

NO: LC-056 **PRODUCT:** E3ZS-T81A Safety Sensor
DATE: February 2016 **TYPE:** Modification Notice

E3ZS-T81A Single-beam Safety Sensor Product Label and Instruction Sheet have been Modified

Effective date: January 2016 production

Reason for modification: To bring the sensor into compliance with recent additional revisions to safety standards EN 61496-1 and EN 60947-5-3.

Affected Part

E3ZS-T81A





Detail of Differences

Product Label

Before the change	After the change
<p>Product label</p> <p>OPERATING RANGE 0.2 to 3m EAA ±5° (at 3m) DETECTION CAPABILITY 18mm dia min (2)</p> <p>TUV E3D CE C UL US LISTED (IND. CONT. EQ.) 58KN (2)</p>	<p>Product label</p> <p>(1) Add our address (OMRON Corporation). (2) Change the content.</p> <p>OPERATING RANGE 0.2 to 3m EAA ±5° (at 3m) DETECTION CAPABILITY φ18mm (2) Shiokoji Horikawa, Shimogyo-ku, Kyoto, 600-8530 JAPAN (1)</p> <p>TUV E3D CE C UL US LISTED AOPD 39FM (2)</p>



Product Label

Before the change	After the change
<p>Product label</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> RATED VOLTAGE 12 to 24V DC RATED CURRENT (without load) EMITTER: 15mA/RECEIVER: 20mA OUTPUT RATING 100mA RESPONSE TIME 1ms TYPE OF POWER SUPPLY See instruction Sheet TYPE2 ESPE (IEC61496-1/2 with F3SX) PROTECTION IP67 </div> <p>Older TUV-SUD logo</p> 	<p>Product label</p> <p>Add Performance level.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> RATED VOLTAGE 12 to 24V DC RATED CURRENT (without load) EMITTER: 15mA/RECEIVER: 20mA OUTPUT RATING 100mA RESPONSE TIME 1ms TYPE OF POWER SUPPLY See instruction Sheet IEC61496-1/2 TYPE2 ESPE with suitable controller ISO 13849-1 PL c PROTECTION IP67 </div> <p>Change to current TUV-SUD logo</p> 

Instruction Sheet

Before the change	After the change
<p>Following are the instruction sheet contents</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> EC Declaration of Conformity </div> <p>OMRON declares that E3ZS-T81A is in conformity with the requirements of the following EC Directives:</p> <p>EMC Directive 2004/108/EC Machinery Directive ,2006/42/EC</p>	<p>Following are the instruction sheet contents</p> <p>Add the new EMC directive</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> EC Declaration of Conformity </div> <p>OMRON declares that E3ZS-T81A is in conformity with the requirements of the following EC Directives:</p> <p>EMC Directive 2004/108/EC (Before April 19, 2016), 2014/30/EU (After April 20, 2016) Machinery Directive, 2006/42/EC</p>
<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> Standards </div> <p>E3ZS-T81A is designed and manufactured in accordance with the following standards:</p> <p>EN954-1 (1) EN61496-1, prEN61496-2, (2) EN55011, IEN60947-5-3, EN61000-6-2, EN50178, UL508, UL1998 CAN/CSA C22.2 No.142 (3) EN ISO13849-1: 2008 Category 1, PL c (using E3ZS by itself) Category 2, PL d (connected to G9SP)</p>	<p>Standard</p> <p>Change and add note about the condition</p> <ol style="list-style-type: none"> (1) EN954-1 is deleted because it is changed to EN ISO 13849-1. (2) Performance level of ESPE(Type2) is restricted to c. (3) Change and add note about the condition. <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> Standards </div> <p>E3ZS-T81A is designed and manufactured in accordance with the following standards:</p> <p>EN 61496-1/-2 (TYPE 2 ESPE)*, EN 60947-5-3 (PDDb) EN 55011, (2) EN 50178 (3) EN 61000-6-2, EN ISO 13849-1:2008 Category 1, PL c (as PDDb) (3) Category 2, PL c (as TYPE 2 ESPE)* (3) UL 61496-1/-2 (TYPE 2 ESPE, used with F3SX) (3) UL 508, UL 1998 (used with F3SX) (3) CAN/CSA C22.2 No.142</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>* When using E3ZS as TYPE 2 ESPE, an appropriate safety controller complied with the requirements of the relevant standards (Cat. 2/PL c according to EN ISO 13849-1, TYPE 2 according to EN 61496-1/-2) must be used. (3)</p> </div>

Instruction Sheet (continued)

Before the change	After the change
<p>Alert Statements</p> <p>(1) G9SP is described as safety controller.</p> <div data-bbox="167 365 748 527" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">⚠ WARNING</p> <p>When the single beam safety sensor model E3ZS is used as a safety device or a part of safety systems for ensuring safety of personnel, be sure to use it with <u>the safety controller model G9SP series.</u> (1) </p> </div> <div data-bbox="126 533 748 684" style="border: 1px solid red; border-radius: 10px; padding: 5px; margin: 10px 0;"> <p>(2) • When the E3ZS is used with the G9SP the requirements of the Category 2, PL d (EN ISO 13849-1:2008) are satisfied. • When the E3ZS is used without the G9SP, it corresponds to the Category 1, PL c (EN ISO 13849-1:2008). • Read the G9SP users manual (SCHG-705) about the rating or other specifications of the G9SP.</p> </div>	<p>Alert Statements</p> <p>(1) An appropriate safety controller is described.</p> <p>(2) Description about connecting to safety controller is deleted</p> <div data-bbox="792 384 1425 621" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">⚠ WARNING</p> <p>When the single beam safety sensor model E3ZS is used as a safety device or a part of safety systems for ensuring safety of personnel, be sure to use it with <u>an appropriate safety controller. See "Standards" section for an appropriate safety controller.</u> (1) </p> </div>

Instruction Sheet (continued)

Before the change	After the change
<div data-bbox="167 306 748 359" style="background-color: black; color: white; padding: 5px; text-align: center;"> WARNING </div> <p data-bbox="167 359 748 495">If the mode selection input line of the receiver is connected to 0V, the output turns ON when light is interrupted (Dark ON), which no longer configures the safety system. Be sure to connect the mode selection input line to 24V DC to make the sensor output ON when light is incident (Light ON).</p> <p data-bbox="167 495 748 579">Always maintain a safe distance between the E3ZS and a hazardous part of a machine. Be sure to refer to the related standards (<u>EN999</u>) for the calculation of safety distance. (1)</p> <p data-bbox="167 579 748 663">Use an opaque test rod with 18mm in diameter and 200mm or greater in effective length to check the detection capability. The E3ZS cannot detect transparent materials.</p> <p data-bbox="167 663 748 716">Do not use the E3ZS in a reflective configuration, otherwise detection may fail.</p> <div data-bbox="167 716 748 915" style="text-align: center;"> </div> <p data-bbox="167 915 748 999">Do not install the E3ZS in a location where it can be affected by wall reflections to avoid detection failure, which may result in serious injury.</p> <p data-bbox="167 999 748 1083">When using multiple sets of E3ZS, arrange them to prevent mutual interference. Failure to do so may cause the sensor not to detect, resulting in serious injury.</p> <p data-bbox="167 1083 748 1188">The E3ZS does not offer protection to the operator's body from projectiles existing the hazardous area. Proper means of mechanical guarding must be provided to ensure protection from these potentially hazardous projectiles.</p> <p data-bbox="167 1188 748 1251">Wiring must be done while the power is turned OFF. Doing it with the power ON may cause an electric shock.</p> <p data-bbox="167 1251 748 1461">Do not connect the E3ZS to an AC or DC power supply with higher voltage than nominal DC24V. Otherwise the sensor may explode, burn, or cause electric shock. The power supply must conform to regulatory requirements and standards, regarding EMC and electrical equipment safety, of the country where the E3ZS is installed. For example, the power supply must fulfill EN60742 requirements for double insulation and must conform to EMC Directive and Low Voltage Directive in EU.</p>	<p data-bbox="841 170 1440 306">(1) Standard number of safety distance is changed from EN999 to ISO 13855. (2) Description is added because EN 61496-1 is revised.</p> <div data-bbox="841 306 1422 359" style="background-color: black; color: white; padding: 5px; text-align: center;"> WARNING </div> <p data-bbox="841 359 1422 495">If the mode selection input line of the receiver is connected to 0V, the output turns ON when light is interrupted (Dark ON), which no longer configures the safety system. Be sure to connect the mode selection input line to 24V DC to make the sensor output ON when light is incident (Light ON).</p> <p data-bbox="841 495 1422 579">(1) Always maintain a safe distance between the E3ZS and a hazardous part of a machine. Be sure to refer to the related standards (<u>ISO13855</u>) for the calculation of safety distance.</p> <p data-bbox="841 579 1422 663">Use an opaque test rod with 18mm in diameter and 200mm or greater in effective length to check the detection capability. The E3ZS cannot detect transparent materials.</p> <p data-bbox="841 663 1422 716">Do not use the E3ZS in a reflective configuration, otherwise detection may fail.</p> <div data-bbox="841 716 1422 915" style="text-align: center;"> </div> <p data-bbox="841 915 1422 999">Do not install the E3ZS in a location where it can be affected by wall reflections to avoid detection failure, which may result in serious injury.</p> <p data-bbox="841 999 1422 1083">When using multiple sets of E3ZS, arrange them to prevent mutual interference. Failure to do so may cause the sensor not to detect, resulting in serious injury.</p> <p data-bbox="841 1083 1422 1188">The E3ZS does not offer protection to the operator's body from projectiles existing the hazardous area. Proper means of mechanical guarding must be provided to ensure protection from these potentially hazardous projectiles.</p> <p data-bbox="841 1188 1422 1251">Wiring must be done while the power is turned OFF. Doing it with the power ON may cause an electric shock.</p> <p data-bbox="841 1251 1422 1461">Do not connect the E3ZS to an AC or DC power supply with higher voltage than nominal DC24V. Otherwise the sensor may explode, burn, or cause electric shock. The power supply must conform to regulatory requirements and standards, regarding EMC and electrical equipment safety, of the country where the E3ZS is installed. For example, the power supply must fulfill EN60742 requirements for double insulation and must conform to EMC Directive and Low Voltage Directive in EU.</p> <div data-bbox="841 1461 1422 1566" style="border: 2px solid red; padding: 5px;"> <p data-bbox="841 1493 1422 1566">(2) To meet the Category 2, at least 100 diagnostic-tests must be undertaken between two requests for a safety-related reaction from the E3ZS. For diagnostic-test intervals, refer to user's manuals of safety controllers to be connected.</p> </div>

Instruction Sheet (continued)

Before the change	After the change												
<p>Alert Statements</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p align="center">Precautions for Safe Use</p> </div> <p>1. Read this instruction sheet thoroughly to understand before using the product. (1)</p> <p>2. When used in combination with the G9SP safety controller, <u>make sure that the B1 module is properly connected.</u> (2)</p>	<p>Alert Statements</p> <p>(1) The first statement is deleted. (2) Writing error correction.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p align="center">Precautions for Safe Use</p> </div> <p>1. When used in combination with a safety controller, <u>also refer to the user's manual of the safety controller for proper connection.</u> (2)</p>												
<p>Precautions for Correct Use</p> <p>6. Power supply specifications</p> <p>For combined DC power supply, use the following UL certified products:</p> <p>(1) Limited voltage current circuit that conforms to UL508</p> <p>Circuit with a power supply that consists of a secondary coil of an insulated transformer that satisfies the following conditions:</p> <p>-Maximum voltage (with no load) : 30Vrms (42.4V peak) or less, and</p> <p>-Maximum current : 8A or less (including short-circuit), or</p> <p style="margin-left: 40px;">① When limited by a circuit</p> <p style="margin-left: 40px;">② protector (fuse, etc.) with the ratings shown in the table below</p> <table border="1" style="margin-left: 40px; margin-bottom: 10px;"> <thead> <tr> <th>No-load voltage (V peak)</th> <th>Maximum current rating (A)</th> </tr> </thead> <tbody> <tr> <td>0 to 20</td> <td>5.0</td> </tr> <tr> <td>More than 20, up to 30</td> <td>100 Peak voltage value</td> </tr> </tbody> </table> <p>(2) Class 2 power supply unit that conforms to UL1310</p> <p>(3) Circuit (class 2 circuit) with 30Vrms (42.4V peak) or less of maximum voltage, and which uses a class 2 transformer that conforms to UL1585 as its power supply</p>	No-load voltage (V peak)	Maximum current rating (A)	0 to 20	5.0	More than 20, up to 30	100 Peak voltage value	<p>Precautions for Correct Use</p> <p>6. Power supply specifications</p> <p><u>Do not connect to DC distribution network.</u></p> <p>For combined DC power supply, use the following UL certified products:</p> <p>(1) Limited voltage current circuit that conforms to UL508</p> <p>Circuit with a power supply that consists of a secondary coil of an insulated transformer that satisfies the following conditions:</p> <p>-Maximum voltage (with no load) : 30Vrms (42.4V peak) or less, and</p> <p>-Maximum current : 8A or less (including short-circuit), or</p> <p style="margin-left: 40px;">① When limited by a circuit</p> <p style="margin-left: 40px;">② protector (fuse, etc.) with the ratings shown in the table below</p> <table border="1" style="margin-left: 40px; margin-bottom: 10px;"> <thead> <tr> <th>No-load voltage (V peak)</th> <th>Maximum current rating (A)</th> </tr> </thead> <tbody> <tr> <td>0 to 20</td> <td>5.0</td> </tr> <tr> <td>More than 20, up to 30</td> <td>100 Peak voltage value</td> </tr> </tbody> </table> <p>(2) Class 2 power supply unit that conforms to UL1310</p> <p>(3) Circuit (class 2 circuit) with 30Vrms (42.4V peak) or less of maximum voltage, and which uses a class 2 transformer that conforms to UL1585 as its power supply</p>	No-load voltage (V peak)	Maximum current rating (A)	0 to 20	5.0	More than 20, up to 30	100 Peak voltage value
No-load voltage (V peak)	Maximum current rating (A)												
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More than 20, up to 30	100 Peak voltage value												
No-load voltage (V peak)	Maximum current rating (A)												
0 to 20	5.0												
More than 20, up to 30	100 Peak voltage value												

Ratings / performance

Detection method	Through beam type	
Controller	Model G9SP series (1)	
Power supply voltage	12 to 24V DC±10% (ripple p-p 10% max) When the E3ZS is used as a part of safe apparatus or safe systems Category2 (EN ISO13849-1), use it with G9SP. (1)	
Operating angle	±5°(at 3m)	
Current consumption	Emitter : 15mA max. Receiver : 20mA max.	
Sensing distance	0.2~3m	
Standard object	Opaque object of φ18mm or more.	
Response time	1.0ms (E3ZS only) Response time depends on the G9SP. For the details, see the users manual of the G9SP. (1)	
Control output	(2) Transistor output PNP, load current 100mA max Output residual voltage of 1V or less (when load current is less than 10mA) Output residual voltage of 2V or less (when load current is from 10 to 100mA) (except for voltage drop due to cable extension) When the E3ZS is used as a part of safe apparatus or safe systems Category2 (EN ISO13849-1), use it with G9SP. (1)	
Utilization categories for switching elements	DC-13 (Control of electromagnets)	
Test Input (Emitter)	E3ZS (2)	22.5 to 24V DC : Emitting OFF (Source current : 3mA max) Open or 0 to 2.5 V DC : Emitting ON (Leakage current : 0.1mA max) When the E3ZS is used as a part of safe apparatus or safe systems Category2 (EN ISO13849-1), use it with G9SP. (1)
Power reset time	100ms	
Ambient illumination	Illumination intensity Incandescent lamp : 3000 lx max. Sunlight : 10000 lx max.	
Ambient temperature	Operating : -10~55°C, Storage : -10~70°C (not freezing or condensation)	
Ambient humidity	Operating : 35~85% RH, Storage : 35~95% RH (not freezing or condensation)	
Insulation resistance	20MΩ or more (by 500V DC megger)	
Dielectric strength voltage	1000V AC, 50/60Hz for 1 min.	
Vibration resistance	Durability	10~55 Hz, 1.5mm double amplitude, each X, Y, Z direction , 2 hours
	Operation limit	10~55 Hz, 0.7mm double amplitude, each X, Y, Z direction , 50 min.
Shock resistance	Durability	500m/s ² (approx. 50G), each X, Y, Z direction for 3 times
	Operation limit	100m/s ² (approx. 10G), each X, Y, Z direction for 1,000 times
Enclosure ratings	IEC standard IP67	
Light source	Red LED	
Indicators	Emitter : Orange / Light emission Receiver : Green / Stability, Orange / Operation	
Circuit protection	Output short-circuit and power supply reverse polarity	
Weight	Approx. 120g (1set)	
Applicable standards	(4) When using E3ZS by itself: EN954-1 (Category 1) , IEC60947-5-3 (PDF-D) UL508, EN ISO 13849-1:2008 (Category 1, PL c) When E3ZS is connected to G9SP: IEC61496-1 Type2 ESPE IEC61496-2 Type2 AOPD EN954-1 (Category 2) UL508 UL61496-1 Type2 ESPE UL61496-2 Type2 AOPD EN ISO 13849-1:2008 (Category 2, PL d)	
Accessories	• Instruction sheet	

Ratings / performance

- (1) G9SP is deleted.
- (2) Descriptions are deleted.
- (3) Risk time, Switching frequency, OFF-state current, minimum current, impulse withstand voltage, pollution degree are added.
- (4) Description is deleted.
- (5) Reliability data is added.

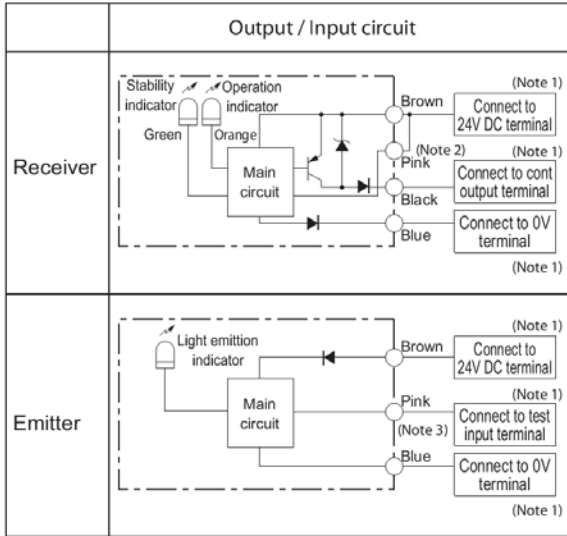
Detection method	Through beam type	
Power supply voltage	12 to 24V DC±10% (ripple p-p 10% max)	
Operating angle	±5° max (at 3m)	
Current consumption	Emitter : 15mA max. Receiver : 20mA max.	
Sensing distance	0.2~3m	
Standard object	Opaque object of φ18mm or more.	
Response time (3)	(3) 1.0ms max (E3ZS only) Response time depends on a safety controller. For the details, see the users manual of a safety controller. (3)	
Switching frequency	500Hz max. (E3ZS only) (3)	
Control output	(3) (3) Transistor output PNP, Load current 100mA max, OFF-state current 0.5mA max., Operational current 1mA min., Output residual voltage of 1V or less (when load current is less than 10mA) Output residual voltage of 2V or less (with load current is from 10 to 100mA)(except for voltage drop due to cable extension)	
Utilization categories for switching elements	DC-13 (Control of electromagnets)	
Test Input (Emitter)	E3ZS	22.5 to 24V DC : Emitting OFF (Source current : 3mA max) Open or 0 to 2.5 V DC : Emitting ON (Leakage current : 0.1mA max)
Power reset time	100ms	
Ambient illumination	Illumination intensity Incandescent lamp : 3000 lx max. Sunlight : 10000 lx max.	
Ambient temperature	Operating : -10~55°C, Storage : -10~70°C (not freezing or condensation)	
Ambient humidity	Operating : 35~85% RH, Storage : 35~95% RH (not freezing or condensation)	
Insulation resistance	20MΩ or more (by 500V DC megger)	
Dielectric strength voltage	1000V AC, 50/60Hz for 1 min.	
Impulse withstand voltage	1kV (3)	
Pollution degree	2 (3)	
Vibration resistance	Durability	10~55 Hz, 1.5mm double amplitude, each X, Y, Z direction , 2 hours
	Operation limit	10~55 Hz, 0.7mm double amplitude, each X, Y, Z direction , 50 min.
Shock resistance	Durability	500m/s ² (approx. 50G), each X, Y, Z direction for 3 times
	Operation limit	100m/s ² (approx. 10G), each X, Y, Z direction for 1,000 times
Enclosure ratings	IEC standard IP67	
Light source	Red LED	
Indicators	Emitter : Orange / Light emission Receiver : Green / Stability, Orange / Operation	
Circuit protection	Output short-circuit and power supply reverse polarity	
Weight	Approx. 120g (1set)	
Reliability data (ISO 13849-1)	(5) When using E3ZS by itself: MTTFd = 100 year, DC = 0%, TM = 20 year When using E3ZS as TYPE 2 ESPE*: MTTFd = 100 year, DC = 90%, TM = 20 year *This data does not include the values of a safety controller.	
Accessories	• Instruction sheet	

Before the change

After the change

Circuit diagram

- PNP output
Output mode : ON when incident (Light ON)



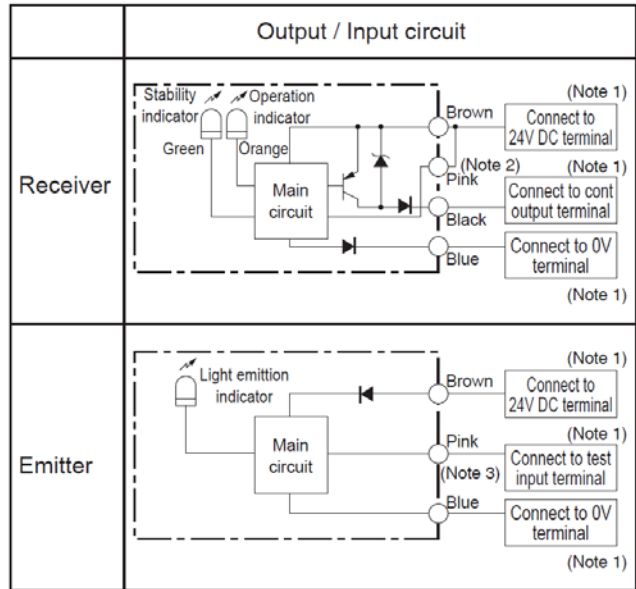
(Note 1) · When the E3ZS is used as a part of safe apparatus or safe systems Category2(EN ISO13849-1), connect to the B1 module of the G9SP. Do not connect to the other modules.
· For the details, see the users manual of the G9SP.

(Note 2) · Be sure to connect the "Mode selection input" to 24V DC terminal.

(Note 3) · When the E3ZS is used without being connected to G9SP, test input should be connected to 0V.

Circuit diagram

- PNP output
Output mode : ON when incident (Light ON)



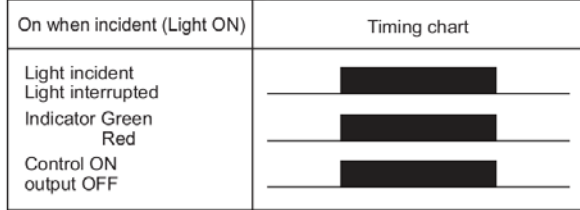
(Note 1) ·To meet the Category 2 (EN ISO 13849-1) or TYPE 2 ESPE (EN 61496-1/-2), connect the E3ZS to the appropriate safety controller. For the details see user's manual of the safety controller and "Standards" section in this instruction.

(Note 2) ·Be sure to connect the "Mode selection input" to 24V DC terminal.

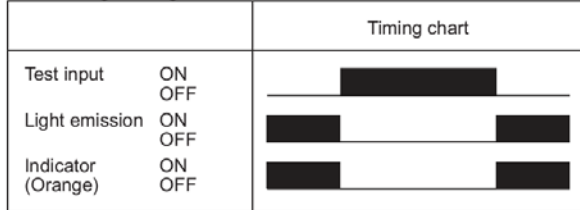
(Note 3) ·When the E3ZS is used without being connected to a safety controller, test input should be connected to 0V.

Timing chart

- Output mode and timing chart



- Emitting timing chart

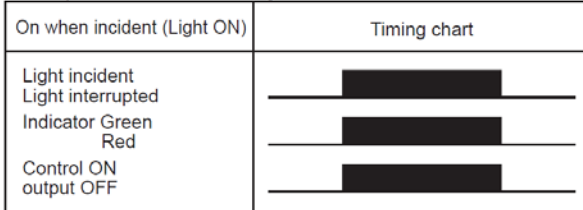


· The G9SP executes a periodic self-diagnosis every 20 ms.

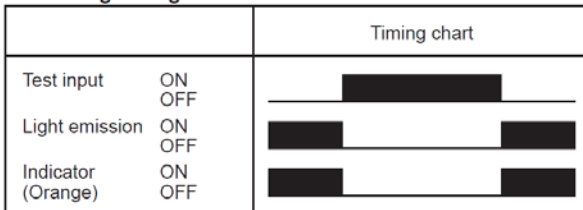
Timing chart

The information of safety controller is added.

- Output mode and timing chart



- Emitting timing chart



*The duration of the periodic test must not exceed 150ms when using as the TYPE 2 ESPE.

Before the change	After the change
<p>Procedures of installation</p> <p style="text-align: center;">None</p>	<p>Procedures of installation</p> <p>■Procedures of installation After mounting and wiring the devices, perform beam alignment of the E3ZS in the following procedures.</p> <ul style="list-style-type: none"> • Turn the power ON. • Align the emitter and receiver so that stability indicator (green) can turn on.
<p>Final check</p> <p style="text-align: center;">None</p>	<p>Final check</p> <p>■Final check</p> <ul style="list-style-type: none"> • Confirm that no object exists in the detection zone of the E3ZS. • Confirm that safety output of safety controller turns OFF when an object exists in the detection zone of the E3ZS. The machine is in the stop state (OSSD OFF state). <p>(Note) Inspect every 6 months or when installation settings are changed.</p>

Specifications in this product news are as of the issue date and are subject to change without notice.
Only main changes in specifications are described in this document. Please be sure to read the relevant catalogs, datasheets, product specifications, instructions, and manuals for precautions and necessary information when using products.