User's Guide

AcquiSuite™
Ally 12 & 48
Advanced Multi-Circuit Meter

And

AcquiSuite Ally
Configuration Console
Software

Revision D (1/19)

TABLE OF CONTENTS

WARNING:

- RISK OF ELECTROCUTION, SHOCK, EXPLOSION, OR ARC FLASH. CAREFULLY READ AND FOLLOW INSTRUCTIONS:
- HIGH VOLTAGE MAY BE PRESENT. RISK OF ELECTRIC SHOCK. LIFE THREATENING VOLTAGES MAY BE PRESENT. Qualified personnel only.
- TO AVOID FIRE, SHOCK OR DEATH, 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.
- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment MUST be installed and serviced by qualified electrical personnel with the requisite knowledge, training and experience related to the installation and operation of this equipment.
- Product may use multiple voltage/power sources. Be sure all sources of power have been disconnected before servicing.
- Do not depend on this product for voltage indication.
- Only install this product on insulated conductors.
- If the meter appears damaged or defective, first disconnect all power to the meter. Then call or email technical support for assistance.

DO NOT EXCEED 346V Line to Neutral or 600 volts Line to Line. This meter is equipped to monitor loads up to 346V L-N. Exceeding this voltage will cause damage to the meter and danger to the user. Always use a Potential Transformer (PT) for voltages in excess of 346V L-N or 600 volts line to line. The AcquiSuite® Ally is a 600 Volt Over Voltage Category III device.

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. Consider the enclosure, the correct use of ventilation, thermal properties of the equipment, and the relationship with the environment. Installation category: CAT II or CAT III

Provide a disconnect device to disconnect the meter from the supply source. Place this device in close proximity to the equipment, and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-1 and IEC 60947-3 and shall be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection and disconnecting device for supply conductors with approved current limiting devices suitable for protecting the wiring. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

CAUTION:

- 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.
- If the collector is connected directly to a source of voltage, the pulse isolator will immediately burn out and become non-responsive.
- Do no use any cleaning agents, including water, on the AcquiSuite® Ally device.
- No accessories are approved for use with the AcquiSuite® Ally meter other than those specified in the Obvius Manufacturing product literature and price sheets.
- A circuit breaker used as a disconnect must meet the requirements of IEC 60947-1 and IEC 60947-3 (Clause 6.11.4.2)
- Current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment.
- Current transformers may not be installed in an area where they block ventilation openings.
- Current transformers may not be installed in an area of breaker arc venting.
- Not suitable for Class 2 wiring method nor intended for connection to Class 2 equipment.
- Secure current transformer and route conductors so that they do not directly contact live terminals or bus.
- External secondary inputs and outputs should be connected to devices meeting the requirements of IEC 60950
- The following additional requirements apply for Recognized board versions of the AcquiSuite® Ally meter
    - For use only with Listed Energy-monitoring Current Transformers
    - Associated leads of the current transformers shall be maintained within the same overall enclosure.
    - Unless the current transformers and its leads have been evaluated for REINFORCED INSULATION, the leads must be segregated or insulated from different circuits.
    - The current transformers are intended for installation within the same enclosure as the equipment. These may not be installed within switchgears and panel boards" or similar.
- Use this device with copper or copper clad wire only.
- For indoor use only.

INTRODUCTION

There are two meters in the AcquiSuite™ Series: the AcquiSuite™ Ally 12 & Ally 48. These meters monitor the voltage, current, power, energy, and many other electrical parameters on single and three-phase electrical systems. A *AcquiSuite™* Ally meter uses direct connections to each phase of the voltage and current transformers to monitor each phase of the current. Information on energy use, demand, power factor, line frequency, and more are derived from these voltage and current inputs.

The AcquiSuite Ally is the perfect companion to the Obvius data acquisition product line. The Ally 48's versatile power metering functionality continues the Obvius mission of lowering the total cost of collecting data by reducing install complexity, and increasing flexibility. The plug-and-play integration ensures the hundreds of data points are immediately captured and made available for countless applications.

The *AcquiSuite™* Ally meter communication interfaces include Ethernet (LAN), RS-485 serial. BACnet MS/TP and Modbus RTU operate over an RS-485 serial network. BACnet IP and Modbus TCP are supported over Ethernet. A USB port is also provided as the preferred connection for on-site configuration and can be run concurrently with an RTU.

Unpacking the Unit

The *AcquiSuite™* Ally can be ordered with optional product features which are identifiable on the part number label.

AcquiSuite™ Ally Part Numbering Scheme

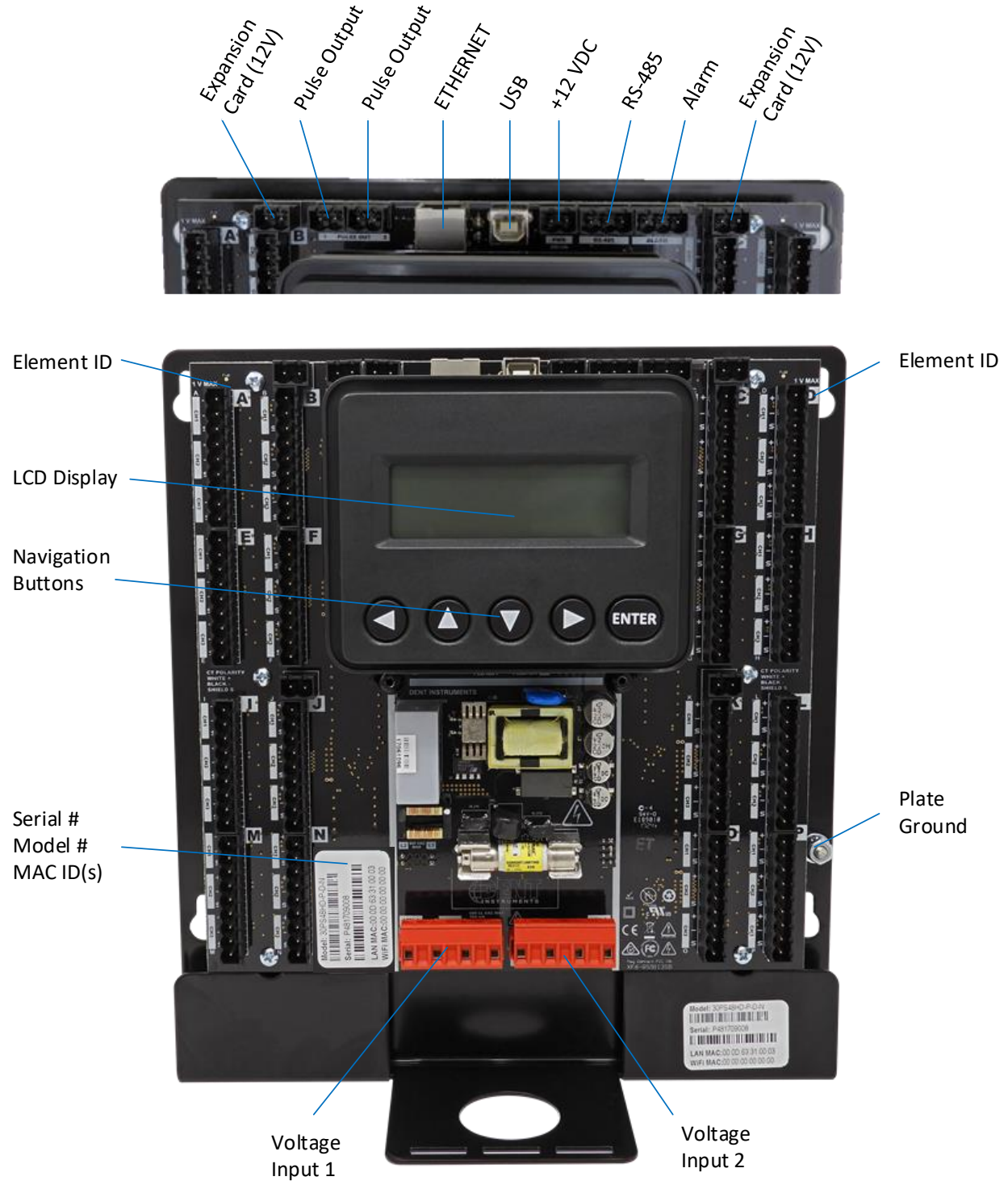
AMC48-ED	48 Input Meter Enclosure with display
AMC48-EN	48 Input Enclosure without display
AMC48-MD	48 Input Mounting Plate with display
AMC48-MN	48 Input Mounting Plate without display
AMC12-ED	12 Input Enclosure with display
AMC12-EN	12 Input Enclosure without display
AMC12-MD	12 Input Mounting Plate with display
AMC12-MN	12 Input Mounting Plate without display

Each *AcquiSuite™* Ally meter shipment also includes the following items:

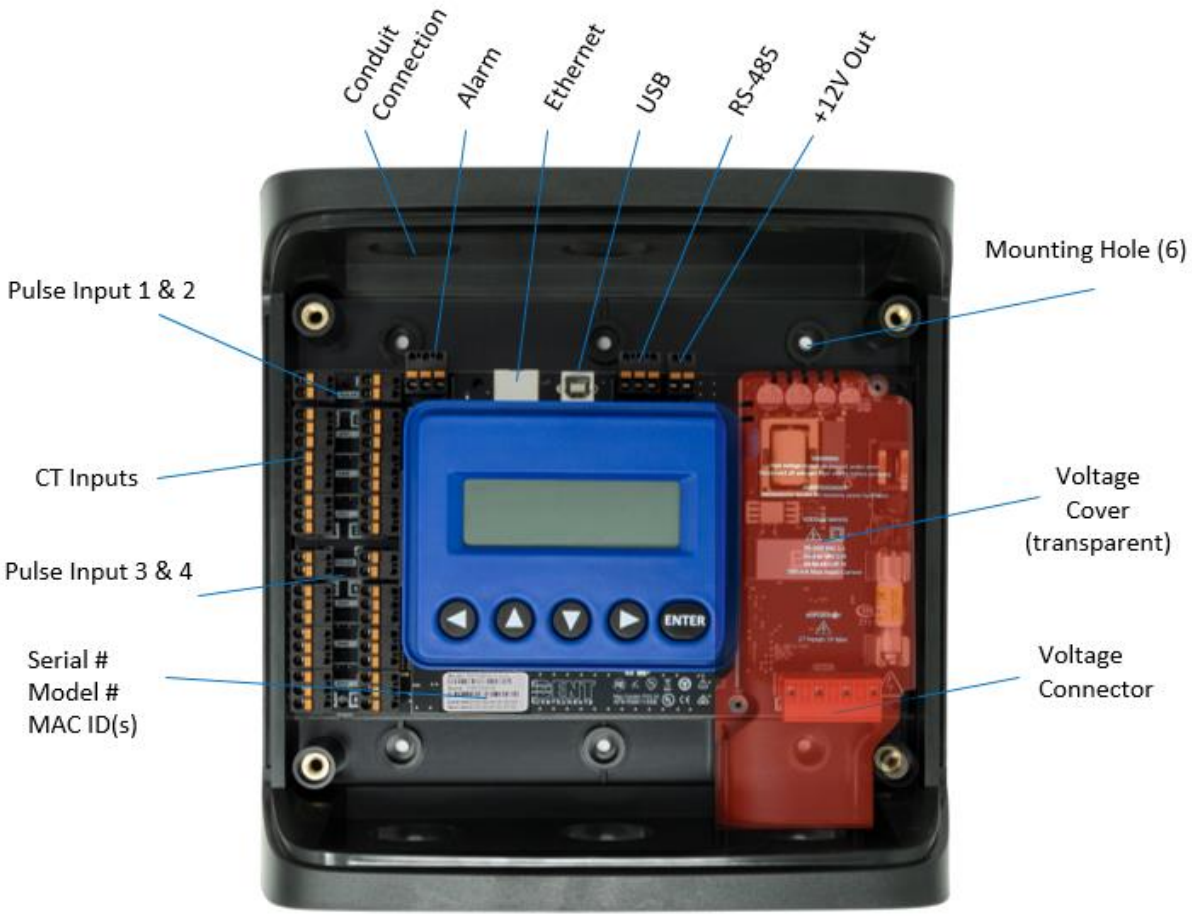
- Meter with Options Installed – Serial Number, MAC ID, and FCC ID indicated on side label.
- Pluggable Connectors (2 voltage, 50 three-position terminals, 3 two-position terminals)
    - AMC48 (2 voltage, 50 three-position terminals, 3 two-position terminals)
    - AMC12 (1 voltage, 14 three-position terminals, 5 two-position terminals)
- Thumb drive containing Obvius Ally Power Meter Viewer Software, Register List, Manual, Tutorial Videos
- Certificate of Calibration (COC) for each unit

AcquiSuite™ Ally Anatomy

All user connections are made on the circuit board. Connectors are identified by function and include polarity markers.



AMC48 mounting plate version shown



AMC12 enclosure version with display shown (cover removed)

AcquiSuite™ Ally Meter Safety Summary and Specifications

<table>
<tr>
<td>This general safety information is to be used by both the Logger operator and servicing personnel. Obvius, Inc. assumes no liability for user's failure to comply with these safety guidelines.</td>
<td> 
AMC12-B-y-z, -P-y-z
AMC48-B-y-z, -P-y-z
 
AMC12-C-y-z
AMC48-C-y-z</td>
<td>The AcquiSuite™ Family conform to the following:
 
AcquiSuite™ Ally 12 & Ally 48:
Conforms to UL Std 61010-1, 3rd Edition
Certified to CSA Std C22.2 No. 61010-1, 3rd Edition</td>
</tr>
<tr>
<td colspan="3">AcquiSuite™ Ally devices need to be installed in a user-supplied UL Listed/ uR Recognized enclosure in order to comply with NEC and local electrical codes.</td>
</tr>
<tr>
<td colspan="3">The AcquiSuite™ Ally is an Over-Voltage Category III device. Use approved protection when operating the device.</td>
</tr>
<tr>
<td colspan="3">CAUTION: THIS METER MAY CONTAIN LIFE THREATENING VOLTAGES. QUALIFIED PERSONNEL MUST DISCONNECT ALL HIGH VOLTAGE WIRING BEFORE SERVICING THE METER WITH THE HIGH VOLTAGE TOUCH SAFE COVER REMOVED.</td>
</tr>
</table>

Symbols on Equipment

Denotes caution. See manual for a description of the meanings.

DENOTES HIGH VOLTAGE. RISK OF ELECTRICAL SHOCK. LIFE THREATENING VOLTAGES MAY BE PRESENT. QUALIFIED PERSONNEL ONLY.

Equipment protected throughout by double insulation (IEC 536 Class II).

Symbols in Documentation

Contains additional information pertinent to current subject

DO NOT EXCEED 346V Line to Neutral or 600 volts Line to Line. This meter is equipped to monitor loads up to 346V L-N. Exceeding this voltage will cause damage to the meter and danger to the user. Always use a Potential Transformer (PT) for voltages in excess of 346V L-N or 600 volts line to line. The AcquiSuite™ Ally is a 600 Volt Over Voltage Category III device.

MAINTENANCE

There is no required maintenance with the **AcquiSuite™ Ally 12 & Ally 48** meter.

Abide by the following items:

- **Cleaning:** No cleaning agents, including water, shall be used on the **AcquiSuite™ Ally 12 & Ally 48** meter.
- No accessories are approved for use with the AcquiSuite™ Ally 12 & Ally 48 meter, other than those specified in the Obvius product literature and price sheets.
- If the meter appears damaged or defective, first disconnect all power to the meter. Then call or email technical support for assistance.

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METER SAFETY

Building Service Safety Requirements (Load Center, etc.)

- Equipment intended for use with field-installed current transformers that could be installed in panel boards or switchgears shall observe the following:
- Always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current transformers.
- A circuit breaker used as a disconnect must meet the requirements of IEC 60947-1 and IEC 60947-3 (Clause 6.11.4.2)
- Current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment.
- Current transformers may not be installed in an area where they block ventilation openings.
- Current transformers may not be installed in an area of breaker arc venting.
- Not suitable for Class 2 wiring method nor intended for connection to Class 2 equipment.
- Secure current transformer and route conductors so that they do not directly contact live terminals or bus.
- CTs shall be listed to UL2808

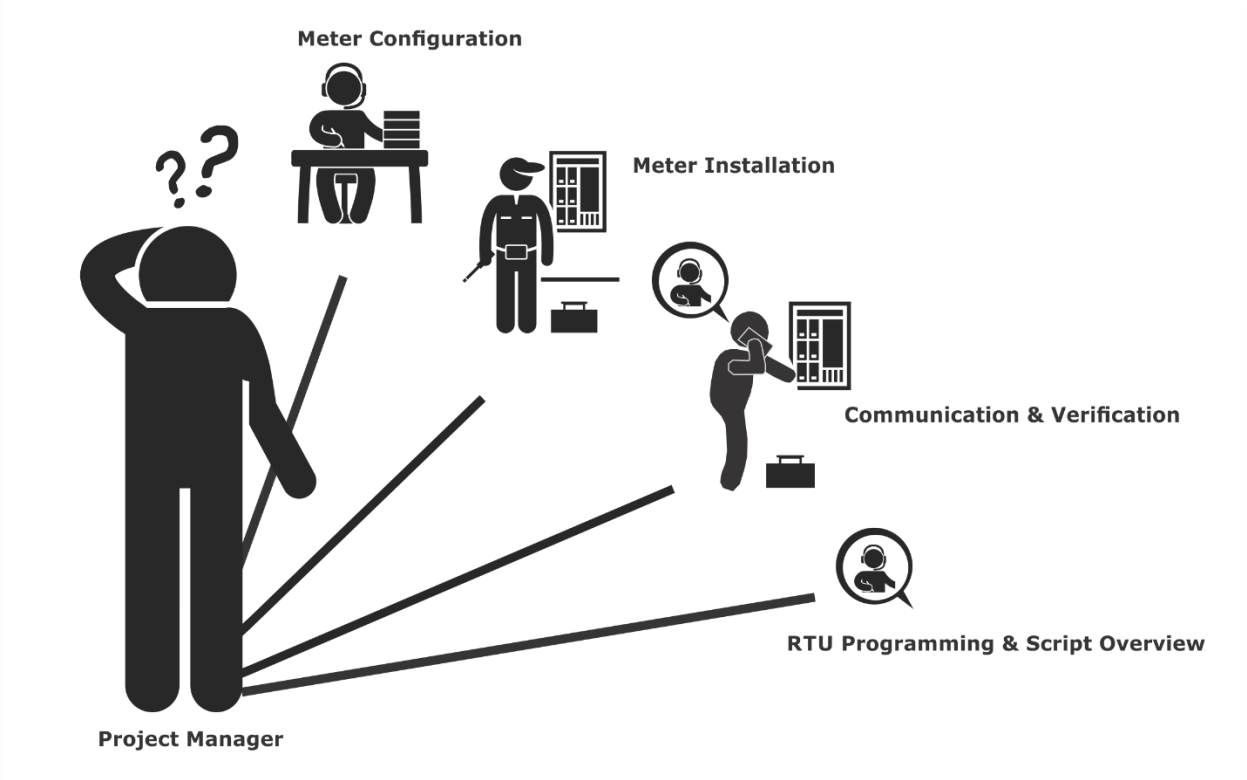
Meter Installation Safety Requirements

- AcquiSuite™ Ally meters must be installed in accordance with local electrical codes.
- Use copper conductors only.
- Connection to the mains terminals shall be made with 14 AWG minimum wire gauge.
- External secondary inputs and outputs should be connected to devices meeting the requirements of IEC 60950
- The following additional requirements apply for Recognized board versions of the AcquiSuite™ Ally meter
- For use only with Listed Energy-monitoring Current Transformers
- Associated leads of the current transformers shall be maintained within the same overall enclosure.
- Unless the current transformers and its leads have been evaluated for REINFORCED INSULATION, the leads must be segregated or insulated from different circuits.
- The current transformers are intended for installation within the same enclosure as the equipment. These may not be installed within switchgear and panel boards, or similar.

PLANNING FOR FIELD INSTALLATION

Project Manager Aspects

Meter installation often includes coordination between individuals or groups of people with different responsibilities. Spend a few minutes considering who will be executing each portion of the installation and what tools are needed at each stage. Things to consider include determining how to communicate with the meter, setting address configuration, installing Obvius Ally Power Meter Viewer, access to PIN number, etc. The more tasks completed before installation, the fewer tasks required in the field. The following section gives an overview of these activities followed by details in the next section.



CONFIGURATION & DATA VIEWING OPTIONS

The AcquiSuite™ Ally meter has multiple methods for configuration and data viewing. The most powerful interface is provided with a PC, Laptop or Tablet running Windows and is encouraged for complex installations. The Ally Power Meter Viewer software is required for configuring advanced functions like alarms. The second interface is intended for smart phones or tablets that can connect over USB, Ethernet, or Wi-Fi. The third interface (LCD) is intended for intermittent end user observation and is restricted in capability. Utilizing the AcquiSuite DAS interface can also be used for configuration, if communication settings are already established. The feature set of each interface is summarized next.

INFORMATION ACCESS BY INTERFACE TYPE

Interface Options				
Device	**PC or Laptop Running Obvius Ally Power Meter Viewer**	**Smart Device or Tablet via WebPage**	**LCD on Meter (if equipped)**	**RTU (Host System) Modbus /BACnet**
When Used	Meter Setup Field Visit	Field Visit	End User	Building System
Real Time Values	All Meter Parameters Waveform Capture Harmonic Analysis All Element View Phasor Plot Alarms	All Meter Parameters Single Element View	Voltage Current VA VAR kWh Single Element View	All Meter Parameters
Configuration	Entire Meter Visual Guides Copy / Paste	Entire Meter (except alarms) Text Based	Communications Only	Entire Meter Register Based
Security PINs Enforced	Factory Support – Level 3	Read Only – Level 1* Read / Write – Level 2*	Read Only – Level 1* Read / Write Level 2* (limited to communication)	Factory Support – Level 3

* If PINs are configured

Meter Configuration Overview

- Work performed ahead of the installation saves time in the field and results in fewer mistakes!

Tools	Typical Work
• Desktop or Laptop PC • USB Type AB Cable (preferred) or Ethernet & USB wall charger (> 500 mA) • Thumb Drive (Obvius Ally Power Meter Viewer Installer) or access to Obvius FTP site. (qualified Obvius personnel only) • Electrical Schematics of project	• Installation of Obvius Ally Power Meter Viewer Software • Connect USB/Ethernet cable from PC to meter • Establish communication with meter • Firmware update (if desired) • Configure software for anticipated meter setup • Field wiring documentation • Set Alarms • Set Security PINs

Meter Installation Overview

- Performed by licensed electrician.

Tools	Typical Work
• Mounting hardware (customer supplied) • Wiring & supplies, labels, wire ties • Tablet, Smart Device, or Laptop PC • Multi Meter, Current Clamp • Camera	• Mechanical mounting • Electrical installation • Install voltage cover • Apply power to meter • Confirm basic operation of meter

Verification & Communication Overview

- Can be modified with power applied to the meter.

Tools	Typical Work
• Tablet, Smart Device (Web Page Based), or Laptop PC (Obvius Ally Power Meter Viewer Software) • On site troubleshooting • Multi Meter, Current Clamp • Camera	• Locate the power meter • Confirm RTU device • Add wire terminations (if required) • Confirm meter communication settings • Meter health metrics (check for setup errors) • Analytics (Obvius Ally Power Meter Viewer) • Correct instrumentation • Set Alarms • Set security PINs • Checklist

RTU Programming and Scripting Overview

Tools	Typical Work
• Laptop PC (Remote Access to RTU) • Remote troubleshooting • Register List	• Confirm meter communication settings • Confirm communication protocols • Exercise remote connectivity • Run configuration scripting • Set Alarms • Set security PINs • Confirm data integrity

METER CONFIGURATION - DETAILS

This section is written to support setting up the *AcquiSuite™* Ally meter in an office environment and configuring the power meter for a pre-determined configuration. In many cases the setup is standardized for an organization or project. In other cases, the setup can be documented and forwarded to an electrician as a wiring schedule. The setup can also be performed on site and reflect "as built" configurations.

- **The Ally meter cannot be configured using Obvius Ally Power Meter Viewer over a serial port. RS-485 serial network configurations must be pre-configured or use Modbus / BACnet hosts.**

- **This section describes the use of the Obvius Ally Power Meter Viewer Windows Application. If this interface cannot be used, refer to the section on using the simplified web browser interface. The web browser can be accessed from the USB port to support Mac users.**

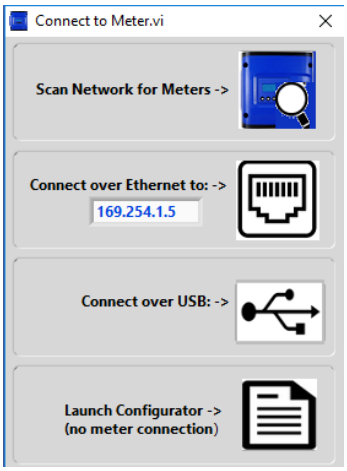
Install the Software

Insert the Obvius Ally Power Meter Viewer thumb drive into the computer or download from the Obvius FTP site. (qualified Obvius personnel only)

The installer should start automatically. If it does not, browse the thumb drive and locate the **AllyConfigurationConsoleInstaller.exe** program. Start the installer by double-clicking on it, and follow the installer instructions.

CONNECTION & CONFIGURATION OPTIONS USING OBVIUS ALLY POWER METER VIEWER

When the Obvius Ally Power Meter Viewer application is launched, it will prompt the user to select one of four connectivity options.



- Connect over USB (recommended)
- Connect over Ethernet
- Scan Network
- Launch Configurator (no meter connection available)

RECOMMENDED CONNECTION VIA USB AB CABLE

The preferred method for configuring the *AcquiSuite™* Ally meter from a locally connected computer is through the USB interface which provides power to the meter as well as communications.

1) **Connect the Ally meter to a USB port of your computer using a USB A to B cable.**

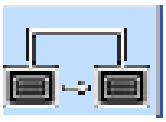
   a. **If equipped, the LCD display is the most visable indication of a running meter.**

   b. **For meters without a display, a green flashing LED on the circuit board indicates that the AcquiSuite Ally meter has booted and is running.**

   c. **The meter will draw 450mA from the USB port which could potentially overload "out of spec" USB hosts. If the meter fails to power from USB, an alternate configuration to power the meter must be used.**

2) **Launch the Obvius Ally Power Meter Viewer application and press the "CONNECT OVER USB" button on the pop-up window.**

The meter should now be communicating. Obvius Ally Power Meter Viewer offers visual guides and context help to facilitate meter configuration. Please read the Obvius Ally Power Meter Viewer overview section (below) or watch the tutorial videos for additional information on configuring the meter. By default, Ally12 & Ally 48 meters are configured for DNS Ethernet addressing. A very common configuration sequence is using USB to configure a meter for Ethernet communications at a static IP address and then switching from USB over to Ethernet to locate it. This is facilitated in Obvius Ally Power Meter Viewer by pressing the "Refresh Connectivity" icon located in the upper right hand corner.



ETHERNET NETWORK CONNECTION

Configuring the Ally meter over Ethernet requires that the meter be powered from an alternate connection. The Ally meter does not support Power Over Ethernet (POE). If the meter is already installed within the building's electrical network, closing the AC breaker (or approved disconnect) will turn on the meter through the meter's internal power supply. In the rare case that a computer's USB port cannot provide 500mA of current, an AC / USB charger or a USB battery can be used as a power source while using Ethernet for communications.

Both the "Network Scan" and "Connect Over Ethernet to IP …" options require that a valid network connection exists between the AcquiSuite Ally meter and configuration PC. This is a common startup issue.

DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP):

Ally meters are shipped in DHCP mode to prevent IP conflicts with other equipment. The meter is expecting to receive an IP address from a DHCP service provided by a router, Layer 3 switch, or a server providing DHCP service. Under this configuration, as long as the AcquiSuite Ally meter and the host PC are requesting an IP address from the same DHCP service provider, they will be able to communicate.

Upon powering up, the AcquiSuite Ally meter will indicate the IP address on the LCD display (if equipped) or can be found using the Network Scan function.

DIRECT:

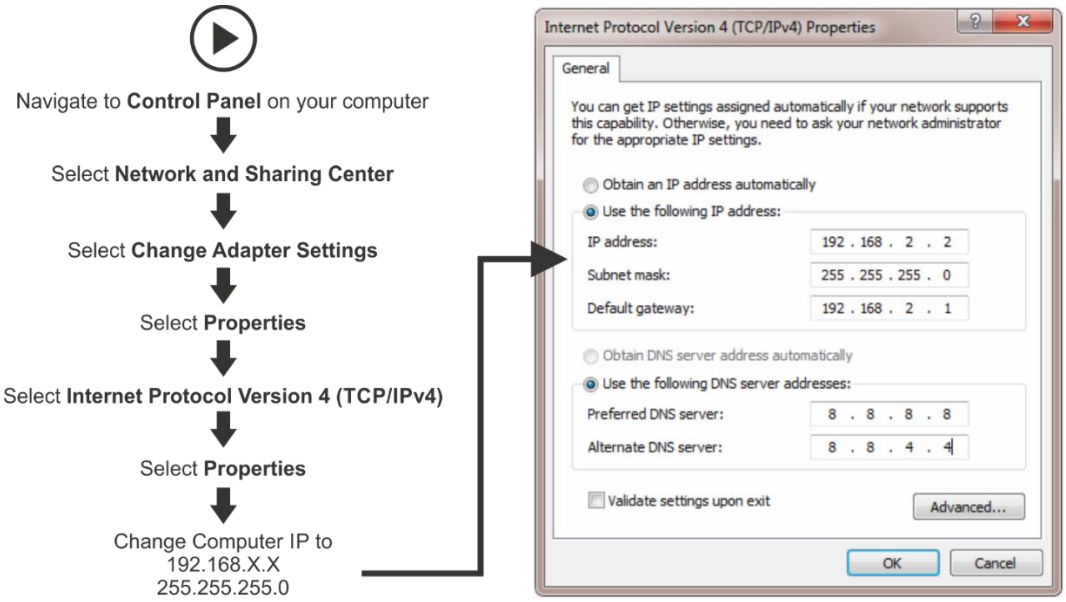
When a PC is directly connected to an Ally meter via an ethernet cable, no DHCP service exists. This configuration can be made to work, but requires changes to either the meter communication settings or the PC network configuration.

LCD Display

For units equipped with an LCD display navigate to

Communications → Ethernet Settings → DHCP → OFF

Change the IP address in the meter to match the subnet of your PC's IP address, making the meter IP unique, or note the current address on the meter and prepare to configure your PC's IP settings as shown below.



Once the PC and Ally meter are set to communicate on the same IP subnet:

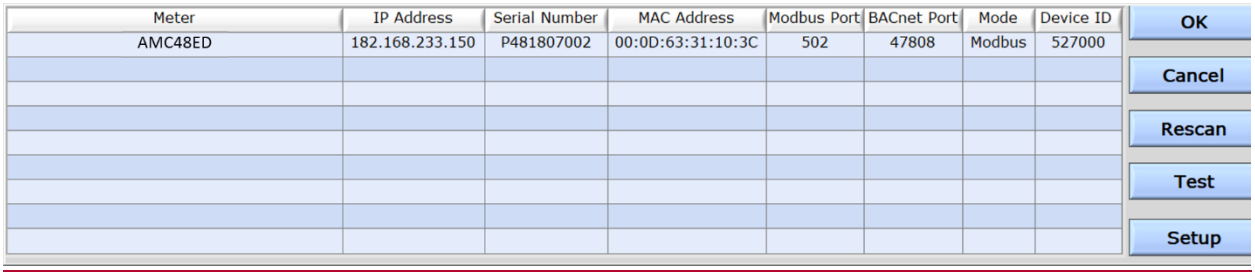
1) **Launch the Obvius Ally Power Meter Viewer application and enter the IP address of the meter (shown as the factory default)**
2) **Press the "Connect over Ethernet" button on the pop up window.**
3) The meter should now be communicating. Obvius Ally Power Meter Viewer is an intuitive application; read the Obvius Ally Power Meter Viewer overview section below.

No LCD Display

An AcquiSuite Ally meter without a display can only communicate directly with a PC over ethernet if the IP address of the meter is set to static. Setting the IP address must be done ahead of time using another interface (such as USB or serial).

NETWORK SCAN

Network Scan is a feature for monitoring previously installed and configured AcquiSuite Ally meters over an Ethernet network. Network Scan will broadcast a UDP discovery packet on the same network as the PC running the Obvius Ally Power Meter Viewer application. Normally this will be performed on a corporate network running DHCP. Any Ally meter that responds will be displayed in a table that includes the system description register, IP address, serial number, and communication configuration.



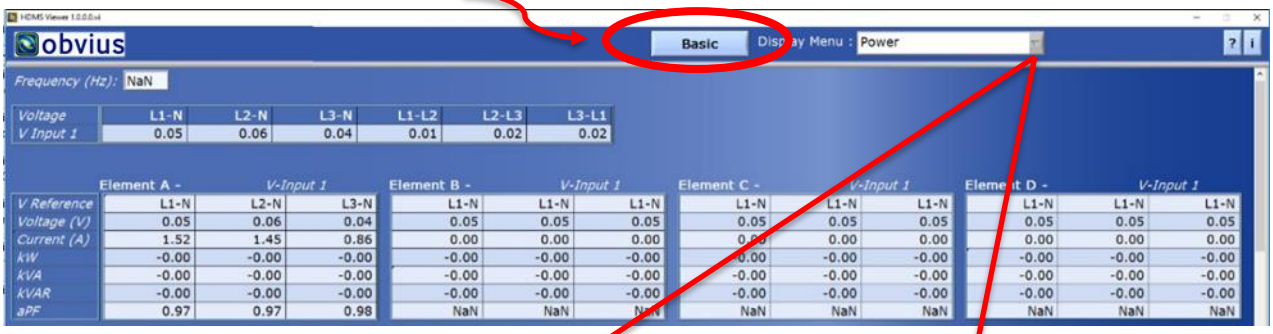
Highlight the desired meter and select OK, Test or Setup. Note that the effectiveness of this technique is highly dependent on the configuration of the PC running Obvius Ally Power Meter Viewer (which may have more than one network card) and the network configuration. Rescans can be used to make multiple attempts to locate a particular meter on busy networks (UDP has no built-in retry provisions).

LAUNCH CONFIGURATOR

The final option in the Obvius Ally Power Meter Viewer Connect to Meter pop-up window is “Launch Configurator”. This option allows for the creation of a meter setup or alarm table for future use without connecting to a meter. After prompting the user for a meter model (shown below), Obvius Ally Power Meter Viewer launches under a mode with restricted functionality. This mode operates on files only.

Obvius Ally Power Meter Viewer Software Overview

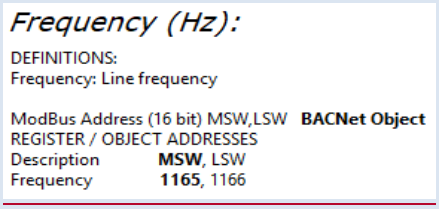
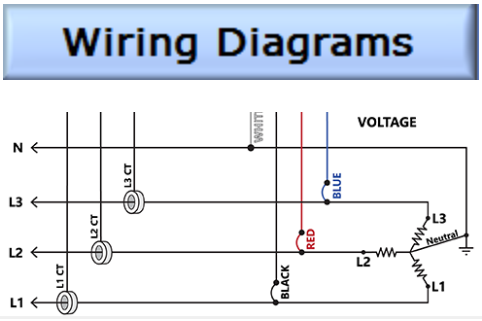
Obvius Ally Power Meter Viewer is a Windows application and is the most versatile software tool for configuring and verifying a *AcquiSuite™* Ally meter. All functions and menus are accessed under the central drop-down list which has a content **filter** for viewing ***basic*** metering data or ***extended*** data that can be helpful in troubleshooting. The information displayed in the drop-down list for each filter setting is summarized below.tro



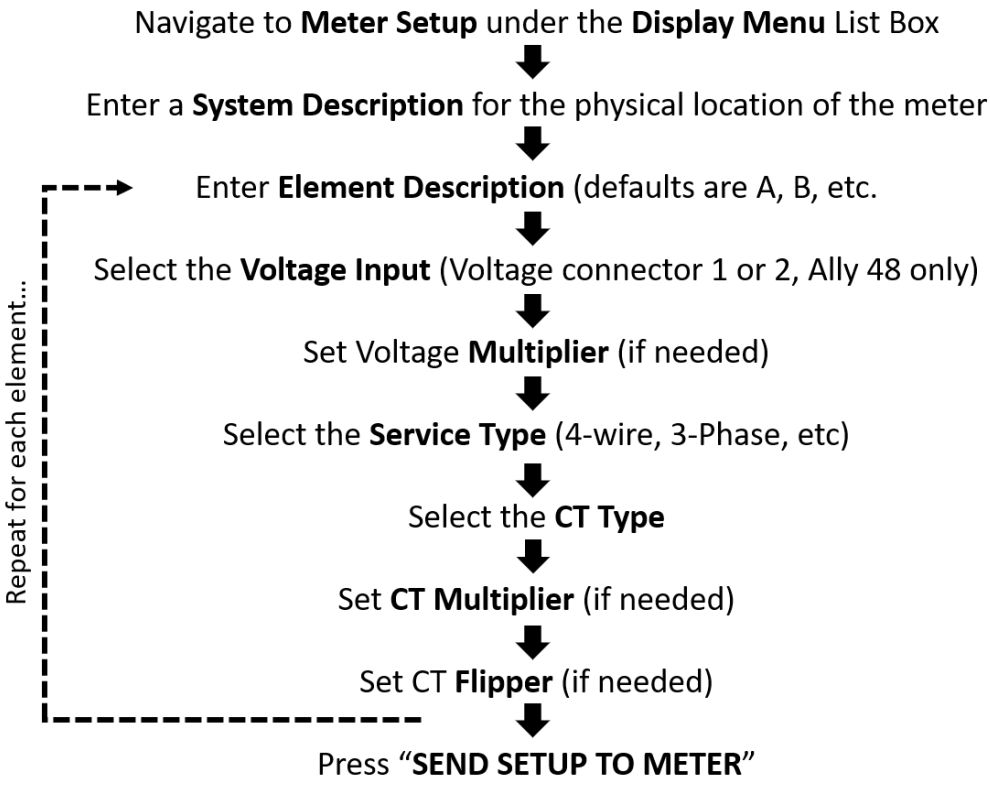
Display Data	
Basic	**Extended**
Monitor Power Energy Demand	**Monitor** Power Energy Demand Power Factor Waveform Capture Harmonics Phasor Plot
Meter Setup Communication Setup Advanced About the Meter	**Meter Setup** Communication Setup Alarms Advanced About the Meter

Obvius Ally Power Meter Viewer Documentation

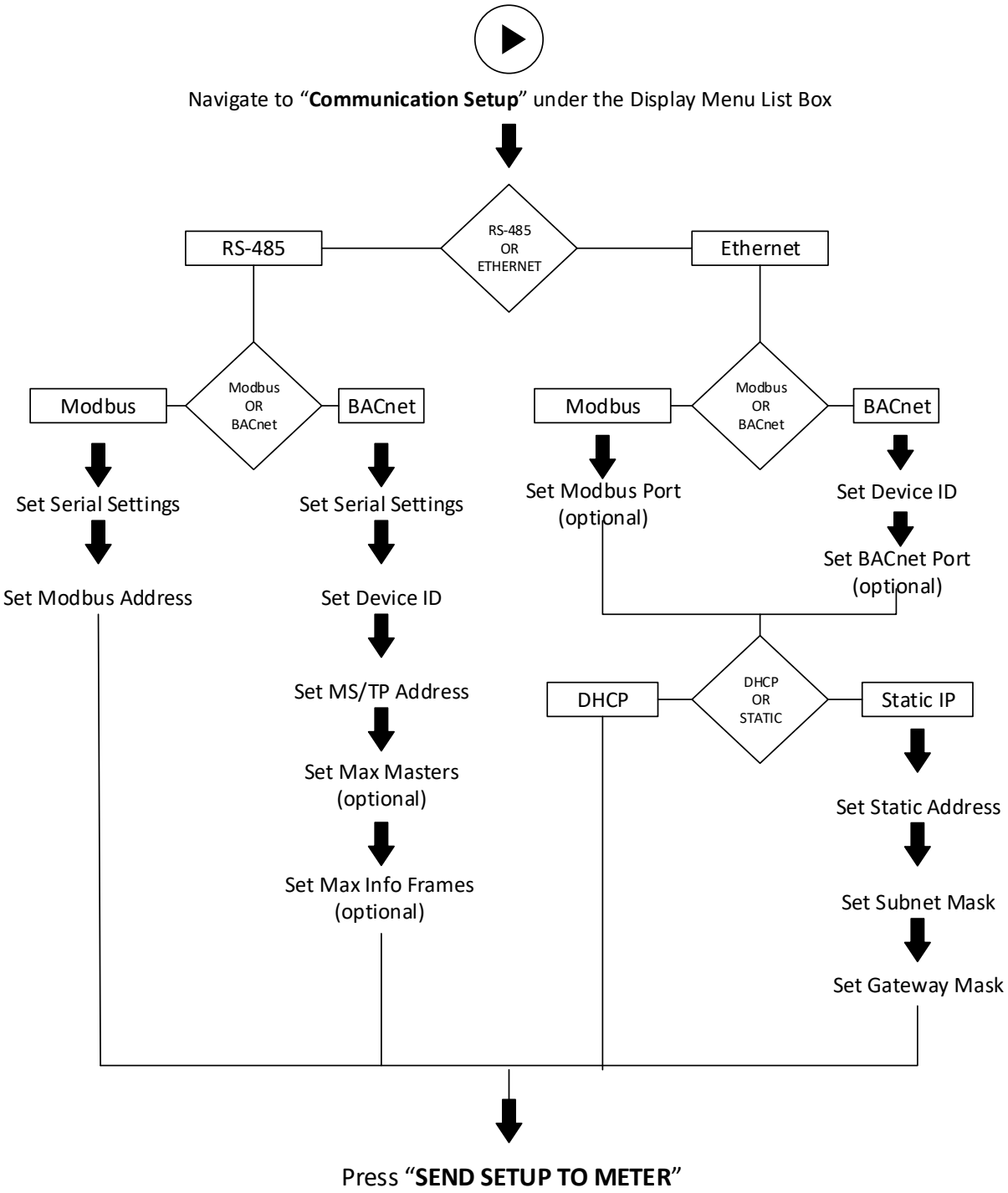
Obvius Ally Power Meter Viewer is an intuitive and self-describing interface that uses context help to facilitate rapid and accurate configuration via the configuration aids described below.

Help Aids	
Information  	This button toggles the context pop-up window which displays the technical and register description of any screen object you hover over with the mouse. (example: Frequency)
CT Type 	Current Transformer models are selected in the drop-down list and are identified by a combination of CT image and amperage range. The parameters for the selected CT are automatically populated. This information can be edited for custom use.
Service Type 	Select a service type from the drop-down list. A selection populates the fields with pre-configured service type information. User-selectable fields are shown in white. Greyed out fields indicate restrictions imposed by the meter.
Wiring Diagrams 	Diagrams of different wiring configurations, such as illustrated here, are available directly within the software for quick reference.

Configuring Electrical Components using Obvius Ally Power Meter Viewer



Configuring Communications using Obvius Ally Power Meter Viewer



CONFIGURING ALARMS IN OBVIUS ALLY POWER METER VIEWER

The AcquiSuite Ally power meter has the ability to set alarms for over and under conditions for voltage and current on any meter channel.

CONFIGURATION INPUT METHODS

Obvius Ally Power Meter Viewer uses dynamic entry for the specification of Alarm settings. Whichever text entry field is selected becomes the forcing condition and the other related fields are updated by calculation to reflect a consistent set of conditions. The text entry fields in grey are "configuration aids" and are NOT retained by the meter. Only the fields with a black background are stored in the meters memory or in configuration files.

NOMINAL VALUES

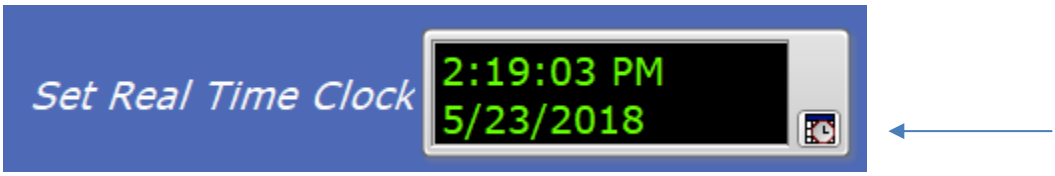
Entering alarm thresholds based on "percent of nominal" values is helpful when alarm conditions are desired to be centered around electrical components or industry standard conditions. For example, an over current alarm may be set to 80% of an installed circuit breaker to alert when that breaker exceeds NEC recommendations.

ABSOLUTE VALUES

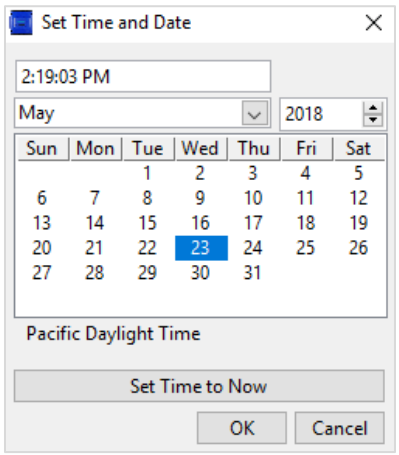
Entering alarms based on absolute value is a matter of entering the triggering values directly in the register fields (black background).

SETTING THE REAL TIME CLOCK

The AcquiSuite Ally meter includes a Real Time Clock. The clock is used only to time stamp Interval Data in the log, it is not used for calculation within the meter. For those customers using the IDR function of the meter, it is helpful (but not strictly necessary) to set the real time clock so that data records can be uniquely identified. The time can be set using Obvius Ally Power Meter Viewer, under the Advanced Tab, by clicking on the small time icon in the bottom right corner of the clock.



The clock icon launches the Window Calendar and allows the user to any desired date and time. "Set Time to Now" populates the current time. Press the "OK" button to commit this time to the RTC chip onboard the meter.



Real Time Clock Power Source

The RTC integrated circuit is a stand alone low power circuit within the AcquiSuite Ally meter. Time is kept in the absence of a connected external power source (AC or USB power) by a super capacitor. The capacitor can keep the RTC running over normal power outages (days to weeks) but is not expected to keep time while the meter is being stored or shipped.

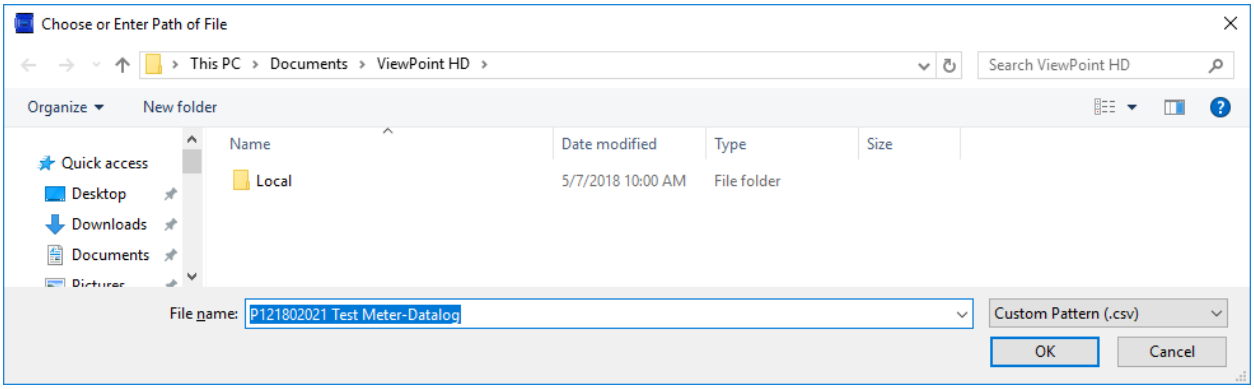
Users desiring to use the Interval Data Recording capability of the AcquiSuite Ally meter will want to have a procedure that ensures the Real Time Clock is set as part of the commissioning process.

Retrieving Interval Data

The AcquiSuite Ally meter maintains an internal log of the energy data (Net kWh) for each channel in the meter. This log is updated every 15 minutes and is always active. The meter stores 63 days' worth of 15 minute data in its memory. This data can be retrieved by users looking to restore gaps in data collection where RTUs may have been offline or communication has been interrupted. The Interval Data Recording (IDR) is accessed through Obvius Ally Power Meter Viewer in the Advanced menu.

Click the "Download" button.

By default, the name of the data file will include the Serial Number of the Meter and the System Description followed by – Datalog (see below)



After pressing "OK" the entire data path will be displayed

The data log is a Comma Separated Values (CSV) file that can be opened in Excel or another program. The data will be listed in Chronological Order according to an internal 32 bit sequence counter. The sequence counter can be used to merge separate files together if necessary (example below).

Sequence Number	Time Stamp	A1 kWh	A2 kWh	A3 kWh	A System	B1 kWh …
123456	5/15/2018 12:00	1.11E+5	2.22E+5	3.33E+5	6.66E+5	0
123457	5/15/2018 12:15	1.12E+5	2.23E+5	3.34E+5	6.69E+5	0

Web Application Overview

The *AcquiSuite™* Ally power meter hosts a Web Application that can be accessed by any smart device running a web browser. The web application can be accessed by using the **USB or Ethernet port.**

CONNECT TO WEB APPLICATION USING USB

1) Connect your smart device to the meter
2) Open a Web Browser
3) Enter http://169.254.1.5 (this is the static address of the internal web server)

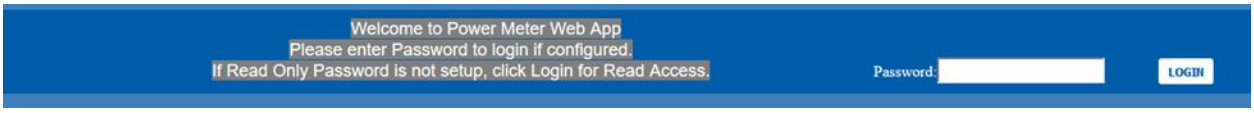
CONNECT TO WEB APPLICATION USING ETHERNET

1) Discover the IP address of the meter by one of the following methods:
    a. Navigate to About Meter on the LCD menu.
    b. Use a network discovery tool to find the address by connecting and disconnecting the Ethernet cable.
    c. Set the meter to a static address using the serial interface.
2) Connect your smart device to the same subnet as the *AcquiSuite™* Ally meter
3) Open a Web Browser
4) Enter the *AcquiSuite™* Ally Ethernet address into the web browser

AUTHENTICATION

Because the *AcquiSuite*™ Ally Web App can be viewed and controlled by any smart device, and communicates in parallel to the host system, the *AcquiSuite*™ *Ally*can be configured to require a PIN# to restrict access the meter. (see Security PIN Protection section on page 44)

Enter the PIN#, if assigned, or leave blank, if unassigned, and press the Login button.



Organizationally, the Web App works much the same as Obvius Ally Power Meter Viewer, although it has no analytics and operates on a single element at a time.

METER INSTALLATION - DETAILS

This section is intended to support the physical installation of the meter and provide guidance on connecting the current transformers (CTs) correctly within the electrical load center and to the AcquiSuite™ Ally meter.

Meter Mounting Configurations

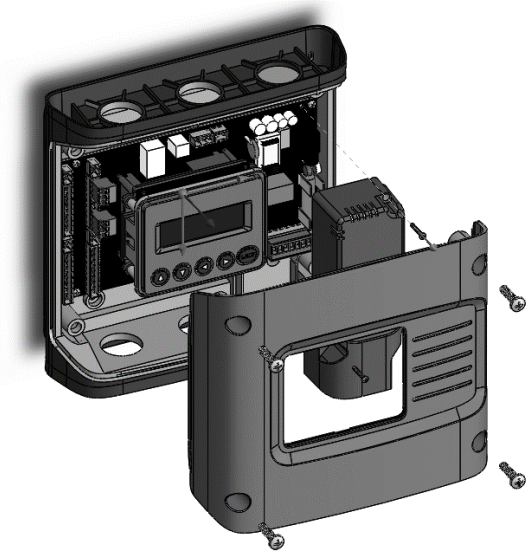
Obvius AcquiSuite™ Ally 12 & Ally 48 meters are sold in both embedded and fully enclosed form factors. Enclosures are designed to be wall mounted and connected to electrical conduit. Embedded versions are ready to be mounted inside a customer supplied NEMA enclosure and offer IP20 protection. Care should be taken not to flex the circuit board during mounting.

Mounting Options	
Enclosure	 
Mounting Plate	 

INSTALLATION SEQUENCE

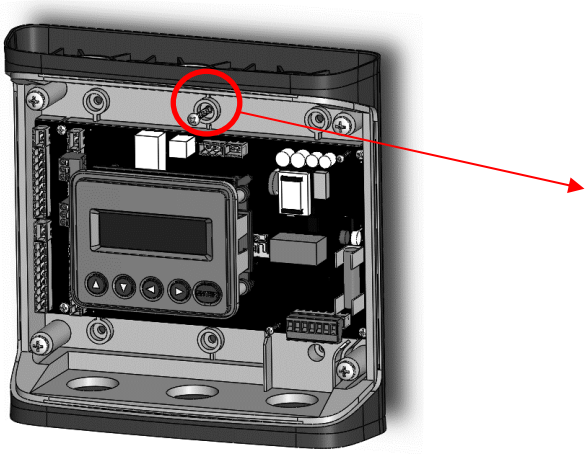
The following section illustrates the Ally AMC12 model. The components are slightly different, but follow the same procedure.

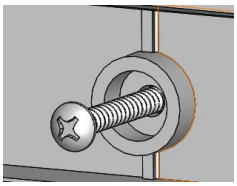
STEP 1) Remove top cover screws (4x) and high voltage cover screws (2x) – provided



STEP 2) Locate, mark, and drill wall mounting points (2x–6x—customer supplied)

The plastic enclosure itself can be used as a template for marking the drill locations on the wall.

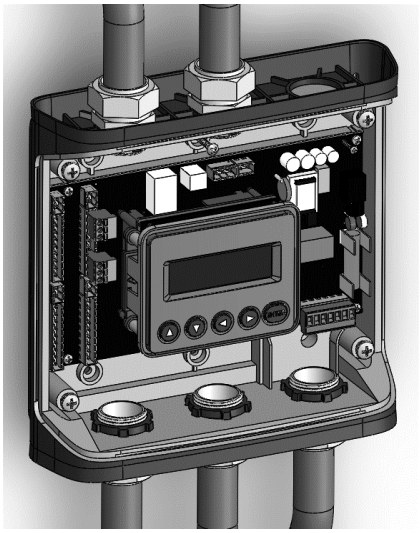




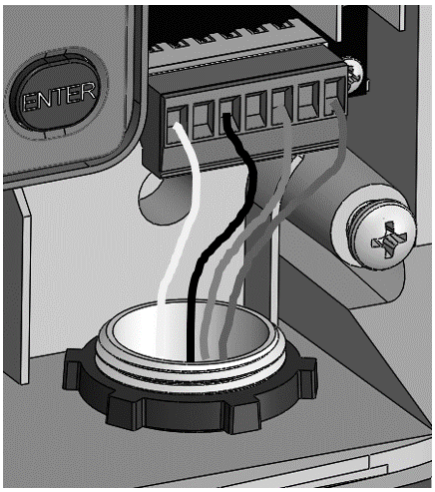
#8 Fastener

If the meter is not available for use as a drill template, a drawing indicating the spacing between mounting holes can be found in the appendix. The centerline holes are intended for fastening to wall studs. If hollow wall fasteners are used, the outer 4 mounting points are recommended.

STEP 3) Mount conduit fittings, conduits, and blanking plugs



STEP 4) Connect voltage leads



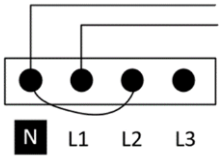
DO NOT ENERGIZE METER WITH VOLTAGE COVER REMOVED

Connecting Voltage

Connect the voltage leads (L1, L2, L3, and N, as necessary) to the meter through a dedicated disconnect or circuit breaker. A voltage lead of **14 AWG THHN Minimum 600VAC rating** (or equivalent) is required.

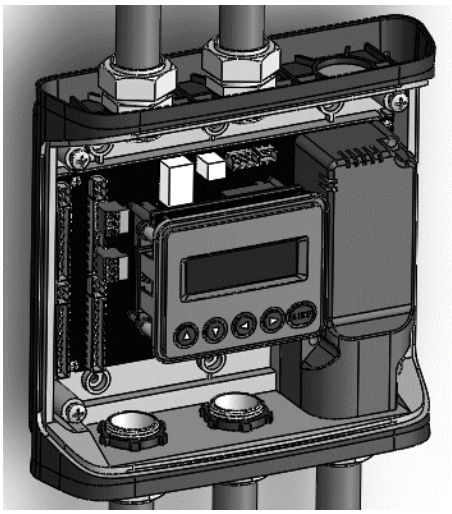
Wiring the Meter in a Single Phase Application

The AcquiSuite™ Ally meter is powered through the voltage between L1 and L2. For single phase installations, where no L2 exists, install a jumper from N to L2. This connection provides power to the meter, maintaining L1-N as the metering voltage reference.



IMPORTANT: Verify the circuit breaker is marked as the disconnect breaker for the meter.

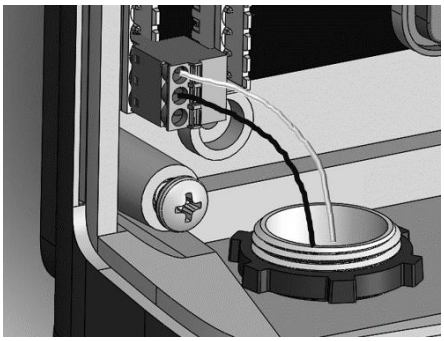
STEP 5) Attach high voltage cover



IP30

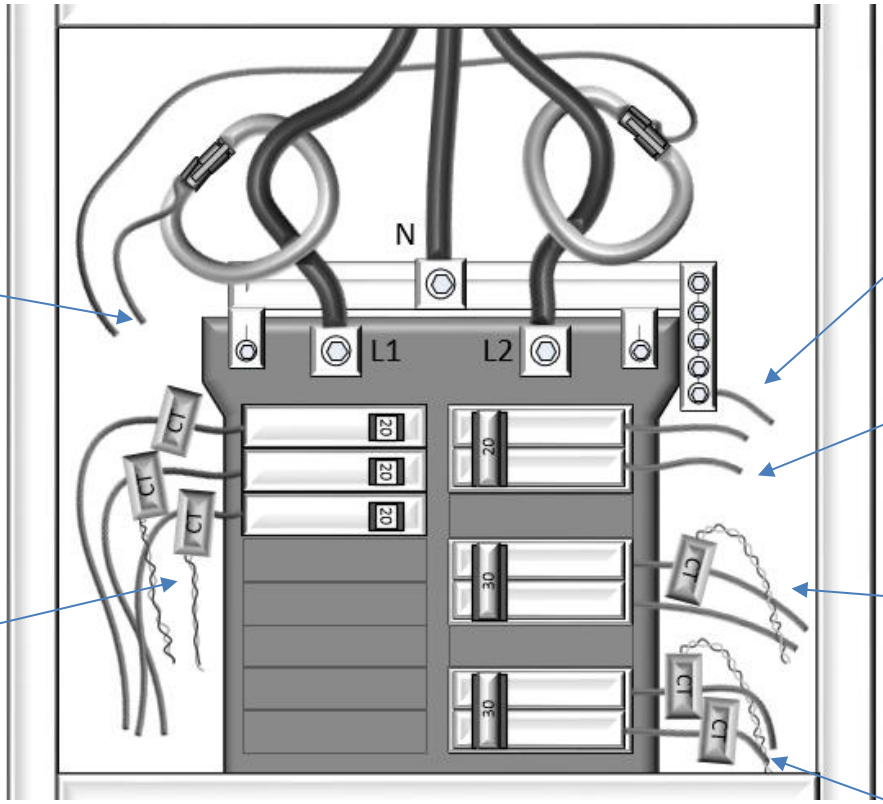
TOUCH SAFE (with internal cover installed)

STEP 6) Connect CT and Communications Wiring



Wiring the *AcquiSuite™* Ally Meter in a 3-wire, Split ϕ Service Panel

> High voltage MAY BE PRESENT. Risk of electric shock. Life threatening voltages may be present. Qualified personnel only.



3-Wire, 1 Phase used On MAINS L1-N, L2-N
(Rogowski Coils Shown)

Connect the Neutral wire to V INPUT 1 (N) on the meter

Meter is powered from L1 to L2 on the V Input 1 terminal
(Label as Disconnect))

Single Phase 110 VAC Plug Loads L1-N or L2-N

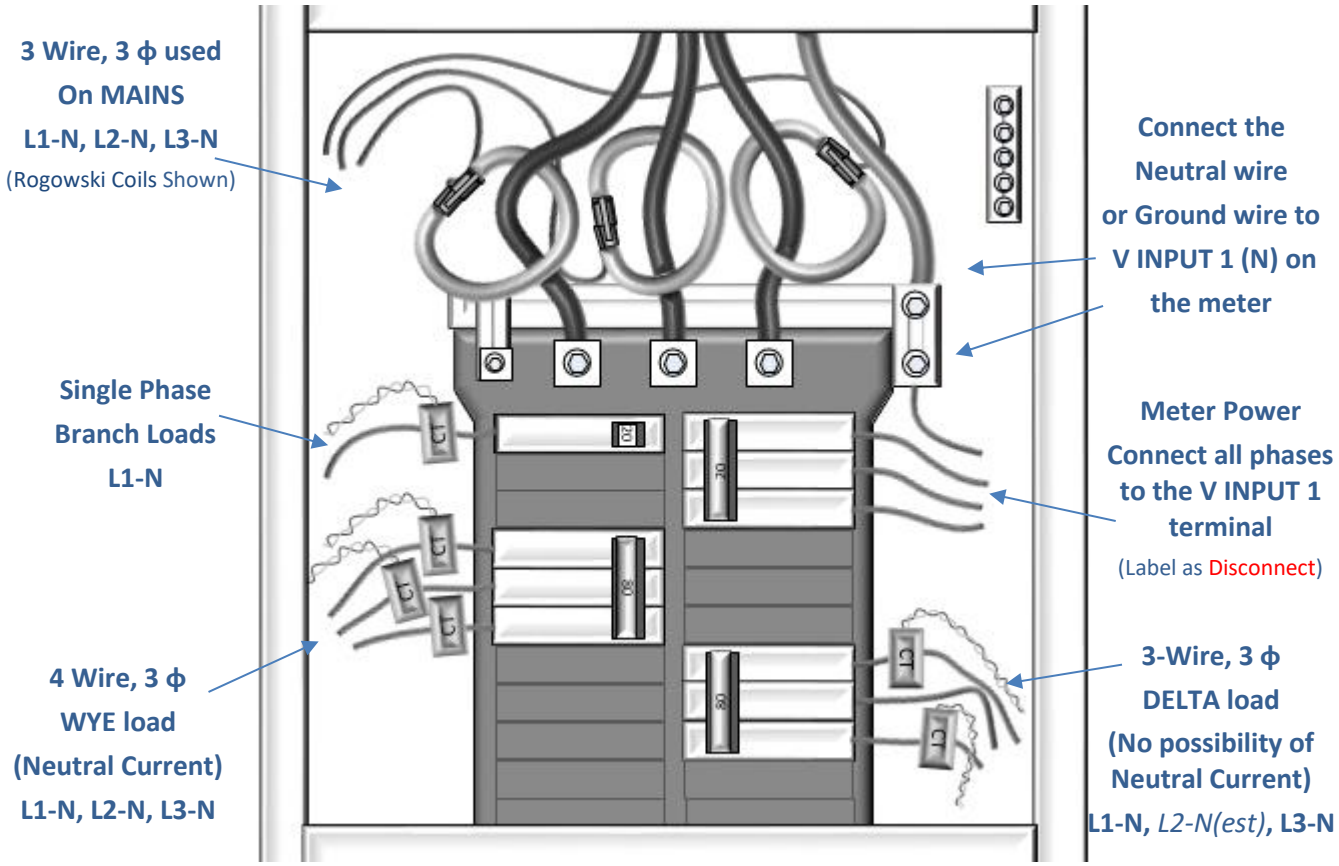
Single Phase 220 VAC Plug Load L1-L2

3-Wire, 1 Phase Split Load L1-N, L2-N

Illustrating the intended wiring configuration for each of the Service Types available in the Service drop-down list under "Meter Setup"

EXAMPLE LOADS:
Single Phase L1-N or L2-N 110 VAC: Lighting, Appliance, Living Zone
Single Phase L1–L2 220 VAC: Water Heater, Clothes Dryer, Equipment with no neutral wire.
Split Phase L1–L2 220 VAC: Service Entrance, Equipment with neutral wire.

Wiring the *AcquiSuite™* Ally Meter in a 4-wire, 3 ϕ Service Panel



Illustrating the intended wiring configuration for each of the Service Types available in the Service drop-down list under "Meter Setup"

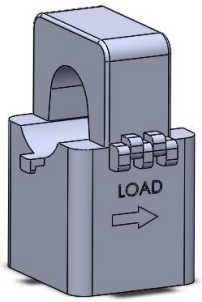
Note: The ***AcquiSuite™*** Ally Meter Series uses the "Neutral" Terminal as a voltage reference. For systems without a neutral conductor, Obvius suggests connecting a ground wire to this terminal. If the neutral terminal is left open, L-L measurements will be accurate, but L-N measurements may not be symmetric. If a ground wire is connected to the Neutral terminal, <2mA will flow into the ground wire.

Current Transformer Basics

Ensure CTs meet the following criteria:

- 600 VAC UL Rated
- UL2808 Listed
- 1/3 V (333 mV) output voltage
- Appropriate range for the circuit (5-120% of CT Rating Recommended)
- Read the label

Ensure CT orientation & placement:

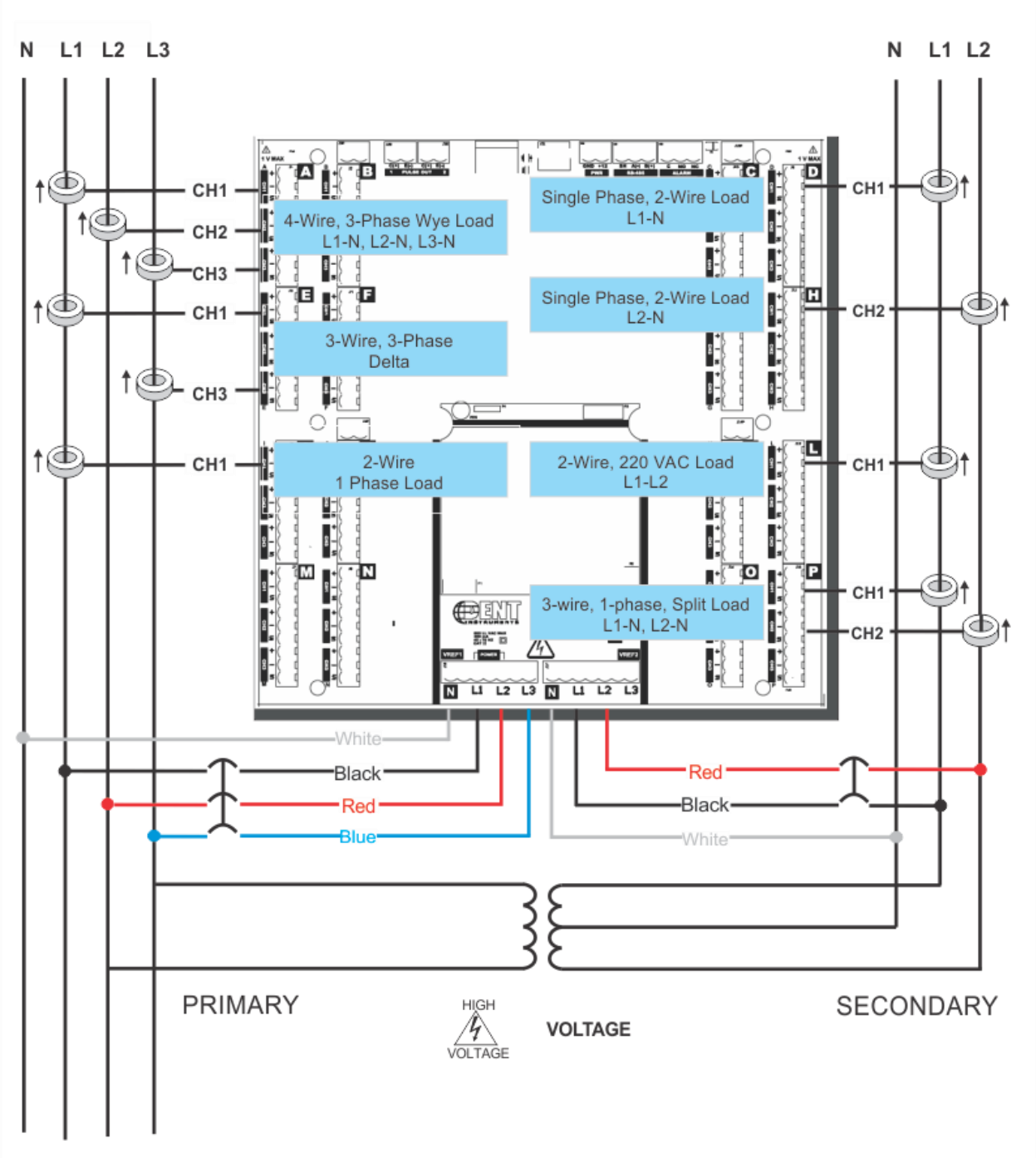


- Arrow points toward load (or as instructed by CT label)
- Arrow points away from Panel (or as instructed by CT label)
- Placed on first conductor of voltage reference (L1 for L1-L2 circuits)
- Observe wiring color and polarity
- Use the Shield wire if provided (connect to PCB terminal marked S)

Wiring Guide for CT Types	
Split, Hinged, & Solid Core CTs	**Rogowski Coil CTs**
	
White: Positive **Black: Negative** **(no shield)**	**White: Positive** **Brown: Negative** **Bare Wire: Shield**

Wiring the CTs to the *AcquiSuite™* Ally Meter

The image below is the counterpart to the service panel illustration and indicates how to connect CTs to the Ally meter for each service type. For service types that are not specifically listed, it is recommended to choose “single phase” service and configure each channel individually. Three phase loads are illustrated on the left and split phase loads on the right as an example only. Elements are fully interchangeable on the meter.



COMMUNICATION & VERIFICATION - DETAILS

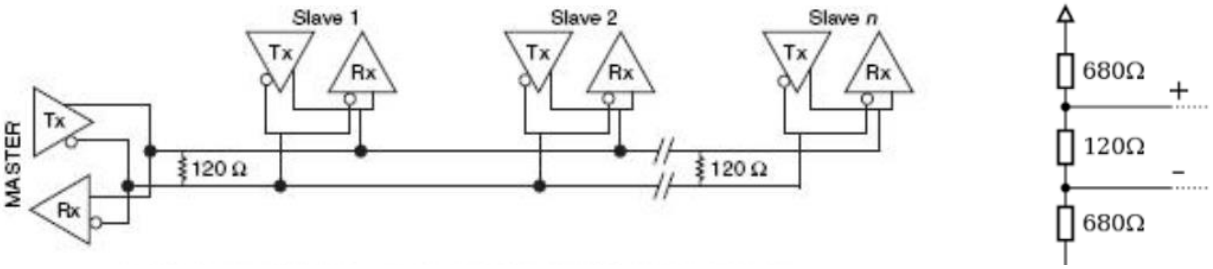
This section is intended to support the commissioning of the *AcquiSuite™* Ally meter by an instrumentation technician. In many cases, the electrical installation is conducted ahead of the availability of the RTU or was performed by a different installer. Often the technician is working in concert with a remote programmer who is confirming the connectivity with a remote host system. A Digital Multimeter (DMM) can be used to confirm measurements at the board terminals, if necessary.

It is assumed that the meter is now powered up from the line voltage. It is safe to touch the meter (including the user buttons) with the top cover removed ONLY IF THE INTERNAL HIGH VOTLAGE COVER IS INSTALLED.

Communications settings and real-time data values can be confirmed quickly using the LCD interface. If significant setup modifications are anticipated, a computer interface is recommended.

Physical Connections on an RS-485 Multidrop Network

The *AcquiSuite™* Ally meter uses a 2-Wire Half Duplex RS-485 Implementation.



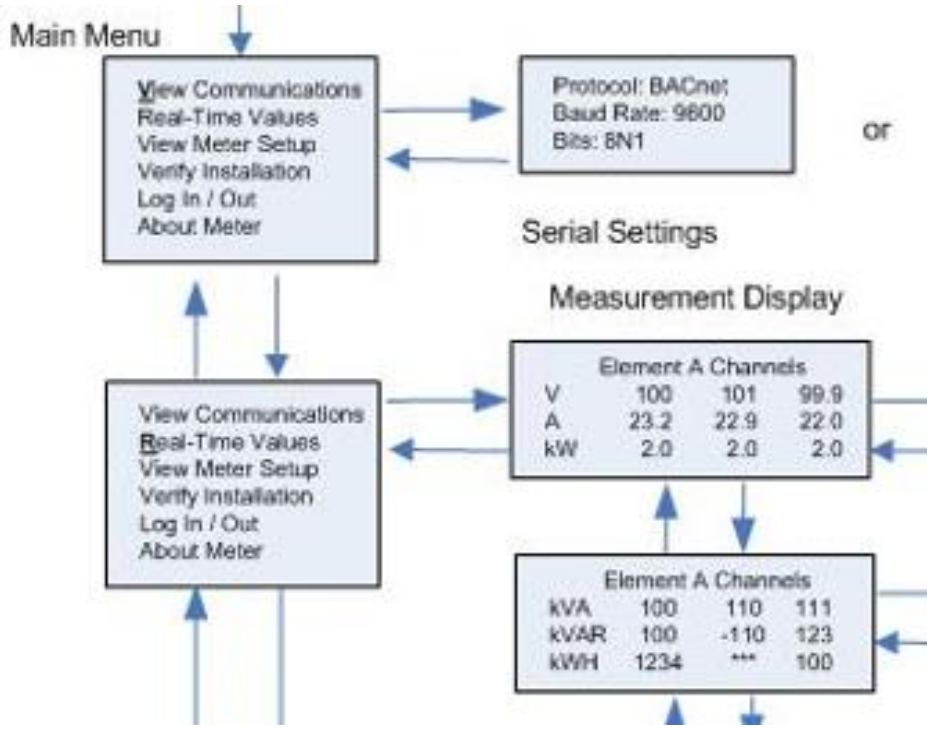
2-Wire Multidrop Network using Terminating Resistors

- **Termination Resistors**—are NOT included on the *AcquiSuite™* Ally meter. If the *AcquiSuite™* Ally meter is at the end of a daisy-chain, then connect a 120-ohm leaded resistor between the + and – terminal at the connector.
- **Bias Resistors**—are NOT included on the *AcquiSuite™* Ally meter. Bias resistors are needed If the idle conditions of the bus are in an indeterminant logic voltage. Bias resistors are usually located at the master node and are usually 680 ohms for a RS-485 network.
- **Network Topology—**RS-485 is designed to be implemented as a **daisy chain** (series connections) rather than star or cascade topologies.
- **Signal Names—**Some RS-485 devices use the terminology A/B while others use +/-. Note that A is (-) and B is (+). Many manufacturers incorrectly label the terminals.
- **Bus Loading**—The *AcquiSuite™* Ally meter is a 1/8th unit load allowing up to 256 like devices in parallel.

Communication Verification

Verification includes confirmation of BOTH the physical interface settings (Serial or Ethernet) and the protocol (Modbus or BACnet) settings.

The LCD User Interface can be used to quickly confirm the settings required for each combination of interface and protocol. The interface is intuitive and groups together commonly associated registers. The complete interface is presented in Appendix A as a navigational map. Arrows indicate how to move from one menu display to the next. A Reverse Contrast entry in the documentation indicates the active menu item in a list which corresponds to a blinking character in the physical LCD. The ENTER button is used to select a property and up / down buttons are used to select among the values supported by the meter. Note that changes to the meter configuration are limited to the communication interface using the LCD. If additional changes (such as CT type) are required they must be made using a software interface.



Example LCD Navigation

Obvius Ally Power Meter Viewer / Web Application

If your *AcquiSuite™* Ally model does not include the LCD User Interface or if you prefer to verify the installation using software then verification is facilitated through the Obvius Ally Power Meter Viewer PC application or the Web App which shares a common design. Refer to the section on Configuration Details for an overview and list of instructional videos for Obvius Ally Power Meter Viewer or the *AcquiSuite™* Ally Web App.

Physical Interface Verification

Serial Setup Verification

In a multidrop serial network, the host data format settings are typically known or specified and the slave is adjusted to match. In some cases (long wiring runs, etc.), it may be necessary to experiment in determining the fastest allowable baud rate for a given wiring configuration by changing BOTH the host and slave devices. Configurations other than 8N1 are rare, and it is advised to use this configuration for Data Bits, Parity and Number of Stop bits, if possible.

LAN Ethernet Network Verification

The *AcquiSuite™* Ally meter communicates using IEEE 802.3 Ethernet connectivity running at a 10/100 Mbps. Verification of the meter settings over Ethernet includes ensuring that the IP address of the meter is within a range that allows communication with a host (if static) or set for DHCP allowing the meter to be assigned an address by a DHCP server as described below.

DHCP

If the *AcquiSuite™* Ally meter is configured for DHCP when the meter is powered on or the Ethernet cable is inserted the meter is assigned an IP address by the DHCP server. This address appears on the meter LCD or can be found through connection with Obvius Ally Power Meter Viewer or the *AcquiSuite™* Ally Web App. The IP address assigned to the meter should be regarded as a **temporary address** as the address may change between power cycles making it difficult for the host system to know how to find the meter on the network. One common approach is to set the *AcquiSuite™* Ally for DHCP so that the address can be assigned by a DHCP server and then change that IP address to static once the connection is made. *AcquiSuite™* Ally meters are set to use DHCP as a default setting to facilitate this approach.

STATIC IP

If the *AcquiSuite™* Ally meter is set to a static IP then its address should be assigned by an IT department to avoid multiple devices on the same network. This scheme is usually used when an RTU is expecting to find the meter at a specific IP address.

Protocol Verification

The network protocol is typically specified as part of the installation. BACnet MS/TP and Modbus RTU are the two communication protocols that operate over an RS-485 serial network and BACnet IP and Modbus TCP are the protocols over Ethernet. Each combination of interface and protocol require specific register settings described below. The scope of this section is to use either the LCD interface or software tools to quickly confirm or change settings to match an existing specification. Further information and optimization tips are covered in the section on RTU programming.

Modbus Settings

MODBUS RTU SETTINGS

Device Address: In a Modbus network each device must be assigned a **unique slave address**. Valid Modbus addresses are 1-240 (keeping in mind the Ally 48 requires 15 addresses beyond Element A or the Ally 12 requires 4 address beyond Element A). The slave address of the power meter. The slave address sets the register address for **ELEMENT A**. Adjacent elements B, C, D, etc. are accessed by incrementing the slave address by 1. The slave address of the *AcquiSuite™* Ally meter needs to be set to match the address expected by the RTU and is normally part of the network specification. The default address for element A is 1.

MODBUS TCP SETTINGS

Modbus Port: The *AcquiSuite™* Ally meter uses the industry standard Port 502 for Modbus. This port number can be changed, although this is considered an advanced setting and should be left at 502 unless this generates a conflict on the host system. The port number can only be changed through a software interface.

BACnet Settings

BACnet Device ID: In a BACnet network each device must be assigned a **unique Device ID and is common to BACnet MS/TP and BACnet IP protocols**. Besides the standard ability to change this from a BACnet explorer tool it may be changed via the Viewer, *AcquiSuite™* Ally Web App, or LCD.

BACNET MSTP

Device Address: Ally meters are Master devices and as such must use MS/TP addresses in the range from 0-127. This address must be unique on the network.

Max Masters: The default setting is 127 and does not usually need to be changed.

Max Info Frame: The default setting is 1 and does not usually need to be changed.

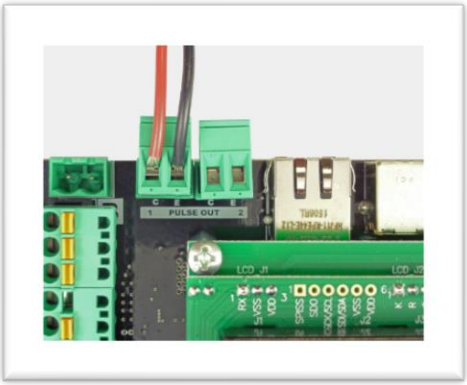
BACNET IP

BACnet Port: The BACnet default port is 47808 and does not usually need to be changed

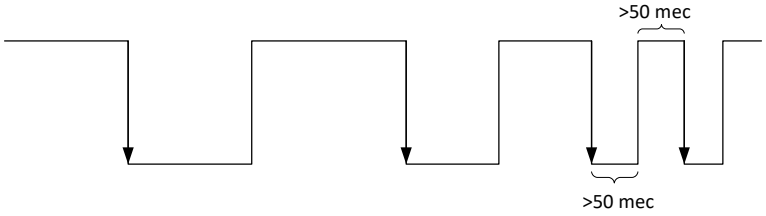
BBMD: The BACnet/IP Broadcast Management Device is set to 0.0.0.0 at default and can be changed through a software tool to allow discovery across networks.

Pulse Inputs

Ally ACM12 meters are equipped with 4 pulse inputs and Ally ACM48 meters (hardware version I) are equipped with 2 pulse inputs. Pulse counting supports accumulation of consumption data from any external meter using a dry contact (Form A Relay) or open collector outputs. The AcquiSuite Ally pulse inputs are compatible with "low speed" meters. The pulse duration must exceed 50mS in both the logic low and high state allowing for a maximum input frequency of 10 Hz.



Pulse scaling, resetting and accumulated values are accessed through registers and are "system" in scope. Refer to the register list, Obvius Ally Power Meter Viewer, or videos for more information.



Typical Pulse Sequence

ALARM (SPDT)

The Ally meter supports user-configurable alarms for over-current, under-current, over voltage, and under-voltage. Obvius Ally Power Meter Viewer helps users set these values by allowing values to be entered using direct entry mode or specifying the limits as a percentage of nominal.

Alarm persistence settings are used to allow for temporary conditions, such as a motor starting, that are beyond trigger limits. For example, in the case of meter upset from ESD events, short persistence settings may lead to false alarm triggers. When any alarm condition has been satisfied throughout the persistence interval, the AcquiSuite Ally trips the MASTER ALARM relay, which is an electromechanical relay on the PCB.

Once tripped, the relay can only be reset by clearing the alarm through Modbus register/ BACnet object 2451"

The Master Alarm relay can be hard wired to an interrupt or polling circuit in a host system allowing for a more rapid response than the data polling frequency, if desired. The status of each alarm is determined by reading status registers.

Refer to the register list, or Power Meter Viewer manual for more information.

Note: The Master Alarm relay is intended for low voltage DC connections. The user must protect the switch from over-current conditions when closed.

12 Volt Auxiliary Power

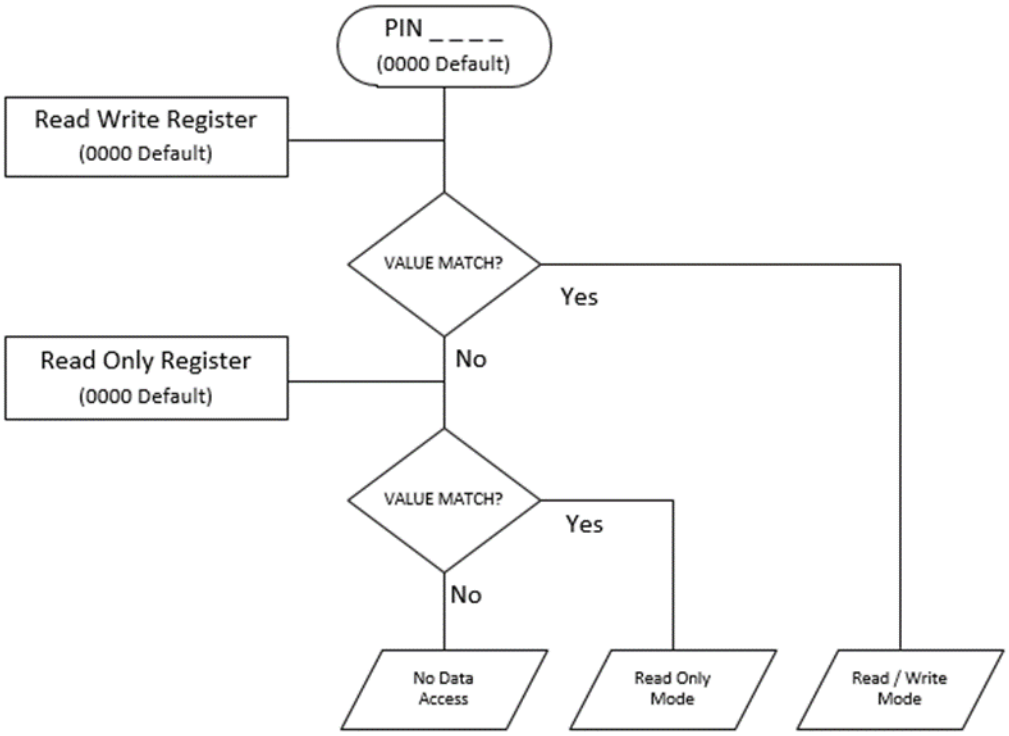
The *AcquiSuite™* Ally meter provides an auxiliary 12 volt output that is derived from an auxiliary winding on the *AcquiSuite™* Ally line connected power supply. The 12 volt supply voltage is unregulated but protected by a self-resetting fuse. The purpose of the supply is to power external radio equipment or provide supply voltage for analog sensors such as 4-20mA current loop devices. If full rated current is drawn from this terminal the minimum operating voltage of the L1-L2 power supply is 100 VAC.

ACCESS RESTRICTION LIMITATIONS

If security levels have been set up in the meter, no data is accessible through the LCD user interface or Web App without entering the PIN credentials. Note, however, that protocols such as Modbus do NOT SUPPORT ANY LEVEL OF security such that any network traffic acting as a master can retrieve and write data from the registers. Generally, this will require knowledge of the IP address or slave ID and the register list which discourages casual intrusion.

SECURITY PIN PROTECTION

AcquiSuite Ally meters have two levels of PIN protection that users can choose to assign for restricting access to meter information. The PIN logic is described in the figure below. The default user entry (on power up or time-out) is 0000 which satisfies both the Read Only and the Read / Write default register settings.



USING THE PERMISSION REGISTERS

The *AcquiSuite™* Ally meter uses both a "Read Only" register and a "Read / Write" register to compare against user entries from the LCD keypad or *AcquiSuite™* Ally Web App form entry. Both internal permission registers have a default value of [0000]. A consequence of this is that both PIN registers need to be configured (i.e. changed from defaults) to implement a read only PIN, otherwise the situation may occur where a user intends to be restrict access to "Read Only" by setting only this PIN, unaware of the

factthat the default PIN still matches the criteria for “Read / Write” which will accidentally promote the user. Obvius Ally Power Meter Viewer and the Web App disallow this condition but remote programmers using direct register access may create this condition.

READ ONLY PERMISSION REGISTER

Configuring the meter for a Read Only user allows data or configuration items to be viewed but not changed. This level of authorization might be appropriate for general end users such as building owners who may not be aware of the details of the installation. It is recommended to use Obvius Ally Power Meter Viewer to configure permissions although it is also possible to set up a Read Only PIN using the Web App if a Read/ Write PIN has already been entered (either through the LCD or the Web App itself).

READ/WRITE PERMISSION REGISTER

Read/Write permissions allow users to read and write configuration items and to reset the PINs. This level of authorization will be required by any technician or user who needs the ability to correct setup errors in the meter. The default PINs [0000] allow new users to reset the Read / Write PIN from either the *AcquiSuite™* Ally Web App or Obvius Ally Power Meter Viewer. Permissions cannot be set through the LCD interface.

READING PINS OVER MODUS OR BACNET

Obvius Ally Power Meter Viewer can be used to directly report the Read Only and Read/ Write PINS under the Advanced Tab (passwords). The value reported by Obvius Ally Power Meter Viewer is the value as entered in the web page or LCD interface.

PINs are also accessible as registers, but are encoded so that reading the value of the register through an RTU does not inform a user what the password is. This feature allows Obvius to support looking up forgotten PINs, if network access is available.

OBVIUS ALLY POWER METER VIEWER UNRESTRICTED ACCESS

The Obvius Ally Power Meter Viewer software tool can be used to read & write configuration information to the meter without entering credentials.

> **Obvius Ally Power Meter Viewer is the preferred tool for setting up access restrictions because it allows users to test the function of the PINs without locking themselves out from the ability to change the PIN, a frustrating catch 22!**

Verification of CT Installation

Once the *AcquiSuite™* Ally meter is configured and communicating with the RTU, it is a good idea to perform some simple checks to ensure that all the CTs are on the correct voltage phases and that the CTs are facing the correct direction. The following are recommendations that work for typical installations. Special circuit conditions, like unloaded motors, may indicate an installation error when none exists. A Digital Multimeter (DMM) can be used to confirm these cases.

Installation Phase Verification

The *AcquiSuite™* Ally meter includes a PhaseChek™ algorithm that identifies any element that the meter suspects may be incorrectly phased (i.e., the CT is associated with the wrong voltage source or is physically on the wrong wire) based on power factors below 0.55. This feature is accessed using the LCD interface by navigating to "VERIFY INSTALLATION" and pressing the ENTER button. The LCD display will list the elements having at least one channel with a low power factor.

```
CHECK ELEMENTS
A    EF
```

Use the navigation buttons to highlight a specific element and hit enter or just hit enter and move from element to element using the ← / → keys. Within each element (identified on the top line of the display) the status of each channel is identified as good (PF > 0.55) or bad (PF < 0.55).

```
ELEMENT F
CH1 Good
CH2 Bad
CH3 Bad
```

Two "Bad" channels are often an indication that two CTs are inadvertently swapped. When the power factor for all enabled channels is greater than 0.55 the meter reports

```
CHECK ELEMENTS
ALL CHANNELS GOOD
```

PhaseChek™ is only applied for elements that are enabled. VIEW METER SETUP on the LCD screen can be used to ensure that all intended elements are active. PhaseChek™ is advisory only. It is possible that the power factor for a particular load is truly less than 0.55, as may be observed in a free running motor.

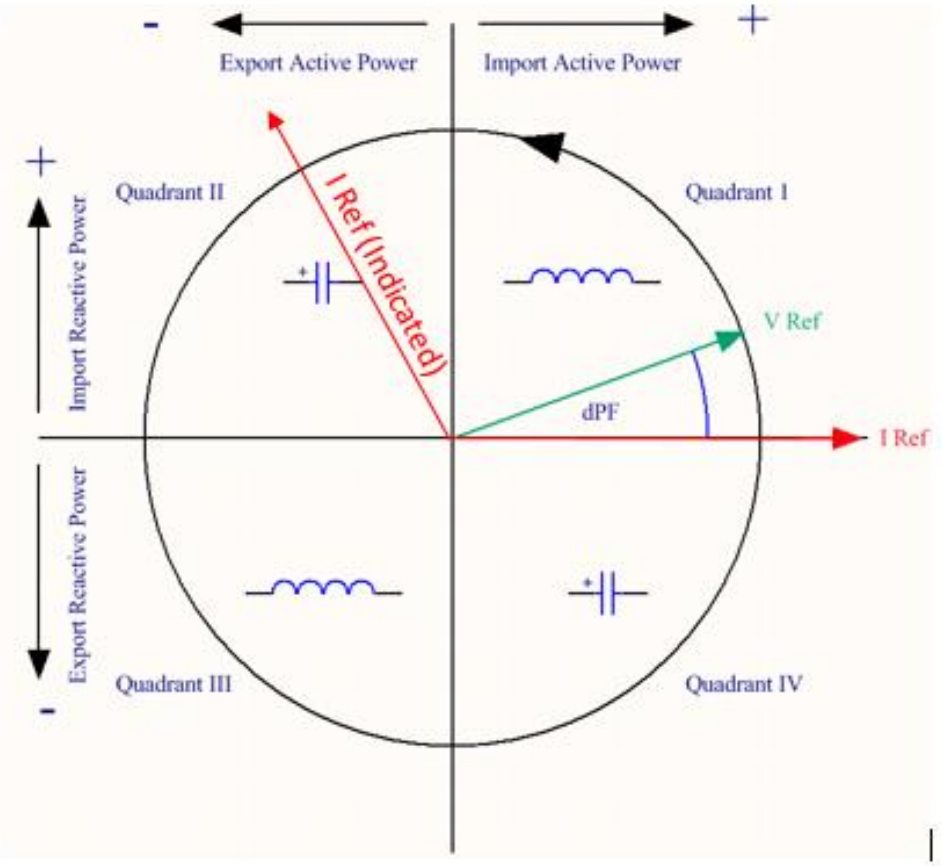
The Obvius Ally Power Meter Viewer and the *AcquiSuite™* Ally Web App run **PhaseChek™** continuously on all enabled elements and report low power factor in the real time values table by turning the text RED or by a using a red indicator.

PHASE CHECKING BY PHASOR PLOT

When a CT is installed on the incorrect phase, the indicated current vector is pointing either 180 degrees away (a split phase system) or 120 degrees away (a three-phase system) from the true displacement angle. In the latter case, this usually causes a significant decrease in the reported power factor, even if the CT is also on backwards. When the absolute displacement power factor of a load is below 0.55 (an angle greater than 57 degrees between voltage and current) the *AcquiSuite™* Ally meter will flag it as a phasing error. Obvius Ally Power Meter Viewer has a PhasorPlot feature that can be used to study the voltage and current vectors of a given meter element.

Check for Low Power Factor

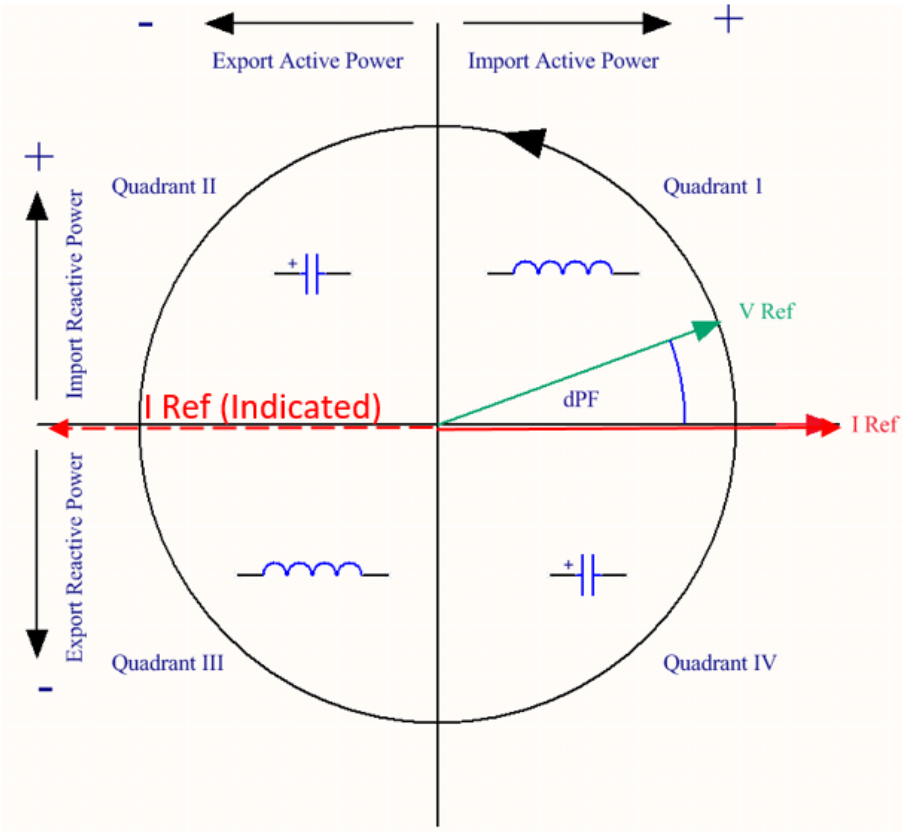
- **Obvius Ally Power Meter Viewer: Real Time Values > (All power factors < 0.55 are shown in RED)**
- ***AcquiSuite™* Ally Web App: Real Time Values > (All power factors < 0.55 are shown in RED)**
- **LCD: Verify Installation > (LCD will list all elements having a PF < 0.55)**



Electrical Power Quadrants with Incorrect CT Phase shown

CT Orientation Check

The *AcquiSuite™* Ally meter reports power and energy in each electrical quadrant under a different register. When CTs are installed backwards, the indicated current vector is oriented 180 degrees away from the true displacement angle. In accordance with standard definitions, the Wattage and VARs of the effected channel report with a sign opposite from what is expected. Often this means that the import registers will be reading zero while the export registers are showing a value. Note that backward CTs have no impact on the amplitude of the Power Factor. A moderate power factor (>0.7) in concert with a negative power is a clue that the CT is on backwards, but is on the correct phase.



Electrical Power Quadrants with Reversed CT shown

Check that the wattage has the correct sign (Designated + for loads)

- **Obvius Ally Power Meter Viewer: Real Time Values > (Confirm Sign of Power For All Elements)**
- ***AcquiSuite™* Ally Web App: Real Time Values > (Confirm Sign of Power For All Elements)**
- **LCD: Real Time Values > (Confirm Sign of Power for Each Element)**

If a CT is discovered to be on backwards after the installation is complete, the direction of the CT can be reversed through a user configuration register designed for this purpose, called the "Flipper," located at 2226, 2234, and 2235, or use Obvius Ally Power Meter Viewer.

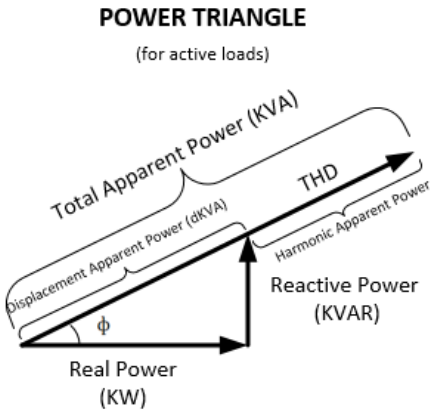
Power Factor Convention

Power Factor is the ratio of a signed number (true power) and an unsigned number (apparent power). This discrepancy has led to some customer confusiuon. The AcquiSuite Ally meter allows users to select between two conventions (ANSI & IEEE). In the IEEE convention the sign of PF follows the sign of power itself. In the ANSI convention a "+" PF indicates a lagging current (inductive load) while a "–" PF indicates a leading current (capacitive load). The sign relationships are shown below for these conventions in each electrical quadrant.

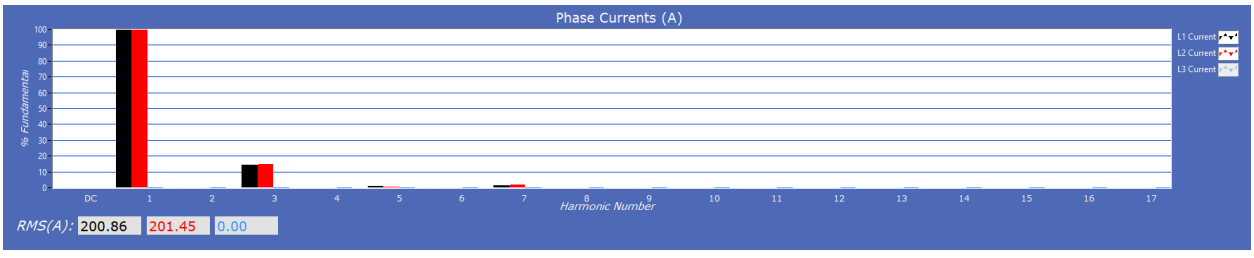
P.F.	Q1	Q2	Q3	Q4
ANSI	+	-	+	-
IEEE	+	-	-	+

Total Harmonic Distortion

The AcquiSuite Ally meter reports overall harmonic content in power (% THD) based on its measurement of Power, Var and Apparent Power as illustrated in the figure below. This method cannot indicate the harmonic number or distribution but provides the overall harmonic content.



In many circumstances users are interested in the harmonic content of **current**. In cases where the voltage is very sinusoidal the THD measurement is a good estimate of both power and current. However, if the voltage waveform is distorted the reported THD in power can be misleading. Obvius Ally Power Meter Viewer can provide additional analysis of harmonic content in voltage and current by sampling the AcquiSuite Ally raw data and performing digital signal processing on the signal. Using this method the individual harmonics levels can be observed. The results are presented in graphical form.



Pre-Processing Aids

The AcquiSuite Ally meter has several registers that can aid in pre-processing or post-processing data that otherwise may need seconday operations.

Snap Thresholds

The signal to noise ratio of the AcquiSuite Ally meter is above 80 db at full scale (1 part in 10,000). When the signal amplitude becomes so small that it is indistinguishable from noise it is often better to record 0 than a small random value. Snap Threshold registers (*Advanced* tab in Obvius Ally Power Meter Viewer) tell the meter when to record 0 instead of the measurement result. The factory defaults for CT's are expressed in percent and have a default value of 0.04% Full Scale. The voltage thresholds are in absolute value, the recommended minimum voltage is 1.0 volt.

Multipliers

The AcquiSuite Ally meter has registers that allow potential transformers and series current transformers to be used with the AcquiSuite Ally meter. These registers allow for transformer winding ratios or other scaling adjustments to be included in the meter processing to eliminate post process scaling. Adjustments for voltage are global to the meter while CT's can be adjusted on a channel by channel basis. The multiplier is a floating-point number and can also be used for post installation calibration if desired. Default values are 1.0.

CT Phase Shifts

Current transformers like all other transformers experience a small magnetizing current that is out of phase with the measurement current. Phase shift registers are available on a per channel basis and allow corrections of +/- 3 degrees. Ally loads the default phase shift for the CT types available in the picker list. If no phase shift information is available then enter the accuracy class in degrees (i.e. 1% = 1.0 degree).

Demand

AcquiSuite Ally meters keep track of electrical demand using a 15 minute sliding window. The *Peak Demand* and *Present Demand* registers contain the highest average power consumption in any 15 minute interval and the average power consumption in the last 15 minute interval respectively. The Clear Peak Demand register is used to reset the peak demand detector.

RTU PROGRAMMING AND SCRIPTING - DETAILS

This section is intended for the programmer of the RTU or host system and includes details about meter and element addressing, register locations, data formats and protocol examples.

Register Organization

The *AcquiSuite™* Ally meter communicates through the reading and writing of registers. Registers are organized into functional groups and are compliant with the SunSpec Modbus interface model.

- SunSpec Common Registers
- SunSpec TCP Network Stack Registers
- SunSpec Serial Interface Registers
- SunSpec Energy Meter
- Obvius Factory Registers
- Obvius User Command Registers
- Obvius User Configuration Registers
- Obvius Metrology Registers
- Obvius Daughter Card Registers
- Obvius Waveform Capture Registers

The complete register set is included as an Excel file on the supplied thumb drive.

ELEMENT VS SYSTEM SCOPE

Element

The term "element" is used in two contexts. Physically the term Element is used to describe groups of three channel sections identified by alphabetic letter on the silk screen of the PCBA (ie A,B,C,D). In a three phase power system these correspond to electric circuits. Logically the term Element describes the scope of a data item, register or point (Modbus register or BACnet object). Each Element based point is accessed by choosing the appropriate Modbus address, BACnet object range, or BACnet structured view. Elements in turn have points that refer to individual channels or to SUMS or AVERAGES of those channels. Registers that contain data inclusive of more than one channel are identified as being either SUMS or AVERAGES of the enabled channels within an element. In a BACnet structured view an Element represents a level of organization for related points.

Channel

Channels are identified on the circuit board as CH1, CH2, or CH3 and represent physical CT inputs. In three phase system configurations, these correspond to a current load on a corresponding line voltage. In single phase configurations, they are just used to identify a CT location. Registers providing data for an individual channel are also described as elements in their scope as a unique value exists for each Slave Address or BACnet object instance.

System

The term **"System"** refers to registers defining the characteristics of the entire circuit board. System registers report the same value independent of the slave address. Under BACnet structured view the system points are grouped together.

CONFIGURING ELEMENT AND CHANNEL REGISTER FOR SERVICE TYPES

The Obvius Ally Power Meter Viewer software enforces all element configurations to form a valid electrical system. Configurations performed by remote systems may produce unexpected results if configurations are internally inconsistent. The following tables document how to configure element and channel registers for each service type. Every register should be explicitly written.

Red Text indicates Required Values, Purple Text indicates Suggested Defaults if this data is not known.

Modbus Absolute Address/BACnet Object Assignments for Setting up Service Types

REGISTER TEMPLATE	
Service Type	2207
V_Input	2217
Description	2617

Channels	Volt Ref	CT Type	Range	Phase Shift	CT Multiplier	CT Sign
CH1	2220	2223	2224,2225	2224,2225	2221,2222	2226
CH2	2229	2232	2227,2228	2233,2234	2230,2231	2235
CH3	2238	2241	2236,2237	2242,2243	2239,2240	2244

Configurations

4 Wire 3 ϕ	(Wye)
Service Type	1
V_Input	1 or 2
Description	31 Char

Channels	Volt Ref	CT Type	Range	Phase Shift	CT Multiplier	CT Sign
CH1	L1 – N [1]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH2	L2 – N [2]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH3	L3 – N [3]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1

3 Wire 3 ϕ	(Delta)
Service Type	2
V_Input	1 or 2
Description	31 Char

Channels	Volt Ref	CT Type	Range	Phase Shift	CT Multiplier	CT Sign
CH1	L1 – N [1]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH2	L2 – N [2]	mV [1] or RōCoil [2]	Same as 1	Same as 1	Same as 1	0 or 1
CH3	L3 – N [3]	mV [1] or RōCoil [2]	Same as 1	Same as 1	Same as 1	0 or 1

Even though CH2 is calculated internally it is recommended that the CT settings reflect those from CH1 rather than being left at factory default to facilitate configuration validation from the RTU.

2 Wire 1ϕ	(Plug Load)
Service Type	3
V_Input	1 or 2
Description	31 Char

Channels	Volt Ref	CT Type	Range	Phase Shift	CT Multiplier	CT Sign
CH1	ANY [1-6]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH2	ANY [1-6]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH3	ANY [1-6]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1

Any channel that needs to be turned OFF should set the CT Type to OFF.

3 Wire 1 ϕ	(Split Phase)
Service Type	4
V_Input	1 or 2
Description	31 Char

Channels	Volt Ref	CT Type	Range	Phase Shift	CT Multiplier	CT Sign
CH1	L1 – N [1]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH2	L2 – N [2]	mV [1] or RōCoil [2]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH3	L3 – N [3]	OFF [0]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1

Even though CH3 is not used for computation it is recommended that the CT settings reflect those from CH1 rather than being left at factory default to facilitate configuration validation from the RTU.

Disabled	(OFF)
Service Type	5
V_Input	1 or 2
Description	31 Char

Channels	Volt Ref	CT Type	Range	Phase Shift	CT Multiplier	CT Sign
CH1	L1 – N [1]	OFF [0]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH2	L2 – N [2]	OFF [0]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1
CH3	L3 – N [3]	OFF [0]	Any > 0A	-3.0˚ to +3.0˚	Any > 0 [1]	0 or 1

Even though disabled channels are not used in calculations and report 0.0 they still contain configuration information. It is suggested that they be set to a known value rather than left at defaults to facilitate configuration validation by the RTU.

CONFIGURING SYSTEM REGISTERS

Modbus Absolute Address/BACnet Object Assignment

REGISTER TEMPLATE	
Description	2601
PF Sign Convention	2248
V1 Multiplier	2203,2204
V2 Multiplier	2205,2206

Configurations

System	
Description	31 Char
PF Sign Convention	ANSI [1] or IEEE[2]
V1 Multiplier	Any > 0 [1]
V2 Multiplier	Any > 0 [1]

Modbus Protocol Commands

If configured for Modbus, the *AcquiSuite™* Ally networked power meter family follows the Modbus RTU protocol and supports the following command set.

Supported Modbus Commands		
Command Name	**Command Number (Hex)**	**Description**
Read Holding Registers	03	Used to read the data values from the AcquiSuite™ Ally
Write Single Register	06	Used to write a single holding register to a AcquiSuite™ Ally
Report Slave ID	11	Used to read information from the identified AcquiSuite™ Ally

SLAVE ADDRESS

For Modbus/TCP the base slave address (or "unit address" as the Modbus TCP spec. calls it) is fixed at 1.

Refer to the section "Serial Protocols" for additional information on setting the Slave Address and finding the address of a specific meter element.

MODBUS STRING ENTRY

Registers that are identified as "strings" are handled uniquely by the AcquiSuite Ally power meter. Each register in the string block must be written to sequentially without interruption either by using a "write multiple" command or by sending single register commands back to back. The final character in the string MUST be a NUL character (ASCII 0). The meter will process the entire string only if these two conditions are met, otherwise the data is ignored. This special processing has been implemented to protect partial updates for network settings.

String example 1: Change a Static IP Address

Change the IP address of a meter from 192.168.2.8 to 192.168.2.9

It may be tempting to update only the digit "8" to "9" in the IP address, but this will NOT perform as expected. Internally, the meter uses a single string buffer for all string register operations and unspecified entrees will continue to contain the previous buffer contents unless specifically written to. Write every register from the beginning of the block to the end.

Reg (dec)	1079	1080	1081	1082	1083	1084	1085	1086
Reg (hex)	04 37	04 38	04 39	04 3A	04 3B	04 3C	04 3D	04 3E
Value (Chr)	'1' '9'	'2' '.'	'1' '6'	'8' '.'	'2' '.'	'9' NUL	NUL NUL	NUL NUL
Value (hex)	**31 39**	**32 2E**	**31 36**	**38 2E**	**32 2E**	**39 00**	**00 00**	**00 00**
	START							STOP

Specific Implementation Examples – Element A set to ID 1

Note that in Modbus the CRC communicated is LSB then MSB.

VIA MODBUS RTU (SERIAL) USING FUNCTION CODE 6 / WRITE SINGLE REGISTER

ID	FC	ADDR	DATA		CRC	
01	06	04	37	**31**	**39**	EC B6
01	06	04	38	**32**	**2E**	9C 4B
01	06	04	39	**31**	**36**	CD 71
01	06	04	3A	**38**	**2E**	3B 2B
01	06	04	3B	**32**	**2E**	6C 4B
01	06	04	3C	**39**	**00**	5A A6
01	06	04	3D	**00**	**00**	19 36
01	06	04	3E	**00**	**00**	E9 36

VIA MODBUS RTU (SERIAL) USING FUNCTION CODE 16 / WRITE MULTIPLE REGISTER

ID	FC	ADDR	#REGS	LN	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	CRC	
01	10	04	37	00	08	10	**31**	**39**	**32**	**2E**	**31**	**36**	**38**	**2E**	**32**	**2E**	**39**	**00**	**00**	**00**	**00**	**00**	9B	99

VIA MODBUS TCP (ETHERNET) USING FUNCTION CODE 6 / WRITE SINGLE REGISTER

TXNID		PROID		LENGT		ID	FC	ADDR		DATA	(TXNID will be arbitrary)
01	87	00	00	00	06	01	06	04	37	**31**	**39**
01	88	00	00	00	06	01	06	04	38	**32**	**2E**
01	89	00	00	00	06	01	06	04	39	**31**	**36**
01	8A	00	00	00	06	01	06	04	3A	**38**	**2E**
01	8B	00	00	00	06	01	06	04	3B	**32**	**2E**
01	8C	00	00	00	06	01	06	04	3C	**39**	**00**
01	8D	00	00	00	06	01	06	04	3D	**00**	**00**
01	8E	00	00	00	06	01	06	04	3E	**00**	**00**

VIA MODBUS TCP (ETHERNET) USING FUNCTION CODE 16 / WRITE MULTIPLE REGISTER

TXNID		PROID		LENGT		ID	FC	ADDR		#REGS	LN	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7
01	87	00	00	00	17	01	10	04	37	00	08	10	**31**	**39**	**32**	**2E**	**31**	**36**	**38**	**2E**	**32**	**2E**	**39**	**00**	**00**	**00**	**00**	**00**

String example 2: Element Description

Change the Element Description from “Mains Bld 100” to “Mains Bld 101”

It may be tempting to update only the character number “0” to “1” in the description, but this will NOT perform as expected. Internally, the meter uses a single string buffer for all string register blocks and unspecified entrees will continue to contain the previous buffer contents unless specifically written to.

Reg (dec)	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632
Reg (hex)	0A 39	0A 3A	0A 3B	0A 3C	0A 3D	0A 3E	0A 3F	0A 40	0A 41	0A 42	0A 43	0A 44	0A 45	0A 46	0A 47	0A 48
Value (Chr)	‘M’ ‘a’	‘i’ ‘n’	‘s’ ‘ ‘	‘B’ ‘l’	‘d’ ‘ ‘	‘1’ ‘0’	‘1’ Nul	NulNul	NulNul	NulNul	NulNul	NulNul	NulNul	NulNul	NulNul	NulNul
Value (hex)	**4D 61**	**69 6E**	**73 20**	**62 6C**	**64 20**	**31 30**	**31 20**	**00 00**	**00 00**	**00 00**	**00 00**	**00 00**	**00 00**	**00 00**	**00 00**	**00 00**
	START															STOP

Specific Implementation Examples – Element A set to ID 1

VIA MODBUS RTU (SERIAL) USING FUNCTION CODE 6 / WRITE SINGLE REGISTER

```
ID FC ADDR  DATA  CRC
01 06 0A 39 4D 61 AE A7
01 06 0A 3A 69 6E 05 A3
01 06 0A 3B 73 20 DF 37
01 06 0A 3C 62 6C 63 53
01 06 0A 3D 64 20 30 C6
01 06 0A 3E 31 30 FE 5A
01 06 0A 3F 31 20 AE 56
01 06 0A 40 00 00 8B C6
01 06 0A 41 00 00 DA 06
01 06 0A 42 00 00 2A 06
01 06 0A 43 00 00 7B C6
01 06 0A 44 00 00 CA 07
01 06 0A 45 00 00 9B C7
01 06 0A 46 00 00 6B C7
01 06 0A 47 00 00 3A 07
01 06 0A 48 00 00 0A 04
```

VIA MODBUS RTU (SERIAL) USING FUNCTION CODE 16 / WRITE MULTIPLE REGISTER

```
ID FC ADDR  #REGS LN DAT00 DAT01 DAT02 DAT03 DAT04 DAT05 DAT06 DAT07
01 10 0A 39 00 10 20 4D 61 69 6E 73 20 62 6C 64 20 31 30 31 20 00 00

DAT08 DAT09 DAT10 DAT11 DAT12 DAT13 DAT14 DAT15 CRC
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 3A 18
```

VIA MODBUS TCP (ETHERNET) USING FUNCTION CODE 6 / WRITE SINGLE REGISTER

TXNID PROID LENGT ID FC ADDR DATA (TXNID will be arbitrary)

01 87 00 00 00 06 01 06 0A 39 **4D 61**
01 88 00 00 00 06 01 06 0A 3A **69 6E**
01 89 00 00 00 06 01 06 0A 3B **73 20**
01 8A 00 00 00 06 01 06 0A 3C **62 6C**
01 8B 00 00 00 06 01 06 0A 3D **64 20**
01 8C 00 00 00 06 01 06 0A 3E **31 30**
01 8D 00 00 00 06 01 06 0A 3F **31 20**
01 8E 00 00 00 06 01 06 0A 40 **00 00**
01 8F 00 00 00 06 01 06 0A 41 **00 00**
01 90 00 00 00 06 01 06 0A 42 **00 00**
01 91 00 00 00 06 01 06 0A 43 **00 00**
01 92 00 00 00 06 01 06 0A 44 **00 00**
01 93 00 00 00 06 01 06 0A 45 **00 00**
01 94 00 00 00 06 01 06 0A 46 **00 00**
01 95 00 00 00 06 01 06 0A 47 **00 00**
01 96 00 00 00 06 01 06 0A 48 **00 00**

VIA MODBUS TCP (ETHERNET) USING FUNCTION CODE 16 / WRITE MULTIPLE REGISTER

TXNID PROID LENGT ID FC ADDR #REGS LN DAT00 DAT01 DAT02 DAT03 DAT04 DAT05

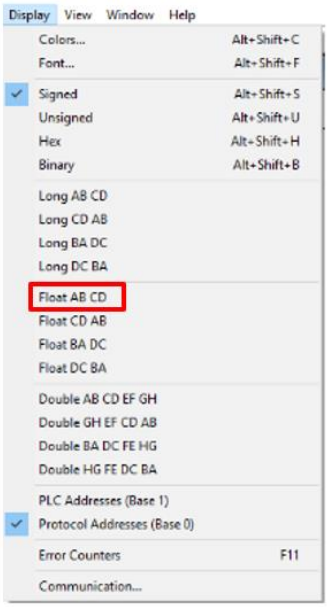
01 87 00 00 00 27 01 10 04 37 00 10 20 **4D 61 69 6E 73 20 62 6C 64 20 31 30**

DAT06 DAT07 DAT08 DAT09 DAT10 DAT11 DAT12 DAT13 DAT14 DAT15

31 20 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Floating Point Registry Entry

The Ally meter uses 32-bit IEEE 754 formatted floating point numbers for reporting results and storing scalable user register values such as CT range, CT and PT scaling factors, etc. Because these registers require two 16-bit Modbus addresses to convey, these registers must be accessed as multiple registers or accessed sequentially without interruption. The reason for preventing floating point registers from being updated as single 16-bit registers is that interim values (when the number is half entered) represent valid but unknown numeric values! Requiring both the MSW and LSW registers to be written sequentially prevents meter data from having unknown and potentially very large scaling factors applied to measurement data between register writes!



SELECTING THE DATA TYPE

It is likely that the RTU program has built-in support for multiple data types including floating point. The Ally meter data is stored as MSW, LSW which may take some trial and error to identify in the RTU setup. Float ABCD is an example of the how this RTU identifies the matching byte order.

It is anticipated that command-line programmers or script writers may prefer to enter data in hexadecimal format. Non-programmers using Modbus or BACnet utilities (or those using ViewPoint HD) may prefer to use decimal notation. This example works through the details of converting information found in our user documentation (decimal) into a hexadecimal format which should cover the highest level of complexity.

Entering Floating Point Data Using a Script

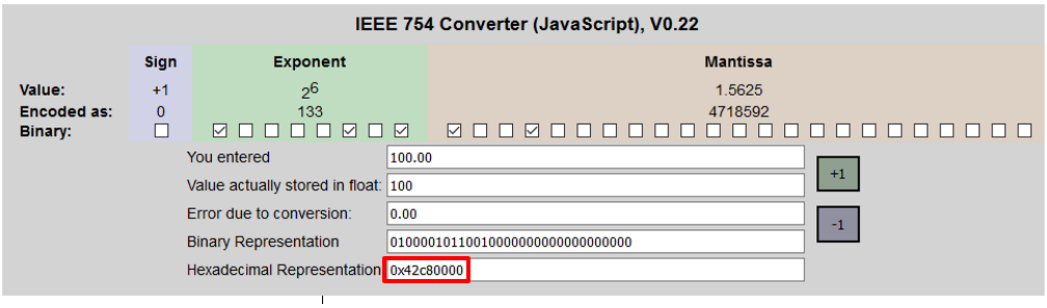
Consider the process of setting the CH1 CT Full Scale Rating to a value of 100.00 amps for a meter having an element at slave address #1.

Step 1) Convert 100.00 into an IEEE 754 floating point format by entering the number in a conversion utility.

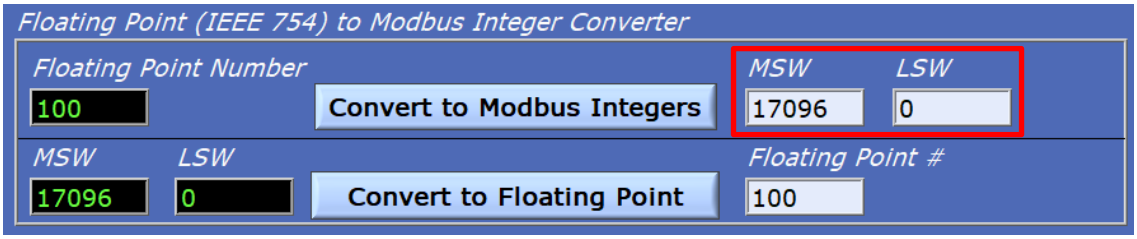
a. Internet Utility. Example: https://www.h-schmidt.net/FloatConverter/IEEE754.html
b. Power Meter Viewer

a) Internet Utility

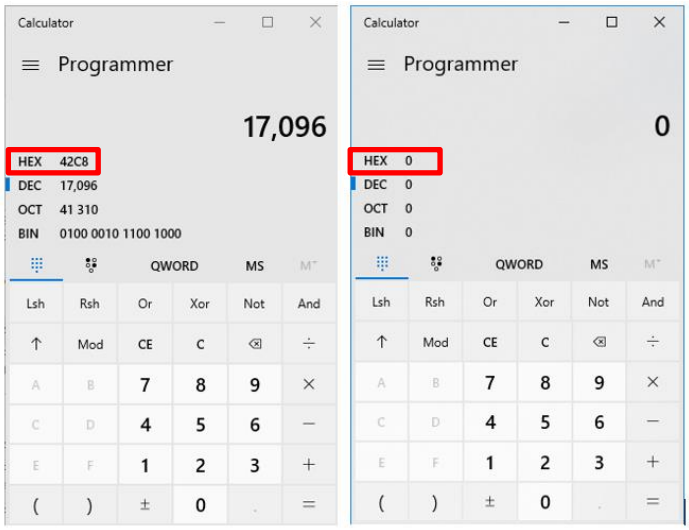
The 16-bit floating point representation of 100.00 is shown below as 0x42C8 0x0000. These are the required MSW and LSW register contents respectively.



b) Power Meter Viewer
c) If an internet utility is not available, Power Meter Viewer has a built-in conversion utility under the *Advanced Tab.* Enter 100.00 and press the "Convert to Modbus Integers" button.



This utility identifies that the MSW and LSW registers need to be set to 17096 & 0 (decimal) respectively. If hexadecimal notation is required these decimal values can be converted using a utility such as the MS Windows Calculator (under Programmer mode) as shown below.



After padding, we also arrive at 0x42C8 0x0000 as the MSW and LSW register values respectively.

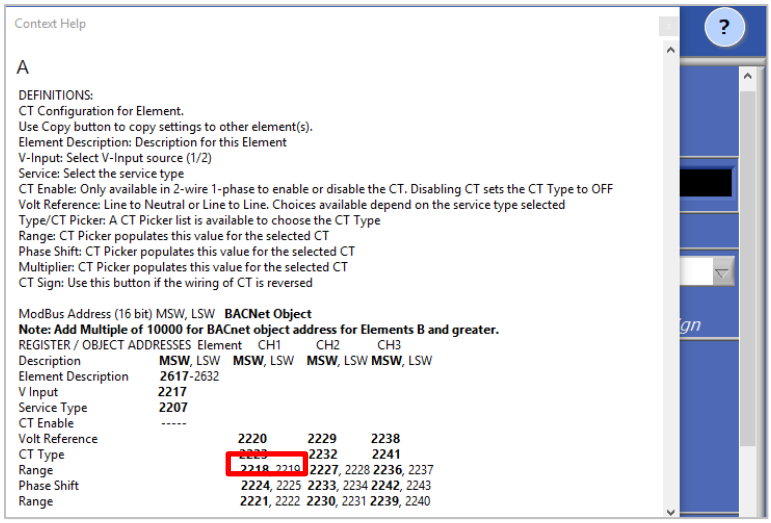
Step 2) Identify which configuration registers control the CH1 CT Full Scale Rating

a. Refer to the MS Excel Register List (USB drive)
b. Use Power Meter Viewer to discover the address of displayed data.

a) Open the MS Excel Register List and locate the CH1 CT Full Scale Rating Registers under USER CONFIG POINTS group.

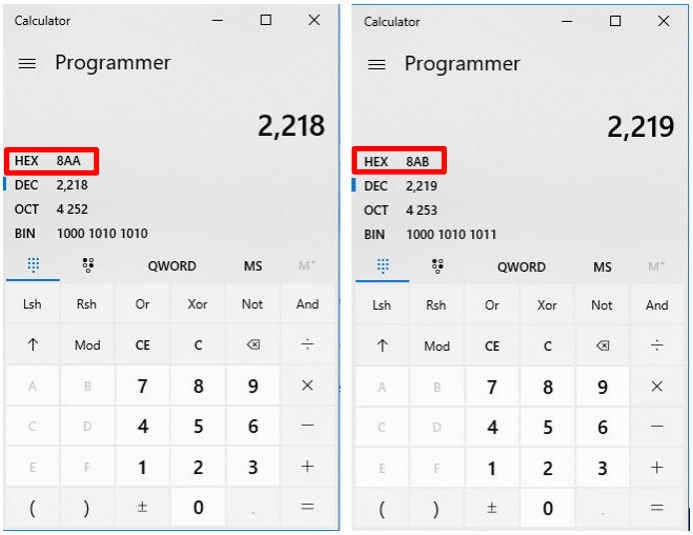
Modbus Register Name	Modbus Register	Absolute Address
CH1 CT Full Scale Rating (MSW)	2218	42219
CH1 CT Full Scale Rating (LSW)	2219	42220

b) Connect to the Ally meter using the Power Meter Viewer. Navigate to the Meter Setup tab and press the ? icon. Hover over the Element A setup portion of the window. This launches the data exploring tool and indicates the addresses of the registers controlled or displayed by this window.



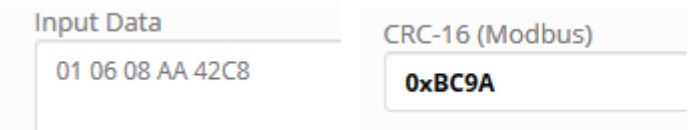
The desired control registers are 2218 (MSW) and 2219 (LSW)

Convert the register addresses of interest into hexadecimal notation (if required)



STEP 3) Calculate the CRC-16 (Modbus RTU) for the expression. There are several variations of the CRC-16; ensure the one you are using is for Modbus. The CRC is entered LSB first.

Enter the Entire Expression into a CRC Calculator (a web utility can be helpful)



Step 4) Putting it all together

```
VIA MODBUS RTU (SERIAL) USING FUNCTION CODE 6 / WRITE SINGLE REGISTER
ID FC ADDR  DATA  CRC (note CRC order is swapped)
01 06 08 AA 42 C8 9A BC
01 06 08 AB 00 00 FA 4A

VIA MODBUS RTU (SERIAL) USING FUNCTION CODE 16 / WRITE MULTIPLE REGISTER
ID FC ADDR  #REGS  LN DATA0 DATA CRC
01 10 08 AA 00 02 04 42 C8 00 00 8B EE

VIA MODBUS TCP (ETHERNET) USING FUNCTION CODE 6 / WRITE SINGLE REGISTER
TXNID PROID LENGT ID FC ADDR  DATA (TXNID will be arbitrary)
01 87 00 00 00 06 01 06 08 AA 42 C8
01 88 00 00 00 06 01 06 08 AB 00 00

VIA MODBUS TCP (ETHERNET) USING FUNCTION CODE 16 / WRITE MULTIPLE REGISTER
TXNID PROID LENGT ID FC ADDR  #REGS LN DATA0 DATA1
01 87 00 00 00 0B 01 10 08 AA 00 02 04 42 C8 00 00
```

COMMANDS REQUIRING A PROCESSOR RESET

Register manipulation of communication protocols or addressing require that the AcquiSuite Ally perform a “soft reset” in order to take effect. Register 2100 can receive a user command to facilitate this process. BACnet users write a “1” and Modbus users write “1234” to effect a soft reset. The AcquiSuite Ally reboot time is approximately 10 seconds.

See the Modbus examples document on the Obvius web site or included with your electronic documentation for additional support on programming Modbus. The following online resources are also helpful.

http://Modbus.org/docs/PI_MBUS_300.pdf

http://www.Modbustools.com/Modbus.html

http://www.simplyModbus.ca/TCP.htm

BACnet

Building **A**utomation and **C**ontrol **Net**work (BACnet) protocol was developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and is recognized as an American National, European, and ISO global standard.

BACnet Device ID. All device IDs on a BACnet network must be unique. Refer to the section "Serial Protocols" and refer to the Register List for additional information.

Serial

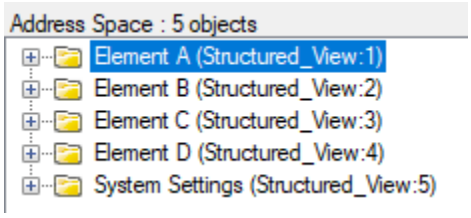
The AcquiSuite™ Ally Serial version supports writable max_master, MS/TP address, max_info_frames properties in the device object for MS/TP networks. For best network performance, the max_master should be set to the highest MS/TP MAC address on the network. The MS/TP address (object 1069) must be unique on the MS/TP network. The max_info_frames does not need to be changed in most installations.

Ethernet

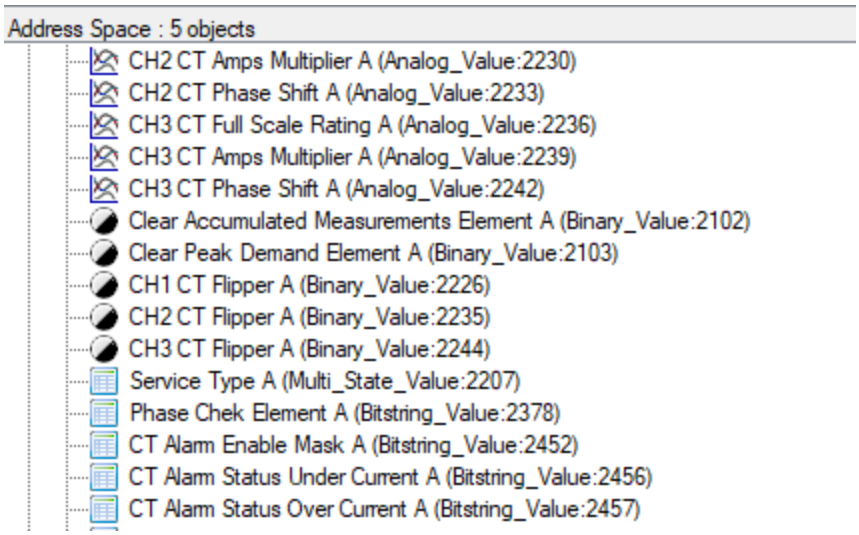
Ethernet versions can register as Foreign Devices to a BBMD. BBMD stand for BACnet/IP Broadcast Management Device. The BBMD IP address can be set from the Ally Configurataion Console, or through character string object 2264. A value of 0.0.0.0 disables foreign device registration. This process requires a processor soft reset.

BACnet Structured View

The AcquiSuite Ally meter supports the Structured View (SV) object container. If this option is supported in the BACnet exploring tool, objects will be grouped logically into elements which can be named to reflect electrical or physical locations, followed by system objects, as shown below for an AMC12 having elements A-D.



Within each element, Structured View lists the BACnet objects by Object Type and then by numeric number as shown below. In addition objects for elements are grouped in a "hotel room" scheme. That is Element A (and system objects) have a range from 0-9999, Element B 10000-19999, Element 20000-29999, to Element P on the AMC48 150000-15999. Some BACnet explorer tools have additional sorting capabilities.



Obvius Ally Supported BACnet Object Types		
Object Type	**Abbr**	**Typical Usage**
Analog Input:	AI	Meter Readings (floating point numeric inputs)
Analog Value:	AV	Analog User Settings (floating point numeric outputs)
Binary Value:	BV	User Boolean Settings
Multi State Value:	MSV	Enumerated Settings
BitString Value:	BSV	Bitfield Status Words and Settings
Positive Integer Value:	PIV	Restricted Range User Settings
Character String Value:	CSV	User Text string settings

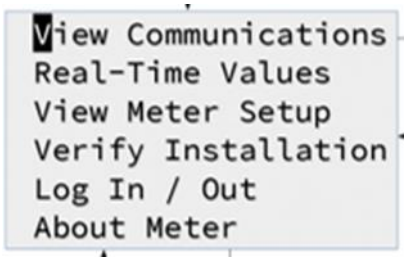
The following online BACnet resources are also helpful.

http://www.bacnet.org/

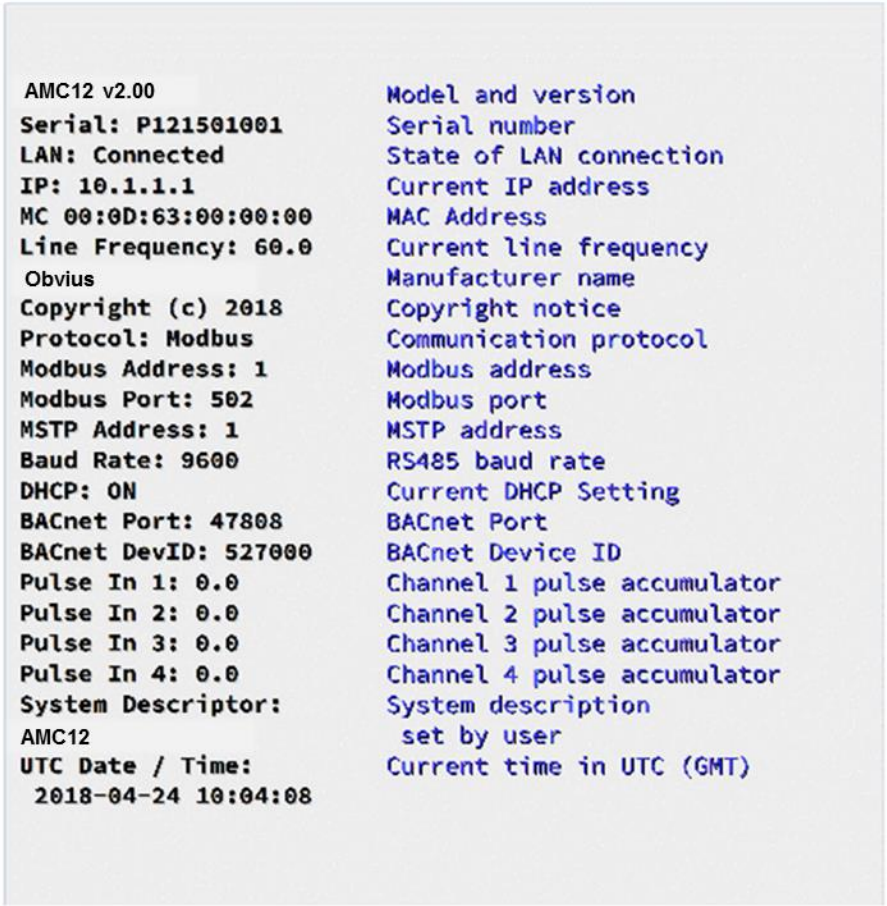
APPENDIX A—ACQUISUITE™ ALLY LCD MENU NAVIGATION

ABOUT METER

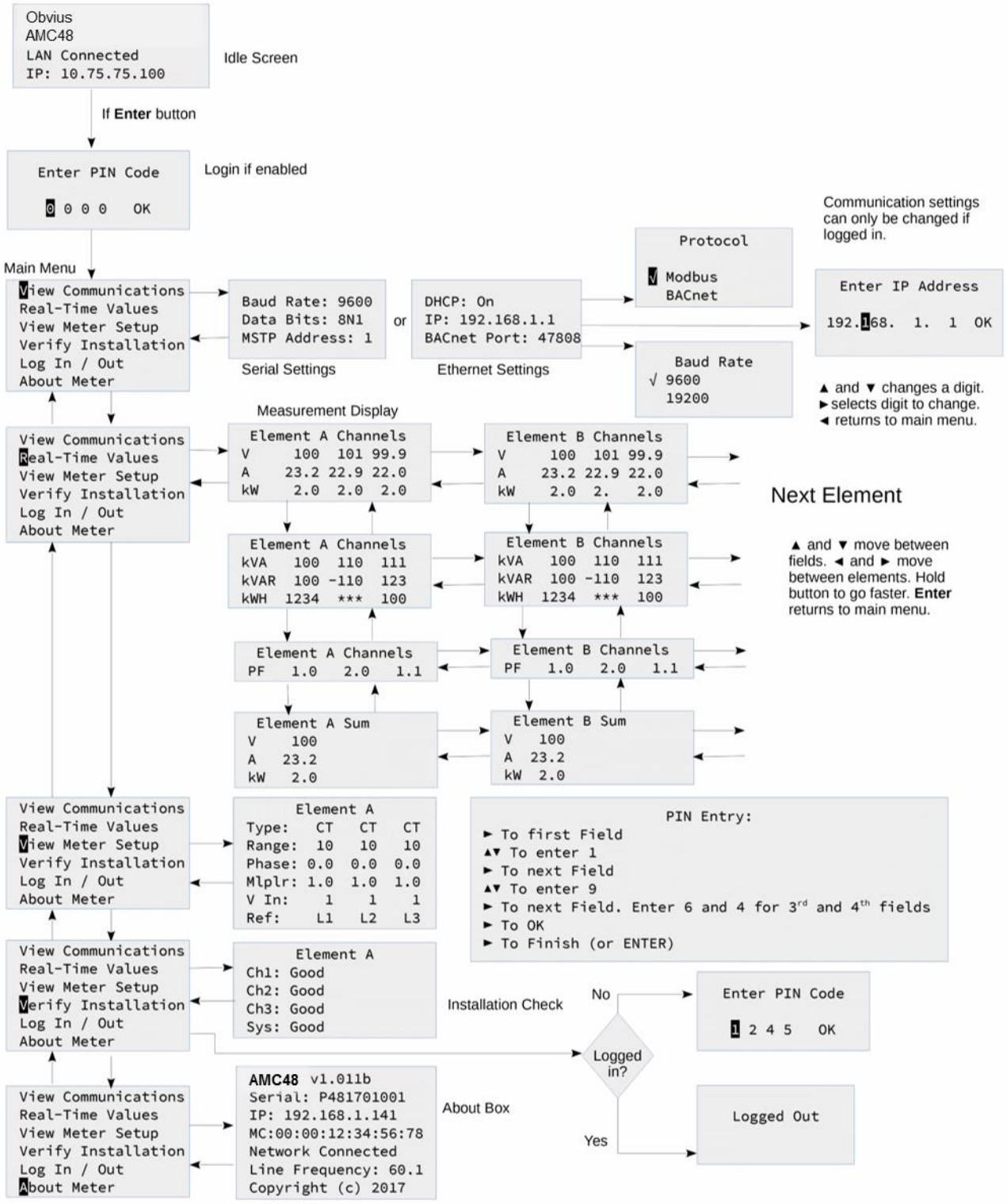
The complete LCD navigation map is shown in diagram form in the next few pages. The "About Meter" menu is the most commonly accessed item which requires 5 down presses or 1 up (rolling menu) to access.



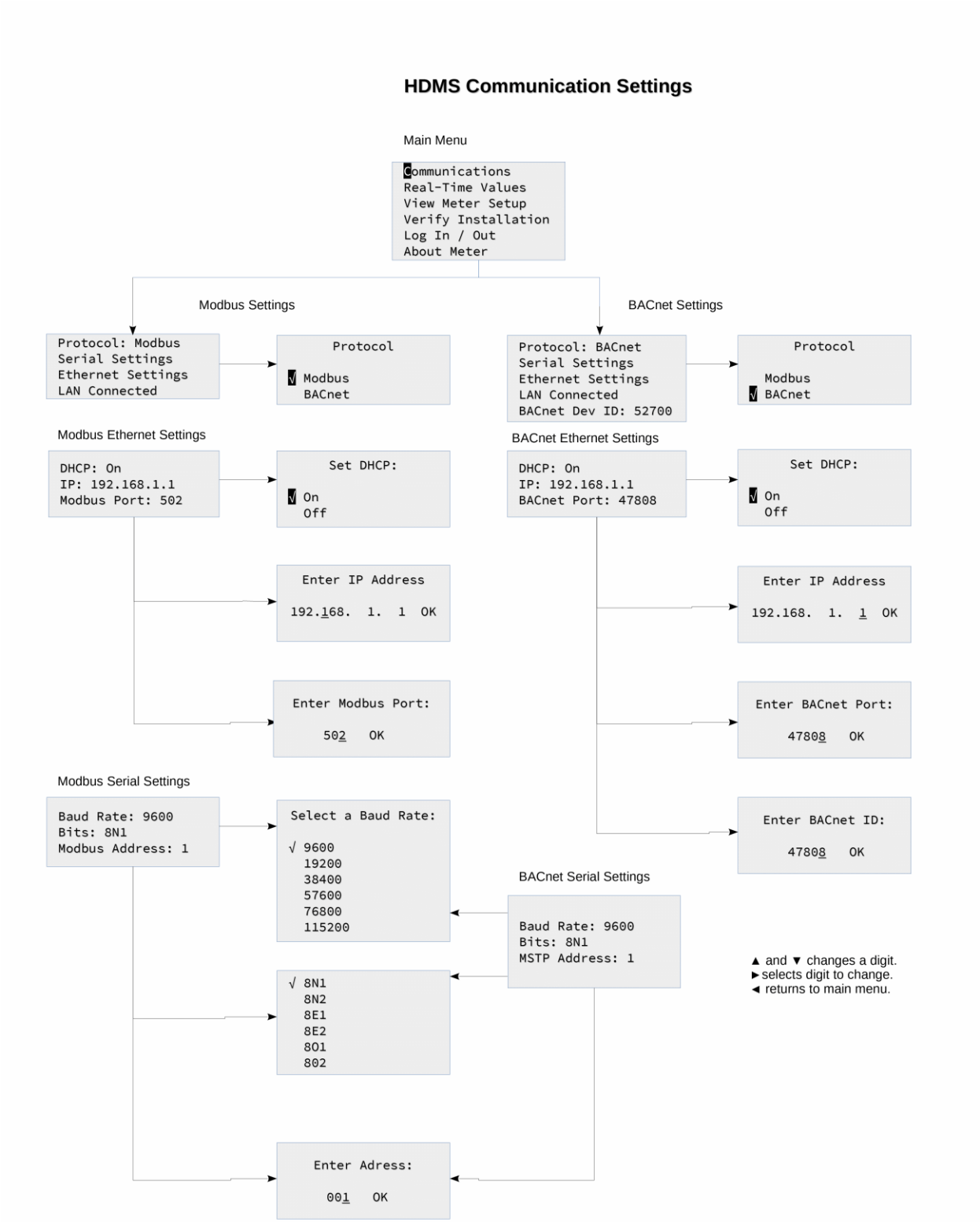
The "About Meter" menu contains the following items which are displayed 4 lines at a time and accessed by using the ^ ˅ keys on the front display.



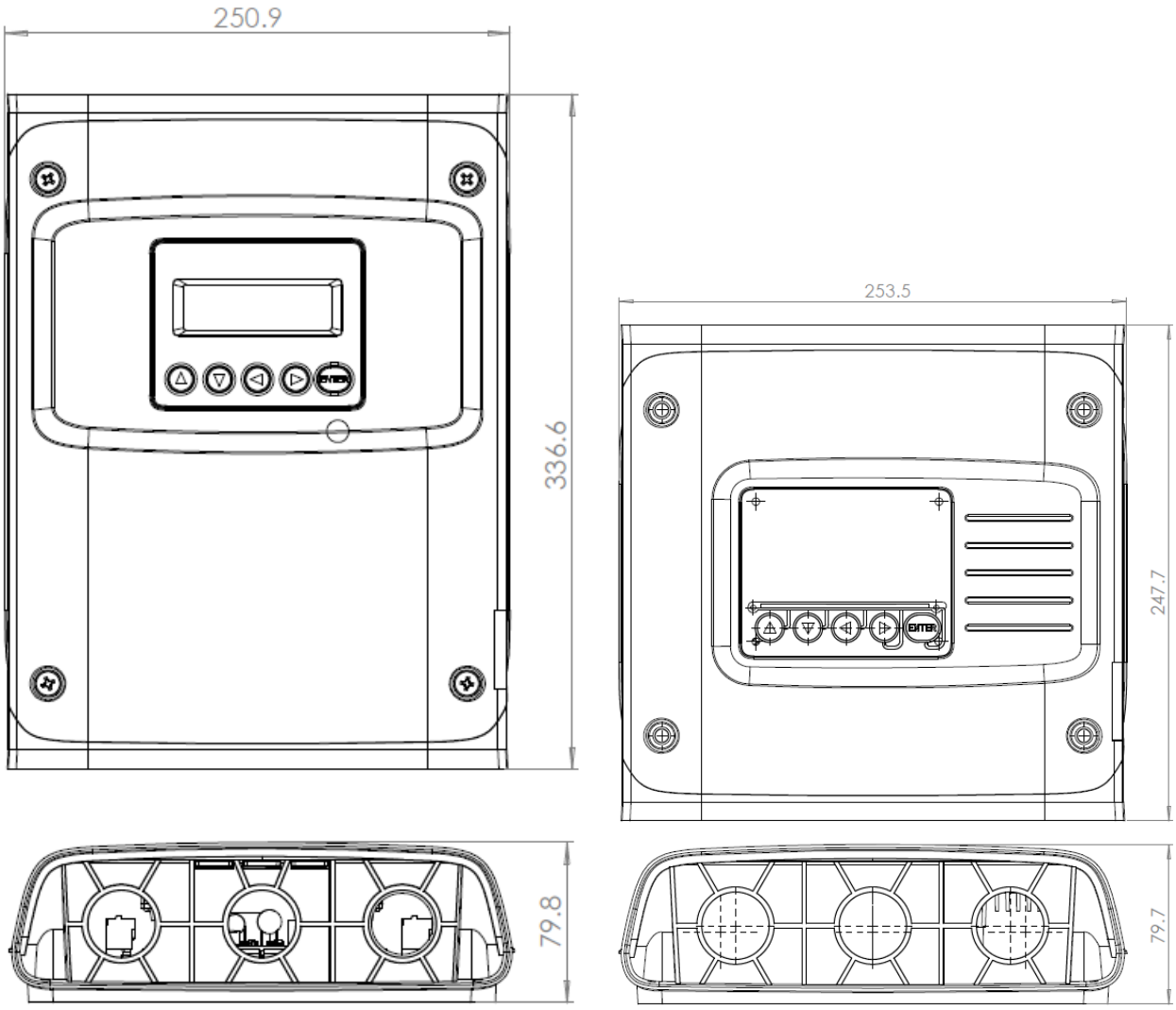
MENU NAVIGATION



COMMUNICATION NAVIGATION

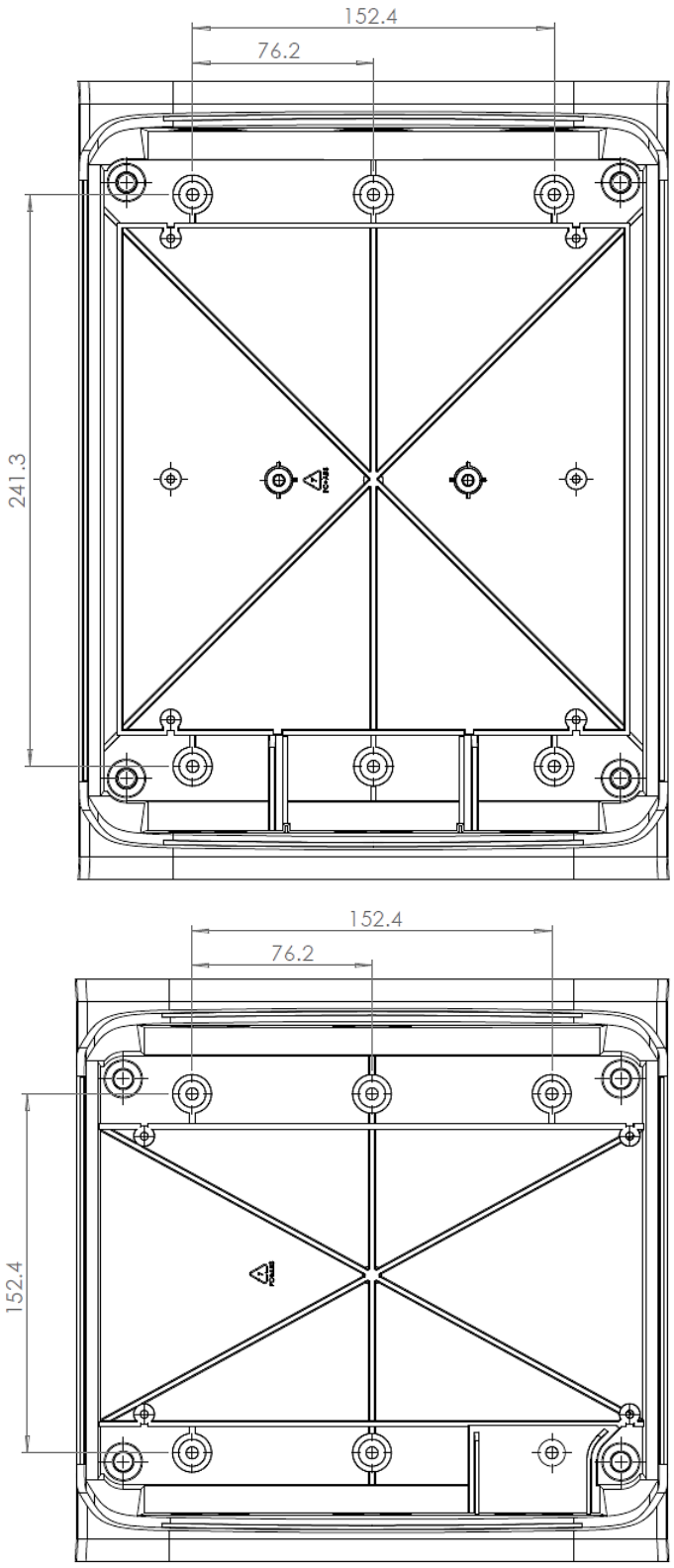


APPENDIX B—ENCLOSURE DIMENSIONS

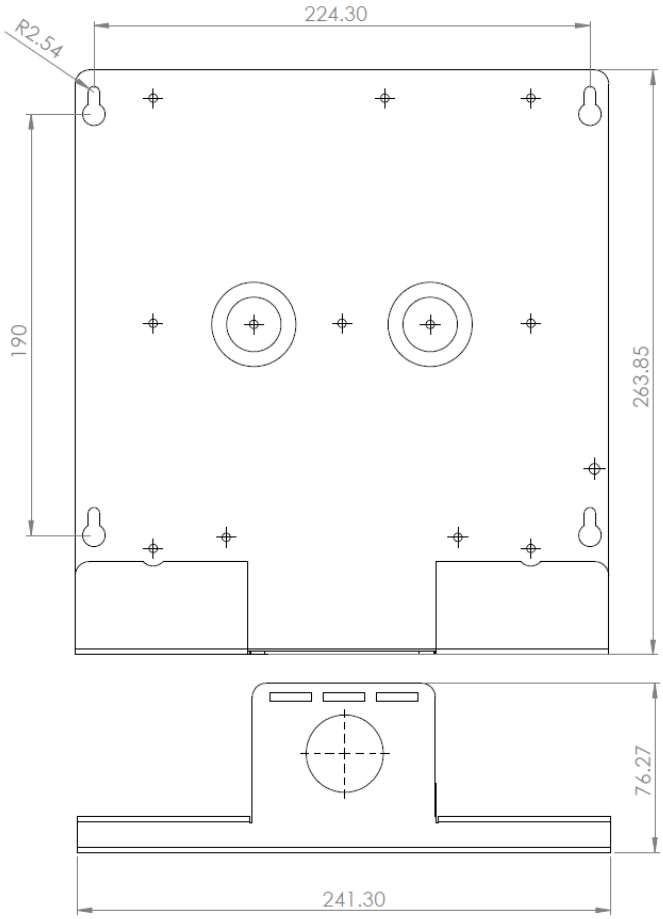


Enclosure Dimensions

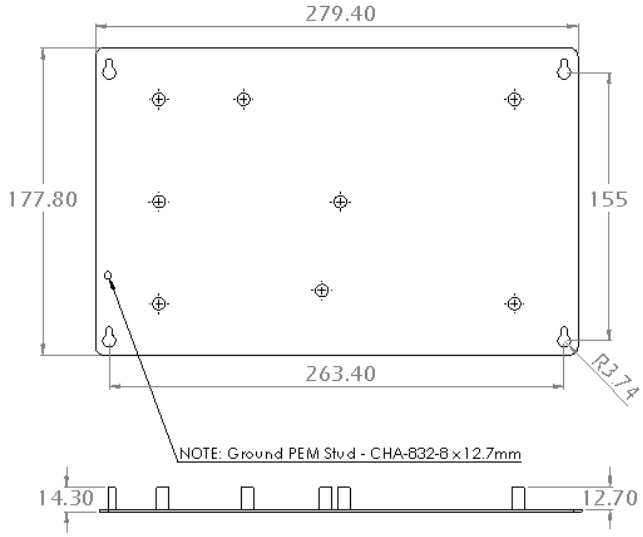
APPENDIX C—MOUNTING TEMPLATES



Enclosure Drill Template



AMC48 Mounting Plate Template



AMC12 Mounting Plate Template

APPENDIX D—ACQUISUITE™ ALLY TECHNICAL SPECIFICATIONS

Specification	Description
Service Types	Single Phase, Split Phase, Three Phase-Four Wire (WYE), Three Phase-Three Wire (Delta)
Voltage Channels	90-346 Volts AC Line-to-Neutral, 600V Line-to-Line, CAT III. Two voltage reference inputs (AMC48 only)
Current Channels	12 or 48 channels, 0.525 VAC max, 333 mV CTs, 0-4,000+Amps depending on current transducer
Maximum Current Input	150% of current transducer rating (mV CTs) to maintain accuracy. Measure up to 4000A with RōCoil CTs.
Measurement Type	True RMS using high-speed digital signal processing (DSP) with continuous sampling
Line Frequency	50-60 Hz
Power	From L1 Phase to L2 Phase. 90-600VAC RMS CAT III 50/60Hz, 500mA AC Max Use of 12 volt auxiliary output requires 100 VAC minimum input voltage.
AC Protection	0.5A Fuse 200kA interrupt capacity
Power Out	Unregulated 12VDC output, 200 mA, self-resetting fuse
Waveform Sampling	1.8 kHz , 3.6 HZ
Parameter Update Rate	1 second
Measurements	Volts, Amps, kW, kVAR, kVA, aPF, dPF, kW demand, kVA demand, Import (Received) kWh, Export (Delivered) kWh, Net kWh, Import (Received) kVAh, Export (Delivered) kVAh, Net kVAh, Import (Received) kVARh, Export (Delivered) kVARh, Net kVARh, THD, Theta, Frequency. All parameters for each phase and system total.
Accuracy	0.2% ANSI C12.20-2010 Class 0.2
Resolution	Values reported in IEEE-754 single precision floating point format (32 bit).
Indicators	4-line display, tri-color backlight (PhaseChek™)
Pulse Input	AMC12 – 4 inputs, AMC48 – 2 inputs
Alarm Output	Voltage Phase Loss Alarm (SPDT Relay - 30 VDC)
Communication	
Hardware	RS-485, Ethernet, & USB (for configuration only)
Supported Protocols	Modbus RTU or BACnet Master Slave Token Passing protocol (MS/TP) ModbusTCP or BACnetIP Modbus (using SunSpec IEEE-754 single precision floating point model)
Max Communication Length	1200 meters with Data Range of 100K bits/second or less
RS-485 Loading	1/8 unit
Communication Rate (baud)	Modbus: 9600 (Default), 19200, 38400, 57600, 76800, 115200 BACnet: 9600 (Default), 19200, 38400, 76800
Data Bits	8

Parity	None, Even, Odd
Stop Bit	2, 1
Termination	None provided
Mechanical	
Wire Connections	12-22 AWG 600 VAC, Voltage connection must be #14 AWG or larger & 600 VAC rated
Mounting	Enclosure (Ally 12 & 48) Panel Mount (Ally 48 only)
High Voltage Cover	IP30
Operating Temperature	-20 to + 60° C (-4 to 140° F) (the colder the temperature the more voltage needed to power the board)
Humidity	5% to 95% non-condensing
Enclosure	ABS Plastic, 94-V0 flammability rating, connections sized for 1–inch EMT conduit
Dimensions	(L) 24.8cm x (W) 25.1cm x (H) 8.0 cm (9.8" x 9.8" x 3.1") (AMC12 enclosure version) (L) 17.8cm x (W) 26.3cm x (H) 8.0 cm (7.0" x 10.4" x 3.1") (AMC12 mounting plate version) (L) 33.7cm x (W) 25.1cm x (H) 8.0 cm (13.3" x 9.8" x 3.1") (AMC48 enclosure version) (L) 26.2cm x (W) 24.1cm x (H) 8.0 cm (10.3" x 9.5" x 3.1") (AMC48 mounting plate version)
PCBA Dimensions	(L) 21.6cm x (W) 21.6.0cm x (H) 6.4 cm (8.5" x 8.5" x 2.5")
Obvius Ally Power Meter Viewer™ Minimum System Requirements	
Operating System	Windows® 7. Windows® 8, Windows® 10
Communications Port	RS-485 & USB standard. Ethernet available. One USB Port required on PC.
Safety	
FCC Compliance	This device 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 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 user's own expense.
Serial/Ethernet Meters	The following are UL Recognized: **AMC12-B-y-z, -P-y-z, AMC48-B-y-z, -P-y-z** The following are UL Listed: AMC12**-C-y-z , AMC48-C-y-z** Conforms to UL Std 61010-1, 3rd Edition, UL 61010-2-30:2010 Certified to CSA Std C22.2 No. 61010-1, 3rd Edition

LIMITED 5 YEAR WARRANTY AND EXCLUSIONS

Obvius warrants to the original consumer purchaser and not for the benefit of anyone else that this product at the time of its sale by Obvius is free of defects in materials and workmanship under normal and proper use for five years from the purchase date. Obvius's only obligation is to correct such defects by repair or replacement, at its option. For details visit www.Obvius.com or call 1-866-204-8134. This warranty excludes and there is disclaimed liability for labor for removal of this product or reinstallation. This warranty is void if this product is installed impro perly or in an improper environment, overloaded, misused, opened, abused, or altered in any manner, or is not used under normal operating conditions or not in accordance with any labels or instructions. There are no other or implied warranties of any kind, including merchantability and fitness for a particular purpose, but if any implied warranty is required by the applicable jurisdiction, the duration of any such implied warranty, including merchantability and fitness for a particular purpose, is limited to five years. Obvius is not liable for incidental, indirect, special, or consequential damages, including without limitation, damage to, or loss of use of, any equipment, lost sales or profits or delay or failure to perform this warranty obligation. The remedies provided herein are the exclusive remedies under this warranty, whether based on contract, tort or otherwise.

FCC STATEMENT:

This device complies with Part 15 of the FCC Rules and ISED License-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by Obvius could void the user's authority to operate the equipment.
These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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, the user is 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.

This Class A digital apparatus complies with Canadian CAN ICES-3(A)/NMB-3(A)

FCC SUPPLIER'S DECLARATION OF CONFORMITY:
Models AMC48-ED, AMC48-EN, AMC48-MD, AMC48-MN, AMC12-ED, AMC12-EN, AMC12-MD, AMC12-MN are sold by Obvius, 20497 SW Teton Avenue, Tualatin, OR 97062. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

TRADEMARK DISCLAIMER:

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