

Installation, Operation, and Maintenance Guide

For indoor/outdoor three-phase, IECEx, ATEX and UKEx certified encapsulated transformers which utilize DQT type enclosures.

This manual covers the recommendations for the installation, operation and maintenance of three-phase encapsulated low voltage transformers. It is emphasized that these abbreviated instructions should be used in conjunction with all local and National codes and should be referenced accordingly.

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

Disclaimer of Liability

The recommended practices in this manual are for general applications and are supplied without liability for errors or omissions. Technical data are subject to change at any time without notice and any necessary corrections will be included in subsequent editions. Special requirements should be referenced back to the manufacturer and/or their representative.

This guide covers the recommendations for the installation, operation and maintenance of encapsulated dry-type transformers which utilize DQT type enclosures. It is emphasized that these abbreviated instructions should be used in conjunction with all standards and local codes covering such work and should be referenced accordingly.

These recommended practices are for general applications and any special requirements should be referenced back to the transformer manufacturer and/or their representative.

It is further recommended that installation work be governed by all applicable National, State and Local codes standards and regulations and ANSI/IEEE C57.94. This is the IEEE recommended practice for Installation, Application, Operation and Maintenance of Dry-type General Purpose Distribution and Power Transformers. All work should be preformed in accordance with NFPA 70E Standard for Electrical Safety in the Workplace and CSA Z462, Workplace Electrical Safety. Always use appropriate personal protective equipment (PPE).

This manual contains warnings to observe in order to ensure personal safety and prevent property damage. Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The notices referring to personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger. If more than one degree of danger is present, the warning representing the highest degree of danger will be used.



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury, and/or substantial property damage.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury, and/or substantial property damage.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury and/or property damage.

Important Note:

Electrical equipment should be installed, operated, serviced, and maintained, only by qualified personnel. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

Safety Precautions

Please check resin level before drilling hole for field wiring (e.g. conduit or cable gland as applicable) and site the field wiring properly so it does not come in contact with resin.

**DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Refer to nameplate for ratings and voltages.
This equipment must only be installed and serviced by qualified electrical personnel.
Follow all requirements in NFPA 70E and CSA Z462 for safe work practice and personal protective equipment (PPE).
Turn off all power supplying this equipment before working on or inside equipment.
Always use a properly rated voltage sensing device to confirm power is off.
Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in serious injury or death.

**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 1, DIVISION 2.**

1. Do not lift or move a transformer without proper equipment and properly trained personnel. Ensure that the transformer is only lifted using the listing provisions provided. Always use lifting provisions provided by the manufacturer. Rolling and skidding are recommended only on transformers with a pre-ordered skidding base.
2. Do not off-load the transformer until it has been fully inspected for damages. If any damages are identified the transformer should not be energized and the transformer manufacturer should be contacted immediately.
3. Only use terminals for electrical connections. The transformer terminals are not designed to support the weight of line or load cable.
4. Connections should only be made in accordance with the nameplate diagram and the applicable local codes and standards.
5. Make sure all power (including back-fed control and possible capacitor charge) is disconnected and all windings are grounded before attempting any work on the transformer or inside the enclosure. (zero energy)
6. Make certain all ground connections, line terminals and selected tap connections are completed and tightened before energizing the transformer.
7. Do not attempt to change any primary or secondary connections or taps while the transformer is energized.
8. Do not adjust or remove any accessories or cover plates while the transformer is energized.
9. No cables should come in contact with or any live parts except the terminal that it is intended for. Ensure that minimum clearances are maintained at all times.
10. This equipment must only be installed and serviced by qualified electrical personnel.
11. Follow all requirements in NFPA 70E and CSA Z462 for safe work practice and personal protective equipment (PPE).
12. Replace all devices, doors, and covers before turning on power to this equipment.
13. Modifications of any kind to the equipment are not permitted. Besides voiding the warranty such actions may result in hazardous situations of which the person(s) performing the modifications will be solely liable.

General



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Refer to nameplate for ratings and voltages.
This equipment must only be installed and serviced by qualified electrical personnel.
Follow all requirements in NFPA 70E and CSA Z462 for safe work practice and personal protective equipment (PPE).
Turn off all power supplying this equipment before working on or inside equipment.
Always use a properly rated voltage sensing device to confirm power is off.
Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Three-phase 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 authorized personnel, trained and qualified in the installation, repair and maintenance of electrical equipment.

As any other electrical equipment, transformers must be installed according to the requirements of all applicable national and local electrical codes. ANSI/IEEE C57-94 may also be referred to for recommended installation, application, operation and maintenance of three-phase encapsulated transformers.

Handling



WARNING

Failure to follow lifting procedures can result in death, serious injury, or property damage.

Transformers are palletized and 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. For safety purposes and to protect the transformer, spreader bars are recommended.

No attempt should be made to lift or move a transformer from any points on the unit other than those indicated. Refer to page 17 (lifting brackets). Avoid subjecting transformer to impact, jolting and other rough handling that may damage the transformer.

Ensure the transformers are transported in upright position - avoid tilting and tipping.

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 immediately communicated to the transformer manufacturers local sales office.

If the examination of the unit takes place outdoors, caution should be exercised to protect the unit against factors that may present further damage.

Storage



WARNING

Failure to follow storage requirements can result in death or serious injury, and property damage.
- Deterioration of product

Transformers that will not be immediately installed and energized, should be stored in a clean dry environment away from any environmental airborne contaminants. Transformers should be stored in such a way not to represent any type of hazard. Stacking transformers one on top of another without proper shelving is not permitted.

It is recommended that transformers be stored in a heated building with uniform temperature and adequate air circulation to prevent condensation with the protective plastic wrap still installed for long term storage. If storage in a heated building is not possible, transformers must be properly protected from contaminants and moisture preferably in a non heated building. We recommend that electric heating be installed inside the transformer to maintain a uniform temperature above the ambient but not exceeding 40°C to prevent condensation. In extreme cases they may be stored in temperatures not lower than -25°C. Special care should be given to prevent the formation of condensation inside the stored transformers. Units that are to be energized after being stored at a low temperature or after being stored for a long time must be warmed to -25°C (-13°F) with warm air or radiant heat. Once the unit reaches this temperature and is free of condensation and any other contaminants resulting from the storage process, it is safe to be energized.

Installation



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Failure to follow these Installation instructions and all applicable local and national codes when installing and connecting a transformer will result in death or serious injury and/ or substantial property damage.

Before drilling holes, please ensure proper clearance is allowed to the resin for both conduit and conduit nut.

Indoor/Outdoor Transformers with Type 4, 4X (IP66 rating if ATEX, IECEx and UKEx)

All three-phase encapsulated transformers are supplied with standard type 4 (IP66 rating if ATEX, IECEx and UKEx) enclosure which also meets type 12. Type 4 (IP66 rating if ATEX, IECEx and UKEx) enclosure offer much greater protection against a variety of elements such as dust, dirt, snow, moisture, rain etc. 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. Before outdoor installations, verify that adequate site drainage exists to prevent groundwater from entering the transformers.

Water tight couplings are strongly recommended to be installed for any holes drilled in the enclosure. When drilling holes, note the resin level.

Three-phase encapsulated transformers must be installed in an upright position on walls, floors, posts, beams or other locations capable of supporting their weight with the proper accessories attached.

Installation (continued)

Ventilation



WARNING

Failure to follow the ventilation instructions can result in death, serious injury or property damage.

Encapsulated 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 and maximum ambient temperatures are not to exceed the maximum temperature noted on the transformer nameplate. Refer to Appendix A for these conditions.

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

Accessibility



CAUTION

Failure to follow accessibility instructions can result in injury and/or property damage.

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 during normal operation will emit a certain level of sound.

Transformers are required to meet NEMA standards for the maximum sound levels permissible. These sound level standards vary from 40 to 67 dB and as such may 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 in sensitive areas like hospitals, classrooms, medical or office facilities.

The following guidelines may be helpful:

- ➔ Units should be mounted away from corners or reflecting walls or ceilings.
- ➔ Flexible conduit should be considered to make the incoming/ outgoing connections.
- ➔ Depending on the environment, to reduce noise acoustically absorbing materials could be considered for walls and ceilings around the unit.
- ➔ The location of the unit should be as far as practical from areas where sound levels could be considered undesirable.

Cable Connections



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Failure to follow these instructions will result in death, serious injury or property damage.

Never attempt to change connections or taps unless the transformer is de-energized and all windings grounded.



WARNING

Failure to follow lifting procedures can result in death, serious injury, or property damage.

The minimum required connecting cable size is to be determined from the line current rating of the transformer primary and secondary windings marked on the transformer (also refer to Appendix A (page 14) and it shall be in accordance with the applicable National and local codes. Use with AL9CU-AL-CU lugs.

For three-phase encapsulated transformers, pre-punched knockouts are not provided. Use the appropriate cable connector suitable for the application. Please refer to Appendix D for cable entry locations. If a transformer must be relocated to make the necessary cable connections, all safety requirements and the related lifting procedures must be followed.

Cable Connection Requirements

Side entry of cables is recommended.

- ➔ For standard non-ventilated DQT type 4 enclosures, bottom entry is permitted only in the areas defined in Appendix D.
- ➔ Offset connectors can be used to help with cable connections to terminal pads, to reduce the bending space for the cables

Cable connection lugs of plated copper may be used to connect to the transformer terminals. Terminals should be cleaned and electrical joint compounds are recommended for use on all electrical connections.

Make certain to insulate any unused wire leads with marrette connectors and electrical tapes where applicable.

Refer to the transformer nameplate for primary and secondary voltage connection combinations and primary and/or secondary tap positions as applicable. Ensure that there is a minimum of 0.28" or 7mm clearance between field installed adjacent terminal lugs of opposite polarity

Transformers received from the factory will have tap jumpers installed on the nominal, or 100%, voltage position. All the other remaining taps may still be coated with impregnation material and insulation.

To change taps, it is necessary to gently remove all contaminants and insulation from the surface of the top and bottom of the taps (eye-loop or lugs) by sanding the lugs to the bare metal.

The surface of the tap lead should be clean and coated subsequently with electrical compound on all non-plated contacts between the jumper terminal and the tap. Assemble jumpers to taps as per Appendix C (Drawing 1 for single conductor eye-loops and tap lugs or Drawing 2 for double conductor eye-loop taps).

6 kVA Transformer for IECEx, ATEX and UKEx

Terminations are provided by terminal blocks. Applicable voltage connection combinations for primary and/or secondary are shown on the transformer nameplate, and

**DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

After installation of cables and connectors, the minimum clearance prescribed by the applicable codes and standards for the respective voltage class must be maintained from energized parts to all case parts.

Failure to install cables and connectors as per all applicable codes and standards and the attached guidelines will result in serious personal injury or death and property damage.

can be changed accordingly by re-locating the provided Tap Selection Jumper on the terminal block. Refer to Appendix C for an illustration of this.

The following table may be used as a guideline for minimum clearances at altitudes not exceeding 1000 m (3300 ft.). Above 1000 m (3300 ft.) please consult factory.

Transformer Voltage Class	Minimum Clearance (mm)	Minimum Clearance (in.)
1.2 KV	25	1
2.5 KV	51	2
5.0 KV	102	4
8.7 KV	135	5.3
15 KV	203	8
18 KV	254	10
25 KV	305	12
34.5 KV	406	16

Note: "Some specific component parts of a transformer may require clearances different than those indicated above. For those exceptions, you should comply with the instructions provided in the assembly drawings or installation procedure."

Grounding**DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Failure to properly ground the transformer as per all applicable codes and standards will result in serious personal injury or death.

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

To ensure the safety in operation, the transformer must be properly grounded before energizing. The transformer enclosure non-metallic paint coating presents a electrostatic discharge hazard. To ensure the safety in operation and to avoid buildup of electrostatic charges, the transformer must be properly grounded or earthed at the main ground location before energizing. Clean enclosure with a damp cloth only.

This grounding should be in accordance with all national and local electrical codes and standards. When the external ground provision is used, remove the paint around the ground hole and apply an anti-oxidant compound to the bare metal to prevent corrosion (see photo for reference).

Recommended External Ground Assembly: The pre drilled ground hole is 0.44" (11.18mm) in diameter. Please use suitable hardware (supplied by others) to secure customer ground terminals to ground hole.

**Altering the Transformer****DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Misapplication or misuse of this equipment may result in serious personal injury or death and property damage.

The application of this equipment is the responsibility of the customer or their agent. Misapplication or misuse may result in serious personal injury or death and/or property damage.

No modification shall be made to the transformer except for the openings in the enclosure required for field wiring. Please refer to Appendix B for recommended cable entry locations.

Before Energization



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Failure to install the transformer in accordance with all applicable codes/ standards and the instructions in this booklet will result in serious personal injury or death and property damage.

For the safe and proper operation of the transformer, please check and verify the following:

- Ensure correct phase connections. Refer to the nameplate vector diagram.
- The load on a delta secondary winding with a 120 volt center tap should not exceed the normal current rating of the winding. This center tap is designed for a max. of 5% of the nameplate kVA.
- The enclosure shall be grounded using an appropriately sized earthing conductor based on the primary and secondary current ratings marked on the label and as per local codes and standard requirements.
- The total load among all the phases should be balanced as much as possible for optimum performance of the transformers windings. The kVA loading on each phase must not exceed 1/3 of the nameplate kVA rating of the transformer.
- The appropriate clearance and tightness of all electrical connections should be checked.
- Following the proper safety precautions, after energizing and before connecting any loads, please measure and verify the output voltage matches nameplate specifications.
- If there is any reason to suspect that the transformer has been exposed to moisture during transit or storage, it should be checked for dryness before energization. This can be done by performing an insulation resistance test (Megger Test). If any exposure to moisture is suspected, consult factory.

Under full load operating conditions, encapsulated dry-type transformers may appear warm to the touch, particularly on the cover of the unit. Standards permit the temperatures of the cover to reach 65°C (149°F) over ambient. Three-phase encapsulated transformers are designed to operate continuously at their full nameplate kVA rating under normal operating conditions.

Operation



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Failure to properly operate the transformer as per all applicable codes and standards and the attached instructions will result in serious personal injury or death.

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

- ➔ Ambient temperatures that differ from the ambient temperatures required for transformer operation. ANSI recommends a maximum ambient of 40°C.
- ➔ 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 operating temperatures, the following contributing factors should be considered and immediately corrected:

**WARNING**

Failure to identify and correct the root causes for the transformer overheating can result in death or personal injury, property damage or severely reduced transformer life expectancy.

- ➔ Rigorous motor starting loads or other impact type loading. For this type of applications a specific transformer type 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.

Three-phase encapsulated transformers may be shut down and stored for extended periods of time without any deterioration. Care must be exercised to clean and dry units prior to energization, as previously outlined. Proper packaging and moisture prevention measures during storing are essential. Perform insulation resistance (Megger) before re-energizing.

Maintenance

**DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Failure to de-energize, isolate and ground the transformer terminals and to verify the ground potential on all terminals before performing any work on the transformer will result in serious personal injury or death.

Inserting any objects through the ventilation openings while the transformer is energized will result in serious personal injury or death.

Under normal operating conditions and environments, three-phase encapsulated transformers require periodic care and inspection. This is essential if the unit is installed in harsh environmental conditions (for ex. outside, environments with high levels of pollutants and dust, etc.).

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

Maintenance typically includes internal cleaning, tightening of links and bolted connections to prescribed torque levels, servicing and inspection of auxiliary devices and an infrared scan or thermal image of the transformer.

All bolted connections at terminals must be in good condition. We recommend under scheduled annual maintenance or at shorter regular intervals that connections be checked for proper torque values and any signs or oxidation, arcing and improper electrical connection. If any improper connections are identified they must be corrected immediately.

RECOMMENDED TORQUE VALUES FOR BOLTED ELECTRICAL CONNECTIONS

BOLT SIZE	CARBON ST.	BRASS	S.S STEEL
	GRADE 5	ALLOY CU270	B8 OR B8M
	ft-lbs [Nm] $\pm 5\%$	ft-lbs [Nm] $\pm 5\%$	ft-lbs [Nm] $\pm 5\%$
1/4-20	7 [10]	3.8 [5]	5 [6]
3/8-16	20 [27]	14 [18]	15 [20]
1/2-13	60 [70]	33 [45]	37 [50]
8 mm	20 [23]	12 [14]	12 [14]
12 mm	60 [70]	33 [45]	37 [50]

***Note: The above torque values are for dry, unlubricated bolts.**

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

The door fit and gasket condition should be checked for a proper fit and seal.

6 kVA Transformer for IECEx, ATEX and UKEx:
Recommended torque range for terminal block is 0.08 - 1.6 Nm



WARNING

Failure to follow storage requirements can result in death or serious injury, and property damage.

Dry-Out of Transformers



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Failure to follow the attached dry-out procedures before energizing transformers previously exposed to moisture will result in serious personal injury or death and property damage.

Transformers that have been exposed to flood conditions, may not be able to be dried out appropriately. The insulation resistance, eater than 1 Mohms. Contact the transformer manufacturer for appropriate action instructions.

Accessories



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

When installing transformers (regardless of the location) the installing contractor is responsible for the proper installation in accordance with the attached instructions and all applicable codes and standards (including Seismic). Failure to do so will result in serious personal injury or death and property damage.

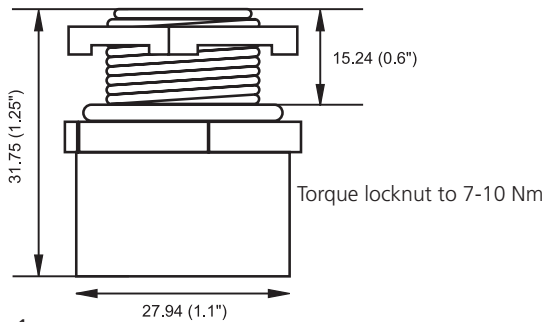


Fig. 1.

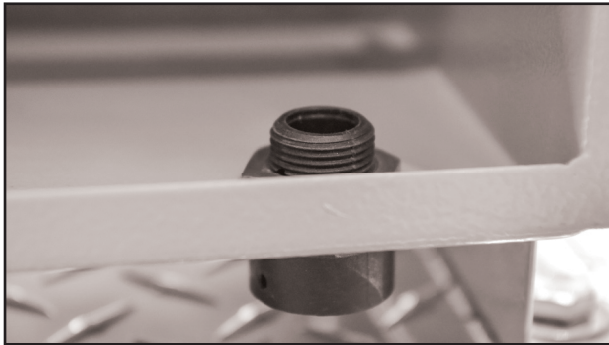


Fig. 2.

Encapsulated transformers are available with a number of accessories to facilitate installation. Consult your local distributor for the purchase of any of the items accessories that are stocked in inventory. Some frequently used accessories include:

Breather drain plugs (Included with the transformer)

Breather drain mounted at the bottom of enclosure provides effective drainage of moisture due to condensation from within enclosure without compromising type 4/4X integrity. (Please refer to Fig. 1.)

***Please ensure the drain plug is installed as per Fig. 2.

Connectors (Lugs)

Connectors for the installation of dry-type transformers are readily available. These connectors are suitable for use with either copper or aluminum cables.

Connectors should be sized, installed and connected to cables in accordance with your local electrical code requirements using the best practices to ensure safe and reliable operation. Cable surfaces should be properly cleaned and electrical compound should be used for all connections.

Selecting Connectors

- Determine the primary current for the transformer from the markings on the transformer label.
- Similarly, determine the secondary current from the markings on the transformer label and Appendix A.

ATEX, IECEx and UKEx Requirements

Specific Conditions of Use:

- The transformer enclosure non-metallic coating presents an electrostatic discharge hazard. Ensure the transformer is earthed and clean the enclosure with damp cloth only.
- Conductors, cables and cable glands must be rated for a minimum service temperature of 111°C (231.8°F) for transformer part numbers marked for 40°C maximum ambient temperature and 122°C (251.6°F) for transformer part numbers marked for 51°C maximum ambient temperature.
- Field wiring device (cables, cable glands) installed through the transformer enclosure shall be ATEX, IECEx and/or UKEx certified components as applicable, complying with Ex ec method of protection and rated IP66.
- Transformers in a rating higher than >6kVA will require a minimum clearance of 7 mm. They shall be maintained between all installed connection lugs (including washers, nuts and bolts) and the nearest live parts opposite in polarity and between all installed connection lugs (including washers, nuts and bolts) and the nearest earthed dead metal parts.

Nameplate Information:

HPS Titan[®] X
Dry Type Encapsulated Transformer
Transformateur de Type Sec Encapsulé
Part No. TX2A0015KBKF

Hammond Power Solutions
565 Southgate Drive
Quincy, MA 01906

CE, IECEx, UKEx, and other certification marks are present.

Col. Ref.	Serial No.	Volts	Current	Power	Frequency	Temp. Rise	Insul. Class	Frequency	Enclosure
3	480V	504	17.5	105	1	115°C	180°C	60	H
4	10 kV	482	17.6	102.5	2	115°C	180°C	60	H
5	10 kV	480	18.0	105	3	115°C	180°C	60	H
6	10 kV	480	18.5	97.5	4	115°C	180°C	60	H
7	10 kV	456	19.0	90	5	115°C	180°C	60	H
8	10 kV	444	19.5	92.5	6	115°C	180°C	60	H
9	10 kV	432	20.0	90	7	115°C	180°C	60	H

WARNING/ATTENTION:
- EXPLOSION HAZARD. DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNDER THE AREA IS FREE OF CONTAMINANT CONCENTRATIONS.
- INTERNAL ELECTROSTATIC CHARGES MAY BE PRESENT. THE INSTALLATION MANUAL MUST BE READ BEFORE THE EQUIPMENT IS USED.
- DO NOT OPEN THE ENCLOSURE WITHOUT THE EQUIPMENT BEING DISCONNECTED AND THE AREA BEING FREE OF CONTAMINANT CONCENTRATIONS.
- DO NOT OPEN THE ENCLOSURE WITHOUT THE EQUIPMENT BEING DISCONNECTED AND THE AREA BEING FREE OF CONTAMINANT CONCENTRATIONS.
- DO NOT OPEN THE ENCLOSURE WITHOUT THE EQUIPMENT BEING DISCONNECTED AND THE AREA BEING FREE OF CONTAMINANT CONCENTRATIONS.

Model: TX2A0015KBKF
Made in Mexico

Transformer Rating

This manual covers all of the ratings indicated in the table below:

Family	Type	Generation	Phase	kVA				Pri. Volt.	Sec. Volt.	Winding Material/ Electrostatic Shield	Temp. Rise & Insul. Class	Frequency	Enclosure
T	X	2	A	0	0	4	5	K	B	K	B	6	H
Family: T - Titan				kVA^{3:} Titan X: 6kVA to 75kVA				Primary Voltage^{3:} 3PH G 380D ¹ H 400D ¹ J 415V ¹ K 480D P 600D, 600Y Q 600D, 480D U 690D		Winding Material: K - CU + Shield		Frequency: 5 - 50/60Hz 6 - 60Hz*	
Type: X - Hazardous Location (IEEx, ATEX & ABS Approval)				6kVA 0006 9kVA 0009 15kVA 0015 30kVA 0030 45kVA 0045 75kVA 0075						Temperature Rise: B - 80°C (180° class) F - 115°C (180° class)		Enclosure: F - Type 4* ² G - Type 4X (304SS) H - Type 4X (316SS)	
Generation: 2 - current designs													
Phase (Pri-Sec)^{1:} A - 3PH Delta-Wye-N B - 3PH Wye-N-Delta C - 3PH Delta-Delta/CT D - 3PH Delta-Delta								Secondary Voltage^{3:} 3PH B 208y/120 C 230Y/133 D 240D, 240Y/139 or 240D/120CT E 220Y/127 G 380Y/220 H 400Y/231 K 480Y/277 P 600Y/347 U 690Y/400					

¹ Units with primary voltage code "G", "H", "J" & "U" come standards as 50/60Hz. All others are 60Hz by default.

* Default Options

² Type 4 enclosure is also Type 12

³ kVA's and/or voltage outside of the scope of standard offering listed are available, however they must fall within the range 6kVA - 75kVA and/ or 208D/Y - 690D/Y respectively.

APPENDIX A

AMPACITY RATINGS FOR CONNECTIONS

- A. For a three phase transformer

$$\text{Line Amperes} = \frac{\text{Volt Amperes}}{1.732 \times \text{Line Volts}}$$

**Full Load Current Table
Three Phase Transformer**

kVA	Current in Amperes			
	208V	240V	480V	600V
3	8.33	7.22	3.61	2.89
6	16.7	14.4	7.22	5.77
9	25.0	21.7	10.8	8.66
15	41.6	36.1	18.0	14.4
30	83.3	72.2	36.1	28.9
45	125	108	54.1	43.3
75	208	180	90.2	72.2
100	278	241	120	96.2
112.5	312	271	135	108
150	416	361	180	144

Note: IECEx, ATEX and UKEx certification covers transformers in the range of 6kVA to 75kVA only.

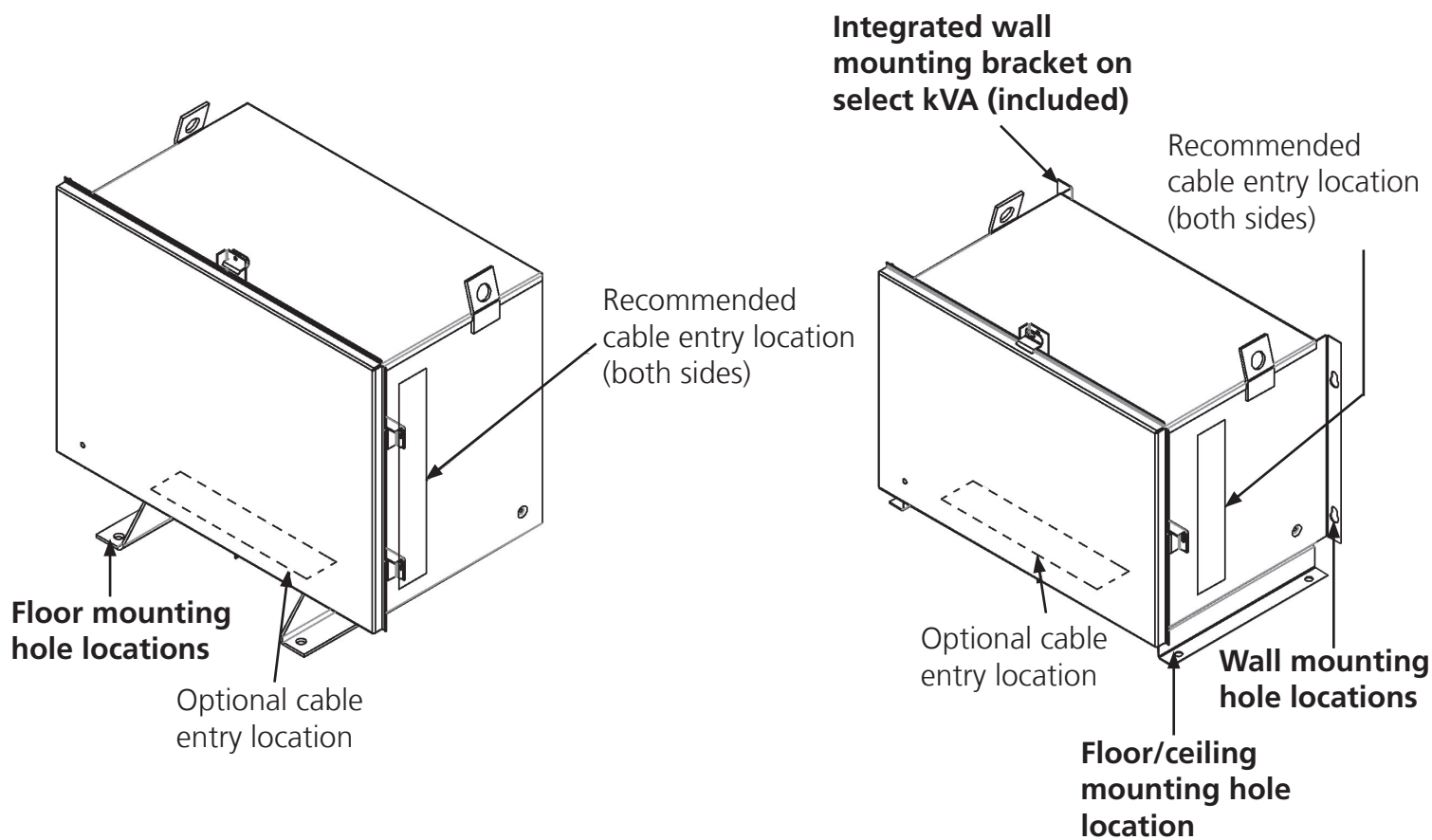
MAXIMUM AMBIENT TEMPERATURES

The ambient temperature range marked on the transformer nameplate is as follows:

- i. -25°C to +51°C on transformer part numbers marked with 50Hz or 50/60 Hz frequency rating on the nameplate.
- ii. -25°C to +51°C on transformer part numbers marked with 60 Hz frequency rating and 80°C temperature rise on the nameplate.
- iii. -25°C to +40°C on all transformer part numbers not covered by items i and ii above.

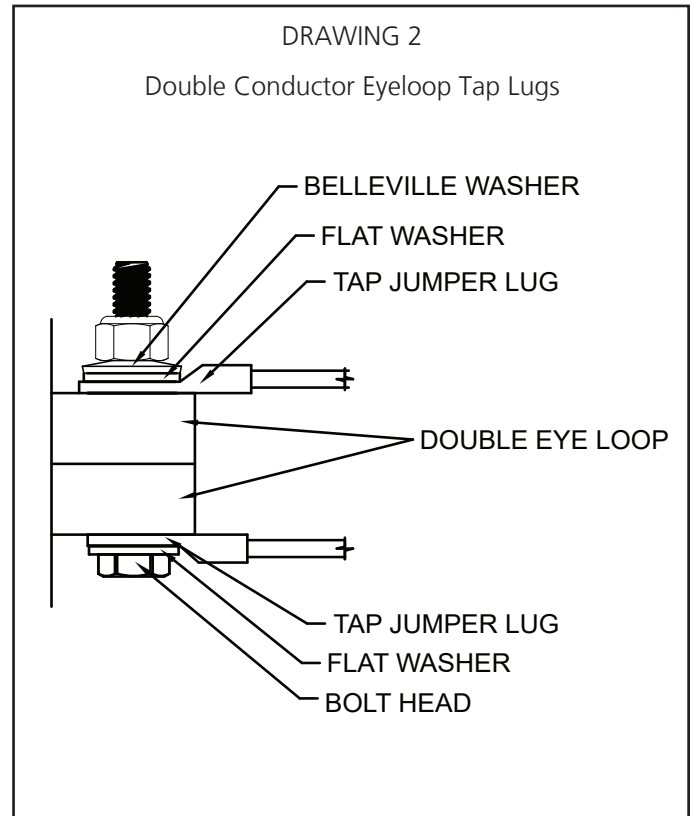
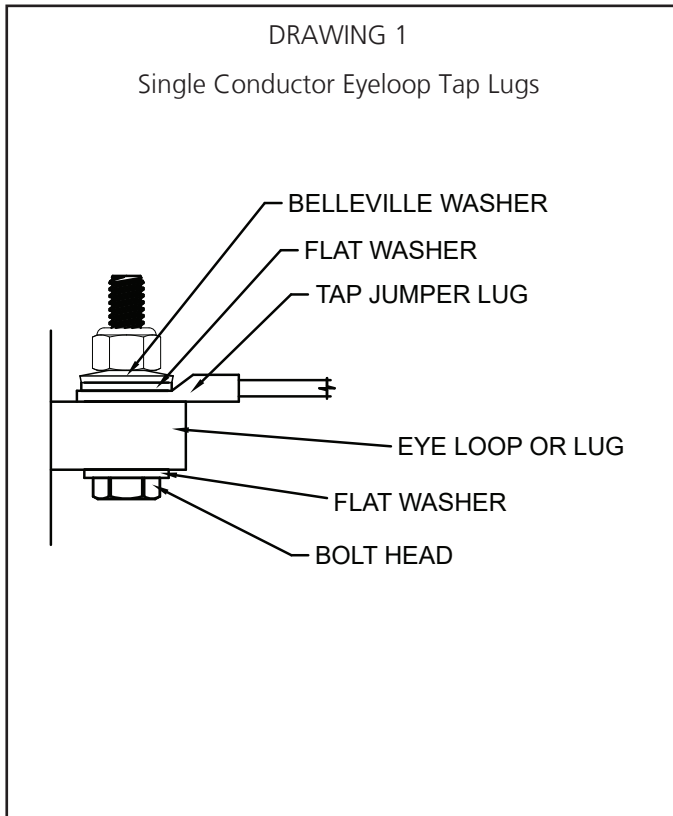
APPENDIX B

LOCATION OF MOUNTING BRACKETS FOR DQT SERIES TYPE 4 (IP66 rating if ATEX, IECEx and UKEx) ENCLOSURES

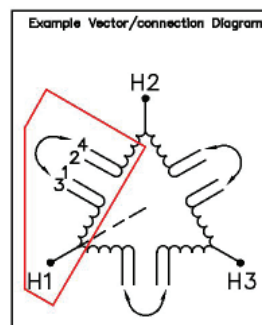
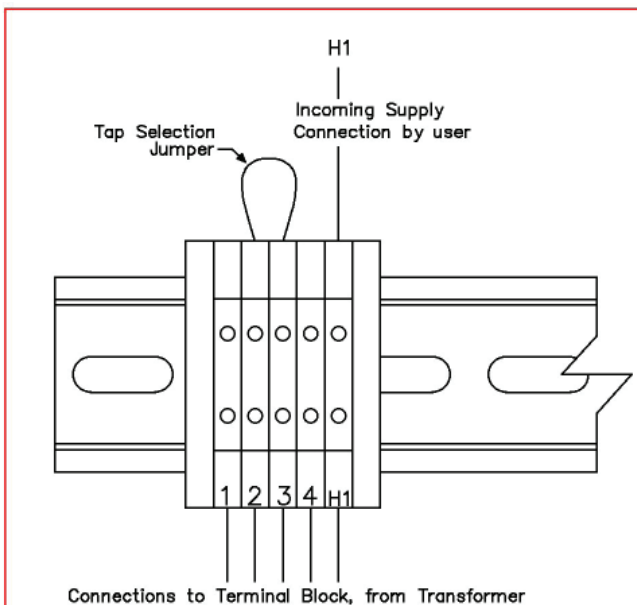


APPENDIX C

Jumper Assembly Drawings



These diagrams are intended to show how different voltages may be selected by the user, by changing the location of the Tap Selection Jumper, for IECEx/ATEX product $\leq 6\text{kVA}$, wherein the terminations are provided on a termination block. The example in the diagram reflects a DELTA supply connection, however is strictly an example, as the customer may order a different winding configuration (WYE), however the concept for changing taps remains the same.



APPENDIX D

Recommended Cable Entry Locations

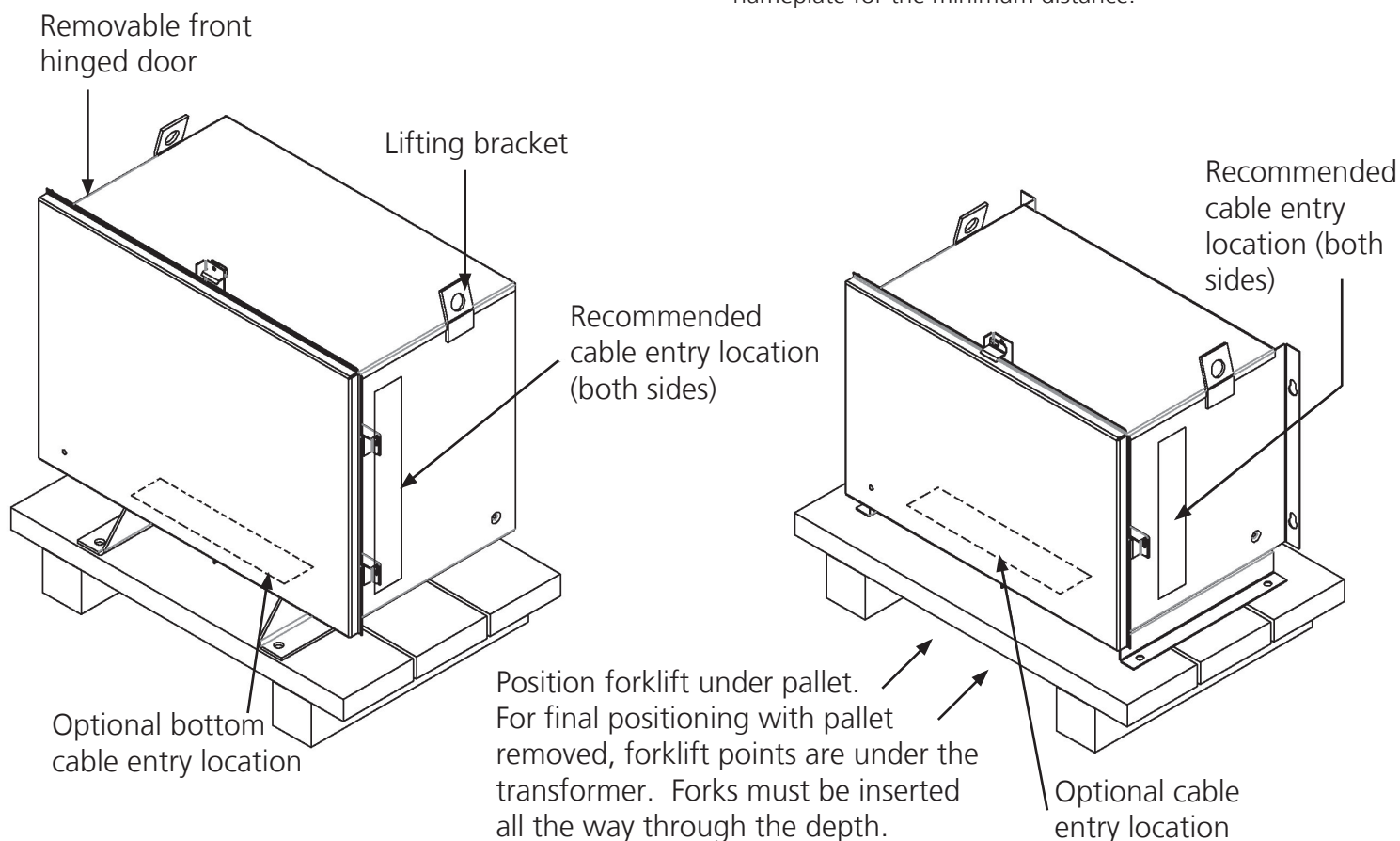
FIGURE 1

Typical Type 4 (IP66 rating if ATEX, IECEx and UKEx), DQT Non-ventilated Enclosure Assembly for Three Phase.

Notes:

1. Handling - units are designed to be raised by a fork lift from underneath the pallet. Final positioning of the unit with the pallet removed can be via a fork lift under the transformer with the forks between the channels.
2. Shipping - units are shipped on pallets which are to be removed at installation.
3. Installation - This transformer can be installed indoor or outdoor providing a degree of protection against falling rain, sleet and external ice formation.
4. All encapsulated transformers should be located away from any wall or any other obstruction, please refer to the nameplate for the minimum distance.

Before drilling holes, please ensure proper clearance is allowed to the resin for both conduit and conduit nut.



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