Self-Enclosed Nexus® 1500+ Meter in Assembly

- Ideal for Retrofit Meter Solutions
- Extends Switchgear Capability
- Pre-Wired and Configured
- Eliminates Wiring and Installation Errors

NEMA 1
Indoor Rated

E-SINE
Engineering Solutions

V.1.04
January 25, 2018

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Nexus® 1500+ Meter in Enclosure Installation and Operation Manual Version 1.04

Published by:

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1800 Shames Drive

Westbury, NY 11590

Copyright Notice

Customer Service and Support

Customer support is available 9:00 am to 4:30 pm, Eastern Standard Time, Monday through Friday. Please have the model, serial number and a detailed problem description available. If the problem concerns a particular reading, please have all meter readings available. When returning any merchandise to EIG, a return materials authorization number is required. For customer or technical assistance, repair or calibration, phone 516-334-0870 or fax 516-338-4741.

Product Warranty

Electro Industries/GaugeTech warrants all products to be free from defects in material and workmanship for a period of four years from the date of shipment. During the warranty period, we will, at our option, either repair or replace any product that proves to be defective.

To exercise this warranty, fax or call our customer-support department. You will receive prompt assistance and return instructions. Send the instrument, transportation prepaid, to EIG at 1800 Shames Drive, Westbury, NY 11590. Repairs will be made and the instrument will be returned.

This warranty does not apply to defects resulting from unauthorized modification, misuse, or use for any reason other than electrical power monitoring. The Nexus® 1500+ Meter in Enclosure is not a user-serviceable product.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ELECTRO INDUSTRIES/GAUGETECH SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING FROM ANY AUTHORIZED OR UNAUTHORIZED USE OF ANY ELECTRO INDUSTRIES/GAUGETECH PRODUCT. LIABILITY SHALL BE LIMITED TO THE ORIGINAL COST OF THE PRODUCT SOLD.

Use of Product for Protection

OUR PRODUCTS ARE NOT TO BE USED FOR PRIMARY OVER-CURRENT PROTECTION. ANY PROTECTION FEATURE IN OUR PRODUCTS IS TO BE USED FOR ALARM OR SECONDARY PROTECTION ONLY.

Statement of Calibration

Our instruments are inspected and tested in accordance with specifications published by Electro Industries/GaugeTech. The accuracy and a calibration of our instruments are traceable to the National Institute of Standards and Technology through equipment that is calibrated at planned intervals by comparison to certified standards. For optimal performance, EIG recommends that any metering device, including those manufactured by EIG, be verified for accuracy on a yearly interval using NIST traceable accuracy standards. In general, EIG metering devices should not require regular adjustments to maintain published accuracy.

Disclaimer

The information presented in this publication has been carefully checked for reliability; however, no responsibility is assumed for inaccuracies. The information contained in this document is subject to change without notice.

Symbols Used in This Manual

This warning symbol indicates that the operator must refer to an important explanation in the operating instructions. The word following the symbol indicates the type of warning being given.

Ce symbole d'avertissement indique que l'opérateur doit se référer à une explication importante dans les instructions d'utilisation. Le mot suivant le symbole indique le type d'avertissement ne soit donné.

CAUTION! The instructions given must be followed to prevent damage to equipment.
Les instructions doivent être respectées pour éviter d'endommager l'équipement.

WARNING! The instructions given must be followed to prevent serious injury to people.
Les instructions doivent être respectées pour d'éviter de graves blessures aux personnes.

About Electro Industries/GaugeTech (EIG)

Founded in 1975 by engineer and inventor Dr. Samuel Kagan, Electro Industries/GaugeTech changed the face of power monitoring forever with its first breakthrough innovation: an affordable, easy-to-use AC power meter.

More than forty years since its founding, Electro Industries/GaugeTech, the leader in power monitoring and control, continues to revolutionize the industry with the highest quality, cutting edge power monitoring and control technology on the market today. An ISO 9001:2015 certified company, EIG sets the industry standard for advanced power quality and reporting, revenue metering and substation data acquisition and control. EIG products can be found on site at mainly all of today's leading manufacturers, industrial giants and utilities.

EIG products are primarily designed, manufactured, tested and calibrated at our facility in Westbury, New York.

Table of Contents

1: Introduction

The Nexus®1500+ Meter in Enclosure lets you expand your switchgear capability and/or easily meter circuits without expensive and time-consuming redesign. Simply mount the enclosure in any convenient location, next to your switchgear or on a wall, and you are ready to go, with no downtime.

This is an ideal solution for a retrofit when there is no metering compartment available. The unit comes standard with a NEMA 1* rated enclosure and is factory wired with the meter installed. Standard safety equipment includes voltage fuses and shorting blocks for current transformers. See Chapter 6 for ordering instructions.

1.1: Product Handling

CAUTION! READ AND UNDERSTAND THE INSTRUCTIONS CONTAINED IN THIS DOCUMENT BEFORE ATTEMPTING TO UNPACK, INSTALL, OPERATE, OR MAINTAIN THIS EQUIPMENT.

Every effort is made to insure that the equipment arrives undamaged and ready to be installed. Packing is designed to protect internal components as well as the enclosure. Do not remove protective packing until you are ready to install the equipment.

When you receive the equipment, you should inspect the shipping container for any obvious signs of rough handling and/or external damage that occurred during transportation. Record any external and internal damage for reporting to the transportation carrier and EIG. All claims should be as specific as possible and include general order numbers.

You will find a plastic bag of instruction booklets and/or CDs in the shipping container. Store these documents in a safe place.

* NEMA 1 Enclosures are constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts and to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt). (Taken from *NEMA Enclosure Types* from the National Electrical Manufacturers Association.)

1.2: Safety Precautions

WARNING! All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation, and maintenance of this device.

Hazardous voltages that can cause death or severe personal injury are present inside enclosure. Follow proper installation, operation, and maintenance procedures to avoid these voltages.

Avertissement! tous les codes de sécurité, normes de sécurité et règlements doivent être suivis strictement dans l'installation, le fonctionnement et la maintenance de cet appareil.

Des tensions dangereuses peuvent provoquer la mort ou des blessures graves. suivre l'installation adéquate, le fonctionnement et les procédures de maintenance pour éviter ces tensions.

Completely read and understand the material presented in this document before attempting installation, operation, or application of the equipment. In addition, only qualified persons should be permitted to perform any work associated with the equipment. Any wiring instructions presented in this document must be followed precisely. Failure to do so could cause permanent equipment damage.

All possible contingencies that may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding a particular installation, operation, or maintenance of particular equipment, contact an EIG representative.

1.3: Storage

Although it has been well packaged, this equipment should not be stored outdoors. If the equipment is to be stored indoors for any period of time, it should be stored with its protective packaging in place. Refer to the *Nexus® 1500+ Meter Installation and Operation* manual, on the enclosed CD, for the meter's storage requirements.

The temperature rating for indoor enclosure storage is (-20 to +60) ^{o}C/(-4 to +140) ^{o}F.

1.4: Enclosure Compliance

UL / cUL Listed, UL508A, File number: E358101.

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2: Installation

WARNING! All safety codes, safety standards, and/or regulations shall be strictly observed in the installation, operation, and maintenance of this device. **This device shall be installed in an un-energized condition and as per the National Electric Code.**

AVERTISSEMENT! Tous les codes de sécurité, normes de sécurité et règlement doivent être suivis strictement pour l'installation, le fonctionnement et la maintenance de cet appareil. **Cet appareil doit être installé hors tension conformément au code électrique national (National Electric Code).**

Choose a mounting location that offers a flat, rigid mounting surface capable of supporting the weight of the equipment. The unit weighs 38 lbs (17.24 kilograms) maximum. Mount the equipment in a suitable environment. This enclosure is designed for NEMA 1 rated environments and is manufactured of painted steel.

Check to make certain that there are no pipes, wires, or other mounting hazards in the immediate mounting area that could create a problem. Verify that there will be enough clearance around the enclosure to run wiring, and that the door can be opened completely, allowing access to all internal wiring. EIG recommends at least 2 feet of clearance around the enclosure. See Section 2.1 for enclosure dimensions.

Carefully remove all packing material from the unit. Even though an equipment inspection was made when the equipment was received, make another careful inspection of the enclosure and the devices inside as packing material is removed. Be especially alert for distorted metal, loose wires, or damaged components. This is important because wiring can come loose in shipping and could cause a short circuit or voltage to be on the wrong terminal.

WARNING! Extreme care shall be taken when mounting the enclosure, and making wire entry holes, to prevent metal chips, filings, and other contaminants from entering the enclosure which may damage the equipment and create a hazardous condition.

AVERTISSEMENT! Attention extrême lors de la monture de l'enceinte et lors de la mise à terre pour prévenir les articules métalliques, remplissage et autre contaminant de l'entrée de l'enceinte qui peuvent provoquer une condition dangereuse de l'équipement.

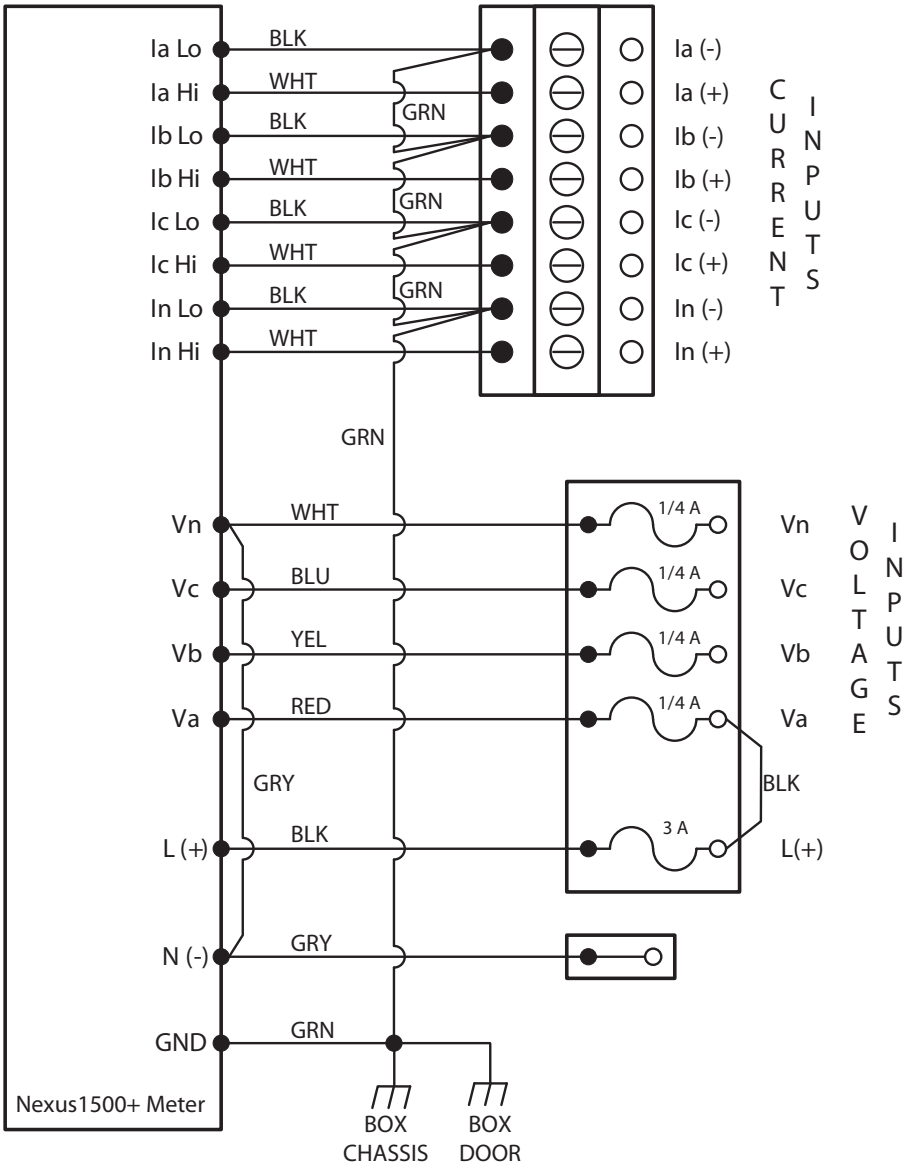

Figure 2.1: 120 Configuration Internal Wiring Schematic

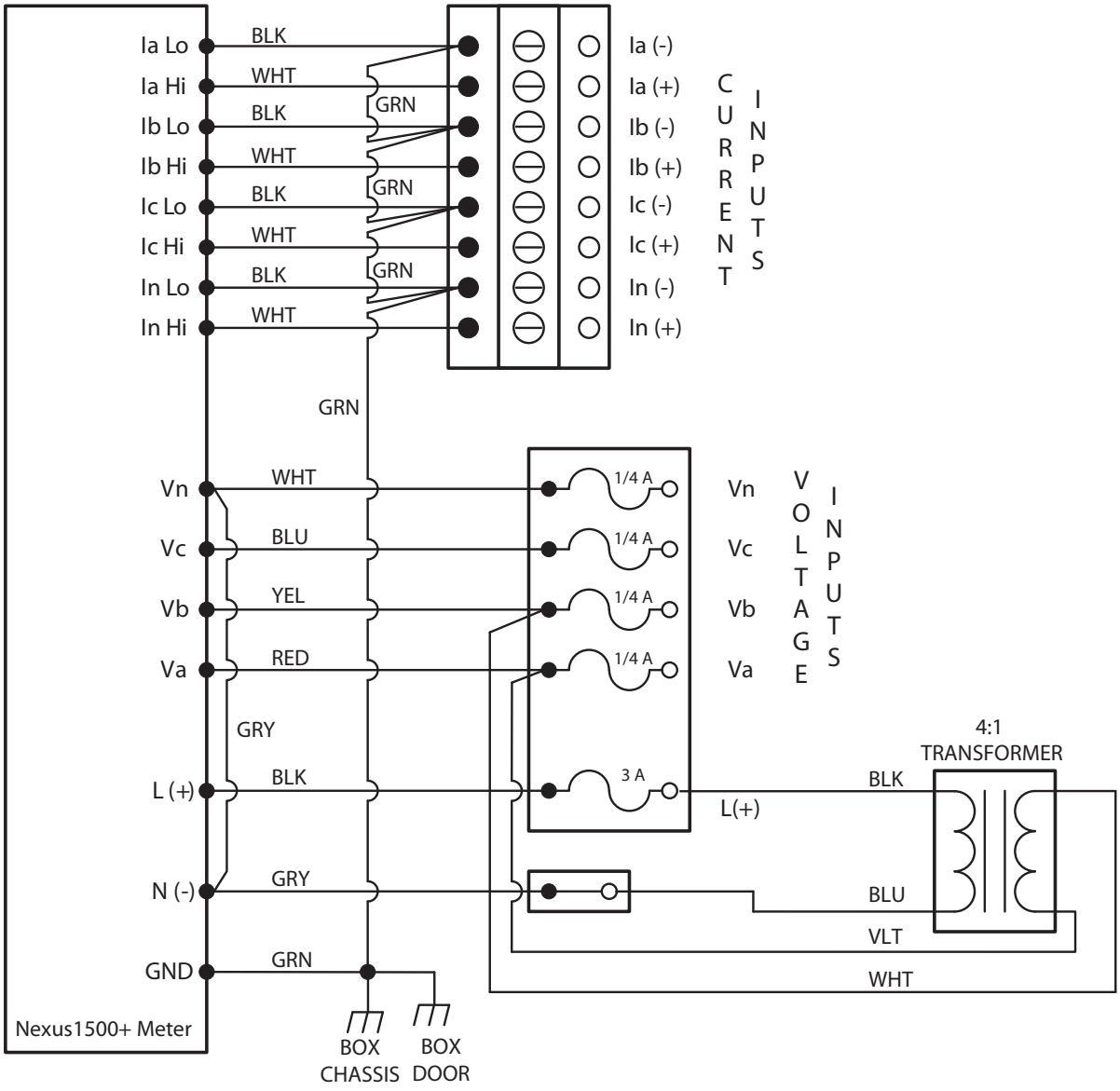

Figure 2.2: 277 Configuration Internal Wiring Schematic

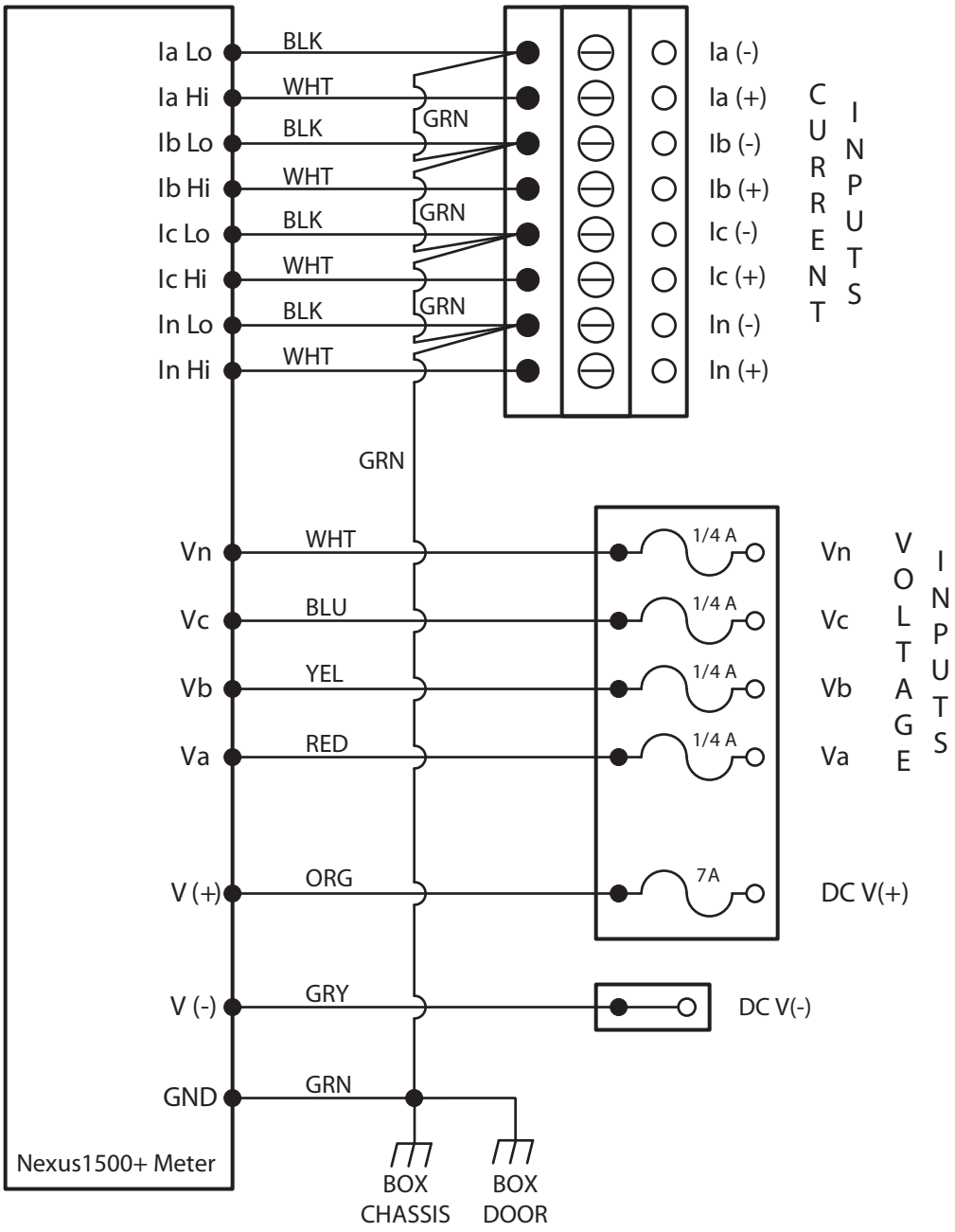

Figure 2.3: 24 Configuration Internal Wiring Schematic

2.1: Recommended Procedures for Wire Entry Hole Cutting

The enclosure does not come with wire entry holes (punch entries). They must be cut in the location you want depending on the installation. See Figure 2.4 for the locations that EIG recommends. See CAUTIONS on next page.

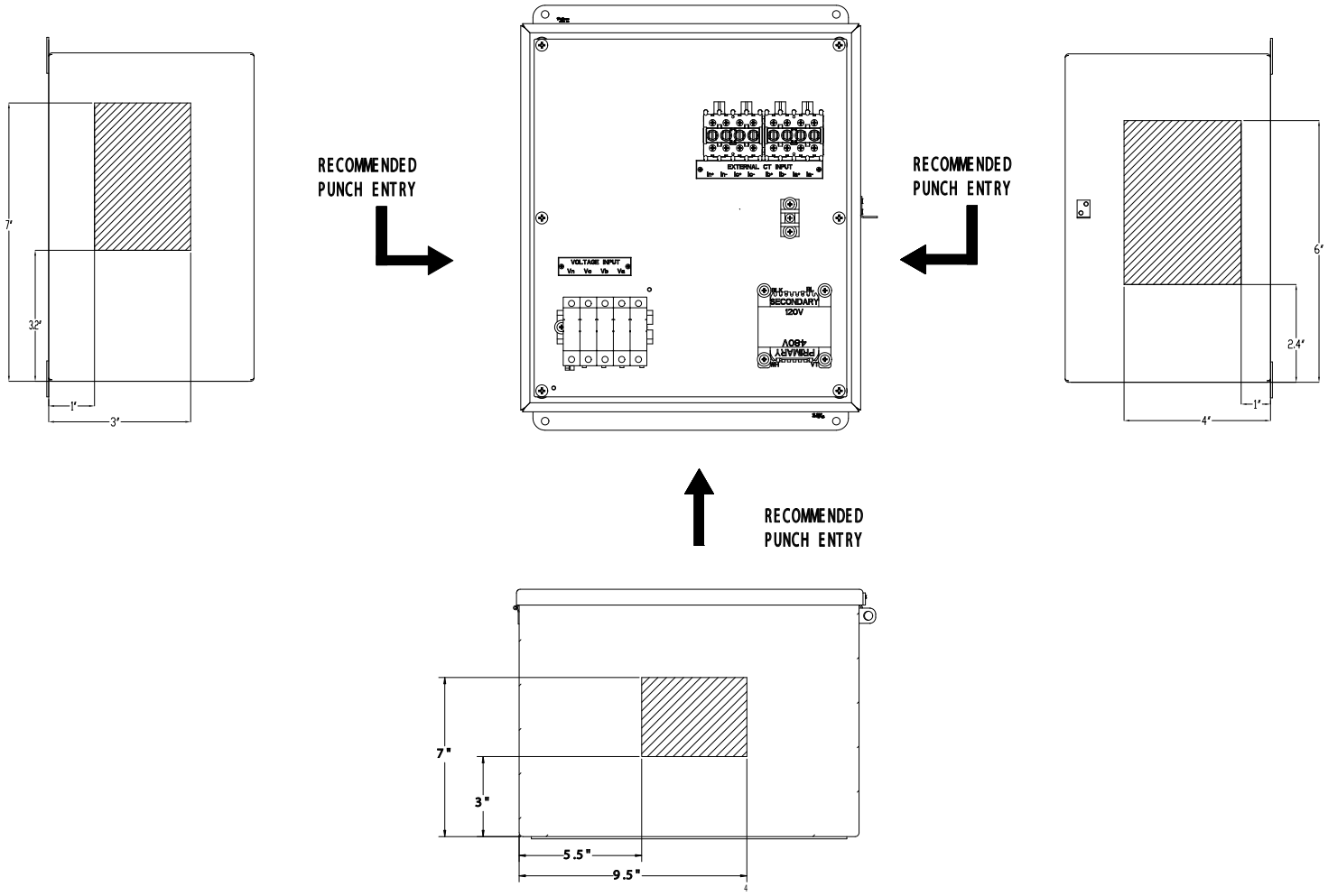

Figure 2.4: Recommended Locations for Wire Entry

CAUTIONS!

- There are numerous methods for making wire entry holes in the enclosure but it is imperative that no loose material generated during the process remains in the enclosure. During installation and cutting the wire holes, all equipment mounted inside or on the enclosure shall be protected from loose material.
- No matter what procedure is used the installer shall verify that the hole cutting process will not damage any of the wiring or components installed inside or on the enclosure.

The two recommended procedures for cutting the wire entry holes are as follows:

- Use a "C" frame punch to cut the wire entry holes. This type of punch does not require a pilot hole. A typical "C" frame punch is shown below.

Figure 2.5: "C" Frame Punch

- Regular punch:
  1. Place a magnet inside the enclosure where the pilot hole is to be cut and completely cover the area with masking tape (or other very sticky tape).
  2. Drill the pilot hole from the outside and do not let the drill pass more than ¼" into the enclosure.
  3. Remove the tape, magnet, and cuttings and punch the hole.

After wiring and before energizing, vacuum the inside of the enclosure to make sure that it is free of foreign material. If a vacuum is not available use an alternate method to clean the inside of the enclosure. Do not use compressed air (or pressurized gas) to clean the inside of the enclosure as this may force cuttings into areas that cannot be seen, creating a hazardous condition.

IMPORTANT!

- All wire entry into the enclosure shall be accomplished with the use of recognized fittings or strain reliefs. Bare holes shall not be used.

2.2: Enclosure Installation

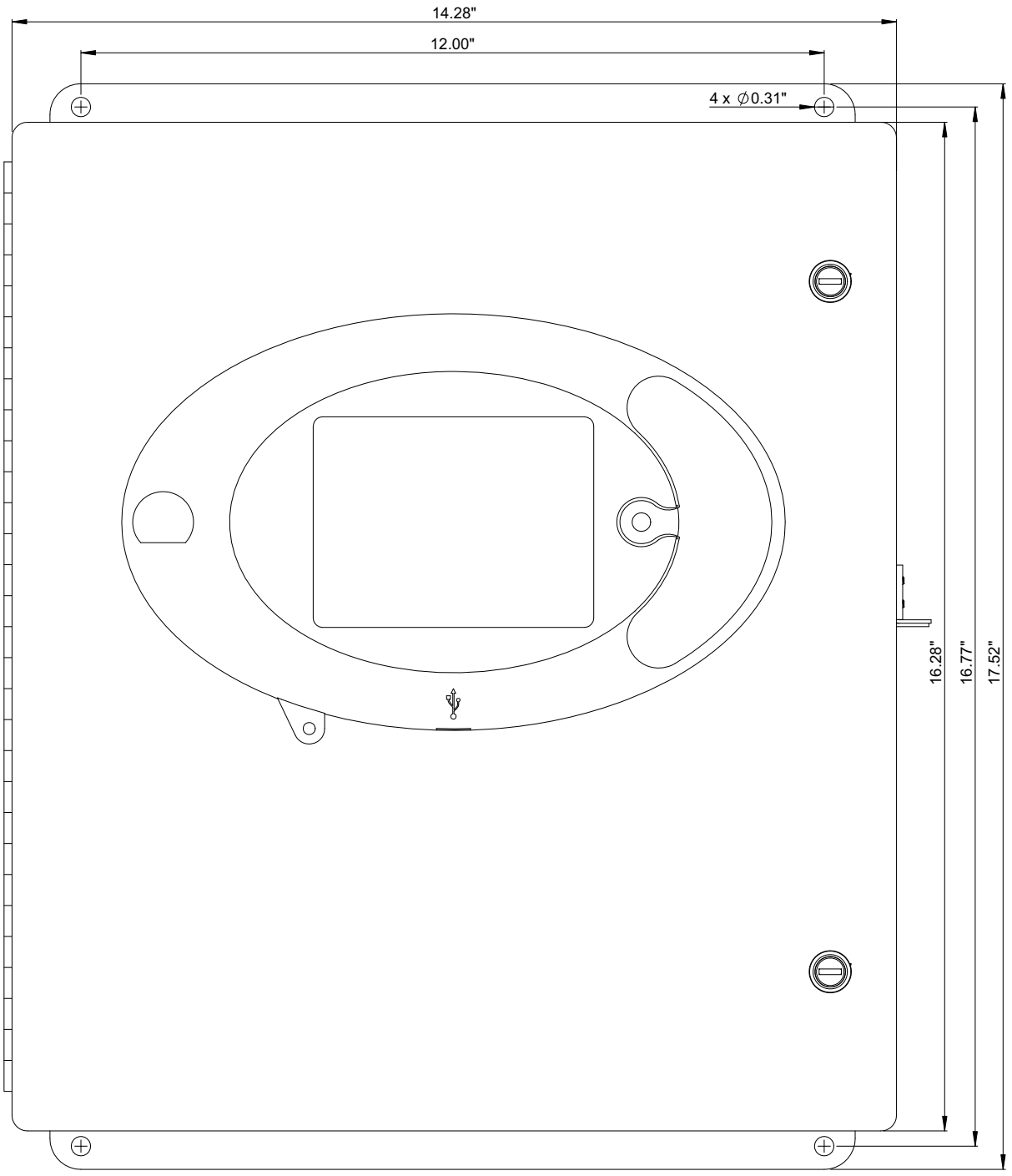

Figure 2.6: Enclosure Front Dimensions

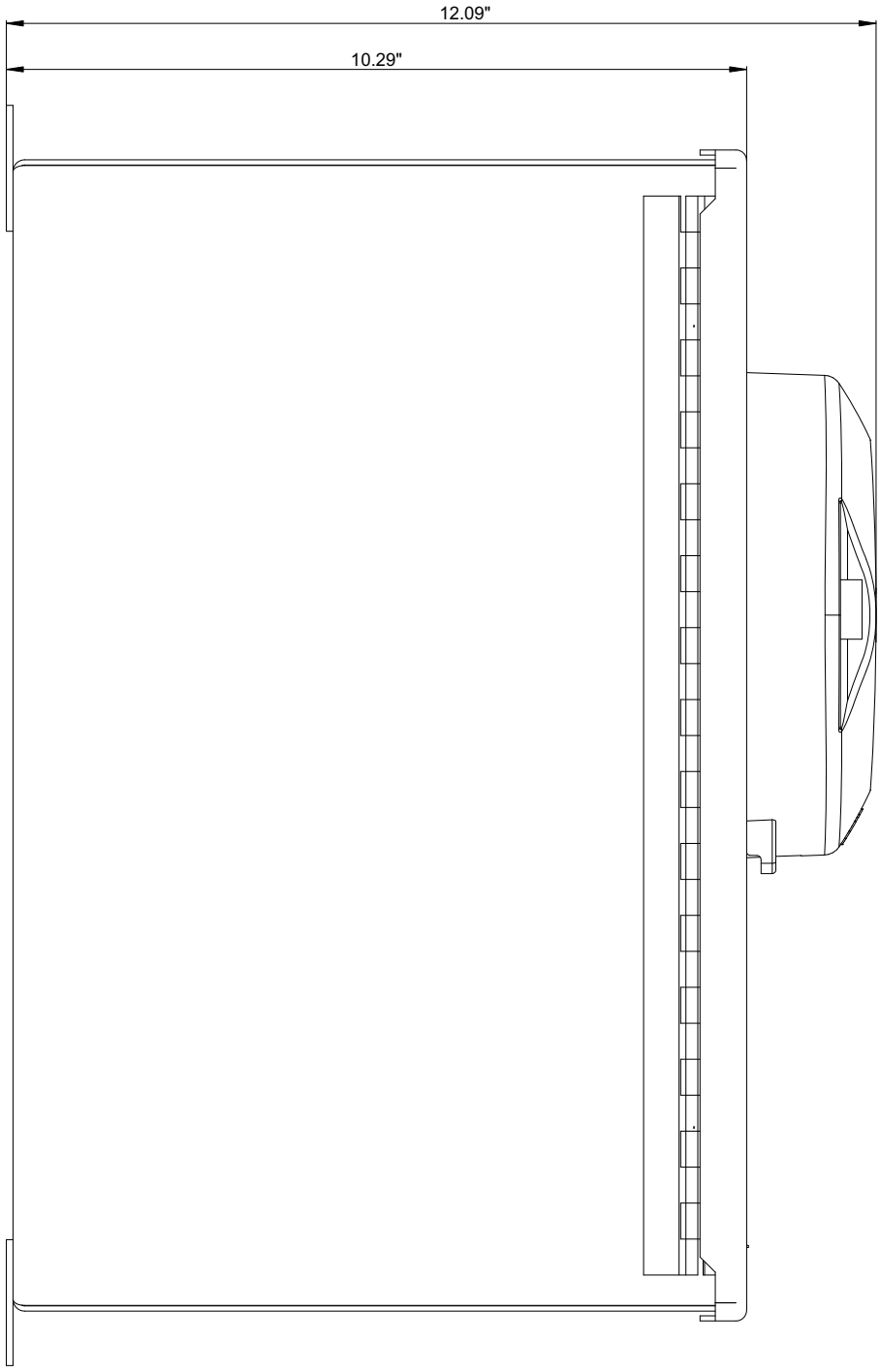

Figure 2.7: Enclosure Side Dimensions

2.2.1: Installation Steps

1. Install the 4 required mounting bolt anchors at locations as shown in Figure 2.6 (4 X 00.31”).

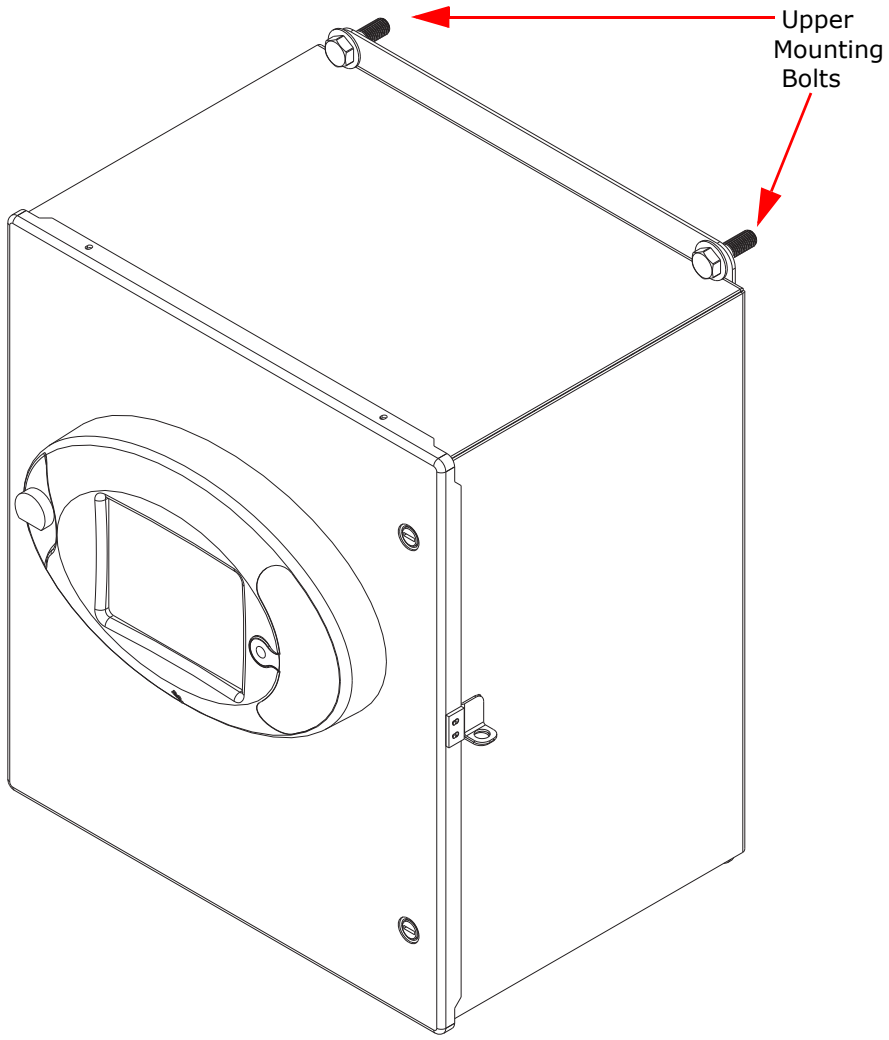

Figure 2.8: Mounting Bolt Installation, Upper Bolts

2. Gently lift the enclosure and guide the top mounting holes over the anchors. Install the top two bolts, but do not tighten them.

3. While still supporting the enclosure, install the two lower mounting bolts in the lower mounting flange, but do not completely tighten them. Use shims, if required, to prevent deformation of the enclosure when tightening the bolts, if the mounting surface is distorted.

4. Tighten all four mounting bolts after any required shimming is completed. See the figure below.

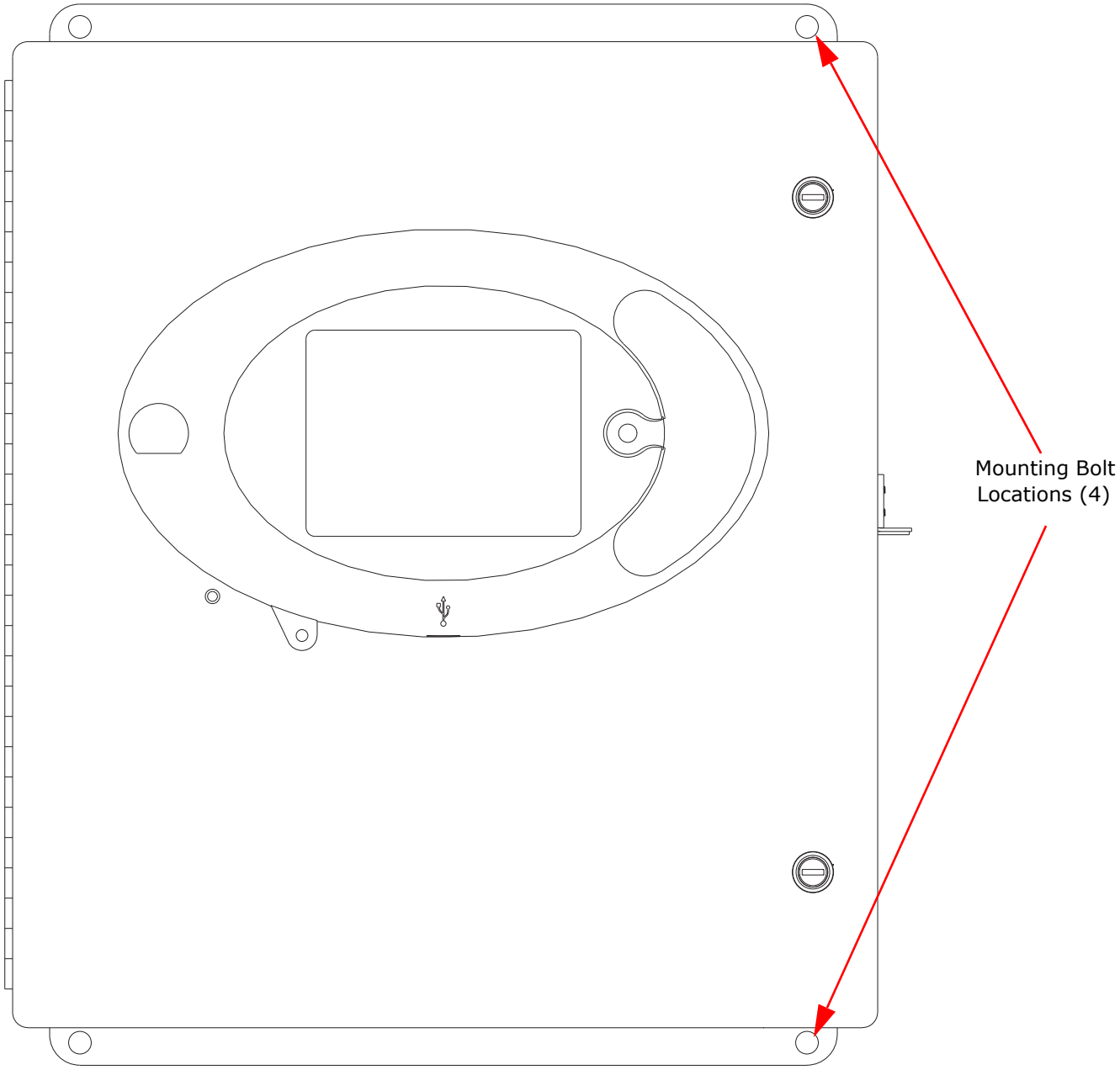

Figure 2.9: Mounting Bolt Locations

2.2.2: Door Locking Instructions

The enclosure has been fitted with means for securing the door so it cannot be opened or tampered with. The padlock bracket can be secured in place with a padlock (3/8 inch shackle diameter). See the figure below.

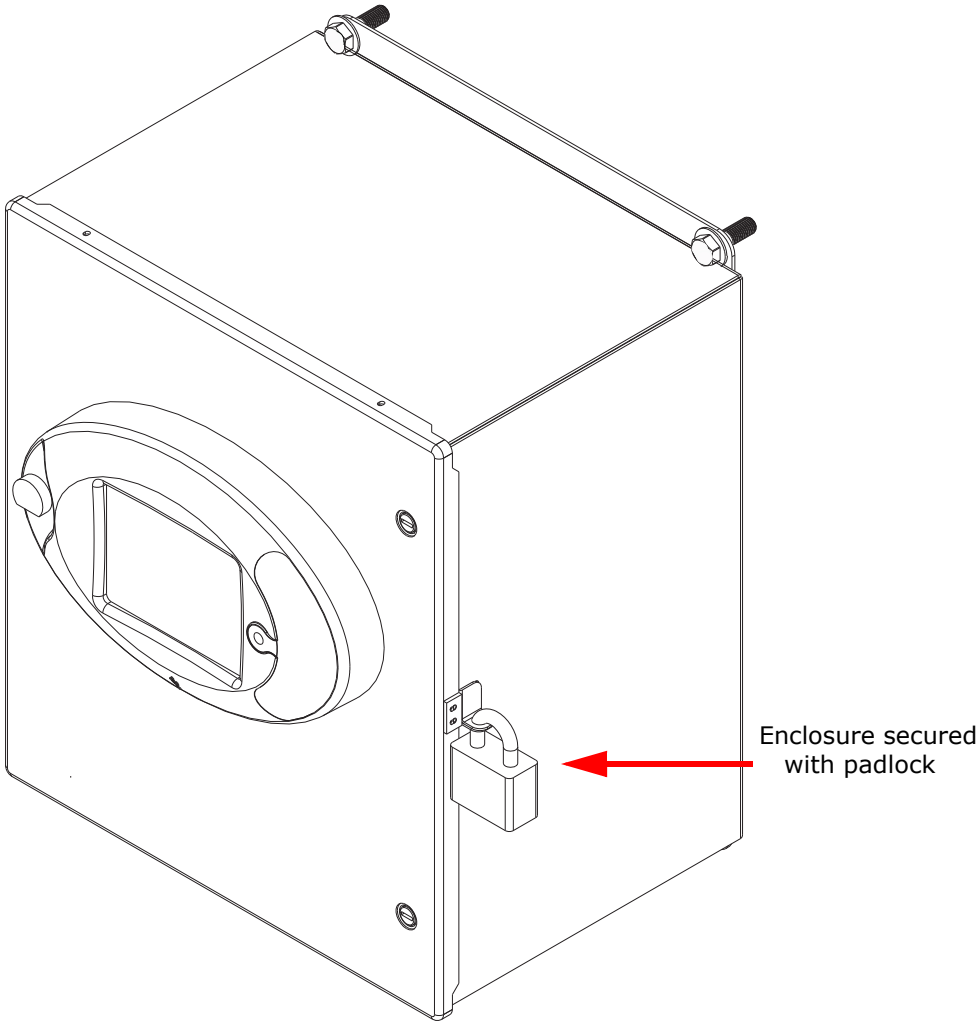

Figure 2.10: Door with Lock

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3. Electrical Wiring

The Nexus®1500+ Meter in Enclosure is factory wired and tested. Installation requires solidly mounting the enclosed unit and connecting field wiring. This document has diagrams of wiring options. Review and understand the appropriate diagrams for the unit you have ordered.

NOTE: See the diagram below for input wiring specifications. Consult your local and/or National Electric Code for external wiring requirements.

IMPORTANT! ALL CONNECTIONS TO THIS PRODUCT ARE TO BE WITH COPPER WIRE ONLY! TOUS LES CONNEXIONS À CE PRODUIT DOIVENT FAIRE UN FIL DE CUIVRE SEULEMENT!

All three enclosure models (120 - (120-240) V DC/AC; 277 - 277/480 V AC; 24 - (18-60)V DC) are pre-wired and programmed for either three phase or single phase operation.

NOTE: The current inputs are only to be connected to external current transformers provided by the installer. The CT's shall be Listed to ANSI/IEEE C57.13 and rated for the current of the meter used.

A DISCONNECTING MEANS AND UPSTREAM PROTECTION SHOULD BE INSTALLED FOR ALL CIRCUITS. A SHORT-CIRCUITING–TYPE TERMINAL BLOCK IS PROVIDED FOR THE CURRENT TRANSFORMER CIRCUIT.

INPUT WIRING SPECIFICATIONS			
Location	**Wire Size***	**Screw Size**	**Maximum Torque**
Shorting Block	#14 AWG Type THHN	#8-32 (Captive)	20 lbf-in (2.3 N-m)
Fuse Block L(+), V1-V3	#14 AWG Type THHN	Compression	20 lbf-in (2.3 N-m)
Fuse Block V4	#14 AWG Type THHN	Compression	20 lbf-in (2.3 N-m)
Earth Ground	#10-12 AWG Type THHN*	#8-32	10 lbf-in (1.2 N-m)

*Or as required by the NEC or local codes.

3.1: Wiring Instructions

WARNING!

First connect Earth Ground as shown in the figure below.

AVERTISSEMENT! Branchez d'abord la mise à la terre comme indiqué dans le dessin ci-dessous.

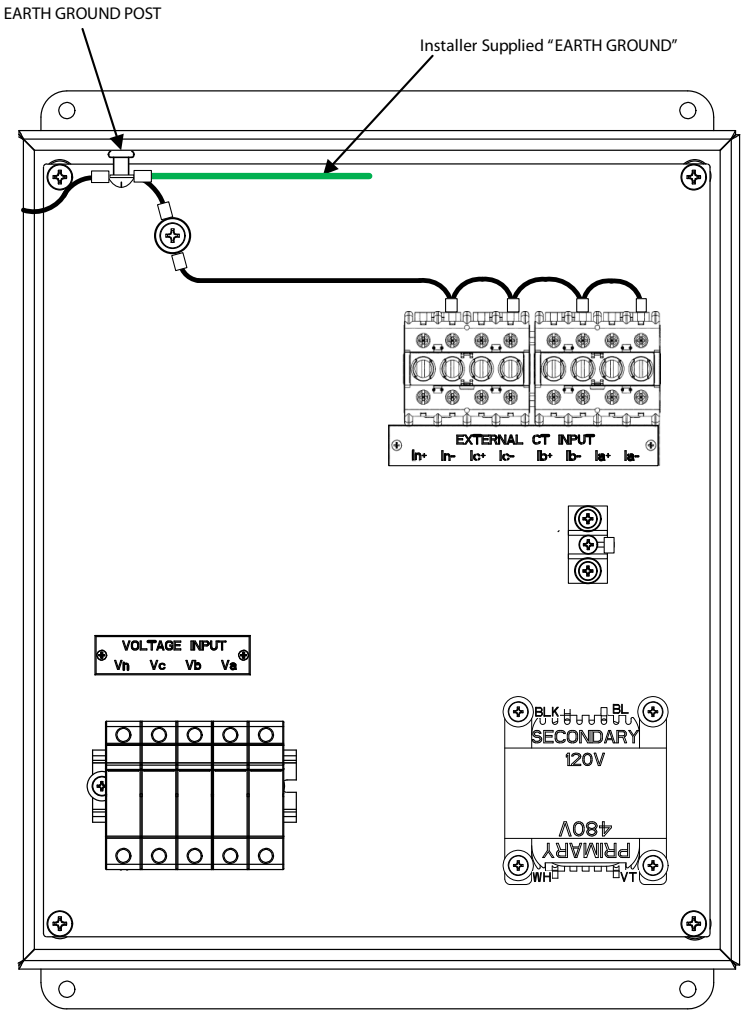


Figure 3.1: Earth Ground Connection

Understand the diagram(s) that pertain to your unit before you begin the field wiring. The following figures show the available wiring options. Understand your system and use the appropriate figures.

WARNING! CONTROL WIRING MAY HAVE VOLTAGE PRESENT THAT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. DE-ENERGIZE ALL CONDUCTORS BEFORE BEGINNING TO PERFORM ANY WIRING ACTIVITY TO OR WITHIN THE NEXUS® 1500+ METER IN ENCLOSURE.

AVETISSEMENT! LE CÂBLAGE DES COMMANDES PEUT AVOIR UNE TENSION PRÉSENTE QUI PEUT PROVOQUER DES BLESSURES GRAVES POU LA MORT. METTRE HORS TENSION TOUS LES CONDUCTEURS AVANT DE COMMENCER LA RÉALISATION D'UNE ACTIVITÉ DE CÂBLAGE DANS L'ENCEINTE DE L'ASSEMBLAGE NEXUS® 1500+.

3.1.1: Wiring Diagrams

The wiring diagrams for the Nexus® 1500+ in Enclosure begin on the next page.

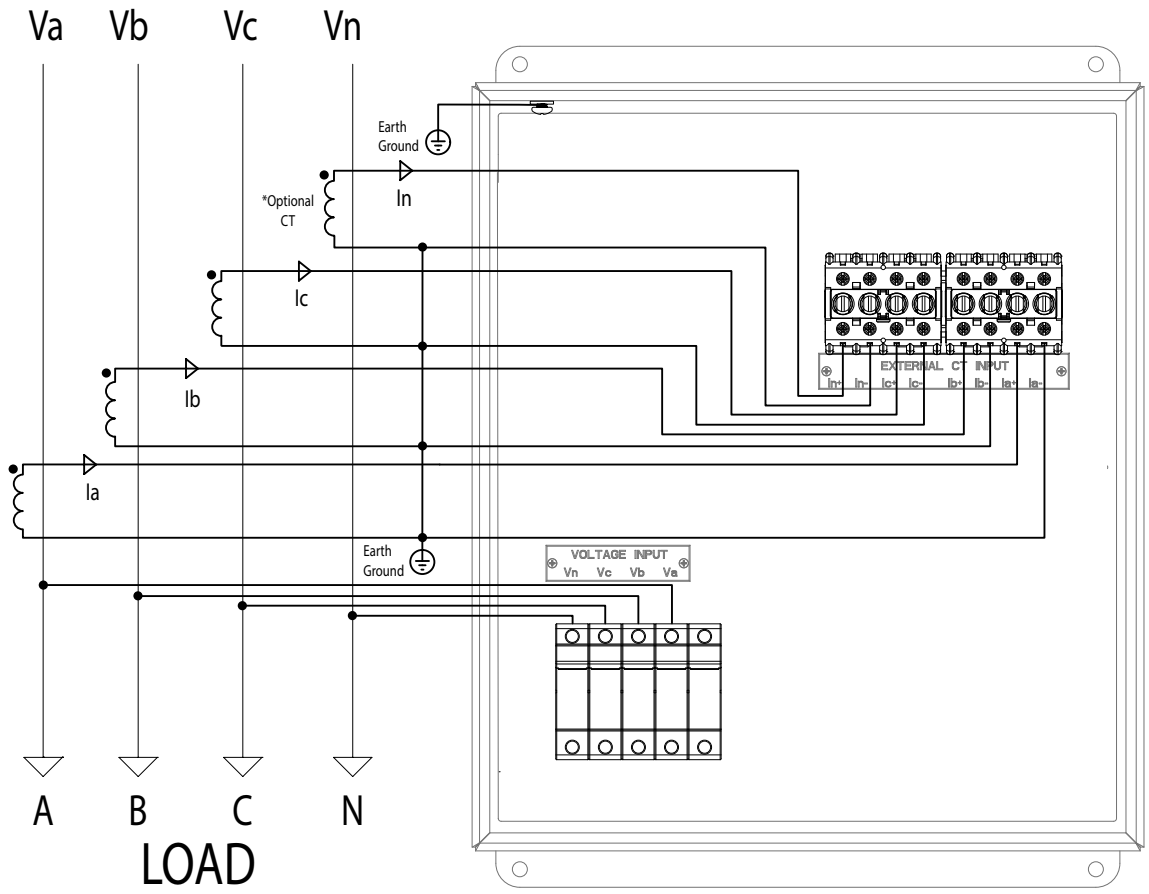


Figure 3.2: 4 Wire WYE Direct Hookup, 3 Element

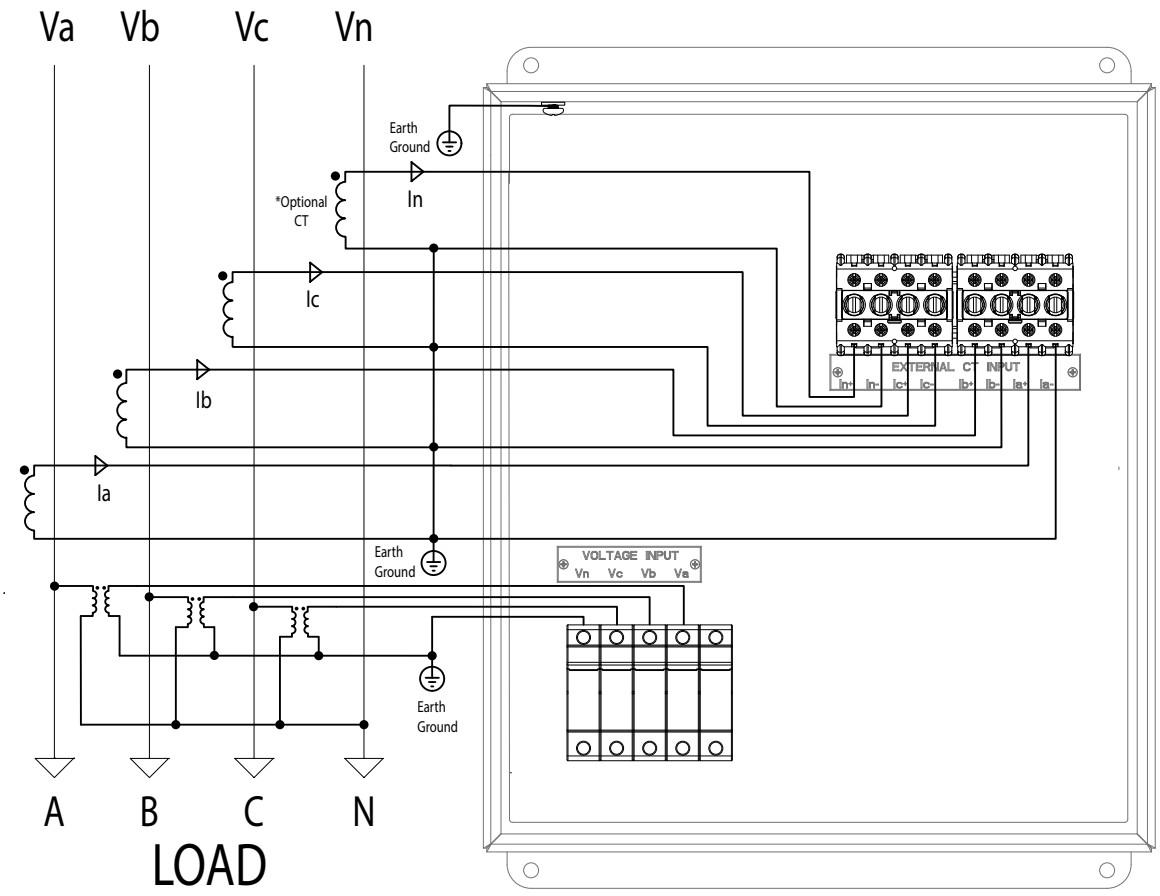


Figure 3.3: 4 Wire WYE 3 PT Hookup, 3 Element

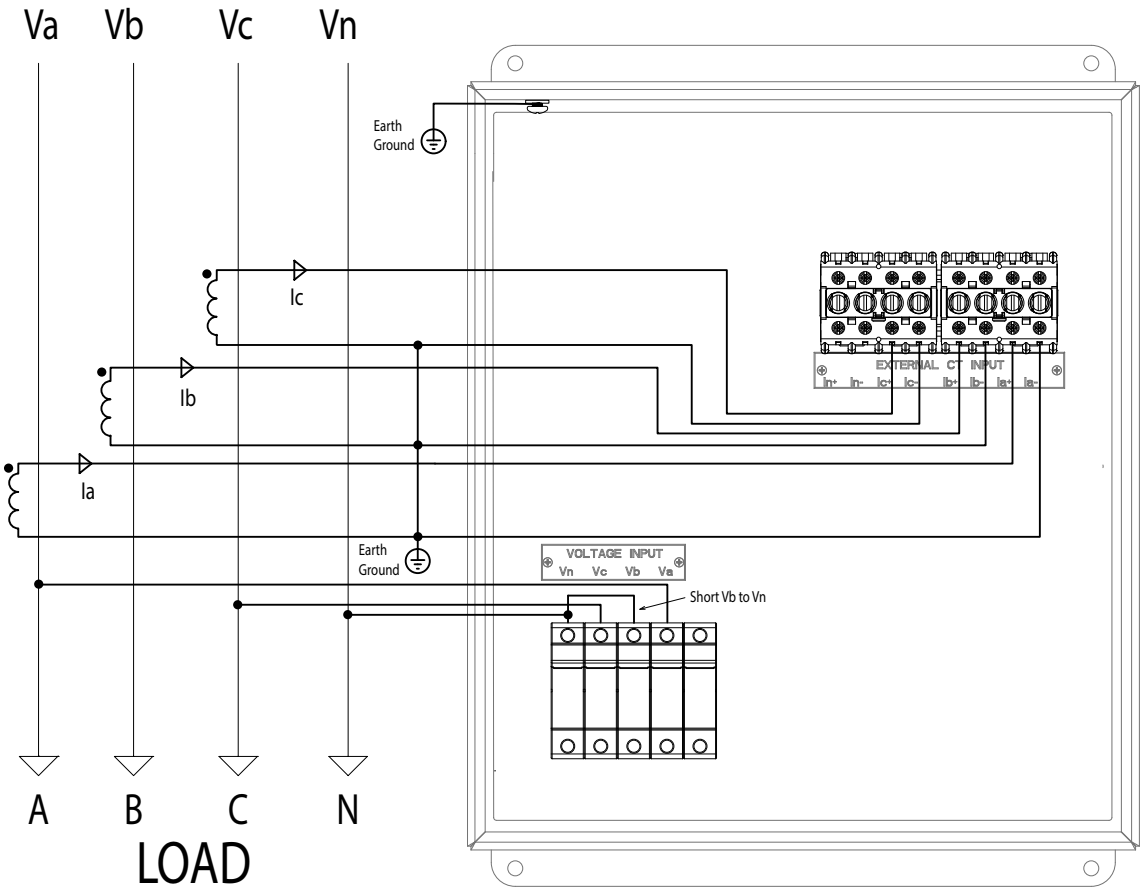


Figure 3.4: 4 Wire WYE Direct Hookup, 2.5 Element

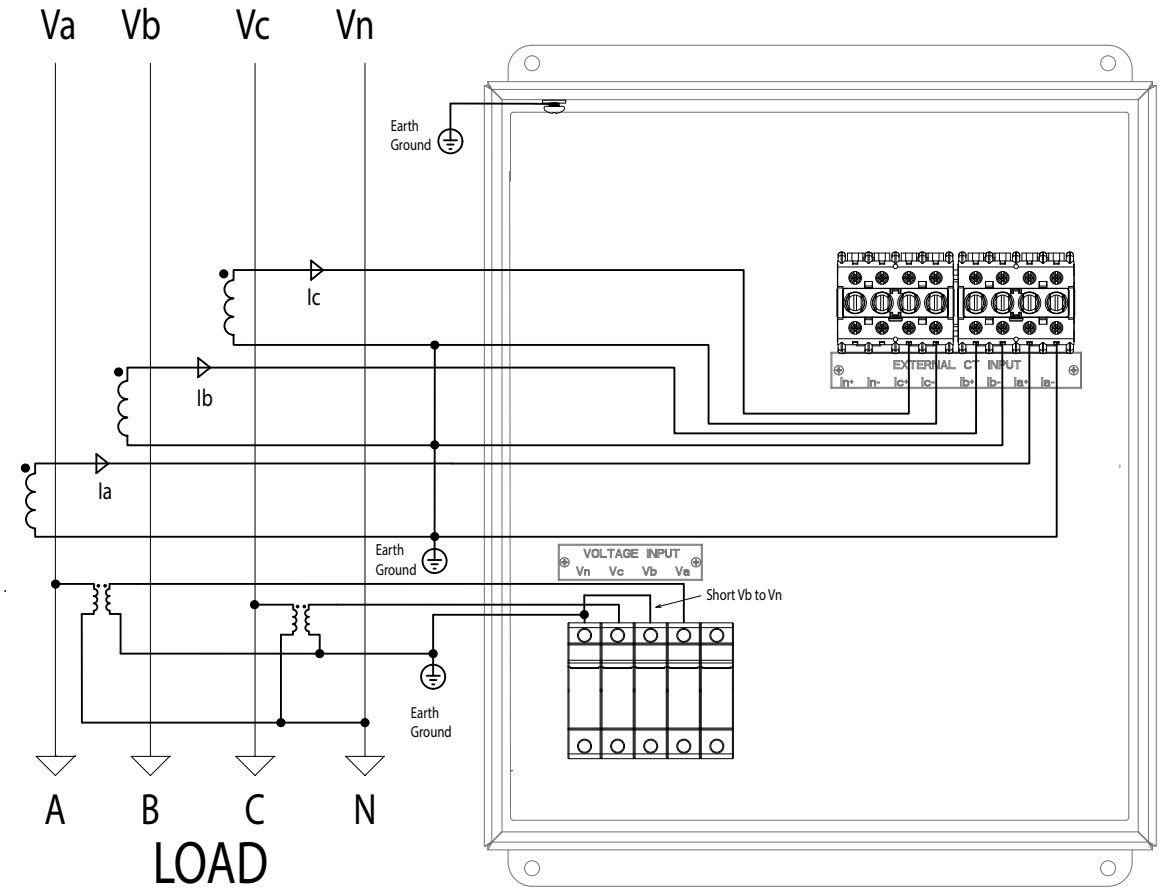


Figure 3.5: 4 Wire WYE 2 PT Hookup 2.5 Element

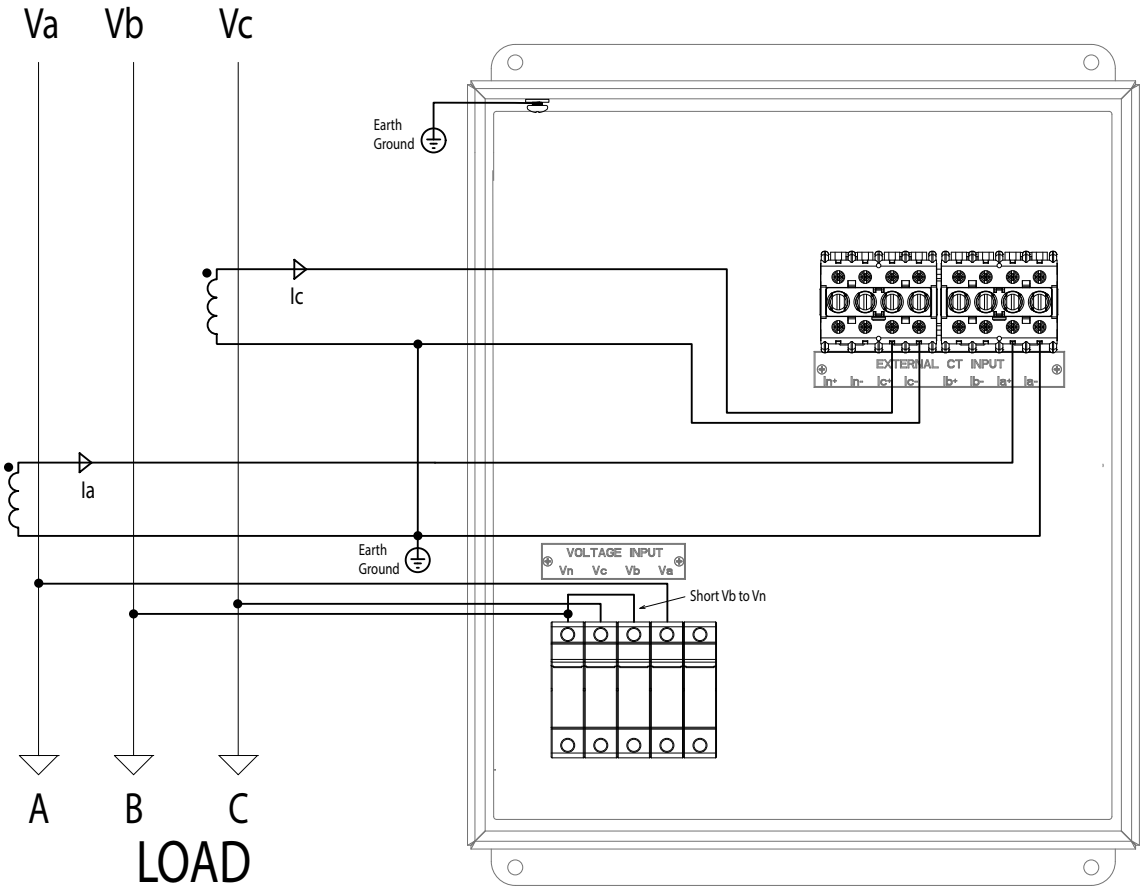


Figure 3.6: 3 Wire Delta Direct Hookup, 2 Element

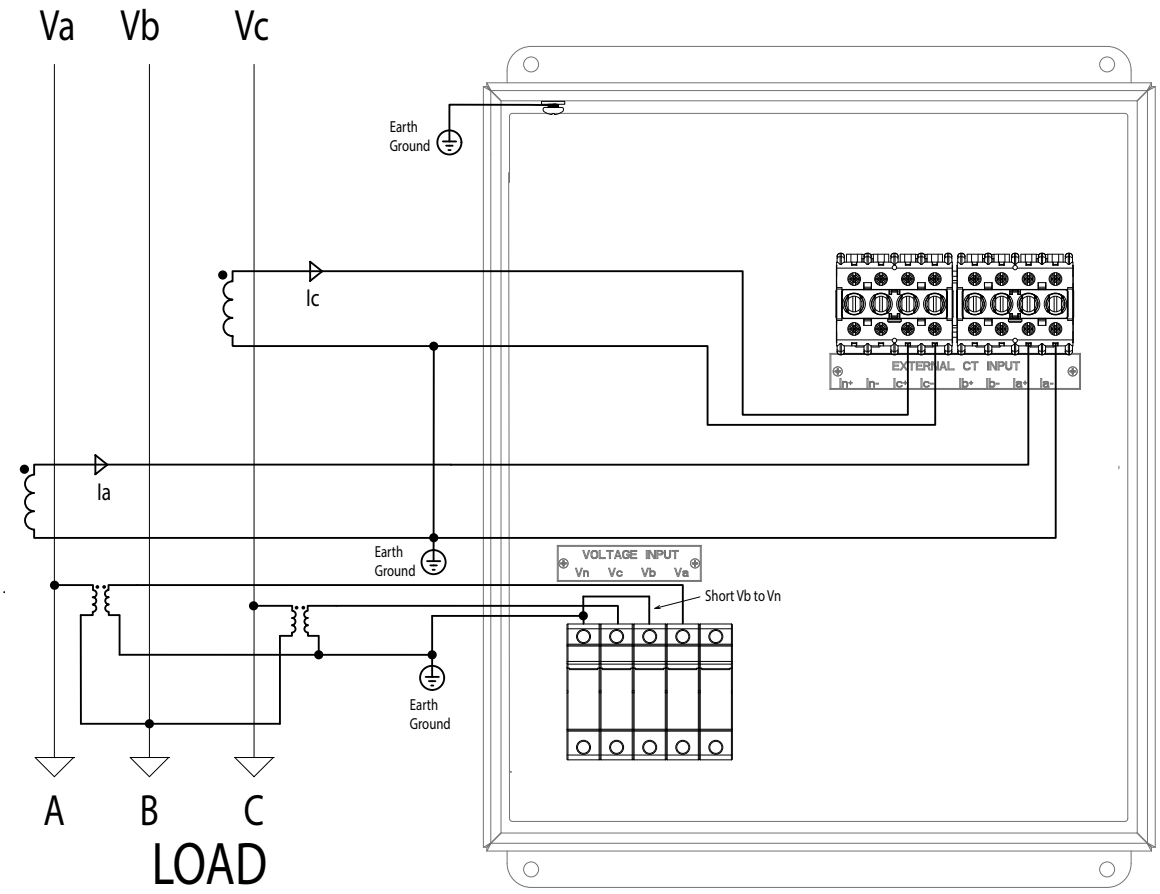
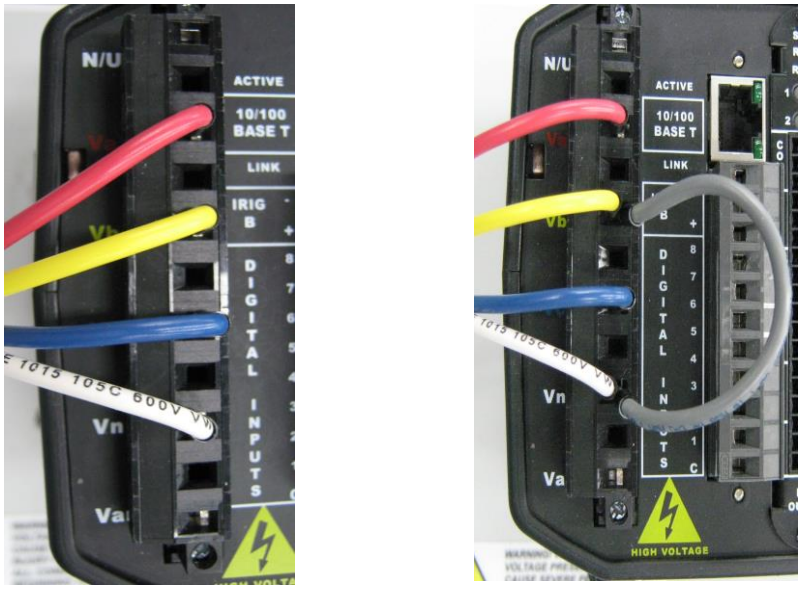


Figure 3.7: 3 Wire Delta 2 PT Hookup, 2 Element

3.2: Hookup Options

The 120 and 277 enclosures are shipped with Vn tied to the Neutral input. For various Wye and Delta connections, a jumper must be installed between Vn and Vb. See the "Short Vb to Vn" in figures 3.4 to 3.7, which indicates you need to use a jumper. Use the supplied jumper to connect Vn to Vb connector at the back of the Nexus® 1500+ meter - refer to the diagram below.



As Shipped (no jumper installed)

Jumper from Vn to Vb

Figure 3.8: Wiring as Shipped, and Modified

4: Operation

4.1: Overview

The Nexus® 1500+ Meter in Enclosure is equipped with three 10 mm x 38 mm, 600 V 1/2 A fast acting fuses and two 10 mm x 38 mm, 500 V, 3 A (for the 277 V and 120 V configurations) or 7 A (for the 24 V DC configuration) Time Delay fuses for the protection of the meter's sense voltage and control power circuits, respectively.

A disconnecting means and upstream protection should be installed for all voltage circuits. Short-circuiting type terminal blocks are provided for the current transformer circuit and are equipped with captive shorting screws (see instructions in Section 5.1).

The temperature rating for enclosure operation is (0 to +50) ^{o}C/(32 to 122) ^{o}F.

Refer to the *Nexus® 1500+ Meter System Installation and Operation Manual* for specific operating instructions for the meter in your enclosure.

4.2: Troubleshooting

Symptom: Extremely inaccurate readings of voltage and/or harmonics.

Perform these two tests:

1. With fuses removed from the unit, test the fuses with an ohmmeter. All of the fuses must show a resistance of <2 Ohms.

2. With the unit fully powered, measure the voltage on the input side and output side of the fuse. The voltages should differ by less than 1 Volt.

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5. Maintenance

The Nexus® 1500+ Meter in Enclosure is designed to be relatively maintenance-free under normal use. However, because of the variability of application conditions and the importance placed on dependable operation and inspection, you should perform maintenance checks on a regularly scheduled basis. Visually inspect for loose parts, wires, and/or hardware; inspect for discoloration of insulation and damaged or discolored components; be alert for accumulation of dirt and/or moisture on structure; check operation of disconnecting means and continuity of fuses, where applicable.

5.1: Removing a Meter From Service

Follow these steps:

1. De-energize all circuits feeding the case.

2. If possible de-energize lines that the CTs are on.

3. Tighten all the shorting screws on all the CT shorting blocks by turning all the screws clockwise until they bottom out.

WARNING! If the meter must be removed from service, the secondary side of the current transformers **MUST** be short circuited to prevent a dangerous high voltage condition from appearing across the secondary wires of the current transformer. **Arcing and damage to personnel and/or equipment can occur if the screws provided on the shorting block are not installed in the correct locations, prior to disconnecting any wires.**

AVERTISSEMENT! Si le compteur doit être enlevé du service, le côté secondaire du transformateur actuel DOIT être court-circuité pour prévenir une condition de haute tension dangereuse d'apparaitre dans les câblages secondaires du transformateur actuel. La brulure d'arc et l'endommagement d'un équipement ou des blessures sont susceptibles de se produire si les vis fournies sur le court-circuit ne sont pas installées dans les emplacements corrects avant de débrancher les câbles.

The four screws on each of the two shorting blocks are used to short the high (+) sides and the low (-) sides to an internal buss bar. The pre-installed jumper connects all lows together and to ground.

WARNING! The screws need to be screwed down until the screw makes contact with the internal bar, enabling the bar to become electrically common with the terminal strip, and grounded.

Les vis doivent être vissées jusqu'à ce que la vis soit en contact avec la barre interne, permettant à la barre de devenir électriquement commune à la barrette de raccordement et mise à la terre.

The figure below shows where the screws are located that must be tightened down to short the CTs.

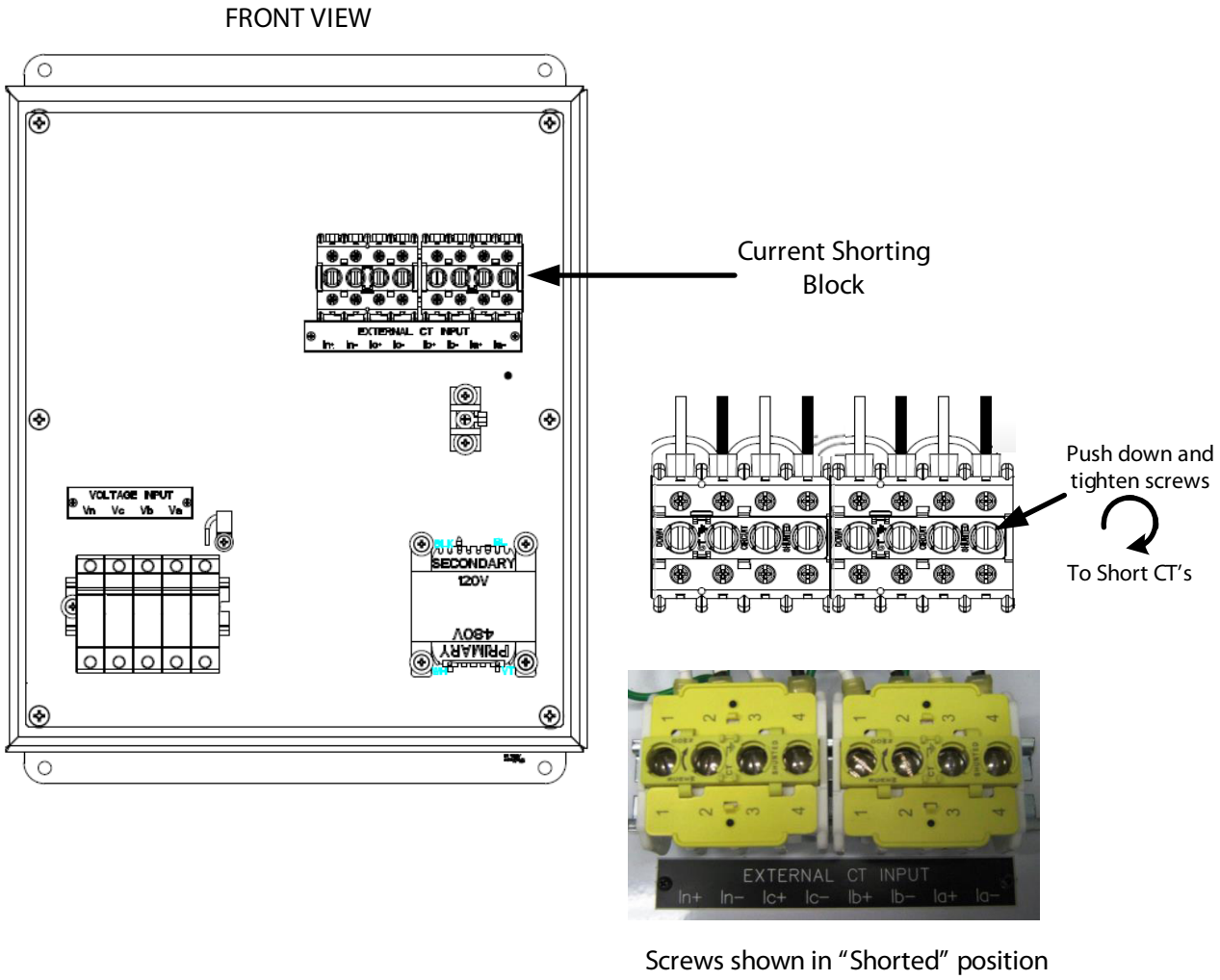

Figure 5.1: Shorting Block Location

WARNING! When you re-install the meter, make sure all CT connections are made **BEFORE** unscrewing the shorting screws. See Section 5.2.

AVERTISSEMENT! Lorsque vous réinstallez le compteur, assurez-vous que toutes les connexions de TC (transformateur de courant) sont faites **AVANT** de dévisser les vis de court-circuit. Voir la section 5.2.

4. Open the 5 section fuse holder, disconnecting the voltage circuit.

5. Unscrew and disconnect all the current leads to the meter.

6. Disconnect all connectors to the meter.

7. Remove the 4 DIN mounting brackets.

8. Remove the meter.

5.2: Reinstalling the Meter

Follow this procedure to reinstall the meter:

1. Place meter in cover cutout.
2. Attach the 4 DIN mounting brackets and tighten their screws.
3. Insert all connectors into the appropriate sockets on the back of the meter.
4. Connect all the current leads to the meter making sure they are attached in the proper order.
5. Close the 5 section fuse holder, reconnecting power to the meter.
6. Unscrew fully the 8 shorting screws on the CT block until they are in the position shown in the figure below.

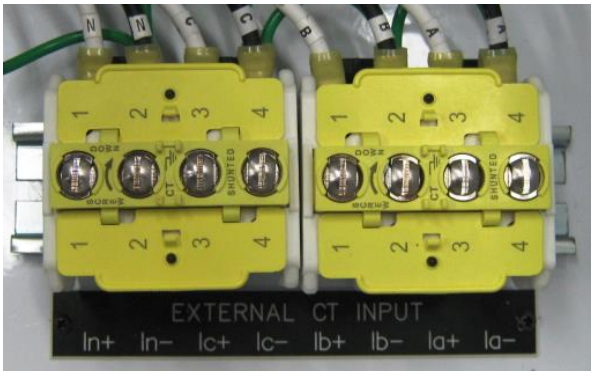

Figure 5.2: Shorting Screws Returned to Their Storage Positions

7. Verify that no foreign material remains inside the enclosure - if there is any, clean it out.
8. Energize all circuits and verify operation.

6. Ordering Information

ENCNX1500+	-	277	-	D2	-	60	-	20	-	V2	-	X	-	NTFO	-	6RO1	-	X
1		2		3		4		5		6		7		8		9		10

1. Model:

   ENCNX1500+ - Nexus® 1500+ Meter in NEMA 1 Enclosure

2. Power System:

   120 - (100-240) V AC/DC

   277 - 277/480 V AC, with supplied control power transformer

   24 - (18-60) V DC*

3. Power Supply:

   115AC - (100-240) V AC @50/60 Hz

   D2 - Universal (100-240) V AC @50/60 Hz or (100-240) V DC

   D - (18-60) V DC*

4. Frequency:

   50 - 50 Hz

   60 - 60 Hz

5. Current Class:

   20 - 20 A

   2 - 2 A

6. Virtual Switch:

   V1 - Standard meter with 512 MB memory; 512 samples/cycle

   V2 - V1 plus 1 GB memory; 1024 samples/cycle; IEC 61850

   V3 - V2 plus 4 GB memory; 50 MHz Transient Recording

7. Communication Expansion/Slot 1:

   X - No option

   485P - 2 RS485 ports and 4 pulse outputs

8. I/O Slot 1:

   X - No option

   NTRJ - Second Ethernet card

   NTFO - Second fiber optic network card (ST terminated)

9. I/O Slot 2:
   X - No option
   6RO1 - 6 relay outputs
   16DI1 - 16 status inputs

10. I/O Slot 3:
   X - No option
   6RO1 - 6 relay outputs
   16DI1 - 16 status inputs

* These two options must be ordered together.

Example on previous page:
ENCNX1500+ - 277 - D2 - 60- 20- V2- X- NTFO - 6RO1 - X

(Nexus® 1500+ Meter in Enclosure, with 277 Power System, Universal (100-240) V AC @50/60 Hz or (100-240) V DC power supply, with 60Hz frequency, Current Class 20, V2 virtual switch, no expansion communication port, a fiber optic I/O card, and a relay output I/O card.