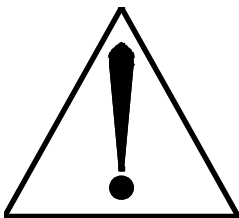
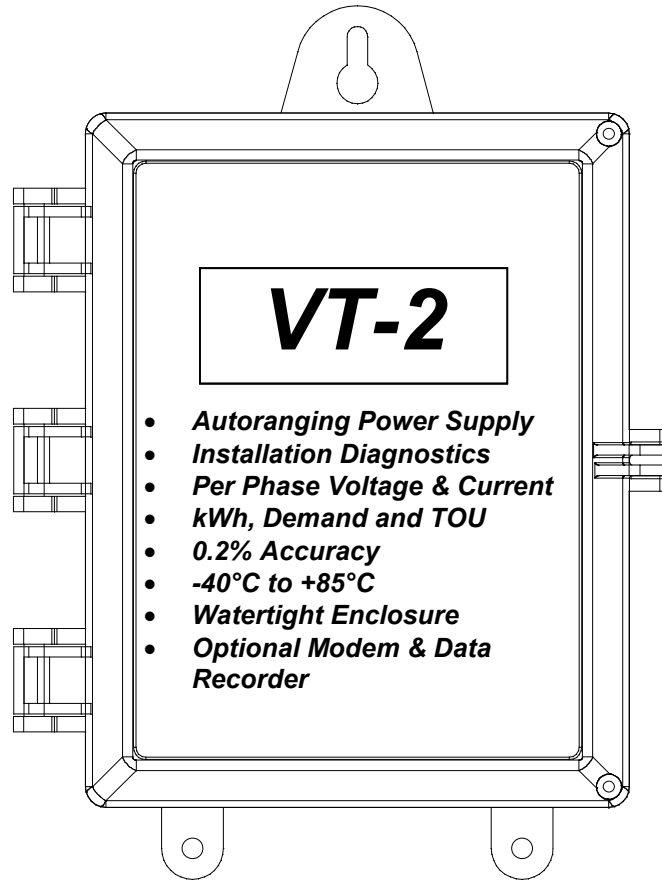


VT-2

Installation & Operation Guide



WARNING

To reduce the risk of electric shock, always disconnect the appropriate circuit from the power distribution system before servicing or installing any VT metering product.

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VT-2

Watthour, Demand and Time of Use Meter Installation and Operation Instructions

INTRODUCTION

Use These instructions to assemble the VT-2™ Energy Meter. ***Read all instructions before you begin the installation.***

The VT-2 Energy Meter is designed for a variety of metering configurations. It can be used as a stand-alone meter, part of an automated dial-up system or a stand-alone data recording device.

All information required to install a stand-alone meter is given in these Installation Instructions and on the diagram inside the meter enclosure. If this meter is to be used with an automated system using a modem or 485 interface, refer to the VT Installation Manual for additional installation instructions.

CONTENTS

The VT-2 Energy Meter is shipped from the factory in a kit containing all the hardware needed to assemble the Energy Meter. Each box contains:

<u>Description</u>	<u>Quantity</u>
Energy Meter electronics installed in a Flush Mount enclosure	1
Current Transformers (quantity depends on service type)	3 (3P 4W Wye)
Hardware Kit containing:	
• Grounding screw with grounding washer	
• Wire meter seal	
• Plug-on terminal blocks:	
4-position block for voltage (TB1)	
6-position block for current transformer inputs (TB2)	
Optional 5-position block for modem or Pulse Output	

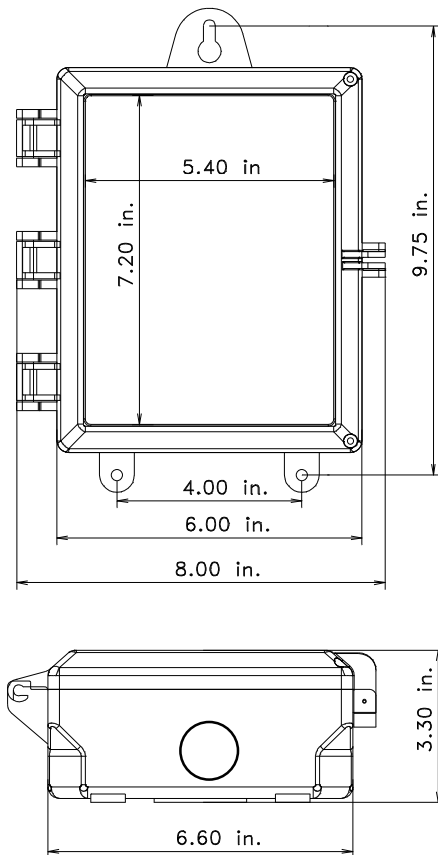
INSTALLATION

This section gives instructions for assembling and installing the VT-2 Energy Meter as a stand-alone unit. The VT-2 should be installed only by a qualified electrician.

These instructions are not intended to control the interface between this product and the facility wiring. Compliance with NEC and local codes in the final applications should be verified by the local inspection authorities.

NOTE: The VT-2 meter is equipped with one hole in the bottom of the box to accommodate 3/4" conduit. If connecting from the bottom is inconvenient, remove the electronics and drill holes in only in the lower half of the box. The upper portion of the box is used to accommodate the circuit boards.

Step 1 Mount enclosure by the three mounting tabs found on the back of the enclosure



If needed, drill a hole in lower half of enclosure approximately 2 inches up from the bottom, **only after removing the electronics.**

Figure 1, VT-2 Enclosure

Step 2 Connect conduit to load center (or switchgear) and to enclosure.

Refer to Figure 2 for steps 3 through 5

Step 3 Install Current Transformers. Current Transformers can be used on the incoming lines or on individual breakers. The dot on the Current Transformer always faces the line or supply side of the service.

Typical connections for a 3 Phase 4 Wire load center

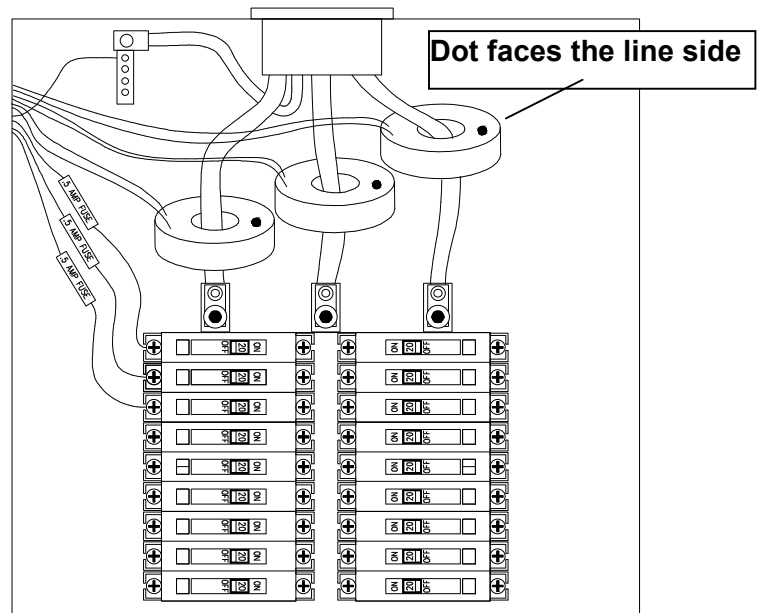


Figure 2

Step 4 Make Voltage, neutral, and grounding taps.

- a) Make sure service is disconnected before make any connections
- b) Using in-line fuses, tap each of the phases according to all applicable electric codes.
- c) Secure one end of a grounding lead to earth ground in the breaker panel or meter board.
- d) Attach a lead to the neutral terminal in the breaker panel or meter panel.
- e) Run voltage taps along with a secured neutral and ground tap through the conduit to the meter.

Step 5 Referring to the wiring diagram on the inside of the meter cover, terminate CT, voltage, ground, and neutral leads. See Figure 3 for a 3 Phase 4 Wire Wye or 4 Wire Delta service and Figure 4 for a 3 Phase 3 Wire Service.

- a) Attach ground lead to the lower left grounding point on the circuit board using the enclosed grounding washer and screw.
- b) Now you are ready to install the terminal blocks. The terminal blocks (TB1 and TB2) found in the hardware kit should be installed on the lower section of the of the board. The four terminal voltage connection block (TB1) goes on the lower left side of the board. The six-terminal current transformer connection block (TB2) goes on the lower right side of the board.
- c) Using the wiring diagram found on the inside of the meter cover, make the appropriate voltage and current lead connections. Refer to Figure 3 for a wiring diagram for a 3-Phase 4-Wire Wye or Delta service and Figure 4 for a 3-Phase 3-Wire Delta service.
- d) Align each terminal block with the pins and header on the circuit board and gently push the terminal block into place.

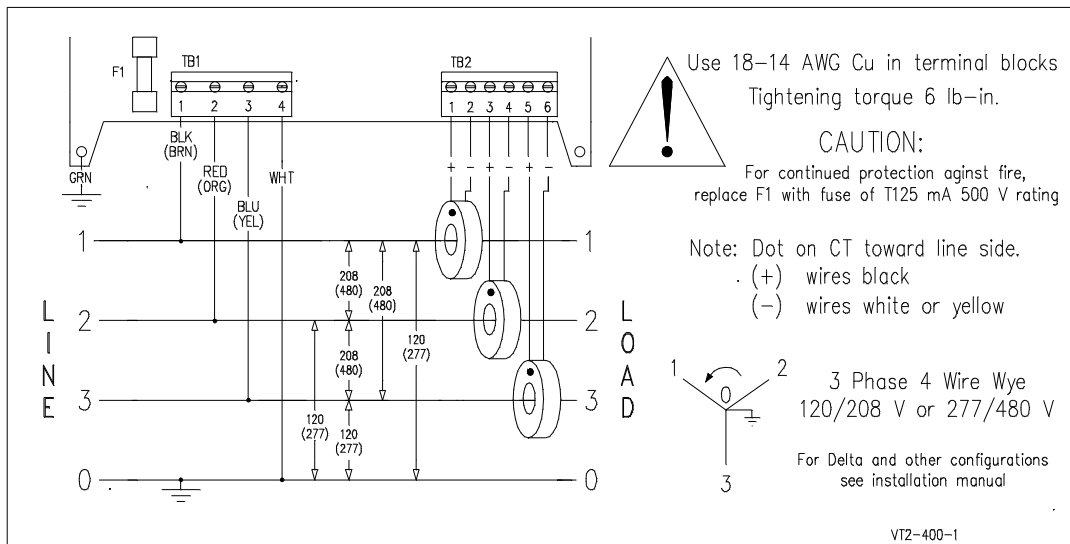


Figure 3 Wiring Diagram for 3-Phase 4-Wire Wye or Delta Service

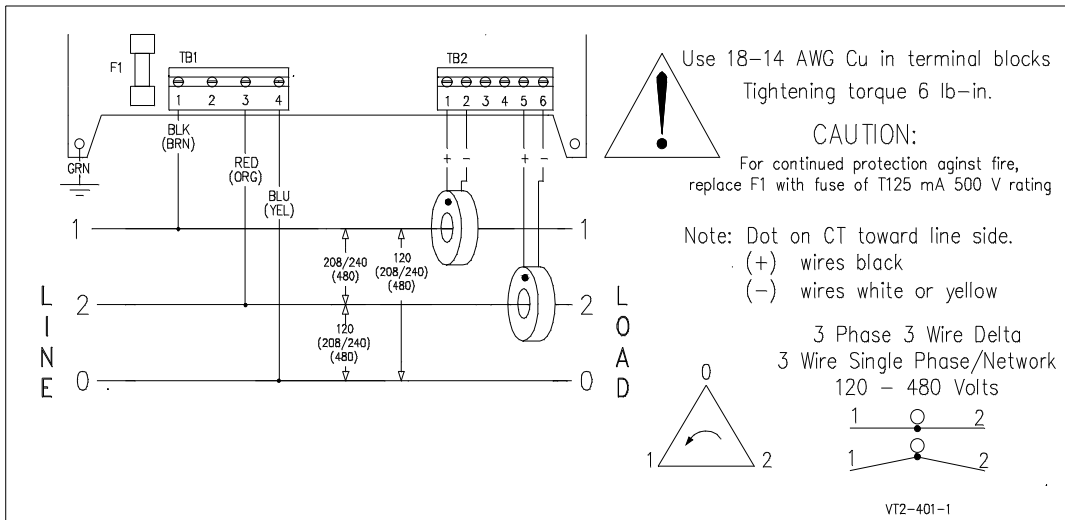


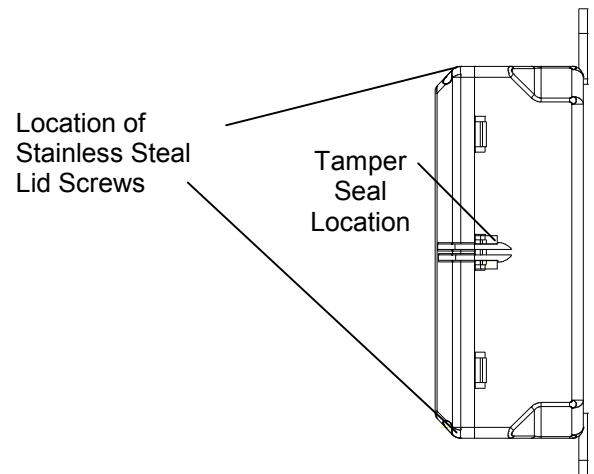
Figure 4 Wiring Diagram for a 3-Phase 3-Wire Delta, Single Phase 3 Wire & Network Service

CAUTION

Do not mix the phases of the voltage and current leads. For example, Phase A voltage tap should match phase A Current Transformer leads. Incorrect metering will result, as well as an error being displayed if the leads are improperly connected.

Step 6 Close cover and Seal:

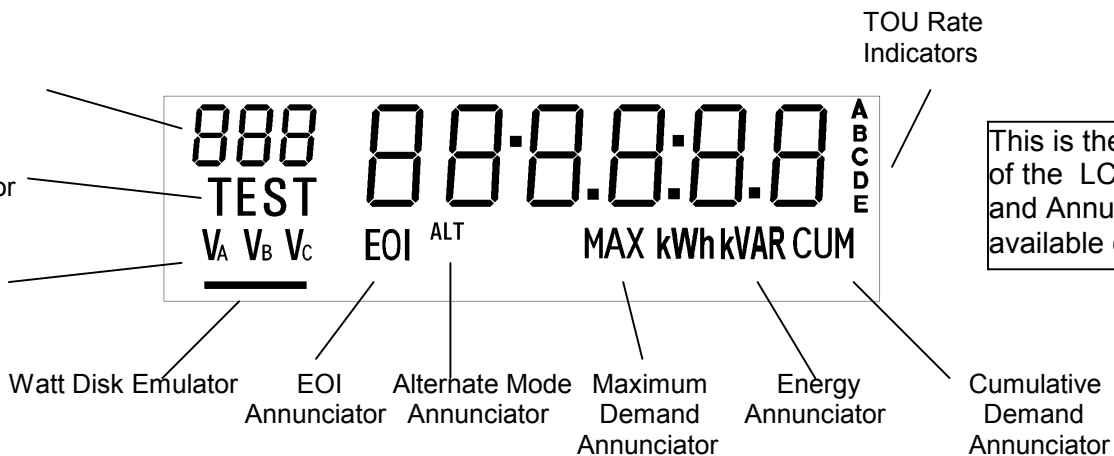
- Install the two captive screws in the right hand side of the enclosure cover.
- Install the wire seal in the cover latch.
- Remove any protective covering on the face of the meter.



Code Numbers

Test Mode Annunciator

Potential Indicators



This is the actual size of the LCD Display and Annunciators available on the VT-2

Potential (Voltage) Indicators	Illuminated annunciators (V _A , V _B , and V _C) indicate active voltage for these respective phases. A flashing Annunciator indicates a loss of voltage
TOU Rate Annunciators	The annunciators A, B, C, D, or E flashes when the applicable rate is active and is enabled to display the register values with their respective rate.

Installation Diagnostics

Upon power-up the VT series meters operates in the **Normal** display mode. The display continuously scrolls through the Normal display sequence, displaying each selected quantity, annunciator, and any other programmed parameter. The meter will operate in Normal Mode until power is disconnected, the Alternate display sequence is initiated, the Test Mode is accessed or the Toolbox Mode is accessed.

The Alternate Mode and the Test Mode can be accessed using a small magnet (30 gauss) near the reed switch. The reed switch is located in the twelve o'clock position just above the nameplate, and labeled ALT/TOOLBOX. The Alternate Mode can be accessed by holding the magnet above the reed switch for less than 4 seconds. The Alternate mode provides diagnostic information regarding the readings held in the meter and the time and dates of maximum demands. The Test Mode can be accessed by holding the magnet above the read switch for longer than 4 seconds. The Test Mode annunciator will continuously flashes while the VT meters are in Test Mode. Once activated, the Test mode will scroll through a defined list of per phase items and diagnostic counters. See Table 1, SiteScan Toolbox Display List for an example of a 3 element VT meter.

Description		Display		Typical	Installed
				Values	Values
Phase A voltage angle	PhA	0.0°	U	0.0	
Phase A voltage	PhA	xxx.x	U	277	
Phase A current angle	PhA	xxx.x°	A	350	
Phase A current	PhA	xxx.x	A	0-200	
Phase B voltage angle	PhB	xxx.x°	U	240	
Phase B voltage	PhB	xxx.x	U	277	
Phase B current angle	PhB	xxx.x°	A	230	
Phase B current	PhB	xxx.x	A	0-200	
Phase C voltage angle	PhC	xxx.x°	U	120	
Phase C voltage	PhC	xxx.x	U	277	
Phase C current angle	PhC	xxx.x°	A	110	
Phase C current	PhC	xxx.x	A	0-200	
# of Diagnostic 1 errors	d1	xxx		0	
# of Diagnostic 2 errors	d2	xxx		0	
# of Diagnostic 3 errors	d3	xxx		0	
# of Diagnostic 4 errors	d4	xxx		0	
# of Diagnostic 5 errors	d5	xxx		0	

Table 1
SiteScan Toolbox Display List

The per phase Volt and Amp readings are Root-Mean-Square (RMS) values which are updated every second. The voltage and current angles are updated every five seconds.

<u>Diagnostic</u>	<u>Description</u>
1	Polarity, Cross-Phase & Energy Flow Check
2	Phase Voltage Deviation Check
3	Inactive Phase Current Check
4	Phase Angel Displacement Check
5	Current Waveform Distortion Check



A diagnostic error will be displayed when the meter is improperly installed. "Er" indicates an Error condition has been detected. D1A9 is a cryptic spelling of diag, short for diagnostic. The number of the error is the last digit. The table above indicates the type of error that has been detected.

Installation Diagnostics Continued:

TESTING

There are several ways to test a VT meter. The following table lists different testing methods and the equipment required.

Testing Method	Location	Requirements
Infrared Test LED	Located on face of meter	Optical Pick-up, Standard & Comparator
Pulse Initiator Outputs	Meter must have KYZ Outputs	Standard & Comparator
Disk Emulation Annunciator	LCD Display	No Additional Equipment

Most field accuracy tests will utilize the Disk Emulator on the bottom of the LCD Display, therefore this method will be described in detail.

The VT-2 is equipped with a bi-directional Liquid Crystal Display (LCD) watthour disk emulation annunciator. The disk emulation annunciator consists of five segments located in the lower portion of the display. The VT-2 uses internal multipliers to compensate for current transformers larger than 200 Amps. The emulator does not use any multipliers. For example, if you have 400 Amp Current Transformers, the accumulated number of increments must be multiplied by 21.6 and 2 in order to calculate the correct watthour consumption.

These segments are individually illuminated and traverse left to right for positive energy flows. The rate of travel is proportional to the programmed watthour constant (K_h value). Most often the K_h value for a VT-2 will be 21.6. To calculate watthour consumption, count the number of increments and multiply by 21.6. As mentioned earlier, any current transformer over 200 Amps will require an additional multiplier. Divide the amperage rating of the installed current transformer by 200 to derive the additional multiplier.

Example: (Number of Increments counted) X 21.6 X (Current Transformer Multiplier) = Watthours
A 200 Amp service might look like; 20 Increments X 21.6 X 1 = 432 Watthours

If your meter is equipped with Time Of Use, Extended Functions or Demand Threshold Outputs, a data sheet of the parameters displayed will be included for all three modes of operation.

WARRANTY

All products manufactured by North American Power Products are guaranteed against defects in material and workmanship for a period of one year from the date of shipment. In the unlikely event a meter needs calibrated or a customer wants to verify the calibration, a service technician can verify the calibration in the field or the meter can be returned to the factory for recalibration. In either case a calibration fee may be charged.

All guarantees are limited to repair or replacement of the defective product.

All products returned to the factory for repair **must be accompanied by a Return Authorization number** and it will be inspected to determine the cause of the failure. Metering equipment determined to have been subjected to an improper installation, neglect or misuse will be repaired or replaced at a standard rate, pending customer approval.

FCC PART 15, CLASS A

The VT-2 meter has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection from harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area may cause harmful interference, in which case you will be required to correct the interference at your own expense.

Any modifications or changes to the equipment, not expressly approved by the party responsible for compliance, could void your authority to operate the equipment.

FCC PART 15, CLASS B

The VT-2 meter has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- consult the dealer or an experienced radio/TV technician for help.

Any modifications or changes to the equipment, not expressly approved by the party responsible for compliance, could void your authority to operate the equipment.