INSTALLATION, OPERATION AND MAINTENANCE GUIDE

FOR INDOOR/OUTDOOR SINGLE PHASE ENCAPSULATED TRANSFORMERS

Indoor/Outdoor Encapsulated Transformers

The pictures used in this guide are only a representation and may vary from the actual product.

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Safety Precautions

(1) Do not lift or move a transformer without proper equipment and experienced personnel.

(2) Do not install the transformer until a full inspection has been completed.

(3) Use terminals only for electrical connections, and flexible connectors are recommended.

(4) Connections should only be in accordance with the nameplate diagram or connection drawings.

(5) Make sure all power is disconnected before attempting any work on the transformer.

(6) Make certain all ground connections are complete and tightened before energizing the transformer.

(7) Do not attempt to change any taps - primary or secondary, while the transformer is energized.

(8) Do not change connections when the transformer is energized.

(9) Do not adjust or remove any accessories or cover plates while the transformer is energized.

Class 1, Division 2, Hazardous Location Installation Requirements

If this unit is designed for use in Class 1, Division 2, Groups A, B, C & D hazardous locations then also refer to notes below:

(1) Power, input and output (I/O) wiring must be in accordance with Class 1, Division 2 wiring methods as per Article 501-10 (b) of the National Electrical Code.

(2) WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

(3) WARNING - EXPLOSION HAZARD - SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

CONTENTS

INSTALLATION, OPERATION AND MAINTENANCE OF ENCAPSULATED TRANSFORMERS

GENERAL

Encapsulated transformers are manufactured to provide optimum performance for a lifetime of uninterrupted service. Careful attention to the following instructions is recommended for safe and reliable operation.

Installation, operation and maintenance of transformers should be performed by qualified persons, familiar with electrical apparatus and the potential hazards involved.

***Warning:* Danger! There is the potential of electric shock whenever working in or around electrical equipment such as transformers. Power must be shut off before any work is conducted on a transformer.**

As with any electrical device, transformers must be installed according to the requirements of the national, and local electrical codes. Refer to ANSI/IEEE C57-94 may also be referred to for recommended installation, application, operation and maintenance of dry-type transformers.

HANDLING

Transformers are either shipped in cartons or palletized. The units on pallets can either be lifted via a forklift truck or hoisted by the lifting lugs provided.

Appropriate lifting equipment should be used relative to the size of each transformer. No attempt should be made to lift or move a transformer from any points on the unit other than those indicated.

Please Note: On units bolted to the pallets, please remove the shipping bolts located at the top mounting holes as well as the one(s) located inside the wiring compartment.

RECEIVING & INSPECTION

Immediately after receiving the transformer, it should be inspected for any transit damage and for correctness against the shipping documents.

The unit should be examined for any breaks in its packaging, dented or damaged enclosures or missing parts from the packing list.

If any damage is noted, a claim should be filed immediately with the carrier and a second copy of all pertinent information relative to the order and the circumstances should be filed with the local sales office.

STORAGE

Transformers that will not be immediately installed and energized, should be stored in a clean, dry and warm environment away from any environmental airborne contaminants.

It is recommended that transformers be stored in a heated building with the protective plastic wrap still installed, but can be stored in temperatures of -40°C (-40°F). Units that are to be energized after being stored at a low temperature must be warmed to -25°C (-13°F) with warm air or radiant heat. Once the unit reaches this temperature, it is safe to energized

INSTALLATION

All encapsulated transformers are supplied with a NEMA 3R enclosure. NEMA 3R units may be installed indoors, or outdoors where applicable.

For any outdoor location, the appropriate applicable codes must be followed including cable installation and hardware suitable for outdoor service. Water tight couplings must be used at the knockouts.

Encapsulated transformers must be located in an upright position on walls, posts, beams or other locations capable of supporting their weight.

If encapsulated units are to be either stored or installed outdoors, the unit must be oriented vertically with the wiring compartment down to prevent the ingress of moisture.

Mounting Instructions (refer to page 6)

1. Select an installation location that is on a non-combustable surface.
2. The mounting location must allow for air circulation around the transformer for cooling purposes. Please refer to the minimum distances stated in the ventilation section (page 4).
3. Using the appropriate mounting template provided, drill the top two mounting holes on the mounting surface.
4. Lift the transformer into position and install the top two mounting bolts.
5. With the transformer hanging on the top two mounting bolts, level the unit, then with the wiring compartment cover open, mark and drill the lower mounting hole(s) into the mounting surface.
6. To provide NEMA 3R protection (protection from falling rain), the transformer must be mounted vertically with the mounting tabs facing up.

1. Install the lower mounting bolt, lock washer, flat washer and rubber washer into the lower mounting.

VENTILATION

Transformers are required to be installed in an area where they can be cooled by means of the free circulation of air where the average ambient temperature is 30°C (86°F) and should not exceed 40°C (104°F) at any time.

Adequate ventilation is essential for transformers to meet their nameplate kVA capability. All encapsulated general purpose transformers should be located at least 2 inches on units up to 10 kVA and at least 4 inches on units over 10 kVA, away from walls or any other obstructions to allow free, clean circulation of air.

ACCESSIBILITY

NEC standards require that transformers be accessible for inspection and located accordingly. However, transformers should not be located in areas where stored items are likely to interfere with either natural air convection or the capability to have them inspected. Passage ways or other areas where people could be exposed to live parts during inspection should also be avoided.

Adequate protection should be provided under any circumstances.

TRANSFORMER SOUND LEVELS

Transformers are an electrically energized apparatus and by their nature emit sound due to their component materials.

Transformers are required to meet NEMA standards for the maximum sound levels permissible. These sound level standards vary from 40 to 60 DB and hence, can be an annoyance if located in close proximity to where people work or reside.

Care should therefore be exercised in selecting sites for transformers particularly to avoid sensitive areas like hospitals, classrooms, medical or office facilities.

The following guide lines may be helpful;

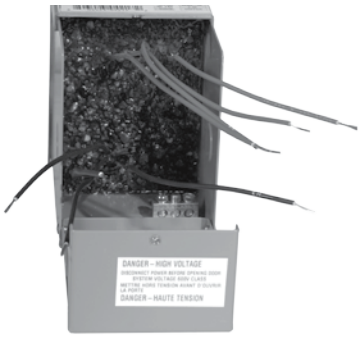
- ➔ Units should be mounted away from corners or reflecting walls or ceilings.
- ➔ Cable or other flexible conduit should be considered to make connections.
- ➔ Acoustically absorbing materials could be considered for walls and ceilings around the unit.
- ➔ The location of the unit should be located as far as practical from areas where sound levels could be considered undesirable.

CABLE CONNECTIONS

1. Open the wiring compartment by loosening the cover screw.
2. Terminals should be cleaned and electrical joint compounds are recommended for use on all electrical connections.
3. Make the appropriate electrical connection to suit the desired voltages as per the connection diagram on the nameplate. This includes the input connections, output connections and the ground(s).

***WARNING*: If this unit is designed for and to be used in Class 1, Division 2, Groups A, B, C and D hazardous locations than the power, input and output (1/0) wiring must be in accordance with Class 1, Division 2 wiring methods as per Articles 501-10 (b) of the National Electrical Code.**

4. Make certain to insulate any unused wire leads with marrette connectors and electrical tape.
5. Close the wiring compartment and ensure that the cover screw is tightly secured.



The connecting cable size is determined from the line current rating of the transformers primary and secondary windings. Convenient pre-punched knockouts are provided on all transformer enclosures, to facilitate cable entry. (NOTE: potted transformers cannot be returned if the knockouts have been removed unless the unit has a manufacturing defect as outlined in the standard warranty policy.)

GROUNDING

All core and coil assemblies are solidly grounded to the enclosure internally to ensure that all conductive metal parts have the same potential.

The transformer enclosure in turn should also be securely and effectively grounded as a safety precaution. This grounding should be in accordance with national electrical code standards.

INSPECTION BEFORE ENERGIZATION

For the safe and proper operation of the transformer, we recommend that the following items be checked for completeness:

a) The insulation resistance, enclosure to primary, enclosure to secondary and primary to secondary, should be greater than 10k ohms.

b) Before energizing and connecting any loads, please measure and verify the output voltage matches nameplate specifications.

c) Ensure correct phase connections. Refer to the nameplate vector diagram.

d) When windings are connected in parallel (as in the case of dual voltage primaries), the primary taps for all coils must be connected to the identical percentage tap positions to avoid the shorting of turns. For tap positions, refer to the nameplate on the transformer.

e) The enclosure should be grounded with the appropriately sized conductor.

f) The clearance and tightness of all electrical connections should be checked.

g) For single phase 3-wire 240/120 volt loads, care must be taken to ensure the neutral current does not exceed 1/2 of the transformers kVA rating.

OPERATION

For all relatively normal and clean installations, encapsulated transformers will operate satisfactorily under normal conditions of energization and load.

For your reference, fully loaded transformers may be very warm to the touch, particularly on the top of the unit.

Standards permit the temperatures of the enclosure to be 65°C over ambient. This represents normal loading and should not be of concern.

Encapsulated transformers are designed to operate continuously at their full nameplate kVA rating.

ANSI C57.96 provides guidance for loading transformers under different conditions including:

- ➔ Ambient temperatures that are varied from the ambient temperatures required for transformer operation.
- ➔ Short time overload as it relates to time and temperature and the corresponding loss of life of the transformer.
- ➔ Overload that results in a reduction of life expectancy of the transformer.

If the transformer is experiencing increased temperatures, the following load characteristics should be considered immediately:

- ➔ Rigorous motor starting loads or other impact type loading for which a specific transformer for that application is required.
- ➔ Over-excitation of unit due to excess supply line voltage or current.
- ➔ Ambient temperatures above standard.
- ➔ Overload beyond ANSI C57.96 guidelines.
- ➔ Harmonic distortions of the supply line voltage and currents.

MAINTENANCE

Under normal operating conditions and environments, encapsulated transformers do not require maintenance. However, periodic care and inspection is a good practice, particularly if the unit is exposed to extreme environmental conditions.

Peripheral inspection and external dust and dirt removal may be carried out while the transformer is in operation. However, access covers must not be opened under energized conditions.

The accumulation of ice or snow will not adversely effect the operation of encapsulated transformers. However, the accumulation of dust or dirt will effect the cooling of the transformer and may become a potential fire hazard.

Internal maintenance must be performed with a transformer de-energized, isolated and with the terminals grounded.

The ground connection should be checked to ensure a low impedance connection.

<u>WARNING</u>: If this unit is designed for and to be used in Class 1, Division 2, Groups A, B, C, and D hazardous locations; DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

DIAGRAM 1a: Enclosure Mounting for Single Phase Encapsulated Transformers.

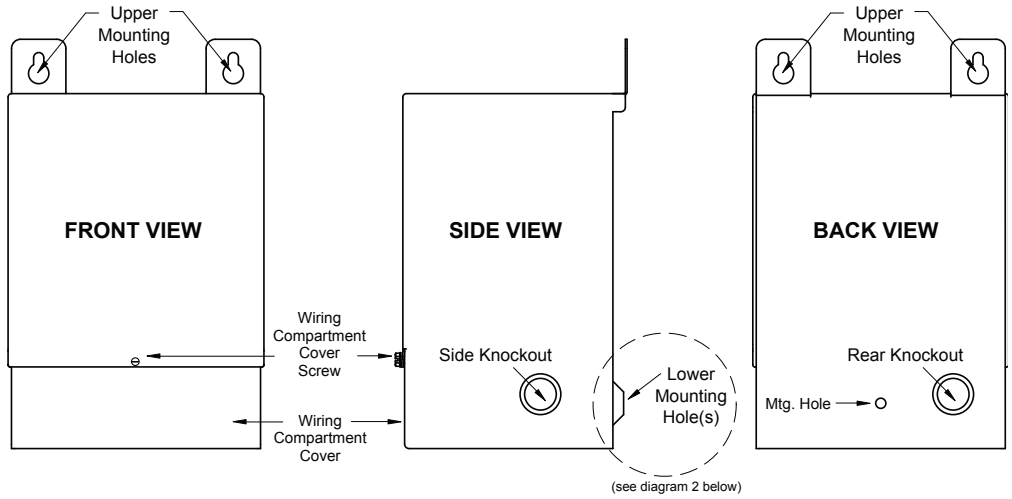


DIAGRAM 1b: Enclosure Mounting for Single Phase Encapsulated Transformers.

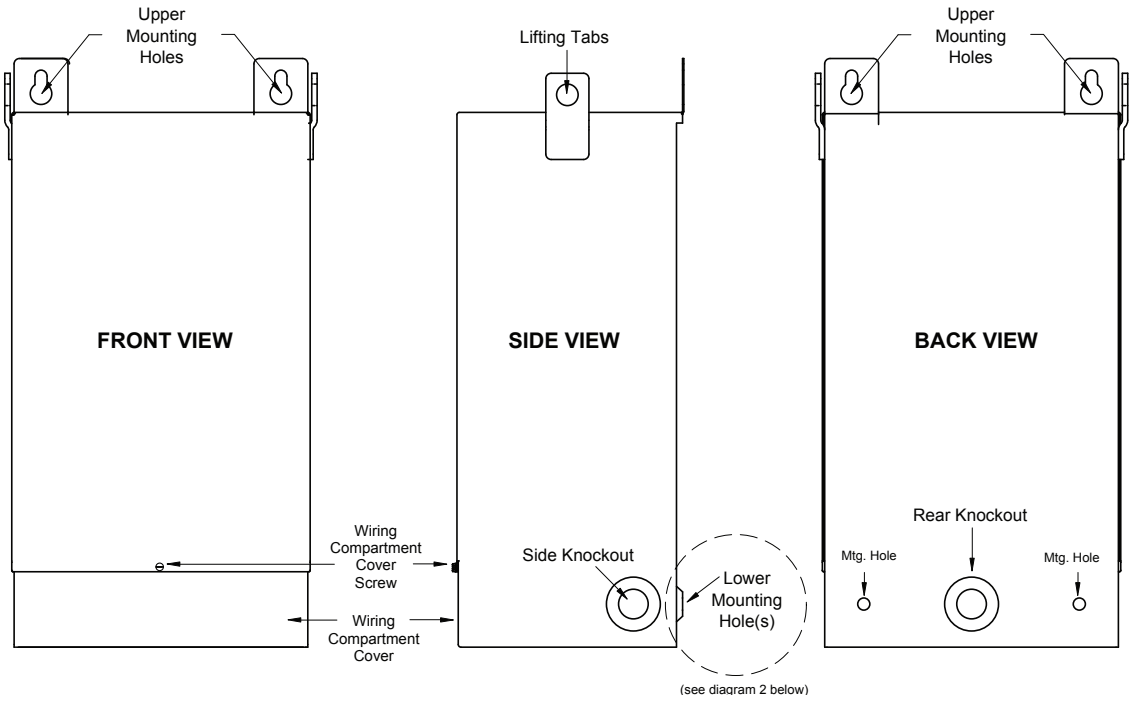


DIAGRAM 2: Lower wiring compartment mounting hole(s), mounting hardware installation assembly diagram.