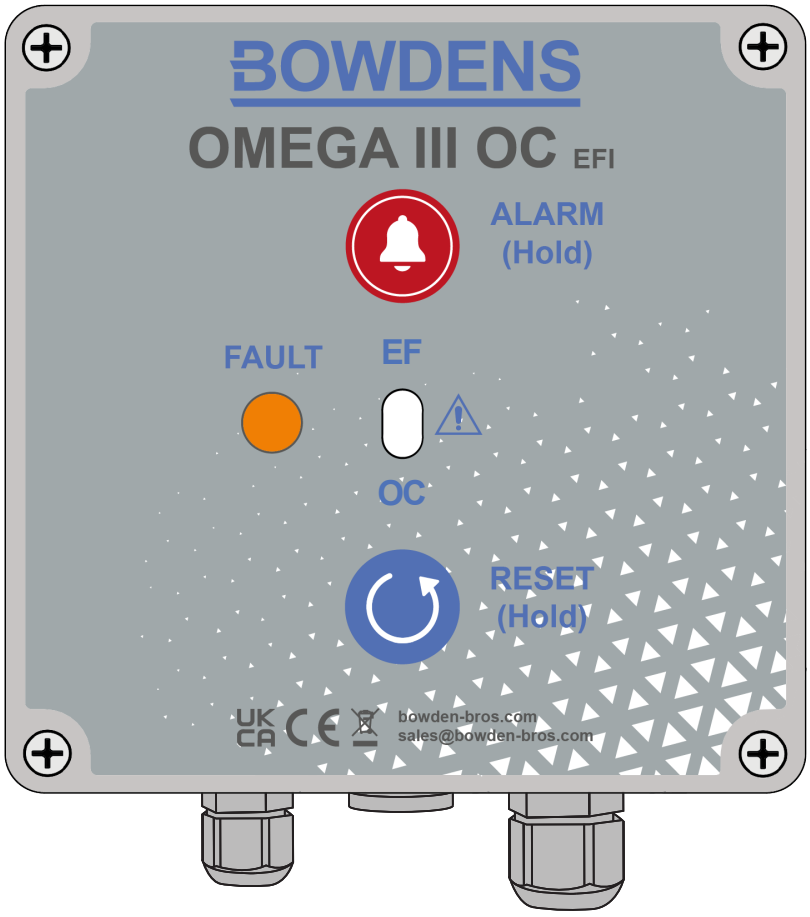
BOWDENS

OMEGA III OC



EARTH FAULT INDICATOR FOR UNDERGROUND CABLE NETWORKS

enquiries@springltd.co

1.0 OVERVIEW

The Omega III OC EFI is a HV fault indicator designed to locate earth and overcurrent faults on cable networks with high accuracy and integrity. It will flash a bright LED as well as rotate the flag indicator to red under fault condition. It will reset automatically on a timed reset, or by restoration of the LV supply or, from a remote reset control signal or by operation of the reset button. The Omega III OC consists of a small polycarbonate box, which is fully water spray and dust proof to IP65. The electronic circuit board within the module is coated using a micro film process to provide protection from weather and environmental conditions when installed externally. The EFI is fully EMC tested to ensure compliance with the required standards for the UK CA and CE mark. It is also tested for power frequency magnetic fields, for stability in a field at 5000Amps/metre, an onerous test to EN61000-4-8 to ensure perfect immunity to high magnetic fields during fault conditions. Fault detection is derived from a remote CT located either around the three phase incoming cable (as long as there is an insulated gland between the cable and the switchgear) or within the dry cable termination box (see 6.0).

2.0 OPERATION
ROTARY SWITCH USER SETTABLE VALUES
TRIP THRESHOLDS

Fault current on the cable network generates a proportional voltage at the CT secondary output, which if above a pre-set threshold will trigger the processor. This starts a trip delay during which any signals are suppressed. This is to allow magnetising inrush or capacitive currents on the HV network to dissipate. Once this trip delay (nominal 20msecs) is over, the EFI will respond to any current above the pre-set trip threshold, and will start the LED flashing, and flip the flag indicator. The trip level and the trip delay are user settable between the values given below by rotating the actuator SW3 (over current trip level) SW4 (earth fault trip level) and SW5 (trip delay). The timed reset is set using SW6 (reset time).

SW 3 - OC Threshold:

0	1	2	3	4	5	6	7	8	9
OFF	200 Amps	300 Amps	400 Amps	500 Amps	550 Amps	600 Amps	650 Amps	700 Amps	750 Amps

SW 4 - EF Threshold:

0	1	2	3	4	5	6	7	8	9
OFF	40 Amps	60 Amps	80 Amps	100 Amps	120 Amps	140 Amps	150 Amps	170 Amps	200 Amps

SW 5 - Trip delay/detection time: select the number of 50 Hz cycles required before the EFI confirms fault current. NOTE: This switch adjusts both earth fault and overcurrent trip delays.

Earth fault trip delay detection time:

0	1	2	3	4	5	6	7	8	9
1 cyls	2 cyls	3 cyls	4 cyls	5 cyls	6 cyls	7 cyls	8 cyls	9 cyls	10 cyls

Overcurrent trip delay detection time:

0	1	2	3	4	5	6	7	8	9
2 cyls	4 cyls	6 cyls	8 cyls	10 cyls	10 cyls	10 cyls	10 cyls	10 cyls	10 cyls

SW 6 - Reset time: select the time in hours before the EFI resets to the alert state.

0	1	2	3	4	5	6	7	8	9
No Reset	2 hours	3 hours	5 hours	6 hours	7 hours	8 hours	9 hours	10 hours	12 hours

RESET : LV RESET - MANUAL - REMOTE - TIMED

There are four methods of resetting the relay:

1. LV reset: the Omega III OC will reset when the local LV source is re-energised ie. restoration of supply. The LED will flash three times and then cancel, the flag indicator will return to black, and the output relay will return to normal state. Note: This reset time can take up to two minutes.
2. Manual reset: there are two manual buttons on the front face of the relay, one to put the unit into alarm and another to reset the alarm.
3. Remote reset: an external signal between 6 – 30V AC or DC can be applied to the reset terminals for a minimum of 10 secs.
4. Timed reset: in case the local LV supply is off for a sustained period, the EFI will reset according to SW6 (see above).

OUTPUT RELAY

The Omega III OC EFI incorporates a two pole changeover output relay brought out to two sets of terminal connectors, which provide volt free contacts for an external telecoms interface (Normally Open, Common, Normally Closed). It can be configured using SW7 switches. The EFI incorporates our multi-detect feature, which means the relay will respond to fault current when the instrument trips, but then will reset nine seconds later. The LED will remain flashing and the flag indicator will be set to red, but the output relay is ready to respond to subsequent faults. If connected to an RTU, it will indicate for the first, second, third, etc detection of fault current on the cable. Contacts are rated at 110V DC / 125V ac. 1 amp. 30 watt maximum.

SW 7 - Relay configuration

Switch 2	Switch 3	Action
Off	Off	Relay is latched on first fault
Off	On	Relay is latched on first fault
On	X	Relay is latched on first fault (multi-detect)

When the EFI is configured as multi-detect, the relay will respond to fault current when the instrument trips, but then will reset nine seconds later. The LED will remain flashing and the flag indicator will be set to red, but the output relay is ready to respond to subsequent faults. If connected to an RTU, it will indicate for the first, second, third, etc detection of fault current on the cable.

MANUAL BUTTONS

Press the ALARM button. The red LED will flash once and then every four seconds. The flag indicator will turn from black to red. Press and hold the RESET button for approx three seconds, the red LED will flash three times before resetting.

REMOTE LEDS

The Omega III OC has the facility to drive remote LEDs (ie. EF fault, OC fault, LEFT directional fault, RIGHT directional fault) which will then flash in unison with the LED on the unit. This is connected to the remote LED indicator connector.

REMOTE RESET (Option)

The Omega III can be reset remotely using a signal from an RTU. The reset signal needs to be 6V to 30V AC or DC and applied for 10 seconds. The signal is connected using the remote reset connector.

CURRENT TRANSFORMER

The Omega III OC can be used with either a single core balanced Earth Fault C/T connected or with three separate Overcurrent Fault phase C/Ts connected. If connecting a single Earth Fault C/T, please use CT1 connector. If three C/Ts are fitted they must all be the same ratio. The user can specify at the time of order the Omega 4 C/T ratio as either 40:1, 60:1, 500:1 or 1000:1. Where 40:1 and 60:1 are recommended for Earth Fault core balanced C/Ts and 500:1 and 1000:1 are recommended for Overcurrent phase C/Ts.

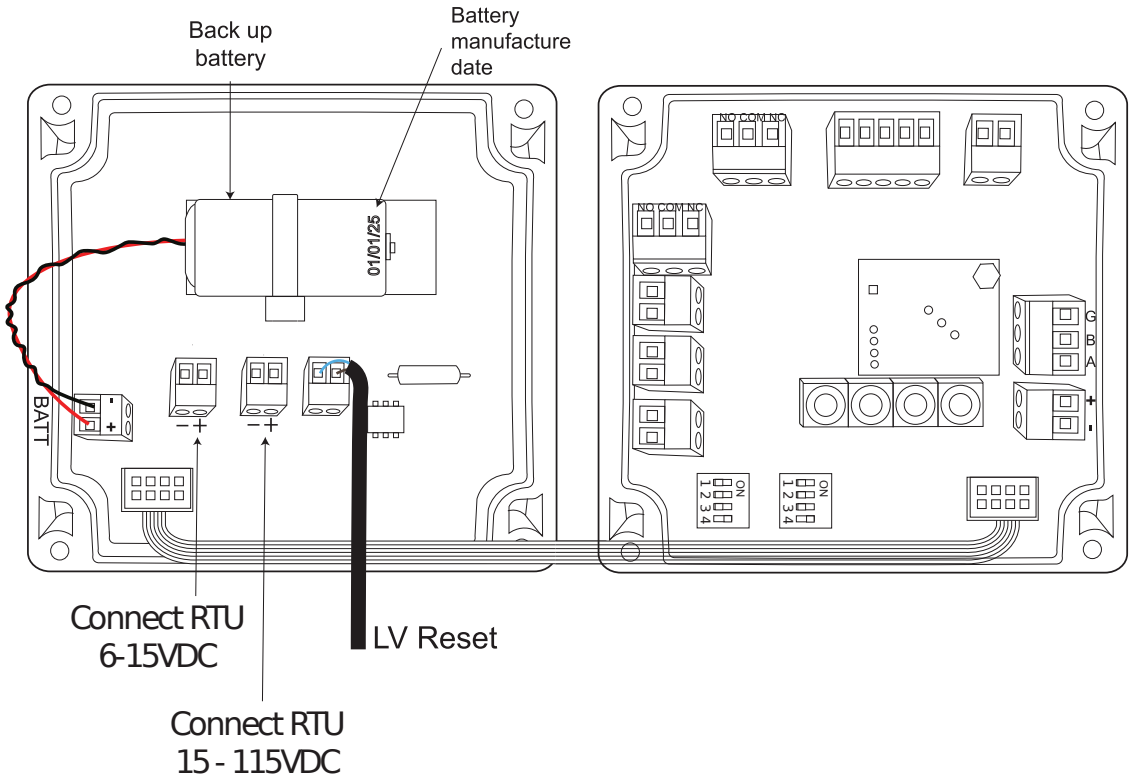
If using the Omega III OC as a directional fault passage indicator then please contact Bowdens for guidance.

3.0 POWER SUPPLY

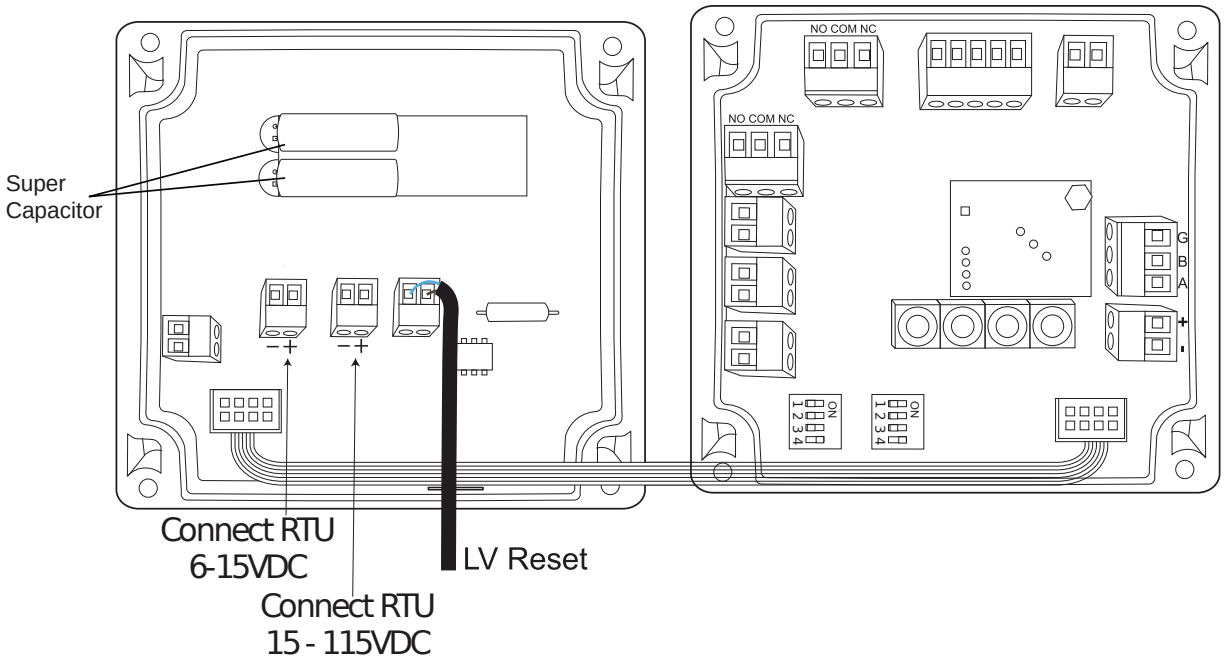
The Omega III OC EFI can be powered from an RTU power source. This is between 6 and 115VDC. Do not exceed the maximum voltage of each conector as labelled.

Power is connected to this terminal via one of the four M12 glands using 0.5mm² mains flex from the local RTU supply. The RTU power supply will power the EFI and charge the internal super capacitor, which powers the unit during fault conditions when the RTU source is not present.

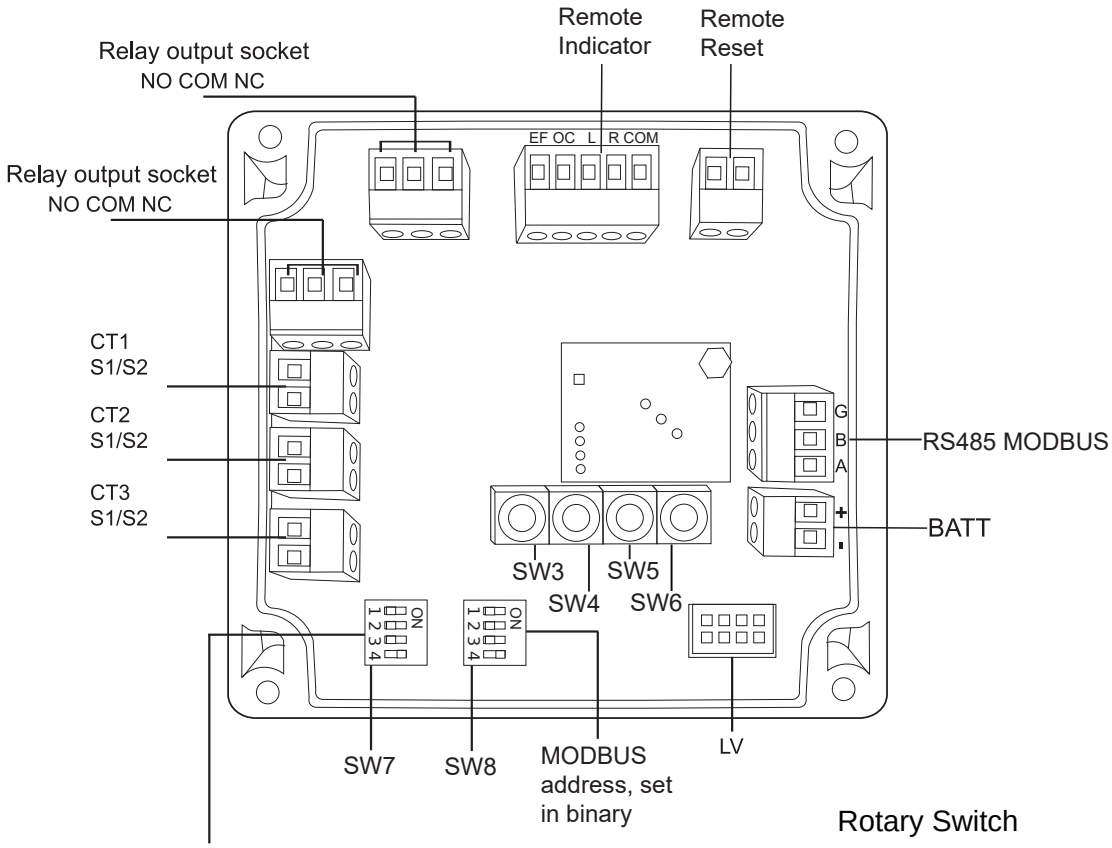
Bowdens Omega 4 RTU BB - RTU (Remote Terminal Unit) with a battery backup.



Bowdens Omega 4 RTU SC - RTU powered unit with a Super Capacitor Backup (no battery fitted).



4.0 CONNECTIONS



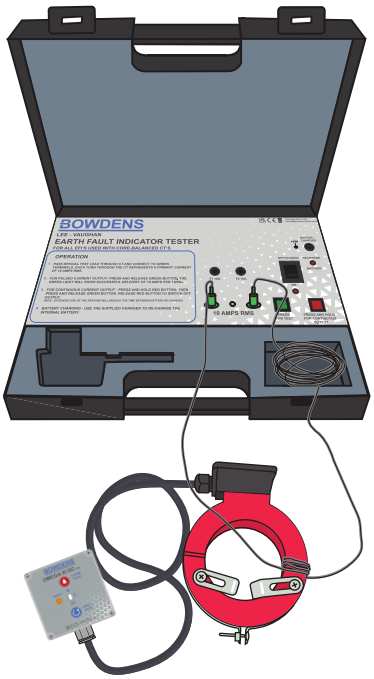
1 - Spare
2 - Multi detect - OFF/ON
3 - Relay pulse - OFF/ON
4 - LV reset - OFF/ON

Rotary Switch

SW3 Over current trip see 2.0 for settings
SW4 Earth fault trip see 2.0 for settings
SW5 Trip delay see 2.0 for settings
SW6 Reset time 2.0 for settings

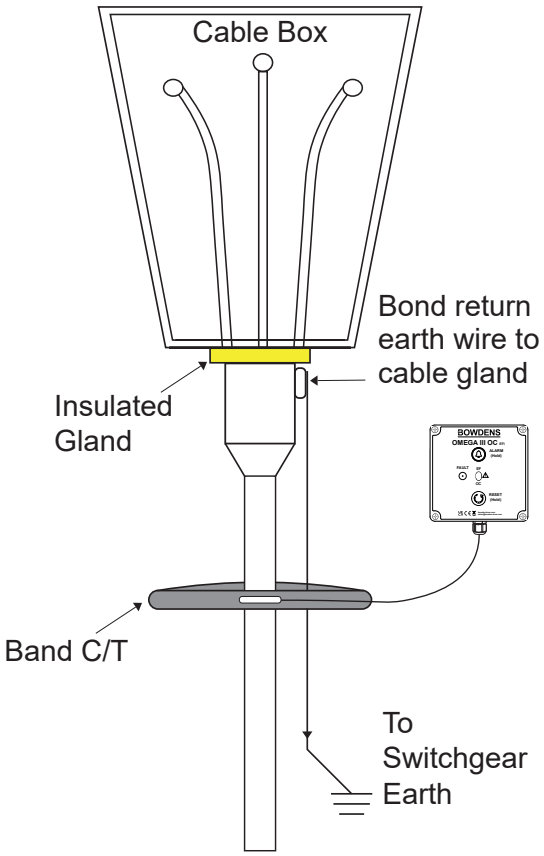
5.0 TESTING OF INSTALLATION

The complete EFI installation should be tested following installation, and at service intervals to ensure correct operation. Bowdens manufacture a mobile injection tester that makes this task easy. For a trip level of 40A (set by SW5), 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 three turns for 30 Amps. The tester delivers the current for a time>40msecs to test the trip delay. The relay can be tested using the manual ALARM button, and can also be RESET.



6.0 CURRENT TRANSFORMER INSTALLATION

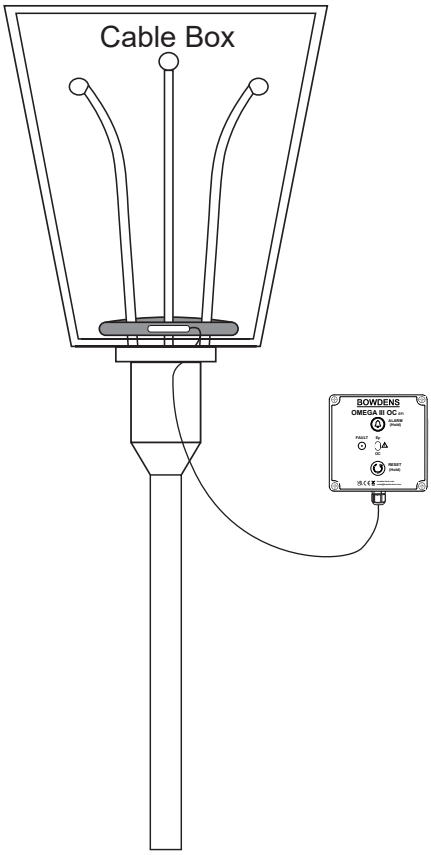
The Omega EFI is compatible with both standard 60:1 ratio cast resin core balance C/Ts, or the 1000:1 Bowdens band sensor C/T, both of which can be installed externally on the incoming cable, or within the dry cable termination box. NOTE: C/T ratio must be specified at time of order. The earthing requirements must be observed to allow any sheath current to be cancelled by returning the earth path back through the C/T (see diagrams).



External Band Current Transformer

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.

The sheath earth terminates at the 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 current caused by an earth fault flowing in one phase.

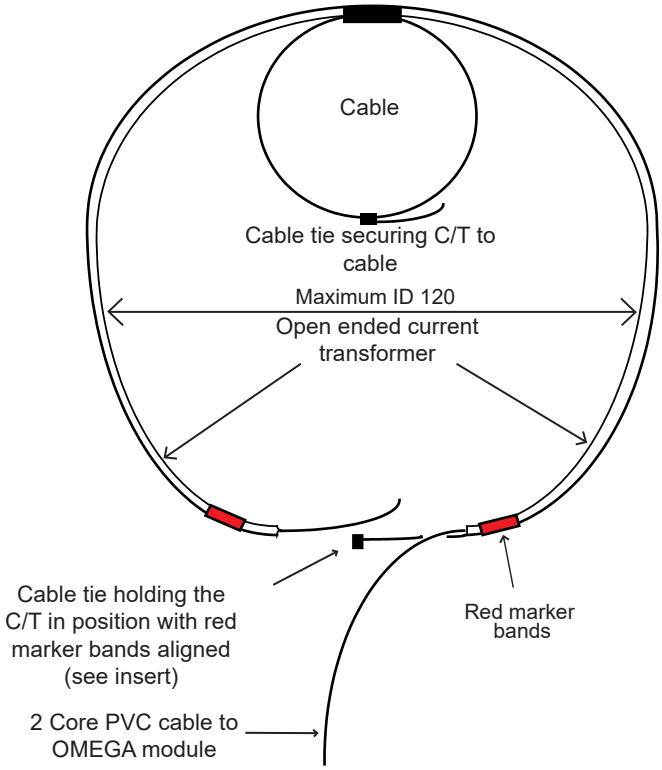


Band Current Transformer in Dry Cable Box

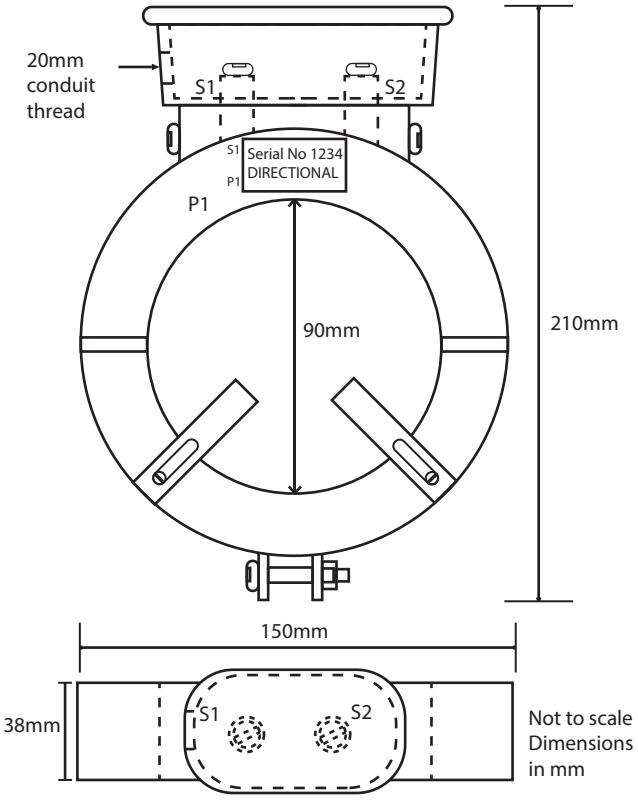
CT SELECTION
BAND SENSOR C/T

The 1000:1 ratio C/T is encapsulated in a flexible polyolefin tubing with a thermoplastic adhesive inner liner. The inner liner melts when the material is shrunk to seal and encapsulate the internal components of the band C/T, thus offering environmental protection. The polyolefin tubing has an operating temperature range of -55°C to +85°C and performs well on exposure to UV. The flexible band sensor C/T can be produced up to 1.3 metres in length, so it can be used to encompass three phase conductors (see BAND C/T diagram) within the cable box, making it very adaptable.

BAND CT - A 1000:1 split core C/T in polyolefin tubing.

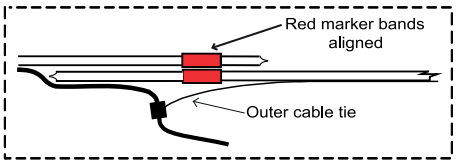


CAST RESIN SPLIT CORE C/T - A 60:1 ratio split or solid core C/T can also be used and mounted on the incoming cable, but must have a burden resistor across the input of the C/T.



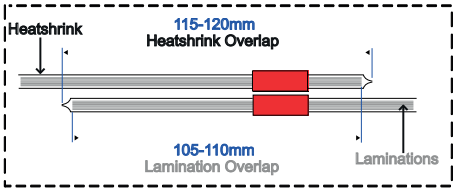
Split EFI cast resin current transformer with terminal box Drawing 1246/B

Align RED MARKERs Carefully



Not to scale
Dimension in mm

Correct Overlap Measurement



7.0 TYPE TESTING

7.1 Electro Magnetic Compatibility

Emissions
1.1.1 EN 55 022: Radiated Emission Limits
1.1.2 EN 55 022: Conducted Emission Limits
1.1.3 EN 61000-3-2 Harmonic Values and Limits of Harmonics
1.1.4 EN 61000-3-3 Voltage Fluctuations
1.2 Immunity EN 61 326
1.2.1 EN 61000-4-2: Electrostatic Discharge
1.2.2 EN 61000-4-3 Radiated Immunity Testing
1.2.3 EN 61000-4-4 Fast Transients
1.2.3 EN 61000-4-5 Surge Immunity
1.2.3.5 EN 61000-4-6 Immunity to conducted radio frequency above 9kHz
1.2.4 EN 61000-4-11 Voltage Dips, Short Interruptions and Voltage Variations

7.2 Low Voltage Directive

Council Directive 2014/35EU.

7.3 Power Frequency Magnetic Field

Immunity to EN 61000-4-8 referencing procedure: MAG-01B

7.4 Short Circuit Testing

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

7.5 Environmental

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

7.6 Temperature Testing:

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

8.0 ROUTINE TESTING

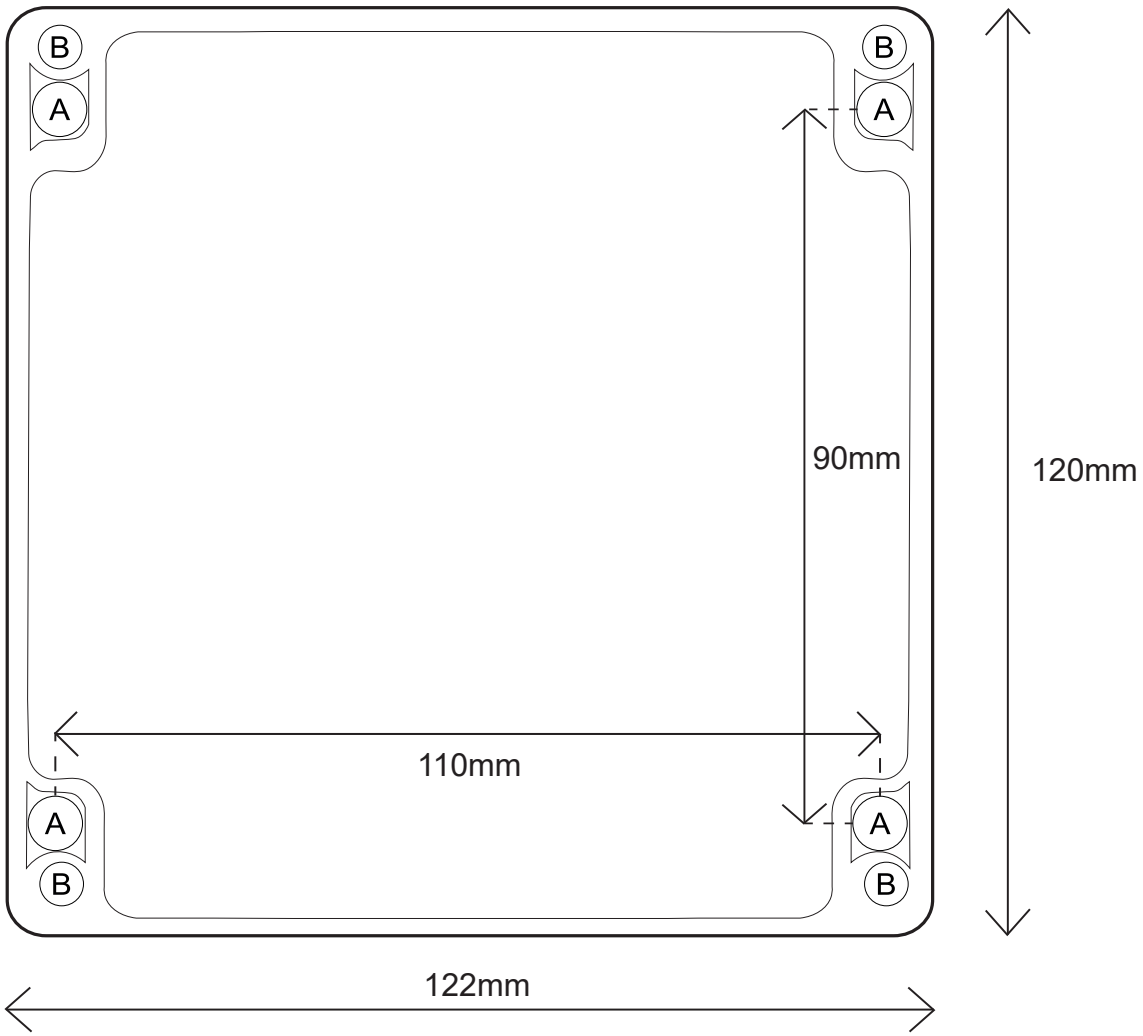
Functional testing is carried out on 100% of all manufactured units before shipping.

9.0 SPECIFICATION

Indication:	**Bright red LED Earth Fault, bright yellow LED over current and mechanical flag black/red**
Trip Level:	**User selectable between 40 Amps and 200 Amps**
EFI Accuracy:	**+/- 5% Over all readings 60-200A (sinusoidal input)** **+/- 6% At 40A readings (sinusoidal input)**
120mm Band CT Accuracy:	**+/-10% Over all readings (sinusoidal input)**
80mm Band CT Accuracy:	**+/-10% Over all readings (sinusoidal input)**
Trip Delay:	**Pre-set at 20msecs nominal**
Reset Time:	**Pre-set at 12 hours +/- 10 mins**

Output relay:	**Two pole changerover relay - common / NO / NC for each pole. Contact rating: 110V DC / 125 AC. 1 Amp. 30 Watt maximum.**
Reset Signal:	**6 to 30VAC or VDC applied for 10 secs.**
Temperature Range:	**-20°C to +70°C**
Enclosure:	**Polycarbonate – IP65**

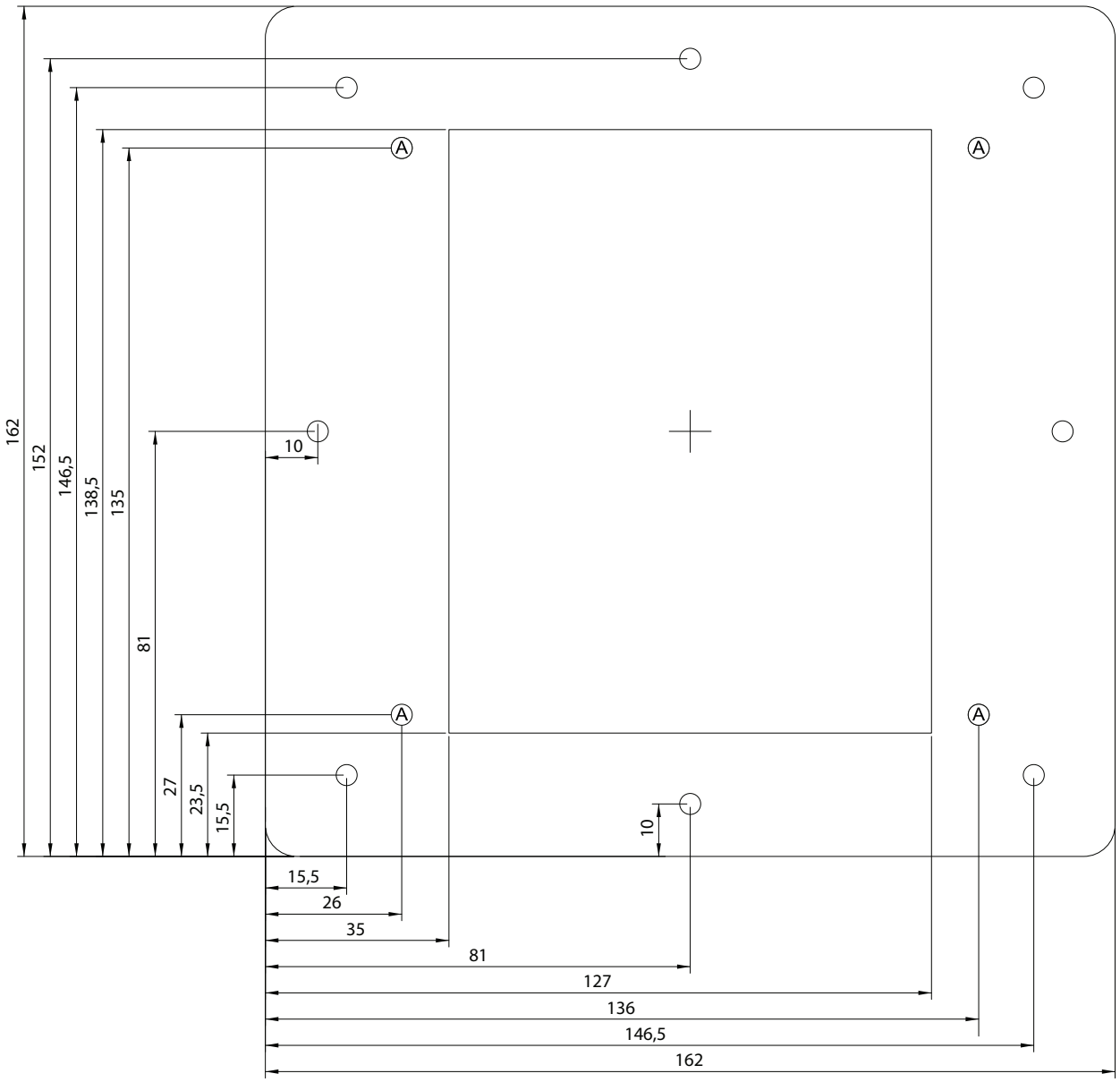
10.0 MOUNTING DATA



HOLES ‘A’	Corner fillet holes for fixing OMEGA III OC base Holes 4mm diameter Distances between centres Dimensions in mm Not to scale
HOLES ‘B’	Recessed screw holes for securing OMEGA III front panel

11.0 PANEL MOUNT BRACKET

The drawing below shows the optional panel mount bracket which allows the Omega III to be panel mounted.



Note 1 : All dimensions in mm.

Note 2 : All holes 4.0mm diameter, countersunk.

Note 3 : Holes marked as ‘A’ are to secure the Omega III OC behind the panel mount bracket. All other holes are to secure the bracket to the panel.

12. MODBUS REGISTERS

Live	Register Number	Type
TempLW	3	float32 (low 16 bits)
TempHW	4	float32 (high 16 bits)
Phase 1	5	int16 read only
Phase 2	6	int16 read only
Phase 3	7	int16 read only
Earth	8	int16 read only
LV freq	9	int16 read only
Battery good	10	int16 read only
Power good	11	int16 read only
Faults 1	20	int16 read only
Fault 1 Type	21	int16 read only
Fault 1 Earth	22	int16 read only
Fault 1 Phase 1	23	int16 read only
Fault 1 Phase 2	24	int16 read only
Fault 1 Phase 3	25	int16 read only
Fault 1 DateTime LW	26	uint32 (unix time) read only
Fault 1 DateTime HW	27	uint32 (unix time) read only
Fault 1 Angle Earth	28	int16 read only
Fault 1 Angle Phase 1	29	int16 read only
Fault 1 Angle Phase 2	30	int16 read only
Fault 1 Angle Phase 3	31	int16 read only
Faults 2	33	int16 read only
Fault 2 Type	34	int16 read only
Fault 2 Earth	35	int16 read only
Fault 2 Phase 1	36	int16 read only
Fault 2 Phase 2	37	int16 read only
Fault 2 Phase 3	38	int16 read only
Fault 2 DateTime LW	39	uint32 (unix time) read only
Fault 2 DateTime HW	40	uint32 (unix time) read only
Fault 2 Angle Earth	41	int16 read only
Fault 2 Angle Phase 1	42	int16 read only
Fault 2 Angle Phase 2	43	int16 read only
Fault 2 Angle Phase 3	44	int16 read only

12. MODBUS REGISTERS

Live	Register Number	Type
Faults 3	46	int16 read only
Fault 3 Type	47	int16 read only
Fault 3 Earth	48	int16 read only
Fault 3 Phase 1	49	int16 read only
Fault 3 Phase 2	50	int16 read only
Fault 3 Phase 3	51	int16 read only
Fault 3 DateTime LW	52	uint32 (unix time) read only
Fault 3 DateTime HW	53	uint32 (unix time) read only
Fault 3 Angle Earth	54	int16 read only
Fault 3 Angle Phase 1	55	int16 read only
Fault 3 Angle Phase 2	56	int16 read only
Fault 3 Angle Phase 3	57	int16 read only
Faults 4	59	int16 read only
Fault 4 Type	60	int16 read only
Fault 4 Earth	61	int16 read only
Fault 4 Phase 1	62	int16 read only
Fault 4 Phase 2	63	int16 read only
Fault 4 Phase 3	64	int16 read only
Fault 4 DateTime LW	65	uint32 (unix time) read only
Fault 4 DateTime HW	66	uint32 (unix time) read only
Fault 4 Angle Earth	67	int16 read only
Fault 4 Angle Phase 1	68	int16 read only
Fault 4 Angle Phase 2	69	int16 read only
Fault 4 Angle Phase 3	70	int16 read only

12. MODBUS REGISTERS

Live	Register Number	Type
Faults 5	72	int16 read only
Fault 5 Type	73	int16 read only
Fault 5 Earth	74	int16 read only
Fault 5 Phase 1	75	int16 read only
Fault 5 Phase 2	76	int16 read only
Fault 5 Phase 3	77	int16 read only
Fault 5 DateTime LW	78	uint32 (unix time) read only
Fault 5 DateTime HW	79	uint32 (unix time) read only
Fault 5 Angle Earth	80	int16 read only
Fault 5 Angle Phase 1	81	int16 read only
Fault 5 Angle Phase 2	82	int16 read only
Fault 5 Angle Phase 3	83	int16 read only
Faults 6	85	int16 read only
Fault 6 Type	86	int16 read only
Fault 6 Earth	87	int16 read only
Fault 6 Phase 1	88	int16 read only
Fault 6 Phase 2	89	int16 read only
Fault 6 Phase 3	90	int16 read only
Fault 6 DateTime LW	91	uint32 (unix time) read only
Fault 6 DateTime HW	92	uint32 (unix time) read only
Fault 6 Angle Earth	93	int16 read only
Fault 6 Angle Phase 1	94	int16 read only
Fault 6 Angle Phase 2	95	int16 read only
Fault 6 Angle Phase 3	96	int16 read only

12. MODBUS REGISTERS

Live	Register Number	Type
CT Ratio	102	int16 read / write
EF Trip	103	int16 read / write
EF Delay	104	int16 read / write
OC Trip	105	int16 read / write
OC Delay	106	int16 read / write
Reset Time	107	int16 read / write
Reset LV	109	int16 read / write
Reset LV Time	110	int16 read / write
Mode	111	int16 read / write
Relay Mode	112	int16 read / write
Bias Fitted	113	int16 read / write
Date Time LW	115	uint32 (unix time) read / write
Date Time HW	116	int16 read / write
Test Alarm	117	int16 write only
Reset Alarm	118	int16 write only



Please consider the environment at the end of this product's life.
At end of life please take this unit to your closest electrical recycling point or return this unit to Spring (Europe) Limited for recycling.
Recycle Responsibly
ISO14001

VERSION 3.3
RELEASE 16.06.26

ECO Reference	Date
ECO0261	28.05.25
ECO0371	08.09.25
ECO0416	04.02.26
ECO0462	16.06.26