



earth leakage relays

- Type A – Variable Sensitivity / Time Delay
- Type A – Fixed Sensitivity / Time Delay
- Type A – with Integral Toroid
- BZCT Circular Toroids
- BZCTR Rectangular Toroids

**select your
product.**

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Type: ELRM44V-3/10/30

Earth Leakage Relay (Variable) - Type A

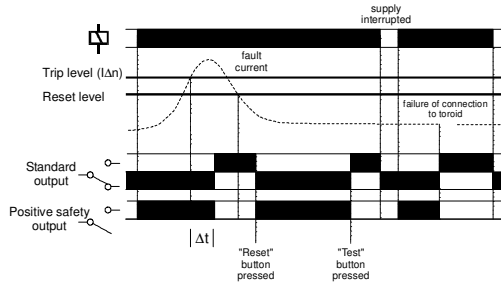
- 44mm (2.5 modules) wide DIN rail housing
- 3 models available (3A, 10A or 30A)
- Designed to monitor and detect true RMS earth fault currents in conjunction with a separate toroid
- LED bargraph provides constant indication of any leakage current
- Microprocessor controlled with internal monitoring (self-checking)
- Adjustable Sensitivity ($I_{\Delta n}$) and Time Delay (Δt) - 0 (instantaneous)* to 10 seconds
- Separate "Test" and "Reset" push buttons
- Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts
- Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)
- 2 Relay outputs - Standard Output (S.O.) and Positive Safety Output (P.S.O.)
- LED indication of Supply status and fault condition after unit has tripped

Dims:
to DIN 43880
W. 44mm

Terminal Protection to IP20



• FUNCTION DIAGRAM



• INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.** Installation work must be carried out by qualified personnel.
- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green "supply on" LED will illuminate and the "positive safety output" relay will energise. The 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 toroid ** (Note the red "tripped" LED will flash during this condition)
 - c, the supply to the unit is removed
 - d, the relay fails internally
- ** causes the "standard output" relay to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph 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 LED's have illuminated and the unit trips due to an excessive fault current, the red "tripped" LED will illuminate. The unit will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the "Test" button on the front of the unit (or by pressing the remote "Test" button - if fitted). The output relays operate accordingly.
- Press the "Reset" button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back 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

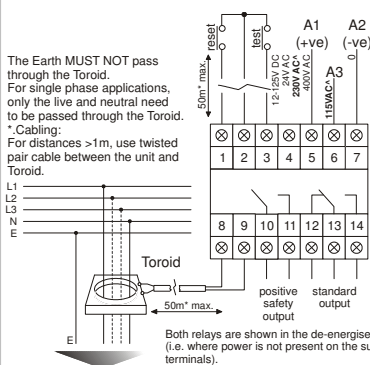
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

The operating function of this unit is classed as a **Type A** for which tripping is ensured for residual 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 AC** devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc).

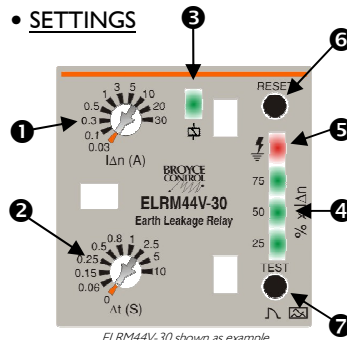
• CONNECTION DIAGRAM



Both relays are shown in the de-energised state (i.e. where power is not present on the supply terminals).

* Dual voltage only available as 115/230V AC. For 115V AC, connect across 6 and 7. For 230V AC (and other voltages), connect across 5 and 7.

• SETTINGS



Key:

- Trip setting adjustment ($I_{\Delta n}$) in Amps
- Time delay adjustment (Δt) in Seconds
- Green "Power On" LED indication
- Green "Leakage Current" LED indication (% $\times I_{\Delta n}$)
- Red "Tripped" LED indication
- "RESET" button
- "TEST" button

• TECHNICAL SPECIFICATION

Supply voltage U_n (5, 6, 7): 12 - 125V DC (85 - 110% of U)
(see connection diagram) 24, 115/230, 400V AC (85 - 115% of U_n)
All AC supplies are galvanically isolated between the supply and the toroid and remote test/reset connections.
Frequency range: 50/60/400Hz (AC supplies)
Isolation: Over voltage cat. III
Rated impulse withstand voltage: 800V (24V AC supplies), 2.5kV (115V AC supplies) (1.2 / 50μs) IEC 60664
Power consumption (max.): 4kV (230V, 400V AC supplies) 6VA (AC supplies) 5W (DC supplies)
Monitored leakage current: Up to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)

Please state Supply voltage when ordering.

Sensitivity $I_{\Delta n}$ (see Accessories also)

ELRM44V-3: 30, 50, 100, 200, 300, 500, 750mA, 1, 2, 3A (user selectable)
ELRM44V-10: 30, 100, 300, 500, 750mA, 1, 3, 5, 7.5, 10A (user selectable)
ELRM44V-30: 30, 100, 300, 500mA, 1, 3, 5, 10, 20, 30A (user selectable)

Trip level limits: 80 - 90% of $I_{\Delta n}$
Reset Value: $\approx$ 85% of tripped level
Time delay Δt : 0*, 60, 150, 250, 500, 800ms, 1, 2.5, 5, 10 sec. (user selectable)
*Actual delay for "0" or "Instantaneous" is $< 25ms$ when fault current @ $5 \times I_{\Delta n}$.

Note:

- For $I_{\Delta n}$ setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
- The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	$\approx$ 25 (from supply interruption)	
LED indication:	Green	
Power supply present:		Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)	
Tripped:		Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button	
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)	
Relative humidity:	+95%	
Output:	1 x SPNO, 1 x SPDT relays	
Output rating:	AC I (250V) 8A (2000VA) 6A (1500VA) AC I5 (250V) 2.5A 4A DC I (25V) 8A (200W) 6A (150W)	P.S.O. (10, 11)
Electrical life:	$\geq$ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2 / 50μs) IEC 60664	
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)	
Minimum trigger time:	$> 80ms$ (Actual trigger time = $80ms + \Delta t$ setting for remote "test")	
Housing:	Grey flame retardant Lexan UL94 VO	
Weight:	$\approx$ 190g (AC power supplies) $\approx$ 110g (DC power supplies)	
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)	
Terminal conductor size:	$\leq 2.5mm^2$ stranded, $\leq 4mm^2$ solid	
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5, -6, -12 and -16. CISPR 22. CE and Compliant.	

() Numbers in brackets shown above refer to terminal numbers on the relay housing.

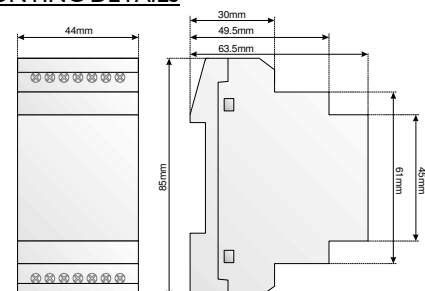
• Options

- For other supply voltages, alternative trip levels or time delays, please consult the sales office.

• Accessories – Toroids

Toroid Type:	Internal diameter:	$I_{\Delta n}$ (min.) A
BZCT035	35mm $\varnothing$	0.03
BZCT070	70mm $\varnothing$	0.03
BZCT120	120mm $\varnothing$	0.1
BZCT210	210mm $\varnothing$	0.3

• MOUNTING DETAILS



Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England
Tel: +44 (0) 1902 773746 Fax: +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: www.broycecontrol.com
The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

ELRM44V-1-A
012421

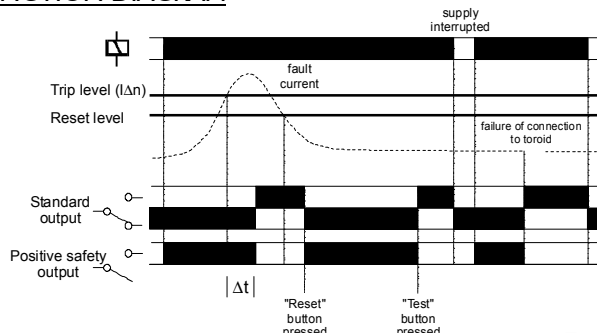
Type: ELRP48V-30

Earth Leakage Relay (Variable) - Type A

- 76mm length¹, 48 x 48mm Panel mount housing - Supplied complete with retaining clips and screws
- Pluggable connectors located at the rear of the unit and supplied with mating, re-wireable sockets
- Designed to monitor and detect true RMS earth fault currents (up to 30A) in conjunction with a separate C.T.
- LED bargraph provides constant indication of any leakage current
- Microprocessor controlled with internal monitoring (self-checking)
- Adjustable Sensitivity (IDn) - 30mA to 30A
- Adjustable Time Delay (Dt) - 0 (instantaneous)* to 10 seconds
- Separate "Test" and "Reset" push buttons
- Connection facility for remote "Test" and "Reset" push buttons
- Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)
- 2 Relay outputs - Standard Output (S.O.) and Positive Safety Output (P.S.O.)
- LED indication of Supply status and fault condition after unit has tripped



FUNCTION DIAGRAM



INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.** Installation work must be carried out by qualified personnel.
- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green "supply on" LED will illuminate and the "positive safety output" relay will energise. The relay will de-energise if:
 - a, the fault current level exceeds the set trip level (IDn)**
 - b, there is a failure of the connection between the relay and the toroid** (Note the red "tripped" LED will flash during this condition)
 - c, the supply to the unit is removed
 - d, the relay fails internally** causes the "standard output" relay to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph will indicate the % of IDn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red "tripped" LED will illuminate. The unit will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the "Test" button on the front of the unit (or by pressing the remote "Test" button - if fitted). The output relays operate accordingly.
- Press the "Reset" button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back 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.

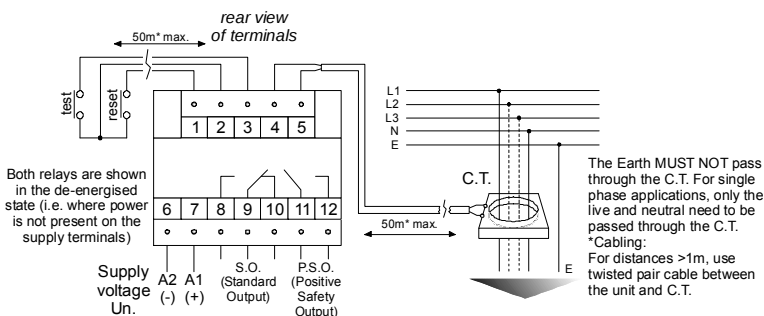
Troubleshooting

- If the unit fails to operate correctly check that all wiring and connections are good.
- For the DC supply version, ensure the polarity to terminals 6 and 7 (A1 and A2) are correct.

Note:

The operating function of this unit is classed as a Type A for which tripping is ensured for residual 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 AC devices which only need to detect residual alternating currents.

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage Un (6, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115, 230V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between the supply and the toroid and remote test/reset connections.	
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies)
(1.2 / 50μs) IEC 60664	4kV (230V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	0 to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 4 and 5)
Sensitivity IDn (see Accessories)	30, 100, 300, 500mA, 1, 3, 5, 10, 20, 30A (user selectable)
Trip level limits:	80 - 90% of IDn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	0*, 60, 150, 250, 500, 800ms, 1, 2.5, 5, 10 sec. (user selectable)
*Actual delay for "0" or "Instantaneous" is <25ms when fault current @ 5 x IDn.	

Note:

- For IDn setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
- The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	≈ 25 (from supply interruption)	
LED indication:		
Power supply present:		Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)	
Tripped:		Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button	
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)	
Relative humidity:	+95%	
Output:	1 x SPDT, 1 x SPNO relays	
Output rating:	S.O. (8, 9, 10)	P.S.O. (11, 12)
AC I (250V)	8A (2000VA)	6A (1500VA)
AC I5 (250V)	2.5A	4A
DC I (25V)	8A (200W)	6A (150W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2 / 50μs) IEC 60664	
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)	
Minimum trigger time:	>80ms (Actual trigger time = 80ms + Δt setting for remote "test")	
Housing:	Black, self-extinguishing noryl UL94 VO (ABS for front plate and rear clip)	
IP Protection:	Terminals: IP20. Housing: IP30 (when clips are inserted)	
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supply)	
Mounting:	Through 45 x 45mm panel cut-out and secured to panel using retaining clips and screws (2 of each supplied). Panel thickness typically 4mm	
Terminal conductor size:	≤ 2.5mm ²	
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5, -6, -12 and -16. CISPR 22. CE and Compliant.	

() Numbers in brackets shown above refer to terminal numbers on the relay housing.

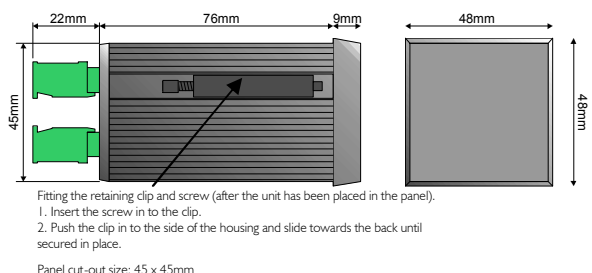
Options

- For other supply voltages, alternative trip levels or time delays, please consult the sales office.

Accessories – Toroids (C.T.)

Toroid Type:	Internal diameter:	IDn (min.) A
BZCT035	35mm Ø	0.03
BZCT070	70mm Ø	0.03
BZCT120	120mm Ø	0.1
BZCT210	210mm Ø	0.3

MOUNTING DETAILS



Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN, England

ELRP48V30-1-A
012369

Telephone: +44 (0) 1902 773746 Facsimile: +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: <http://www.broycecontrol.com>

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELRV-30

True RMS Earth Leakage Relay (Variable) - Type A

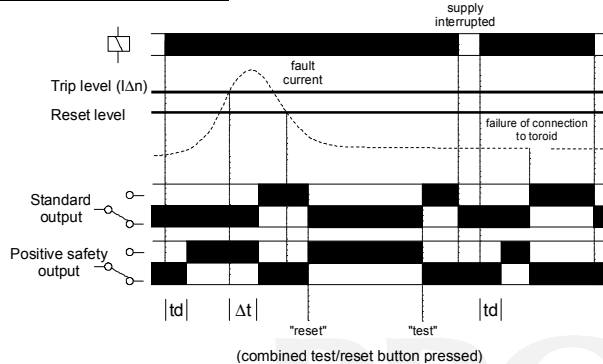
- 70mm DIN rail housing
- Designed to monitor and detect true RMS, earth fault currents (up to 30A) in conjunction with a separate toroid
- Fast response time of <25ms¹ to fault currents that are 5 x greater than the set trip current
- Digital LED Display shows measured leakage current, various user settings and diagnostics
- Microprocessor controlled with internal monitoring (self-checking)
- Sensitivity (I_{Δn}) and time delay (Δt) adjustable using simple 2-button operation
- "Display" push button allows user to view settings without needing to open the tamperproof cover. The "last recorded" peak trip current can also be recalled using the same push button
- Single button operation for "Test / Reset" and connection facility for remote "Test" and "Reset" push buttons
- Connection for remote lamp facility warning user prior to a trip condition (level adjustable by user)
- Toroid open and short circuit detection (unit forced to trip during open circuit condition)
- 2 x SPDT relay output 8A. LED indication of user settings / fault condition after unit has tripped

Dims:
to DIN 43880
W. 70mm

Terminal Protection to IP20



FUNCTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage U _n (1, 3):	12 – 60V DC (85 – 115% of U) 24, 115, 230, 400V AC (85 – 115% of U _n) Galvanic isolation between the supply and the toroid and remote test / reset connections on AC supply versions.
Supply frequency:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supply) 2.5kV (115V AC supply) 4kV (230V, 400V AC supplies)
Power consumption (max.):	6VA (AC supplies), 5W (DC supply)
Monitored leakage current:	2mA to 30A (50/60/400Hz) (through external toroid with 1000:1 ratio and connected to terminals 11 and 13)
Sensitivity I _{Δn} :	6, 10, 30, 50, 75, 100, 300, 500, 750mA 1, 3, 5, 7.5, 10, 15, 20, 25, 30A (user selectable)
Trip level:	75% of I _{Δn} (nominal)
Hysteresis:	8% of I _{Δn} or 2mA, whichever greater
Accuracy:	±15% (valid range 10 ... 110% of I _{Δn} or 2mA, whichever greater)
Time delay Δt:	inst., 50, 250, 500ms, 1, 2.5, 5, 10 sec. (user selectable)

Please state Supply voltage when ordering.

Note: For I_{Δn} settings of 30mA or less, the time delay is fixed to inst. (instantaneous, <25ms) and is not adjustable.

Measured current:	Displayed on auto ranging 2 digit 7-segment red LED display
Display Resolution:	100uA min.
Reset time:	<200ms (from supply interruption)
Power on delays:	Self test duration: <5 secs. Delay before P.S.O. relay energises "td": 600ms (Note: relay will energise during self test period assuming no fault present)
Memory:	storage of the leakage fault and reset with "test / reset" button
Ambient temp:	-5 to +60°C -5 to +40°C (in accordance with IEC 755)
Relative humidity:	+95%
Output :	2 x SPDT relay (4, 6, 8 / 10, 12, 14)
Output rating:	AC1 250V 8A (2000VA) AC15 250V 2.5A DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50μs) IEC 60664
Remote "test" / "reset" (5, 7, 9)	Requires two N.O. contacts. (i.e. push buttons)
Contact closure time:	> 100ms
Fault level output (1, 2):	50% of I _{Δn} (factory set) User adjustable from 10 - 65% in 5% increments
Hysteresis:	8% of I _{Δn} or 2mA, whichever greater
Load (resistive):	40mA max. @ 240V Note: A remote lamp can only be connected when terminals 1 and 3 are being supplied with an AC supply
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 250g (AC supplies), ≈ 170g (DC supply)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm ² stranded, ≤ 4mm ² solid
Approvals:	Conforms to: IEC 755, IEC 61543 (EMC) Radiated Immunity: IEC 61000-4-3: 1.89GHz @ 30V/m

and CE and Compliant.

- Options
- For other supply voltages, alternative trip levels or time delays, please consult the sales office.
- Accessories – Toroids

Toroid Type:	Internal diameter:	I _{Δn} (min.) A
BZCT035	35mm Ø	0.03
BZCT070	70mm Ø	0.03
BZCT120	120mm Ø	0.1
BZCT210	210mm Ø	0.3

Note:
() Numbers in brackets shown above refer to terminal numbers on the relay housing.

INSTALLATION

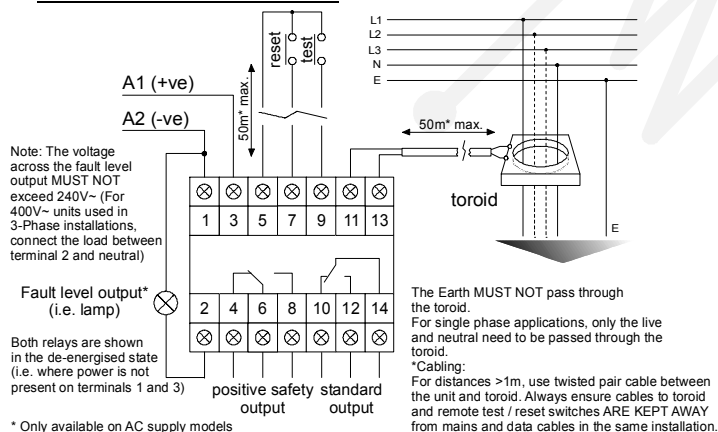
- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Operational and setting information can be found on the reverse of this data sheet.



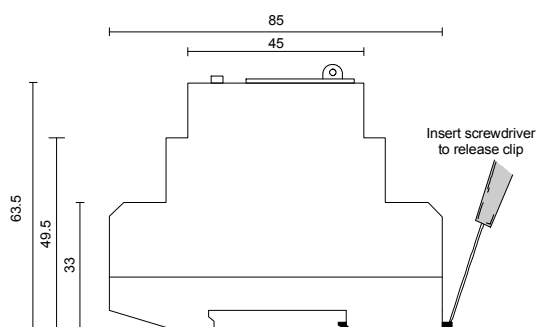
Installation work must be carried out by qualified personnel.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

CONNECTION DIAGRAM



MOUNTING DETAILS



Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England

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The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

• OPERATING INSTRUCTIONS AND SETTINGS

Description

- The operating function of this unit is classed as a Type A  for which tripping is ensured for residual true RMS sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping. 

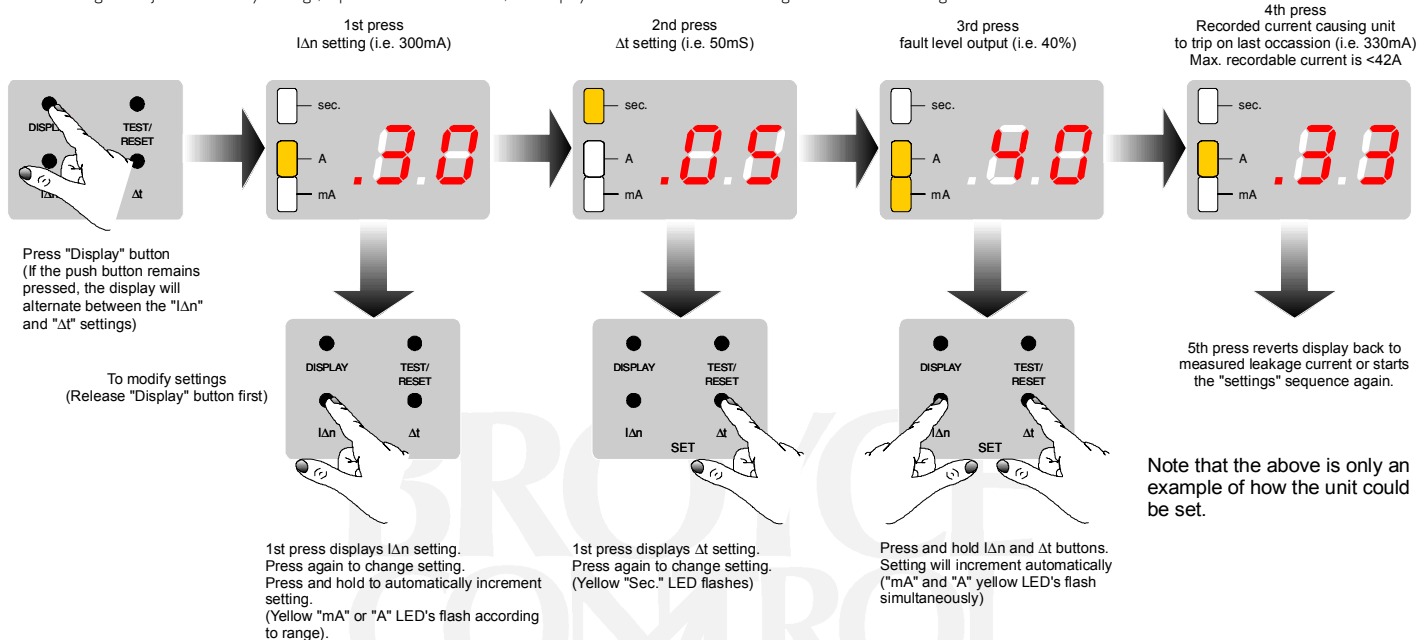
Applying power (assuming no leakage current present)

- Apply power, the "positive safety output" relay will energise and contacts **6** and **8** will close after delay "td". The "standard output" relay will remain de-energised (contacts **12** and **14** open).
- After carrying out a self test (all segments illuminate on the LED display for a short period), then indicate the IΔn setting, followed by the measured "leakage current" that may be present in the installation. The yellow LED's to the left of the display show whether the current is "mA" or "A".

Viewing and changing the user settings.

Note: The unit is factory set to 30mA trip and instantaneous delay. The remote fault level output is set to 50%. Adjustment of these settings can be made if required to suit the requirements of the installation. A seal is supplied with the unit allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

- The settings can be viewed and checked by pressing the "Display" push button as shown. Carrying out adjustments to these settings requires the tamperproof cover to be lifted in order to gain access to the two push buttons underneath.
- If during the adjustment of any settings, a push button is released, the display will revert back to indicating the measured "leakage current" after a short duration.



Note: After a change to a setting has been made, the new setting will only be stored once the yellow LED has stopped flashing.

Fig. 1

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the "Test/Reset" button on the front of the unit (or by pressing the remote "Test" button - if fitted). If the unit is already in a "no fault" condition, i.e., not tripped, the first press will trip the unit. The output relays operate accordingly. The display shows the characters as in Fig.2
- Press the same button again to reset the unit. The display reverts back to any measured leakage current that may be present.
- The unit can also be reset using the external "Reset" button (if fitted) or by interrupting the power supply.
- To satisfy regulations, it is recommended the device is tested periodically to ensure correct operation.

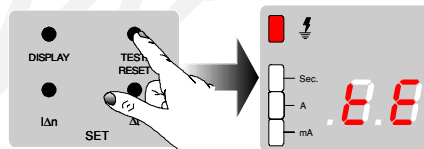


Fig. 2

Fault conditions

Leakage currents

- If during normal service, the leakage current increases above the setting for the fault level output, the remote lamp will illuminate (if fitted) and the display will flash to give the user early warning of a possible fault condition. If the fault persists and the level of leakage current exceeds the trip level setting, the unit will trip. The "positive safety output" relay will de-energise and contacts **6** and **8** will open. The "standard output" relay will energise and contacts **12** and **14** will close. The red "fault" LED  will illuminate and the display will stop flashing.
- Pressing the "Test/Reset" button returns the unit back to normal operation, assuming the fault has cleared. Note that the level of current that caused the unit to trip is now stored and can be re-called by pressing the "Display" button (see Fig.1). Note that the recorded trip current is only stored whilst power is applied and cleared if the power supply is interrupted.

Toroid open circuit

- If the wiring between the unit and toroid becomes damaged (open circuit), the unit will trip.
- The display shows the following characters as in Fig.3
- After the fault has cleared, press the "Test/Reset" button to return the unit back to normal operation. Note that the unit cannot be reset remotely following an open circuit condition.

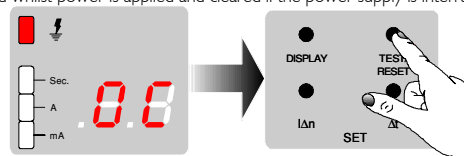


Fig. 3

Toroid short circuit

- Shorts that are present across terminals **11** and **13** (typically < 33Ω and purely resistive) will force the unit to display the characters as shown in Fig.4. However, the unit still remains functional other than not being able to detect and display fault currents.

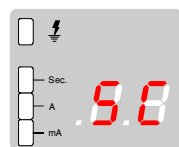


Fig. 4

Supply voltage fault

- If the applied supply voltage is <70% of Un (typical), the unit will not operate and the display shows the following characters as in Fig.5. During this condition and assuming the supply is also >50% of Un, the lamp connected to the fault level output will flash. After the correct voltage has been established, the unit will revert to normal operation.

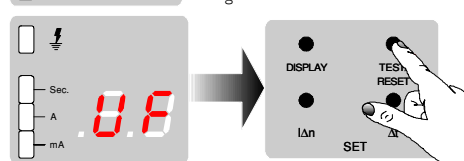


Fig. 5

Troubleshooting

- If the unit fails to operate correctly other than that described above, then the fault will more than likely be with the wiring to the unit. Check all wiring and that the connections are good.
- Ensure the supply to the unit is present on terminals **1** and **3** and is within the operational limits specified. For DC units, ensure the polarity of the supply is correct.

Type: ELRM44F-0030, 0100 & 0300

Earth Leakage Relay (Fixed) - Type A

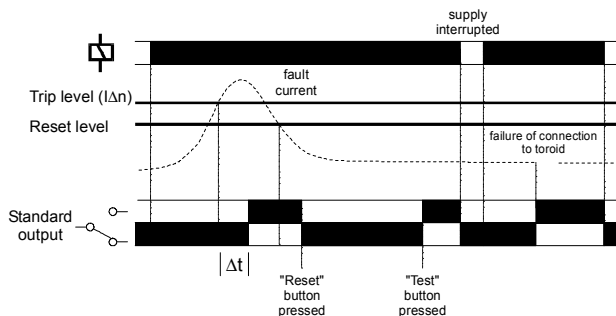
- 44mm (2.5 modules) wide DIN rail housing
- Designed to monitor and detect true RMS earth fault currents in conjunction with a separate toroid
- Microprocessor controlled with internal monitoring (self-checking)
- Fixed Sensitivity ($I_{\Delta n}$) - 30, 100 or 300mA*
- Fixed Time Delay (Δt) - 0 (instantaneous)
- Separate "Test" and "Reset" push buttons
- Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts
- Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)
- SPDT relay output 8A
- LED indication of Supply and fault condition after unit has tripped

Dims:
to DIN 43880
W. 44mm



Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.**  Installation work must be carried out by qualified personnel.
- Connect the unit as shown in the diagram below.
- Apply power, the green "supply on" LED will illuminate. The output relay will energise and the red "tripped" LED illuminate if:
 - a, the fault current level exceeds the fixed trip level ($I_{\Delta n}$), or
 - b, there is a failure of the connection between the relay and the toroid. (Note the red "tripped" LED will flash during this condition)
- The relay will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the "Test" button on the front of the unit (or by pressing the remote "Test" button - if fitted). The output relay operates accordingly.
- Press the "Reset" button on the front of the unit (or remotely - if fitted) to reset the unit. The output relay reverts back to the "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

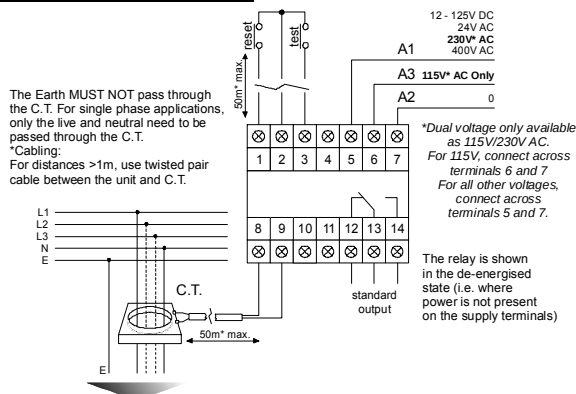
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

The operating function of this unit is classed as a Type A  for which tripping is ensured for residual 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 AC devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage U_n (5, 6, 7): (see connection diagram)	12 - 125V DC (85 - 110% of U_n) 24, 115/230, 400V AC (85 - 115% of U_n) All AC supplies are galvanically isolated between the supply and the toroid connection.
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies) (1.2 / 50μs) IEC 60664
Power consumption (max.):	4kV (230V, 400V AC supplies) 6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	0 to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)
Sensitivity $I_{\Delta n}$ (see Accessories):	30, 100 or 300 mA (*to be specified when ordering)
Trip level limits:	80 - 90% of $I_{\Delta n}$
Reset Value:	≈ 85% of tripped level
Time delay Δt :	instantaneous (Actual delay is <25ms when fault current @ 5 x $I_{\Delta n}$)
Reset time:	≈ 25 (from supply interruption)
LED indication:	
Power supply present:	Green
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C
Relative humidity:	-5 to +40°C (in accordance with IEC 60755) +95%
Output:	SPDT relay (12, 13, 14)
Output rating:	AC1 250V 8A (2000VA) AC15 250V 2.5A DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50μs) IEC 60664
Remote "Test" and "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80ms
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supply)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm ² stranded, ≤ 4mm ² solid
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5, -6, -12 and -16. CISPR 22. CE and  Compliant.

() Numbers in brackets shown above refer to terminal numbers on the relay housing.

Options

- For other supply voltages, alternative trip levels or time delays, please consult the sales office.

Ordering*

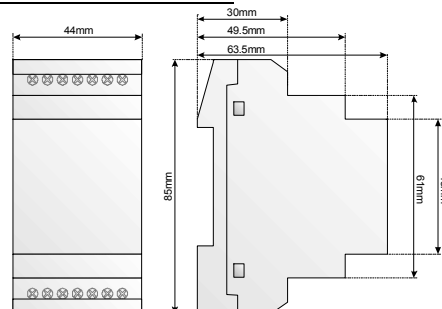
Please state full part number and voltage when ordering. The suffix, which should follow ELRM44F, is 0030 (30mA), 0100 (100mA) or 0300 (300mA).

Example: ELRM44F-0030 24V AC

Accessories – Toroids

Toroid Type:	Internal diameter:	$I_{\Delta n}$ (min.) A
BZCT035	35mm Ø	0.03
BZCT070	70mm Ø	0.03
BZCT120	120mm Ø	0.1
BZCT210	210mm Ø	0.3

MOUNTING DETAILS



Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England

ELRM44F-2-A

Telephone: +44 (0) 1902 773746 Facsimile: +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: <http://www.broycecontrol.com>
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELR-IF-0030, 0100 & 0300

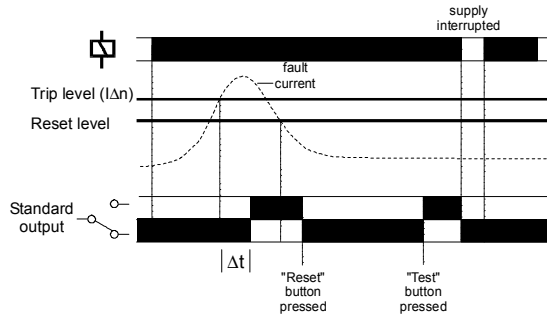
Earth Leakage Relay with Integral Toroid (Fixed) - Type A

- ❑ DIN Rail or Surface mount enclosure
- ❑ Integral toroid - 25mm $\varnothing$
- ❑ Designed to monitor and detect true RMS earth fault currents
- ❑ Protected against nuisance tripping
- ❑ Microprocessor controlled
- ❑ Three versions available - 30mA (instantaneous), 100mA (100mS) or 300mA (100mS)*
- ❑ Separate "Test" and "Reset" push buttons
- ❑ SPDT relay output 5A
- ❑ Green LED indicates presence of power supply
- ❑ Red LED indicates fault current is >50% of $I_{\Delta n}$ if flashing, or relay has tripped if permanently illuminated

Dims:
W. 70mm
H. 110mm
D. 37mm



• FUNCTION DIAGRAM



• TECHNICAL SPECIFICATION

Supply voltage U_n (a, b)*:	120, 240V AC (85 - 115% of U_n)	Please state Supply voltage when ordering.
(see connection diagram)		
Frequency range:	48 - 63Hz	
Isolation:	Over voltage cat. III	
Rated impulse withstand voltage:	2.5kV (120V AC supply) 4kV (240V AC supply)	
(1.2 / 50μs) IEC 60664		
Power consumption (max.):	2W	
Rated current:	2-wire: 167A (35mm ²) 3-wire: 136A (25mm ²) / 4-wire: 100A (16mm ²)	
Applicable wire sizes:	2-wire: 35mm ²	
(using 600V AC tri-rated wiring conforming to BS 6231)	3-wire: 25mm ² / 4-wire: 16mm ²	
Monitored leakage current:	0 to 1A (15 - 400Hz)	
Sensitivity $I_{\Delta n}$ (Time delay Δt)*:	30mA (0 / instantaneous**), 100mA (100mS) or 300mA (100mS) (*to be specified when ordering)	
**Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x $I_{\Delta n}$.		
Trip level:	75% of $I_{\Delta n}$ (nominal)	
Hysteresis:	8% of $I_{\Delta n}$	
Accuracy:	±10%	
Reset time:	≈ 2S (from supply interruption)	
LED indication:		
Power supply present:	Green	
Tripped:	Red (see "INSTALLATION" to the left)	
Memory:	storage of the leakage fault and reset with the "Reset" push button	
Ambient temp:	-20 to +55°C	
	-5 to +40°C (in accordance with IEC 60755)	
Relative humidity:	+95%	
Output :	SPDT relay (21, 22, 24)	
Output rating:	AC1 250V 5A (1250VA) AC15 250V 2.5A DC1 25V 5A (125W).	
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2 / 50μs) IEC 60664	
Housing:	Grey flame retardant Lexan UL94 VO	
Weight:	≈ 190g	
Mounting option:	1. Using the two fixing holes for mounting directly to a back plate 2. On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)	
Terminal conductor size:	≤ 2.5mm ² stranded, ≤ 4mm ² solid	
Approvals:	Conforms to: IEC60755, IEC 61543 (EMC) CE and Compliant.	

() Numbers in brackets shown above refer to terminal identification on the housing.

• Options

For other supply voltages, alternative trip levels or time delays, please consult the sales office.

• Ordering*

Please state full part number and voltage when ordering. The suffix, which should follow ELR-IF, is 0030 (30mA), 0100 (100mA) or 0300 (300mA), then the voltage.

Example: ELR-IF-0100 240V AC

• INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.  Installation work must be carried out by qualified personnel.
- Connect the unit as shown in the diagram below.
- DO NOT install the unit in close proximity to equipment generating high magnetic fields.
- Ensure the conductors that pass through the aperture are straight, and as central as possible. Ensure the conductors do not cause any undue stress on the unit itself.

Applying power

- Ensure the voltage to be applied to terminals "a" and "b" corresponds with the voltage marked on the unit itself.
- Apply power, the green "supply on" LED will illuminate. The output relay will remain de-energised and red "tripped" LED extinguished. If the fault current is >50% of $I_{\Delta n}$, then the red LED will flash to provide early indication that a fault current is present. When the fault current exceeds the fixed trip level ($I_{\Delta n}$), the output relay will energise and red LED illuminate after the fixed delay (Δt).
- The relay will now remain in a latched condition until reset.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the "Test" button on the unit. The output relay will energise.
- Press the "Reset" button on the front of the unit to reset the unit. The output relay will de-energise.
- 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

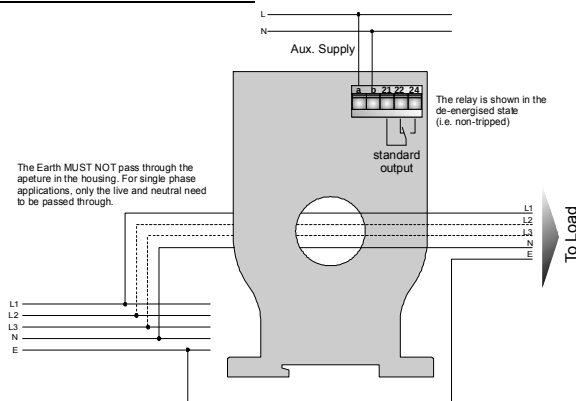
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

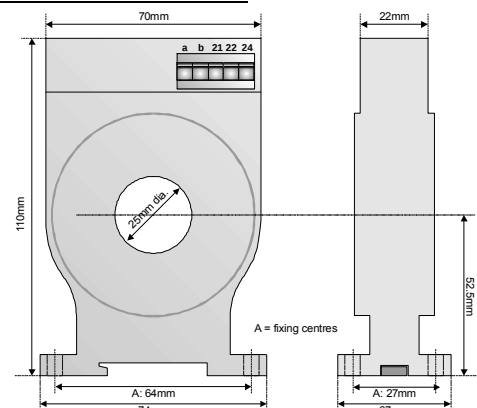
The operating function of this unit is classed as a Type A  for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping ∇ . This unit will also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

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

• CONNECTION DIAGRAM



• MOUNTING DETAILS



Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England

ELR-IF-2-A

Telephone: +44 (0) 1902 773746 Facsimile: +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: <http://www.broycecontrol.com>
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: BZCT035, 070, 120 & 210

Circular Toroids

- ❑ For use in conjunction with Broyce "Type A" Earth Leakage Relays
- ❑ Designed to detect leakage current and transmit a proportional signal to an Earth Leakage Relay
- ❑ Surface mounting with 4 fixing slots (BZCT210 supplied with separate mounting feet)
- ❑ Slim design



• INSTALLATION NOTE

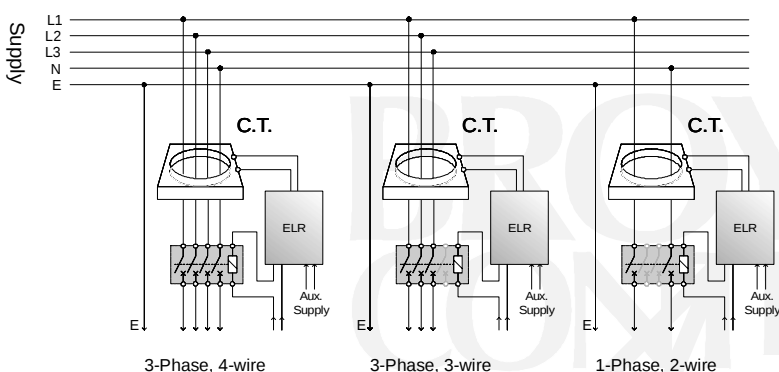


Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY TO THE CABLES THAT ARE TO BE PASSED THROUGH THE TOROID.
- Installation of the toroid, along with the Earth Leakage Relay must be carried out in accordance with the latest wiring practices and regulations.

• FUNCTION DIAGRAM

Typical connection examples are shown below.



• TECHNICAL SPECIFICATION

Size availability* and part number:

35mm Ø (BZCT035)
70mm Ø (BZCT070)
120mm Ø (BZCT120)
210mm Ø (BZCT210)

* internal diameter

210mm Ø (BZCT210)

Rated system voltage: 720VAC

Insulation level: 3kVAC

Current ratio: 1/1000

Maximum permissible

current:

1 kA continuous

5kA for 1.5Sec.

100kA for 0.05Sec.

Minimum IΔn setting on

Earth Leakage Relay for

each type of toroid:

0.03A - 35 and 70mm Ø

0.1A - 120mm Ø

0.3A - 210mm Ø

Distance between

toroid and relay:

50 metres (max.)

Ambient temp:

-20 to +60°C

Relative humidity:

+95%

Housing:

Grey ABS

Mounting option:

Panel mount only using fixing slots provided (BZCT210 requires separate mounting feet as supplied)

Terminal conductor size:

≤ 2.5mm² solid

≤ 1.5mm² stranded

Approvals:

CE Compliant.

Conforms to: IEC44-1, IEC185 & BS7676

• INSTALLATION DO's and DONT's

- Correct installation of the Earth Leakage Relay and toroid should ensure trouble free operation, in particular, if this document is followed.

1. Always ensure the Earth conductor DOES NOT pass through the toroid. If it is unavoidable, the Earth must be routed back through the toroid again and around, as shown in Fig.2 below.
2. As a rule, select a toroid that has an inside diameter which is twice that or greater than the outsider diameter of the cable(s) to be passed through.
3. Ensure the cable is central in the toroid.
4. Place the toroid on a straight section of cable, not near a bend.
5. Keep the cable and toroid away from intense magnetic fields from nearby equipment.
6. DO NOT pass individual conductors through separate toroids, as shown in Fig. 3.

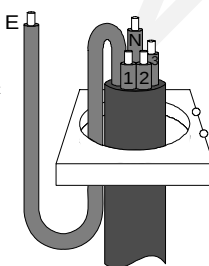


Fig. 1

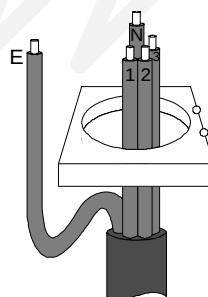


Fig.2

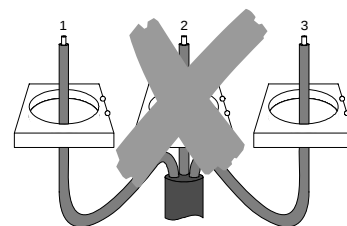
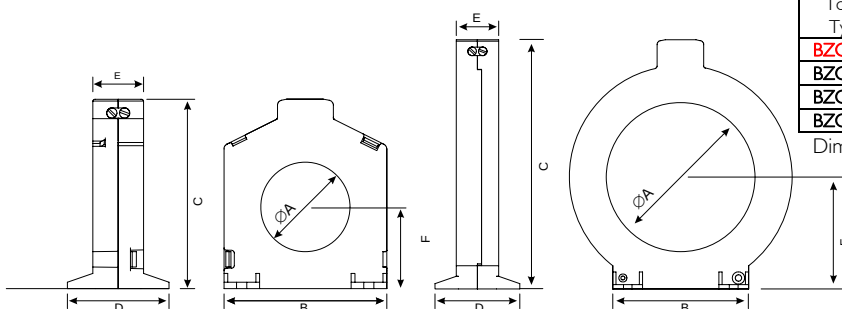


Fig.3

• DIMENSIONS



BZCT035

BZCT070, 120 & 210mm

Toroid Type:	AØ	B	C	D	E	F	Weight
BZCT035	35	64	74	40	20	32	77g
BZCT070	70	105	117	40	20	53	135g
BZCT120	120	155	170	40	20	80	265g
BZCT210	210	149	304	60*	30	145	1300g

Dimensions in mm

*exc. mounting feet

Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England

BZCT-3-A

Telephone: +44 (0) 1902 773746 Facsimile: +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: <http://www.broycecontrol.com>
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: BZCTR305, 350 & 470

Rectangular Toroids

- ❑ For use in conjunction with Broyce "Type A" Earth Leakage Relays
- ❑ Designed to detect leakage current and transmit a proportional signal to an Earth Leakage Relay
- ❑ Suitable for installations that use busbars
- ❑ Three sizes available



BZCTR305



BZCTR470

• INSTALLATION NOTE

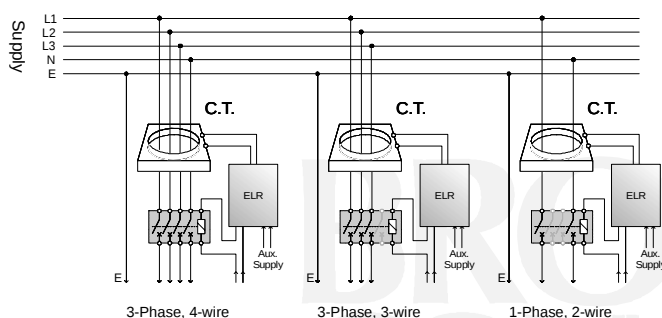


Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY TO THE BUSBARS/CONDUCTORS THAT ARE TO BE PASSED THROUGH THE TOROID.
- Installation of the toroid, along with the Earth Leakage Relay must be carried out in accordance with the latest wiring practices and regulations.

• CONNECTION EXAMPLES

Typical connection examples are shown below.



• TECHNICAL SPECIFICATION

Size availability and part number:

115 x 305mm (BZCTR305)¹
150 x 350mm (BZCTR350)¹
160 x 470mm (BZCTR470)

Current ratio: 1/1000

Maximum permissible current: 2kA (BZCTR305 & 350)
2.5kA (BZCTR470)

Rated supply voltage: 720V AC

Rated insulation voltage: 3kV AC

Minimum I_{Δn} setting on Earth Leakage Relay: 1A

Distance between toroid and relay: 50 metres (max.)

Ambient temp: -10 to +50°C

Relative humidity: +95%

Housing: Self extinguishing, shock resistant, black ABS (Resin cast, natural finish for BZCTR470)

Mounting: Using fixing slots provided on metal bracket (Using 4 x 9mmØ corner holes for BZCTR470)

Approvals: CE Compliant.

Note:
¹ Part number change as of August 2010 (see below)

BZCTR305 (previously known as BZCTR115)
BZCTR350 (previously known as BZCTR150)

• INSTALLATION DO's and DONT's

- Correct installation of the Earth Leakage Relay and toroid should ensure trouble free operation, in particular, if this document is followed.

1. Always ensure the Earth conductor DOES NOT pass through the toroid. If it is unavoidable, the Earth must be routed back through the toroid again and around.
2. Ensure the busbars are located centrally in the toroid. (Fig. 1)
3. Place the toroid on a straight section of the busbars, not near a bend.
4. Keep the busbars and toroid away from intense magnetic fields from nearby equipment.
5. DO NOT pass individual busbars through separate toroids.

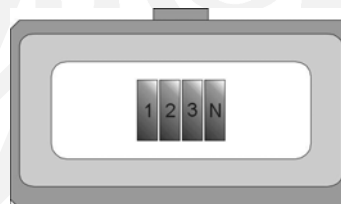
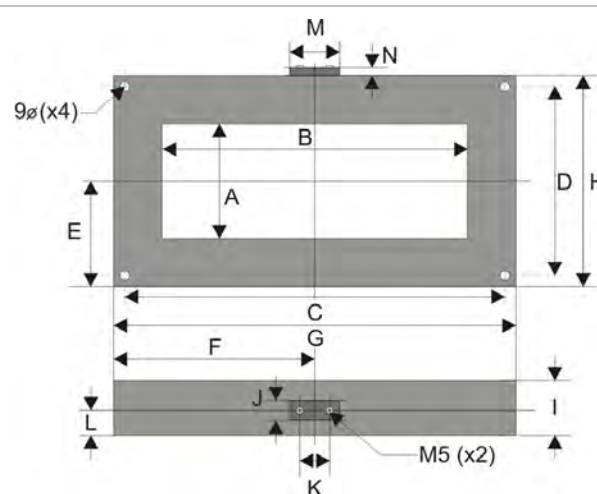
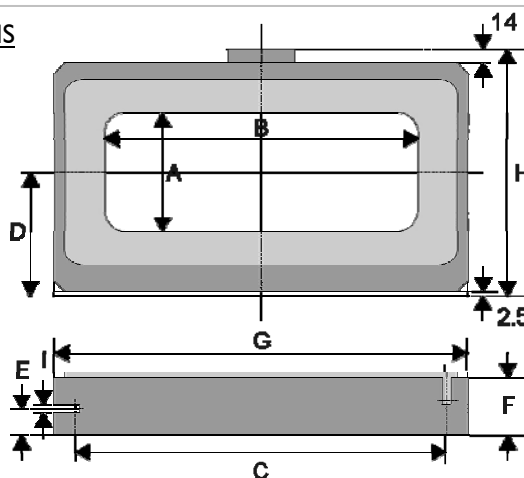


Fig. 1



Fig. 2

• DIMENSIONS



Dimensions in mm

BZCTR305 & 350

BZCTR470

Toroid Type:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Weight
BZCTR305	115	305	360	116	25	55	402	240	8						5.45kg
BZCTR350	150	350	415	140	28	55	460	285	8						7.40kg
BZCTR470	160	470	552	242	131.5	286	572	263	72	32	40	36	80	8	14kg

Tolerances = ±0.1



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BZCTR-2-A