INSTALLATION, OPERATION AND MAINTENANCE OF GENERAL PURPOSE DRY TYPE TRANSFORMERS

(600 VOLTS AND BELOW) Marine units can be wired per ABYC E.11 for either Polarization or Isolation system

1. GENERAL

The installation, operation and maintenance of dry type transformers should be performed by an electrician or other qualified personnel who are familiar with national and local electrical codes and with the potential shock hazards associated with electrical equipment.

These instructions cover two types of enclosure construction: ventilated and encapsulated.

- A) Ventilated units are NEMA type 2 enclosures suitable for indoor use. They are UL-3R listed and CSA certified for outdoor use with the addition of an optional weather shield kit. The proper weather shield part number is listed on the nameplate.
- B) Encapsulated units are NEMA3R enclosures suitable for either indoor use in harsh environments or for outdoor use.

This transformer is ready for installation and operation. It must be installed per the National Electrical Code® and local code requirements is recommended that these instruct-tons be read carefully prior to installation and kept for future reference

2. INSPECTION AND HANDLING

The transformer should be inspected carefully upon receipt to check for any visible or concealed damage that may have occurred during shipment. If damage is found, a claim should be filed immediately with the carrier.

Single and three phase transformers, in smaller KVA sizes, are provided with lifting ears. Larger KVA sizes are palletized and can be lifted with appropriately sized fork lifts or hoisted by the lifting lug bolts provided on the core frame after removal of the top cover. Incorrect handling can bend the enclosure or cause other damage or result in personal injury.

^{3.} INSTALLATION



WARNING: There is a potential danger of electrical shock when working on electrical equipment! Make sure power is off before installation. Replace all covers before energizing transformer.

A) Ventilated Dry Type Transformers

Ventilated units can be installed indoors or outdoors. Outdoor installation requires the addition of **a weather** shield to be UL-3R listed. For outdoor installation, check electrical codes for the proper protection of transformer against adverse weather conditions

Ventilated units should be installed in an upright position on walls (optional wall mounting brackets are available for certain KVA sizes), beams, platforms, floors or other structures capable of supporting their weight.

The ambient air should be dry and free from dust, dirt, corrosive fumes, heat or other adverse conditions. The unit should be installed a minimum of 6" from the wall or other obstructions that might prevent proper air flow through the vents.

Ventilated transformers are designed for operation in an average ambient temperature of 30 degrees $C(86^{\circ} F)$ and a maximum of 40 degrees $C(104^{\circ} F)$ not to be exceeded.

Larger KVA sizes contain "shipping bolts" to prevent damage during shipping; these should be removed pionto installation of the unit.

B) Encapsulated Dry TypeTransformers

Encapsulated units can be installed indoors or outdoors. When installed outdoors, these units should be installed with the wiring compartment down to prevent the entrance of moisture. Some encapsulated units have a top entry wiring compartment and can be installed vertically (wiring compartment up).

For indoor floor mounting of an encapsulated unit that has a bottom entry wiring compartment, the unit can be installed horizontally (on its back side) for ease of making wire connections.

4. ELECTRICAL CONNECTIONS

WARNING: Danger of electrical shock! Do not remove parts or make connections while the transformer is energized.

Refer to the transformer nameplate label or enclosed wiring diagram for primary and secondary voltage combinations, frequency and number of phases. Tap connections and voltage combinations are also listed on the diagram or nameplate.

CAUTION: Do not make connections other than those shown. The transformer must be as large (KVA) as the load it must operate.

Never exceed the nameplate rating as this could result in overheating, reduced life expectancy or fire.

Proper assembly of the connector (lug) to the transformer terminal is extremely important. Make certain that the connector is sized for the cable and is of the correct type to match cable and terminal metals. Always follow recommendations of the connector (lug) manufacturer. Space and insulate connectors per the NEC®.

INSTRUCTIONS FOR ALUMINUM BUS BAR CONNECTIONS

NOTE: Single phase 37.5 thru 100 KVA and three-phase 27 thru 225 KVA transformers have copper bus terminals. The following steps should be followed when making connections to transformers with ALUMINUM BUS BAR TERMINALS.

- **4.** Remove oxide form joint area of transformer bus terminal. This may be done with a wire brush or emery cloth. Other tools may be used but care should be taken to avoid scratching or gouging terminal.
- **5.** Coat terminal area with joint compound, following manufacturer's instructions.
- 6. Make connections using one of the bolting methods shown.



CAUTION: Care should be taken to avoid shearing aluminum bolts. Follow manufacturer's maximum torque rating.

* Place cup in washer toward bus bar. Draw washer to flat position for proper torque.

5. GROUNDING

All dry type transformers have a ground stud in the enclosure. The transformer enclosure should be solidly grounded to protect personnel. The customer supplied grounding conductor should have a current-carrying capacity to meet NEC® requirements.

C) MAINTENANCE

Non-ventilated encapsulated styles only require periodic wiping of dust and dirt from the outside of the case under normal conditions and environments. Adverse conditions may require more frequent inspections.

Ventilated units should be inspected within one to three months after initial installation. Air ducts should be kept clear at all times. Vacuum cleaners or low pressure compressed dry air can be used to remove dirt or dust. A regular inspection schedule for cleaning and maintenance will help ensure added safety and longer transformer life.

If a dry type transformer accidentally gets wet, it must be cleaned and thoroughly dried before energizing. Otherwise, complete failure could result!

CAUTION: Never perform internal maintenance while the unit is energized!

D) STORAGE

Both ventilated and encapsulated transformers should be stored in a clean, dry area. Care should be taken to prevent moisture or condensation from entering the transformer, and vent openings should be covered on ventilated units. If stored outside, the transformer must be covered and protected from water, dust and other airborne contaminants.

E) LIMITED PRODUCT WARRANTY

All dry type transformers are warranted against defects in materials and workmanship. This is a limited product warranty and certain conditions apply. Please contact the manufacturer for further information on warranty claims.

NOTICE: These instructions are general in nature and may

6. Wiring Instructions for Marine Isolation Transformers.

NOTICE: Marine isolation transformers should be installed by a qualified technician only, in accordance with the American Boat and Yacht Council (ABYC) E-11 Standard, AC and DC Electrical Systems on Boats, and these instructions. Hubbell Isolation Transformers have 2 Ground connections so that they can be wired for either a polarization transformer system or an isolation transformer system. Refer to the corresponding wiring diagram in the ABYC, E-11 Standard to wire the transformer into the vessel's electrical system.

NOTICE: A "D Curve" circuit breaker is highly recommended for marine transformer installations to mitigate high inrush current from tripping the circuit breaker.

For Auto-Boost equipped isolation transformers, connect the input and output wires to the corresponding positions on the terminal block inside the transformer. Tighten the terminal block screws to 28 to 33 in/lbs. (3.2 to 3.7Nm)

Transformer Wiring Diagram:



Domestic 60Hz. Shore Power Input Connections

240VAC Input – Connect L1 to H1, connect L2 to H4, connect H2 to H3.

120VAC Input – Connect L1 to H1, connect Neutral to H4, connect H1 to H3, connect H2 to H4.

Transformer Output Connections

120/240VAC (1:1) – Connect L1 to X6, connect L2 to X1, connect X2 to X5, connect Neutral to X2 and X5.

120/240VAC + 12.5% (1:1.125) - Connect L1 to X6, connect L2 to X1, connect X3 to X4, connect Neutral to X3 and X4.

120VAC (1:1) – Connect L1 to X6, connect Neutral to X1, connect X1 to X5, connect X2 to X6.

120VAC + 12.5% (1:1.125) - Connect L1 to X6, connect Neutral to X1, connect X1 to X4, connect X3 to X6.

International 50Hz. Shore Power Input Connections

220-240VAC Input – Connect L1 to H1, connect L2 to H4, connect H2 to H3.

Transformer Output Connections

220-240VAC (1:1) – Connect L1 to X6, connect Neutral to X1, connect X2 to X5.

220-240VAC + 12.5% (1:1.125) - Connect L1 to X6, connect Neutral to X1, connect X3 to X4.

NOTICE: When converting a 120/240V, 60Hz wired Auto-Boost equipped transformer to a 220-240V, 50 Hz output, remove the transformer center tap neutral wire running from the contactor to the far right terminal block position. Replace the 5-position 60Hz terminal block label with the 4-position 50Hz terminal block label. See wiring diagram above.

When converting a 220-240V, 50 Hz wired Auto-Boost equipped transformer to a 120/240V, 60Hz output, add a transformer center tap neutral wire running from the contactor to the far right terminal block position. Replace the 4-position 50Hz terminal block label with the 5-position 60Hz terminal block label. See wiring diagram above.