



Elektrometal Energetyka SA



Voltage Indicator

e²ECHO-W

e²ECHO-B (with earthing switch interlock)

e²ECHO-Bd (with unlock)

Operation and Maintenance Manual (O&MM)

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BASIC RULES FOR SAFE HANDLING OF e²ECHO VOLTAGE INDICATOR



- The user is responsible for ensuring the continuity of circuits connected to the device, as well as checking its rated data, reading the installation and operating instructions before starting and operating the device.
- The user is responsible for installation and operating of the device as intended and provided for by the manufacturer. Otherwise, the safety measures provided in the device may be reduced.



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CHANGE CARD

All information, photos, and drawings contained in this manual are based on the latest data on the device, available at the time of publication. The manufacturer reserves the right to change specifications or design at any time, without notice and without making any commitments resulting therefrom.

No.	Date	Section	Change description



1. COMPLIANCE INFORMATION

The e²ECHO type devices are compatible with the provisions of the following directives and standards:

- 2004/108/EC
Directive of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (EMC).
- 2006/95/EC
Directive of the European Parliament and of the Council of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LVD).
- PN-EN 60255-26:2014-01
Measuring relays and protection equipment. Part 26: Electromagnetic compatibility requirements.
- PN-EN 60255-27:2006
Measuring relays and protection equipment. Part 27: Product safety requirements.
- PN-EN 62271-206:2011
High-voltage switchgear and controlgear. Part 206: Voltage presence indicating systems for rated voltages above 1 kV and up to and including 52 kV.

2. APPLICATION

e²ECHO type voltage indicators are devices used to control AC voltage on MV switchgear busbars. Voltage presence indication allows to prevent any accidental starts of an earthing switch, making the switchgear operation safer. The e²ECHO-B voltage indicator with earthing switch interlock has auxiliary contacts cooperating with a coil preventing from earthing switch maneuvering. The e²ECHO-Bd indicator is additionally equipped with an interlock function. Once the interlock is disabled, it is possible to close the earthing switch depending on the voltage presence on busbars.

Voltage indicators come in IP40 (Fig. 2.1) and IP 54 (Fig. 2.2) versions.



Fig. 2.1 IP40 protected e²ECHO-B voltage indicator



Fig. 2.2 IP54 protected e²ECHO-B voltage indicator

3. OPERATING PRINCIPLE

e²ECHO type voltage indicators use three neon lamps on the front panel (L1, L2, L3) to signal the presence of voltage.

Devices are designed to work with 100-300 μ A reactive insulators in a way to ensure compliance with requirements of the PN-EN 62271-206:2011 standard according to which voltage presence is indicated for values exceeding 45% of rated voltage on busbars – and voltage absence – for values less than 10% of rated voltage.

On the front panel, there are sockets for connecting an external portable voltage indicator which can also be used for phasing.

The e²ECHO-B voltage indicator with earthing switch interlock is additionally equipped with auxiliary contacts preventing from earthing switch activation in the presence of voltage on busbars or in case of auxiliary power failure. The status of auxiliary contacts is indicated on the device front panel by two diodes: red and green.

The e²ECHO-Bd type voltage indicator has an interlock system preventing activation of the earthing switch. The interlock is constantly active and its release can be done by pushing DB button on the front panel or providing the unlocking input with a voltage whose value is equal to an auxiliary voltage. Once the button is released and there is no unlocking voltage, the device starts the countdown of the unlock time of approx. 30 s. At this time, it is possible to close the earthing switch depending on the voltage presence on L1, L2, and L3. After that time, the interlock is activated again.

Table 1 Operating principle

Conditions	e ² ECHO-W	e ² ECHO-B
Voltage present on L1, L2, L3 Interlock released	Appropriate lamps are on L1, L2, L3	Appropriate lamps are on L1, L2, L3 Relay contacts in NC Indication of no authorization to grounding (red diode is on)
No voltage on L1, L2, L3 Interlock released	Appropriate lamps are off L1, L2, L3	Appropriate lamps are off L1, L2, L3 Relay contacts in NO Indication of authorization to grounding (green diode is on)
Interlock activated		Relay contacts in NC Indication of no authorization to grounding (red diode is on)



4. TECHNICAL PARAMETERS

Table 2 Technical parameters

Parameter	Value
Rated auxiliary voltage	110 V AC/DC 230 V AC/DC
Power takeoff of the auxiliary circuit	in stand-by mode < 0.5 VA in operating mode < 2.5 VA
Insulator current range at Un	100-300 μ A
Indicator sensitivity	40 μ A
Interlock sensitivity	40 μ A
Interlock activation voltage range	\geq 1100 V
Rated frequency	50/60 Hz
Operating temperature	- 10 ... + 55 °C
Storage temperature	- 25 ... + 75 °C
Average relative humidity within 24 h	Max. 95%
Relay response time	< 1s
Degree of protection	IP40 IP54
Unlock voltage	as Uzas
Unlock time	30 \pm 5 s
Electric strength of insulation	2 kV, 50 Hz, 1 min.
Output relay type	RM84-2012-35-1005

* on special request. The degree of protection is defined from the front side, for normal position of the unit.

5. NAMEPLATES

Each device is equipped with a nameplate including the following information:

- Manufacturer: Elektrometal Energetyka S.A.,
- device type: e²ECHO-B / e²ECHO-Bd / e²ECHO-W,
- rated data,
- connection scheme,
- individual serial number with a barcode,
- CE marking:

Sample nameplates are shown in **Błąd! Nie można odnaleźć źródła odwołania., Błąd! Nie można odnaleźć źródła odwołania., Błąd! Nie można odnaleźć źródła odwołania..**

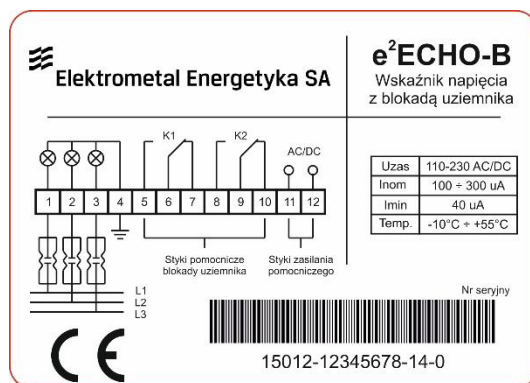


Fig. 5.1 Nameplate of e²ECHO-B

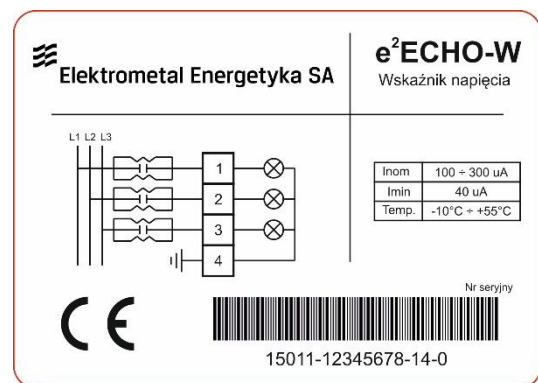


Fig. 5.2 Nameplate of e²ECHO-W

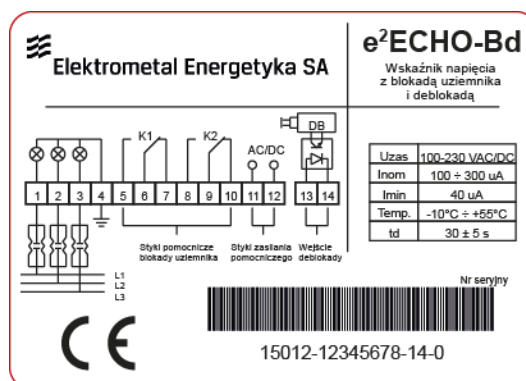


Fig. 5.3 Nameplate of e²ECHO-Bd

6. INSTALLATION

The unit should be installed in the absence of voltage on insulators, in a place providing for the environmental conditions specified in TECHNICAL PARAMETERS. The unit should be installed using the supplied fasteners in a mounting hole whose dimensions are shown in Fig. 6.1. The connection schemes are shown in Figs. 6.2, 6.3 and 6.4.

The relay does not require protective earthing since it has a plastic housing.

The unit terminals must be connected using 1 mm, 2 mm or 1.5 mm² 450/750 V wires.

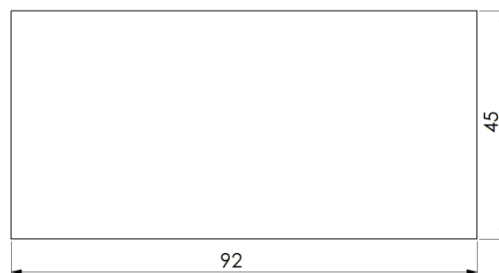


Fig. 6.1 Mounting hole for e²ECHO type relays

6.1 CONNECTION SCHEMES

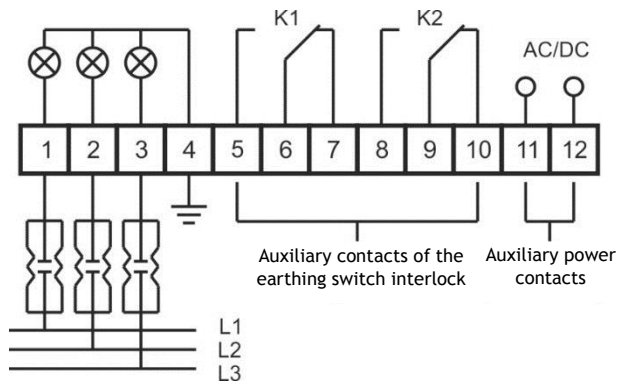


Fig. 6.2 e²ECHO-B connection scheme

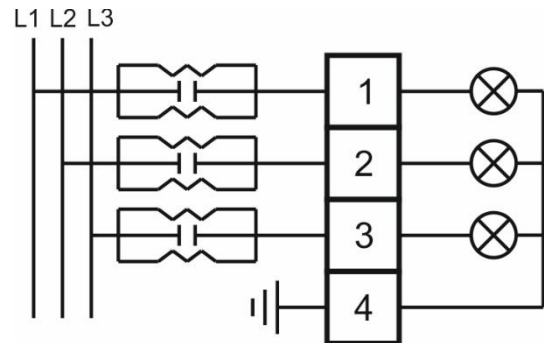


Fig. 6.3 e²ECHO-W connection scheme

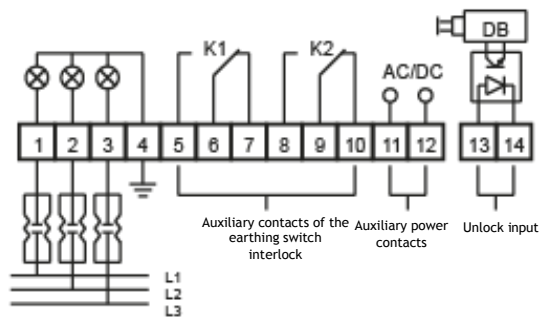


Fig. 6.4 e²ECHO-Bd connection scheme



7. OPERATION

The device does not require special operation procedures. Where the proper operation is in doubt, the external voltage indicator should be used by connecting it to sockets on the front panel.

When using the voltage indicator in a room with strong sunlight, additional measures should be used in order to properly read the device indication (e.g. by shading the indicator).

Do not attempt to repair the indicator by yourself in the case of damage.

The unit indication is not sufficient to state the absolute absence of voltage. If it is mandatory according to appropriate procedures, use voltage indicators compliant with IEC 61243-1, IEC 61243-2, and IEC 61243-5.

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