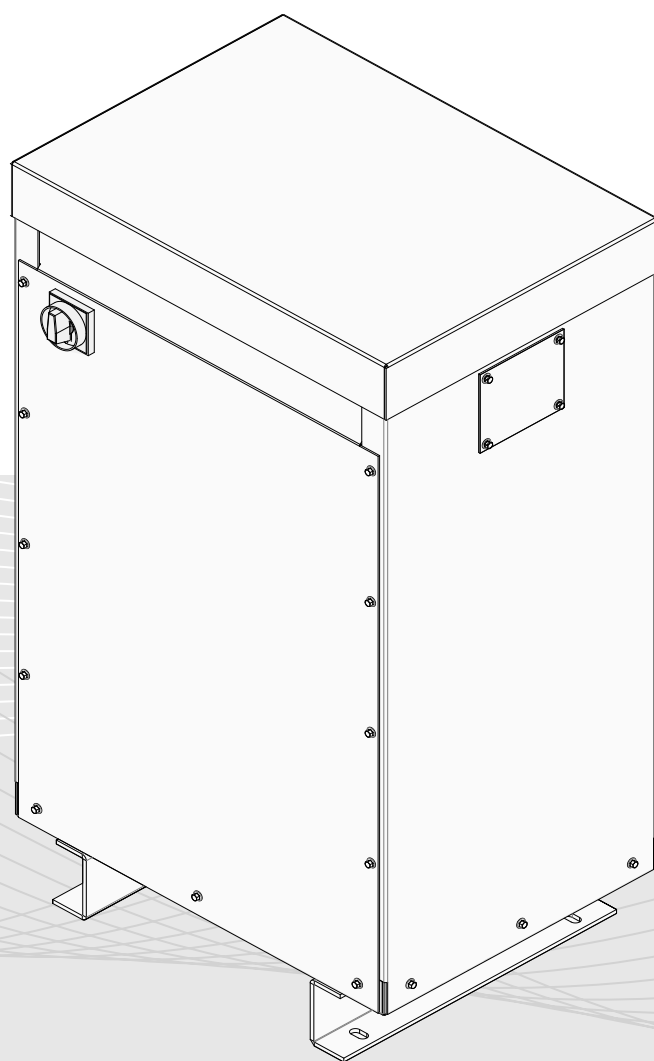


# O&M MANUAL

Class I PSP/ASP Transformer 3ph 400/650V  
Lightweight Aluminium Range



English

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Version	Implemented By	Revision Date	Approved By	Approval Date	Reason
1	N.D.H.	24/04/17	B.M.	24/04/17	O&M Manual Creation
2	C.J.W.	15/08/22	N.D.H.	15/08/22	Dd0 & Yd11 Variants Added
3	C.J.W.	21/07/23	N.D.H.	21/07/23	Product Acceptance Numbers Added. Torque Settings Added.
4	C.J.W.	31/08/23	B.M.	31/08/23	Changes to Wiring Diagrams

# 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**

This O&M Manual defines the operating & Installation guidelines for the ATL Transformers, 10 - 150KVA range of aluminium 400/650V PSP/ASP transformer ranges for use within a standard Network Rail approved Principal Supply Point.

## **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.

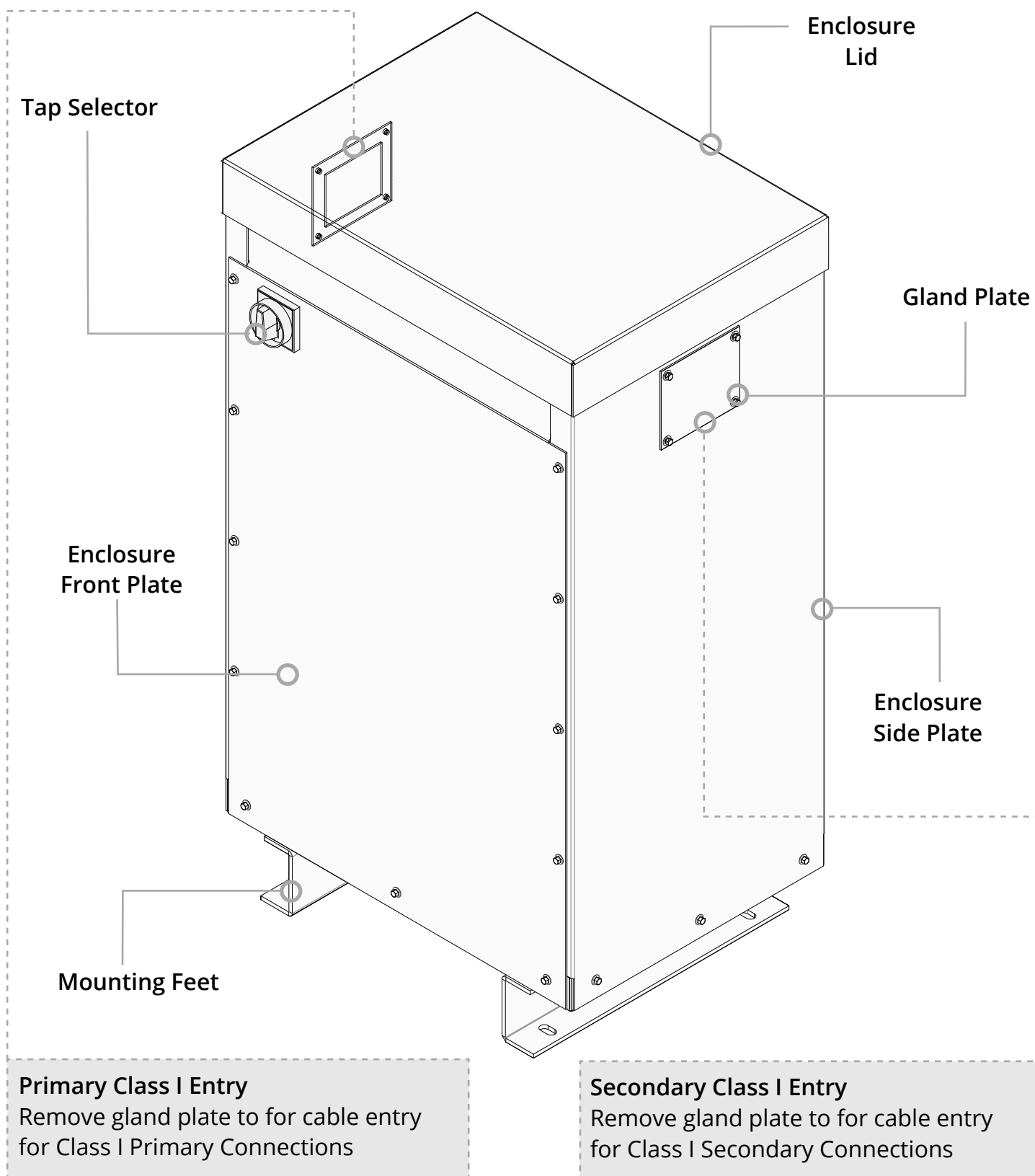
ATL Transformers Ltd is not liable for any personal injury or damage to property that occurs as a result of the warning and manual being disregarded.

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 PSP/ASP eco-rail® FEATURES

The enclosed transformer has an ingress protection level of IP32 and is suitable for indoor Railway Installations. Primary & Secondary Class I terminals are segregated within separate terminals on the transformer. The Transformer features a tap changer which allows quick and simple tap selection.



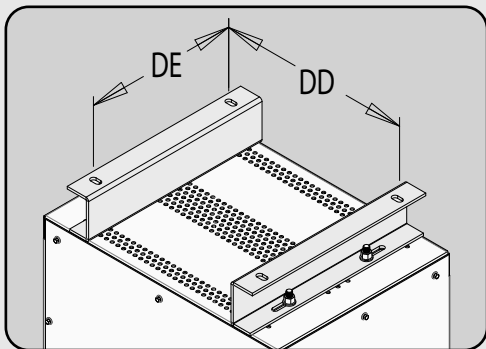
## 2.2 PRODUCT OPERATION

Supplied as standard for Class I distribution systems this range of transformers are designed to be fed from a nominal 50Hz (+4% to -6%) supply voltage. Input and output cables are to be routed through the gland plates provided with suitable conduit and glands, terminated above the transformer Internally to the screw clamp terminals provided. Conduit should meet the requirements of NR/L2/SIGELP/27410 Issue 2 & NR/L2/SIGELP/27421 & 27422.

- On class I models an earth terminal is provided and shall always be connected to the protective earth network.
- Cable glands shall always be removed where hole profiles for conduit are being made. Never drill holes on transformer panels in situ as swarf can enter the enclosure and short circuit the magnetics when energized.
- All cabling should meet the requirements of NR standards: NR/L2/SIGELP/27410 Issue 2 and NR/L2/SIGELP/27421 & 27422

## 3. PRODUCT INSTALLATION

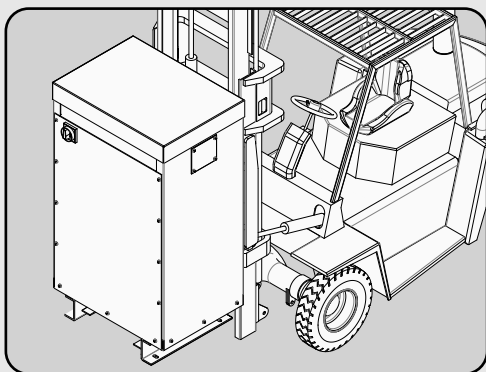
### 3.1 MOUNTING WITHIN APPARATUS HOUSING



A. Always ensure that there is 100mm clearance around the transformer taking care not to obstruct or impede on the transformers cooling louvres.

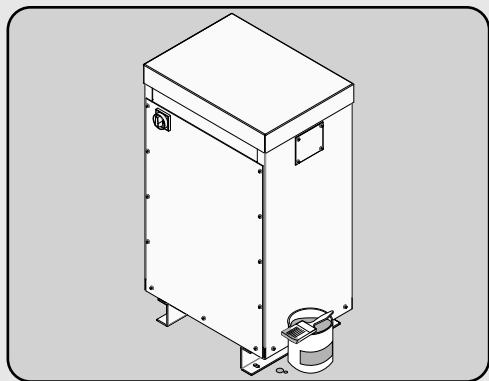
#### 1. Dimensioning

The transformers shown in general arrangement drawings in Appendix A are designed to be securely fixed to a secure and level base. If Integrating within switch panel ensure that the plinth bar work is capable of bearing the weight of the transformer. Footprint and fixing points are summarised with the tables of Appendix



#### 2. Lifting

Safe lifting practices should be observed when handling heavy transformers. These units can be lifted using a forklift or pallet truck, ensure that the transformer is secure before transporting. Please refer to weights in Appendix A and consult the manufacturer's forklift/pallet truck manual before 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 & Secondary terminals are accessible within the enclosure by removal of the transformer lid. Cables glands are provided either side of the enclosure for cable access and are removeable for customization of gland and cable entry requirements.

- On class I models an earth terminal is provided and shall always be connected to the protective earth network.
- Cable glands shall always be removed where hole profiles for conduit are being made. Never drill holes on transformer panels in situ as swarf can enter the enclosure and short circuit the magnetics when energized.
- Cables should be installed correctly and not resting on top of the transformer core. Adequate bend radius's should be observed on the installed cables and all terminals checked for good compression prior to energization.
- All cabling should meet the requirements of NR standards: NR/L2/SIGELP/27410 Issue 2 and NR/L2/SIGELP/27421 & 27422

Torque Settings for Terminals (**applies to all vector groups**):

Rating	Min Torque (Primary)	Max Torque (Primary)	Min Torque (Secondary)	Max Torque (Secondary)
10KVA	1.2 Nm	2.4 Nm	1.2 Nm	2.4 Nm
20KVA	1.2 Nm	2.4 Nm	1.2 Nm	2.4 Nm
25KVA	1.2 Nm	2.4 Nm	1.2 Nm	2.4 Nm
30KVA	3.2 Nm	3.7 Nm	3.2 Nm	3.7 Nm
35KVA	3.2 Nm	3.7 Nm	3.2 Nm	3.7 Nm
40KVA	3.2 Nm	3.7 Nm	3.2 Nm	3.7 Nm
50KVA	3.2 Nm	3.7 Nm	3.2 Nm	3.7 Nm
60KVA	3.2 Nm	3.7 Nm	3.2 Nm	3.7 Nm
80KVA	3.5 Nm	6 Nm	3.2 Nm	3.7 Nm
100KVA	6 Nm	12 Nm	3.2 Nm	3.7 Nm
120KVA	6 Nm	12 Nm	3.2 Nm	3.7 Nm



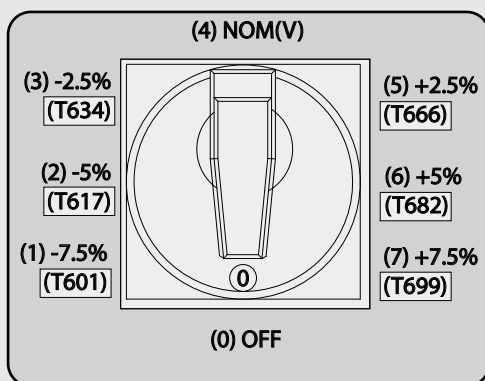
### 3.3 VOLTAGE SELECTION

**INPUT:** Monitor the supply voltage with a calibrated DVM to check your distribution is within tolerance +4%/-6%. Connect Supply cables to the provided Input Voltage terminals ensuring they are routed through suitable conduit and secure before energizing the transformer.

**OUTPUT:** The output tap selector facilitates feeder Voltage adjustment, this can be used to reset, reduce or boost output voltages according to your feeder requirements. Connect Output cables to the provided terminals ensuring they are routed through suitable conduit and secure. Select the required output voltage using the on-board tap selector and reinstate the transformer lid before energizing the transformer.



**NOTE:** - The on-load tap selector should not be used for isolation and that the transformer should be isolated from the supply before removing covers.



#### 1. On-Load Tap Selector

The Voltage Selector can be found on the front of the enclosure at the top left, the tap selector automatically turns on a 45° and can be turned a full 360° clockwise or anti-clockwise with 8 different settings. The standard output for 3ph PSP/ASP range is 650V.

## **4. PRODUCT MAINTENANCE**

### **4.1 ROUTINE MAINTENANCE**

These units are non serviceable and require observational maintenance only to their Terminals, cables and enclosure panels which must be intact and installed as originally supplied.

Always ensure that there is 100mm clearance around the transformer taking care not to obstruct or impede on the transformers cooling louvres.

Do not place any foreign bodies on top of the enclosure lid or inside the transformer housing.

This does not supersede any maintenance tasks or scheduling procedures network rail deem necessary and set in accordance with. NR/SP/SIG/10661 Signalling Maintenance Task Intervals. 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**

1. Isolate incoming supply, when isolated remove transformer lid and disconnect Input supply and Secondary Output connections.

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

3. Check incoming supply voltage at protection, If within tolerance Isolate supply at the protection and connect Incoming supply cables onto the respective transformer terminals.

4. Using a DVM and with the transformer energised, safely check at the output terminals secondary tap voltages are within 2% using the tap selector to cycle transformer taps accordingly. Check Secondary tap voltages which should be within 2% of the terminal voltage.

5. Isolate Supply and when safe re-connect Secondary Output cables.

6. Energise the transformer and using a calibrated ammeter check the load current.

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-RAL7032-125ml

## 5. TRAINING & COMPETENCE

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

All maintenance activities shall be undertaken by trained and authorized Network Rail crews and/or contractors.

## 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	ATL 400/650V Signalling Power Transformers
ATL DATA SHEETS	AVAILABLE ON REQUEST: DOC REF
NETWORK RAIL CERTIFICATE(S)	PA05/07022

## 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	IEC 60076 - Power Transformers
Internal Standards	ISO 9001: 2015 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 - Product Specification for Power Transformers for Signalling Systems. IEC 60076 – Power Transformers BR 924A – Air Cooled Power Transformers for Railway Signalling
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 25/03/2015

## 7. MANUFACTURER CONTACTS

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UK  
M24 2HD

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Web: [www.atltransformers.co.uk](http://www.atltransformers.co.uk)

Email: [sales@atltransformers.co.uk](mailto: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 62262 – Degrees of protection provided by enclosures for electrical equipment against mechanical impacts (IK code).

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.

## 9. FREQUENTLY ASKED QUESTIONS

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



#### WARNING

Ensure supply is Isolated before removing the Lid or Gland Plates. Ensure that the Gland Plates and Lid are bolted back on before exerting power supply.

- **To access Terminals:**

To access Terminals the bolts securing the enclosure lid/gland plates door must be unscrewed using an M8-M10 spanner or Socket.

The terminals are located on top of the transformer on the angled brackets and are labelled accordingly to the wiring schematic in Appendix C.

If Ferrules are not being used cables should be stripped 10mm and secured into the terminals. For recommended torque settings, see [3.2 Cable Connection](#)



**NOTE:** - All enclosure covers/plates must be replaced after terminating cables to maintain protection.

All electrical termination is by flat head terminal driver.

Cables are connected directly onto the terminals of the transformer, these are located on top of the transformer inside the enclosure and are clearly marked.

### 2) Where do I connect the cables?

- The cables are connected on the terminals of the Primary, these are located on top of the transformer inside the transformer, the same for the secondary terminals they're located on top of the transformer inside the enclosure.

### 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. The terminals are accessible via removing the lid or the gland plates on either side of the enclosure.

#### 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® PSP/ASP TRANSFORMER RANGE

- Table-12.1 400/650V 3ph Dyn11 Lightweight Transformer Product Range

Part No.	Description	Catalogue No.
T2914	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 10,000VA	0054/215074
T2961	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 20,000VA	0054/215075
T3116	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 25,000VA	0054/215076
T2915	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 30,000VA	0054/215077
T3334	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 35,000VA	0054/215078
T2962	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 40,000VA	0054/215079
T3058	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 50,000VA	0054/215080

- Table-12.1 400/650V 3ph Dyn11 Lightweight Transformer Product Range Continued.

Part No.	Description	Catalogue No.
T2963	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 60,000VA	0054/215081
T3027	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 80,000VA	0054/215082
T3758	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 100,000VA	0054/215108
T3143	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 120,000VA	0054/215083

- Table-12.2 400/650V 3ph Dd0 Lightweight Transformer Product Range

Part No.	Description	Catalogue No.
T3699	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 10,000VA	0054/215084
T3700	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 20,000VA	0054/215085
T3701	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 25,000VA	0054/215086
T3702	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 30,000VA	0054/215087
T3719	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 35,000VA	0054/215088
T3703	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 40,000VA	0054/215089
T3704	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 50,000VA	0054/215090
T3705	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 60,000VA	0054/215091
T3706	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 80,000VA	0054/215092
T3722	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 100,000VA	0054/215109
T3707	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 120,000VA	0054/215093

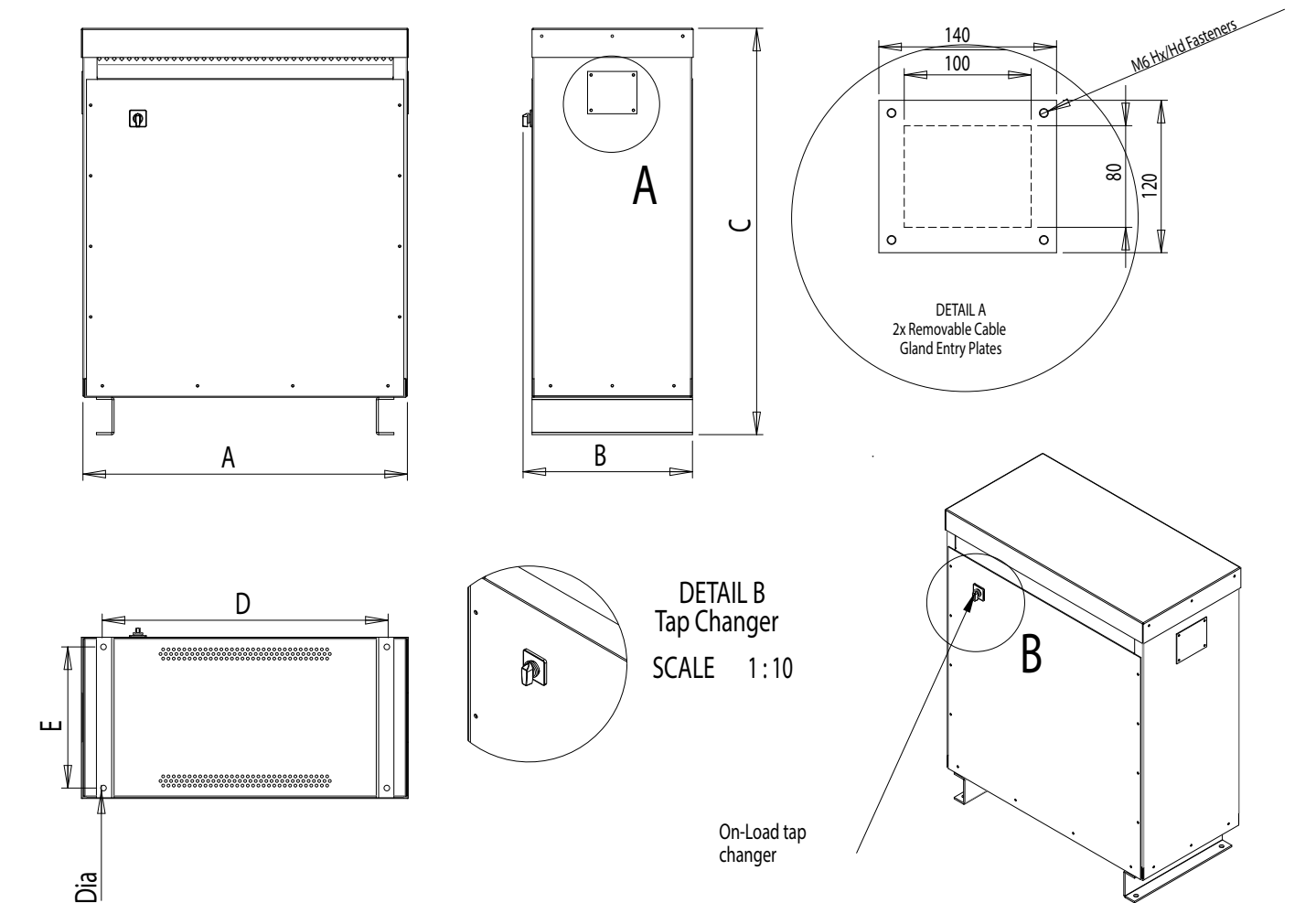
- Table-12.3 400/650V 3ph Yd11 Lightweight Transformer Product Range

Part No.	Description	Catalogue No.
T3709	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 10,000VA	0054/215094
T3710	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 20,000VA	0054/215095
T3711	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 25,000VA	0054/215096
T3712	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 30,000VA	0054/215097
T3720	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 35,000VA	0054/215098
T3713	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 40,000VA	0054/215099
T3714	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 50,000VA	0054/215100
T3715	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 60,000VA	0054/215101
T3716	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 80,000VA	0054/215102
T3650	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 100,000VA	0054/215110
T3717	CLASS I ASP/PSP LIGHTWEIGHT TRANSFORMER 120,000VA	0054/215103



# APPENDICES A

## GENERAL ARRANGEMENTS



Aluminium Wound PSP/ASP 400/650 Transformers							
Model	Dimension (mm)						Weight (kg)
	A	B	C	D	E	Dia	400/650V
10KVA	625	454	615	400	450	13	180
20KVA	760	500	1100	465	400	16	280
25KVA	760	500	1100	465	400	16	295
30KVA	760	500	1100	675	400	16	310
35KVA	760	500	1100	675	400	16	330
40KVA	760	500	1100	675	400	16	340
50KVA	920	600	1200	810	455	16	450
60KVA	920	600	1200	810	455	16	500
80KVA	920	600	1200	810	455	16	690
100KVA	920	600	1200	810	455	16	780
120KVA	920	600	1200	810	455	16	850

# APPENDICES B

## LABEL DETAILS

**LABEL 1**

<b>atl</b> TRANSFORMERS LTD MANCHESTER M242HD TEL: 0161 653 0902		Manufactured to NR/L2/SIG/3007	
Elec Spec			
PADS No			
VA	1000	Duty	100 %
Serial No	xxxxx	Date	01/04/2013
Input Voltage		Ins Class	
Input Current		Frequency	
Output Voltage		Impedance	
Output Current		Weight	
		IP Rating	
		Efficiency	

**LABEL 2**



**LABEL 3**



**LABEL 4**

On-Load Output Voltage  
Tap Selector  
"Not to be used for Isolation purposes"

**LABEL 5**



**LABEL 6**

TESTED	
DATE	INITIALS

Label	Description	Location
1	Electrical Specification Rating Plate	Enclosure Front Plate
2	Danger 650V - Isolate Supply	Enclosure Lid
3	Danger - Live Terminals Isolate Supply	Transformer
4	On Load Output Voltage Tap Selector	Enclosure Front Plate
5	CE Mark	Enclosure Lid
6	Tested Label - Date & Initials	Transformer

# APPENDICES C

## WIRING DIAGRAMS

Title	Description	Diagram
DYnII Delta Star Aluminium	Aluminium DynII Delta Star 3ph Step-Up Transformer Generic Wiring Diagram	
Dd0 Delta Delta Aluminium	Aluminium Dd0 Delta Delta 3ph Step-Up Transformer Generic Wiring Diagram	
Yd11 Star Delta Aluminium	Aluminium Yd11 Star Delta 3ph Step-Up Transformer Generic Wiring Diagram	

**Single Phase Transformers**

**Three Phase Transformers**

**Solutions for Rail**

**DC Chokes**

**Specialist Assemblies**

**Power Supplies**

**Control Gear**



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