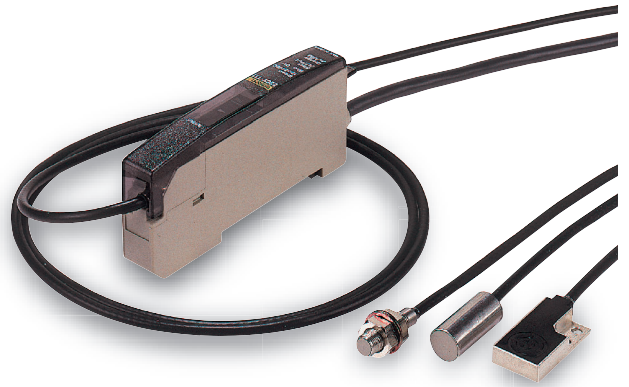



# E2CY

## Simple Teaching Function for Simple Sensitivity Adjustment. Easy-to-see Excess Gain Level Indicators.


- Detects aluminum, copper, and other non-ferrous metal objects.
- Compact Flat Sensors with a wide range of Sensing Heads.
- Eight easy-to-see excess gain level indicators.
- Fluororesin Sensor Head for applications requiring resistance to chemicals. (E2CY-C2AF)



 Be sure to read *Safety Precautions* on page 5.

## Ordering Information

### Sensors [Refer to *Dimensions* on page 6.]

Appearance	Stable sensing distance	Model
 Shielded	M5	E2CY-X1R5A 3M
	5.4 dia.	E2CY-C1R5A-1 3M
	8 dia.	E2CY-C2A 3M
	Flat	E2CY-V3A 3M
	8 dia.	E2CY-C2AF 3M

### Amplifier Units

Output configuration	Model
DC 3-wire NPN open collector	E2CY-T11 2M

Note: The E2CY-C2AF is also available with a 5-m cable. Specify the cable length at the end of the model number (e.g., E2CY-C2AF 5M).

## Ratings and Specifications

### Sensors

Model		E2CY-X1R5A E2CY-C1R5A-1	E2CY-C2A(F)	E2CY-V3A	
<b>Item</b>	<b>Stable sensing distance</b>	0 to 1.5 mm	0 to 2 mm	0 to 3 mm	
<b>Differential travel</b>	10% max. of sensing distance with Amplifier Unit in FINE mode 10% max. of sensing distance with Amplifier Unit in NORM mode				
<b>Detectable object</b>	Non-ferrous metal				
<b>Standard sensing object</b>	Aluminum: 8 × 8 × 1 mm		Aluminum: 12 × 12 × 1 mm		
<b>Response frequency *1</b>	40 Hz min. with Amplifier Unit in FINE mode 100 Hz min. with Amplifier Unit in NORM mode				
<b>Ambient temperature range</b>	Operating: -10 to 55°C, Storage: -25 to 70°C, (with no icing or condensation)				
<b>Ambient humidity range</b>	Operating/Storage: 35% to 95% (with no condensation)				
<b>Temperature influence</b>	-10 to 55°C	±15% max. of sensing distance at 23°C	±10% max. of sensing distance at 23°C	±15% max. of sensing distance at 23°C	
	0 to 40°C	±10% max. of sensing distance at 23°C*2		±10% max. of sensing distance at 23°C	
<b>Vibration resistance</b>	Destruction: 10 to 500 Hz, 2-mm double amplitude or 150 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions				
<b>Shock resistance</b>	Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions				
<b>Degree of protection</b>	IEC 60529 IP67				
<b>Connection method</b>	Pre-wired Models (High-frequency coaxial cable, Standard cable length: 3 m)				
<b>Cable length compensation</b>	0.5 to 5 m*3				
<b>Weight (packed state)</b>	Approx. 35 g				
<b>Materials</b>	<b>Case</b>	Stainless steel		Zinc die-cast	
	<b>Sensing surface</b>	Heat-resistant ABS (E2CY-C2AF: Fluoresin)			
	<b>Cable</b>	Soft PVC (E2CY-C2AF: Fluoresin)			
	<b>Clamping nut</b>	Nickel-plated brass (E2CY-X1R5A only)			
	<b>Toothed washer</b>	Zinc-plated iron (E2CY-X1R5A only)			

\*1. The average value when using the DC-switching control output on the Amplifier Unit.  
Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the stable sensing distance.

\*2. E2CY-C1R5A-1: ±15% max. of sensing distance at 23°C

\*3. When extending the cable, use a 1.5D-2V (equivalent to JIS C 3501) cable with characteristic impedance of 50 Ω.

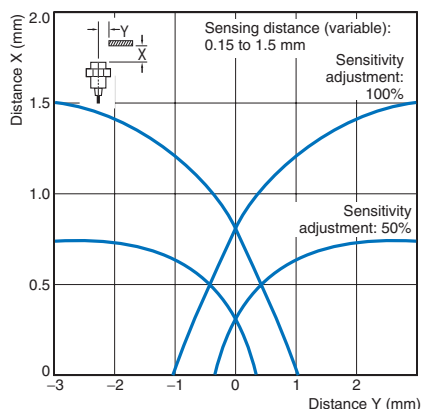
### Amplifier Units

Item	Model	E2CY-T11
<b>Power supply voltage (operating voltage range)</b>	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.	
<b>Current consumption</b>	40 mA max.	
<b>Sensing distance adjustment range</b>	10% max. of stable sensing distance	
<b>Adjustment method</b>	Teaching	
<b>Control output</b>	<b>Load current</b>	NPN open collector, 100 mA max. (30 VDC max.)
	<b>Residual voltage</b>	1 V max. (Load current: 100 mA, Cable length: 2 m)
<b>Self-diagnostic output</b>	NPN open collector, 100 mA max. (30 VDC max.)	
<b>Operation mode</b>	Changed with NO/NC switch.	
<b>Protection circuits</b>	Reverse polarity protection, Load short-circuit protection, Surge suppressor (control and diagnostic outputs)	
<b>Teaching function monitor</b>	Orange and green indicators (Also used for operation and excess gain level indicators.)	
<b>Indicators</b>	Operation indicator: Orange Excess gain level indicators: Green with sensing object approaching Orange with sensing object not approaching Fine-tuning indicator: Green	
<b>Ambient temperature range</b>	Operating: -10 to 55°C, Storage: -25 to 70°C, (with no icing or condensation)	
<b>Ambient humidity range</b>	Operating/Storage: 35% to 85% (with no condensation)	
<b>Temperature influence</b>	±10% max. of sensing distance at 23°C in the temperature range of -10 to 55°C	
<b>Voltage influence</b>	±1% max. of sensing distance in the rated voltage range ±10%	
<b>Insulation resistance</b>	50 MΩ min. (at 500 VDC) between current-carrying parts and case	
<b>Dielectric strength</b>	1,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case	
<b>Vibration resistance</b>	Destruction: 10 to 150 Hz, 1.5-mm double amplitude or 100 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions	
<b>Shock resistance</b>	Destruction: 300 m/s <sup>2</sup> 3 times each in X, Y, and Z directions	
<b>Degree of protection</b>	IEC 60529 IP50 (with Sensor cable connected and protective cover attached)	
<b>Connection method</b>	Pre-wired Models (Standard cable length: 2 m)	
<b>Cable length compensation</b>	0.5 to 5 m for cable extension of free-cut length	
<b>Weight (packed state)</b>	Approx. 75 g	
<b>Materials</b>	<b>Case</b>	PBT
	<b>Cover</b>	Polycarbonate
<b>Accessories</b>	Mounting Bracket, instruction manual	

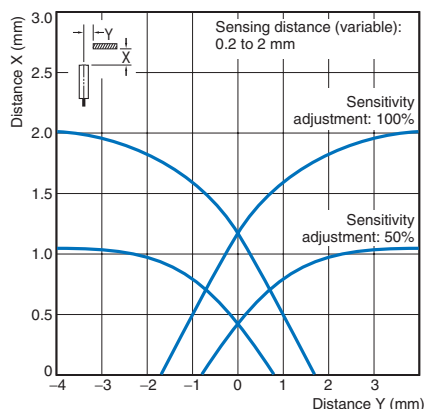
## Engineering Data (Typical)

### Sensing area

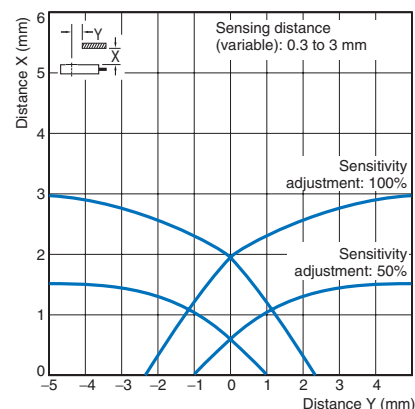
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)

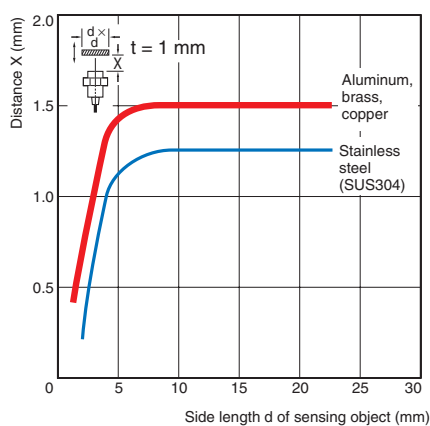


E2CY-V3A

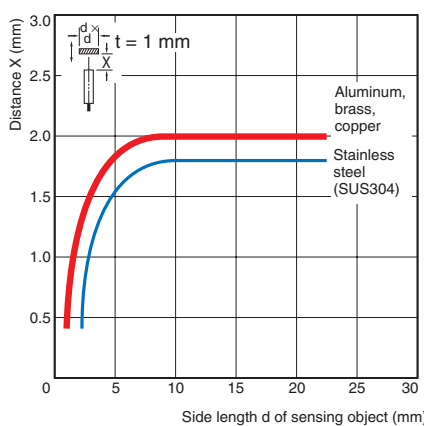


### Influence of Sensing Object Size and Material

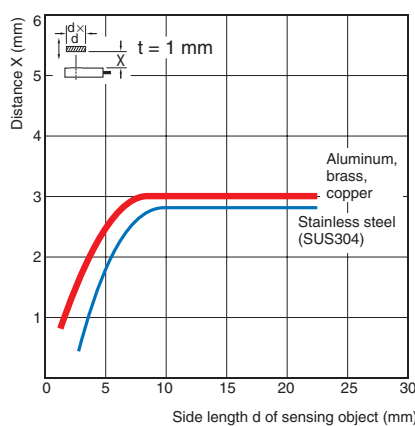
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)

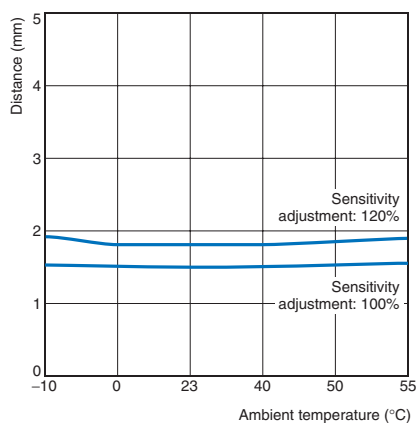


E2CY-V3A

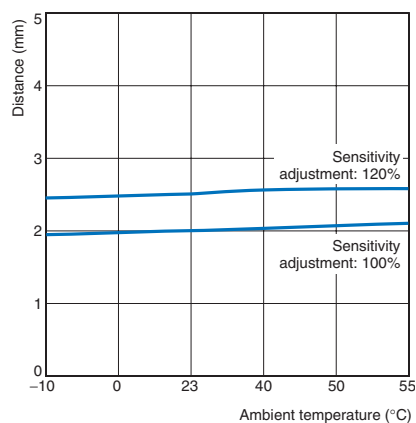


### Temperature influence

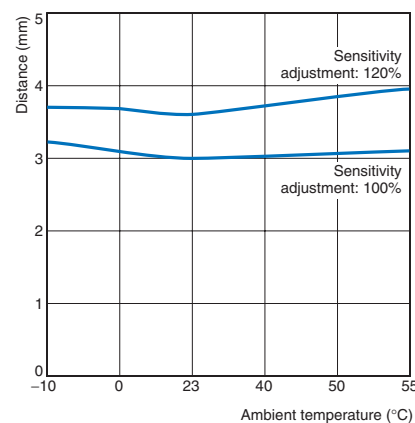
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)



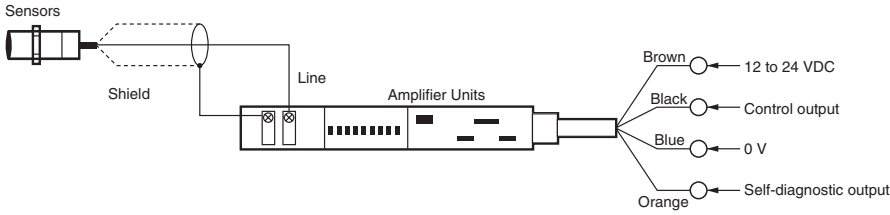
E2CY-V3A



I/O Circuit Diagrams

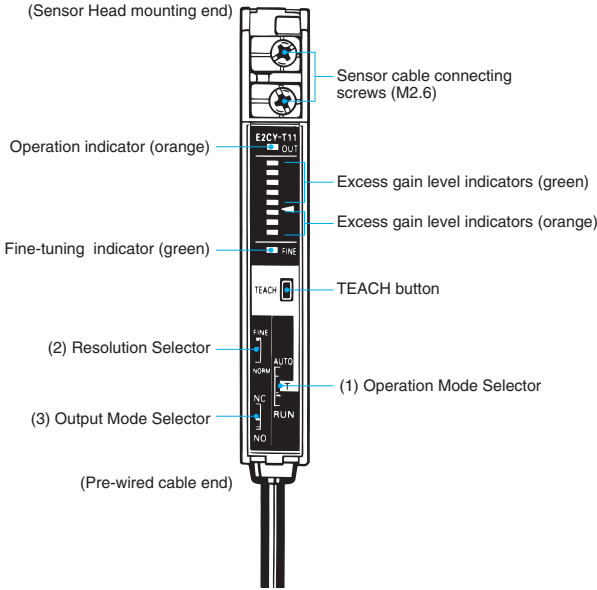
Operation mode	Timing Chart	Output circuit
NO	<p>Sensing object Present</p> <p>Sensing object Not present</p> <p>Output transistor OFF</p> <p>Amplifier Unit ON</p> <p>Operation indicator (orange) OFF</p>	
NC	<p>Sensing object Present</p> <p>Sensing object Not present</p> <p>Output transistor ON</p> <p>Amplifier Unit ON</p> <p>Operation indicator (orange) OFF</p>	

Connection



Nomenclature

Amplifier Units



(1) Operation Mode Selector

**AUTO Mode:** The sensitivity is automatically adjusted within a range of approximately 80% to 110% of the rated sensing distance. Except for the E2CY-C1R5A-1, which is adjusted within approximately 60% to 110% of the rated sensing distance.

**T Mode:** This mode is used when adjusting the sensitivity of the Sensor. (The output transistor does not operate in this mode.)

**RUN Mode:** This mode is used for the normal operation of the Sensor.

(2) Resolution Selector

If the E2CY often has a teaching error when detecting fine differences, set the resolution selector to FINE. The response speed will drop but improvement in the sensing precision of the E2CY can be expected.

(3) Output Mode Selector

Used to select the transistor mode of the NPN open-collector output.

**NO:** Normally open output (Output transistor will turn ON if a sensing object is present.)

**NC:** Normally closed output (Output transistor will turn ON if a sensing object is not present.)

Indicators

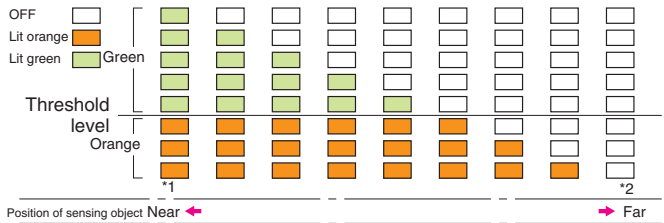
Operation Indicator (Orange)

The operating indicator will turn ON when the control output is ON.

Excess Gain Level Indicators (Green and Orange)

The excess gain level indicators will be ON according to the distance of the sensing object as shown at the right.

Excess Gain Level Indicators



\*1. All indicators will be ON if the sensing object is at a position of approximately 80% of the preset sensing distance.  
 \*2. All indicators will be OFF if the sensing object is at a position of approximately 110% of the reset distance.

## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

### ⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



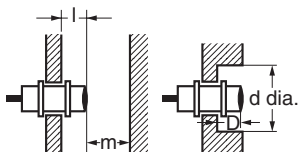
### Precautions for Correct Use

Do not use the Encoder under ambient conditions that exceed the ratings.

#### ● Design

##### Influence of Surrounding Metal

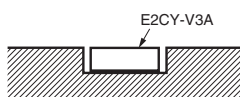
When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.



##### Influence of Surrounding Metal (Unit: mm)

Model	Item	l	d	D	m
E2CY-X1R5A/ E2CY-C1R5A-1	0	0	5	0	9
E2CY-C2A(F)			8		15
E2CY-V3A			12		18

The E2CY-V3A can be embedded in metal with the sensing surface at the same level as the metal surface.

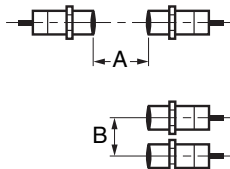


##### Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.

##### Mutual Interference (Unit: mm)

Model	Item	A	B
E2CY-X1R5A E2CY-C1R5A-1	20	15	15
E2CY-C2A(F)			
E2CY-V3A	30	12	12



##### Effects of a High-frequency Electromagnetic Field

If the Sensor is located near a device that generates high frequencies or a transceiver, it may be affected by such a device and malfunctions may occur.

#### ● Mounting

- Do not use excessive force when tightening the nuts on the E2CY-□.
  - A toothed washer must be used with the nut.

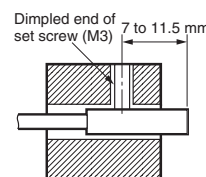


Model	Torque
E2CY-X1R5A	1 N·m

Note: The above leeways in tighten torque assume that a toothed washer is being used.

- Mounting Unthreaded Cylindrical Models

When using a set screw, tighten it to a torque of 0.2 N·m max.



#### ● Adjustment

##### Power ON

The Sensor is ready to sense an object within 50 ms after turning the power ON.

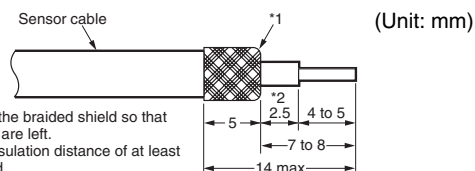
If the load and Sensor are connected to different power supplies, always turn ON the Sensor power first.

##### Teaching

Make sure that the Sensor is in operating condition before making sensitivity adjustments.

##### Processing the Sensor Cable Ends

When cutting or extending the cable, the end of the Sensor cable connected to the E2CY-□ must be processed as shown in the following illustration.



- \*1. Be sure to turn over the braided shield so that none of its thin wires are left.
- \*2. Make sure that an insulation distance of at least 2.5 mm is maintained.

##### Self-diagnostic Function

The self-diagnostic output transistor will turn ON in the following cases.

##### (1) Sensor Open Circuit:

Output will turn ON 105 ms after the Sensor circuit opens.

##### (2) Sensor Short Circuit:

Output will turn ON 105 ms after the Sensor circuit shorts.

##### (3) Control Output Short Circuit:

Output will turn ON when both ends of the control output (load) are shorted and an overcurrent flows.

##### (4) Internal Memory Error:

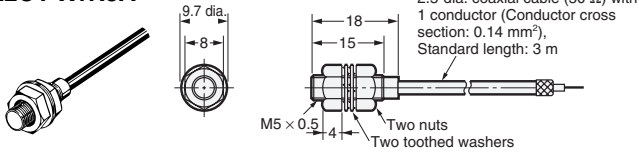
Output will turn ON when the teaching conditions cannot be recorded in internal memory when power is turned ON in RUN or TEACH mode.

Dimensions

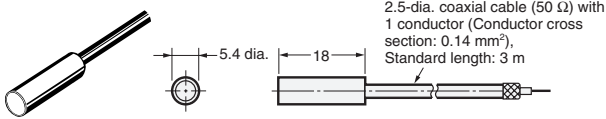
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Sensors

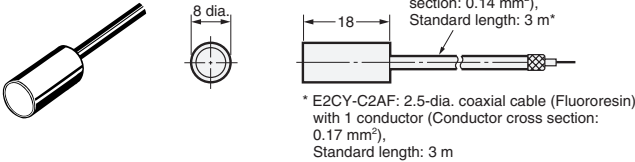
E2CY-X1R5A



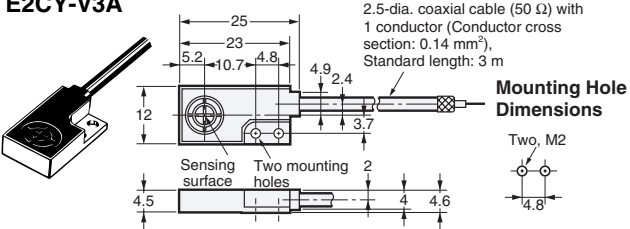
E2CY-C1R5A-1



E2CY-C2A(F)

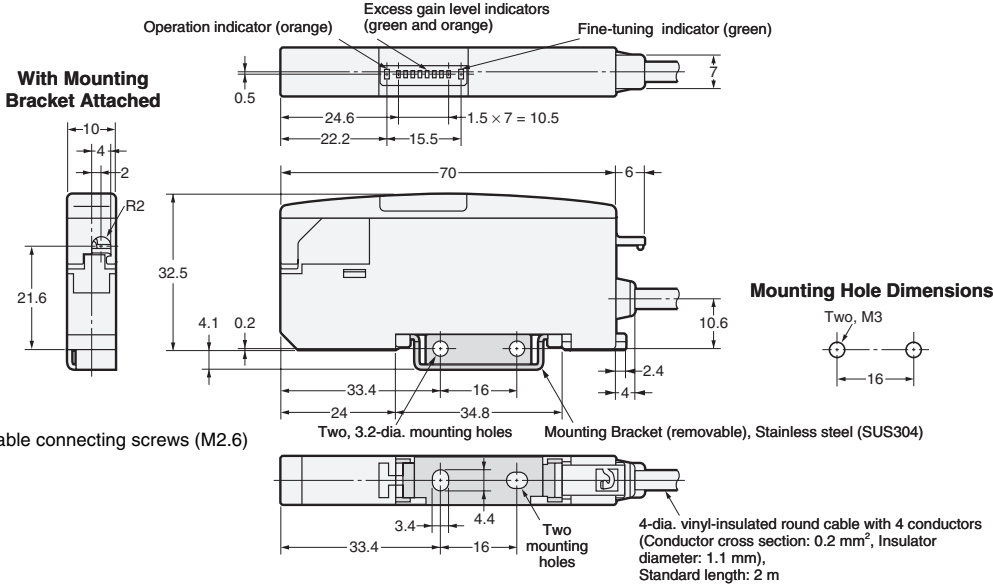
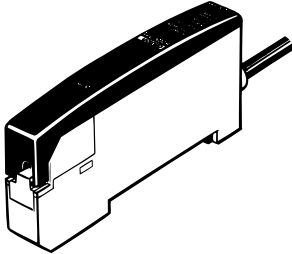


E2CY-V3A



Amplifier Units

E2CY-T11



## Read and Understand This Catalog

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2008.11

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