



Quick Installation Guide for Field Installers

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Legal Statement

DECK Monitoring is not responsible for the installation of the monitoring system, which must be installed by a licensed electrician. In no event will DECK be liable for any damages, including personal injury, arising out of or related to any of the following:

- The installation of the monitoring system
- The security of Customer's network or the devices placed on the Customer's network (including the AcquiSuite)
- Any failure of the Hardware
- Unauthorized use of or access to the software service
- Internet connectivity

For a full description of DECK's Terms and Conditions, including the warranty provisions, please visit this web page: www.deckmonitoring.com/terms.pdf.

Required Installation Tools and Materials

Installer should bring the following materials to assist in the installation process:

- Laptop computer
- Digital multimeter
- Wire and conduit necessary for installation
- Small (#0) slotted and Phillips-head screwdrivers
- A 5/16" slotted screwdriver
- Ethernet patch cable
- A small Ethernet router, switch or hub (as example: Netgear ProSafe 5-Port 10/100 Desktop switch or similar item)

Networking Information

Installers will need the following information before starting the configuration process:

- Valid IP address for your network
- Subnet Mask
- Gateway IP address
- Domain Name Service IP address

If you need assistance to complete the items on the list above, contact your local network Administrator.

Modbus Communication and Wiring

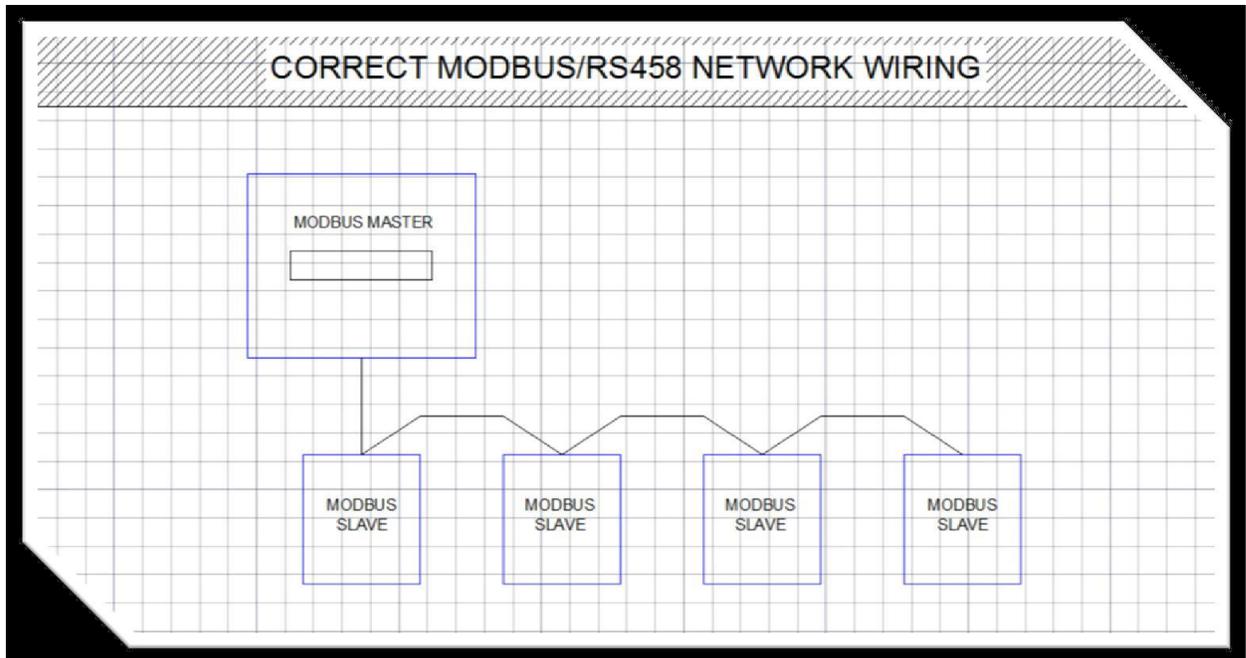
DECK Monitoring's Engineering Department has identified approved cables and network wiring methods in an attempt to provide a stable communications bus given that environmental noise has been and will continue to be an issue in the field.

DECK Engineering has identified Belden 3106A as a desirable cable for Modbus communication networks. 3106A carries a 300V dielectric rating and as such must be provided with additional insulation as required when conductors carrying higher voltages are present, as required by the NEC and jurisdictions having authority.

Belden 3106A		
Wire Color	AWG	Signal ID
Orange/White	22	Data +
White/Orange	22	Data -
Blue/White	22	DC REF*
Tinned Copper (non-insulated)	22	Shield Drain
<p>* DC REF provides an effective <i>reference</i> for the differential data signals of an RS485 network. This may be referred to as COMMON/COM/REF or SHIELD by individual equipment manufacturers. DECK Monitoring <i>requires</i> the use of a stranded copper (Cu) #22 AWG insulated conductor for DC reference for the network. See the applicable sections of this document for more information regarding this topic.</p>		

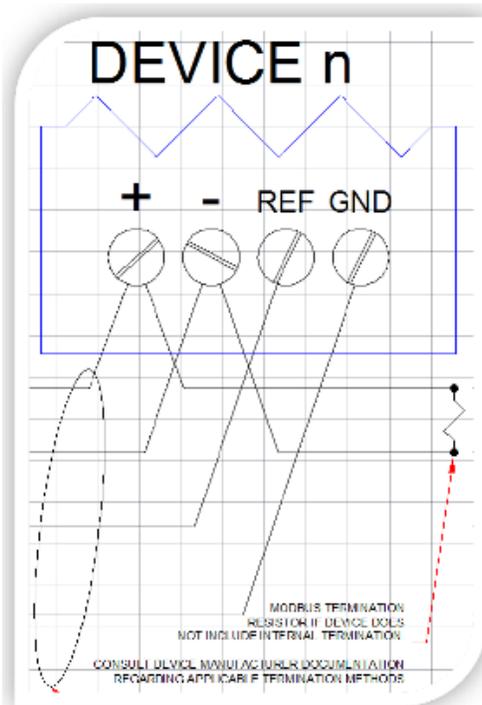
Modbus Network and Layout

- Devices shall be networked as a single bus
- Network shall originate from a single Bus Master device
- Network shall include termination per Modbus protocol specifications
- Network wiring shall be executed with an approved cable per DECK Monitoring Engineering
- Devices identified by DECK Monitoring Engineering as inducing noise into the Modbus network shall each require one (1) approved RS-485 Optical Isolator

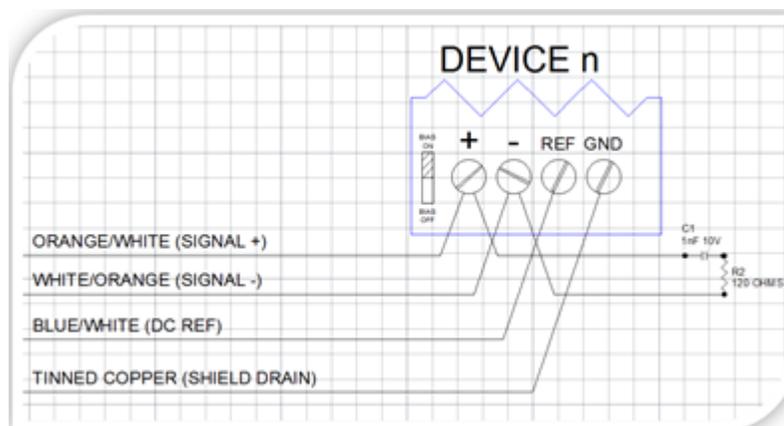


Cable Termination

The Modbus Standard for Serial Communication states that line termination resistors must be placed near each end of the bus. Modbus specifies that a network not requiring line bias shall use a 150Ω $\frac{1}{2}W$ resistor between the differential pair. This resistor value should be selected in accord with the impedance of the cable selected. Recommended cables typically require a 120Ω resistor. Some devices provide integral termination resistors. Before installing termination the installer should verify the absence of integral termination in the devices at each end of the Modbus network.



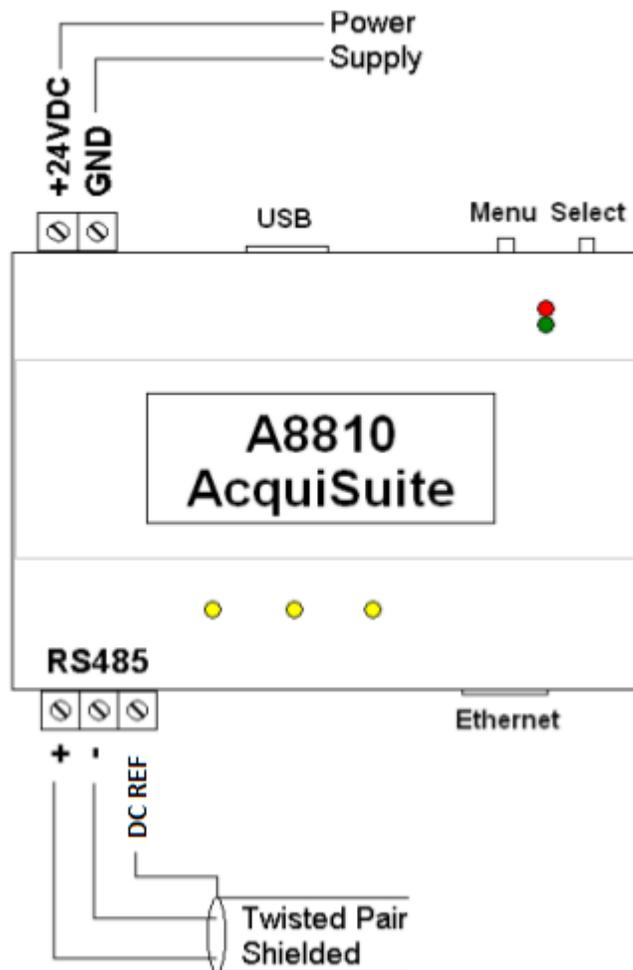
Networks in a high RF environment may require the use of Line Bias to stabilize communications. The use of line bias requires a change to the termination resistor arrangement. Modbus specifies that a 1nF 10V capacitor shall be used in series with a 120Ω ½W resistor.



When the RS485 network is not being actively driven by a device the differential pair is more susceptible to interference and noise. Correct termination of the shield drain to a dedicated ground terminal or chassis should provide noise rejection. In environments where excessive interference and noise still compromises network stability line biasing (the use of pull-up/pull-down resistors on the differential pair) is required. Individual equipment manufacturers may or may not provide facilities to bias the network. As such DECK Monitoring Engineering directs installers and technicians to reference the applicable installation documents for the equipment in these environments. In the event that none of the devices on the network provide the requisite bias facilities an approved optical isolator may be used.

AcquiSuite Installation

- 1) Connect the power leads to the DC power supply terminal on the AcquiSuite.
- 2) Connect the RS485 leads from the closest Modbus device to the RS485 termination points on the AcquiSuite.
- 3) Connect a Cat5e cable from the 10/100 Ethernet port to the AcquiSuite unit to provide Internet connectivity.



AcquiSuite Configuration

The preparation and configuration of the local network is the responsibility of the Integrator, in conjunction with the Site owner. DECK may be able help pinpoint networking issues; however, Deck has no access to the site network and cannot resolve these issues. You can verify an active network connection at the installation site by applying the same network settings to a laptop (a Required Installation tool), opening up a web browser, and visiting <http://data.deckmonitoring.com>. If you do not experience browser or server errors, then your network connection is active. Since the AcquiSuite has enough onboard memory to store many months of data, we recommend focusing on establishing communication between the AcquiSuite and the monitoring devices, if you experience networking issues. The AcquiSuite must be able to access the DECK servers at <http://data.deckmonitoring.com/upload.php>, via port 80. Timeserver access via rdate (port 37) or NTP (port 123) must also be available.

Obtaining an IP Address

Although the AcquiSuite can obtain an IP address automatically via Dynamic Host Control Protocol (and is set to DHCP by default), Deck Monitoring strongly recommends that the

AcquiSuite be configured with a static IP address, which provides a more stable and consistent network connection to the AcquiSuite. In order to configure for a static IP address you will need to obtain the following information from the IT department responsible for the site: IP Address, Subnet Mask, Gateway Address, Domain Name Service 1 Address, and Domain Name Service 2 Address.

The AcquiSuite is set to DHCP by default. To set it for a static IP address:

- A) Power on your AcquiSuite. "AcquiSuite Ready", along with an IP address will appear on the built-in LCD screen.
- B) Locate the "Menu" and "Select" buttons on the top right hand side of the AcquiSuite.
- C) Press the "Menu" button once to get to the TCP/IP Configuration Menu.
- D) Press the "Select" button once to get to the IP Configuration Menu.
- E) Press the "Select" button again to get to the IP address. At this point, the cursor on the display will be blinking on the first number in the IP address on the second line.
- F) Your IT department should have provided you with a static IP address to assign to the AcquiSuite. To change the number currently displaying on the AcquiSuite to the one given to you, press the menu button and the display will cycle through the digits 0-9 as well as a decimal option ("."). Once the correct digit is displayed, press the select button to advance to the next digit. Repeat the process until all the digits are correct.
- G) To set the Subnet Mask, Gateway, and DNS Server, follow steps B-F above, pressing the "Select" button in step d multiple times to cycle to the appropriate setting.

Configuring the AcquiSuite

Logging into the AcquiSuite

1. The AcquiSuite's active IP address is displayed on its embedded LCD screen. From any computer connected to the same network as the AcquiSuite, type the displayed address into the Internet browser's URL bar on your computer. The "AcquiSuite-Data Acquisition Server" page will appear. *(If you are unable to have your laptop connected to the same network, you can directly connect your laptop to the AcquiSuite with a network cable. Both the AcquiSuite and the laptop need to be set with a static IP address to do this. Refer to p. 10 of the Laptop/Computer Setup section of the AcquiSuite manual for detailed instructions.)*
2. Click on the link titled 'Click here for System Configuration.' You will be prompted for your username and password to access the AcquiSuite's settings.
3. The login ID user name is "admin." For security purposes, DECK has begun setting a non-default password. This password is "deckXXXX", where the "XXXX" is the last 4 characters of your AcquiSuite's serial number. (For installers in the field, the s/n can be displayed on the AcquiSuite LCD by using the menu/select buttons to navigate to Data Upload ->Show Serial Number.)
4. After logging in, you will be redirected the "Welcome" page. On the left is the navigation pane where you will choose which area of the AcquiSuite you wish to configure. The right pane displays information about the area you've chosen in the navigation panel, and allows you to change the settings for this area.

Verifying and Naming Modbus devices

1. Choose "Modbus" then "Device List" from the top of the navigation panel.
2. Check the list that appears against the list of Modbus devices on your network.
3. Verify that the status for every device is listed as 'OK' and that the type of device is correct.
4. Give each Modbus device a logical name with meaning that will help to easily identify it from other devices. Here's how:
 - a. Choose your first device and click on its Modbus ID (listed under 'Device' column).
 - b. Scroll down to the bottom of the page (the length of page is determined by device type) and click on "Configure".
 - c. In the "Device Name" field enter the name you've chosen to identify that individual device by.
 - d. Repeat step c for each device that you have in the Modbus loop.

The AcquiSuite is now configured.

Sending Data to DECK

1. Expand the "Log File Data" option in the navigation pane and choose "Setup/Upload".
2. Click on "Upload Data Now" To begin sending your data to DECK.
3. Click on "View Transfer Log" to view the transfer progress.

Installing a Revenue-Grade Meter & CT's

Supplying Reference Voltage

For a standard 480V 3-phase system each of the three hot conductors must be tapped to supply reference voltage to the meter (16 - 18 AWG wire is recommended).

Attaching your CTs

- a. Each CT should be placed on a load carrying conductor and wired to the corresponding CT input on the meter.
- b. Each CT will indicate which side should face the source. (In PV applications, the "source" is the inverter.)

Veris Meter CT's

1. When wiring Veris meter CTs directly, the White CT leads go to the A+, B+, and C+ terminals on the meter.
2. The Black CT leads go to the A-, B-, C- terminals on the meter.
3. There is a label on the Veris CT that says "Source Side". Please orient this side of the CT towards the inverter, the AC combiner, or the power source you are monitoring (not the grid).
4. To verify proper CT installation:

- a. Verify that there is no wrench symbol in the top left corner of the meter's LCD screen. (This wrench symbol is a warning of a phase sequencing error that would need to be rectified.)
- b. Then use the down / - button to navigate to the "3PHAS" menu, and then the right arrow button to "3 KW" to confirm a positive power reading.
 - i. *A negative reading can be fixed by flipping the polarity of the CT leads at the meter.*

Elkor Meter CT's

1. When wiring Elkor meter CTs directly, the White CT leads go to the 11, 21, and 31 terminals on the meter.
2. The Black CT leads go to the 12, 22, 32 terminals on the meter.
3. There is a label on the Elkor CT that says "This Side Towards Source". Please orient this side of the CT towards the inverter, the AC combiner, or the power source you are monitoring (not the grid).
4. To verify proper CT installation, verify that the red DIAG LED on the top of the meter is not lit.
 - a. A flashing red DIAG LED indicates a phase sequencing error that needs to be rectified.
 - b. If the red DIAG LED is lit, but not flashing, the meter is reading negative power.
 - i. *A negative reading can be fixed by flipping the polarity of the CT leads at the meter.*

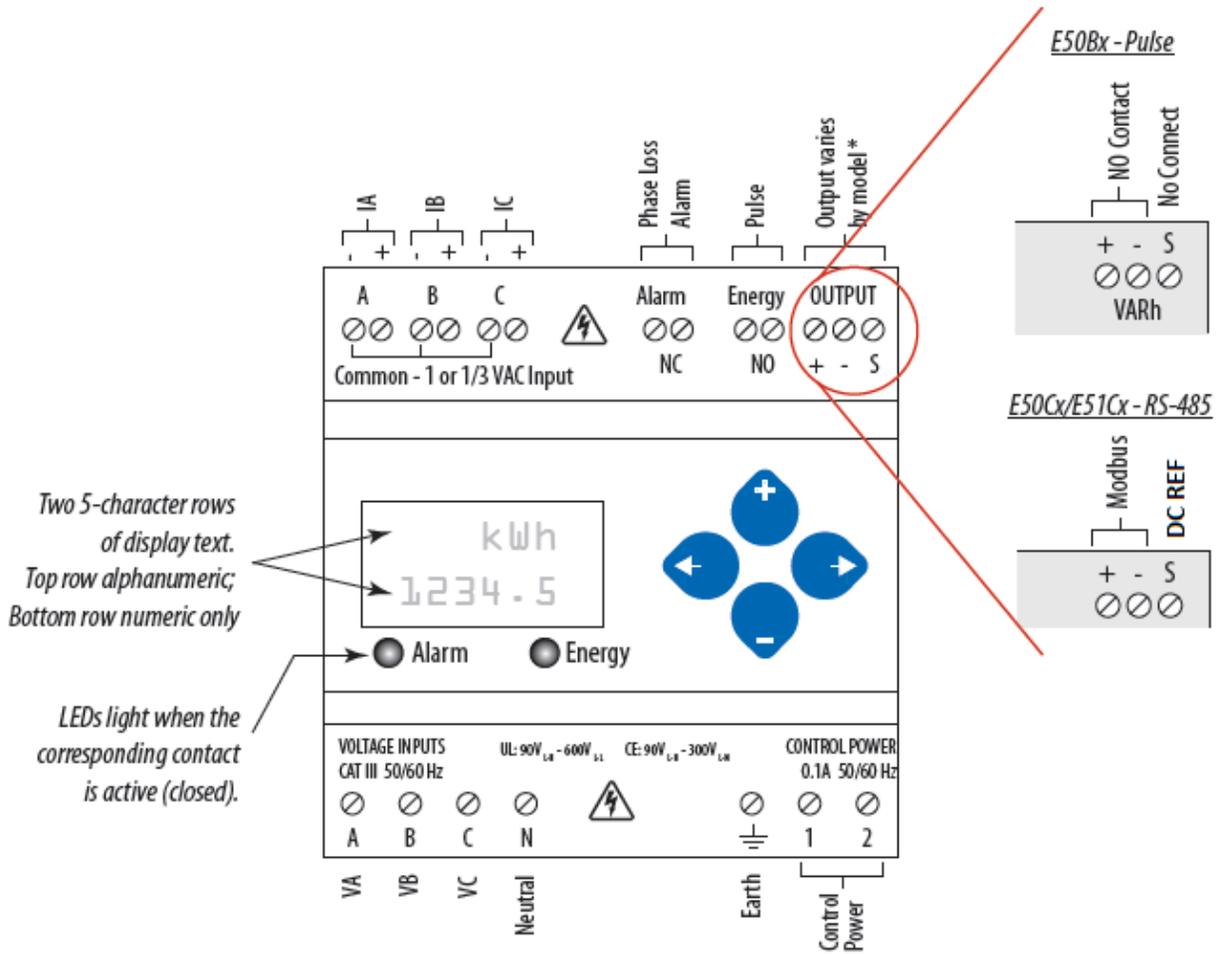
All-in-One Box (Veris Meter)

1. The 1, 2, 3, 4, 5, 6 Terminals are intended for the CT leads.
2. Terminal 1, 2, 3 are intended for the white CT leads.
3. 4, 5, 6 are intended for the black CT leads.
4. There is a label on the Veris CT that says "Source Side". Please orient this side of the CT towards the inverter, the AC combiner, or the power source you are monitoring (not the grid).
5. To verify proper CT installation:
 - a. Verify there is no wrench symbol in the top left corner of the meter's LCD warning of a phase sequencing error that would need to be rectified.
 - b. Then use the down / - button to navigate to the "3PHAS" menu, and then the right arrow button to "3 KW" to confirm a positive power reading.
 - i. *A negative reading can be fixed by flipping the polarity of the CT leads at the meter.*
- c. The accuracy of the CT readings depends on the conductor being centered in the CT window. Where the CT falls loosely on the conductor, use electrical tape to center the conductor. Additionally, we recommend securing the end caps of split core CTs.

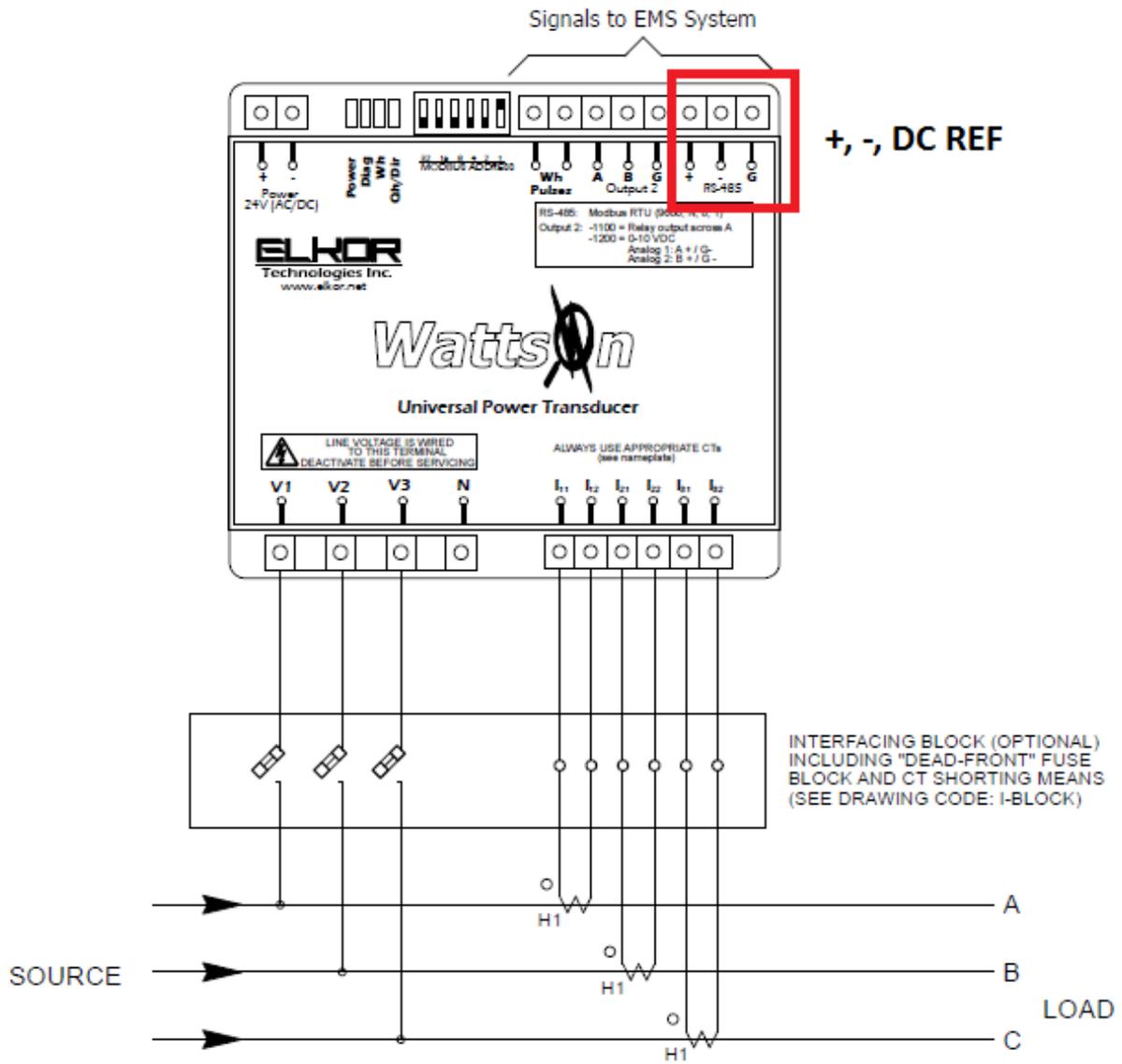
Wire the Output Connections

- d. The revenue grade meter has 3 RS-485 Modbus terminals that need to be connected to the AcquiSuite RS-485 terminals: Data+, Data-, and DC REF.

1. Veris Meter



2. Elkor Meter



- e. If the revenue grade meter is the only Modbus device, simply connect it directly to the AcquiSuite's Modbus inputs.