

ELR-2 EARTH LEAKAGE RELAY

GENERALITY

The device type ELR-2 is an amperometric relay of maximum homopolar differential current to use to control the insulation towards earth of networks of energy supplier, of electric machines, etc.

The device must be joined at a suitable toroidal current transformer of the CT line in the way to point out the earth leakage current of the system to control and to protect. The toroidal current transformer point out the vectorial sum of the currents present on the active conductor of single-phase line, three-phase with or without neutral (inside the toroidal current transformer will pass all phase conductor and if present the neutral, but none protection conductor must pass), in the way to point up the leakage current towards earth, depend of the insulation level line under control.

When the current read exceed the threshold value set the two exchanging contacts, available in output, will commute in the way to protect the line under control using opportune opening coils switch or contactor or to signal at distance the low insulation condition of the line or equipment under control.

INTRODUCTION

The ELR-2 has standard dimensions DIN 96x96mm with depth very limited, in the way to use it in application where the space available is limited.

A wide range of current and time of delay calibration, allows to use it in a lot of application, both like signalling of low insulation and like protection line according with the norms (CEI 64.8), to realize adequate vertical and horizontal selectivity, etc.

The device has, on input circuits of the measure circuit opportune filters doing it exempt by external noises, permanent control function of efficiency of internal circuit, permanent control of connection between relay and toroidal current transformer and coil continuity with test at 4 wires, in the way to verify the efficiency of system relay + toroidal current transformer. The functioning is insured also with sinusoidal current and unidirectional button (type A according to norms IEC 755).

On the front it's possible to program the tripping current (25mA ÷ 25 A), the tripping delay (0,02 ÷ 5 sec.), the activation of the alarm threshold and the type of functioning of output relays. The device has two contacts in exchange in output for tripping and prealarm (both for the application with a closed contact and opened contact), the possibility of functioning with the manual or automatic reset, the connection for eventually bottom of reset at distance, an apposite transparent cover of frontal protection and lateral screw terminals.

MODELS:

In basis of power supply there are three models:

- ELR-2-230: 100÷125Vca - 220÷240Vca - 380÷415Vca
- ELR-2-24: 24V ca/cc - 48V ca/cc
- ELR-2-110: 100-125V ca/cc

On request are available others power supplies.

ACCESSORIES AND OPTION

accessories: transparent cover of frontal protection

INSTALLATION

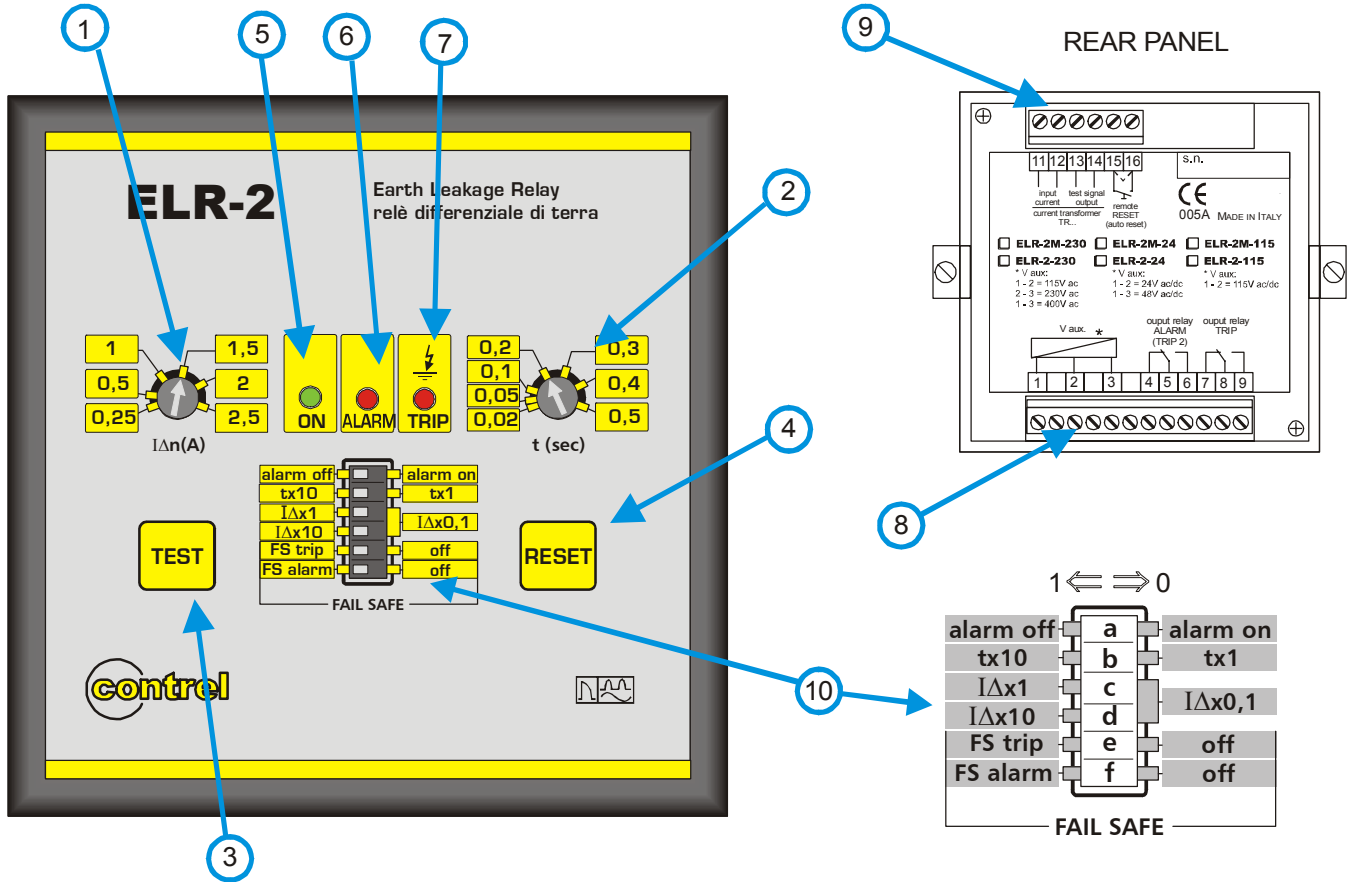
Only a qualified technician can do the installation. The instrument installation must be done in total absence of voltage. The instrument must be intact and it haven't damages caused of transport. The power supply must be compatible with the tool range. To fix the device at the panel, insert the two bracket into apposite button-holes in the side of the enclosure and to shut the screw. The transparent cover is fixed at the upper part at joint. To remove the cover it's necessary to act on the two hooks in a side of the frontal part of the instrument with a screwdriver.

The wire of connection between the relay and the toroidal current transformer must be twisted or shielded in presence of strong electromagnetic noises or considerable length. It's better to use a cable with a section of 1 mm² and a length lower than 30 meters. The toroidal current transformer must be connected at the terminals 1-2 (coil of measure) and the terminals 3-4 (coil of test) for the function of test.

The relay trip if the connection is interrupted (function of permanent control of the efficiency of the connection circuit). To test the device it's possible to use the bottom of TEST that caused the intervention of relay after the delay set.



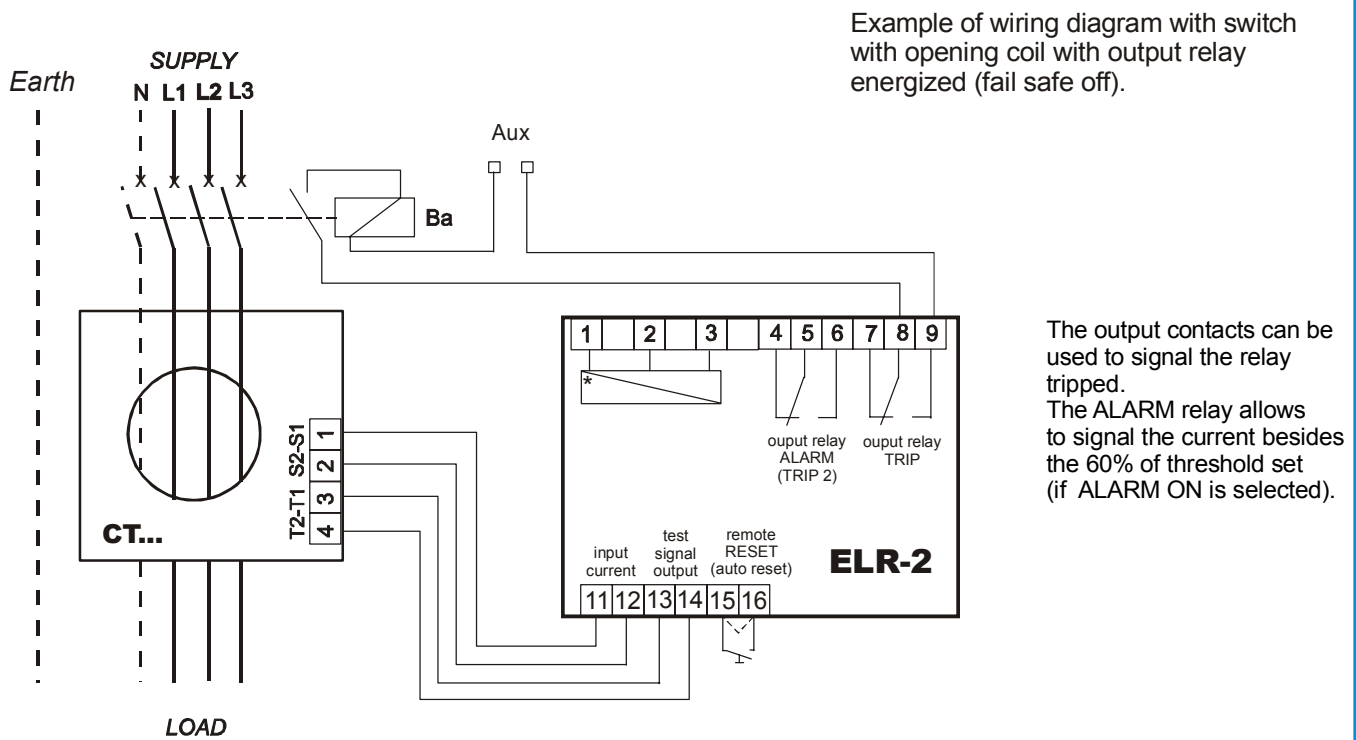
DESCRIPTION – PROGRAMMING



Legenda:

- 1) current tripping setting potentiometer
- 2) tripping time setting potentiometer
- 3) push button for test
- 4) push button for manual reset
- 5) signalling green LED for auxiliary supply presence
- 6) signalling yellow LED of alarm tripped
- 7) signalling red LED of relay tripped
- 8) screw terminals for the connection of the power supply and contacts of output relays
- 9) screw terminals for the connection at the toroidal current transformer and for the reset at distance or automatic
- 10) microswitches of programming:
 - a. selection of the activation alarm function
in position 1 the alarm function is disabled
in position 0 the alarm function is enabled
 - b. selection of the multiplying constant of tripping time
in position 1 $K=10$
in position 0 $K=1$
 - c,d selection of the multiplying constant of tripping current
with c,d in position 0 $K=0,1$
with c in position 1, d in position 0 $K=1$
with c,d in position 1 $K=10$
 - e selection of the type of functioning of the TRIP relay
in position 1 the relay is energized at rest (FAIL SAFE)
in position 0 the relay is de-energized at rest
 - f selection of the type of functioning of the ALARM relay
in position 1 the relay is energized at rest (FAIL SAFE)
in position 0 the relay is de-energized at rest

WIRING DIAGRAMS



Example of wiring diagram with switch with opening coil with output relay energized (fail safe off).

The output contacts can be used to signal the relay tripped. The ALARM relay allows to signal the current besides the 60% of threshold set (if ALARM ON is selected).

* power supply Vaux:

ELR-2-230

- terminals 1 - 2 = 100-125V ca
- terminals 2 - 3 = 220-240V ca
- terminals 1 - 3 = 380-415V ca

ELR2-115

- terminals 1 - 2 = 100-125V ca/cc

ELR-2-24

- terminals 1 - 2 = 24 V ca/cc
- terminals 1 - 3 = 48 V ca/cc

connection at toroidal current transformer:

- terminals 11-12 to connect at measure coil
- terminals 13-14 to connect at test coil

connection reset at distance or automatic reset:

- terminals 15-16 to connect at a external botton with contact normally open to realize the function of automatic reset, to short-circuit the terminals

connection contacts output relay:

- terminals 7-8-9 of TRIP relay the contact 7-8 is normally closed if FAIL-SAFE OFF is selected or without power supply with FAIL-SAFE TRIP ON the contact will be normally opened in condition of rest

- terminals 4-5-6 of ALARM relay (TRIP2) the contact 4-5 is normally closed if FAIL-SAFE OFF is selected or without power supply with FAIL-SAFE ALARM ON the contact will be normally opened in condition of rest

FUNCTIONALITY

When the device is installed and correctly supplied, its green LED will be on and the output relays commuted if the functions FAIL SAFE ON (relays normally energized) are selected. The eventual trip of relays can depend by an interruption of the toroid-relay circuit or by a presence of earth leakage current higher than the value set.

The function FAIL SAFE allows the commutation of output relay, besides at the normal intervention for the overcoming of the current threshold, also for damage of relay or for absence of power supply.

When the instrument switch on, the relays will commute (normally energized), after in the condition of trip or if the power supply is absent the relays come back de-energized.

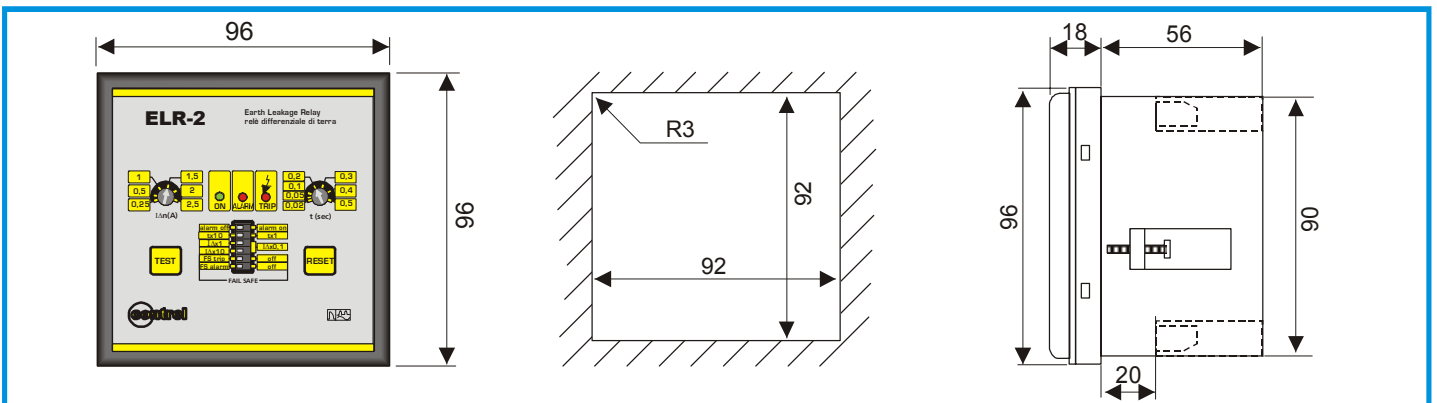
If the ALARM ON is set, the ALARM (TRIP2) output relay will commute when the current measured reach the 60% of the threshold set; in this way it's possible to have a signalling of increase of the earth leakage current, but not yet at the level to need the opening of the line under control. If the ALARM OFF is set, the two output relays will commute together, in the way to use a contact for the opening the switch jointed and the other for a signalling at distance of tripping relay.

To realize the automatic reset it's necessary to short-circuit the terminals 15-16, in the way that if the current measured descend under the level of the threshold set, the relay will rearm automatically. If after the trip the power supply disappears, the relay will rearm automatically. If it's impossible to rearm the relay depends by a current measured upper than the threshold or the connection between relay and toroidal current transformer is interrupted.

TECHNICAL FEATURES

Auxiliary power supply	ELR-2-230: 100÷125V 220÷240V 380-415V 50-60Hz ±10% ELR-2-115: 100÷125V cc/dc 50-60Hz ±10% ELR-2-24: 24 – 48V cc/dc 50-60Hz ±20%
Maximum consumption	4 VA
Current tripping adjustment range $I_{\Delta n}$	0,025 ÷ 0,25 A for K = 0,1 0,25 ÷ 2,5 A for K = 1 2,5 ÷ 25 A for K = 10
Tripping time adjustment range t	0,02 ÷ 0,5 sec. for K =1 0,2 ÷ 5 sec. for K =10
Signalling	led ON, led ALARM, led TRIP
Alarm tripping	60% of threshold tripping $I_{\Delta n}$ (disabling)
External toroidal current transformer and accessories	TR... serie
Output relay: voltage free contacts	2 changeover contacts NO-C-NC 5 A 250V resistive load
Functions programmable	function alarm output, function fail safe for both outputs, automatic (external reset) or manual reset
Working temperature	-10 ÷ 60°C
Storing temperature	-20 ÷ 70°C
Relative humidity	≤ 90 %
Insulation test	2,5 kV 60 sec.
Position of mounting	Indifferent
Type of connection	Extractible terminal with screws, section wires max 2,5 mm ²
Protection degree	IP 52 front with cover (IP40 without cover) - IP 20 enclosure
Mounting DIN 43700	Flush mounting DIN 96x96mm, depth 56mm
Standards	CEI 41-1 IEC 255 VDE 0664 IEC755 CEI 64.8 EN 61008-1 (1999-11); EN 62020 (1999-09); EN 61543 (1996-09); EN61326-1 (1998-04);EN 61326/A1 (1999-05)
Electromagnetic compatibility	CEI-EN 50081-1 CEI-EN 50082-2

DIMENSIONS



Contact the technical assistance or refer at specific document for applications don't described in this manual.

NOTE

At reason of the evolution of standards and products, the company reserves to modify in every time the features of the product described in this document, that it's necessary to verify preventively.

The liability of the producer for damage caused by defect of the product "can be reduced or deleted (...) when the damage is caused joint by a defect of product or for blame of the damaged or a person of which the damaged is responsible" (Article 8, 85/374/CEE).

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