

PROTECTION  
AND CONTROL

# ELR-3BN



## TYPE B

Residual current  
monitoring and  
protection relay in  
accordance with  
current standards

# Why use type B residual current protection?

The earth leakage relay **ELR-3BN** provides earth fault protection for all types of AC/DC installations including power distribution, sub-distribution and industrial control systems. Type B protection ensures the safety of people from alternating current (AC), direct current (DC) or mixed current (AC / DC). Type A, AC and F residual current devices don't detect DC residual currents, which are common in electric vehicle charging points, photovoltaic systems, variable speed drives, data centers, UPS, etc.

The earth leakage relay **ELR-3BN** is installed in the front of electrical panels and cabinets and provides valuable assistance for the maintenance of electrical systems.

The **ELR-3BN** relay complies with the IEC/EN 60947-2 Annex M standard.



**Type AC protection**  
Sinusoidal alternating current



**Type A protection**  
Sinusoidal alternating current  
Pulsating alternating current



**Type B protection**  
Sinusoidal alternating current  
Pulsating alternating current  
Direct current

## Residual Current Monitor (RCM)

In addition to the protection of people, the safety of plants and their operation is becoming increasingly important. Differential currents, in monitored systems, can already be detected before the intervention of the protection device.

The differential relay ELR-3BN monitors the differential currents in electrical systems and signals when they exceed a certain value (Residual Current Monitor (RCM)).

RCMs enable the plant operator to recognize faults and to rectify them before a sudden shutdown occurs.

## Residual Current Device (RCD)

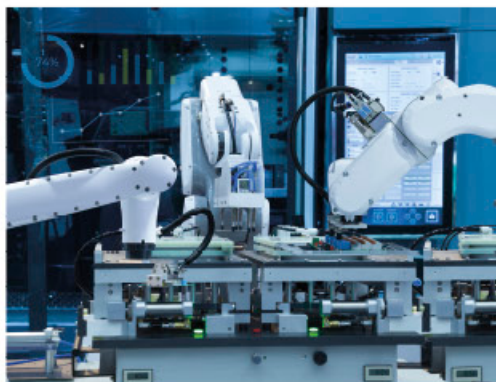
The ELR-3BN residual current relay monitors the differential currents in electrical systems and allows the main switch to be opened, via a shunt coil or undervoltage coil, if the set value is exceeded (Residual Current Monitor (RCM)).

A pre-alarm threshold can be set in the device menu. Compliant with standard EN 60947-2 (attachment M) it allows protection from direct and indirect contacts and from fire risks even if installed subsequently for extensions and adaptations of the system.

# Loads and applications with type B requirement

## ■ AC/DC CONVERTERS

These devices can be found in battery chargers, machine tools, lifts for tall buildings, railway traction, inverter-powered cranes, electric welding machines.



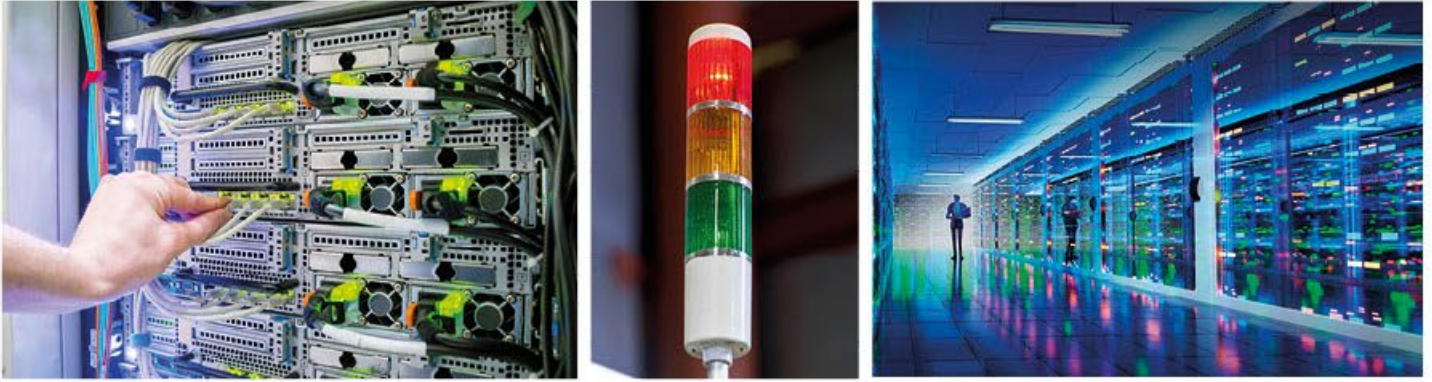
## ■ ELECTROMEDICAL DEVICES

Where there are DC powered devices from an AC/DC converter internal to the device (X-ray devices, magnetic resonance, computed tomography, ...).



## ■ UPS STATIC GROUPS

The most typical applications are hospitals, telecommunications systems, data centers and electronic calculators, alarm and security systems and machine tools.



## ■ PHOTOVOLTAIC INSTALLATIONS



## ■ FREQUENCY CONVERTERS

Where the earth fault current can be high frequency or with a high harmonic contribution. Frequency converters (inverters) are increasingly used for motor regulation due to energy savings, noise reduction and mechanical wear.

The main fields of application of motors with inverters are in pumping systems, in air treatment systems and in industrial processes in general.



## ■ ELECTRIC VEHICLE CHARGING POINTS



## ■ THE MAIN FEATURES OF THE EARTH LEAKAGE RELAY ELR-3BN ARE:

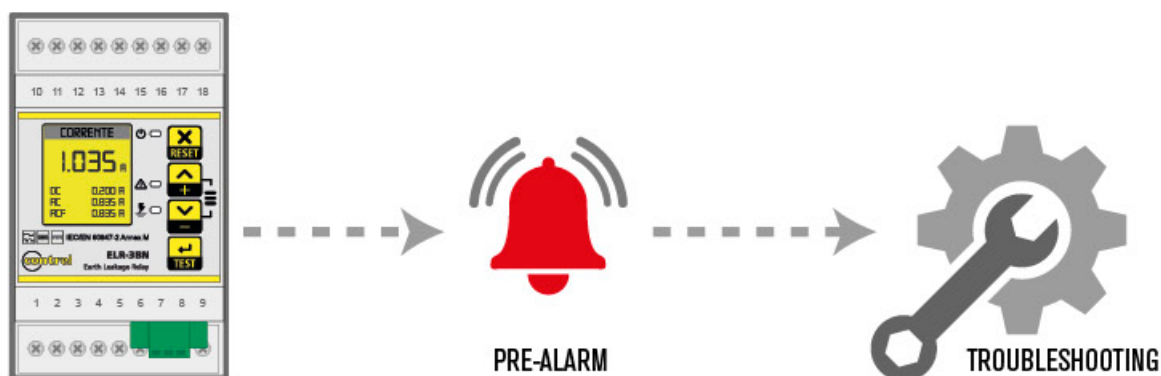
- Provides earth fault protection function with two separate adjustable thresholds (TRIP and alarm), with adjustable delays
- Measures (TRMS) the residual current value, the value of the alternating (AC) and direct (DC) component according to the standard IEC/EN 60947-2 annex M
- View the measured value via a multifunction LCD display (it changes color according to the system status)
- Indicates alarms via LEDs (TRIP and ALARM) and changeover contacts
- Provides password protection against unauthorized parameter changes
- Residual current peak values
- Total harmonic distortion (THD) and harmonic analysis
- Stores in the memory the earth leakage current value measured for the ALARM and TRIP events detected
- Provides a self-test to monitor the toroid connection
- RS485 communication port (Modbus-RTU communication protocol)

## ■ VERSATILITY

The wide sensitivity range, from **30 mA** to **10 A**, and selectable delays, from **0.02 s** up to **10 s**, allow the **ELR-3BN** to be used anywhere in the installation.

## ■ PREVENTIVE MAINTENANCE

The **ELR-3BN** has alarm via display and relay output. It can be useful for preventive maintenance, anticipating the shutdown of the installation, facilitating troubleshooting.



## ■ COMMUNICATIONS

**RS485** communication (Modbus-RTU protocol), for integration into **SCADA** systems, facilitating the monitoring, event logging and remote control offered by the relay and inputs.

## ■ FRONT PANEL ADAPTER ACCESSORY

The 72x72mm front adapter accessory is used to install the device on a panel. All connections must remain inside the electrical board. The front adapter accessory has a frame, two tabs and screws



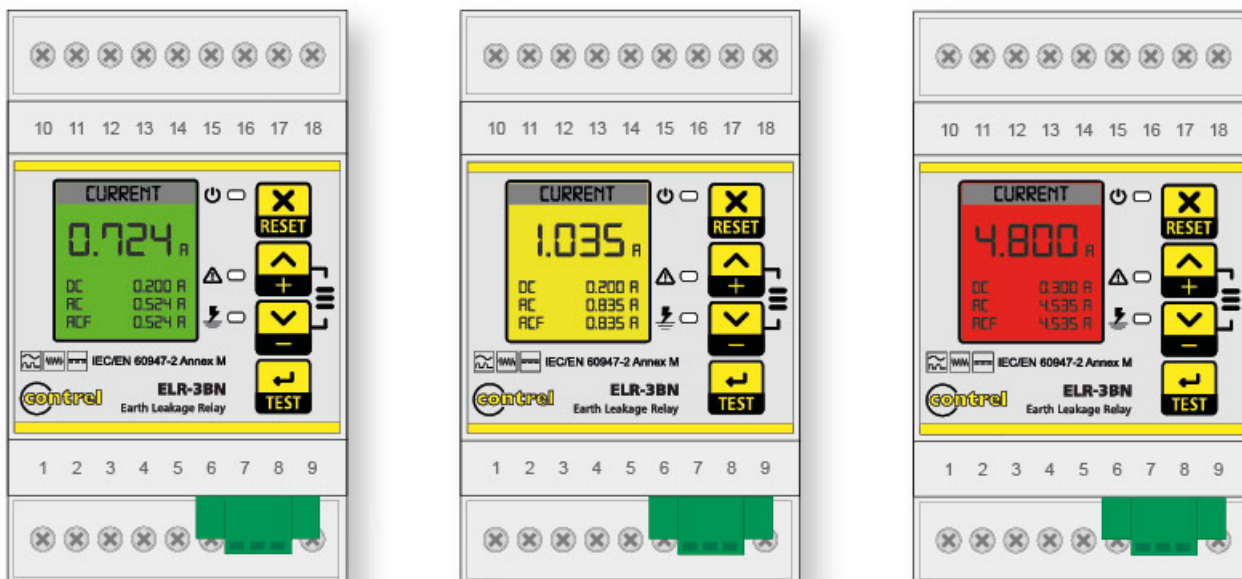
**3EDA03**

Adapter for flush  
mounting 72x72 mm

## REAL-TIME DISPLAY AND MONITORING

The LCD display, together with **RS-485 (Modbus RTU)** communication, allows for real-time leakage follow-up and monitoring. The display turns yellow when the residual current value exceeds the alarm threshold, turns red when it trips, saving the tripping current value and the AC and DC components detected.

The display will always show the alternating (AC) and direct (DC) components. This makes it easier to detect and find the source of the problem.

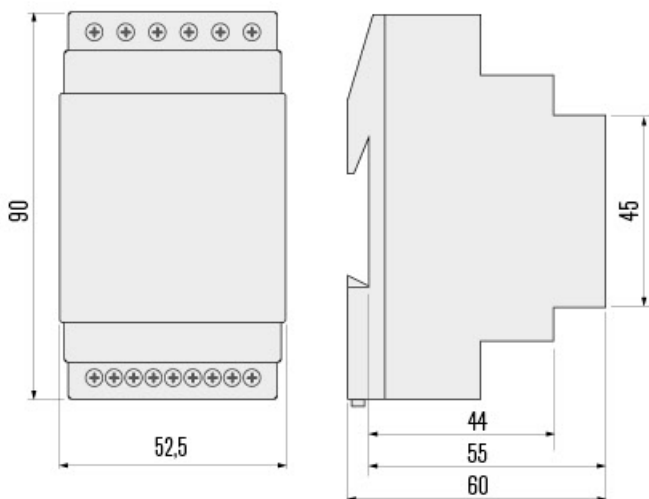


 REGULAR

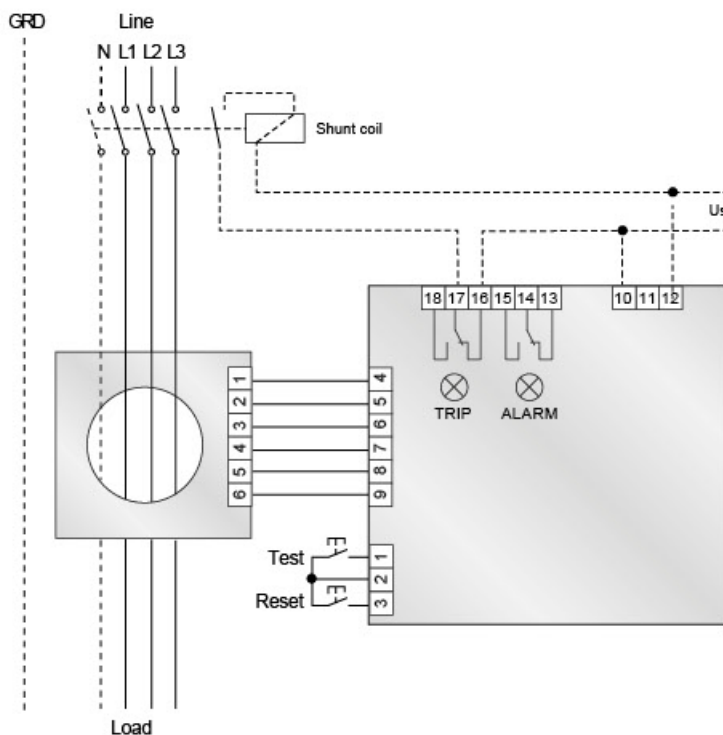
 PRE-ALARM

 TRIP

## MECHANICAL DIMENSIONS (mm)



## WIRING CONNECTION



## ■ TECHNICAL CHARACTERISTICS

<b>CONTROL CIRCUIT</b>	
Toroidal transformer	External, CTB-2 series
Tripping type	Type B
Tripping set-point (I $\Delta$ )	0,03+10A
Tripping time (t)	0,02+10s
Resetting	Manual by pushbutton on front or remote
<b>AUXILIARY SUPPLY</b>	
Auxiliary voltage	85+250 VAC
	120+350 VDC
	24+48 VAC/DC (optional)
Rated frequency	50/60Hz
Max power consumption	4VA
<b>OUTPUT RELAY</b>	
Number of outputs	2
State	Configurable normally de-energised or energised
Rated operating voltage	250 VAC
Rated current	5A
Mechanical life	10 · 10 <sup>6</sup> cycles
<b>DIGITAL INPUTS</b>	
Number of inputs	2 (TEST and RESET)
Input type	Free contact
<b>DISPLAY</b>	
Type	LCD
<b>RS485 serial interface (optional)</b>	
Protocol	Modbus-RTU
Baud-rate	Programmable 4800 – 115200 bps
<b>CONNECTIONS</b>	
Type of terminal	Screw (fixed)
Number of terminals	18
Conductor cross section	0,127 - 2,082 mm <sup>2</sup>
Tightening torque	0.5 - 0.6 Nm
Length of cable to strip	7mm
<b>AMBIENT OPERATING CONDITIONS</b>	
Operating temperature	-10+60°C
Storage temperature	-20+80°C
Relative humidity	5+95%
<b>HOUSING</b>	
Version	3 moduli DIN
Degree of protection	IP20 terminals
	IP40 on front
Weight	200g
<b>CERTIFICATIONS AND COMPLIANCE</b>	
Reference standards	2014/35/UE,2014/30/UE,2015/863/UE
	EN 61326-1:2013-01
	EN 61326-2-1:2013-01
	EN 61326-2-2:2013-01
	EN 61326-2-3:2013-01
	EN 61326-2-4:2013-01
	EN 61326-2-5:2013-01
	EN 60947-2:2017-10 (Annex M)
	EN 61543/A2:2006-02
	CEI EN 61543/A11
	CEI EN 61543/A12

The residual current transformers of the **CTB-2** range are especially designed to protect and monitor Type-B loads (**IEC 60755**) and are suitable for measuring AC, DC and pulsating leakage currents. The range of **CTB-2** differential transformers is designed for use with the **ELR-3BN** electronic relays, which give it the associated trip current (sensitivity).

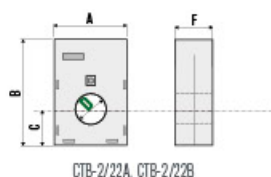


Type	Code	Useful section Ø (mm)	Weight (g)
<b>CTB-2/22A</b>	<b>3CTB200A</b>	22	110
<b>CTB-2/22B</b>	<b>3CTB200B</b>	22	110
<b>CTB-2/35</b>	<b>3CTB201</b>	35	255
<b>CTB-2/60</b>	<b>3CTB202</b>	60	360
<b>CTB-2/80</b>	<b>3CTB203</b>	80	550
<b>CTB-2/110</b>	<b>3CTB204</b>	110	610
<b>CTB-2/160A</b>	<b>3CTB205A</b>	160	760
<b>CTB-2/160B</b>	<b>3CTB205B</b>	160	760
<b>CTB-2/210</b>	<b>3CTB206</b>	210	950

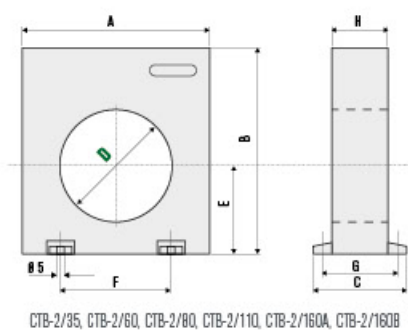
## ■ TOROIDAL CURRENT TRANSFORMER TYPE ACCORDING TO CURRENT

Current	Toroidal transformer	Note
30 mA	<b>CTB-2/22A, CTB-2/22B, CTB-2/35, CTB-2/60</b>	Versions of CTB-2 with special sensitivity level are available.
>= 100 mA	<b>CTB-2/80, CTB-2/110</b>	
>= 500 mA	<b>CTB-2/160A, CTB-2/160B, CTB-2/210</b>	

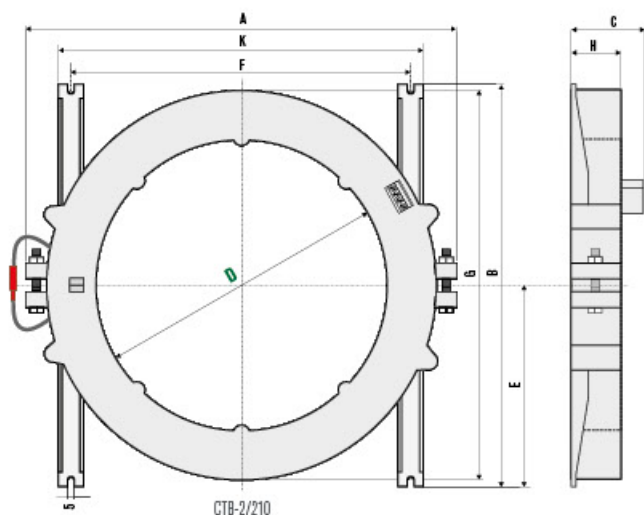
## ■ MECHANICAL DIMENSIONS (mm)



Type	A	B	C	D	E	F	-	-	-
<b>CTB-2/22A</b>	52	65	26	<b>22</b>	27	60	-	-	-
<b>CTB-2/22B</b>	52	65	26	<b>22</b>	27	60	-	-	-



Type	A	B	C	D	E	F	G	H	-
<b>CTB-2/35</b>	100	110	50	<b>35</b>	47	60	43	30	-
<b>CTB-2/60</b>	100	110	50	<b>60</b>	47	60	43	30	-
<b>CTB-2/80</b>	150	160	50	<b>80</b>	70	110	43	30	-
<b>CTB-2/110</b>	150	160	50	<b>110</b>	70	110	43	30	-
<b>CTB-2/160A</b>	220	236	64	<b>160</b>	110	156	50	34	-
<b>CTB-2/160B</b>	220	236	64	<b>160</b>	110	156	50	34	-



Type	A	B	C	D	E	F	G	H	K
<b>CTB-2/210</b>	310	290	54	<b>210</b>	145	240	280	36	258



**More than 45 years of experience and constant evolution are the best guarantee for our customers.**

Since 1975 Contrel has distinguished itself for the design, production and marketing of instruments for industrial electronic protection, for the measurement and control of energy consumption, as well as in insulation monitoring systems and alarm systems.

**We provide solutions to all electricity generation processes.**

Wide range of products, divided into 5 families, which offer solutions to any process of generation, transmission or consumption of electricity in the industrial, tertiary and domestic sectors.



**CONTREL elettronica s.r.l.**

Via San Fereolo 9, 26900 LODI

Tel. +39 0371 30207

[www.contrel.it](http://www.contrel.it)

