



**SINGLE-PHASE OVERHEAD-TYPE
DISTRIBUTION TRANSFORMER**

INSTRUCTION MANUAL

Introduction

This instruction manual provides general information for the installation, operation, and maintenance of EVERPOWER single phase, pole mounted transformers. These transformers are to be applied for the single-phase, mineral-oil-filled, overhead-type distribution transformers for use on 34 500GrdY /19920V overhead distribution system,

19920volts (34 500GrdY/19920V)

Secondary: BIL 30KV

120/240volts (or 277/480 V)

Frequency – 60Hz

Polarity – Subtractive

Ambient air temperature: 40°C

Temperature rise: <65°C

Reference Standards

ANSI/IEEE C57.12.00 IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

ANSI/IEEE C57.12.20 American National Standard for Overhead-Type Distribution Transformers 500kVA and Smaller: High Voltage 34500 Volts and below; Low Voltage 7970/13800Y and below Requirements

Rating kVA & Current:

KVA	PRIMARY VOLTAGE (V)	PRIMARY CURRENT (A)	SECONDARY CURRENT (A)		
			120/240V	240/480V	277V
10	19920	0.50	41.7	20.8	36.1
15		0.75	62.5	31.3	54.2
25		1.26	104.2	52.1	90.3
37.5		1.88	156.3	78.1	135.4
50		2.51	208.3	104.2	180.5
75		3.77	312.5	156.3	270.8
100		5.02	416.7	208.3	361.0
167		8.38	695.8	347.9	602.9
250		12.6	1041.7	520.8	902.5
333		16.7	1387.5	693.8	1202

Nominal voltage ratings

Primary: BIL150KV

WARNING

READ THIS INSTRUCTION BOOK CAREFULLY BEFORE ATTEMPTING TO INSTALL, MAINTAIN, OPERATE OR SERVICE THE TRANSFORMER, FAILURE TO FOLLOW THIS INSTRUCTIONS CAN CAUSE SEVERE INJURY, DEATH, OR PROPERTY DAMAGE.

TRANSFORMER MUST BE PROPERLY GROUNDED BEFORE ENERGIZING.

THE EQUIPMENT COVERED BY THESE INSTRUCTIONS SHOULD BE INSTALLED, OPERATED, AND SERVICED ONLY BY COMPETENT TECHNICIANS FAMILIAR WITH GOOD SAFETY PRACTICES.

THESE INSTRUCTIONS ARE WRITTEN FOR SUCH PERSONNEL AND ARE NOT INTENDED AS A SUBSTITUTE FOR ADEQUATE TRAINING AND EXPERIENCE IN PROCEDURES FOR THIS TYPE OF EQUIPMENT.



Receiving and inspection

Check the transformer according to the information on the nameplate.

EVERPOWER pole transformers are shipped filled with insulating transformer oil. Immediately upon receipt, and before being put in service, transformers should be inspected for any external damage or loose parts caused by shipping and handling. Damage presumed to have occurred during shipment should be noted, and your EVERPOWER sales representative contacted. Extreme care is taken at the factory in the processing and sealing of the transformer to insure that it is clean and dry, and of adequate dielectric strength. Normally, therefore, it is not recommended that the transformer seals be broken for internal inspection. If it is decided, nevertheless, that the transformer be opened, adequate precautions should be taken as outlined elsewhere in these instructions.

Handling and installation

Transformers should be lifted by the lifting lugs only. The transformer bushings should not be used for lifting or moving the transformer into position. The transformer should be kept upright at all times and not tipped over on its side for any reason. This will prevent air bubbles from entering the coil which could degrade the dielectric strength. Support lugs for direct pole mounting are provided in accordance with ANSI standards. Hangers and kickers for cross arm mounting is to be provided by the user. When installed, transformers should be protected from dangerous overloads, overvoltages and lightning by suitable, approved devices.

Insulating liquids (Oil)

Transformers are thoroughly dried at the factory and filled with inhibited mineral oil having a minimum dielectric strength of 30 kV at 60 Hz when tested per ASTM D-877. Inhibited mineral oil contains less than 1 ppm of PCB's at time of manufacture. The transformer should never be energized unless it is

filled with oil. If it should be found necessary to add to or replace the oil in the transformer, only clean dry oil having the minimum dielectric strength of 30 kV and less than 1 ppm PCB's should be used.

Before opening the transformer, sufficient time should be allowed for the transformer to come to temperature equilibrium with the air in the room to eliminate the possibility of moisture condensation from the air.

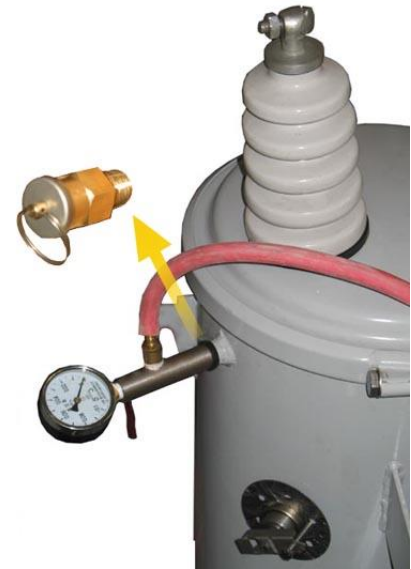


A recommended procedure for opening the transformer is to first bring the interior of the transformer to atmospheric pressure by venting the automatic pressure relief valve furnished on all EVERPOWER transformers. The cover band may then be removed. Natural rubber hose should not be used in the transfer of oil. The correct oil level at 25°C is marked on the inside of the tank.



Care should be taken to re-seal the transformer so that moisture is permanently excluded from the interior. A pressure test using dry air or nitrogen, may conveniently be made through the pressure vacuum fitting, after removing

the pressure relief valve, to be sure all seals are tight. Pressurize the transformer to 10 psi and hold for 30 minutes. A drop in pressure during this time would indicate the transformer is not properly sealed and the tank and fittings should be checked and the leak repaired. Finally, the pressure relief valve should be installed and carefully tightened.



Connections

Refer to the transformer nameplate for the kVA rating and the permissible connections. No connections other than those shown on the nameplate should be made; and none of the connections should be changed while voltage is applied to the transformer. For three-wire low voltage connections, the loads between the line terminals and neutral should be as nearly equal as possible. More than one-half the rated kVA should not be applied between any one line terminal and neutral. Provision is made for grounding the tank by means of a tapped pad or ground connector.

On single high voltage bushing transformers, it is advisable, for safety reasons, to connect the tank and the low voltage neutral to the system neutral through conductors of adequate capacity before voltage is applied to the

transformer. Connection should then be made to the low voltage and finally to the high voltage. When disconnecting the transformer, all high voltage connections, including those to protective devices should be opened first.

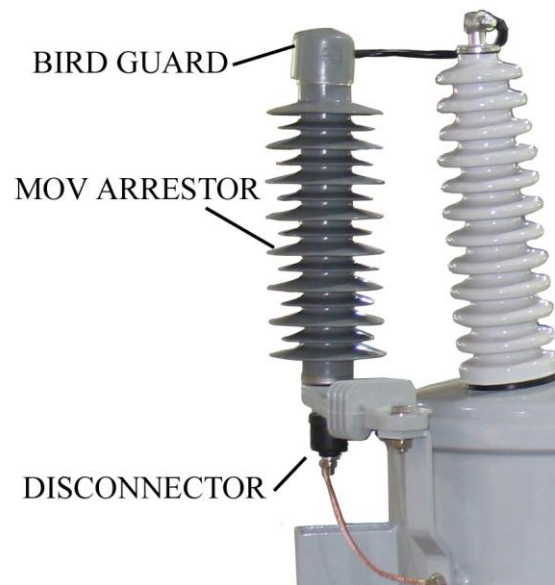
Complete self protection (CSP)

Transformer protection against overloads and overvoltages may be obtained by suitable devices applied in the field to conventional transformers, or by use of protected transformers (EVERPOWER CSP or CP types) as supplied from the factory.

Fuses

High voltage fused cutouts are recommended for protection of conventional transformers against overloads and to protect the line against outages. On EVERPOWER CSP and CP transformers, a fusible protective link, mounted inside the tank, is provided in series with each HV terminal. In case of internal failure of the transformer, the protective link disconnects the transformer from the line without affecting line fuses or breakers. When the available fault current exceeds the maximum interrupting rating of the protective link, a current limiting fuse should be used in series with the protective link.

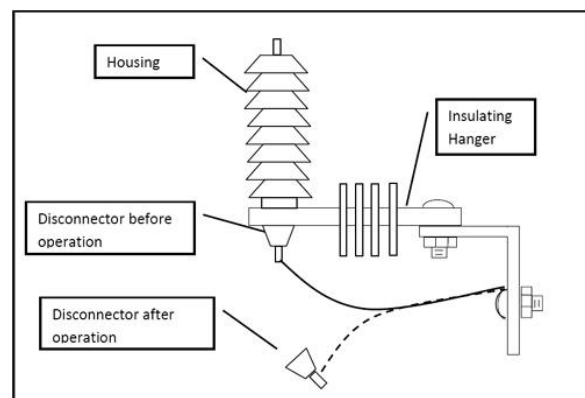
Lightning Arresters



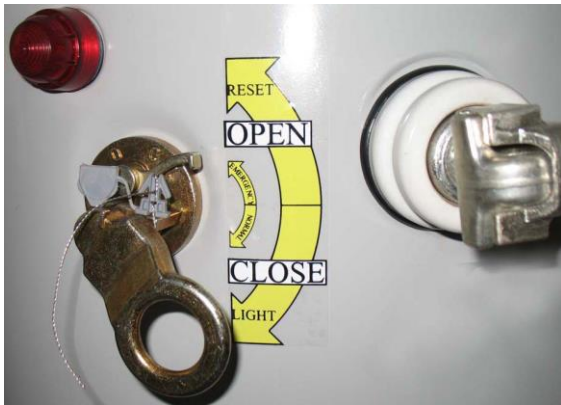
Conventional transformers should be protected by properly rated lightning arresters. Ground connections on the arresters should be made before connection to the high voltage line is made.

CSP transformers are lightning protected by direct connected MOV lightning arresters bolted to mounting pads welded to the tank wall.

Arrestor Disconnecter for disconnecting an arrester in anticipation of or after, a failure in order to prevent a permanent fault on the circuit and to give visual indication of a failed arrester.



Secondary Breakers



EVERPOWER CSP and CP transformers are protected against secondary overloads and short circuits by an internally mounted circuit breaker. The function of the breaker is to open the low voltage circuit and protect the transformer from faults or severe overloads. The breaker operating mechanism is designed to be operated by a lineman's hot stick. Transformers are shipped with the circuit breakers closed. To open the low voltage manually, move the handle fully counterclockwise so that the pointer moves from the "C" (closed) to "O" (open), at which point the circuit is open. Verify that the circuit breaker is latched in the "open" position. To ensure the discharge of the static charge which is sometimes present in the low voltage winding due to capacitance, it is recommended that the low voltage be grounded after opening the circuit breaker until after the high voltage is disconnected. To close the breaker, rotate the handle fully counterclockwise to "R" (reset), which engages the latch mechanism, and then clockwise to "C" (closed). If a fault exists or an excessive load exists at the time the breaker is closed, the breaker will reopen even though the handle is held in the "C" (closed) position.

The circuit breakers are provided with a red **signal light** which gives warning

that the load has reached a value near the tripping point of the breaker. The signal light remains lighted until reset (turned off) by means of the breaker operating handle. Transformers should not be operated under load conditions that will cause the red light to appear frequently, since it indicates an overload on the transformer. When such a condition exists, it is recommended that a larger transformer be substituted to avoid impairing the life of the smaller unit. To reset the signal light without disconnecting the load, rotate the handle to "L" (light), and then return to "C" (closed). If the light fails to go out, the transformer is still overheated. To check the signal light bulb when the transformer is in service, rotate the handle to "L" (light). The light should turn on. If it does not, the bulb should be replaced.

The circuit breakers are equipped with an **emergency overload** device which can be used to restore service following a circuit breaker operation due to overload. The **emergency overload lever** is located immediately above the breaker operating handle. With the emergency lever in the normal position, the breaker will trip at its normal setting as calibrated at the factory. Moving the lever in a counterclockwise direction increases the setting so a higher temperature is required to trip the breaker. The emergency setting may be adjusted to an intermediate or extreme value. This emergency setting provides extra load capacity and still permits manual breaker operation, and also retains short circuit protection of the transformer. It is important that the emergency setting be used only when, and as long as, absolutely necessary because its use will result in a reduction of transformer life. A meter seal is provided on the emergency lever to prevent tampering. It is recommended that a new seal be applied to the lever when it is returned to the normal

position after emergency operation.

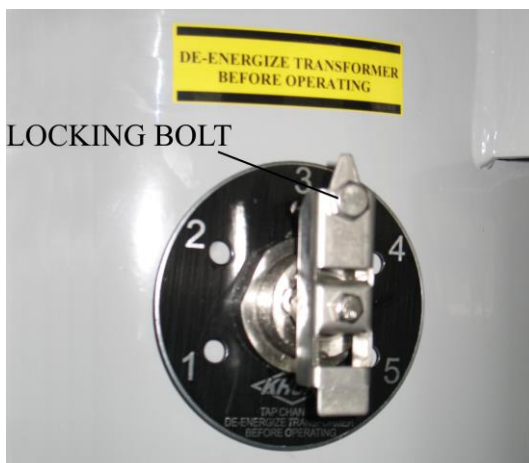
The breaker is a thermal and short circuit protective device for the transformer. It is not recommended that the breaker be used for routine disconnect operations.

Gaskets

Cover and bushing gaskets are all made of Buna-N Nitrile rubber. Gaskets may be reused if not damaged. Covers must seat evenly of the gaskets so that pressure is distributed evenly. The cover band must be tightened firmly to insure an effective seal.

Tap changers

EVERPOWER transformers rated for more than one primary voltage are equipped with a dual voltage switch or tap changer. These switches are externally operated, but should never be operated while the transformer is energized. Before operate the tap changer, loose the LOCKING BOLT till out of hole of Dial, the rotate the handle to desire position, make sure the switch is in the proper position before re-energizing the transformer. After turning the switch, tighten the locking bolt into the hole of Dial to minimize the possibility of unintentional movement.



Storage

Transformers should be stored filled with oil and in a clean dry place, if possible where there will be no extreme temperature changes. Before the transformer is put in service, it should be checked in the same manner as when received.

Maintenance

A periodic visual inspection of the transformer is recommended. At such times, the general condition of the following should be noted:

1. High voltage bushings;
2. Low voltage bushings;
3. Arresters (if provided);
4. Evidence of oil leakage;
5. Ground connections;
6. Accessories;

Safety labels.

Where tanks show evidence of rusting or deterioration of the finish, they may be cleaned and then retouched with paint. It is necessary to remove all loose paint and rust by wire brushing, scraping, or sanding, and clean with a good solvent. Apply an acrylic lacquer, alkyd enamel, two part urethane or silicone alkyd primer, allow to dry, and then apply a color matched compatible top coat and allow to dry. If metal is rusted to the point of being weak such that the tank integrity can be compromised, repair or replace the part rather than painting it.

Repair and replacement parts

It is the responsibility of the owner to inspect, maintain and keep the transformer in good repair. All warranty repairs must be made by EVERPOWER or an approved service facility.

To assure proper operation, use only EVERPOWER approved replacement parts. It is recommended that the owner limit repairs to replacing broken parts unless the owner has well-trained repair personnel.

Some internal parts can be replaced without completely draining the tank. In such cases, only the fluid necessary to expose the part should be drained. Replacement parts are available from

EVERPOWER. When ordering parts, give a complete description of the part. Also, give the kVA, voltage, and serial number of the transformer, all of which may be found on the nameplate.

The core and coil assembly can be repaired or replaced by EVERPOWER personnel at either the factory or at an authorized repair facility.

Additional information

Complete information on details of construction, installation, operation and maintenance can be obtained from the EVERPOWER factory or your nearest EVERPOWER Sales office.

CAUTION

THESE INSTRUCTIONS DO NOT PURPORT TO COVER ALL DETAILS OR VARIATIONS IN EQUIPMENT NOR TO PROVIDE FOR EVERY POSSIBLE CONTINGENCY TO BE MET IN CONNECTION WITH INSTALLATION, OPERATION OR MAINTENANCE.

SHOULD FURTHER INFORMATION BE REQUIRED, OR SHOULD PROBLEMS ARISE WHICH ARE NOT COVERED SUFFICIENTLY FOR THE USER'S PURPOSE, REFER THE MATTER TO THE NEAREST SALES OFFICE/AGENT OF EVERPOWER.

ALL APPLICABLE SAFETY PRACTICES, BUT NOT LIMITED TO, IEC, ANSI, REGIONAL AND LOCAL SAFETY CODES, SAFE WORKING PRACTICES AND GOOD JUDGMENT, AS THEY MAY BE APPLIED TO THIS TYPE OF EQUIPMENT MUST BE USED AND OBSERVED BY ALL PERSONNEL WHEN INSTALLING, OPERATING AND MAINTAINING THIS EQUIPMENT. DO NOT MAKE ANY CONNECTIONS THAT ARE NOT AUTHORIZED BY THE NAMEPLATE OR CONNECTION DIAGRAMS.