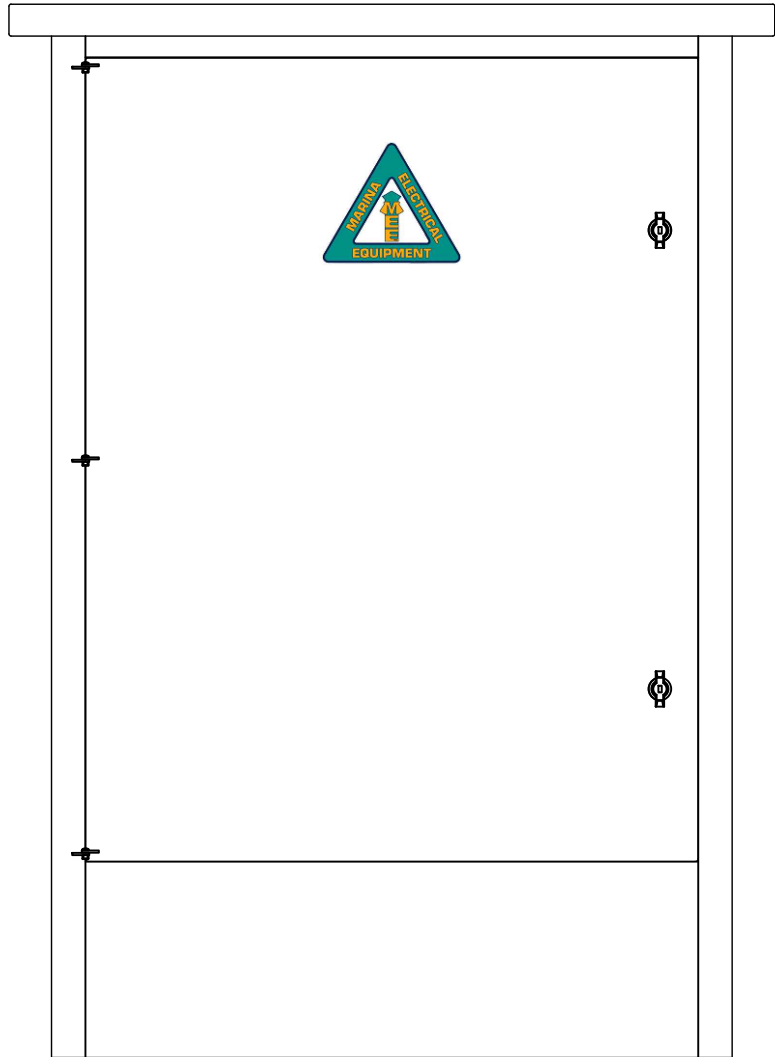
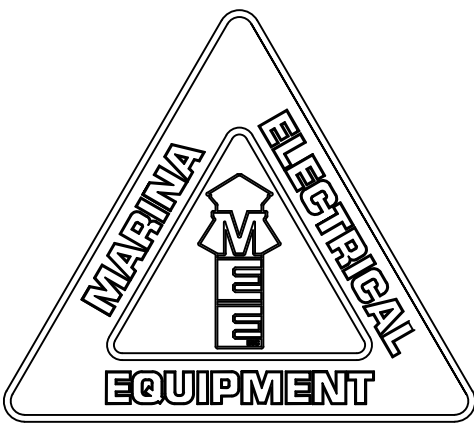


GTX™ UNIT SUBSTATION

Installation, Maintenance, and Operation Manual



Marina Electrical Equipment, Inc.
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Intertek
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CONFORMS TO STD. ANSI/UL1062

GTX™ Unit Substation

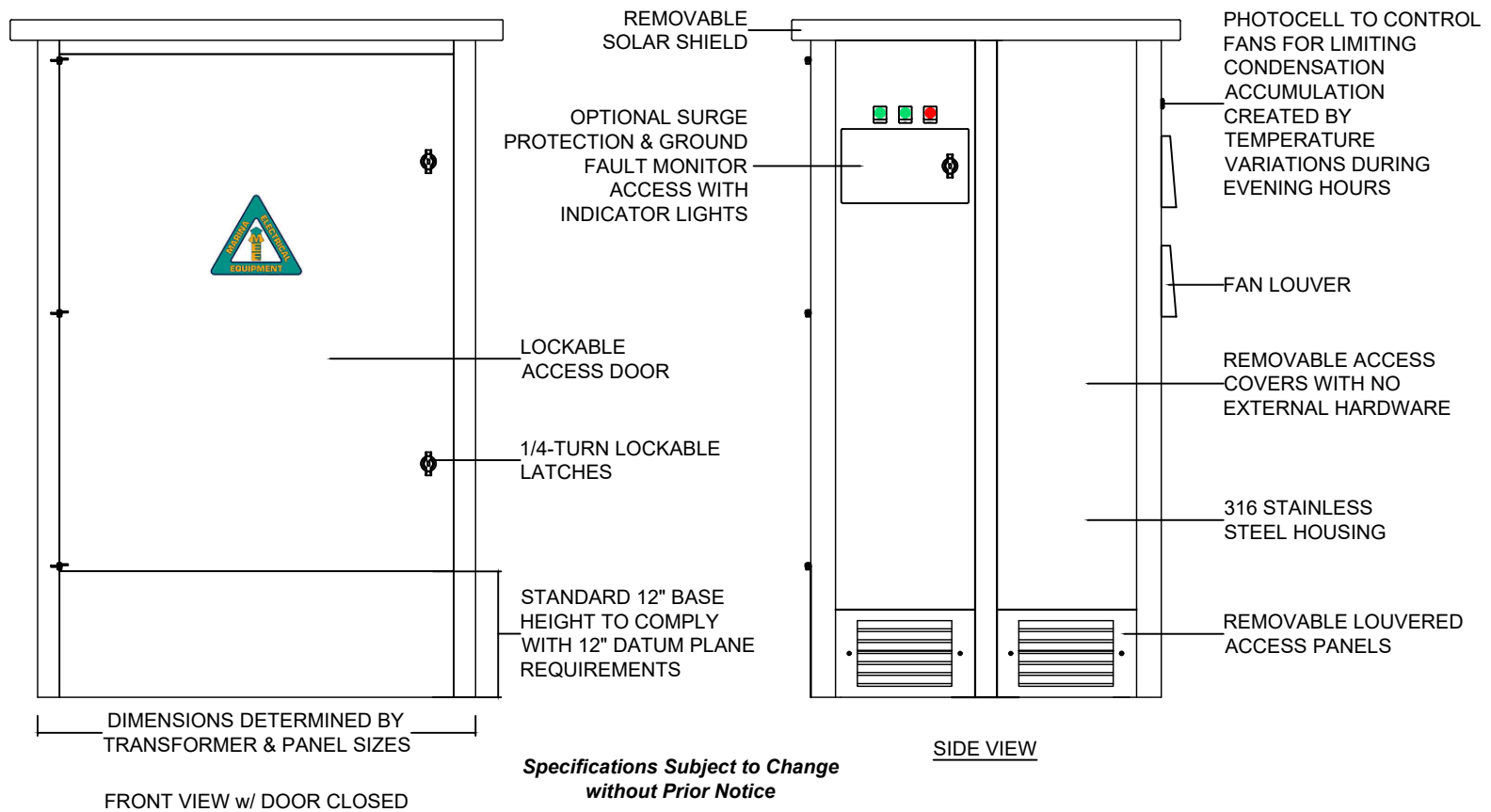
Installation, Maintenance, and Operation Manual

INTRODUCTION:

PRODUCT DESCRIPTION:

GTX Substation is designed to distribute power to industrial equipment. The standard GTX Unit Substation ranges from 25 kVA to 330 kVA, single or three phase. The GTX Unit Substation is equipped with DOE2016 high efficiency dry-type isolation transformers that range from 25 kVA to 330 kVA. Transformers are rated from 480V-600V primary to 120/240V, 208Y/120V, or 220Y/127V secondary. Other secondary voltages are available by request. The factory-installed and wired secondary distribution panelboard ranges from 100A to 1200A main breaker or main lug and can be series or fully rated up to 200 kAIC and a current rating up to main current level of the panelboard. Standard panelboard bussing is 1000A PSI copper, with other materials and ratings available by request. The GTX Unit Substation is equipped with a primary terminal block with a voltage rating up to 600V and a current rating up to 750A. Heavy duty thermostatically-controlled cooling fans provided in the GTX Unit Substation improve efficiency and reduce condensation. The GTX Unit Substation utilizes "take-apart" construction with a top solar access shield that is designed to lift off to reveal the concealed lifting shackles and removable "lift-off" side panels that provide easy 360-degree access to the transformers and electrical components for field maintenance and inspection. All GTX Unit Substations use high stranded tin plated copper wire rated at 600V, 105°C wiring that is routed away from sharp or moving parts. At points where internal wiring passes through metal walls or partitions, the wiring insulation is protected against abrasion or damage by plastic bushings or grommets and edge-guards. The GTX Unit Substation Enclosure is NEMA 3RX rated, constructed of 14 gauge 316L stainless steel with a white textured powder-coat finish.

GTX Unit Substations are ETL listed to Safety Standard for Unit Substation UL 1062 Dated January 29, 1997 Third Edition including revision through June 25, 2010.



GTX™ Unit Substation

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CAUTION

Use lockout/tag-out precautions as prescribed in OSHA, NFPA 70E and other safety manuals during maintenance shutdown of any systems or circuits.

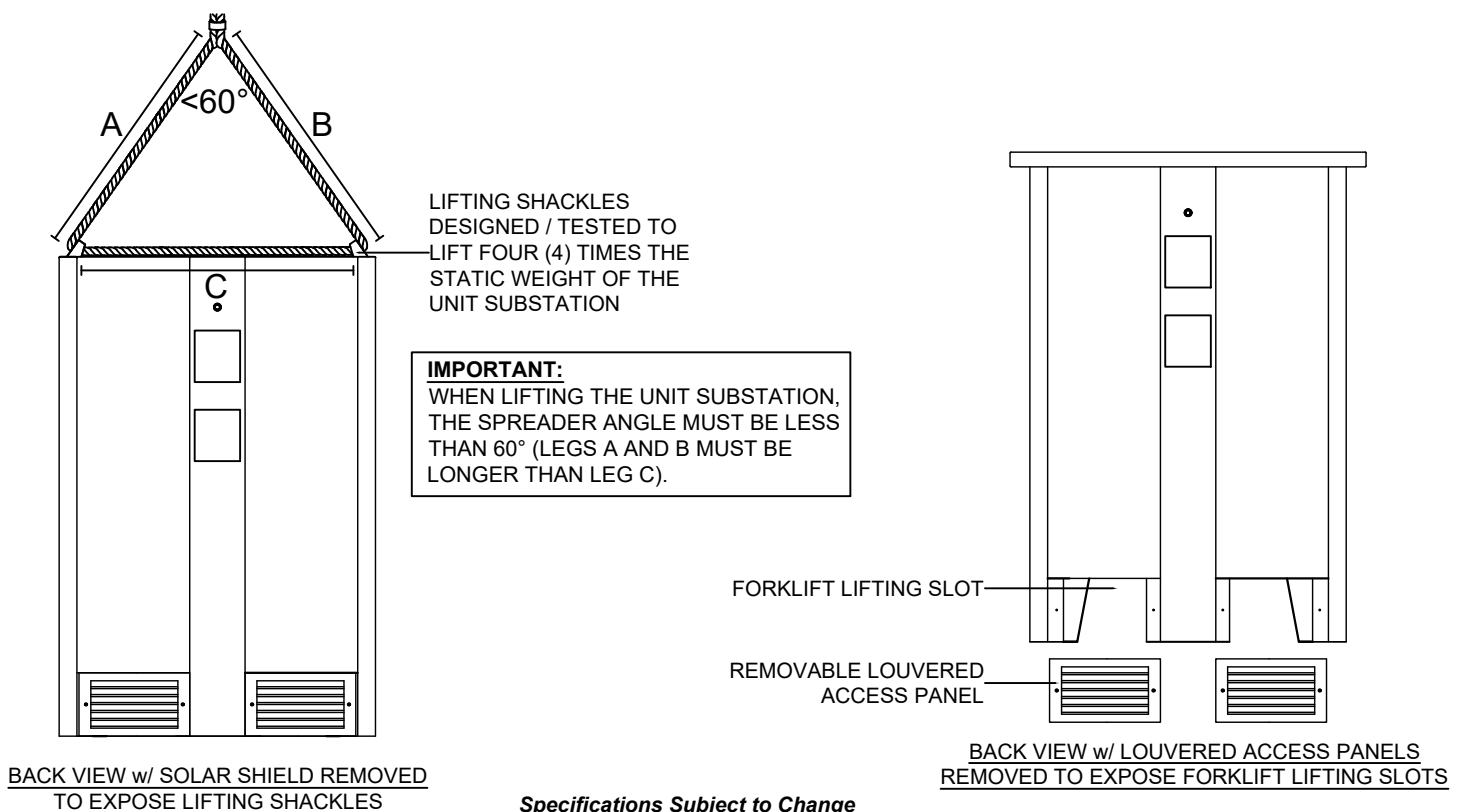
WARNING: BEFORE INSTALLING OR WORKING ON GTX SUBSTATION ELECTRICAL EQUIPMENT READ THE INSTALLATION INSTRUCTION IN ITS ENTIRETY. ONLY QUALIFIED ELECTRICIANS OR CONTRACTORS FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS UNIT SUBSTATION SHOULD INSTALL THIS EQUIPMENT OR ANY ELECTRICAL DEVICE. INSTALLATION SHOULD BE DONE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRIC CODES.

FOR ALL CONSTRUCTION: **WARNING HAZARDOUS VOLTAGE** CAN CAUSE SEVERE INJURY, DEATH, OR DAMAGE TO EQUIPMENT. DE-ENERGIZE UPSTREAM SOURCE BEFORE OPENING UNIT SUBSTATION. CHECK THAT ALL WIRES HAVE ZERO VOLTAGE.

INSTALLATION:

Step 1: Handling / Lifting the GTX Substation:

- **LIFTING SHACKLE METHOD:** This lifting assembly has been tested at a load of four times the static weight of the unit substation. The lifting shackles are located under the solar shield. The solar shield can be removed by removing the screws located around the lower edge of the shield.
- **FORKLIFT METHOD:** Lifting slots are provided on each end of the unit substation. Remove the louvered panels on each end of the unit. Use fork extensions so that the forks are spread to the outside of the slots, making sure that the forks extend past the end of the substation. Forks that do not extend through the complete substation could damage internal components. Forklift access can also be accomplished from the front or rear of the unit with the removal of the louvered access panels.



BACK VIEW w/ SOLAR SHIELD REMOVED
TO EXPOSE LIFTING SHACKLES

BACK VIEW w/ LOUVERED ACCESS PANELS
REMOVED TO EXPOSE FORKLIFT LIFTING SLOTS

*Specifications Subject to Change
without Prior Notice*

GTX™ Unit Substation

Installation, Maintenance, and Operation Manual

Step 2: Mounting the GTX Substation:

Remove the front and rear access panels on the bottom of the substation. This will expose the mounting holes at the bottom of the substation. Do not remove the neoprene pads from the bottom of the substation. The neoprene pads provide isolation from the dock surface.

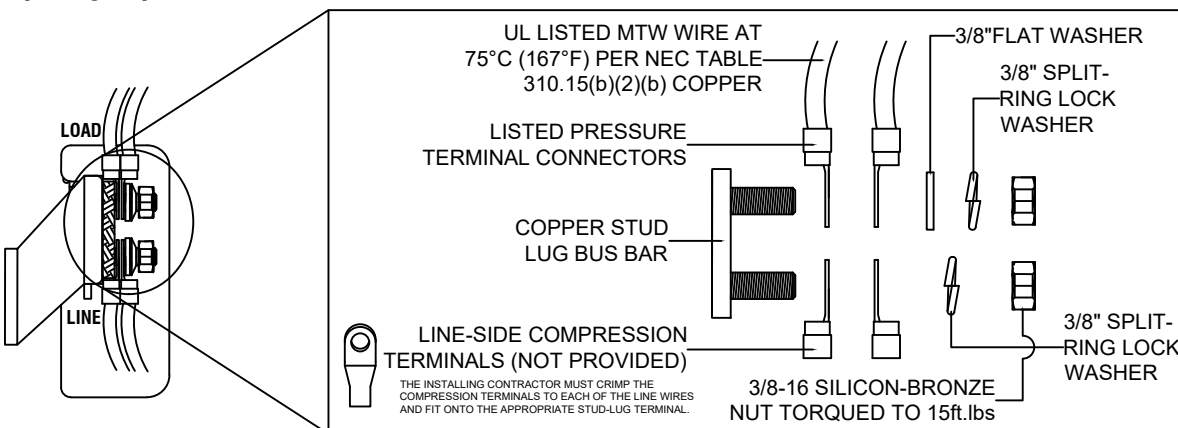
On Wooden Docks: Transfer mounting hole locations from the base of the Unit Substation to dock. Drill 1/2" hole for 1/2" through-bolt. Line the unit substation mounting holes to the holes in the dock. Feed bolts through the mounting hole and dock. Torque bolts and nuts to min. 18 ft. lbs.

On Concrete Docks: Transfer mounting hole locations from the base of the Unit Substation to dock. Follow manufacturer's instructions for installation of 1/2" expansion bolts. Line unit substation mounting holes with the holes on the dock. Thread 1/2" bolt into the expansion nuts to the manufacturer's recommended torque value.

Step 3: Terminal Block Wiring:

- Open the main door of the GTX Unit Substation to remove the panel deadfront and gutter trim rails to expose the panel interior. The 600V-rated main supply terminal block is located behind the deadfront trim. *Note: location of terminal block can vary based on customer requirements.*
- Remove gland plate from top of GTX Unit Substation frame. Punch or cut the desired hole(s) in the gland plate. Install appropriate fittings in the gland plate.
- Feed all branch circuit and primary circuit wires through the gland plate to the 600V-rated main terminal block and to each branch breaker.
- Secure the gland plate back in place to the GTX Unit Substation base.
- Install the 480V/600V feeder circuit to the 600V-rated supply terminal block and torque all terminations to **180 in.-lbs. minimum.**
- **IMPORTANT:** This terminal block is designed for **COPPER** compression-type lugs **ONLY**. The installing contractor must crimp each of the **LINE** terminations and place on the appropriate stud-lug. These terminals are **NOT** provided by the factory. Use of any other terminal/lug will **VOID THE MANUFACTURER'S WARRANTY.**

IMPORTANT: Contractor shall mount line side feeders per the diagram below. Heat shrink tubing shall be used when uninsulated copper terminal extend below bus bar insulation divider to keep proper spacing between live and grounded conductors, per NEC spacing requirements.



USE ONLY 75°C (167°F) COPPER CONDUCTORS ONLY ON ALL FIELD INSTALLED LINE, LOAD TERMINATIONS INTENDED FOR USE WITH TERMINATED CONDUCTORS.

CAUTION: BONDING BETWEEN CONDUIT CONNECTIONS IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION.

CAUTION: NONMETALLIC ENCLOSURE DOES NOT PROVIDE GROUNDING BETWEEN CONDUIT CONNECTIONS, USE GROUNDING TYPE BUSHINGS AND JUMPER WIRES.

TERMINAL BLOCK ASSEMBLY - EXPLODED VIEW

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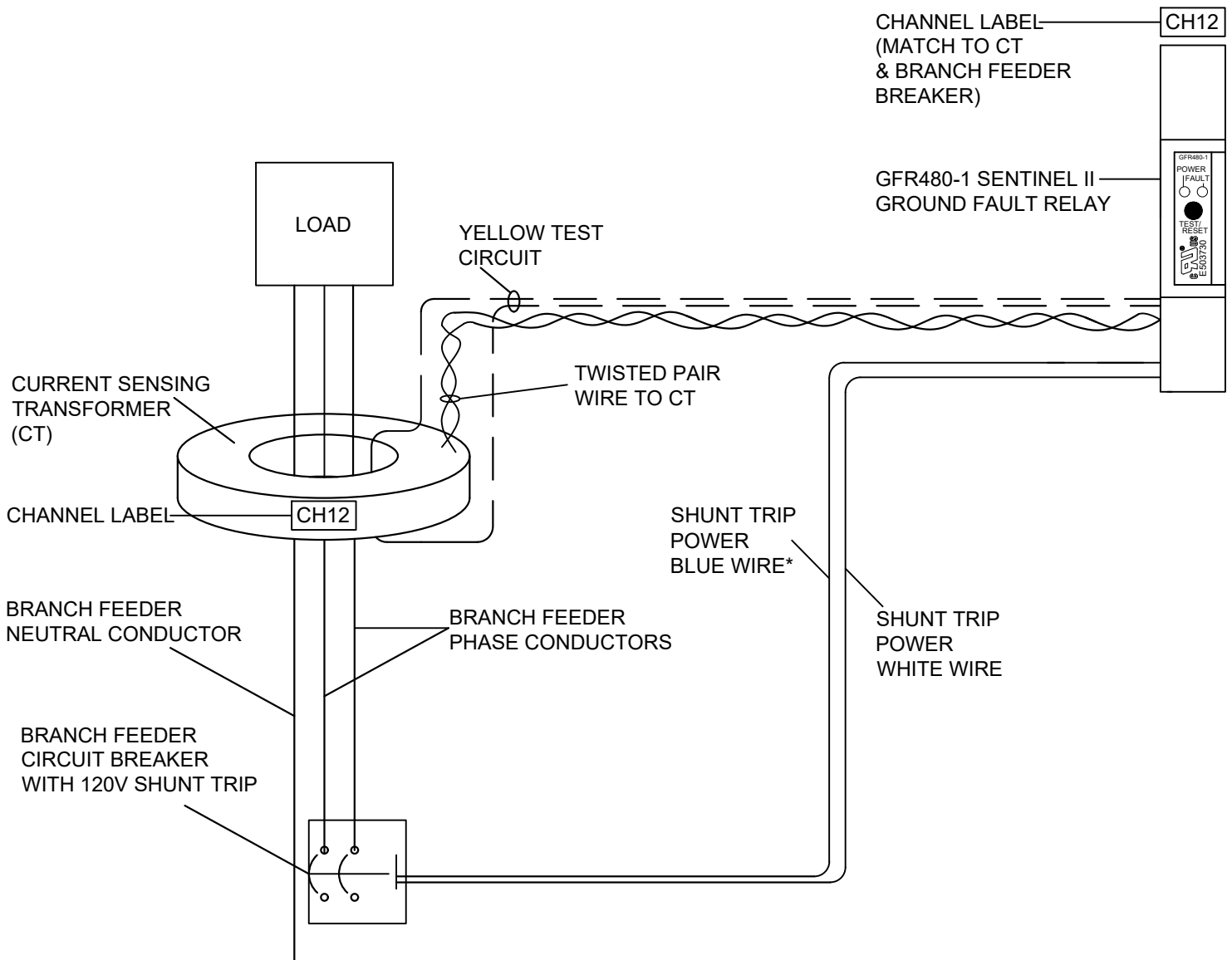
GTX™ Unit Substation

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Step 4: Branch Feeder Circuit Breaker Wiring:

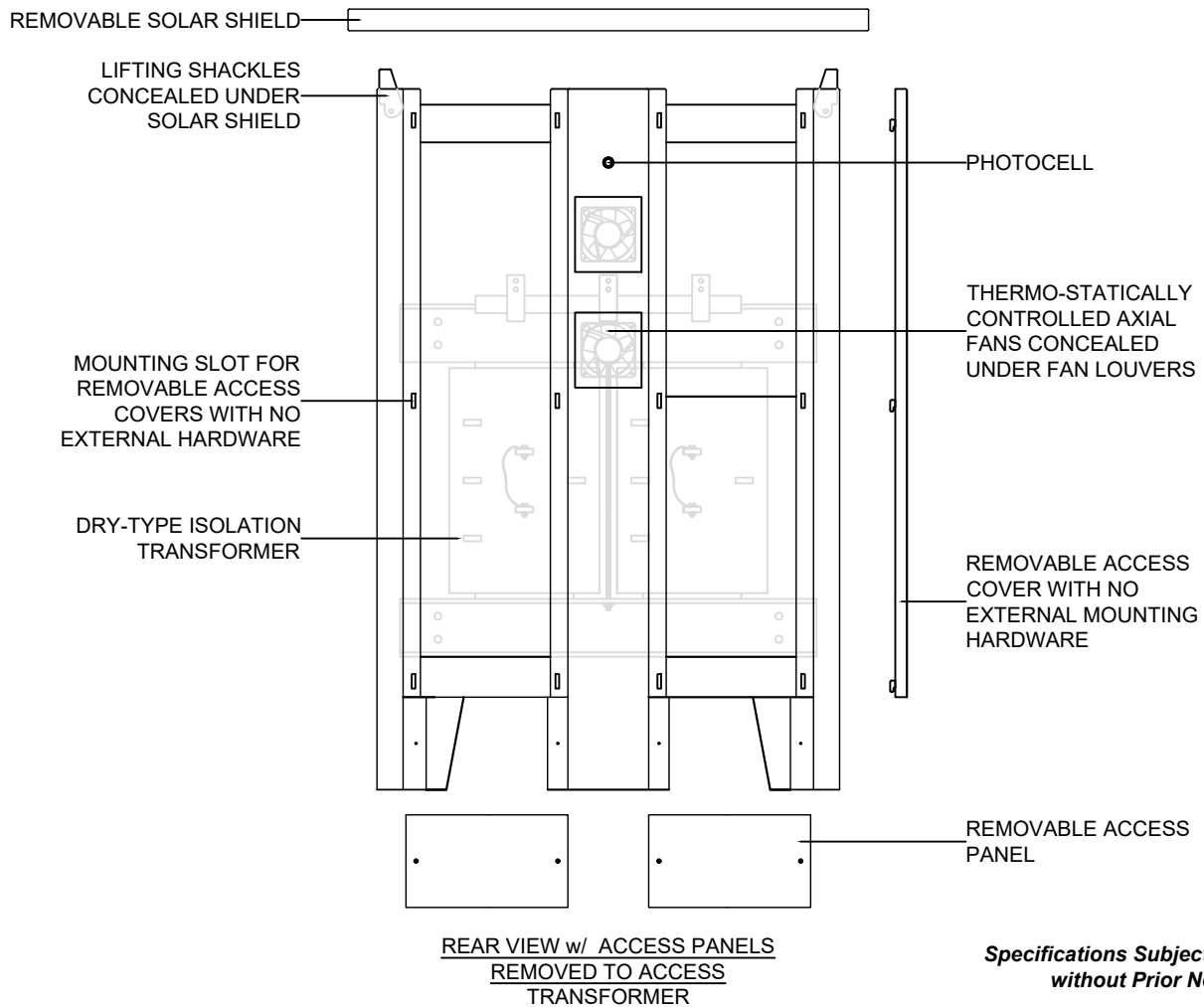
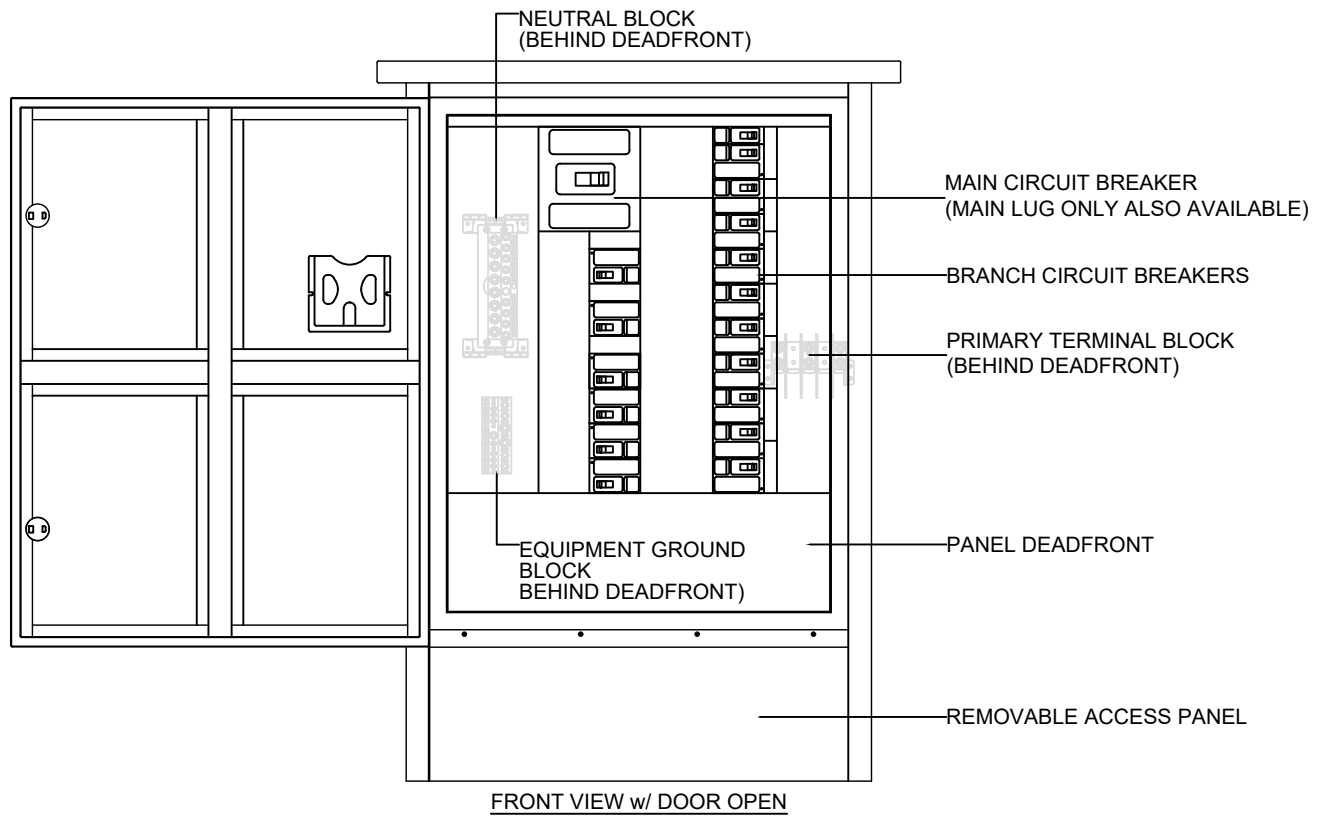
IMPORTANT: BRANCH FEEDER CIRCUIT BREAKERS EQUIPPED WITH GROUND FAULT PROTECTION:

- Individual factory-wired current-sensing transformers (CTs) are provided per branch feeder circuit breaker. CTs will be factory-labeled with a "channel" number to match the "channel" number label on the appropriate branch feeder breaker, i.e. "CH1," "CH12," etc.
- Route **all** of the **PHASE** and **NEUTRAL*** (**if present*) conductors of each branch feeder (**NO EQUIPMENT GROUND CONDUCTORS**) through the appropriate CT (all conductors must be routed through the CT in similar fashion for proper operation, i.e. all from "top" or all from "bottom" of CT; they cannot be mismatched). See figure below for detail
- Terminate all branch feeder circuit equipment ground conductor to the equipment ground block following the manufacturer's torque specifications.
- Terminate each branch feeder circuit phase conductor to the appropriate branch feeder circuit breaker load terminals following the manufacturer's torque specifications.



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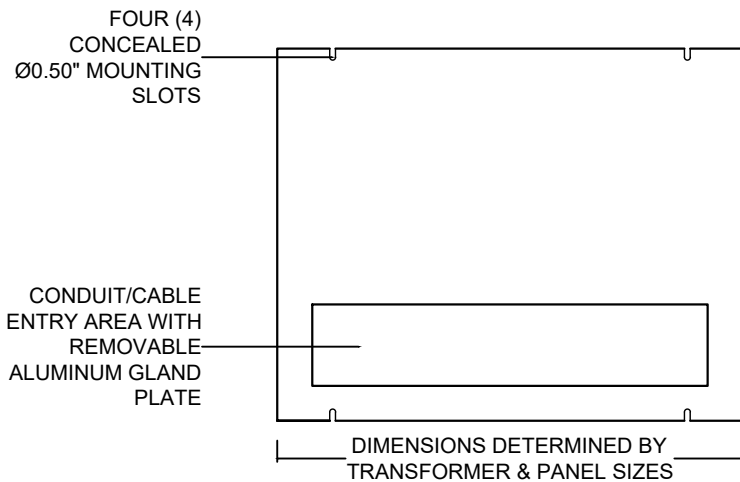
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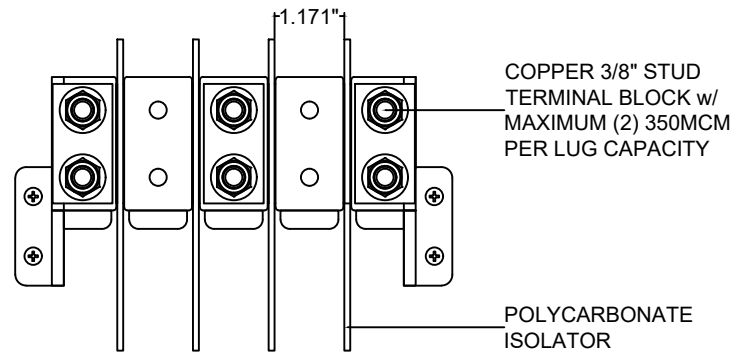
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TYPICAL MOUNTING FOOTPRINT

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PRIMARY TERMINAL BLOCK

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without Prior Notice*

Note: Test and inspect all connections, main feed and branch feeds using a multi meter, high-pot tester, and/or any other test required by the local jurisdiction in the area.

WARNING: UNITS EQUIPPED WITH GROUND-FAULT MONITORING DEVICES: REMOVE PROTECTIVE FUSE ON POWER CIRCUIT PRIOR TO PERFORMING HI-POT TEST TO AVOID DAMAGING THE DEVICE. SUCH FAILURES ARE NOT COVERED BY THE MANUFACTURER'S WARRANTY.

UNITS EQUIPPED WITH SURGE-PROTECTIVE DEVICES (SPDs): TURN THE LABELED CIRCUIT BREAKER PROTECTING THIS DEVICE TO THE "OFF" POSITION PRIOR TO PERFORMING HI-POT TEST TO AVOID DAMAGING THE DEVICE. SUCH FAILURES ARE NOT COVERED BY THE MANUFACTURER'S WARRANTY.

EXTERIOR MAINTENANCE:

Dirt, grime, bird droppings and insect residue can be removed by use of a mild degreasing solution mixture of one teaspoon per gallon of warm water. Gently scrub the housing exterior and rinse clean. Spiders and other insects can be controlled by use of a **WATER-BASED** insect spray.

WARNING: DO NOT use any petroleum or solvent-based insect spray or corrosion inhibiting products on any part of the power pedestal. These solvents will compromise the structural integrity of the polycarbonate material and cause stress cracking and material failure. Use of any such solvents will void the manufacturer's warranty.

TOUCHING UP DAMAGED POWDER COAT

- 1) Scuff the area well with wet and dry 220-grit sandpaper.
- 2) Clean the area (dishwashing detergent and water) and allow to dry.
- 3) Shake the touch-up powder paint can vigorously for two to three minutes each time you are going to use it to paint.
- 4) Apply the paint in thin coats until you achieve the correct darkness of color. Apply the paint at approximately 8 inches from the surface. Allow each coat of paint to dry for at least 30 minutes before applying another coat. In most cases you can reach the desired color in three coats of paint. In rare cases you might require more than three coats of paint; if this is the case let the final coat dry for at least 24 hours before touching the surface.

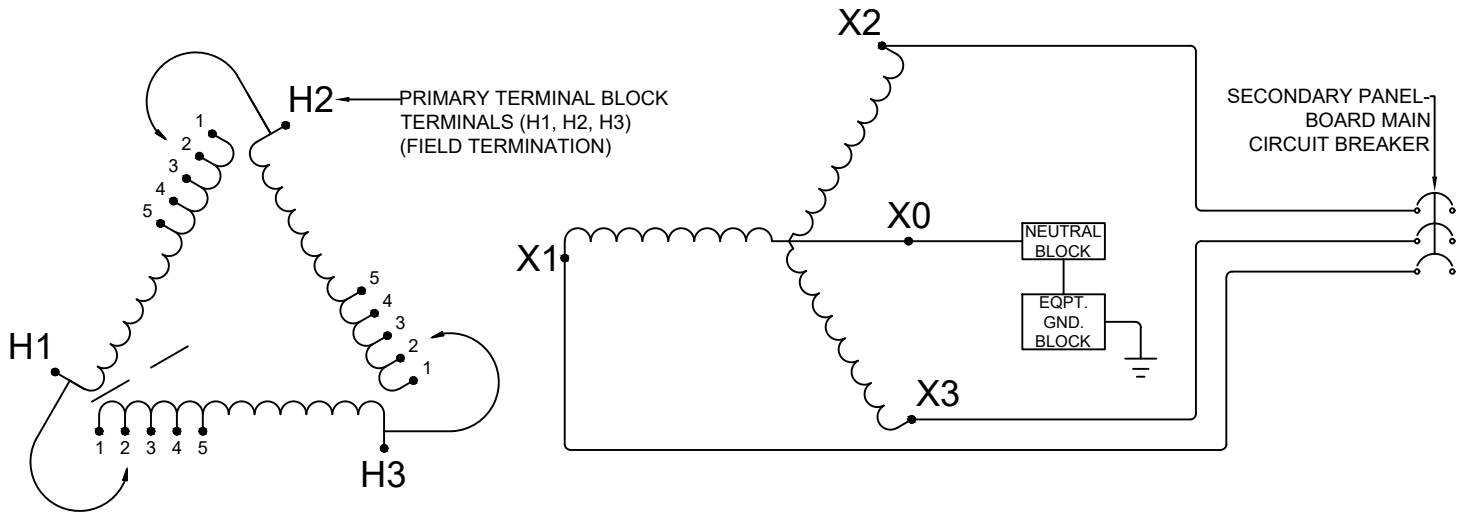
INTERIOR MAINTENANCE:

WARNING: Turn off or disconnect the power supplying this equipment before beginning work. This might require you to contact your local utility to disconnect the power to an existing panel board or disconnect. The line side of the main breaker in a panel board is energized unless power is disconnected upstream. Marina Electrical Equipment, Inc. will not assume any responsibility for property damage or personal injury resulting from misuse of the information in this manual.

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TYPICAL THREE PHASE WIRING DIAGRAM



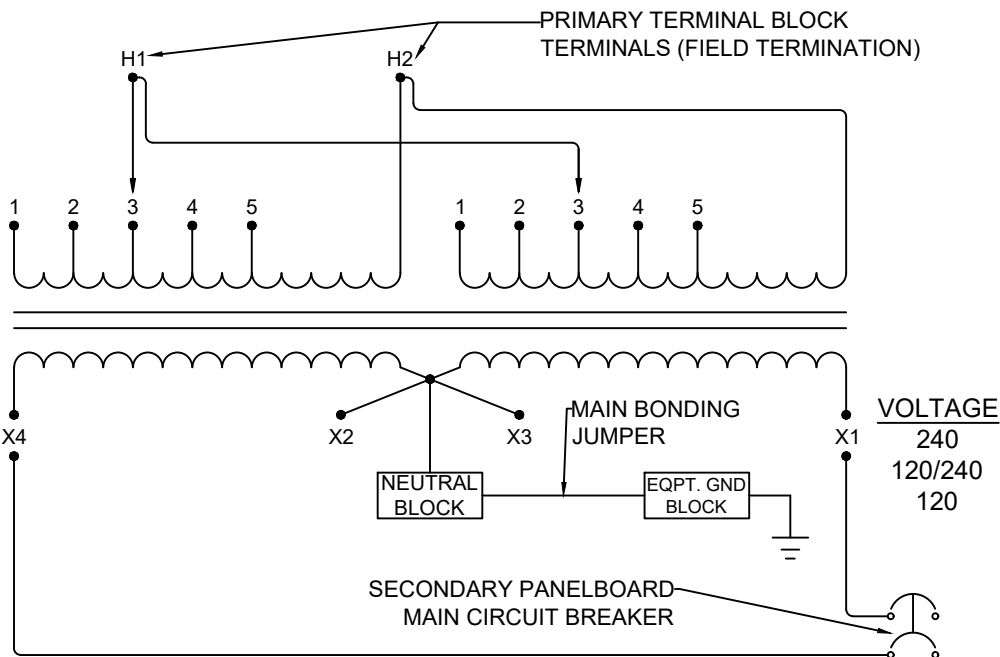
PRIMARY: H1-H2-H3

SECONDARY: X0,X1,X2,X3

<u>VOLTAGE</u>	<u>% TAP</u>	<u>LINKS</u>
504	105.0%	1-1-1
492	102.5%	2-2-2
480	100.0%	3-3-3
468	97.5%	4-4-4
456	95.0%	5-5-5

<u>VOLTAGE</u>	<u>CONNECT LOADS TO:</u>
208	X1-X2-X3
120	X0-X1, X0-X2 and/or X0-X3

TYPICAL SINGLE PHASE WIRING DIAGRAM



PRIMARY: H1 - H2

<u>VOLTAGE</u>	<u>% TAP</u>	<u>LINKS</u>
504	105.0%	1-1
492	102.5%	2-2
480	100.0%	3-3
468	97.5%	4-4
456	95.0%	5-5

SECONDARY: X1, X2, X3, X4

<u>VOLTAGE</u>	<u>INTERCONNECT</u>	<u>CONNECT LOAD TO</u>
240	X2-X3	X1-X4
120/240	X2-X3	X1-X2-X4
120	X1-X3 & X2-X4	(X2 is a Neutral) X1/X3-X2/X4

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ANNUAL TERMINAL MAINTENANCE:

Open the main door and remove the gutter rails and dead front to expose the de-energized supply terminal block and panel board. The terminal block and each circuit breaker lug should then be thoroughly examined for signs of excessive heating, loose and/or corroded connections, and any other sign of damage or wear. All loose or damaged connections need to be tightened or replaced.

Thoroughly examine any copper wire to aluminum lug connections for signs of corrosion. If any corrosion is found, simply remove the copper wire, clean the wire, coat with synthetic anti-corrosion grease and reinstall the wire.

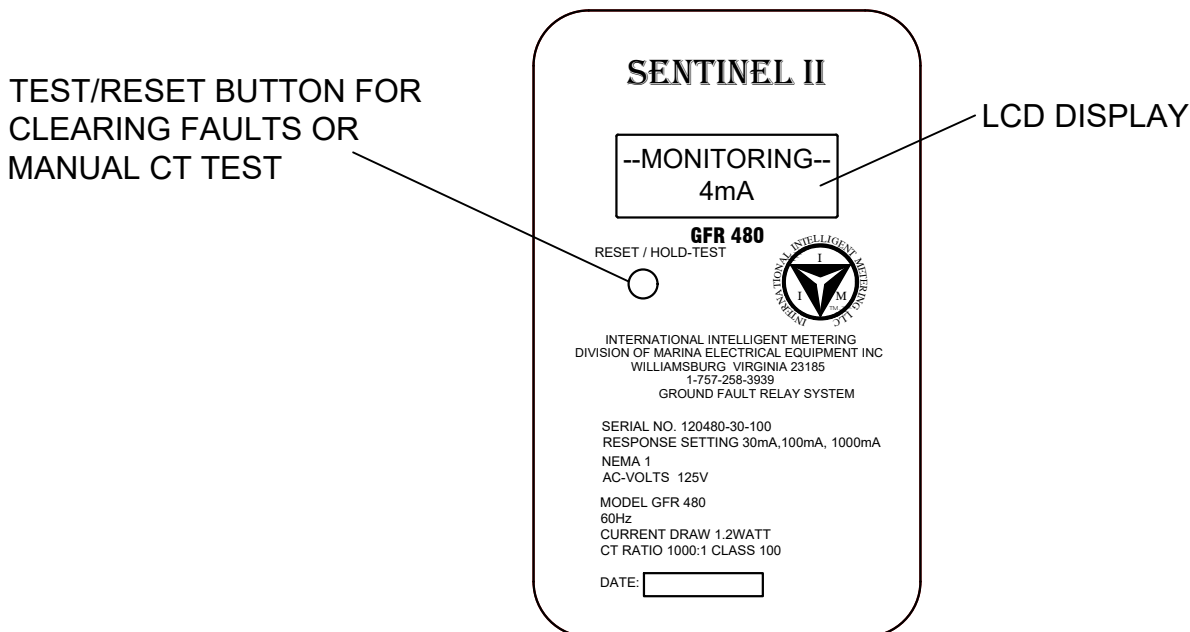
OPERATION:

1. Energize MAIN Circuit Breaker:

Turn the main circuit breaker to the "ON" position. If handle is in the intermediate "TRIP" position: move handle to "OFF" position, then to "ON." Check to see that power holds. Note: if the main circuit breaker is equipped with ground-fault protection which trips under load, this indicates an issue with downstream wiring, equipment and/or connected vessel wiring and or equipment. Short circuits, overload and/or ground faults (if equipped with ground fault protection) will cause the main circuit breaker to trip, requiring the downstream wiring, equipment, and/or connected vessel's electrical system to be examined and repaired by a qualified electrician before the main circuit breaker can be re-energized.

For GTX Unit Substations equipped with optional ground fault protection on the main circuit breaker: if the breaker immediately trips upon attempting to energize/close: the grounded (neutral) conductor(s) and the equipment ground conductor(s) are improperly bonded downstream. A qualified electrician must repair this faulty wiring/equipment before attempting to re-energize.

To Reset the Sentinel II Ground Fault Relay (GFR480): Once the ground fault has been cleared, press the "TEST/RESET" button for ≤ 1 second, switch the breaker(s) to "OFF" and then "ON" to re-energize. Refer to the following figure for Sentinel II Ground Fault Relay GFR480 operation (refer to GFR480 O&M for further details):



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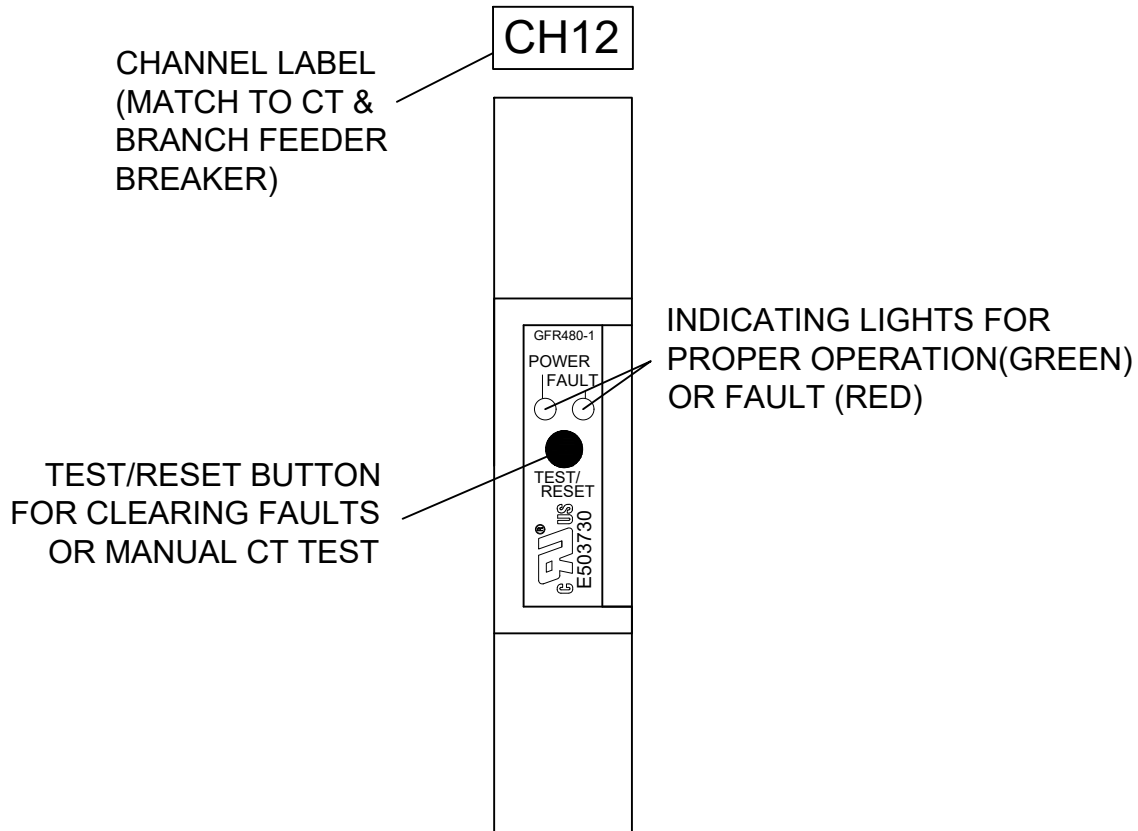
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2. Energize Each Branch Feeder Circuit Breaker:

After energizing main circuit breaker, energize each branch feeder circuit breaker. Turn each branch feeder breaker handle to "ON" position. If handle is in the intermediate "TRIP" position: move handle to "OFF" position, then to "ON." Check to see that power holds. Note: if the branch feeder circuit breaker is equipped with ground-fault protection which trips under load, this indicates an issue with downstream wiring, equipment and/or connected vessel wiring and or equipment. Short circuits, overload and/or ground faults (if equipped with ground fault protection) will cause the branch feeder circuit breaker to trip, requiring the downstream wiring, equipment, and/or connected vessel's electrical system to be examined and repaired by a qualified electrician before the main circuit breaker can be re-energized.

For GTX Unit Substations equipped with optional ground fault protection on each branch feeder circuit breaker: if the breaker immediately trips upon attempting to energize/close: the grounded (neutral) conductor(s) and the equipment ground conductor(s) are improperly bonded downstream. A qualified electrician must repair this faulty wiring/equipment before attempting to re-energize.

To Reset the Sentinel II Ground Fault Relay (GFR480-1): Once the ground fault has been cleared, press the "TEST/RESET" button for ≤ 1 second, switch the appropriate breaker(s) to "OFF" and the "ON" to re-energize the circuit. Refer to the following figure for Sentinel II Ground Fault Relay GFR480-1 operation (refer to GFR480-1 O&M for further details):



Specifications Subject to Change Without Notice

END OF SECTION

GTX™ Unit Substation

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WARRANTY POLICY

Housings:

Marina Electrical Equipment, Inc. (MEE) warrants that the main housing and attached parts (top, lens, doors, receptacle faceplates, circuit breaker plates, and mounting base plate) will be free from failure resulting from defects in material and/or workmanship, and are covered by a limited warranty of one (1) year. Should any of the above parts fail to comply with the above-mentioned warranty, MEE will either repair or replace the defective part(s), or credit the purchaser for the purchase price of the part. This warranty is voided if any petroleum-based solvent is used anywhere on or near any of the polycarbonate parts. These parts include, but may not be limited to: the top, lens, doors, receptacle faceplates, circuit breaker plates, terminal block, and the mounting base plate.

Internal Components:

MEE warrants that all internal electrical components shall be covered by a limited warranty of one (1) year. Items covered include but are not limited to: transformers, panelboards, ground fault monitor relays, surge protective devices, receptacles, circuit breakers, photocells, lamp holders, coil transformers, counters and wiring harnesses. Should any of the above parts fail to comply with this warranty policy, MEE will coordinate the repair or replacement of the defective part(s) with the respective supplier.

Solid-State Electric kWh Monitors:

MEE warrants that the International Intelligent Meter (IIM) solid-state electric kWh monitors will be free from failure resulting from defects in material and/or workmanship, and are covered for one (1) year. Although the IIM meters contain integrated surge protection, MEE and IIM will not warrant the product against severe over-voltage conditions such as lightning strikes or abnormal utility surges. Should an electric monitor fail to comply with the above-mentioned warranty, MEE will either repair or replace the defective part(s)/components, or credit the purchaser for the purchase price of the part. This warranty is voided if the damage to any or all of the components is the result of abuse, misuse, or Force Majeure. This warranty is voided if the factory seal is broken or manipulated.

This warranty policy does not cover damage or failure resulting from abuse, misuse, negligence or Force Majeure. All warranty claims must be made in writing and all defective products shall be returned to MEE for evaluation unless stated otherwise by MEE. MEE will not be responsible for reimbursing the purchaser for any sort of expense incurred by the purchaser as a result of the repair or replacement of a warranty claim.

Send all warranty claims to:

Marina Electrical Equipment, Inc.
1715 Merrimac Trail
Williamsburg, VA 23185
Toll Free: 1-855-258-3939
Fax: 757-258-3988

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END OF SECTION