

BOWDENS

BATTERYLESS - NB EFI (Standard and Advanced models)



EARTH FAULT INDICATOR FOR UNDERGROUND CABLE NETWORKS

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1.0 OVERVIEW

The Batteryless NB EFI is a unique HV fault indicator designed to locate earth faults on cable networks with high accuracy and integrity. It has no battery to power the relay, which derives the energy required to trip and reset via the C/T during the fault condition. The flag indicator will flip from Black to Red in fault condition and reset automatically on a timed reset. The new Batteryless NB Standard and Advanced models are an upgrade to the highly successful NB range, but now with improved electronics to enhance performance. It retains the high level of immunity to external magnetic influences which minimises any false indications due to stray currents. The unit consists of a small polycarbonate box which is fully water spray and dust proof to IP65. The electronic circuit board within the module is conformal coated using two layers to provide protection from weather/environmental conditions in an external location.

The EFI is fully EMC tested to ensure compliance with the required standards for the CE mark. It is also tested for immunity against Power Frequency Magnetic Fields, an onerous test to EN61000-4-8 to ensure perfect immunity to high magnetic fields during fault conditions in both the tripped and reset operating modes. The EFI relay is driven from a core balance C/T located either around the three phase incoming cable, so long as there is an insulated gland between the cable and the switchgear, or within the dry cable termination box.

2.0 MODEL FEATURES

BATTERYLESS NB Standard:

Flag Indicator

Three hour timed reset & Manual button reset

BATTERYLESS NB Advanced:

Flag Indicator

Three hour timed reset & Manual button reset.

Relay output volts free changeover No/Nc.

LV reset

Remote reset.

3.0 OPERATION - TRIP

Fault current on the cable network generates a proportional voltage at the C/T secondary output, which, is sufficient to charge the on-board super capacitors, which will power the relay for the duration of the trip. If the fault current is above a pre-set threshold it will trigger the processor, which starts a timer, during which any signals are suppressed, this is to allow magnetising inrush or capacitive currents on the HV network to dissipate. Once this time delay (nominal 50msecs) is over the EFI will respond to any primary current above the pre-set trip threshold, and will flip the indicator to RED. The trip level is set at a nominal 30 Amps +/- 15 Amps using a 60:1 ratio solid core C/T.

RESET: TIMED - MANUAL - REMOTE

1. Timed Reset: Std & Adv. Flag indicator will trip RED for three hours (± 15 mins) before it resets.
2. Manual Reset: Std & Adv. Press button on front of the unit to reset the flag back to black.
3. LV Reset: Adv only. An LV connection can be made to the relay 220/240V 50 Hz. If following a fault the LV supply returns for a minimum of 10 seconds, and within the Timed reset period, then the flag indicator will reset back to black.

4. Remote Reset: Advanced only. If an external signal between 6-30V ac or dc is applied to the reset terminals for a minimum of 10 sec within the timed reset period, the flag indicator will be reset.

OUTPUT RELAY - ADVANCED

The Batteryless NB Advanced incorporates a three pin terminal block with latching changeover relay (Common/NO/NC) which provides Volt free contacts for external telecoms interface. The relay latches when the Flag Indicator flips to RED, and unlatches when the unit is reset by any of the methods described above.

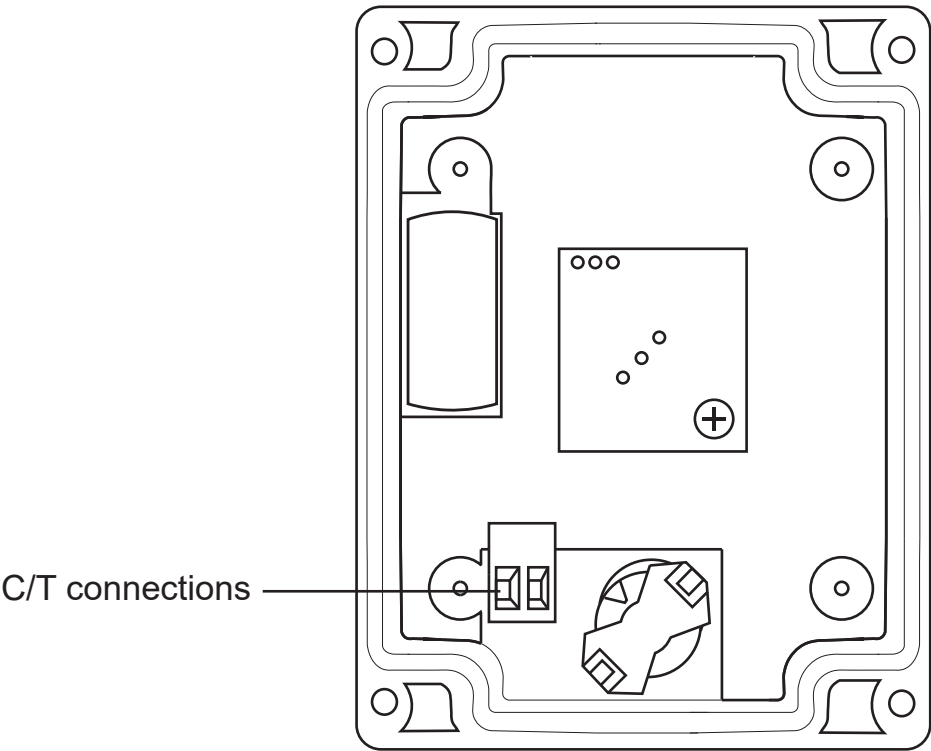
MANUAL RESET BUTTON - Standard & Advanced

If the Flag Indicator has registered a fault and has tripped to RED, press the RESET button to reset the Flag Indicator to BLACK.

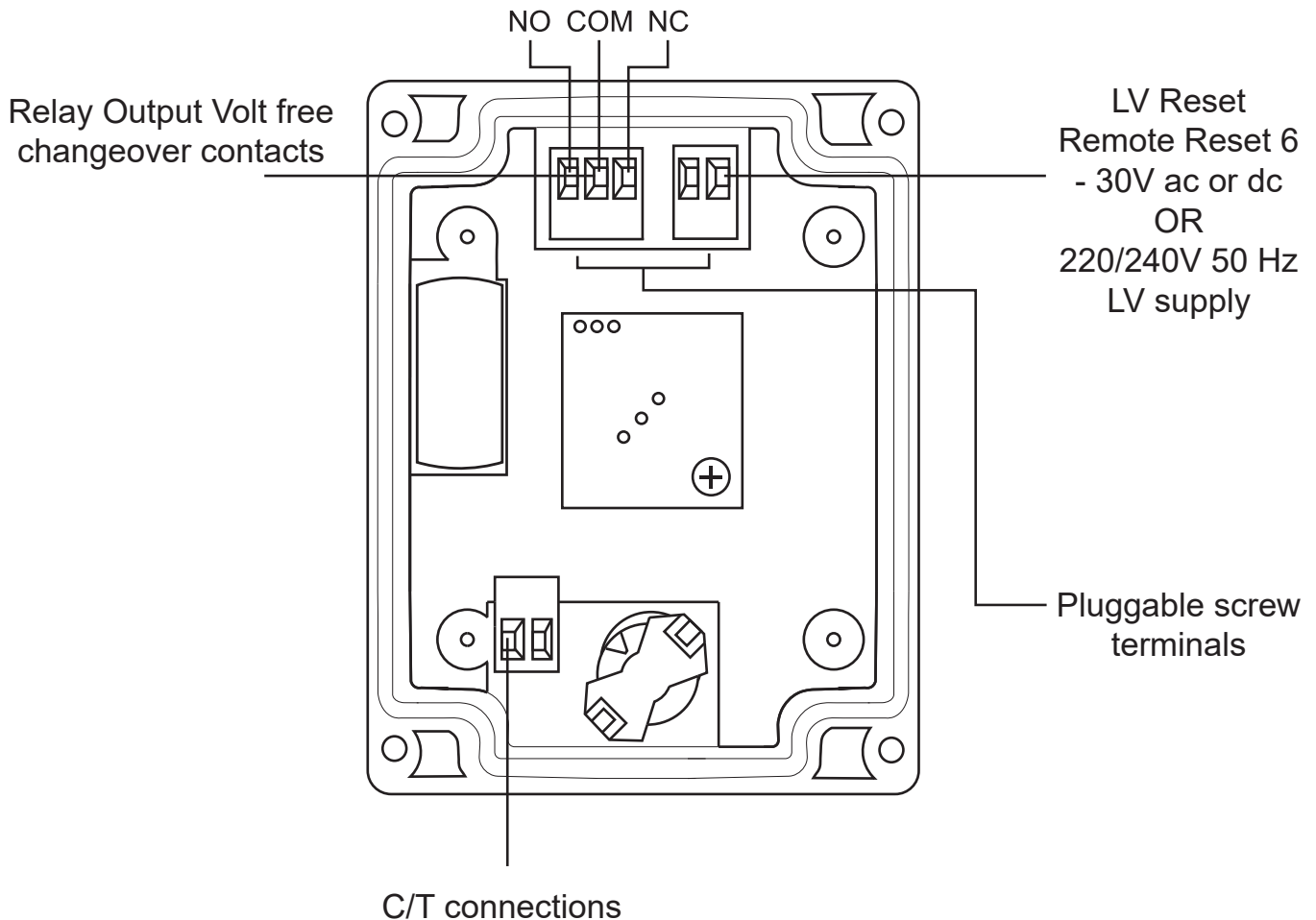
4.0 CONNECTIONS

WARNING: The C/T connection should be made to the NB before the CT is installed onto the network.

Batteryless NB Standard

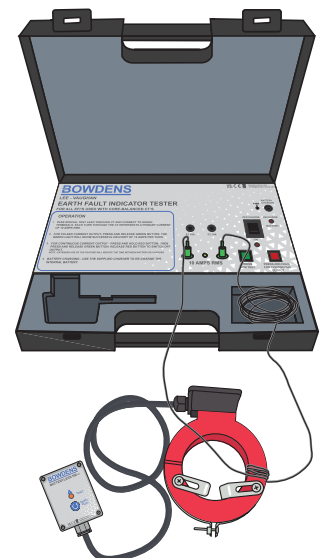


Batteryless NB Advanced



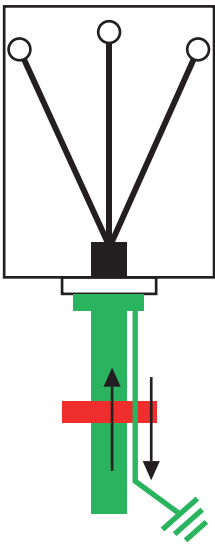
4.0 TESTING OF INSTALLATION

The complete EFI installation should be tested following installation, and at service intervals to ensure correct operation. Bowdens manufacture a mobile Injection Tester which makes this task easy. The test cable can be wrapped around the C/T generating 10 Amps per turn, so with five turns the EFI should trip at 50 Amps, but not on two turns for 20 Amps. The relay can be tested using the manual ALARM button, and can be RESET also.



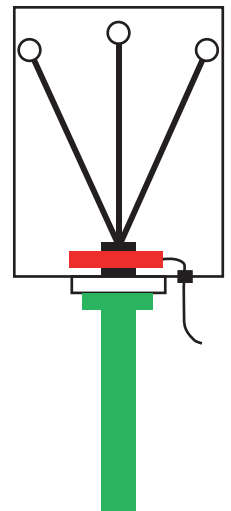
5.0 CURRENT TRANSFORMER

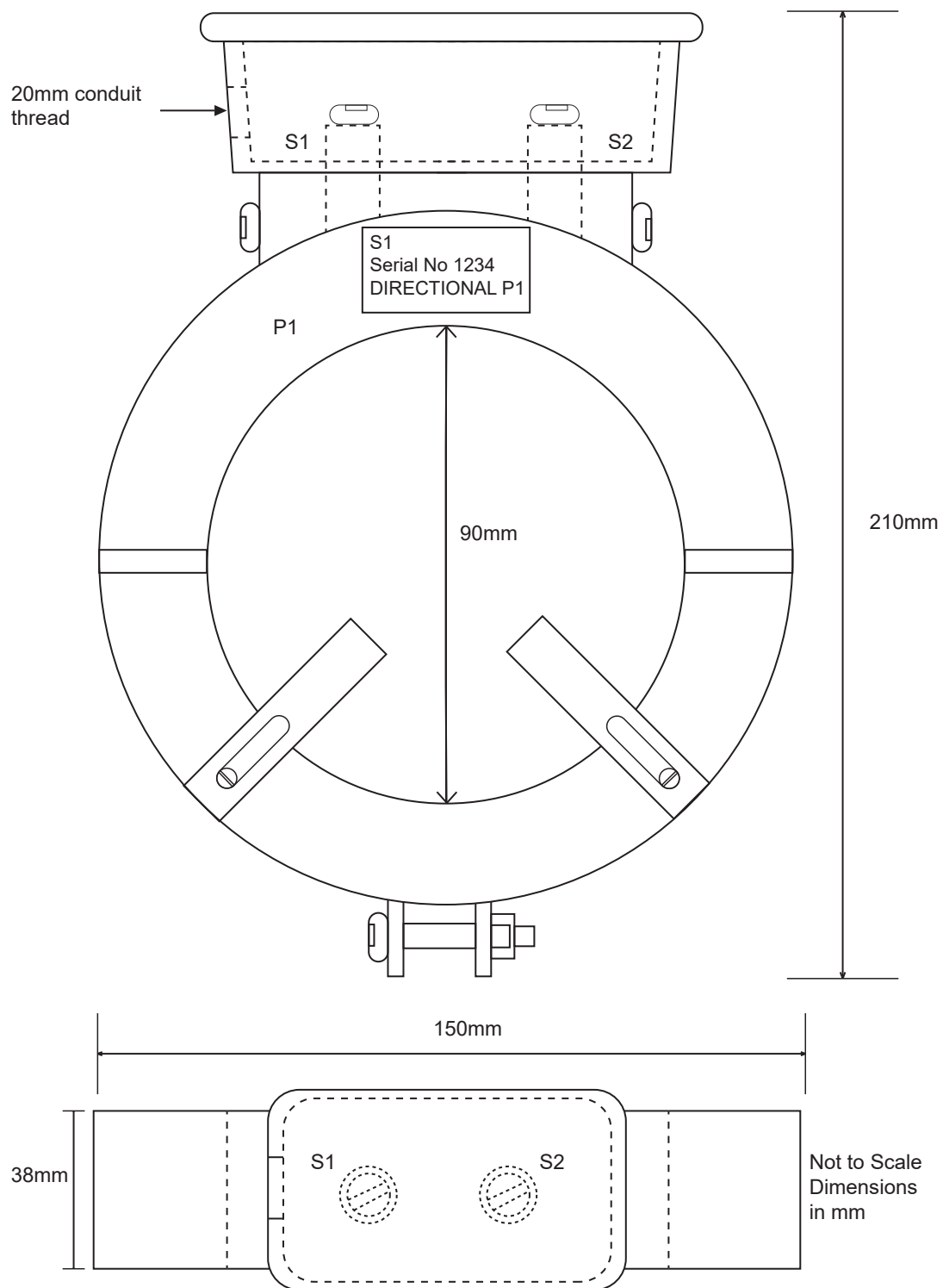
The BATTERYLESS NB EFI requires a special 60:1 ratio cast resin split core balance C/T. The Split Core C/T has a tertiary winding to capture the energy required to power the relay. However a standard 60:1 ratio C/T may be used instead. The C/T can be installed externally on the incoming cable, or within the dry cable termination box. The earthing requirements must be observed to allow any sheath current to be cancelled by returning the earth path back through the C/T (see diagrams).



Traditional external cast resin C/T installation. Insulated gland at entry to cable box. An earth braid needs to be soldered to the earth termination and brought back through the C/T to cancel the earth fault flowing in the cable sheath.

Sheath earth terminates at insulated gland and so the C/T can be installed in the base of the cable box where it will detect only out of balance caused by earth fault flowing in one phase.





SPLIT EFI Cast Resin Current Transformer with Terminal Box
OUTLINE DRAWING DKM 1246/B

6.0 TYPE TESTING

Electro Magnetic Compatibility

Conformity Testing to Council Directive to 2014/30/EU

Emissions: EN55 022 & EN61000-3-2 EN61000-3-3

Immunity: EN61 326 (class A) - EN61000-4-2 to EN61000-4-6 & EN61000-4-11

Power Frequency Magnetic Field

Immunity to EN 61000-4-8 REFERENCING PROCEDURE: MAG-01B

Short Circuit Testing

Immunity to maximum voltage at C/T input on saturation.

Low Voltage Directive

Conformity Testing to Council Directive 2014/35/EU

Environmental

Enclosure testing to IP65 with additional accelerated tests to freeze/thaw cycle, humidity and salt spray.

Temperature Testing:

Temperature cycle testing between -20°C to +70°C

7.0 ROUTINE TESTING

Functional testing is carried out on 100% of all manufactured units before shipping.

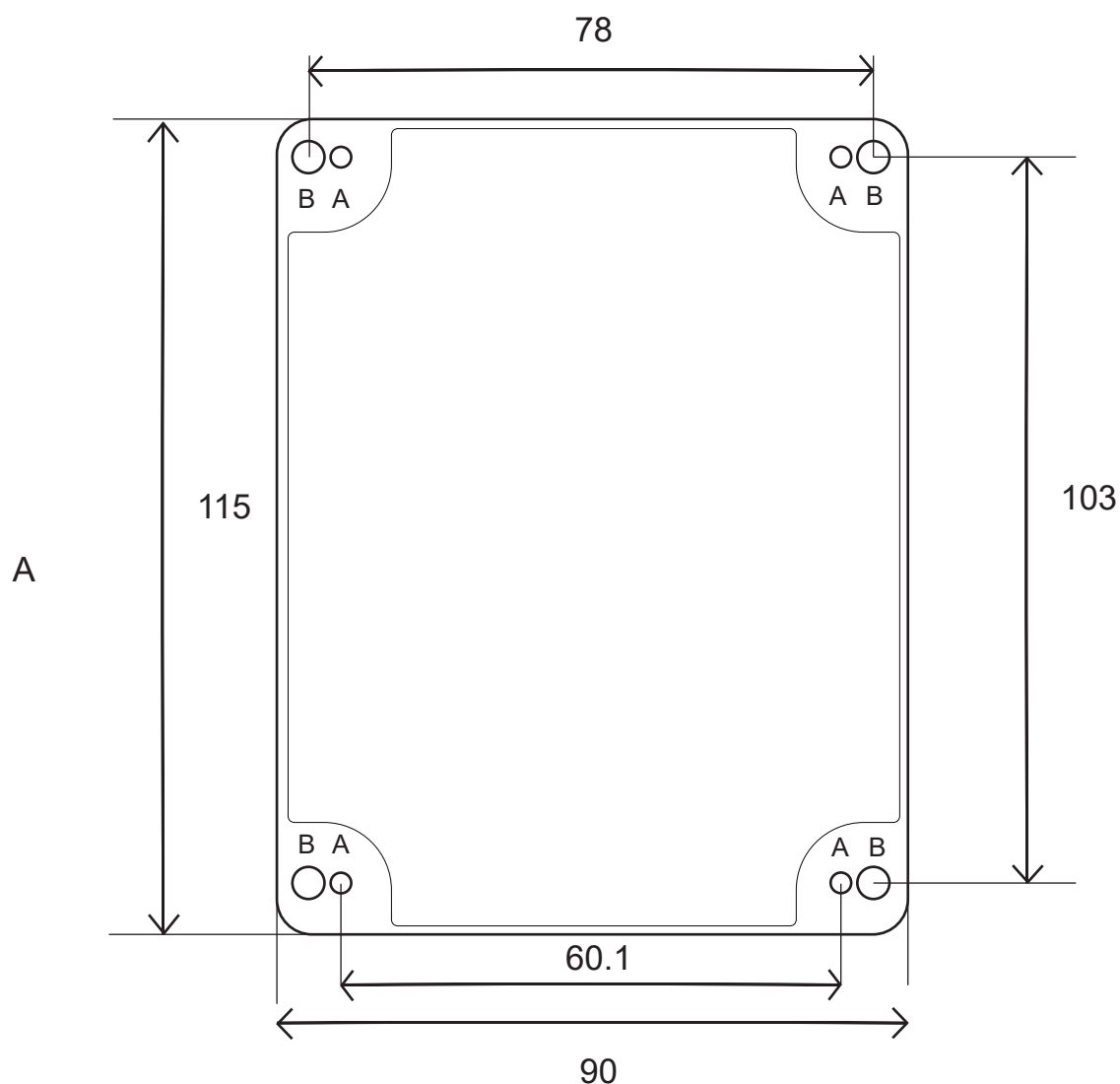
8.0 SPECIFICATION

Indication:	Flag Indicator BLACK/RED
Trip Level:	Standard Nominal – 30 Amps +/- 15 Amps.
Trip Delay:	Nominal 40msecs +/- 15%
Reset Time:	3 hours +/- 15 mins
Output relay Adv. :	Changeover relay - common / NO / NC 110V dc /125V ac. 1 Amp. 30 Watt maximum.
Reset Signal Adv:	220/240 50 Hz or 6 to 30V a.c or d.c applied for 10 secs.
Temperature Range:	-20°C to +70°C
Enclosure:	Polycarbonate – IP65

9.0 MOUNTING DATA

Location of Fixing Holes in Back Box

The Batteryless NB can be secured with 4mm screws through the mounting holes 'A' in the back box, as detailed above, alternatively the front lid can be panel mounted with suitable cut-out using fixing screws through the panel mount holes 'B'.



HOLES A

Through holes for fixing back box

HOLES B

Captive threaded holes for fixing front to back box

Dimensions in mm

VERSION 3.0

RELEASE 20.02.25

ECO Reference
ECO0219