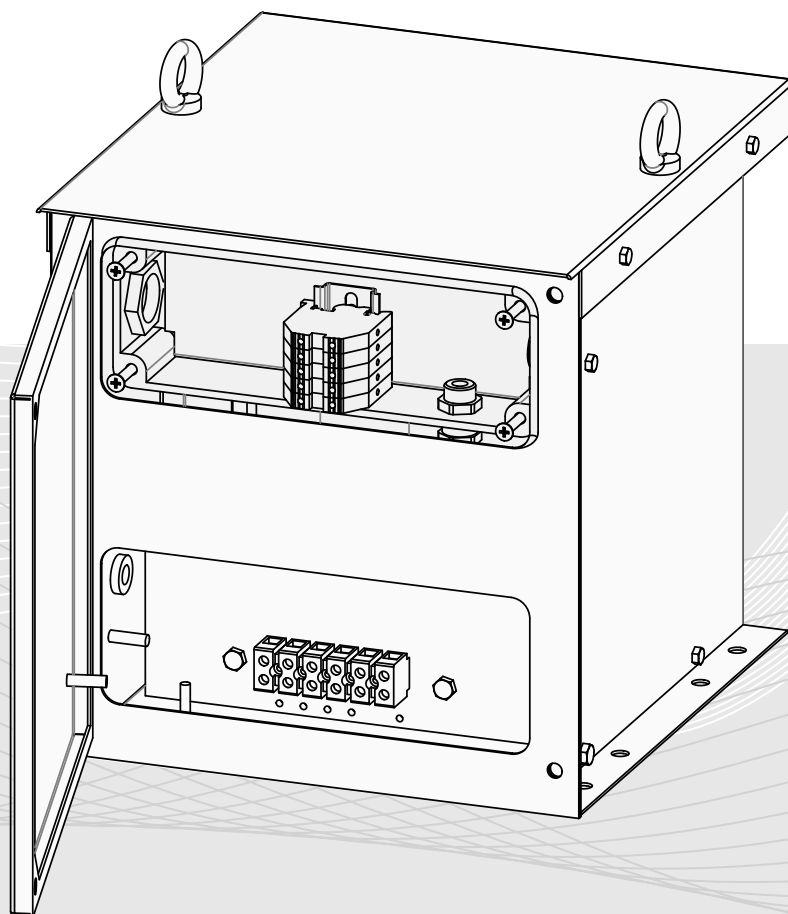


O&M MANUAL

CLASS II HYBRID TJ'S FOR NETWORK RAIL
POWER DISTRIBUTION NETWORKS



English

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Version	Implemented By	Revision Date	Approved By	Approval Date	Reason
1	B.M.	23/11/15	N.D.H.	08/12/15	Issue 1
2	B.M.	01/02/16	N.D.H.	01/02/16	PADS No's Included
3	C.W.	12/04/19	N.D.H.	12/04/19	Configurations Added
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5	C.W.	22/03/23	N.D.H.	22/03/23	Legacy Bracket Catalogue Numbers Added to App D

1. INTRODUCTION

1.1 SAFETY NOTES

SAFETY PRECAUTIONS	
GENERAL	The need for Personal Protection Equipment (PPE) must be assessed prior to undertaking installation or maintenance operations.
HEAVY EQUIPMENT	All manual handling must be in accordance with the Manual Handling Operations Regulation 1992
LETHAL VOLTAGES	<p>Electrical power within this system/equipment is at a level considered, by the low voltage directive 73/23/EEC, to be sufficient to kill.</p> <p>Always assume conductors are live until proved dead.</p> <p>Before attempting any maintenance task, ensure that equipment is isolated from electrical supply.</p> <p>When the electrical supply cannot be isolated, testing/maintenance tasks are to be undertaken only by personnel who are aware of the dangers involved and after all necessary precautions have been taken.</p>
WORKING PRACTICES	<p>Unauthorized interruption of the system may endanger the safe operation of the railway. Before attempting any maintenance on the equipment, obtain the necessary permission from the relevant authority. Ensure the consequence of any interruption has been fully considered and understood.</p> <p>If a component or equipment becomes overheated or burnt, a toxic fume hazard may exist. Isolate the power to the equipment, ventilate the area and allow the equipment time to cool before carrying out repairs.</p> <p>This equipment does not liberate any toxic or injurious gases during normal operation.</p> <p>When working on equipment, especially in the confines of a case, do not wear metal rings, bracelets, watches, etc. These articles can cause personal injury or damage to equipment by becoming entangled in components or causing a short circuit.</p>

1.2 PURPOSE

Class II Hybrid Isolation Transformer Rectifiers for Network Rails class II based signaling power distribution systems, suitable for class I legacy system integration.

1.3 GUARANTEE

The function and safety of the equipment is only guaranteed if the warning and safety instructions included in this manual are adhered to.

ATL Transformers Ltd is not liable for any personal injury or damage to property that occurs as a result of the warning and manual being disregarded.

ATL Transformers Ltd does not accept any liability or warranty for damage due to the use of non-approved spare parts and accessories.

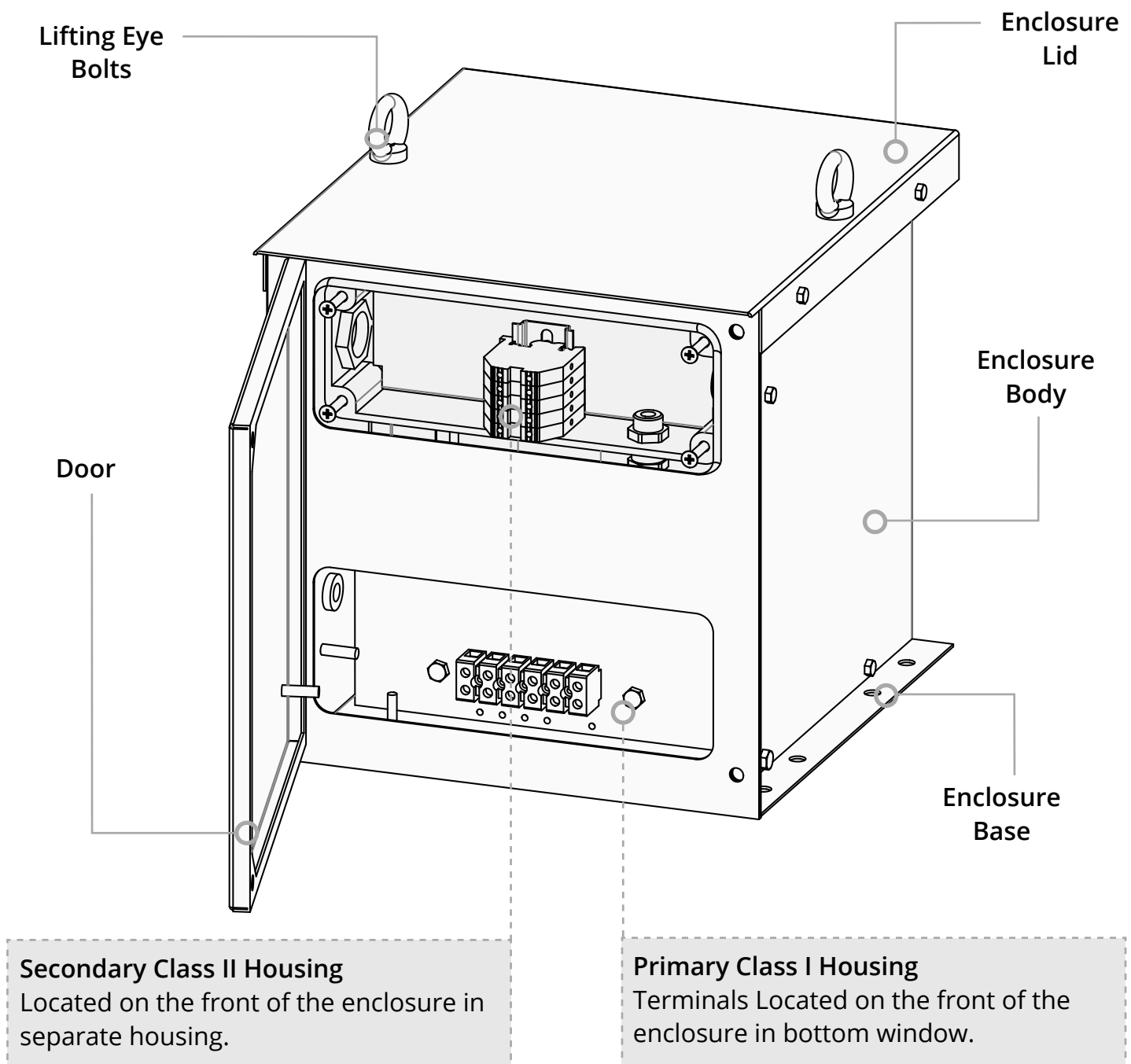
2. PRODUCT DESCRIPTION

2.1 KEY eco-rail® FEATURES

The enclosed transformer rectifier fits inside a standard Network Rail Apparatus Housing. The transformers rectifiers have an ingress protection rating greater than IP32.

Primary Class II terminals are housed within a separate double insulated enclosure and feature a protective inspection cover which enables cables to be traced from the point of entry and inspection of Class II terminals under load.

Optional gland entry zones for both class I output and class II input cables are available on either side of the enclosure. IP5X blanking glands are provided to seal the unused gland holes once cables have been terminated. This feature limits the need for additional cabling/conduit and reduces location restrictions commonly found within the FSP Apparatus Housing.



2.2 PRODUCT OPERATION

The Transformer Rectifier is designed to be fed from two wires 650VAC ($\pm 10\%$) Supply at a nominal 50Hz (+4% to -6%).

The 650VAC Class II supply cables are to be connected within the double insulated compartment through a straight or angled insulated coupling suitable for M32 flexible conduit. Conduit should meet the requirements of NR/L2/SIGELP/27410 Issue 2 & NR/L2/SIGELP/27421 & 27422.

Cables are terminated to the transformers DIN rail terminal blocks provided within the double insulated compartment which are designed to accept a cable size between 0.5-10mm².

The 120VDC Class I Output cables are connected to the transformer rectifier through an Insulated M20 Cable gland and terminated to the provided terminal blocks which are designed to accept a cable size between 0.5-10mm².

Optional Cable entry points are provided at either side of the enclosure for

Both Class I & Class II cables. Insulated Blanking glands are provided to cap the un-used cable entry points on the enclosure and must always be fitted.

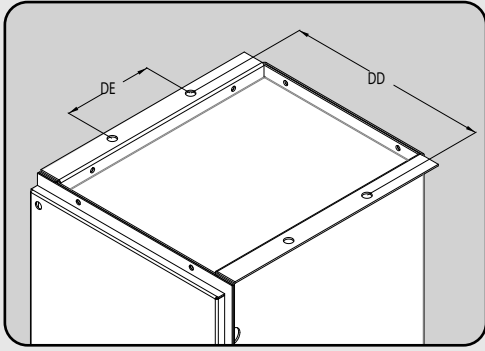
The functional earth terminal is located with the Class I termination and is designed to accept a cable size between 0.5-10mm².

All cabling should meet the requirements of NR standards:

NR/L2/SIGELP/27410 Issue 2 and NR/L2/SIGELP/27421 & 27422.

3. PRODUCT INSTALLATION

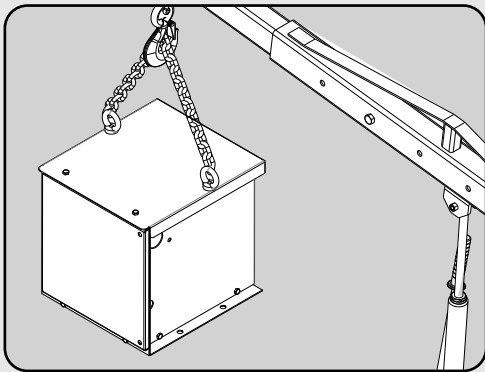
3.1 MOUNTING WITHIN APPARATUS HOUSING



Additional mounting brackets are available for backplate legacy installations where required reference Appendix D of this document.

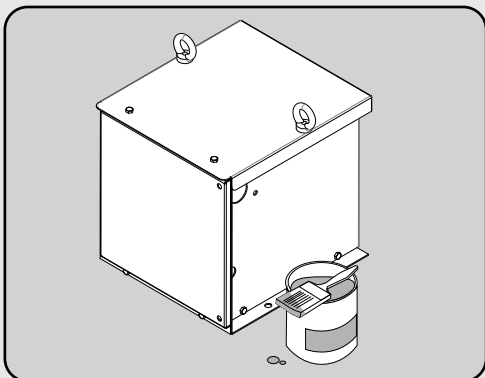
1. Dimensioning

The transformers shown in the general arrangement drawings in Appendix A are designed to be securely fixed to substantial mounting rails or brackets such as BRS SM 440 bar work. The bar work should be capable of bearing the weight of the transformer using the 4 horizontal footprint holes shown in Appendix A.



2. Lifting

Safe lifting practices should be observed when handling heavy transformers. Larger units 1KVA and above 30Kg + are fitted with additional top mounted removable lifting eyes for crane assisted installation. Ensure that the lifting eyes are secure and that the main door is closed prior to lifting.



3. Repercussions

Due diligence and care should be taken not to damage any installed cable entry glands or couplings during the installation process as this could compromise the safety integrity of the unit. In the event that the paint finish is damaged during installation a touch up pen is available for aesthetics however paint is supplementary to the base material and not critical to the units operational integrity.

3.2 CABLE CONNECTION

Primary: Cables enter via glands provided into a double insulated terminal compartment, cables can be secured using the cable clamps where provided and terminated accordingly. All terminations are accessible via the front access door.

Secondary: Cables enter via glands provided directly onto secondary terminals within the transformer housing. All terminations are accessible via the front access door.



NOTE: - If Ferrules are not being used cables should be stripped 10mm and secured into the terminals. The recommended torque setting is between 2.0 – 4.0 Nm.

3.3 VOLTAGE SELECTION

INPUT: Monitor the supply voltage with a calibrated DVM and take an average value over 3 minutes. Connect supply to the nearest input voltage terminal provided i.e. if the monitored voltage average RMS value over 3 minutes is 648 VAC then connect to the input terminals T650 and T0 respectively.

OUTPUT: The output terminals facilitate fine voltage adjustment and the relevant terminal should be used to achieve an output voltage of 120VDC \pm 2V under load. Ensure that the output voltage is achieved within the range of \pm 2V

4. PRODUCT MAINTENANCE

4.1 ROUTINE MAINTENANCE

These units are non-serviceable and require observational maintenance to their Class II terminals and protective covers which must be intact and installed as originally supplied. This does not supersede any maintenance tasks or scheduling procedures Network Rail deem necessary. Each unit is provided with a serial number and part code reference. This information is located on the transformer rating plate and should be quoted at any point where the unit is examined and suspected to be compromised.

4.2 TESTING IN SERVICE

Disconnect incoming supply, and secondary connections.

Using a calibrated 500V d.c insulation resistance tester check insulation resistance. Primary to body (Functional Earth) Secondary to body (Functional Earth) & Primary to Secondary.

All values should be greater than 100M ohms. Check Primary and Secondary winding resistances with values on Data Sheet in Appendix C, and reconnect incoming supply to Primary terminals.



WARNING

The Inspection cover on the double insulated Class II compartment **MUST** be fitted and secured in the correct orientation following its removal to access Class II terminals. The Inspection cover is notched so as not to locate easily in an incorrect orientation, the fitting of this part correctly after any work within the Class II compartment is essential in maintaining the Class II Integrity and safety of the transformer.

Check incoming supply voltage, adjusting Primary taps if necessary (using the method specified in section 3.3).

Check Primary tap voltages. Terminal voltages should be within 10% of the nominal 650VAC terminal voltage.

Reconnect secondary, and using a calibrated ammeter check the load current. The load current should not exceed the value shown on the data sheet in Appendix C.

Check Secondary tap voltages. Voltages should be within 2% of the terminal voltage. Adjust Secondary taps if necessary.

Relevant safety checks & testing should be conducted in addition to these checks & in line with Network Rails controlled safety & inspection procedures prior to energizing the transformer.

4.3 MAINTENANCE AFTER FLOODING

Please note that the transformer should be sent back to ATL Transformers if the transformer has sustained flooding

Please see section 7 of this document for contact details.

4.4 SPARE PARTS

Item	Part Reference
TOUCH UP PAINT	RS-PAINT-RAL6005-125ml
CLASS II BLANKING NUT	RS-BLANK-NUT-LNPB/25
CLASS II BLANKING PLUG	RS-BLANK-PLUG-66B
CLASS I BLANKING NUT	RS-BLANK-NUT-LNPB/20
CLASS I BLANKING PLUG	RS-BLANK-PLUG-65B
M8X18MM LIFTING EYE BOLTS	RS-M8-EYEBOLT-DIN580-COLLARED

5. TRAINING & COMPETENCE

The transformers are to be installed within a Network Rail approved Apparatus Housing by trained & authorized Network Rail installers only.

All maintenance activities shall be undertaken by trained and authorized Network Rail crews and/or contractors familiar with the Class II system installation.

6. PRODUCT MAINTENANCE

6.1 DATA SHEET REFERENCE

Refer to manufacturers Datasheets for required specification.

6.2 NR COMPONENT APPROVALS

CUSTOMER	DECLARATION OF CONFORMITY
	NETWORK RAIL
PRODUCT NAME	CLASS II HYBRID TRASFORMER RECTIFIERS FOR NETWORK RAIL POWER DISTRIBUTION NETWORKS
ATL DATA SHEETS	AVAILABLE ON REQUEST (DOC REF: TECH137)
NETWORK RAIL CERTIFICATE(S)	PA 05/ 06329

6.3 DECLARATION OF CONFORMITY

ATL Transformers claim conformity for this family of product(s) manufactured at our Manchester facility. In accordance with the specifications referenced below. This declaration is based upon our technical file which contains data supporting our claims.

COMPLIANCE SPECIFICATION(S)	
EC Directives	2006/95/EC Low Voltage Directive
Harmonized Standards	BS EN 61558-1:2009
Internal Standards	ISO 9001: 2008 BSI Audited Quality Assurance
Customer Standards/Specifications	BS EN 61558-1:2009 - Safety of power transformers, power supplies, reactors and similar products. NR/L2/SIGELP/30007 Issue3 & Relevant Guidance documents for Transformer Rectifiers
This declaration is made by: Mr. Neville D Haide (Company Director) ATL Transformers Ltd. Hanson Close, Middleton, Manchester, Lancashire, UK, M24 2HD	
Declaration by: N. Haide	Date 08/12/2015

7. MANUFACTURER CONTACTS

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Hanson Close
Hanson Street
Middleton
Manchester
Lancashire
UK
M24 2HD

Tel: +44 (0) 161 653 0902 Monday – Thurs 08:00 – 17:15 Friday 8:00 – 13:00
Web: www.atltransformers.co.uk
Email: sales@atltransformers.co.uk

8. REGULATORY REQUIREMENTS APPLICABLE STANDARDS

- BS EN 50122-1 – RAILWAY APPLICATIONS – FIXED APPLICATIONS – PART 1 PROTECTIVE PROVISIONS RELATING TO ELECTRICAL SAFETY & EARTHING.
- BS EN 50125-2 – Railway applications. Environmental conditions for equipment. Fixed electrical installations.
- BS EN 50125-3 – Railway applications. Environmental conditions for equipment. Equipment for signalling and telecommunications.
- BS EN 60529 – Degrees of protection provided by enclosures.
- BS EN 61558 – Safety of power transformers, power supplies, reactors and similar products.
- BS EN 62262 – Degrees of protection provided by enclosures for electrical equipment against mechanical impacts (IK code).
- NR/L1/ELP/27000 – Asset Management Policy for Electrical Power assets.
- NR/L2/SIGELP/27408 – Product Specification for Signalling Power Distribution Cables.
- NR/GN/ELP/27315 – Management of Power Supplies for Telecoms Equipment.
- NR/L2/SIGELP/27410 Issue 2
- NR/L2/SIGELP/27421 & 27422 - Flexible Conduits & Glands
- NR/L2/SIGELP/27410 – Specification for Class II Based Signalling Power distribution systems.
- NR/L2/SIG/11201 – Signalling Design Handbook.
- NR/L2/SIG/30050 - Functional Signalling Power Circuits.
- NR/L3/SIG/10663 – Signal Maintenance Specifications.
- NR/SP/SIG/11221 – Signalling Works Testing.
- NR/SP/SIG/11231 – Signalling Maintenance Testing Handbook.
- NR/L2/ELP/21120 – E & P Records Management Process. Low Voltage Directive 2006/95/EC. EMC Directive 2004/108/EC.

9. FREQUENTLY ASKED QUESTIONS

1) What tools are required to access the Transformer for termination?



WARNING

Ensure supply is Isolated before removing the Class II Compartments Protective Cover. Never attempt to replace Nylon screws or fasteners with metal screws or fasteners.

- **To access Class I & Class II Terminals:**

To access both Class I & Class II Terminals the two captive screws securing the enclosure access door must be unscrewed using an M8 spanner or Socket.

To access Class II Terminals: Remove Inspection cover from double insulated compartment using Phillips head driver, secure cables into cable clamps and Terminate into the correct terminals using a Flat head terminal driver.

If Ferrules are not being used cables should be stripped 10mm and secured into the terminals. The recommended torque setting is between 2.0 – 4.0 Nm.



NOTE: - All terminal housing covers must be replaced in the correct orientation after terminating cables to maintain protection.

To access Class I Output Terminals: Terminate using a Flat head terminal driver.

Where Glands and/or couplings are provided use a suitable spanner or socket to secure tightly in place.

2) Where do I connect the cables?

- The cables are connected in the case of the Primary, to the terminals in the Double insulated compartment behind the main door or, in the case of the secondary to the terminals in the non insulated compartment behind the main door.

3) How do I gain access to the different sections of the assembly?

- This unit is designed to offer access to terminals only for installation purposes. Both Class I & Class II terminals are accessible via the front enclosure door.

4) What is the procedure for installing & connecting cables?

- All cables shall be installed in accordance with NR Installation handbook.

5) Is there a start-up or switch on procedure?

- The assembly must be installed, commissioned & tested in accordance with NR Installation handbook by qualified person/s before power is applied to any part of the system.

6) The assembly is damaged or not functioning correctly, who shall I Contact for spare or replacement parts?

- Contact:
ATL Transformers Ltd - details are given in section 7 of this document.

10. PRODUCT WARRANTY

These products are under ATL's standard warranty which is 12 months. Product warranty document is available upon request.

11. END OF LIFE DISPOSAL

All Electrical equipment must be disposed of in accordance with the Wee Directive 2002/96/EG.

End of life or completed equipment may be returned to ATL Transformers for Disposal or alternatively must be issued to a certified waste disposal vendor.

12. ECO-RAIL® POINT DRIVE RECTIFIERS RANGE

- Table-12.1 650/120VDC Lightweight Point Drive Rectifier Product Range

Part No.	Description	Catalogue No.
T3007	10A TYPE C Tj 650VAC /120V D.C	PA 054/035057
T3024	5A TYPE B Tj 650VAC /120V D.C	PA 054/035056
T3040	2.5A TYPE A Tj 650VAC /120V D.C	PA 054/035055
T3055	2 x 5A POINTS Tj 650VAC /120V D.C	PA 054/035058

- Table-12.2 230/120VDC Lightweight Point Drive Rectifier Product Range

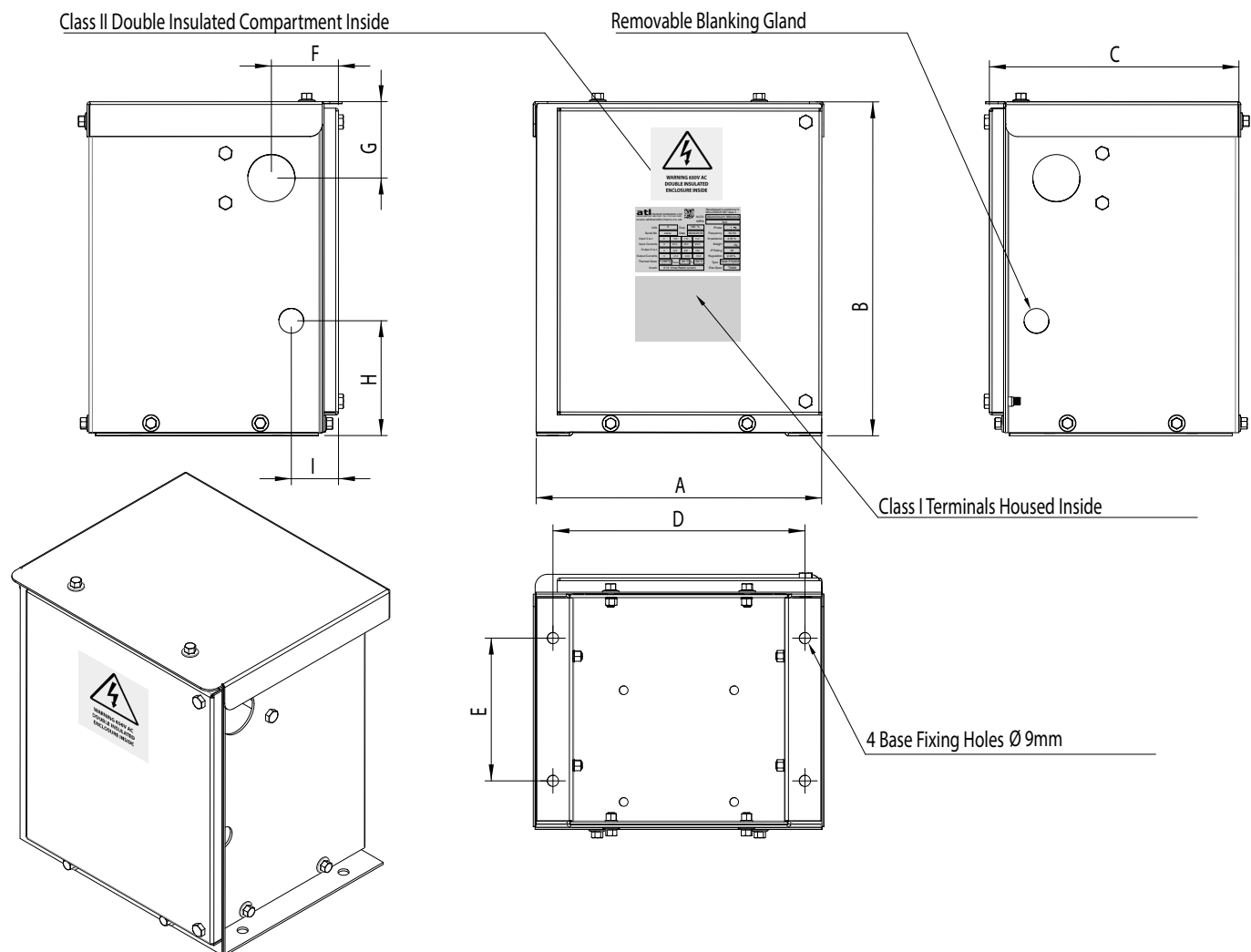
Part No.	Description	Catalogue No.
T3403	10A TYPE C Tj 230VAC /120V D.C	PA 054/035060
T3405	5A TYPE B Tj 230VAC /120V D.C	PA 054/035061
T3407	2.5A TYPE A Tj 230VAC /120V D.C	PA 054/035062
T3409	2 x 5A POINTS Tj 230VAC /120V D.C	PA 054/035063

- Table-12.3 400-415-440VAC/120VDC Lightweight Point Drive Rectifier Product Range

Part No.	Description	Catalogue No.
T3092	2 x 5A POINTS Tj 400VAC /120V D.C	PA 054/035059
T3404	10A TYPE C Tj 230VAC /120V D.C	PA 054/035064
T3406	5A TYPE B Tj 230VAC /120V D.C	PA 054/035065
T3408	2.5A TYPE A Tj 230VAC /120V D.C	PA 054/035066
T3410	2 x 5A POINTS Tj 230VAC /120V D.C	PA 054/035067

APPENDICES A

GENERAL ARRANGEMENTS



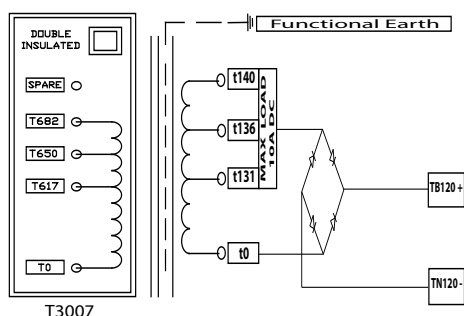
Note: Dimension D has a tolerance of +/- 3mm

Copper Wound Transformer Rectifiers										
Model	Dimension (mm)									Weight (kg)
	A	B	C	D	E	F	G	H	I	Copper
120V @ 2.5A DC	230	275	218	195	115	55	62	92	27	20
120V @ 5A DC	286	299	249	257	115	54	62	93	38	25
120V @ 10A DC	286	299	329	257	115	54	62	73	38	40
2 X 120V@5A DC	286	299	329	257	115	54	62	73	38	39

APPENDICES B

LABEL DETAILS

LABEL 1



*T3007 USED AS AN EXAMPLE

LABEL 2

atl TRANSFORMERS LTD MANCHESTER M24 2HD TEL: +44 (0) 161 8530902 WWW.ATLTRANSFORMERS.CO.UK			
RATING 10A D.C. Duty 100% Phase 1		Serial No Prototype Date 21/01/15 Frequency 50 Hz	
Input V a.c 0 617 650 682 Impedance 2.5 %		Weight 40 Kg	
Input Currents 0 2.24 2.12 2.02		IP Rating 32	
Output V d.c 120 V		Regulation 2.13 %	
Output Current 10A D.C.		Type Class II Hybrid	
Thermal Class F (155 °C) t _{min} 20 °C t _s +60 °C		Elec Spec T3007	
Inrush 9 times Rated Current			

LABEL 3



LABEL 4



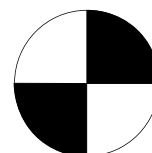
LABEL 5



LABEL 6

TESTED	
DATE	INITIALS

LABEL 7



Label	Description	Location
1	Electrical Specification Wiring Diagram	Enclosure Door
2	Electrical Specification Rating Plate	Enclosure Door
3	Danger - Isolate Supply	Primary & Secondary Housing Lid
4	ATL Transformers Eco-Rail® Logo	Enclosure Lid
5	CE Mark	Enclosure Lid
6	Tested Label - Date & Initials	Transformer
7	Centre of Gravity Symbol	Enclosure Lid

APPENDICES C

WIRING DIAGRAMS

Title	Description	Diagram
650VAC/120V @ 2.5A DC Aluminium Class II	Copper: T3007	<p>T3007</p>
650VAC/120V @ 5A DC Aluminium Class II	Copper: T3024	<p>T3024</p>
650VAC/120VDC @10A Aluminium Class II	Copper: T3040	<p>T3040</p>
650VAC/ 2 X 120V@5A Aluminium Class II	Copper: T3055	<p>T3055</p>

APPENDICES C

WIRING DIAGRAMS

Title	Description	Diagram
230VAC/120V @ 2.5A DC Aluminium Class II	Copper: T3403	<p>DOUBLE INSULATED</p> <p>SPARE</p> <p>T241</p> <p>T230</p> <p>T218</p> <p>T0</p> <p>T3403</p> <p>Functional Earth</p> <p>t140</p> <p>t136</p> <p>t131</p> <p>t0</p> <p>MAX LOAD 2.5A DC</p> <p>TB120 +</p> <p>TN120 -</p>
230VAC/120V @ 5A DC Aluminium Class II	Copper: T3405	<p>DOUBLE INSULATED</p> <p>SPARE</p> <p>T241</p> <p>T230</p> <p>T218</p> <p>T0</p> <p>T3405</p> <p>Functional Earth</p> <p>t140</p> <p>t136</p> <p>t131</p> <p>t0</p> <p>MAX LOAD 5A DC</p> <p>TB120 +</p> <p>TN120 -</p>
230VAC/120VDC @10A Aluminium Class II	Copper: T3407	<p>DOUBLE INSULATED</p> <p>SPARE</p> <p>T241</p> <p>T230</p> <p>T218</p> <p>T0</p> <p>T3407</p> <p>Functional Earth</p> <p>t140</p> <p>t136</p> <p>t131</p> <p>t0</p> <p>MAX LOAD 10A DC</p> <p>TB120 +</p> <p>TN120 -</p>
230VAC/ 2 X 120V@5A Aluminium Class II	Copper: T3409	<p>DOUBLE INSULATED</p> <p>SPARE</p> <p>T241</p> <p>T230</p> <p>T218</p> <p>T0</p> <p>T3409</p> <p>Functional Earth</p> <p>t140</p> <p>t136</p> <p>t131</p> <p>t0</p> <p>MAX LOAD 5A DC</p> <p>TB120 +</p> <p>TN120 -</p> <p>t140</p> <p>t136</p> <p>t131</p> <p>t0</p> <p>MAX LOAD 5A DC</p> <p>TB120 +</p> <p>TN120 -</p>

APPENDICES C

WIRING DIAGRAMS

Title	Description	Diagram
400-415-440 VAC/120V @ 2.5A DC Aluminium Class II	Copper: T3404	<p>T3403</p>
400-415-440 VAC/120V @ 5A DC Aluminium Class II	Copper: T3406	<p>T3405</p>
400-415-440 VAC/120VDC @10A Aluminium Class II	Copper: T3408	<p>T3407</p>
400VAC / 2 X 120V@5A Aluminium Class II	Copper: T3092	<p>T3092</p>

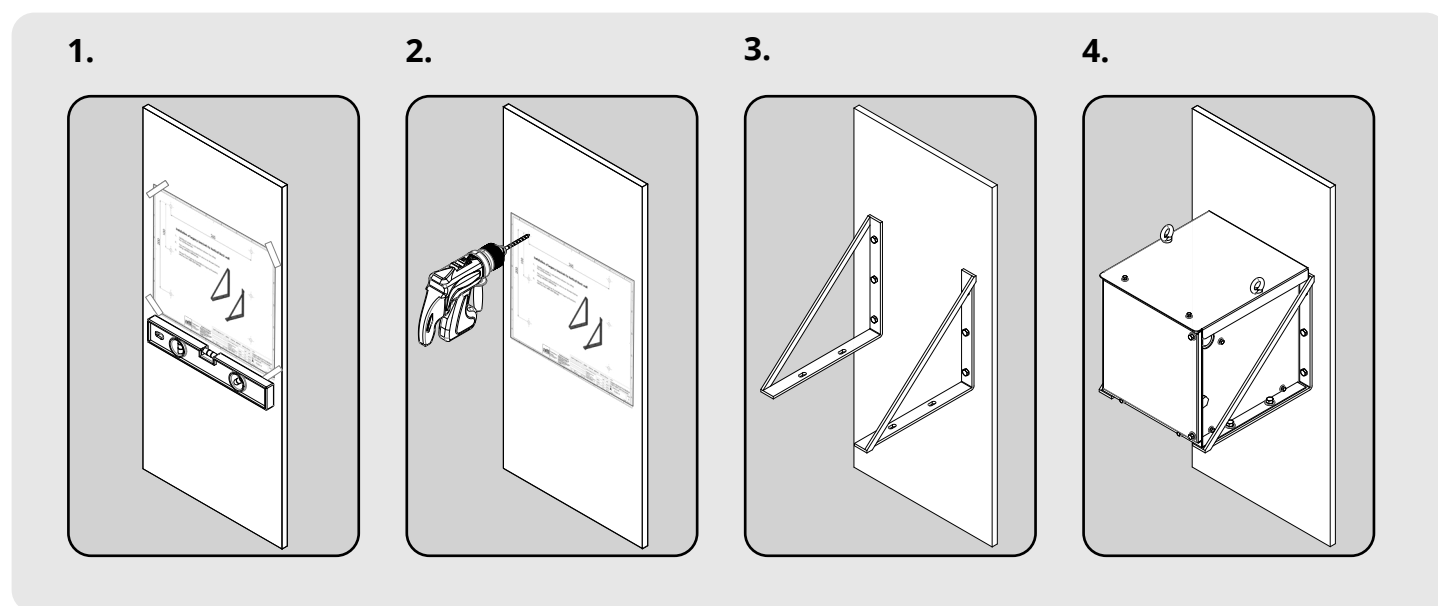
APPENDICES D

LEGACY MOUNTING BRACKETS

MOUNTING WITHIN A LOCATION CASE

The transformers shown in the data sheets in Appendix C. The transformers are designed to be securely fixed to substantial mounting rails or brackets such as BRS SM 440 apparatus racking systems, capable of bearing the weight of the transformer, using the 4 horizontal footprint holes detailed in Appendix A.

When Installing eco-rail transformers within a legacy system requiring vertical timber back board installation. Additional mounting brackets (Legacy brackets) are available from the manufacturer which enable eco-rail transformers to be installed efficiently & safely by a single operator.



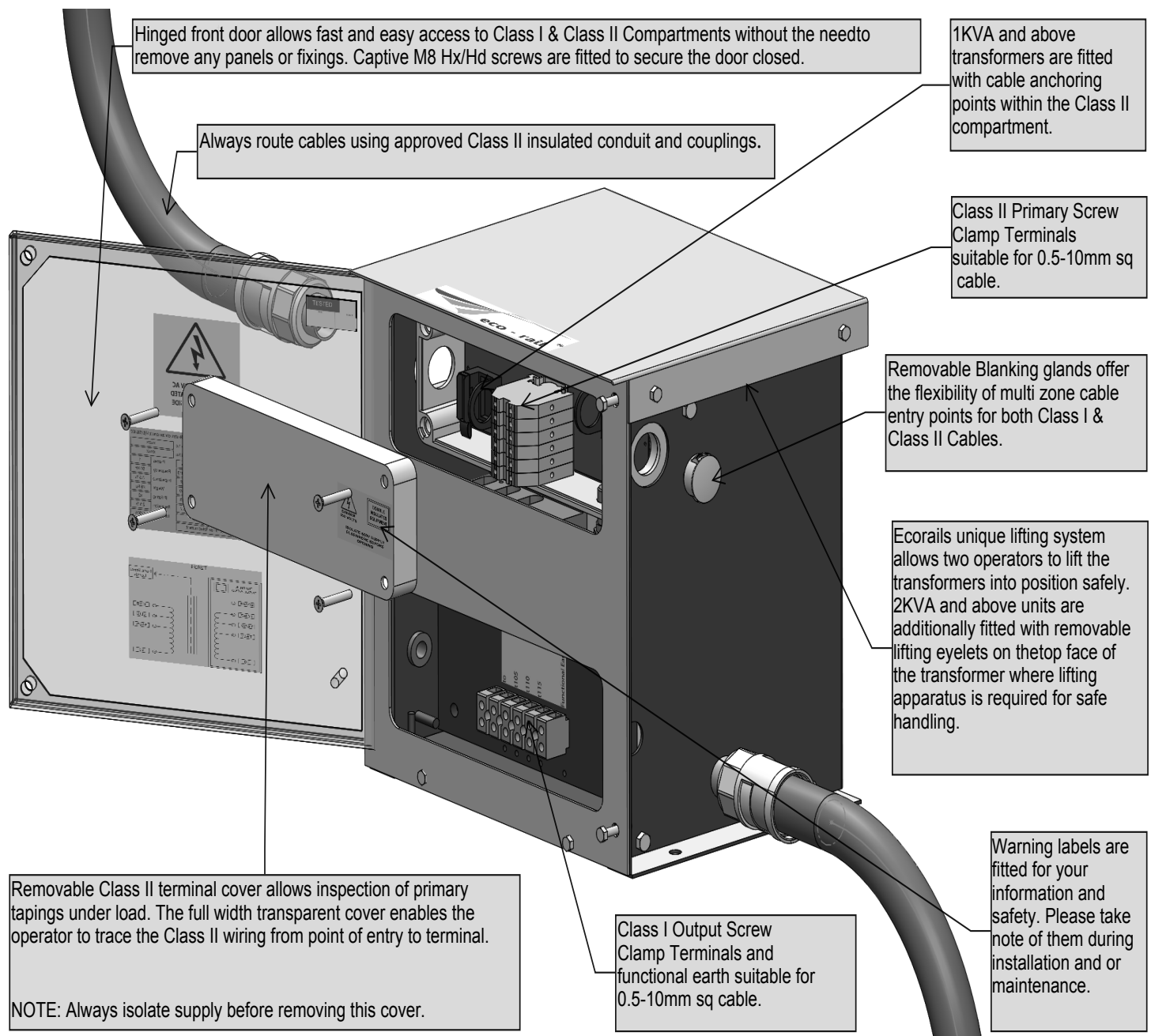
The Legacy brackets are supplied as a set of 2 for each transformer and come supplied with a back plate drilling information and installation instructions. Where legacy FSP renewals are a requirement for installation the legacy bracket is provided as an optional extra within the eco-rail transformer range. Using the template where provided drill and fix the legacy brackets to the back plate within the apparatus case and secure as instructed. For safety and ease of installation legacy brackets should be fitted & secured prior to mounting the transformer. Care should be taken when lifting and handling the transformer not to damage any attached cable entry glands or couplings. Manual lifting and handling practices should be observed when lifting the transformers into position.

Part No.	Description	Catalogue No.
D1496-1	LEGACY BRACKETS FOR 250-500VA TRANSFORMERS & 2.5A TJ's	054/214897
D1496-2	LEGACY BRACKETS FOR 1KVA - 1.5KVA TRANSFORMERS INC 1KVA DUAL OUTPUT & 5A TJ's.	054/214898
D1496-3	LEGACY BRACKETS FOR 2KVA - 4KVA TRANSFORMERS INC QUAD OUTPUTS, 10A TJ's AND DUAL 5A TJ's.	054/214899

Please contact for general arrangements for Legacy Brackets.

APPENDICES E

DETAILED ASSEMBLY OF ECORAIL® TRANSFORMER



Single Phase Transformers

Three Phase Transformers

Solutions for Rail

DC Chokes

Specialist Assemblies

Power Supplies

Control Gear



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sales@atltransformers.co.uk • www.atltransformers.co.uk