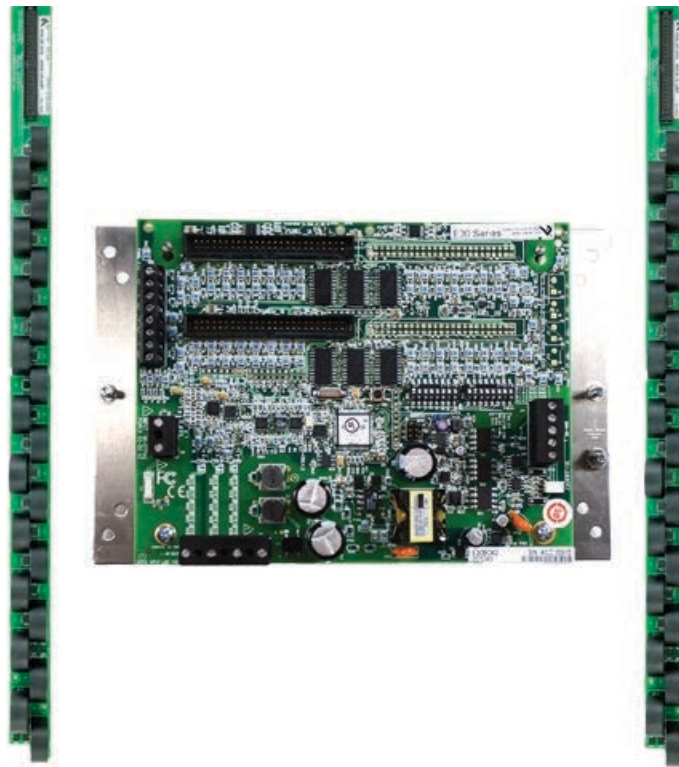


DET-756 Installation Instructions

ASPMETER Panelboard Monitoring System



Safety

If ASPMETER products are used in installations with circuits higher than the product ratings, the circuits must be kept segregated per UL508A Sec. 17.5.

NOTE: 277/480 VAC Wye connected (center grounded) power systems operate within the 300 VAC line to neutral safety rating of the ASPMETER series, and the operational voltage limit (single-phase connection) as the line to neutral voltage is 277 VAC in such power systems. Corner-grounded delta 480 VAC systems would not qualify, as the actual line to earth voltage is 480 VAC on each leg, exceeding the ASPMETER ratings.

NOTE: ASPMETER internal circuitry (cables and CTs) are not circuits as defined by UL508A, as they do not extend beyond the ASPMETER itself without further safety / fire isolation.



- UL Listed under Standard 508 as an “open type device.”
- Maximum ambient air temperature for use is 60°C.
- Installation category: CAT III
- The ASPMETER Series must be installed in an appropriate electrical and fire enclosure per local regulations.

For Use in a Pollution Degree 2 or Better Environment only.

A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consideration must be given to the enclosure, the correct use of ventilation, thermal properties of the equipment and the relationship with the environment.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

IEC/EN 61010-1

	This symbol indicates an electrical shock hazard exists.
	Documentation must be consulted where this symbol is used on the product.

DANGER: Hazard of Electric Shock, Explosion or Arc Flash **Failure to follow these instructions will result in death or serious injury.**

- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Use a properly rated voltage sensing device to confirm power is off.
DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION
- Only install this product on insulated conductors.

NOTICE:

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- The installer is responsible for conformance to all applicable codes
- Mount this product inside a suitable fire and electrical enclosure.

FCC PART 15 INFORMATION NOTE: This equipment has been tested by the manufacturer 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 against 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 is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications to this product without the express authorization of the manufacturer nullify this statement.

For troubleshooting or service related questions, contact GE at 1-800-GE-1-STOP (1-800-431-7867).

Save These Instructions

Installer's Specifications




Performance	
System Accuracy (Branch Circuits Included)	
Current	1% of reading from 2.0-100A, 2% of reading from 0.25-2A
Power	3% of reading from 1-100% ¹
Main Accuracy	
Voltage	1% of reading from 90-277 VAC L-N
Power (Aux input)	IEC 61036 Class 1
Current (Aux input)	2% of reading from 1-10% of CT rating; 1% of reading from 10-100% of CT rating (0.333 VAC)
Operation	
Input Voltage	90-277 VAC
Frequency	50/60 Hz
Sampling Frequency	2560 Hz
Update Rate	1.8 seconds (both panels)
Overload Capability	22 kAIC
Ribbon Cable Support	Up to 20 ft. (6m) available (flat or round); sold separately
Operating Temp Range	0° to 60°C (32° to 140°F); <95% RH, non-condensing
Storage Temp Range	-40° to 70°C (-40° to 158°F)
Network Communications	
Type	Modbus RTU™
Connection	DIP switch-selectable 2-wire or 4-wire, RS-485
Address	DIP switch-selectable address 1 to 247 (in pairs of 2) ²
Baud Rate	DIP switch-selectable 9600, 19200, 38400
Parity	DIP switch-selectable NONE, ODD, EVEN
Communication Format	8-data-bits, 1-start-bit, 1-stop-bit
Termination	5-position depluggable connector (TX+ TX- SHIELD TX+/RX+ TX-/RX-)

Note: Standard IEC62053-21 Table 8 temperature coefficients apply for temperatures above and below 25°C.

¹ Add 1% for 0.8 PF to 0.5 PF.

² See Configuration Section for details.

Product Identification

	Description	# of CTs	
ASPMETER			
	A = Advanced	42 = 2 strips*	AQ = THQB circuit breakers
	B = Intermediate		AE = TEY circuit breakers
	C = Basic		

*Each strip contains 21 current sensors.

Quick Install

1. Disconnect and lock out power. Use a properly rated voltage sensing device to confirm power is off.
2. Mount current sensor strips adjacent to breaker terminations.
3. **Verify that the serial numbers on the CTs match that on the board.**
4. Configure communication and addressing parameters using DIP switches.
5. Mount the main acquisition board in the electrical enclosure.
6. Connect current sensor strip cables to the main board, observing the 2-strip setup and their orientation (A or B) within the panel.
7. Wire RS-485 communications.
8. Connect CTs to the auxiliary inputs and connect them onto the main conductors in the enclosure (optional).
9. Wire control power and voltage taps (ASPMETERA and ASPMETERB only).
10. Download the free Configuration Tool "NetConfig" from www.veris.com/modbus_downloads.aspx to commission the device for operation.

Operations

The ASPMETER Series Branch Current Monitor is a device designed to measure the current, voltage, and energy consumption of up to for 46 circuits (42 branch circuits, 1 3-phase main, and 1 neutral).

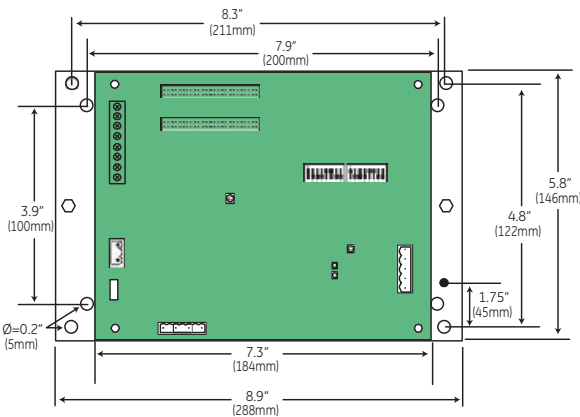
The ASPMETER consists of a data acquisition board and two 21-unit current sensor strips, with four auxiliary inputs. The strips are mounted on each side of the panel board along the termination points of each breaker. The conductor passes through the appropriate current sensor before terminating at the breaker. Each strip transmits the current data to the data acquisition board.

Data is transmitted using an RS-485 Modbus protocol. Each data acquisition board requires one Modbus address for the set of two current sensors and four auxiliary inputs. Data is updated roughly every two seconds. As a circuit approaches the user-defined threshold, the ASPMETER activates the alarm indicators.

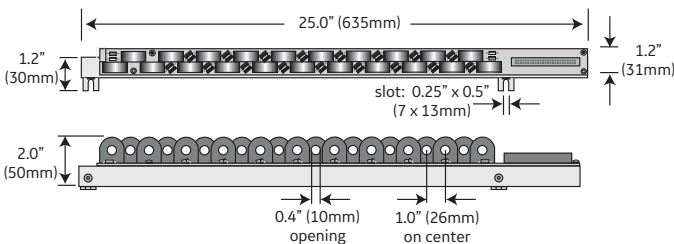
The ASPMETERA measures both current and power for the mains and branch circuits. The ASPMETERB measures both current and power for the mains, and current only in each circuit. The ASPMETERC measures current only for the mains and branch circuits.

Dimensions

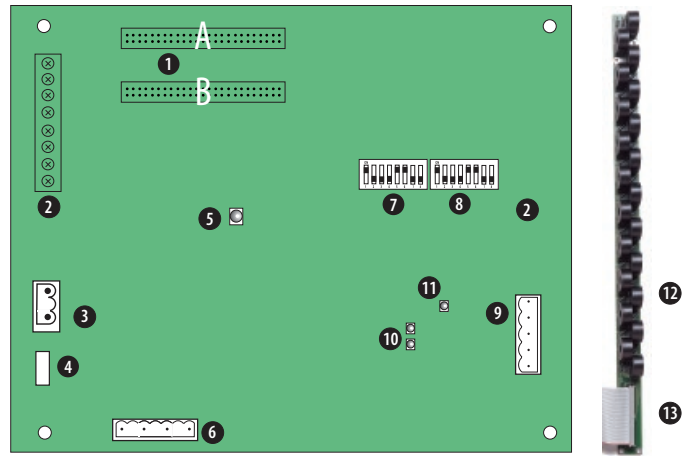
Circuit Board and Mounting Bracket



Solid-Core CT Strips



Product Diagrams



- 50-Pin Ribbon Cable Connectors (Data Acquisition Board):** 18 inch (457 mm) ribbon cables are provided for easy connection of current sensor strips to this point of the data acquisition board.
NOTE: Connect CT strips to the correct ribbon cable connectors for each panel. The top connector is for Strip A, and the bottom connector is for Strip B.
- Auxiliary Inputs:** These 0.333 VAC inputs are used for monitoring the main breaker or other high amperage source.
- Control (Mains) Power Connection:** Easy 2-wire 90-277 VAC 50/60 Hz connection.
- Control Power Fuse:** 600 VAC, 500 mA time lag, factory-replaceable.
- Alive LED:** Red/green/amber LEDs. Blink codes are on page 5.
- Voltage Taps:** 1, 2, or 3 phase plus neutral connections. For voltage sensing and power calculations (no voltage taps on the ASPMETERC).
- Communications Address DIP Switches:** Each Modbus device must have a unique address. Switches are binary weighted. Left-most switch has a value of 1; right-most switch has a value of 128.
- Communications Settings DIP Switch:** Configures baud rate, parity, 2/4 wire communications.
- RS-485 2 Connection:** Used for Modbus serial communications. The Universal plug accommodates 2 or 4 wire connections.
- RS-485 LEDs:** The RX LED (closest to DIP switches) indicates the RS-485 is receiving information; the TX LED (farthest from DIP switches) indicates transmission of information.
- Power LED:** Indicates power to main board
- Current Sensors:** Each current sensor is capable of monitoring conductors rated up to a maximum of 100 amps.
- 50 Pin Ribbon Cable Connectors (Current Sensor Strips):** Connects current signal from the sensor strip to the main board via the ribbon connectors

Data Output

Monitoring at Mains	ASPMETERA	ASPMETERB	ASPMETERC
Current per phase	✓	✓	✓
Max. current per phase	✓	✓	✓
Current demand per phase	✓	✓	✓
Max. current demand per phase	✓	✓	✓
Energy (kWh) per phase	✓	✓	
Real Power (kW) per phase	✓	✓	
Apparent Power (kVA)	✓	✓	
Power factor total *	✓	✓	
Power factor per phase	✓	✓	
Voltage - L-L and average	✓	✓	
Voltage - L-N and average	✓	✓	
Frequency (phase A)	✓	✓	
Monitoring at Branch Circuit			
Current	✓	✓	✓
Max. current	✓	✓	✓
Current demand	✓	✓	✓
Max. current demand	✓	✓	✓
Real power (kW)	✓		
Real power (kW) demand	✓		
Real power (kW) demand max.	✓		
Energy (kWh) per circuit	✓		
Power factor	✓		
Apparent Power (kVA)	✓		
Modbus Alarms			
Voltage over/under	✓	✓	
Current over/under	✓	✓	✓

* Based on a 3-phase breaker rotation.

Blink Code


Color and Pattern	Status Description
Green, once per second	Normal operation
Amber, once per second	Volts or Amps clipping
Amber, twice per second	Invalid firmware image
Amber, three per second	Incorrect strips or strip order
Red, solid or blink	Device Failure

Commissioning

1. Install according to instructions in Mechanical Installation.
2. Provide control power to main circuit board.
3. Configure installation mode using Modbus Register 6.
4. Configure CT scaling.
5. Configure alarms.
6. Configure demand.

Download the free Configuration Tool “NetConfig” from www.veris.com/modbus_downloads.aspx to commission the ASPMETER for operation.

Wiring



Power must be disconnected and locked out before making any wiring connections.

Connect 2-wire or 4-wire Modbus RS-485 daisy chain network (Figures 1 and 2).

Figure 1.

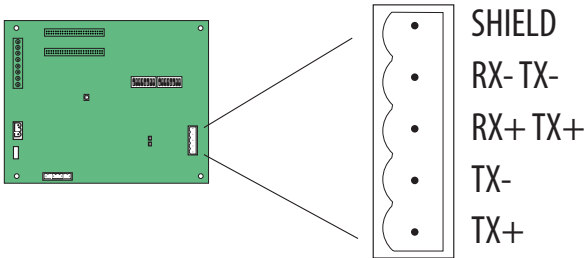
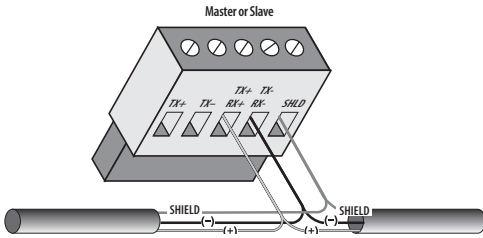
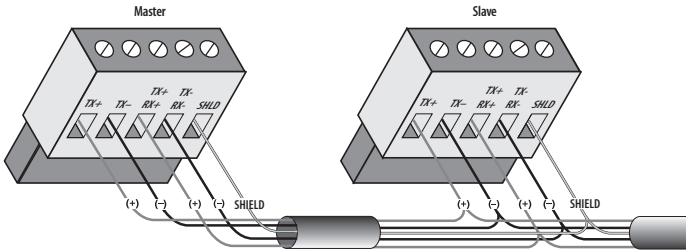


Figure 2.

2-wire



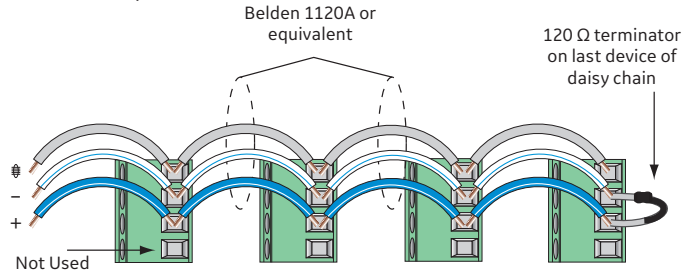
4-wire



1. Mechanically secure the RS-485 cable where it enters the electrical panel.
2. Connect all RS-485 devices in a daisy-chain fashion, and properly terminate the chain (Figure 3).

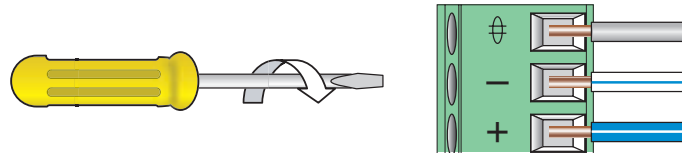
Figure 3.


2-wire example



3. Shield the RS-485 cable using twisted-pair wire, such as Belden 1120A. The cable must be voltage-rated for the installation.
4. When tightening terminals, ensure that the correct torque is applied: 0.5 to 0.6 N·m (0.37 to 0.44 ft·lb) for connectors on main board, 0.22 to 0.26 N·m (0.16 to 0.19 ft·lb) for connectors on adapter boards (Figure 4).

Figure 4.



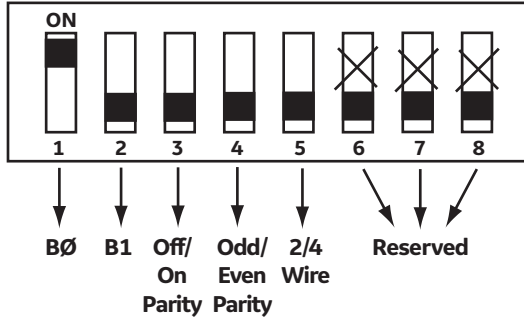


WARNING: After wiring the RS-485 cable, remove all scraps of wire or foil shield from the electrical panel. Wire scraps coming into contact with high voltage conductors could be DANGEROUS!

Configuration

1. **Communications Configuration:** Communications parameters for the ASPMETER series are field selectable for your convenience. Please see the Product Diagrams section (page 4) for selector location. The following parameters are configurable:

- Baud Rate: 9600, 19200, 38400
- Parity On or Off
- Parity: odd or even
- Wiring: two or four

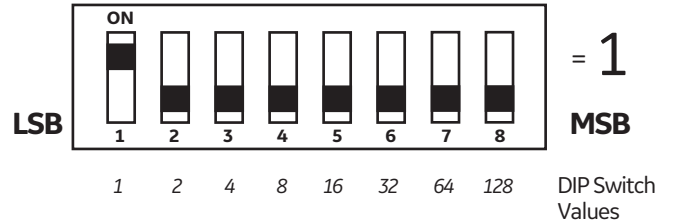


Example: 2-wire 19200 Baud, no parity (default only)

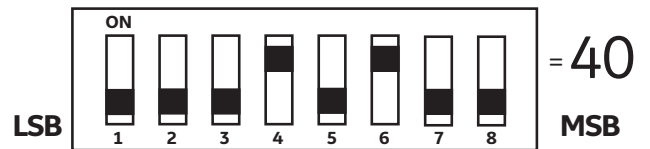
1	2	3	4	5	6	7	8	
Off	Off				X	X	X	9600
On	Off				X	X	X	19200
Off	On				X	X	X	38400
On	On				X	X	X	Reserved
		Off	Off		X	X	X	No Parity
		On	Off		X	X	X	Odd Parity
		Off	On		X	X	X	No Parity
		On	On		X	X	X	Even Parity
				On	X	X	X	4-wire RS-485
				Off	X	X	X	2-wire RS-485

2. **Address Configuration:** Each Modbus device on a single network must have a unique address. Set the switch block to assign a unique address before the device is connected to the Modbus RS-485 network. If an address is selected which conflicts with another device, neither device will be able to communicate.

3. Address the ASPMETER as any whole number between and including 1-246. Each unit is equipped with a set of 8 DIP switches for addressing. See below.



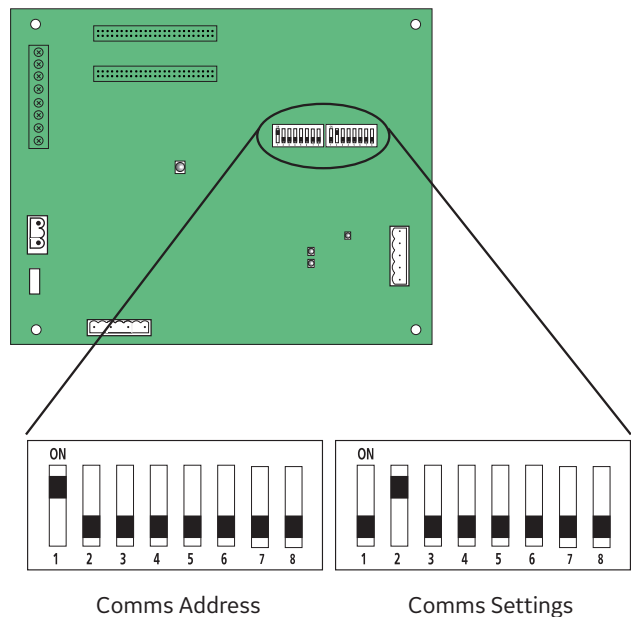
4. To determine an address, simply add the values of any switch that is on. For example:



Switch number 4 has an ON Value of 8 and switch number 6 has an ON Value of 32. (8 + 32 = 40). Therefore, the address for the ASPMETER is 40. See the Address Setup section (page 8) for a pictorial listing of the first 63 switch positions.

Default DIP Switch Settings

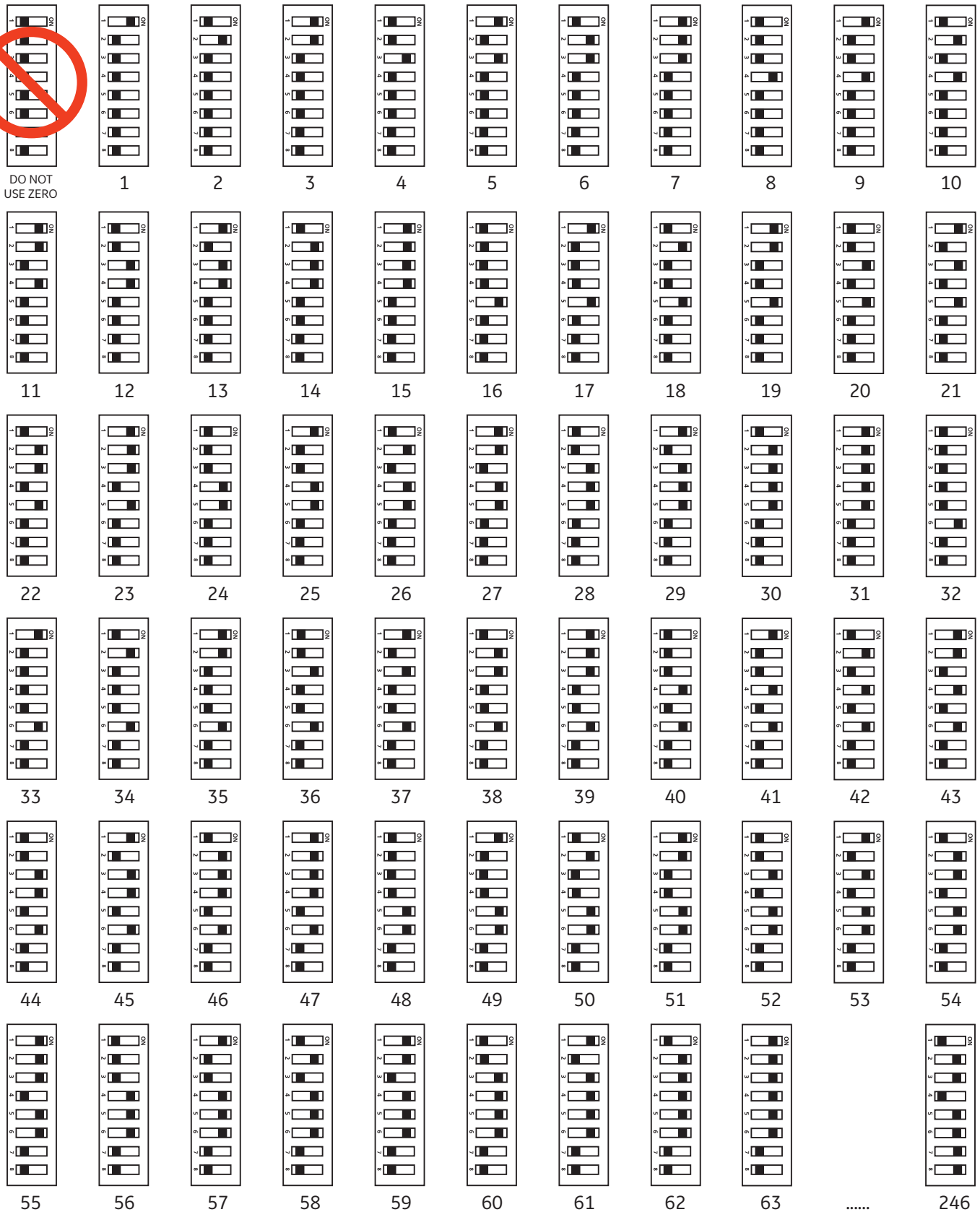
The ASPMETER includes two DIP switches, as shown below. Switches are shown in their default positions.



Address Setup



DO NOT
USE ZERO



Mechanical Installation



Observe precautions for handling static sensitive devices to avoid damage to the circuitry that is not covered under the factory warranty.



Disconnect power to the electrical panel and lock it out.

1. Install the current sensor strips in the panel (Figure 5).
2. Arrange the sensor strips in one of the four configurations shown in Figure 6. Adjust orientation of the circuit numbers in the field during commissioning by writing to Modbus Register 6 or use free configuration software.

Figure 5.

CTs accept a maximum #2 AWG (0.384" O.D.) wire with THHN insulation. Use this gauge wire or smaller for 100 A circuits.

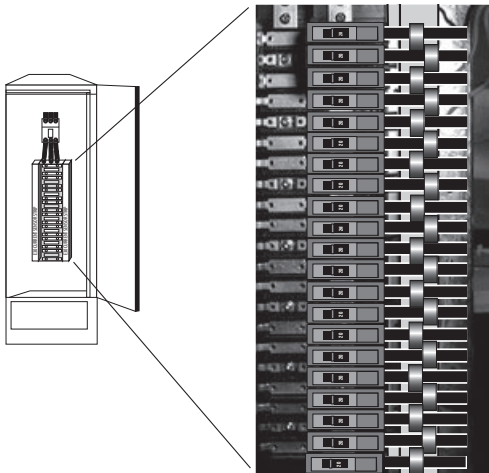
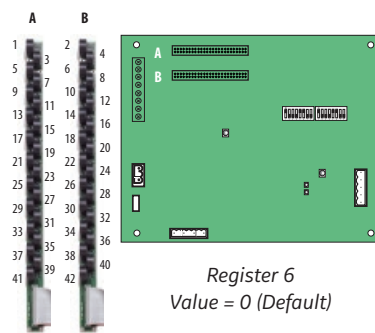
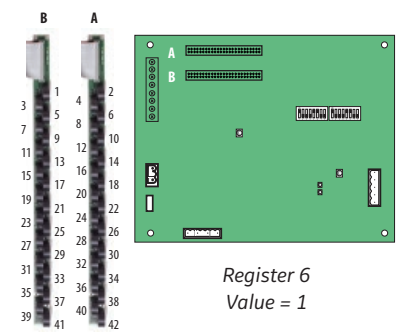


Figure 6.

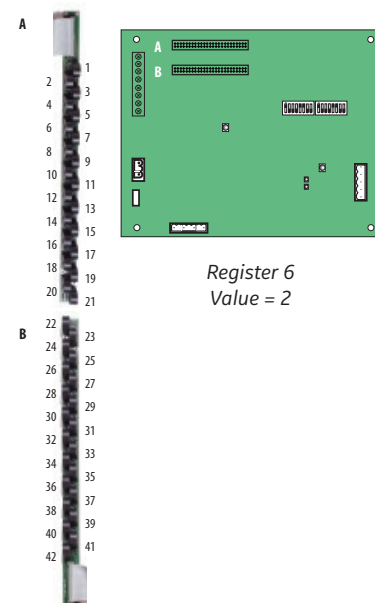
Top Feed



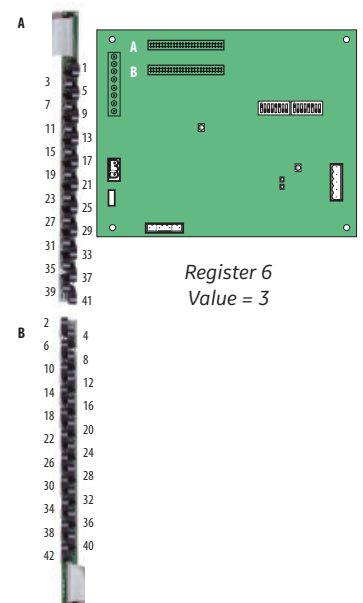
Bottom Feed



Single Row – Sequential

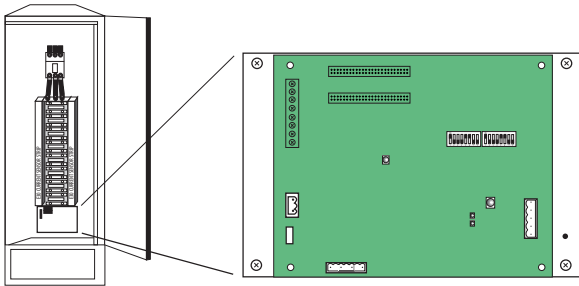


Single Row – Odd/Even



- Verify that the serial numbers printed on the current strip and on the data acquisition board match. The board and the strip are sold as a calibrated set.
- Configure communication and addressing parameters using DIP switches. See the Configuration section for more information.
- Install the ASPMETER acquisition board mounting bracket in the panel using screws and bolts provided (Figure 7). A grounding connection is located on the mounting bracket, near the lower right corner. Use this stud to ground the bracket when it is mounted on a plastic surface.

Figure 7.



- Connect current sensor ribbon cables to the 50-pin connectors on the main board (Figures 8 and 9). Orient cables so that the red stripe is on the left.

Figure 8.

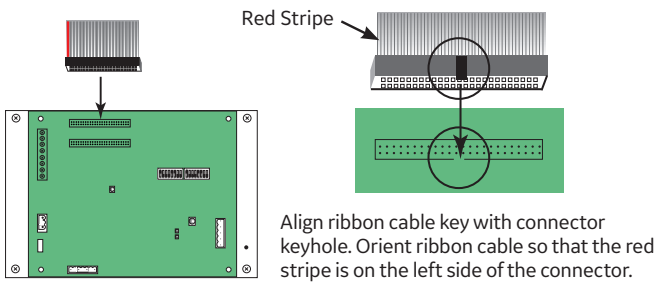


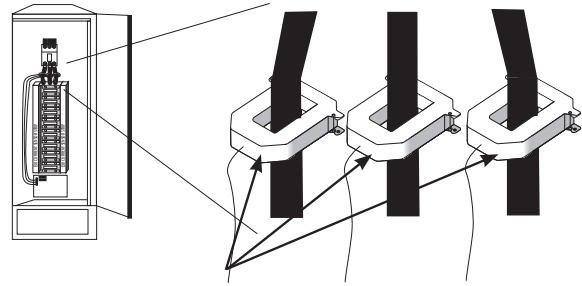
Figure 9.



- Wire RS-485 communications (see diagrams in Wiring section, page 6).

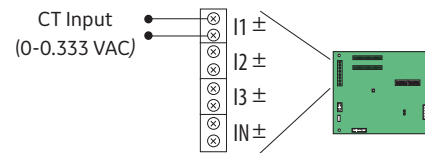
- Connect 0.333 VAC CTs to the main conductors by snapping CTs around lines, observing local codes regarding bending radius (optional; Figure 10).

Figure 10.



Recommended CT: AMP1 Series available in 100A max. to 2000A max. Contact your local GE sales rep for recommended CTs amperages or if higher amperages are required.

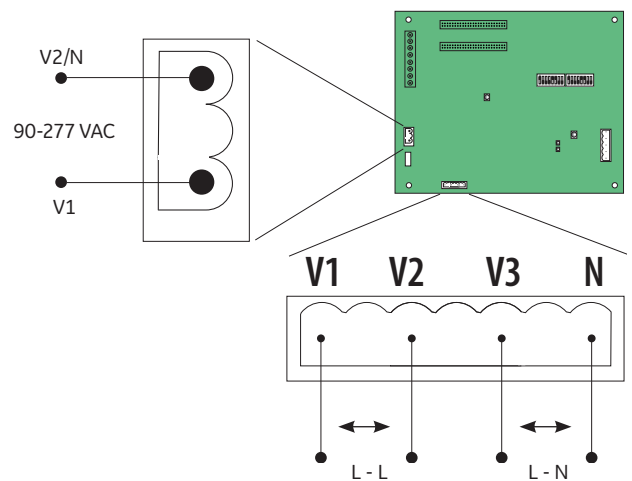
Figure 11.



Set up Modbus registers 115-118 for CT scaling.

- Connect 2-wire 90-277 VAC power to main power terminals. Observe polarity. For the ASPMETERA and ASPMETERB, connect lines to the voltage taps (Figure 12). Equip voltage lines with fuses.

Figure 12.



Line to Line (L-L) Voltage: 150 to 480 VAC
Line to Neutral (L-N) voltage: 90 to 277 VAC

Troubleshooting

Problem	Solution
Product is not communicating over Modbus daisy chain	<ul style="list-style-type: none"> • Check the unit Modbus address to ensure that each device on the daisy chain has a unique address. • Check Parity. • Check the communications wiring. • Check that the daisy chain is properly terminated.
RX LED is solid	<ul style="list-style-type: none"> • Check for reversed polarity on Modbus comms. • Check for sufficient biasing on the Modbus bus. Modbus physical specification calls for 450-650 Ω biasing. This is usually provided by the master.
The main board has a fast flashing amber light	<ul style="list-style-type: none"> • Check that the 1A and 1B CT strips are connected to the left top and left bottom ribbon cable connections; 2A and 2B must be connected to the right top and right bottom ribbon cable connections (see illustrations in the product install). • Verify ribbon cable connectors are inserted in the correct orientation. • If cables are correct, reset main board to re-initialize product. • Verify serial number on strips matches serial number on main board.
The main board has a slow flashing amber light	<ul style="list-style-type: none"> • One or more channels is clipping. This can be caused by a signal greater than 100 A or 277 V L-N, or by a signal with high THD near the gain stage switching points (1.5 A and 10 A).
The main board has a flashing green light	<ul style="list-style-type: none"> • Everything is wired properly and the main board has power.
The main board is a flashing or solid red light	<ul style="list-style-type: none"> • Light may be red briefly while device powers up. • If light is red for more the 60 sec. device has encountered a diagnostic event. Contact technical support.
Power factor reading is not as expected	<ul style="list-style-type: none"> • Verify voltage taps are connected in appropriate phase rotation. • Verify strip configuration register matches actual strip installation. • Verify phase rotation of breakers (firmware rev. 1.012 or higher allows for custom rotation if needed).
Current reading is not as expected, or reading is on different CT number than expected	<ul style="list-style-type: none"> • Verify strip configuration register matches actual strip installation. • Verify ribbon cable is fully seated and in the correct orientation.
Current is reading zero, even when small currents are still flowing through circuit	<ul style="list-style-type: none"> • The product cuts off at 50 mA, and will set the reporting register to 0 mA for currents near or below this range.
Configuration Tool “NetConfig” returns Modbus error on read/write	<ul style="list-style-type: none"> • Verify using the latest release of Configuration Tool “NetConfig” as older versions may not support all features in current product firmware. Latest version is available on the website http://www.veris.com/modbus_downloads.aspx

For troubleshooting or service related questions, contact GE at 1-800-GE-1-STOP (1-800-431-7867).



Imagination at work

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