



ELRB-03

Earth Leakage Relay (Type B) and Residual Current Sensors

Data Sheet/Technical Information English

Issue 1 – 08/2026

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1. Key Features

- ❑ **Type B operating characteristics for the detection of smooth DC, pulsating DC and AC residual currents**
- ❑ **Five adjustable trip levels from 0.1 A to 3 A**
- ❑ **Ten adjustable non-operating time-delay settings from 0.1 to 10 seconds**
- ❑ **Used with separate SEN-070 or SEN-120 residual current sensors**
- ❑ **Sensor connection monitoring**
- ❑ **Remote Test/Reset facility**
- ❑ **Standard and positive-safety relay outputs**
- ❑ **Wide auxiliary supply range: 24–230 V AC/DC**
- ❑ **LED indication of supply, residual current level and trip status**
- ❑ **Designed and tested in accordance with IEC 60947-2, Annex M**

2. Overview

The ELRB-03 is a Type B Earth Leakage Relay designed to detect AC, pulsating DC and smooth DC residual currents in applications where power electronic equipment may be present. Typical applications include photovoltaic installations, EV charging equipment, uninterruptible power supplies and variable speed drives, where conventional Type A or Type AC earth leakage protection may not detect every form of residual current.

The relay operates with a dedicated SEN-070 or SEN-120 residual current sensor and provides adjustable trip levels from 0.1 A to 3 A, together with a selectable non-operating time delay. Front-panel LED indication shows the supply status, prevailing residual current level and trip condition, while integral monitoring detects a loss of connection to the sensor.

Two output relays provide both standard and positive-safety operating functions, allowing the ELRB-03 to control external devices such as contactors, shunt trips or undervoltage releases. A combined local and remote Test/Reset facility supports commissioning, periodic testing and fault reset.

ELRB-03 Earth Leakage Relay (Type B)

3. Function Diagram

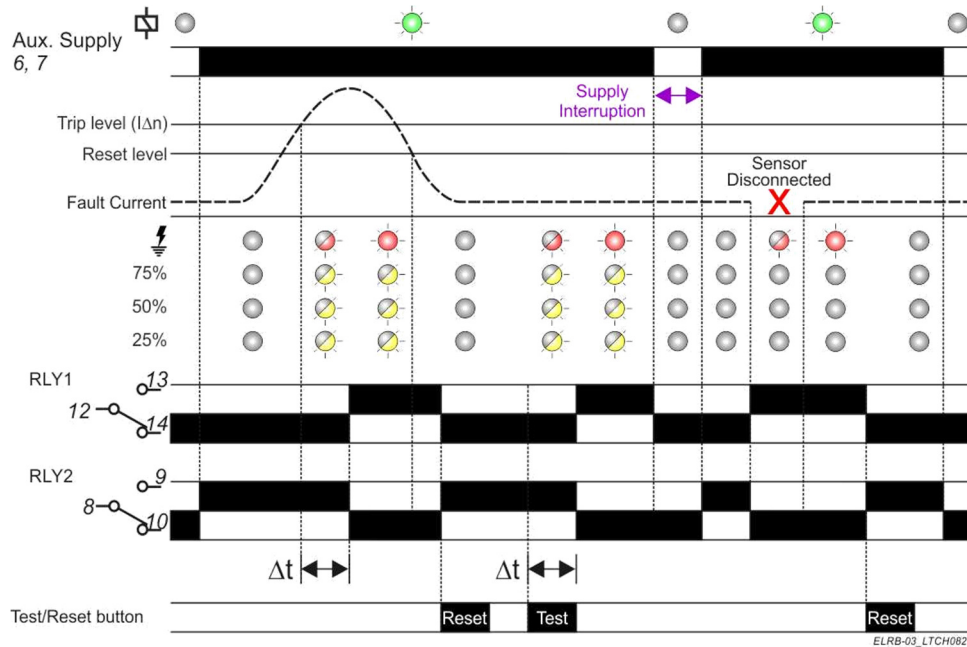


Figure 1

LED legend

 Off
  On
  Flashing

4. LED & Relay Status

System status	Green LED	Yellow LEDs	Red LED	RLY 1 (S.O.)*	RLY 2 (P.S.O.)*
Normal operation ($I_{\Delta} = 0$)	On	Off	Off	DE-EN	EN
Fault condition during Δt ($I_{\Delta} > I_{\Delta n}$)	On	Flashing	Flashing	DE-EN	EN
Fault condition after Δt ($I_{\Delta} > I_{\Delta n}$) [1]	On	Off	On	EN	DE-EN
"Reset" button pressed ($I_{\Delta} = 0$) [1]	On	Off	Off	DE-EN	EN
"Test" button pressed ($I_{\Delta} = 0$) [1]	On	Off	On	EN	DE-EN
Sensor disconnected/short circuit	On	Off	Flashing	EN	DE-EN
Sensor re-connected	On	Off	On	EN	DE-EN

* Factory default assignment of relays
 [1] Assumes fault current removed

Key to relay abbreviations:
 EN = Relay Energised
 DE-EN = Relay De-Energised

5. Installation

- BEFORE INSTALLATION, **ENSURE ALL SUPPLIES ARE ISOLATED.**
- Connect the unit as shown on page 10.
- Ensure the Auxiliary supply voltage to be connected to terminals 6 and 7 matches the rating of the product.
- A suitably rated fuse should be installed in series with connection to terminal 6 (A1) to protect the unit. See [Technical specification](#) for further information.
- Refer to section 12 for additional information on correct installation practices for the sensors.



Installation work must be carried out by qualified personnel.

6. Calibration

It is necessary to carry out a calibration procedure on the ELR along with the external sensor to be used in the application. Calibration will be carried out automatically on first power up and the **ELR cannot be used until calibration has been done**. The calibration procedure is as follows:

IMPORTANT - Ensure that no residual current is present during this procedure.

- Apply power and the green “supply on” LED ③ will illuminate.
- The “25%” and “75%” LEDs in the bargraph ⑤ will flash alternately, indicating calibration is required.
- Press and hold the front panel Test/Reset button ⑥ for five seconds.
- The red “tripped” LED ④ will now remain lit, while the “25%”, “50%” and “75%” bargraph LEDs light in sequence.
- When calibration is completed (after about 3 seconds), the bargraph LEDs remain lit.
- Press the Test/Reset button once to save the calibration data and reboot the ELR.
- The unit is now ready for use.

In most cases, the ELR will only need to be calibrated once, on initial installation. If re-calibration is required, e.g. if the sensor is changed, the user must first put the unit into Test mode by pressing the Test/Reset button once in the usual way; then continue from step 3 above.

7. Front Panel Description

- | | | |
|---------------------------------------|------------------------------------|-------------------------------------|
| 1. $I_{\Delta n}$ Trip level selector | 3. Power on LED indication (Green) | 5. Bargraph LED indication (Yellow) |
| 2. Δt Time delay selector | 4. “Tripped” LED indication (Red) | 6. Combined “Test/Reset” button |

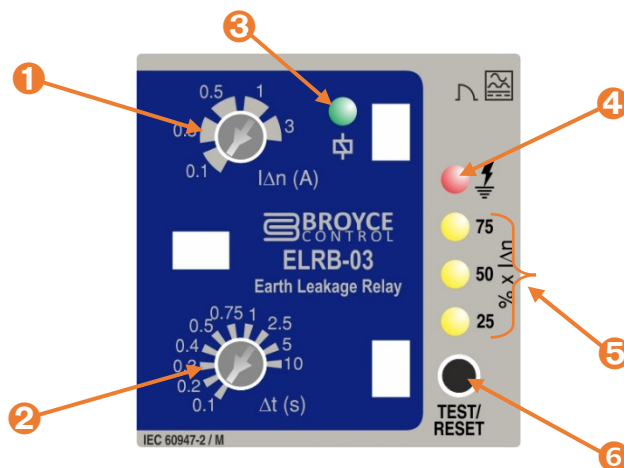


Figure 2

8. Normal Operation

Note that the calibration procedure in section 6 must be carried out first before proceeding with the following.

Applying Power.

- Apply power and the green “supply on” LED ③ will illuminate, and the “positive safety output” (RLY2) relay energise.
- The positive safety output relay will de-energise if:
 - a, the fault current level exceeds the set trip level ($I\Delta n$) **
 - b, there is a failure of the connection between the relay and the sensor ** (Note the red “tripped” LED ④ will flash during this condition)
 - c, the supply to the unit is removed
- ** causes the “standard output” relay (RLY1) to energise in response to the fault condition.
- Prior to the unit tripping, the LED bargraph ⑤ will indicate the % of $I\Delta n$ being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LEDs have illuminated and the unit trips due to an excessive fault current, the red “tripped” LED ④ will illuminate.
- After the fault has cleared, the unit will remain in the latched state.

Fault simulation (Test mode).

- The unit can be placed into a fault condition by pressing the “Test/Reset” button ⑥ on the front of the unit (or by pressing the remote button - if fitted). The output relays operate accordingly. *Note, if the time delay (Δt) is set, the “Test” button must be held for this duration before tripping occurs.*
- Press the same “Test/Reset” button on the front of the unit (or remote button - if fitted) to reset the unit. The output relays revert to their “non-tripped” state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting.

- If the unit fails to operate correctly check that all wiring and connections are good. Also check that the externally connected sensor meets the requirements of the product.

Note:

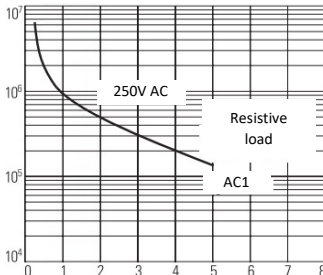
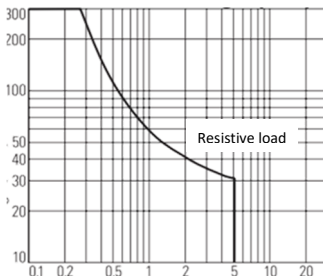
The operating function of this unit is classed as a **Type B**  for which tripping is ensured for residual direct currents, sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping . This unit will also satisfy the requirements for **Type A and AC** devices which only need to detect residual alternating currents.

9. Technical Specification

9.1 Earth Leakage Relay

Auxiliary Power Supply (6, 7)			
Voltage rating (Us):		24 - 230V AC/DC	
1.25A (T) rated fuse should be installed in line with terminal A1			
Frequency range (AC supply):		50/60Hz	
Supply variation:		85 - 115% of Us	
Auxiliary supply is galvanically isolated from the Sensor and Remote Test/Reset connections			
Overvoltage category:		III (IEC 60664)	
Rated impulse withstand voltage:		4kV (1.2/50μS) IEC 60664	
Power consumption (max.):		AC: 6VA, DC: 5W	
Monitored input (via external Sensor connected to terminals 3 and 4)			
Unit classification:		Type B	
Measurement principle:		True R.M.S.	
Frequency range:		DC – 1000Hz	
Monitored leakage current range:		Up to 3A	
User adjustments			
Trip level settings (IΔn):		0.1A, 0.3A, 0.5A, 1A, 3A	
Actual trip level:		85% of IΔn (+/- 5%)	
Rated residual non-operating current (IΔno):		<80% of IΔn	
Reset level:		≈ 85% tripped level	
Time delay (Non-operate) settings (Δt) ¹ :		0.1s, 0.2s, 0.3s, 0.4s, 0.5s, 0.75s, 1s, 2.5s, 5s, 10s	
Note: ¹ Adjustment of these settings should be made to suit the requirements of the installation. To prevent tampering of the settings, the clear window can be secured in place using a 2mm or 2.5mm wide cable tie (not supplied).			
Reset time:		<1s (from supply interruption)	
LED indication (refer also to LED status table on page 4)			
Power Supply		Green x1	
Bargraph (25%, 50%, 75%)		Yellow x3	
Tripped		Red x1	LED flashes if the external sensor is disconnected.
Manual Test and Reset			
		Front push button	Remote N.O. push button
“Test” method: (assuming unit is in the non-tripped state)		Press and hold for >Δt to trip the unit	Press button to trip the unit (connected to terminals 1 and 2)
“Reset” method: (assuming unit is in the tripped state and fault current cleared)		Press once to reset the unit	Press same above button to reset the unit
Minimum trigger time:		>Δt	>80ms + Δt setting

ELRB-03 Earth Leakage Relay (Type B)

Relay operation		
	RLY1	RLY2
Key (assuming non-tripped state): S.O. = Standard Output (relay is normally de-energised) P.S.O. = Positive Safety Output (relay is normally energised)	S.O.	P.S.O.
Temperature rating		
Operating:	-20 to +60°C	
Storage:	-30 to +70°C	
Relative humidity:	95% max.	
Output		
	Relay 1 (RLY1)	Relay 2 (RLY2)
Terminals:	12, 13, 14	8, 9, 10
Contact arrangement:	1 x SPDT	1 x SPDT
AC1 (250V)	5A (1250VA)	5A (1250VA)
AC15 (250V)	2.5A	2.5A
DC1 (25V)	5A (125W)	5A (125W)
Electrical life:		
DC load capacity:		
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µs) IEC 60664	
Housing		
Material:	Grey flame-retardant Lexan UL94 V0	
Weight:	120g approx.	
Mounting:	On to 35mm symmetric DIN rail to BS EN 60715	
Terminal conductor size		
Cable type:	Solid or stranded	
Nominal cross section:		
	0.2 – 4mm ²	0.2 – 2.5mm ²
	30 – 12AWG	30 – 14AWG
Stripping length:	6mm ±1mm	
Tightening torque:	0.4 Nm	

ELRB-03 Earth Leakage Relay (Type B)

Standards	
Product:	IEC 60947-2/Annex M, IEC 60755, IEC 62020
EMC:	IEC 61543, IEC 61000-4 Series
General Compliance:	CE, UKCA and RoHS Compliant. RCM mark (Australia and New Zealand)

9.2 Residual Current Sensors

Sensor options			
Part number:	Aperture type	Internal diameter/size:	IΔn (min.) A
SEN-070	○	70mm Ø	0.1
SEN-120	○	120mm Ø	0.1
Electrical ratings			
Rated system voltage:	720V AC		
Insulation level:	3kV AC		
Current ratio:	1/500		
Rated operational current (Ie):	SEN-070	SEN-120	
	160A (95mm ²)	250A (240mm ²)	
Max. cross-section/phase cable size shown in brackets and assumes 3P + N copper cables			
Standards			
General Compliance:	CE, UKCA and RoHS Compliant		
Housing			
Material:	Grey ABS		
Weight:	SEN-070	SEN-120	
	135g	265g	
Mounting:	Surface mount only using fixing slots provided		
Terminal conductor size			
Cable type:	Solid or stranded		
Nominal cross section:			
	0.2 – 2.5mm ²	0.2 – 2.5mm ²	
	30 – 14AWG	30 – 14AWG	
Stripping length:	6mm ±1mm		
Tightening torque:	0.4 Nm		

10. Connection Diagram

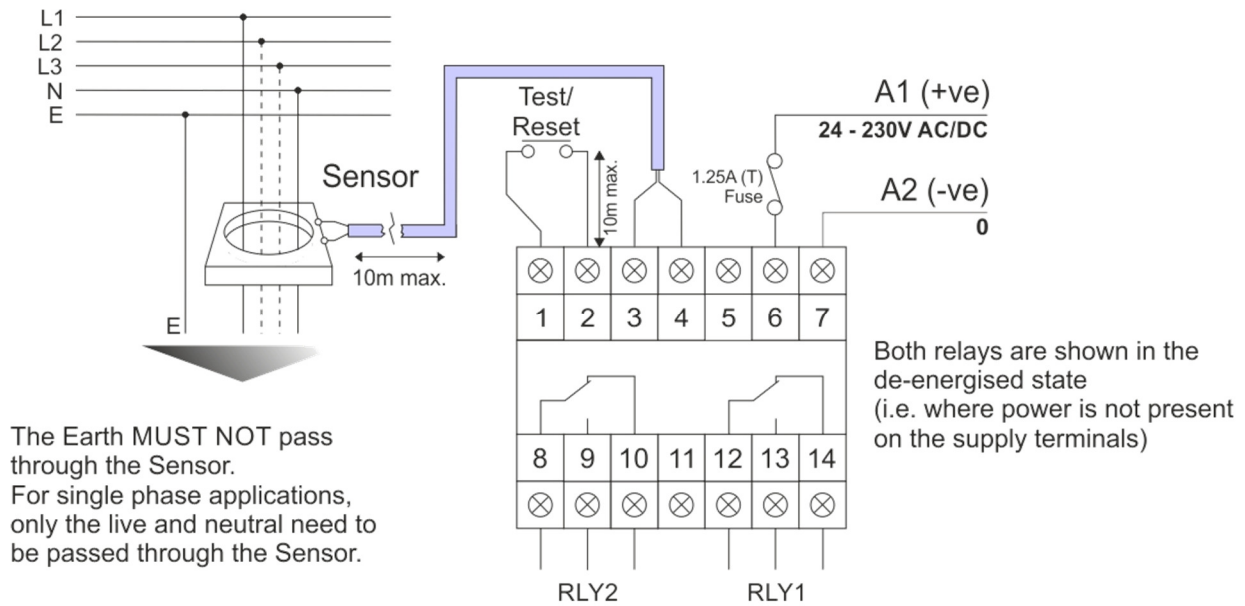


Figure 3

11. Dimensions

11.1 Earth Leakage Relay

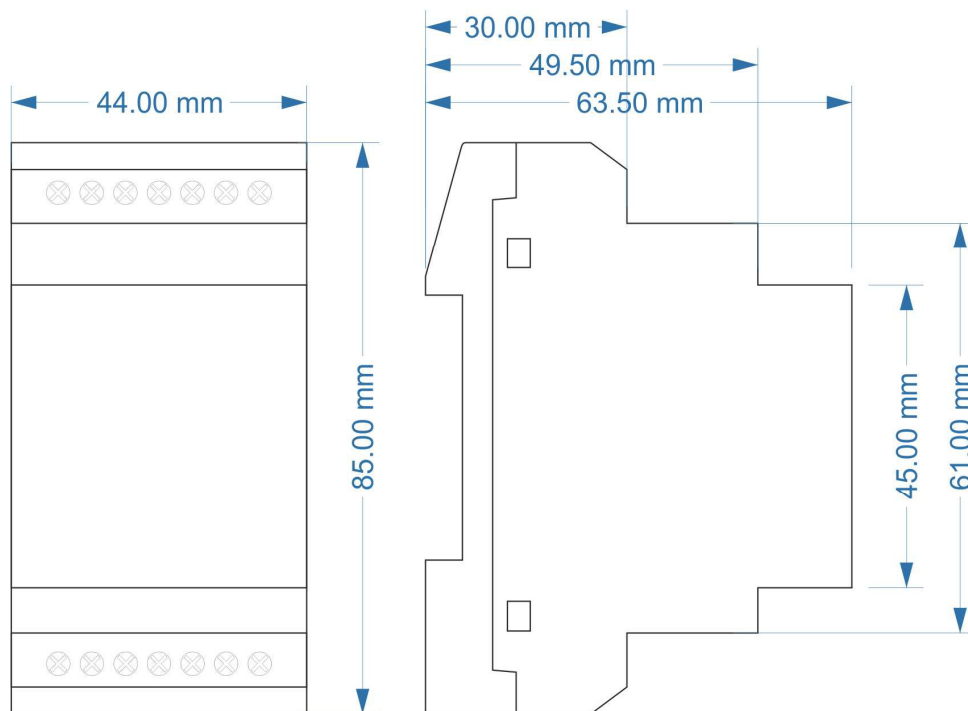


Figure 4

11.2 Residual Current Sensors

SEN-070

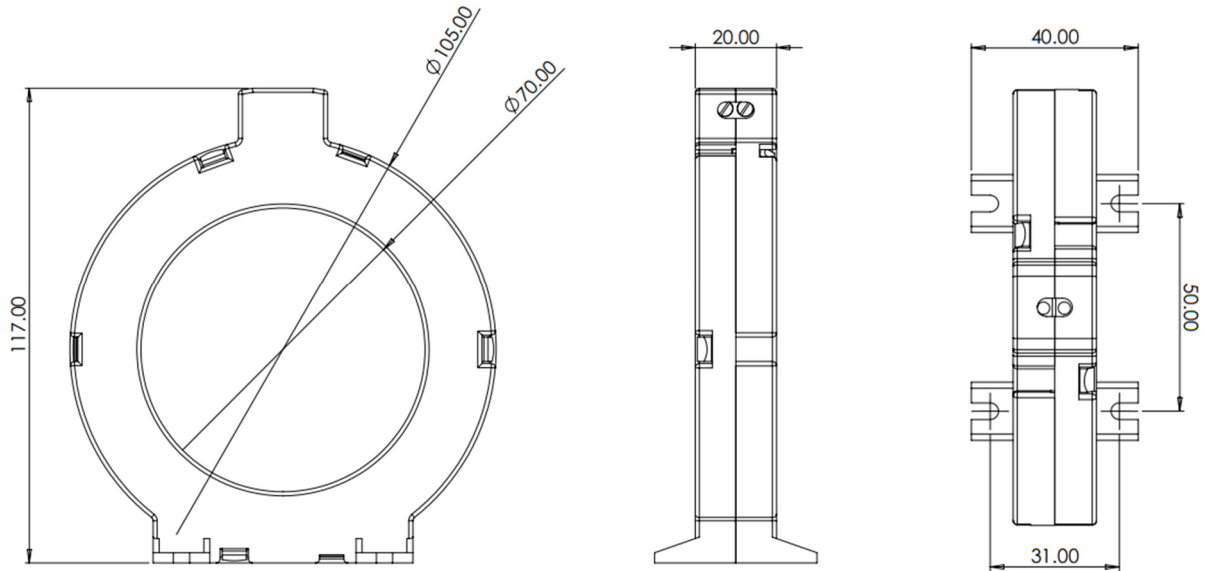


Figure 5

SEN-120

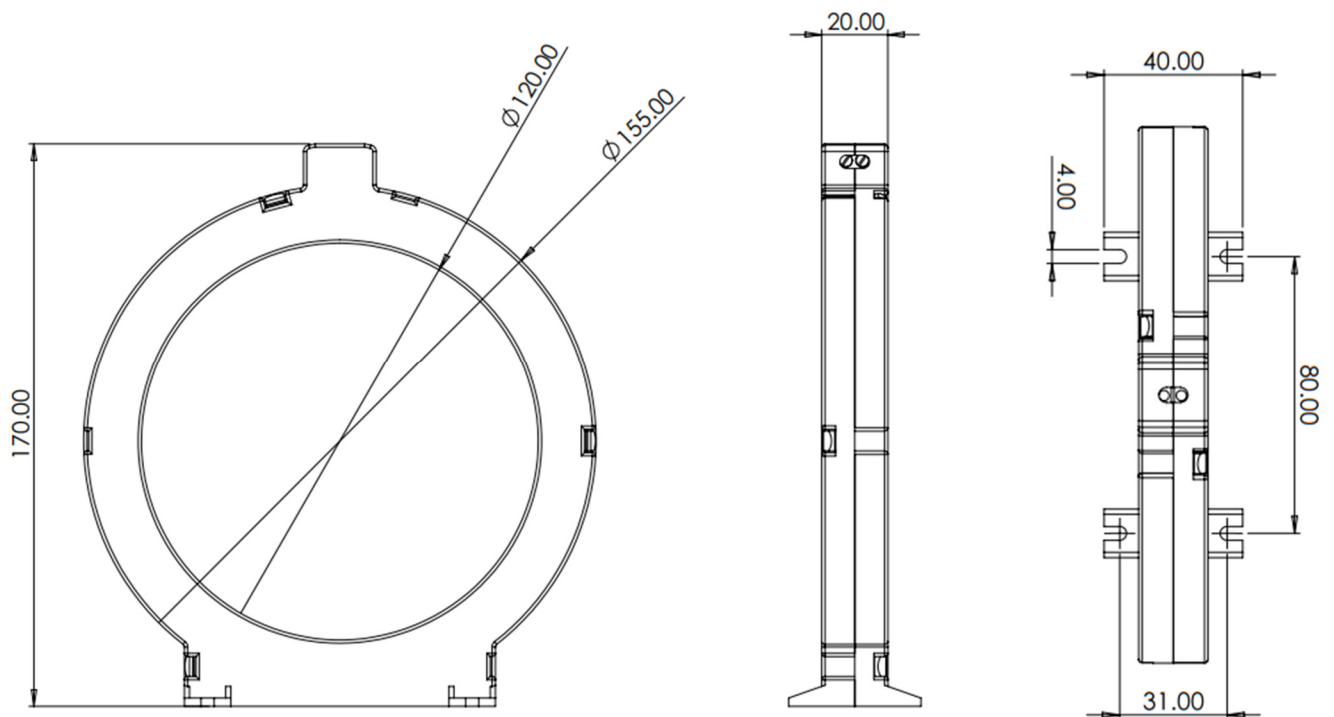


Figure 6

12. Sensor Installation

Correct installation of the earth leakage relay and residual current sensor will help ensure reliable operation. Follow the instructions below.

Always ensure the Earth conductor DOES NOT pass through the sensor. If this is unavoidable, the Earth must be routed back through the sensor again and around, as shown in Figure 7.

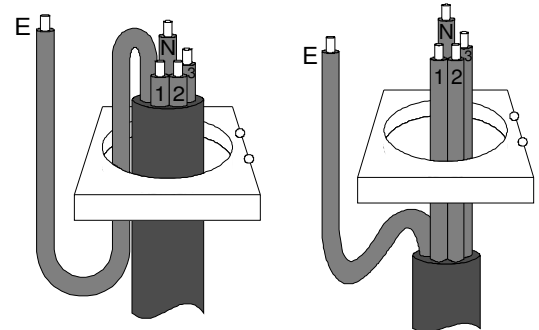


Figure 7

DO NOT pass individual conductors through separate sensor's as shown in Figure 8.

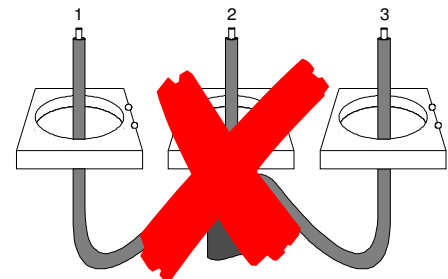


Figure 8

Ensure the cable is central in the sensor (see Figure 9).

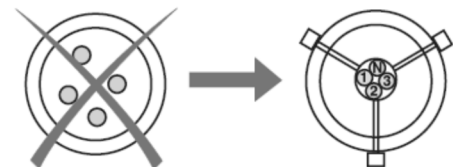


Figure 9

As a rule, select a sensor that has an inside diameter which is twice that or greater than the outside diameter of the cable(s) to be passed through (see Figure 10).

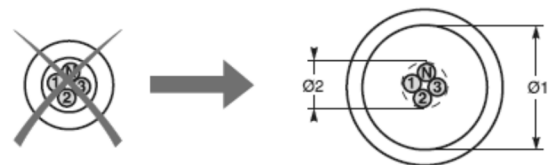


Figure 10

Place the sensor on a straight section of cable, not near a bend (Figure 11).

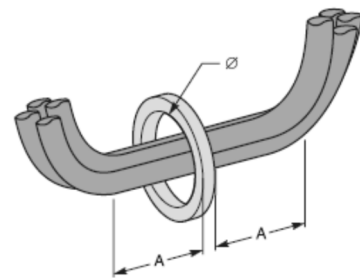


Figure 11

Keep the cable and sensor away from intense magnetic fields from nearby equipment.

13. Ordering Information

Part number to be specified when ordering.

Part Number	Part Description
99-1301	ELRB-03 (0.1 – 3A) 24-230VAC/DC

Accessories - Sensor's

Part Number	Part Description
99-1920	SEN-070
99-1921	SEN-120



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