

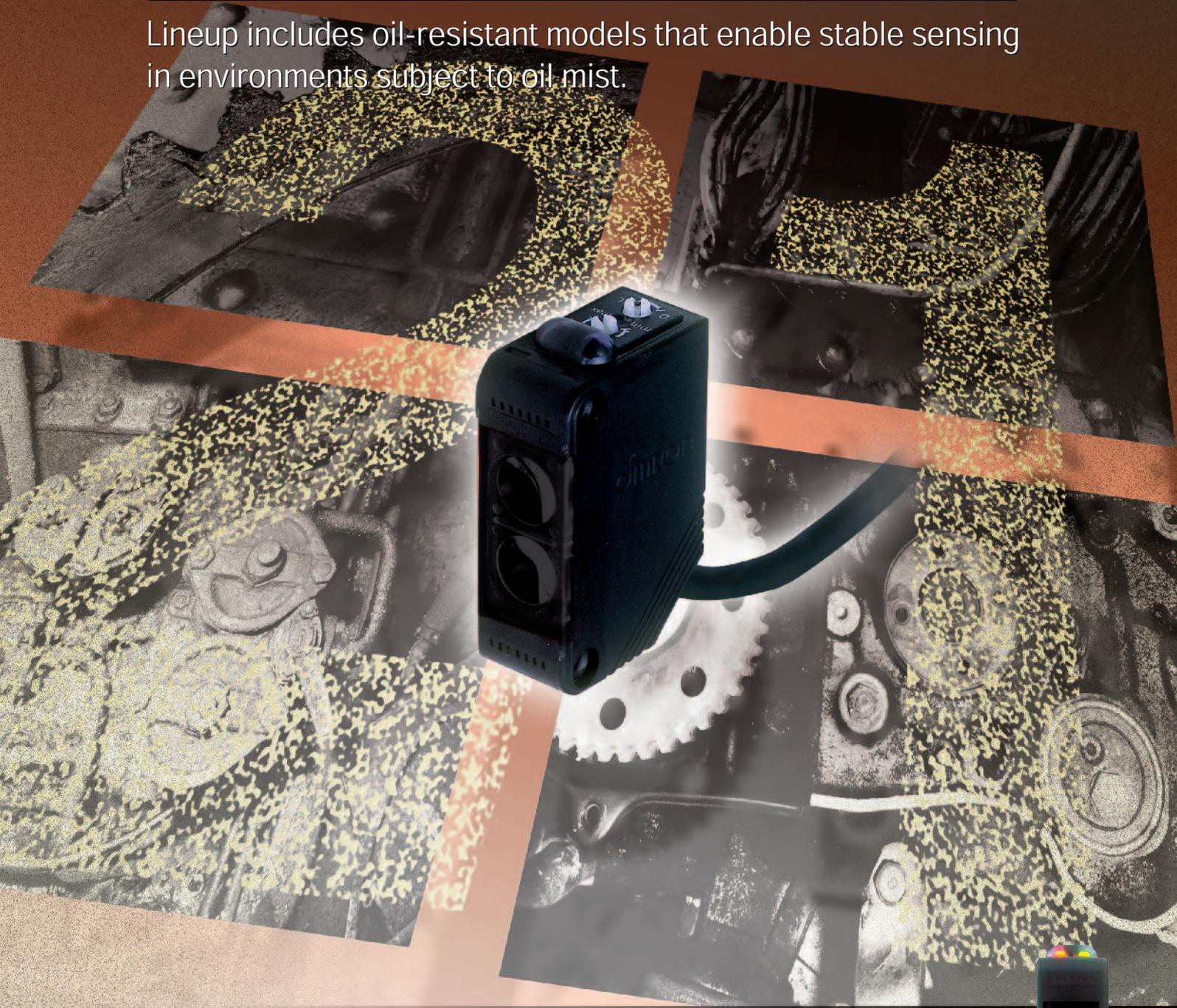
Photoelectric Sensor
with Built-in Amplifier

E3Z
SERIES

OMRON

The E3Z Series is better than ever!

Lineup includes oil-resistant models that enable stable sensing in environments subject to oil mist.



E3Z-TK /-DK

21st century Photoelectric Sensor
STANDARD with Built-in Amplifier
(Oil-resistant Models)



Photoelectric Sensor with Built-in Amplifier (Oil-resistant Models) E3Z-TK/-RK/-DK

Lineup includes oil-resistant models that enable stable sensing in environments subject to oil mist.

<READ AND UNDERSTAND THIS CATALOG>

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.



Ordering Information

List of Models

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model		
				NPN output	PNP output	
Through-beam		Pre-wired (2 m)		E3Z-T61K	E3Z-T81K	
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-T61K-M3J	E3Z-T81K-M3J	
Retro-reflective (with M.S.R. function)		Pre-wired (2 m)		E3Z-R61K	E3Z-R81K	
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-R61K-M3J	E3Z-R81K-M3J	
Diffuse-reflective		Pre-wired (2 m)		E3Z-D61K	E3Z-D81K	
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-D61K-M3J	E3Z-D81K-M3J	
		Pre-wired (2 m)			E3Z-D62K	E3Z-D82K
		Pre-wired M8 4-pin connector (0.3 m)			E3Z-D62K-M3J	E3Z-D82K-M3J

Note 1. The Reflector is sold separately. Select the Reflector model most suited to the application.

2. The sensing distance specified is possible when the E39-R1S used. Figure in parentheses indicate the minimum required distance between the Sensor and Reflector.

Specifications

■ Ratings/Characteristics

Sensing method		Through-beam	Retro-reflective (with M.S.R. function)	Diffuse-reflective		
Item	Model	E3Z-T61K (-M3J)	E3Z-R61K (-M3J)	E3Z-D61K (-M3J)	E3Z-D62K (-M3J)	
	NPN output	E3Z-T81K (-M3J)	E3Z-R81K (-M3J)	E3Z-D81K (-M3J)	E3Z-D82K (-M3J)	
PNP output						
Sensing distance		15 m	3 m (150 mm)* (when using E39-R1S) 2 m (100 mm)* (when using E39-R1)	White paper (100 × 100 mm): 100 mm	White paper (300 × 300 mm): 1 m	
Standard sensing object		Opaque:12-mm dia. min.	Opaque:75-mm dia. min.	---		
Hysteresis		----			20% max. of sensing distance	
Directional angle		Both emitter and receiver: 3° to 15°	2° to 10°		---	
Light source (wave length)		Infrared LED (870 nm)	Red LED (660 nm)		Infrared LED (860 nm)	
Power supply voltage		12 to 24 VDC±10% including 10% (p-p) max. ripple				
Current consumption		Emitter: 15 mA Receiver: 20 mA	30 mA max.			
Control output		Load power supply voltage: 26.4 VDC max. Load current: 100 mA max. (Residual voltage: 1 V max. for a load currents less than 10 mA. and 2 V max. for load currents between 10 mA and 100 mA) Open collector output (NPN or PNP depending on model) L-ON/D-ON selectable				
Circuit protection		Protection from reversed power supply connection, output short-circuit, and reversed output connection	Protection from reversed power supply connection, output short-circuit, mutual interference, and reversed output connection			
Response time		Operation or reset: 1 ms max.				
Sensitivity adjustment		One-turn adjuster				
Ambient illumination (receiver side)		Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.				
Ambient temperature		Operating: -25°C to 55°C/Storage: -40°C to 70°C (with no icing or condensation)				
Ambient humidity		Operating: 35% to 85%/Storage: 35% to 95% (with no condensation)				
Insulation resistance		20 MΩ min. at 500 VDC between charged parts and case				
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between charged parts and case				
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude or 300 m/s ² for 2 hours each in X, Y, and Z directions				
Shock resistance		Destruction: 500 m/s ² 3 times each in X, Y, and Z directions				
Degree of protection		IEC60529: IP67 (JEM**: IP67f, except for cable and connector)				
Connection method		Pre-wired cable (standard length: 2 m) or Pre-wired M8 4-pin connector (standard length: 0.3 m)				
Indicator		Operation indicator (orange) Stability indicator (green) Emitter has power indicator (orange) only.				
Weight (packed state)	Pre-wired cable	Approx. 120 g	Approx. 65 g			
	Pre-wired M8 4-pin connector	Approx. 50 g	Approx. 30 g			
Material	Case	PBT (polybutylene terephthalate)				
	Lens	Denatured polyarylate	Methacrylate resin	Denatured polyarylate		
Accessories		Instruction manual (The Reflector and Mounting Bracket are not provided with any of the above models.)				

* Figures in parentheses indicate the minimum required distances between the Sensors and Reflectors.

** JEM: Standards of the Japan Electrical Manufacturer's Association

Oil Resistance

- Although the E3Z-□□□K Sensors have oil-resistant specifications, performance may be affected by certain types of oil. Refer to the table on the right.
- E3Z-□□□K Sensors are tested for resistance to the oils given in the table on the right. Refer to the information in the table when deciding which type of oil to use.

Testing oil classification	JIS classification	Product name	Dynamic viscosity (mm ² /s) at 40 °C	pH
Lubricant	---	Velocity No. 3	2.02	---
Water insoluble coolant	Class 2, No.5	Daphne Cut AS-30D	No less than 10 to less than 50	---
	Class 2, No.11	Yushiron Oil No. 2 ac	Less than 10	
Water soluble coolant	Class W1, No. 1	Yushiroken EC50T-3	---	7 to 9.5
		Yushiron Lubic HWC68		7 to 9.9
	Class W1, No. 2	Gryton 1700D		7 to 9.2
	Class W2, No. 1	Yushiroken S50N		7 to 9.8

- Note 1.** The E3Z-□□□K maintained a minimum insulation resistance of 100 MΩ after the sensors were dripped in all the above oils for 240 hours.
- 2.** When using the Sensors in environments subject to oils other than those listed above, use the figures for kinetic viscosity and pH as rough guides. Consideration of the effects of additives in the oil may also be required.
- 3.** JIS: Japanese Industrial Standards

Output Circuit Diagram

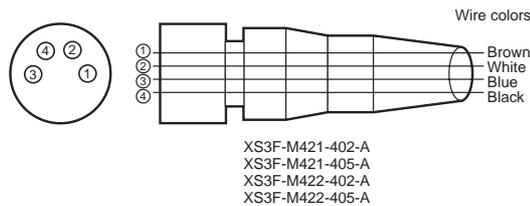
■ NPN Output

Model	Operating mode	Timing chart	Mode selector	Output circuit
E3Z-T61K (-M3J) E3Z-R61K (-M3J) E3Z-D61K (-M3J) E3Z-D62K (-M3J)	Light ON		L (Light ON)	<p>(Through-beam receiver) (Retroreflective model) (Diffuse-reflective model)</p> <p>Connector Pin Arrangement</p> <p>Pin 2 is not used.</p>
	Dark ON		D (Dark ON)	<p>(Through-beam emitter)</p> <p>Connector Pin Arrangement</p> <p>Pins 2 and 4 are not used.</p>

■ PNP Output

Model	Operating mode	Timing chart	Mode selector	Output circuit
E3Z-T81K (-M3J) E3Z-R81K (-M3J) E3Z-D81K (-M3J) E3Z-D82K (-M3J)	Light-ON		L (Light ON)	<p>(Through-beam receiver) (Retroreflective model) (Diffuse-reflective model)</p> <p>Connector Pin Arrangement</p> <p>Pin 2 is not used.</p>
	Dark ON		D (Dark ON)	<p>(Through-beam emitter)</p> <p>Connector Pin Arrangement</p> <p>Pins 2 and 4 are not used.</p>

Structure of Sensor I/O Connector



Classification	Wire color	Connector pin No.	Use
DC	Brown	①	Power supply (+V)
	White	②	---
	Blue	③	Power supply (0 V)
	Black	④	Output

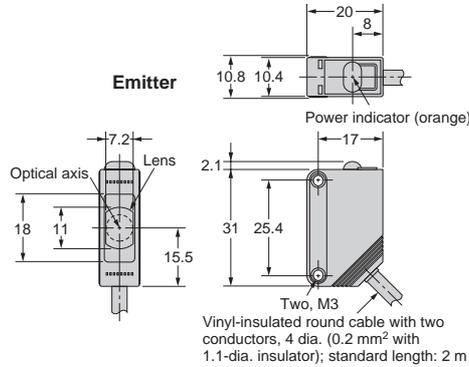
Note: Pin 2 is not used.

Dimensions

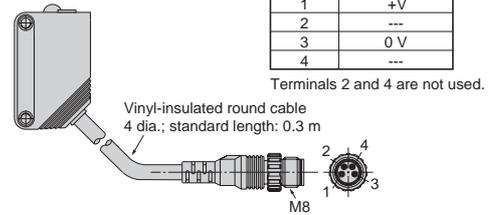
Note: All units are in millimeters unless otherwise indicated.

Through-beam E3Z-T61K (-M3J) E3Z-T81K (-M3J)

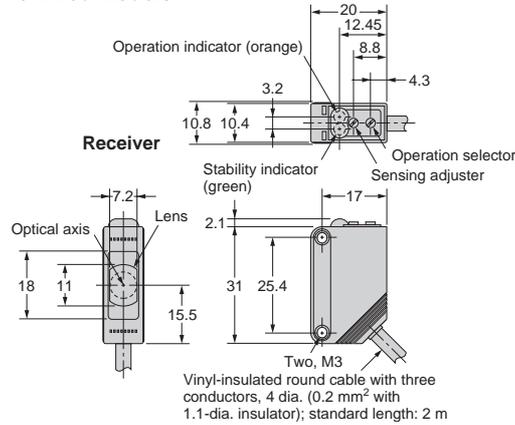
Pre-wired Models



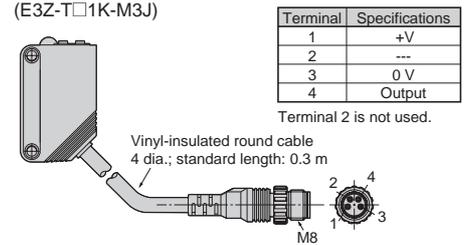
Connector Models (E3Z-T□1K-M3J)



Pre-wired Models



Connector Models (E3Z-T□1K-M3J)



Retro-reflective Models

E3Z-R61K (-M3J)

E3Z-R81K (-M3J)

Diffuse-reflective Models

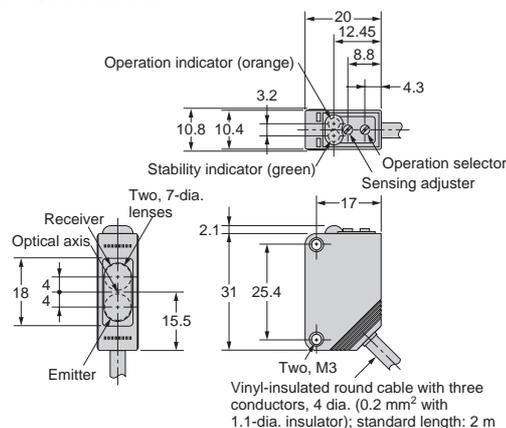
E3Z-D61K (-M3J)

E3Z-D62K (-M3J)

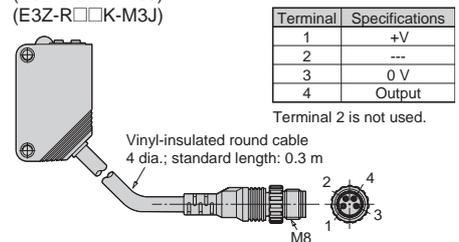
E3Z-D81K (-M3J)

E3Z-D82K (-M3J)

Pre-wired Models



Connector Models (E3Z-D□□K-M3J) (E3Z-R□□K-M3J)



Safety Precautions

Be sure to abide by the following precautions for the safe operation of the Sensor.

Wiring

Power Supply Voltage

Make sure that the power supply to the Sensor is within the rated voltage range and do not apply 100 VAC or more if the Sensor is a DC model, or otherwise the Sensor may explode or burn.

Load Short-circuiting

Do not short-circuit the load, otherwise the Sensor may be damaged.

Wiring Mistakes

Do not make mistakes in wiring, such as mistakes in polarity, otherwise the Sensor may be damaged.

Connection without Load

Do not connect power supply to the Sensor with no load connected, otherwise the internal elements may explode or burn.

Operating Environment

Do not use the Sensor in locations with explosive or flammable gas.

■ Precautions for Safe Use

Settings

Power Reset Time

The Sensor is ready to operate 100 ms after the Sensor is turned ON. If the load and Sensor are connected to independent power supplies respectively, be sure to turn ON the Sensor before turning the load ON.

Connections

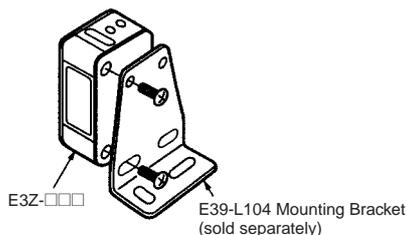
M8 Metal Connector

- Be sure to connect or disconnect the metal connector after turning OFF the Sensor.
- Hold the connector cover to connect or disconnect the metal connector.
- Secure the connector cover by hand. Do not use any pliers, otherwise the connector may be damaged.
- The proper tightening torque range is between 0.3 and 0.4 N • m. Be sure to tighten the connector securely, otherwise the specified degree of protection may not be maintained or the connector may be disconnected due to vibration.

Mounting

Sensor Mounting

Use M3 screws to mount the sensor and tighten each screw to a maximum torque of 0.5 N • m.



■ Precautions for Correct Use

Sensors

The Sensor has a special coating that makes it more oil resistant. Handle it with care to avoid scratching the coating.

If you attach adhesive tape to the Sensor, the coating may be damaged when you remove the tape.

Part of the coating around the adjuster may peel off when you adjust the sensitivity. This does not reduce the oil resistance of the Sensor.

Cables

Part of the cable is coated and may wrinkle when bent.

Observe the following precautions when handling the cable because it is made of the same polyvinyl chloride (PVC) material as the cables for standard E3Z Sensors.

- Keep the cable from direct contact with oil. If the cable is used in oily environments, provide a cover or other protective measure to keep the cable from direct contact with oil.
- Do not subject the cable to mechanical movement in oily environments. The sheath will lose its elasticity and harden over time. The cable may break as a result and cause faulty operation, or there may be damage to the sheath that leads to a short circuit.

Lens

The oil-resistant treatment on the lens may cause slight blurring, but this does not affect detection.

Warranties, Limitations of Liability

■ WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

■ LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

■ SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the product 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 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 IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

■ CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

■ DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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