



Manufacturers of Transformers, Reactors, Power Supplies & Site Electrical Equipment

West Avenue, Nelson Ind. Est. Talke, Stoke on Trent, Staffordshire, ST7 1TR. T: 01782776321 F.01782 776422 sales@electro-wind.co.uk

**GENERAL INSTALLATION INSTRUCTIONS FOR
AIR COOLED TRANSFORMER RECTIFIER UNIT**

RATING 28Vdc @ 300A dc

Electro-wind Limited

INDEX**1. INTRODUCTION**

1.1 General Information

1.2 Health and Safety

1.3 Technical Specification

2. STORAGE/HANDLING PROCEDURES

2.1 Receipt Inspection

2.2 Lifting and Handling

2.3 Storage Precautions

3. INSTALLATION AND COMMISSIONING

3.1 Installation Procedure

3.2 Commissioning Procedure

4. MAINTENANCE

4.1 Preventative Maintenance

5. DRAWINGS

5.1 General Arrangement Drawing

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

All air cooled transformer/rectifiers manufactured by ELECTRO-WIND LIMITED. are designed, manufactured and tested to Customers Specifications and to the relevant recommendations of British Standard Specifications BS EN 61558.

The purpose of this manual is to give guidance and instructions to personnel concerned with the operation of the dry type transformers rectifier units. It is the responsibility of the equipment user to ensure that the maintenance procedures are correctly applied and adhered to.

The information contained within this manual is obtained from practical field experience, as well as procedures established by custom and practice. When properly installed, commissioned and operated in accordance with the instructions contained within this manual, transformer rectifier unit will provide a long and reliable life. Negligent maintenance, as well as improper installation and commissioning, may well result in damage to the transformer or rectifier, as well as a reduction in effective life. It is important that a regular programme of inspections is established and maintained, with feedback to the originator in order to maintain confidence in the scheme.

In order that the instructions in this manual are performed safely and effectively, it is recommended that all maintenance is performed by qualified personnel. Particular attention must be paid to the isolation and making safe of electrical equipment prior to any maintenance work being carried out, only authorised persons are to be responsible for these procedures.

Electro-wind Limited. guarantee equipment provided by them against faults due to defective work and materials for 12 months, unless agreed otherwise.

In the unlikely event of breakdown, please contact us on 01782 776321

Your warranty is given subject to the equipment being used in accordance with the instructions supplied, and rating label. It is also subject to fair wear and tear conditions. It does not cover consequential damage arising out of any failure acceptable under warranty, nor does it cover damage resulting from misuse, accident or unauthorised alterations to the equipment.

Remember you will need to quote the serial number of the unit which can be found on the rating label on the lid.

The warranty does not cover damage or defects arising from poor maintenance – including damage extension cables and connectors.

The company has a policy of continuous improvement in product quality and design. The company reserves the right to change the specification at any time.

1.2 THE HEALTH AND SAFETY AT WORK ACT 1974

Attention is drawn to the users of transformers and other electrical equipment to the Health and Safety At Work Act. The following clauses and considerations being particularly relevant:-

1. To take all necessary measures to prevent contamination of the environment.

Sources of contamination include:-


- a) Objectionable noise and vibration.
 - b) Interference with communications networks due to unsatisfactory external connections.
 - c) The influence on sensitive electronic equipment of stray electric and magnetic fields.
2. To prevent access to live terminals. To operate a 'Permit To Work' system, or similar safeguards to ensure isolation of excitation and associated auxiliary equipment during maintenance work.
 3. To ensure that work is not carried out on any transformer, or its auxiliary equipment, unless it is disconnected from the supply.
 4. To ensure that the equipment is only operated within its design limits. Should there be any doubt as to the operational limits of the transformer rectifier unit, reference must be made to ELECTRO-WIND LIMITED.
 5. It is recommended that all transformers of the air cooled type be installed in a housing or segregated area. It is the site operators responsibility to undertake risk assessments based upon the environment that the equipment is to be used in. This area is to be accessible to authorised personnel only. Procedures to follow in the event of fire and electrocution are to be posted in the area, together with relevant high voltage warning notices.

1.3 DATA/SPEC SHEET

Three Phase Transformer Rectifier

Document type

Data Sheet

Part A – Specification	Data	Image similar not actual
Transformer Rating	10.56kVA	
Input volts on-load	415V 3ph + Earth	
Input Current	14.7A	
Taps Primary	±10 & 15%	
Secondary AC volts OFF load	24Vac	
Secondary AC volts ON load	20Vac	
Secondary AC current ON Load	257A	
Secondary protection	250A Fuse links	
Bridge Rectifier	Full wave three phase silicon diode	
Output DC volts off-load	32VDC	
Output DC volts on-load	28VDC	
Output DC current Amps	300ADC	
Ripple Factor %	4.8	
Ingress Protection BS EN60529	IP00	
Frequency – Hz.	50/60 Hz	
Type	Dry	
Vector Group	N/A	
Ambient Temperature Degrees C	30°C	
Impedance Voltage (%)	TBA	
Duty Cycle	Continuous	
Noise Emission dB(A) (Lpa)	N/A	
Dielectric Class	3kV	
Insulation Class (Temp. rise)	F (155° C)	
Item Data		
Enclosed	Yes	
IP Rating	23	
Height (mm) Approx. H	700	
Length (mm) Approx. L	450	
Depth (mm) Approx. W	500	
Weight (kg) Approx.	110	
Part B – Fittings		
Input connection	2m SY flex fitted with 32A 4pin plug (BSEN60309).	
Primary Protection	25A 3 Pole MCB Type D	
Secondary Protection	250A HRC Fuse links.	
Control Gear and visual indication.	Rotary Isolator, 415V Power ON indicator lamp (White) 24VDC On illuminated switch (Green) Emergency push button Station.	
Output connection	1 x Anderson SB350 (surface mounted)	
Ancillary's	Wheel castors, grab handle, extension lead stowage hook.	
Standard	BSEN 61558	
Part D- Notes	-	

2. STORAGE/HANDLING PROCEDURES

2.1 RECEIPT INSPECTION

Immediately after the transformer has arrived on site, it should be subjected to a thorough external inspection. This inspection should include an examination of the packing case (if any), as well as any components that have been despatched separately. The various packages and contents should be checked against the advice note.

Any damages or shortages whatsoever must be reported to the carrier and Electro-wind Limited.

If there is damage to the transformer such that ingress of moisture may have occurred, or is suspected, it may be necessary to dry-out the transformer. Reference should be made to Electro-wind Limited without delay.

The Transformer must not be commissioned until after the initial inspection and check procedures have been completed. A transformer which has been commissioned and later withdrawn from service, should be re-checked as when first commissioned, before putting back into service.

CHECK LIST

The following specific checks and inspections are to be made on the transformers:-

1. Inspect for evidence of rough handling during shipment. If it is suspected that the transformer has been dropped, or otherwise mishandled during transportation, this should be reported to Electro-Wind Limited. prior to commissioning. If transportation damage is suspected, then on no account must the transformer be energised until a full inspection has been conducted by authorised persons.
2. Remove the access panels, lids (if fitted) and inspect the transformer for damage. Visually check the windings, connecting leads, core, holding down bolts and other fixtures.
4. Examine the transformer for damage to the paint work. Any such damage must be reported and action taken to repair the damage before deterioration of the transformer occurs. Details of suitable painting materials may be obtained from the transformer manufacturer.

2.2 LIFTING AND HANDLING

Care must be exercised when attempting to move or lift air cooled transformer rectifier units, the following procedures should be adopted. The transformer/rectifier enclosure and the General Arrangement Drawing are to be checked for any specific lifting or handling instructions.

When lifting or moving the transformer use only the lifting eye's, skid channels or lockable swivel casters if specified provided for the purpose. Never use other components to lift off, such as the enclosure covers, cable boxes or lashing-down eye-bolts if present.

The total weight of the transformer will be displayed on the diagram/rating plate fitted to the unit, ensure that lifting devices are adequate for the purpose.

During transportation, air cooled transformer/rectifiers must not be allowed to become contaminated with moisture, or other forms of pollution. Care must be taken to ensure that the packaging materials are not subjected to excessive forces during transportation that might lead to deformation or deterioration of the enclosure or components.

If a fork lift truck is to be used to lift a transformer, the forks must be located inside the bottom channels. On no account must the sheet metal enclosure be used to lift or jack a dry type transformer/rectifier unit.

Units supplied with castors must not be transported on vehicles with the castors attached. Remove the castors, pack away securely and refit after transportation. Castors are only to aid positioning in its operating locality.

Power supplies having positioning castors fitted must not be moved when plugged into the mains supply or the trailer.

Isolate the power supply from the mains and remove the plug from the outlet. Never move the power supply unit when connected to the mains socket outlet.

Do not disconnect the DC extension lead if connected to the Anderson DC output connector. Carefully reposition the unit before reconnecting the mains supply and the trailer.

Remember 2 of the 4 swivel castors are lockable and must be locked when the unit is in position.

2.3 STORAGE PRECAUTIONS

Transformers often arrive on-site in advance of their planned installation date. In this event, adequate provision for storage must be made. It is preferable to site the transformer/rectifier and make it ready for service as soon as is practically possible.

Air cooled transformer rectifiers units must be stored within an enclosed area, having a controlled atmosphere, protection must be afforded against the ingress of dust and other foreign matter. Particular care must be taken for the exclusion of water in any form, transformer rectifiers units must not be stored in any location that could allow contamination by moisture.

During extended periods of storage, a system of routine inspections should be implemented and records kept of those inspections .

Any components despatched separately from the transformer must be stored under similar conditions, after having been subjected to the same receipt inspection procedures.

STORAGE CHECK LIST

Whilst the transformer rectifier unit is in store, a periodic inspection routine should be maintained.

The following storage checks are recommended:-

1. Check the storage area and ensure that it is weatherproof, dry and free from dust, or any other air-borne contamination.
2. Examine the packing for signs of deterioration or external damage
3. Clean off any dust that may have accumulated.
4. NA
5. NA
6. Thoroughly inspect all paint work for signs of rust or corrosion. Refurbish any paint work that shows signs of deterioration. For information on appropriate paints, refer to Electro-wind Limited.
7. Any loose items supplied with the transformers are to be subject to the same storage conditions and periodic checks.

3. INSTALLATION AND COMMISSIONING

3.1 INSTALLATION

Dry type transformer rectifier units must be installed to give maximum accessibility, ventilation and ease of inspection. Adequate allowance must be made for the installation or removal of connectors (if any). Consideration should be given to the access height above the transformer rectifier unit. In order to allow for a free flow of cooling air, it is recommended that a minimum spacing of 500mm is allowed between the transformer enclosure and any adjacent walls. Avoid positioning the transformer/rectifier adjacent to a heat source such as a radiator or placed in direct sunlight.

It is normal for dry type transformer rectifier units to be installed within a building, some designs have enclosures with paint systems suitable for our door environments. Consequently, unless specified otherwise, dry type transformers are to be sited indoors, within a suitably constructed room or designated area. Provision must be made for the inlet and outlet of cooling air, the amount of ventilation required will be partly dependant upon the transformer and rectifier power losses, ambient temperatures and the method used in the construction of the building. If there is any doubt as to the ventilation requirements for any particular installation, then the transformer manufacturer's advice should be sought.

Dry type transformer rectifier units will operate successfully in humid conditions, but precautions must be taken to keep the units dry during periods when de-energised. It is important that dry type transformers are not allowed to become contaminated with air-borne dust that may affect the operation of components such as tapping switches (if fitted) link boards, insulators and bushings. Care must be taken to prevent water entering the housing, or dripping onto the unit.

Where there is a risk of voltage surge and/or lightning, the equipment must be adequately protected against such occurrences.

Transformers are inductive devices and as a result exhibit a current inrush when its iron core is energised (during switch ON). The magnitude of the inrush is dependent upon a number of conditions present at the time of energising. Inrush current values can be up 15 - 20 times the full load primary current value. The inrush occurs over a very short period of time.

MCB's with a D curve magnetic trip point: 10 to 20 times the rated current. D curve devices are suitable for applications where high levels of inrush are expected. The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.

Installers must consider the inrush spikes when selecting a protective device such as a miniature circuit breaker bear in mind it's time-current curve.

CHECK LIST

On completion of the installation, the following checks should be made:-

1. Ensure that the transformer earth connection has been properly made.
2. Check that all fittings are in place, reference should be made to the drawings if applicable.
3. Check that the installation allows sufficient clearance for any future maintenance tasks.
4. Ensure that the transformer is located in a suitable position and is provided with an adequate supply of cooling air. Adjacent service pipes, cables etc. must not present a safety hazard to the safe operation of the installation.
5. Repeat the checks outlined in the section headed Storage Checks.
6. Remove any constructional equipment or debris left behind from installation activities.

3.2 COMMISSIONING

After having completed the preliminary checks required by the installation procedure, there will be a requirement for a programme of commissioning checks. The extent and nature of this programme will depend upon the fittings and other equipment that is provided with the transformer.

A basic series of checks are common to all types of dry type transformers rectifier units. These include functional checks on any instruments fitted and the setting of the tapping links (if fitted) to suit the local supply voltage conditions.

Electro-wind Limited

CHECK LIST

The following checks are to be made on the transformer rectifier unit.

1. NA
2. NA
3. Remove any dust deposits using suction equipment (preferred method) or blow with dry air (recommended maximum pressure of 25-30 lbs/sq.in or 1.7-2.0 bar).
4. Check the tightness of all electrical connections.
5. Select appropriate tap and connect supply cable to the correct position according to the supply voltage, ensure that tapping links are all connected in an identical manner for each phase.
6. If control gear such as Isolators, selector switches, emergency stop, instruments or auxiliary equipment are fitted to the transformer rectifier unit, these components are to be checked as follows:-

Before connecting the 32A 400V 4 pin Plug IP44 IEC60309 plug to a mains outlet or the unit has been hard wired to the electrical supply, before connecting to the mains supply.

- Check
- a) The rotary isolator is turned to its off position (4).
 - b) The primary TPMCB is set to OFF (5).
 - c) The emergency stop button (Twist/pull to reset) is out (8).

7. Power up from mains.

Insert the 32A 400V 4 pin plug into the mains outlet.

Important note: 400Volts will be present at the input terminals of the rotary isolator when the mains outlet is switch to its ON position.

- Now
- a) Set primary MCB to ON position (5).
 - b) Turn rotary isolator to ON position (4).
- Check
- c) 400V Power ON indicator (white lense) is now illuminated (6)
 - d) Press green push button 24V ON (green lens will illuminate) (7).
 - e) Use a multimeter set to the DC Volts range to test for the presence of 28VDC at output power connector (9).

NOTE: The off load voltage will be several volts higher than its on load operating voltage due to the transformers regulation.

- Now f) Operate the emergency stop button (8).
- Check g) Use a multimeter set to the DC Volts range to test for NO presence of 28VDC at output power connector (9).
- Now h) Turn the rotary isolator (4) to its OFF position and reset emergency stop button (Twist/pull to reset) (8).

The steps carried out ensure that the transformer and rectifier are operating correctly. If at any stage operation is not as expected contact the manufacturer.

Electro-wind Limited

4. MAINTENANCE

4.1 PREVENTATIVE MAINTENANCE.

The amount of maintenance required by a dry type transformer is almost totally dependant upon the environment that it is operating in. This type of transformer rectifier unit will give satisfactory service for long periods of time, provided that it is operated within it's design parameters in a suitable environment. Overloading of the transformer beyond its thermal capabilities, operation in high ambient temperatures, or in poorly ventilated areas will lead to early deterioration of the insulation materials, and reduction of its operational life.

Contamination of the windings by dust can result in reduced cooling efficiency, with resultant overheating. Similarly, ventilation through blockage by debris or stacked materials will reduce the flow of air through the transformer, leading to higher than normal operating temperatures.

Contamination and damage to components, such as extension cables outer insulation and power connectors by dirt, moisture, abrasion, crushing etc may lead to failure of these items and the transformer rectifier unit.

NEVER use damaged extension leads. Remove them from service.

Preventative maintenance may be divided into two sets of operations. The first set will consist of simple inspections, which are conducted at frequent intervals, for these inspections there is not normally a requirement for the transformer to be withdrawn from service. The second set of maintenance operations are performed at greater intervals and are usually associated with inspection of the windings, for this operation it is essential that the transformer be removed from service.

A regular programme of inspections must be implemented, the frequency of which will be determined by the site conditions. It is recommended that an initial full inspection is conducted 3 months after the transformer has been commissioned and afterwards at intervals not exceeding 12 months. The specific interval will depend upon the site conditions, if it is found that the transformer becomes contaminated by dirt and dust over a short period of time, then the maintenance intervals must be reduced and the source of contamination eliminated.

Transformers of conventional construction require a clean dry atmosphere if they are to give reliable service. During periods of de-energisation they must be kept warm in order to prevent contamination of the windings by condensation. It is recommended that this type of transformer be fitted with anti-condensation heaters, which are arranged to operate when the transformer is de-energised. When the transformer is off-load, but energised, the non-load loss is usually sufficient to prevent the formation of condensation.

It is recommended that a log be kept for each transformer. Record should be made of all checks, inspections and maintenance work that is conducted on the transformer.

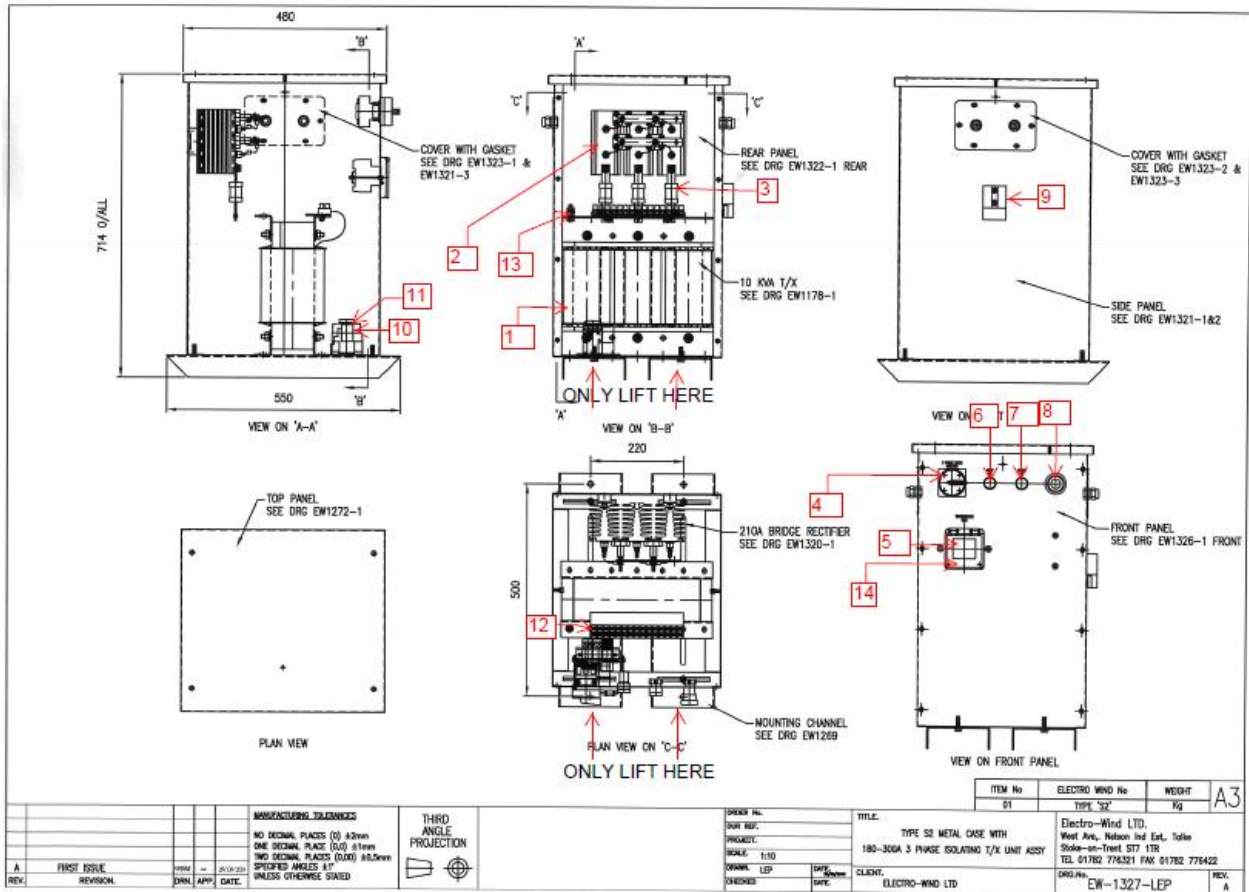
MAINTENANCE CHECK LIST

The following checks are to be conducted after the transformer has been in service for a period of 3 months and then at intervals not exceeding **12 MONTHS:-**

Before removing lids or covers disconnect the unit from the mains voltage supply.

1. Examine and clean out dust and debris (if necessary). Use low pressure clean dry air, or preferably, suction equipment.
2. Check all ventilator grills to ensure that they are not obstructed by dust or dirt.
3. Wipe off surface dust and dirt deposits from heatsinks, stand-off insulators, electrical leads, busbars and coil faces.
4. Inspect tap link boards or terminal block (if fitted) for signs of overheating or arcing. Clean these components (if required) and check any link bolts for tightness
5. Check electrical joints for signs of overheating, remake joints if necessary.
6. NA
7. Check the operation and setting of any items of auxiliary equipment that is fitted.
8. Examine the transformer earth connection and ensure that it is effective.
9. Examine the paintwork of the transformer metal components and enclosure for signs of deterioration. Repair as necessary, details of suitable painting materials may be obtained from the manufacturer.

5. General Arrangement Drawing



1. Three Phase Transformer
2. Three Phase Bridge Rectifier
3. Secondary AC Fuse
4. Rotary Isolator
5. Primary miniature circuit breaker
6. Indicator lens illuminated (white) "400V ON"
7. Push button switch illuminated (green) "24VDC ON"
8. Emergency stop button
9. Output power connector
10. Control transformer
11. Contactor
12. Terminal block
13. Protective Earth Terminal
14. Cover