communications no response error OUT RUN Continuous operation Not lighting [E-LCH]	Communications with the IO-Link master has failed.	Check the connection with the IO-Link master.
Teaching error OUT RUN Continuous operation [E-LCH]	Teaching has failed.	Put the workpiece in the detection area and try teaching again.

*Letters are displayed in order by the 7-segment indication.

4-2 Ratings and Specifications

Model	E3S-DCP21-IL3	E3S-DCP21-IL2	E3S-DCN21
Input-output method	Push-pull output, input/output (selectable with IO-Link and "input" is set as default)		NPN output, input
Sensing distance	10±3mm		
Spot size (reference)	1×4mm		
Light source	RGB LED		
Power supply voltage	10 to 30VDC (including 10% ripple (p-p))		
Current consumption	960 mW max. (Reference: Power supply voltage 24V, Current consumption 40mA max.)		
Control output	Load current: 100mA max. (30V DC max.)		
External input	High: +V to +V-1.5V, within -1mA Low: 1.5V to 0V, within +1mA		
Operation configuration	High when mark is detected.		ON when mark is detected.
Protection circuit	Power supply reverse polarity protection, output short-circuit protection and output incorrect connection protection		
Response time	Operate or reset : 50μs max. for each (2-point teaching mode) Operate or reset : 150μs max. for each (1-point teaching mode)		
Sensitivity adjustment	Teaching method		
Ambient illumination	Incandescent lamp: 3,000 lx max.		
Ambient temperature	Operating:-10 to +55℃, Storage:-25 to +70℃ (no freezing and condensation)		
Ambient humidity	Operating:35 to 85%RH, Storage:35 to 95%RH		
Insulation resistance	20MΩ min.(at 500VDC)		
Dielectric strength	1000 VAC 50/60 Hz 1min		
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude or 100 m/s ² 2 hours each in X, Y, and Z directions		
Shock resistance	500m/s ² 3 times each in X, Y, and Z directions		
Degree of protection	IEC60529 : IP67		
Connection method	M12 4-pole Connector type (M12, 4-pin)		
Indicator	Operation indicator (Orange), RUN indicator (Green), 7-segment indicator (White), Key lock indicator (White), Timer indicator (White), 1-point teaching mode indicator (White)		
Material	Case	Diecast zinc (nickel-plated brass)	
	Lens	PMMA	
	Lens cover	ABS	
	Display	ABS	
	Button	Elastomers	
Connector	Diecast zinc (nickel-plated brass)		
Accessories	Instruction Sheet, Compliance Information Sheet		
Major IO-Link functions ([] : factory shipment setting)	• Operation mode switching between NO and NC [NO] • Timer function of the control output and timer time selecting function (Select a function from disabled, ON delay, OFF delay, one-shot or ON/OFF delay.) [Disabled] (Select a timer time of 1-5000ms) [10ms] • Selecting function of ON delay timer time for instability (0 (disabled)+1000ms) [Disabled] • Monitor output function (PD output indicating a relative detection quantity) • Energizing time read-out function (unit: h) • Initialize the settings function "Restore the factory settings"		—
IO-Link communications specification	IO-Link specification	Ver1.1	—
	Transmission speed	E3S-DCP21-IL3 : COM3 (230.4kbps) E3S-DCP21-IL2 : COM2 (38.4kbps)	—
	Data length	PD size : 8byte	—

4-3 Time Chart

E3S-DCP21-IL3/IL2 (Push-pull output)

Inversion of operational logic, output delay and input/output can be switched with IO-Link communication.

Output mode	NO/NC setting ※It can be switched in IO-Link	Time Chart
Standard I/O mode (Pin2 Output Settings)	NO ※Default	
	NC	
IO-Link mode (Pin2 Output Settings)	NO ※Default	
	NC	

E3S-DCN21 (NPN output)

Time Chart	Sensing object	Background	Mark
	RUN indicator (Green)	Lighting	
	Operation indicator (Orange)	Not Lighting	Lighting
	Pin4 output (NO)	OFF	ON
	Load current	ON	
		OFF	

Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT 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(S) 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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