



DECK All-In-One Enclosure

Quick Installation Guide for Field Installers

Contents

- Legal Statement 2
- Preliminary Considerations 2
 - Required Installation Tools and Materials 2
 - Networking Information 2
- Modbus Communication and Wiring Specification 3
 - Cable Termination..... 4
- AC Wiring 5
 - Providing AIO Box Control Power 5
- Meter Setup 6
 - Supplying Reference Voltage 6
 - Attaching your CTs 6
 - Verifying proper CT installation 7
 - External Modbus Devices..... 8
- AcquiSuite Configuration 9
 - Configuring an IP Address 9
 - Logging into the Acquisuite 9
 - Verifying and Naming Modbus devices 10
 - Sending Data to DECK 10

Figures

- Figure 1 – Control power input area..... 5
- Figure 2 – Voltage reference input area 6
- Figure 3 – CT input area 7
- Figure 4 - Auxiliary 24VDC power output area 8
- Figure 5 - Modbus device input area 8

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.

Preliminary Considerations

Please read this guide fully for a comprehensive understanding of the installation procedures.

Required Installation Tools and Materials

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

- Laptop computer
- Digital multimeter
- Belden 3106A Modbus communication cable for monitoring additional devices
- AC 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 gathering the above information, contact your local network Administrator.

Modbus Communication and Wiring Specification

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.

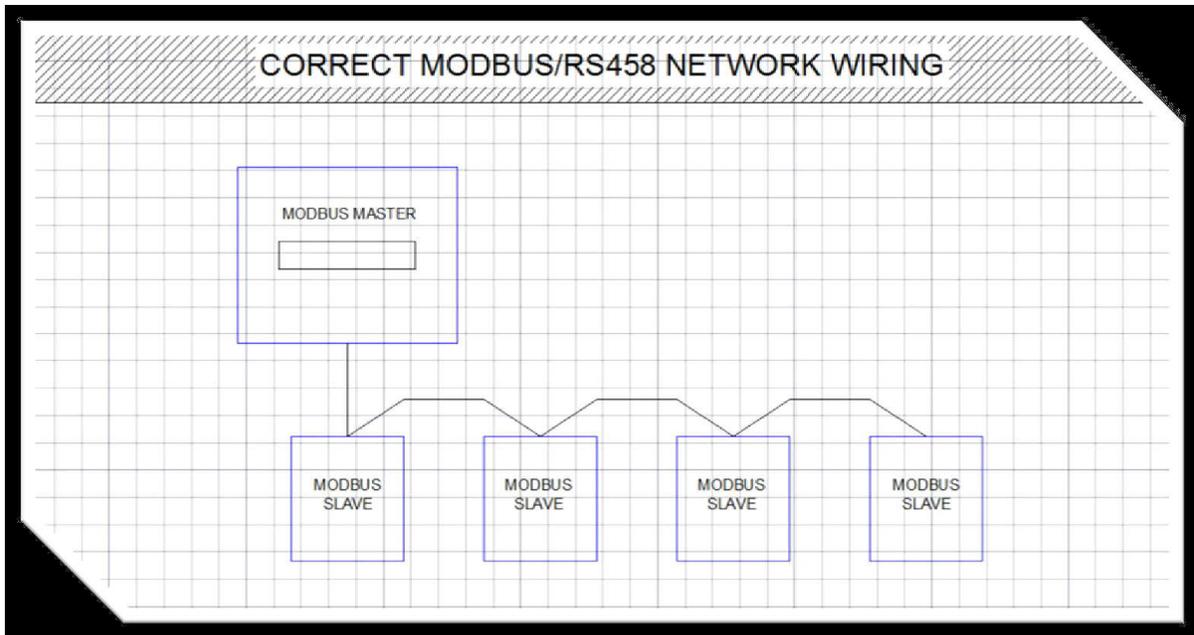
Belden 3106A has been identified as a desirable cable for Modbus communication networks. 3106A carries a 300V dielectric rating and as such must be provided with additional insulation as required when conductors carrying higher voltages are present, as required by the NEC and jurisdictions having authority.

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

* **DC REF** provides an effective *reference* 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 *requires* 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.

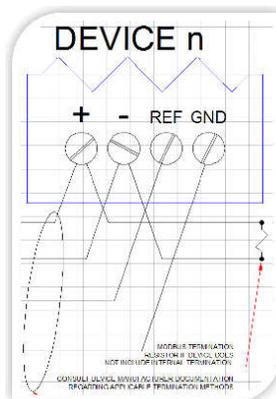
Modbus Network and Layout Requirements

- Devices shall be networked as a single bus
- Network shall originate from a single Bus Master device, here the Acquisuite
- 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

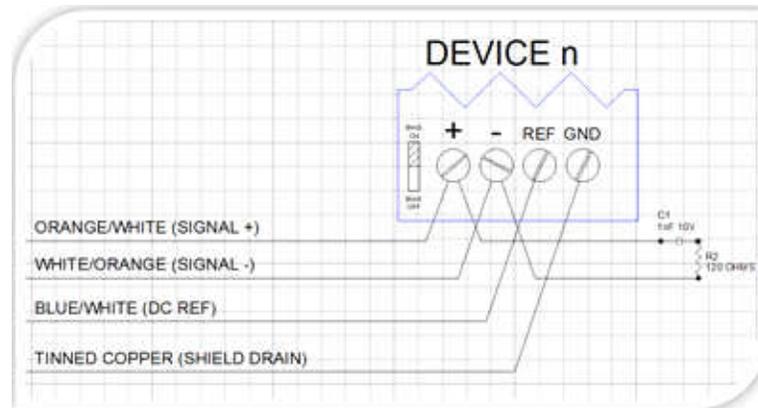


Cable Termination

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 $\frac{1}{2}W$ 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.

AC Wiring

Providing AIO Box Control Power

Control power terminals are two breaker-fused terminal blocks and a ground terminal (Figure 1 – Control power input area). The DECK All-In-One enclosure provided (30BD) is powered using 90 Volts up to 304 Volts between the L1 and L2/N breakers. If control power is lost to the equipment, i.e. if it is powered from inverter output that is temporarily lost, data will not be recorded from the time of power outage to restoration. Please select the most reliable available source to power the equipment.

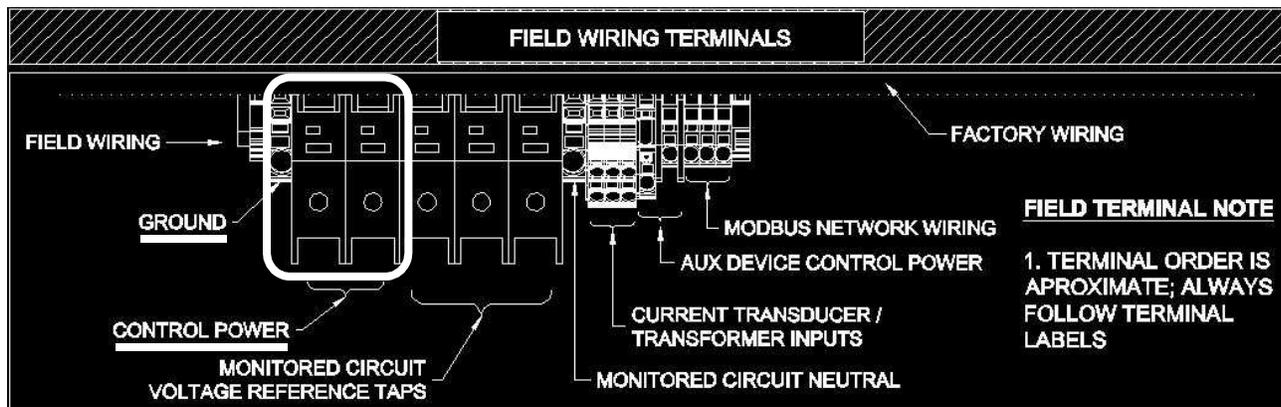


Figure 1 – Control power input area

Meter Setup

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 with the appropriately sized conductors. If a neutral conductor is present at the point being metered, a neutral tap is required as well.

Split-phase systems require the two hot conductors and neutral tapped to A, B, and N. Single-phase system require L-L or L-N tapped to A and B or to A and N, respectively.

For more details, See the Veris meter manual at:

http://www.veris.com/docs/Installs/e51cx_full_i0b2.pdf

For the DECK All-In-One enclosure provided with two DSP 30-24/277A power supplies, fused terminals under Monitored Voltage labeled VA, VB, VC, and N supply meter terminals A, B, C, and N, respectively (Figure 2 – Voltage reference input area).

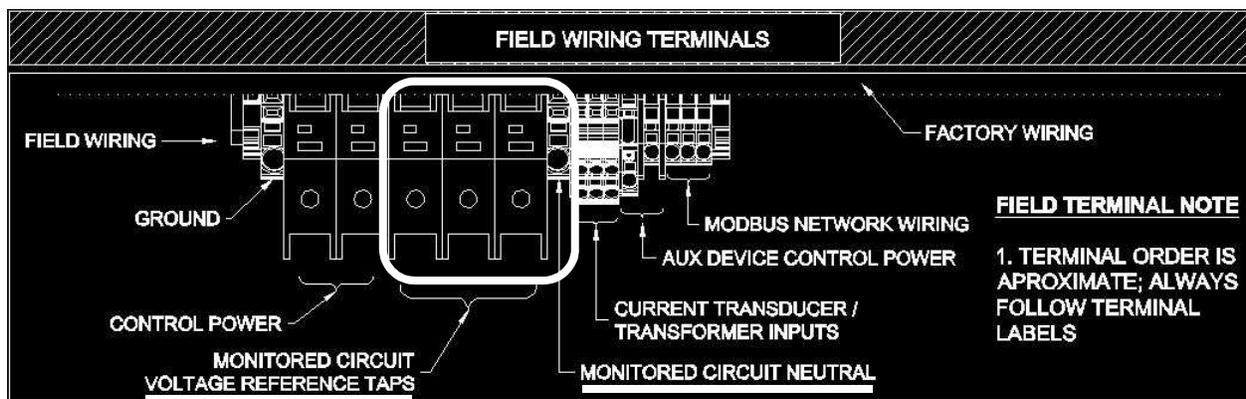


Figure 2 – Voltage reference input area

Attaching the CTs

Each CT should be placed on a load carrying conductor and wired to the corresponding CT input terminal on termination block inside the DECK All-In-One enclosure.

- Be sure that the CTs are mounted to the correct side of the switchgear, bus bar, etc. For PV generation metering, the CTs will be on the inverter side of the disconnect; for net metering, the CTs will be on the grid side; for building energy metering, the CTs will be on the load side.
- The CTs provided are labeled identifying their orientation to “Source”. Please face this side of the CT towards the inverter, the AC combiner, or the power source. If monitoring PV or other generation, the “Source Side” points towards the inverter(s). If monitoring demand, “Source

Side” points away from the load and towards the load’s incoming energy source. If monitoring net grid energy used (net metering), “Source Side” points towards the grid.

- The white CT leads go to the A+, B+, and C+ ‘CTs’ terminals (2.1, 2.3, and 2.5) and the black CT leads go to the A-, B-, C- terminals (2.2, 2.4, and 2.6) (Figure 3 – CT input area).

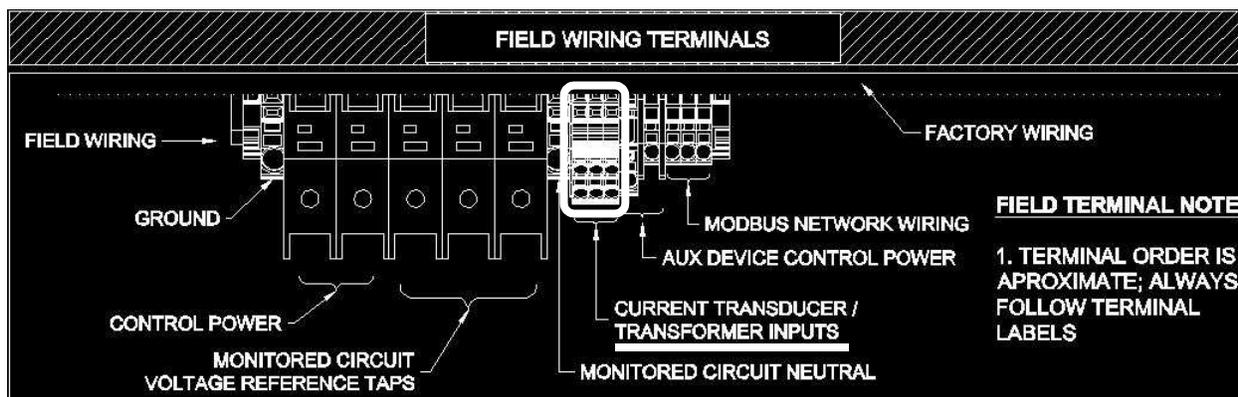


Figure 3 – CT input area

Verifying proper CT installation

The Elkor WattsOn meter installed in the DECK All-In-One enclosure is equipped with a red LED diagnostic light located at the top of the meter to the right of the control power input to aid in verifying proper CT installation when the monitoring equipment is energized.

The red LED not being illuminated indicates proper CT installation.

A solidly illuminated red LED indicates the reverse flow of current. This is resolved by flipping the polarity of the CT leads at the terminal landing block, i.e. white replaces black and black replaces white.

A slowly blinking red LED indicates a sequencing error, meaning the CT inputs aren’t landed in the same sequence as the voltage taps. This is resolved by visually verifying that the CTs are landed in the same order as the voltage taps.

A quickly blinking red LED indicates no reference voltage is detected. This is resolved by verifying the continuity of reference voltage conductors as well as that of the fuses provided in the terminal blocks.

External Modbus Devices

Fused DC power at 24V and 1.25 Amps is available via terminals labeled DC 24V (11 and 12) that are just to the right of the neutral tap (Figure 4 - Auxiliary 24VDC power output area). These are designed to power weather stations, add-on meters requiring 24V, etc.

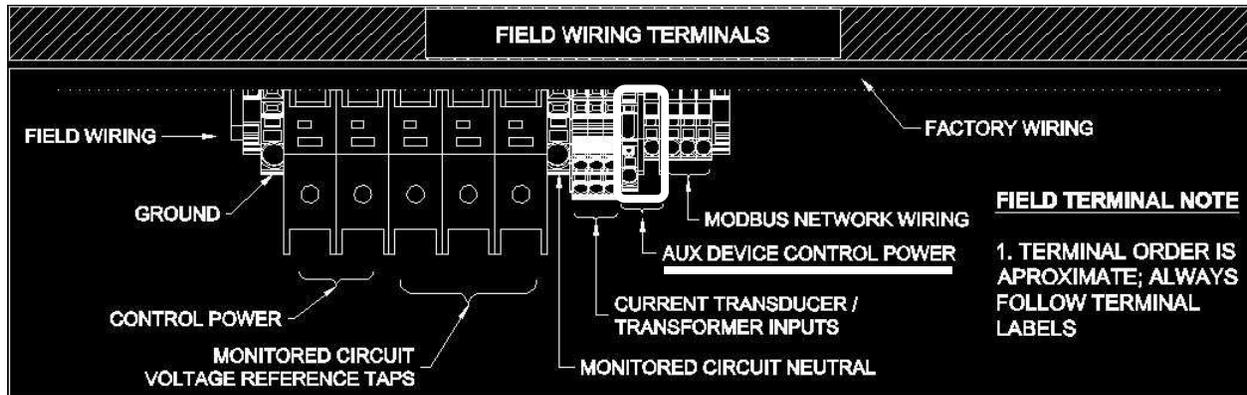


Figure 4 - Auxiliary 24VDC power output area

External Modbus devices are connected to the communications loop via standard Modbus daisy-chaining (Figure 5 - Modbus device input area). Connect the outgoing +, -, and common RS485 wiring to the DATA MOD/RTU terminals. Connect the other end of the wiring to the RS485 terminals on the next device in the chain. Double-land an outgoing RS485 wire set on the device along with the incoming wires for further devices in the chain as needed. Continue to the last device on the chain, where a terminative resistor is included between the + and – terminals) if the final devices does not contain internal termination. See Communication and Wiring for termination information.

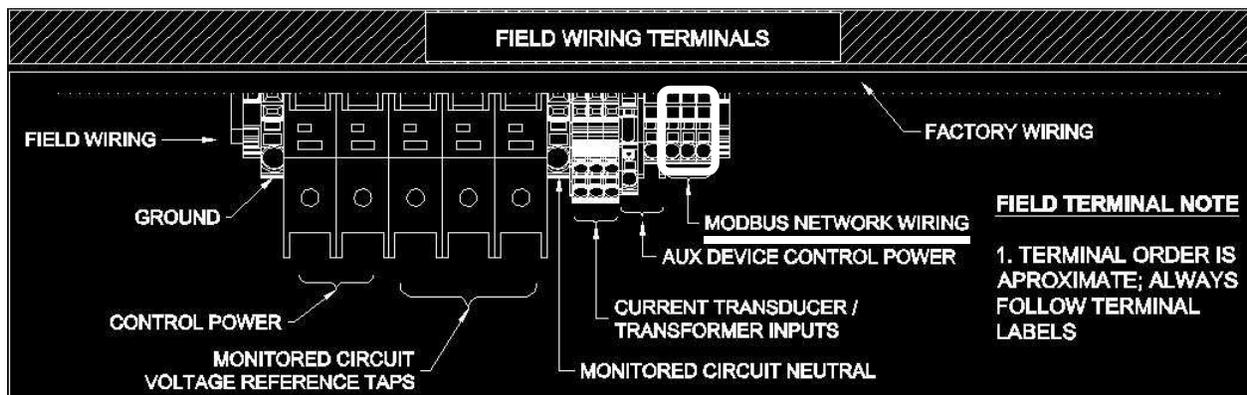


Figure 5 - Modbus device input area

Note that the Acquisuite gateway will be preconfigured to communicate with most external Modbus devices at Modbus IDs specified on the Bill of Materials provided on the 1-Line drawing generated by DECK.

AcquiSuite Configuration

Configuring an IP Address

Although the Acquisuite can obtain an IP address automatically via DHCP (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, DNS 1 Address, and DNS 2 Address.

To set the unit for a static IP address:

- Power on your Acquisuite. “Acquisuite Ready”, along with an IP address will appear on the built-in LCD screen.
- Locate the “Menu” and “Select” buttons on the top right hand side of the Acquisuite.
- Press the “Menu” button once to get to the TCP/IP Configuration Menu.
- Press the “Select” button once to get to the IP Configuration Menu.
- 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.
- 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.
- Set the Subnet Mask, Gateway, and DNS Servers, by pressing the “Menu” button to arrive at the appropriate menu, the “Select” button to enter that menu, and repeating the steps above to enter the appropriate IP address.

Logging into the Acquisuite

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.)

- 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.
- The user name is "admin" and the password is "deckXXXX", where the "XXXX" is the last 4 characters of your AcquiSuite's serial number, which can be found on a label inside the bottom right of the DECK All-In-One enclosure.

Verifying and Naming Modbus devices

After logging in, you will be redirected the "Welcome" page. Choose the Device List menu option on the left menu tree under Modbus to view the communication status of the Modbus devices connected to the gateway. You can rename any of the devices by clicking the Rename All Devices link at the bottom of the "Name and Purpose" column of the Modbus Device List.

Sending Data to DECK

Once the Acquisuite detects an active Internet connection, it will begin uploading data to DECK. Visit the "Status" menu under "Log File Data" to view the current upload status and verify that data has been uploaded to DECK. As a final step, please call DECK Technical Support at (503) 224-5546 to verify the uploading of data to DECK.