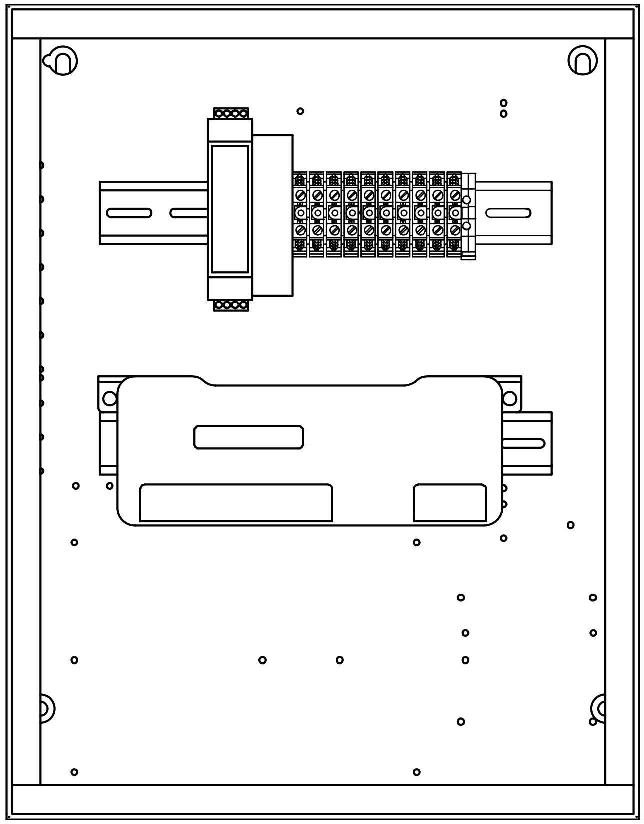
Power Monitoring Manual

Installation, Operation, and Maintenance Manual



RECEIVING AND INSPECTION
Upon receiving unit, check for any interior and exterior damage, and if found, report it immediately to the carrier. Also check that all accessory items are accounted for and are damage free.

WARNING!!
Installation of this control panel should only be performed by a qualified professional who has read and understands these instructions and is familiar with proper safety precautions. Improper installation poses serious risk of injury due to electric shock and other potential hazards. Read this manual thoroughly before installing or servicing this equipment. ALWAYS disconnect power prior to working on module.

Save these instructions. This document is the property of the owner of this equipment and is required for future maintenance. Leave this document with the owner when installation or service is complete.

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March 2018 Rev. 0

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WARRANTY

This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 24 months from date of shipment.

This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the MANUFACTURER'S installation instructions shipped with the product.
2. The equipment is not installed in accordance with federal, state and local codes and regulations.
3. The equipment is misused or neglected, or not maintained per the MANUFACTURER'S maintenance instructions.
4. The equipment is not operated within its published capacity.
5. The invoice is not paid within the terms of the sales agreement.

The MANUFACTURER shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 24 month warranty period, upon examination by the MANUFACTURER, such part will be repaired or replaced by MANUFACTURER at no charge. The BUYER shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without MANUFACTURER'S prior authorization and all returned equipment shall be shipped by the BUYER, freight prepaid to a destination determined by the MANUFACTURER.

NOTE: To receive warranty coverage, register this product by filling out the Startup and Maintenance Document. Fax the form to 1-919-554-9374 or call 1-866-784-6900 for email information.

CONTROL SPECIFICATIONS

The power monitoring meter provides a flexible cost efficient solution to monitoring various types of power circuits. With a single monitoring device, it is possible to monitor four types of single and three-phase electrical systems (only one type can be monitored at a time). The power monitoring meter will monitor voltage, current, power, energy, and many other electrical parameters.

The monitoring meter uses direct connections to each phase of the voltage, and uses current transformers to monitor each phase of the voltage supply line. Information on energy usages, power factor, line frequency, and more are derived from the voltage and current inputs. With continuous monitoring comes the possibility of making continuous improvements to power quality and sustainability. Continuous power quality monitoring is the best way to both maintain current equipment performance and support a facility’s continuous improvement efforts. CASLink makes such monitoring easier in a number of ways.

Figure 1 – Trend Graph

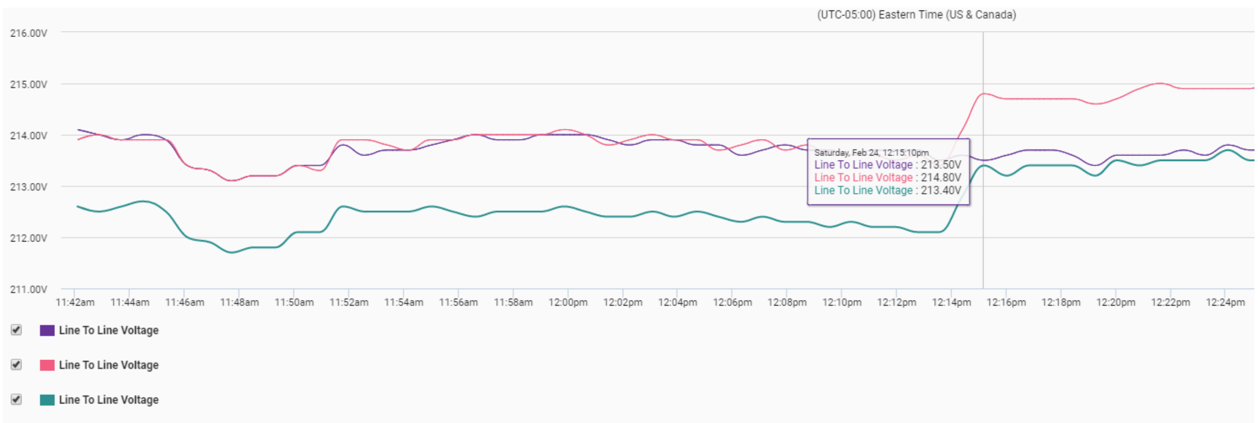


Figure 1 can provide clear indication of many long-term, steady-state power quality disturbances over time. Facility staff can easily see if recommended limits on harmonics, power factor or other potential problem areas have been exceeded.

The communications interface to the monitoring device is an RS-485 serial that uses the Modbus protocol for sending commands and retrieving data.

Table 1 – Typical Specifications

Specification	Description
Service Types	Single Phase, Three Phase-Four Wire (WYE), Three Phase-Three Wire (Delta)
3 Voltage Channels	80-346 Volts AC Line-to-Neutral, 600V Line-to-Line, CAT III
Current Channels	3 channels, 0.525 V AC max, 333 mV current transformers, 0-4,000+ Amps depending on current transducer.
Maximum Current Input	158% of current transducer rating (mV current transformers) to maintain accuracy. Measure up to 4000 Amps Rogowski current transformers.
Measurement Type	True RMS using high-speed digital signal processing (DSP)
Line Frequency	50/60Hz
Power	From L1 Phase to L2 Phase. 80-600V AC CAT III 50/60Hz, 90mA Max. Non-user replaceable 315 Amp internal fuse protection.
Power Out	Unregulated 5V DC output, 140 mA max
Waveform Sampling	12 kHz
Parameter Update Rate	.5 seconds
Measurements	Volts, Amps, kW, kWh, kVAR, kVARh, kVA, kVAh, Apparent Power Factor (aPF), Displacement Power Factor (dPF). All parameters for each phase and for system total.

INSTALLATION

Meter Safety

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

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.
- Current transformers shall be listed to UL2808.

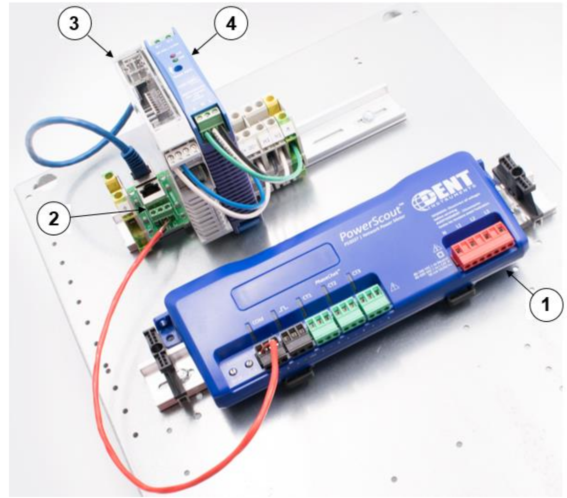
Meter Installation Safety Requirements

- 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 monitoring meter.
  - For use only with Listed Energy-monitoring current transformers.
  - The current transformers and its leads must be isolated from different circuits.
  - The current transformers are intended for installation within the circuit breaker panel or similar.

Power Monitoring Package Basics

1. **PowerScout** - Power monitoring device.
2. **RJ45 converter** - Communication port for a Cat 5 cable that allows components to connect to other components.
3. **Comm Module** - For CASLink monitoring.
4. **24V DC Power Supply** - Converts input voltage of 100-240V AC to an output voltage of 24V DC.

Figure 2 - Basic Panel Layout

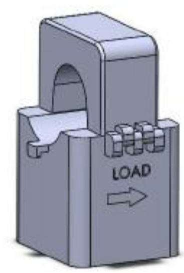


Transformer Basics

Make sure current transformers meet the following criteria:

- 600V AC UL Rated.
- UL2808 Listed.
- 1/3 (333 mV) output voltage.
- Appropriate range for the circuit (5-120% of current transformer rating recommended).
- Check label to verify specifications are correct.

Figure 3 – Directional Arrow



Verify current transformer orientation and placement:

- Directional arrow points toward load (or as instructed by label).
- Directional arrow points away from panel (or as instructed by label).
- Placed on first conductor of voltage reference (L1/L2) circuits are placed on L1.
- Make a note of wiring color and polarity.
- Use the shield wire if provided (connect to PCB terminals marked S).

Types of Current Transformers

Figure 4 – Current Transformer Types

Split-Core: hinged and solid core current transformers:

White wire = Positive
Black wire = Negative
No shield

Rogowski current transformers:

White wire = Positive
Brown wire = Negative
Bare wire = shield

Current transformers should be rated to work 0.25- 80A AC with an output of 333mV @ 50A AC.

Wiring the Power to the Service Panel

Figure 5 – 3 Wire Split Phase Service Panel

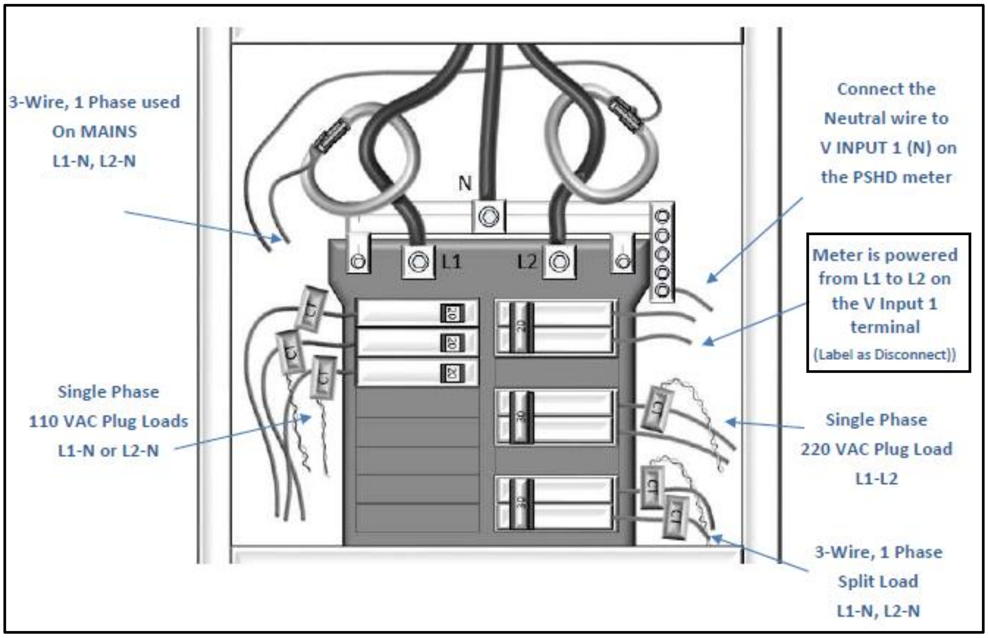
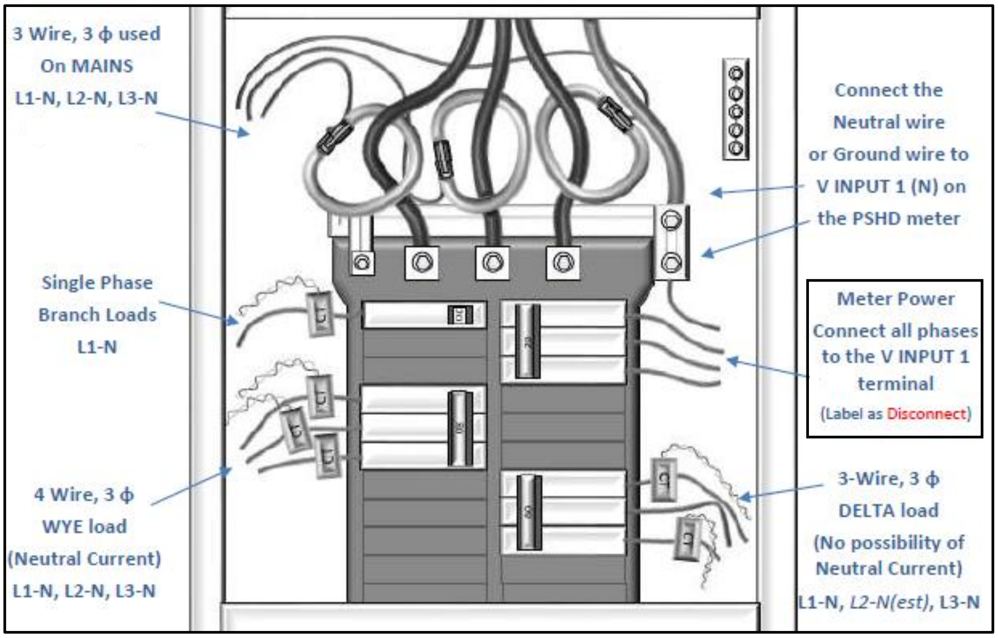


Figure 6 – 4 Wire 3 Phase Service Panel



Monitoring Device Single-Phase Connections

The monitoring device can be used to monitor single-phase loads. There are several guidelines to follow about this type of connection:

1. The monitoring device is powered from a potential between L1 and L2. This can be phase-to-phase (208V) or phase-to-neutral (120V). With a single-phase 208V panel, the L1 and L2 voltage leads are connected between the L1 and L2 voltage sources. With a 120V circuit, the L1 voltage lead is connected to the L1 “hot lead,” and the L2 voltage lead is connected to neutral.
2. Each current transformer must be paired with the correct voltage source. The current and voltage need to be in-phase for accurate measurements. For instance, CT1 would monitor branch circuit supplied by voltage source L1, and so on.
3. The neutral must be connected because the monitoring device uses line-to-neutral measurements for all calculations.

A Typical 120V Single-Phase Panel Setup

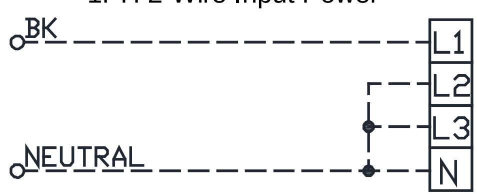
- Connect the Black L1 voltage lead to Voltage L1 (hot).
- Connect the Red L2 voltage lead to Neutral, and White N voltage lead to neutral.

CT1 will monitor the L1 load. CT3 can be used if the Blue L3 voltage lead is connected to L1. CT3 could then monitor any L1 branch circuit.

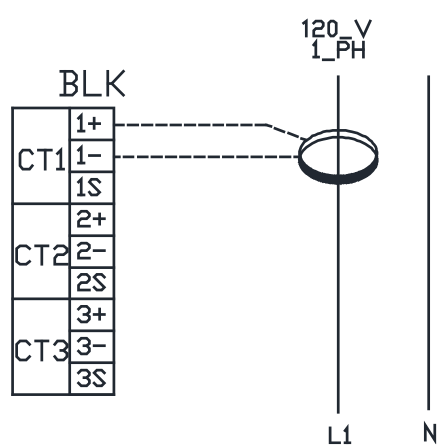
Figure 7 – Typical Single Phase 120V Wiring

Incoming Power To The Power Monitoring Box

1PH 2-Wire Input Power



Current Transformer Wiring Circuit



A Typical 208V Single-Phase Panel Setup

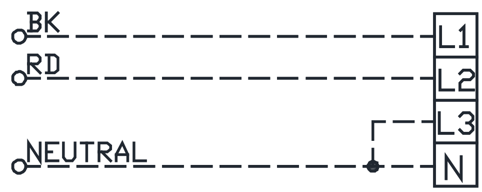
- Connect the Black L1 voltage lead to Voltage L1.
- Connect the Red L2 voltage lead to L2 voltage.
- Connect the White Neutral voltage lead to neutral.

CT1 will monitor L1 loads and CT2 will monitor L2 loads. Based on the above guidelines, CT3 can be used if the Blue L3 voltage lead is connected to either L1 or L2. As long as voltage lead L3 and CT3 are in-phase, the monitoring device will provide correct kW readings. If the Blue L3 voltage lead was connected to L2 voltage source, then CT3 could monitor any L2 branch circuit. Or, if the Blue L3 voltage lead was connected to L1 voltage source, CT3 could monitor any L1 branch circuit.

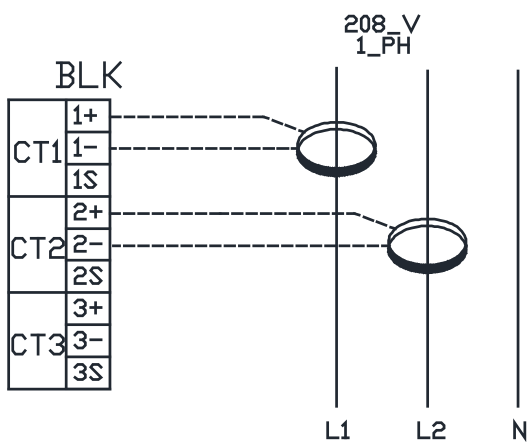
Figure 8 - Typical Single Phase 208V Wiring

Incoming Power To The Power Monitoring Box

1PH 3-Wire Input Power



Current Transformer Wiring Circuit



A Typical 3-Phase Panel Setup

- Connect the Black L1 voltage lead to Voltage L1.
- Connect the Black L2 voltage lead to Voltage L2.
- Connect the Black L3 voltage lead to Voltage L3.
- Connect the White Neutral voltage lead to neutral.

CT1 will monitor L1 loads, CT2 will monitor L2 loads and CT3 will monitor L3 loads. As long as all the current transformers are in-phase, the monitoring device will provide correct kW readings.
There are 2 different types of 3 phase circuits WYE and DELTA.

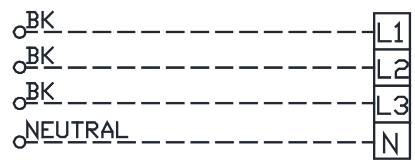
Figure 9 – Typical Three Phase Wiring

Incoming Power To The Power Monitoring Box

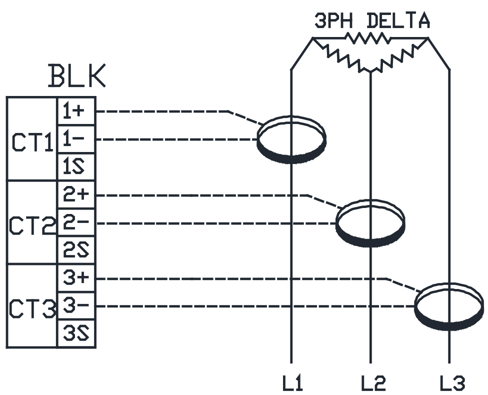
3PH 3-Wire Delta Input Power

Incoming Power To The Power Monitoring Box

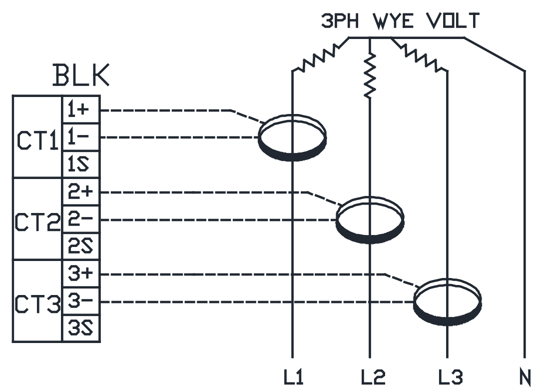
3PH 4-Wire WYE Input Power



Current Transformer Wiring Circuit



Current Transformer Wiring Circuit



Powering the Monitoring Device

Connect the monitoring device using **14 AWG THHN Minimum 600V AC rating** (or equivalent in order to maintain 600V AC safety rating of the device) voltage leads as close as possible to a building-installed, dedicated circuit disconnect breaker. Mark the breaker as the “disconnect” for the monitoring device. Refer to the wiring diagrams provided with electrical package.

The communication module used for CASLink monitoring is powered by a 24V DC power supply and requires a 120VAC circuit connected to the power supply. **NOTE: If 120V AC is not available to power the 24V DC power supply, a small transformer can be used to convert the incoming voltage to 120V AC.**

Always follow local electrical codes during this installation.

Monitoring devices are self-powered from the L1 and L2 lines. When 80–600V AC or DC is placed across the L1 and L2 wires, the three phasing LEDs begin to flash in sequence.

Connecting Voltage

1. Refer to **Figure 10** connect the voltage leads (L1, L2, L3, and N, as necessary) to the monitoring device. A voltage lead of **14 AWG THHN Minimum 600VAC rating** (or equivalent in order to maintain 600V AC safety rating of the device) is required.
2. Connect the leads to the circuit breaker.
    - Refer to the wiring diagrams in for wiring connection specifics. Follow local electrical codes during this installation.
    - **IMPORTANT:** Verify the breaker is marked as the disconnect breaker for the meter. A separate breaker would be needed for the 120VAC used to power the COMM module.

Figure 10 – Voltage Lead Connections

Wiring Guide for Current Transformer

Field Wiring Current Transformers

1. Insert the current transformer wires into the connector/s. See **Figure 11** for wire inserting. Refer to wiring diagrams provided with electrical package.
2. Attach the current transformers onto the monitoring device connections labeled CT1, CT2 and CT3. See **Figure 12** for wiring configuration.
3. Place the current transformer on the phase wires of the load to be monitored and corresponding to the phase of the voltage leads. The connection labeled CT1 must be placed on L1 phase voltage wire, CT2 must be on the L2 voltage and CT3 on the L3 voltage. Refer to Verifying Installation with PhaseChek on **page 15** for information about the LEDs and verifying the current transformer installation.

Figure 11 – Current Transformer Wiring

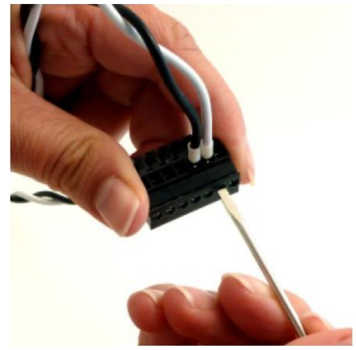
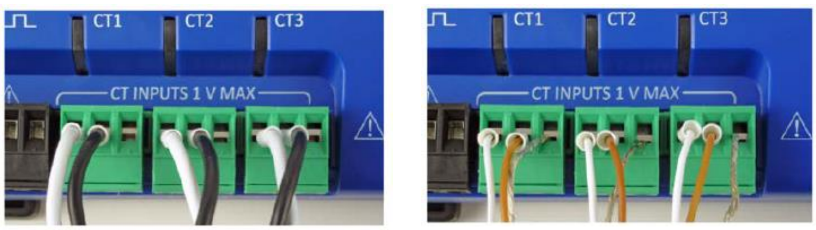


Figure 12 – Wiring Connections for Type of Transformer

Split-Core: 2 wire (+, -)   Rogowski: 3 wire (+, -, shield)



Current Transformer Wire Lead Polarity

Table 2 – Current Transformer Polarity

Current Transformer Type	Current Transformer Lead (+)	Current Transformer Lead (-)
Rogowski	White	Brown
Split-Core mV	White	Black
Clamp On mV (1000A clamp rarely used)	Red	Black

Note: The directionality for Rogowski current transformers is the arrow points toward the load (motor). Rogowski coils have a shield wire which must be connected to the meter. This reduces interference and improves accuracy of the current transformer.

Connecting Split-Core Current Transformer to a Load

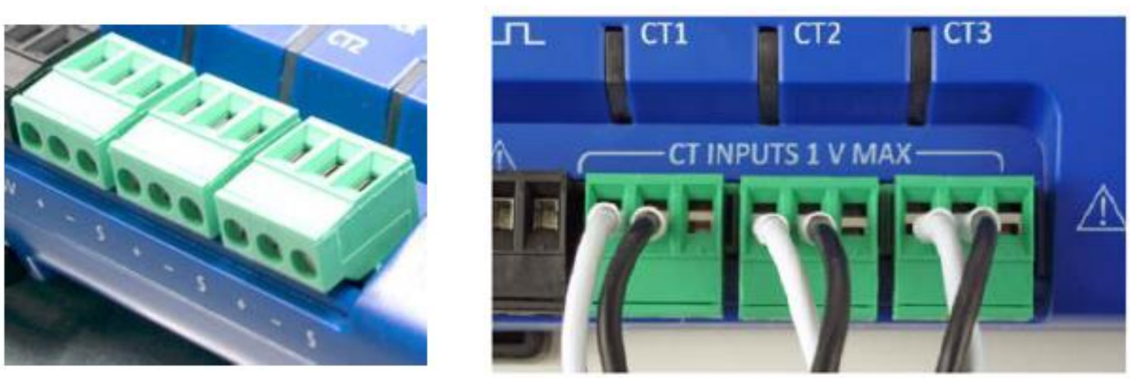
1. Open the Split-Core by holding on to the removable leg and pulling it apart, see **Figure 13**.
2. Connect Split-Core around the load conductor to be measured, see **Figure 14**. Make sure the maximum current of the conductor does not exceed the maximum rating listed on the current transformer's data sheet.
3. Carefully re-connect the removable leg while ensuring the core alignment matches. The conductor should be in the inside of the Split-Core body.
4. Repeat Steps 1-3 if you are using more than one current transformer.

Figure 13 – Opened Split-Core

Figure 14 – Insert Load Conductor

5. Refer to **Figure 15** to connect wiring to the measuring device:
   - Connect the **white wire** from the Split-Core to the **positive terminal** on the measuring device.
   - Connect the **black wire** on the Split-Core to the **negative terminal** on the measuring device.

Figure 15 – Metering Device



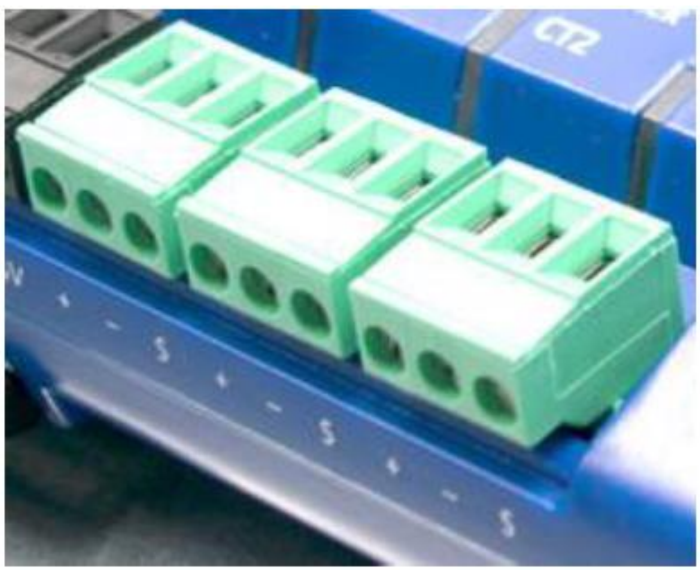
Note: Correct orientation of a current transformer is required to ensure proper measurement. If an arrow is shown on the current transformer label, it should be pointed toward the load. Otherwise, use the instructions printed on the current transformer label/body.

Connecting Rogowski Current Transformer to a Load

Figure 16 – Rogowski Coil

1. Open the Rogowski by squeezing the connector latch and pulling it apart.
2. Connect the Rogowski around the load conductor to be measured. Orient the Rogowski so that the arrow on the case points towards the load. Make sure the maximum current of the conductor does not exceed 4,000 amps.
3. Push the connector back together, make sure the conductor is within the loop of the Rogowski.
4. Repeat Steps 1-3 if you are using more than one Rogowski current transformer.
5. Refer to **Figure 17** to connect wiring to the monitoring device.
    - Connect the **brown wire** from the Rogowski to the **negative terminal** on the monitoring device.
    - Connect the **white wire** from the Rogowski to the **positive terminal** on the monitoring device.
    - Connect the **bare shield wire** from the Rogowski to the **"S" shield terminal** that is part of the connector. This reduces interference and improves accuracy of the current transformer.

Figure 17 – Typical Coil Transformer Connections (Green Connectors)



Verifying Installation with PhaseChek

PhaseChek1 is a unique feature of the monitoring device instruments that simplifies installation by ensuring proper current transformer orientation and avoiding faulty data collection.

Verifying the Monitoring Device Setup Using the LEDs

The monitoring device uses three bi-color status LEDs. These LEDs provide the following information:

- All LEDs are green—the system power factor is greater than 0.55 and the current transformers are properly placed on the corresponding voltage phases.
- Any one LED is red—there is a phasing connection error.
- Two LEDs are red and one is green—two current transformers are reversed.
- All three LEDs are red—all current transformers are incorrectly connected.

The following table describes the PhaseChek error conditions and the appropriate correction.

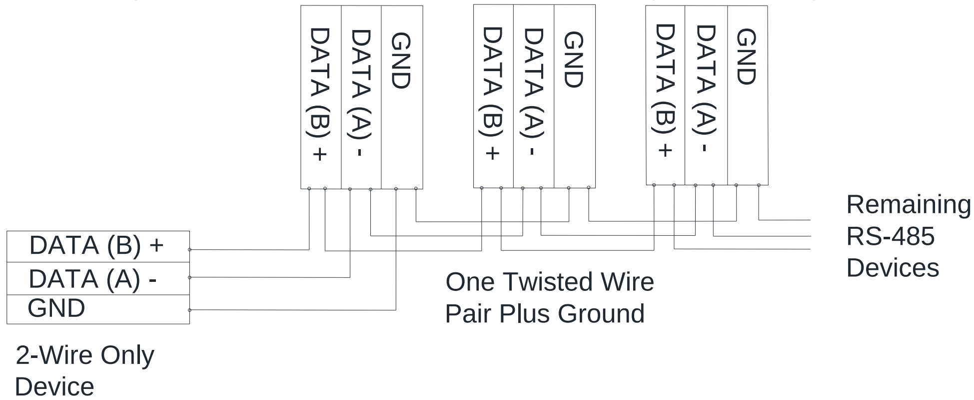
Table 3 – PhaseChek LED Error Resolution

CT1	CT2	CT3	Error Description	Correction
Green LED	Green LED	Green LED	• Setup is correct and the system power factor is greater than 0.55. • All current transformers are disconnected.	Connect the current transformers.
Red LED	Red LED	Red LED	• All current transformers are incorrectly connected. • The system power factor is less than 0.55.	• Rotate the current transformer connections by one position by move CT 1 to CT 2, CT 2 to CT 3 and CT 3 to CT 1, until all LEDs are green. • The system power factor is less than 0.55 but the current transformers are connected properly indicating a light load.
Green LED	Red LED	Red LED	CT2 and CT3 are reversed.	Switch the position of the current transformer flashing red.
Red LED	Red LED	Green LED	CT1 and CT2 are reversed.	Switch the position of the current transformer flashing red.
Red LED	Green LED	Green LED	CT1 is reversed with either CT2 or CT3	• Switch CT1 with CT2 • Switch CT1 with CT3
Green LED	Red LED	Green LED	CT2 is reversed with either CT1 or CT3	• Switch CT1 with CT2 • Switch CT2 with CT3
Green LED	Green LED	Red LED	CT1 is reversed with CT2 or CT3	• Switch CT3 with CT1 • Switch CT3 with CT2
Red LED	Green LED	Red LED	CT1 is reversed with CT2 or CT3	Switch the position of the current transformer flashing red.

Physical Connections on an RS-485 Multi-drop Network

The meter uses a 2-Wire Half Duplex RS-485 Implementation.

Figure 18 – 2-Wire Multi-drop Network using Terminating Resistors



- 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 meter is a 1/8th unit load allowing up to 256 like devices in parallel.

Figure 19 – RS-485 Connection

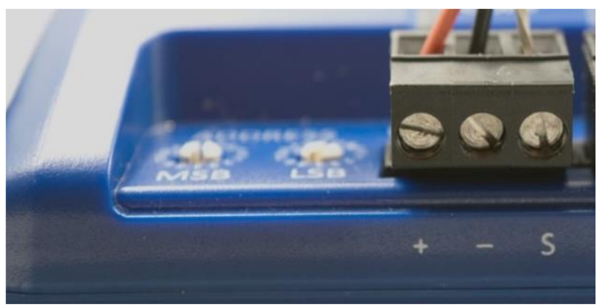


Table 4 – Communication LEDs

Modbus	Description
Steady Green	Power is applied to the meter
Flashing Green	The monitoring meter is communicating
Steady Red	Communications failure, or talking with BACnet while the meter is in Modbus mode.
Flashing Red	The monitoring meter is receiving communications on the bus for a meter at another address.

Verification of Current Transformer Installation

Once the monitoring device is configured and communicating with CASLink via the COMM module, it is a good idea to perform some simple checks to ensure that all the current transformers are on the correct voltage phases and that the current transformers 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 Multi-meter (DMM) can be used to confirm these cases.

CASLink

Figure 20 – Trend Graph

CASLink is a cloud-based Building Management System that allows users to monitor and control equipment connected through the system. Built-in proprietary algorithms provide periodic assessments and recommendations regarding cost reduction measures to optimize building performance. The power monitoring package has CASLink service included, however there needs to be an Ethernet connection ran to the communication module. CASLink will provide the user to visualize all the data points regarding power usage on a graphical interface. The user can access the data for volts, amps and phase for individual legs of a circuits along with the total system.

The data points include the following information:

Name	Unit	Description
Volts	V	Derived unit for electric potential/electric potential difference.
Amps	A	The electric current of the equipment.
Kilowatt	Kw	Power that actually powers the equipment and performs useful work.
Kilowatt Hour	kWh	Total energy consumed.
Kilovolt Ampere Reactive	kVAR	Power that magnetic equipment (transformer, motor, relay) needs to produce the magnetizing flux.
Kilovolt Ampere Reactive Hours	kVARh	Difference between working power and total power consumed.
Kilovolt-Ampere	kVA	Apparent factor of the two vector (quantities) of kVAR and kW.
Kilovolt-Ampere Hour	kVAh	Apparent energy from source.
Apparent Power Factor	aPF	Product of the current and voltage of the circuit. Frequently expressed as a percentage, e.g., 0.5 pf = 50% pf.
Displacement Power Factor	dPF	Power factor displacement due to the phase shift between voltage and current at the fundamental line frequency.

CASLink also provides complete summary of the power usage which can be used to further improve power efficiency and utility cost.

CASLink can provide timely detection of any variation in the power usage, which can cause damage to the equipment. Along with this it can also provide insight of equipment operation and any potential issues that may be present or on the verge of occurrence. This could assist in reduction of maintenance cost for the equipment.

The data can be downloaded and the user can analyze the power usage which can be used to perform energy audits weekly, monthly or even yearly.

Communication Module

The Communication Module, PN: **COMM01**, is included in all CASLink equipped panels. It obtains operational data from various connected components. This communication wiring is either RS-485 shielded twisted pair wiring or RJ45 Cat 5 Ethernet wiring.

Configuration Registers

Register	Description
Synchronize Register	Multiple monitoring meter's synchronization register
Clear Accumulated Measurements	Writing 1234 resets all 'H' registers, accumulated monitoring meter data (kWh, kWh, etc) stored in flash to CAM Default value
Slave ID	Default starts at 99
Data Scalar	A Value of 0-6 that changes the scaling of certain registers
Demand Window Size	Demand window size in minutes; default is 15 min
Volts Multiplier Integer	Multiply volts values by this scalar + Volts Multiplier Decimal/1000. Use with Step-down Transformer. Affects all parameters that use volts (i.e., kW)
Volts Multiplier Decimal	Multiply volts values by (this scalar/1000+Volts Multiplier Integer). Use with Step-down Transformer. Affects all parameters that use volts (i.e., kW)
Communication Setting	Baud: 1900=19200 Parity: 20 = EVEN Stop bit: Add 1= 1 (does permit 1 stop bits), E.g., 1900 = 19200 baud, EVEN, 1 stop bit
Service Type	A value of 0x0001 configures the meter for DELTA A value of 0x0000 configures the meter for WYE
Set Line Frequency	Line frequency setting for metering: 50=50 Hz, 60=60Hz
CT1 Integer	Integer part of CT1
CT1 Decimal	Fractional part of NV_CT1
CT1 Type	Select 1=mV or 2=Rogowski CT1s
CT1 Phase Shift	Phase Shift X 100 +/-
CT2 Integer	Integer part of CT2
CT2 Decimal	Fractional part of NV_CT2
CT2 Type	Select 1=mV or 2=Rogowski CT2s
CT2 Phase Shift	Phase Shift X 100 +/-
CT3 Integer	Integer part of CT3
CT3 Decimal	Fractional part of NV_CT3
CT3 Type	Select 1=mV or 2=Rogowski CT3s
CT3 Phase Shift	Phase Shift X 100 +/-

Points to Monitor

Points that may be monitored by CASLink are:

Name	Description
kWhSystem	System total true energy
kWSystem	System total true power
kWDemandSystemMax	System peak demand
kWDemandSystemNow	System demand now
kWSystemMax	System Max instantaneous
kWSystemMin	System Min instantaneous
kVARhSystem	System total reactive energy
kVARSystem	System total reactive energy
kVAhSystem	System total apparent energy
kVASystem	System total apparent power
DisplacementPFSystem	System displacement power factor
ApparentPFSystem	System apparent power factor
AmpsSystemAvg	Average Amps of all phases
VoltsLineToLineAvg	Voltage Line to Line
VoltsLineToNeutralAvg	Voltage Line to Neutral
VoltsL1toL2	Individual Ph to Ph
VoltsL2toL3	Individual Ph to Ph
VoltsL1toL3	Individual Ph to Ph
LineFrequency	Line frequency
kWhL1	Individual Phase True Energy
kWhL2	
kWhL3	
kWL1	Individual Phase True Power
kWL2	
kWL3	

Name	Description
kVARhL1	Individual Phase Reactive Energy
kVARhL2	
kVARhL3	
kVARL1	Individual Phase Reactive Power
kVARL2	
kVARL3	
kVAhL1	Individual Phase Apparent Energy
kVAhL2	
kVAhL3	
kVAL1	Individual Phase Apparent Powers
kVAL2	
kVAL3	
DisplacementPFL1	Individual Phase displacement Power Factor
DisplacementPFL2	
DisplacementPFL3	
AppPFL1	Individual Phase apparent Power Factors
AppPFL2	
AppPFL3	
AmpsL1	Individual Phase Currents
AmpsL2	
AmpsL3	
VoltsL1toN	Individual Phase to Neutral Voltages
VoltsL2toN	
VoltsL3toN	
TimeSinceReset	Seconds since KWH resister was reset
DataTickCounter	Internal sample count

START-UP AND MAINTENANCE DOCUMENTATION

START-UP AND MEASUREMENTS SHOULD BE PERFORMED AFTER THE SYSTEM HAS BEEN AIR BALANCED (Warranty will be void without completion of this form)

Job Information

Job Name	
Address	
City	
State	
Zip	
Phone Number	
Fax Number	
Contact	
Purchase Date	

Service Company	
Address	
City	
State	
Zip	
Phone Number	
Fax Number	
Contact	
Start-Up Date	

Maintenance Record

Date	Service Performed

Factory Service Department
Phone: 1-866-784-6900
Fax: 1-919-554-9374