PART OF
BEMSIQ
GROUP

OPERATOR'S GUIDE

PowerScout™ FLEX
Installation & Wiring

PowerScout™ FLEX Meter Series:

Rev Date: 5/20/26 |

TABLE OF CONTENTS

1 Introduction

1.1 General Description

The PowerScout™ FLEX Series is a family of multi-channel submeters designed for networked electrical monitoring in commercial, industrial, and institutional applications. The product line includes four base models:

- PowerScout™ FLEX 3 (PS3FX)
- PowerScout™ FLEX 12 (PS12FX)
- PowerScout™ FLEX 24 (PS24FX)
- PowerScout™ FLEX 48 (PS48FX)

PowerScout™ FLEX meters measure true RMS electrical parameters including voltage, current, power, energy, demand, power factor, frequency, and other electrical values on single-phase and three-phase systems. The meter connects directly to the system voltage and to supported external current sensors, including 333 mV current transformers (CTs) and DENT Rogowski coils. Electrical measurements are calculated from these inputs and reported to the host system in real time.

PowerScout™ FLEX meters are designed for integration with a Building Management System (BMS), Remote Terminal Unit (RTU), AcquiSuite® data acquisition device, DENTCloud™, or other supervisory host system. Depending on model and application requirements, communication options include:

- Ethernet (BACnet/IP or Modbus TCP)
- RS-485 (BACnet MS/TP or Modbus RTU)
- USB for local setup and service

PowerScout™ FLEX meters also support FLEXPoint™ software features for flexible point mapping, configuration, and system integration. These capabilities are described in later sections of this guide and in the Programming and Integration Guide.

Some models support direct connectivity to DENTCloud™ for remote access to real-time and historical meter data through a web browser. Refer to the product label and model information in this guide for supported features and options.

1.2 Installation & Wiring Operator's Guide Scope

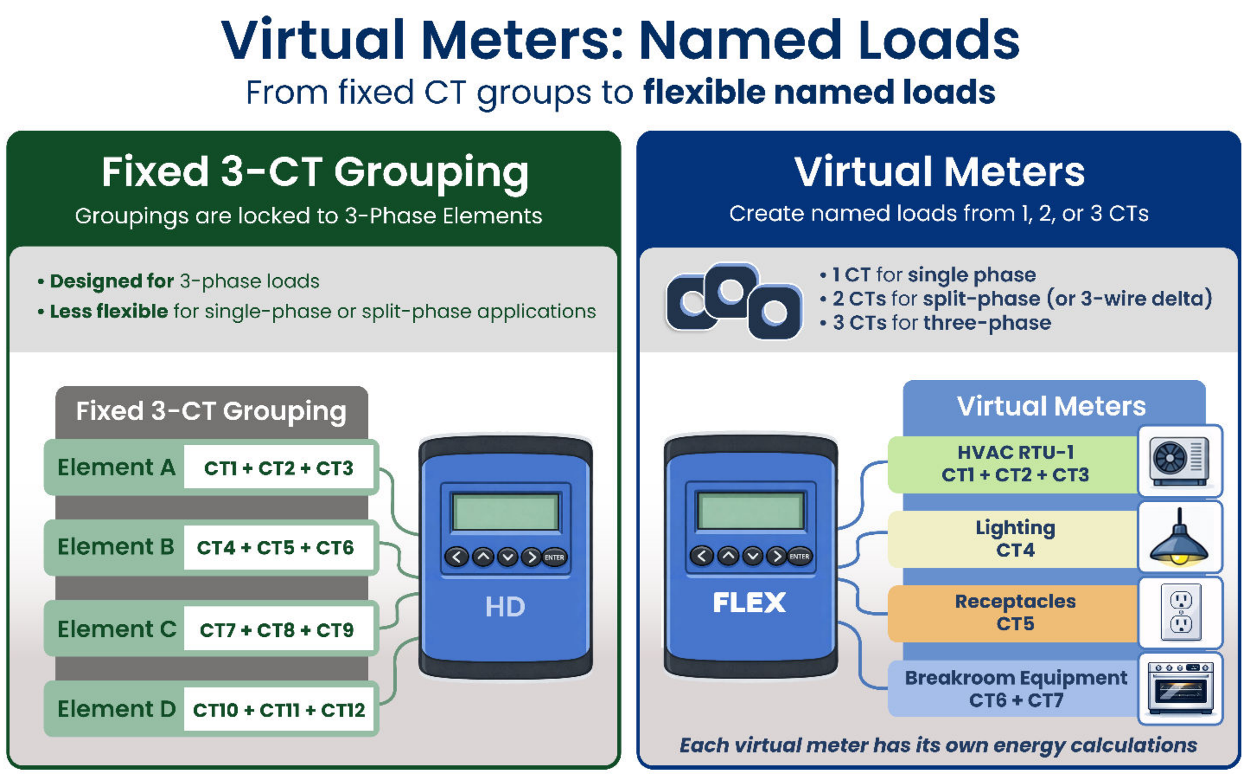
This Installation & Wiring Guide covers physical installation, voltage wiring, current sensor installation, communication wiring, auxiliary wiring, and field documentation required before commissioning.

Detailed software configuration, programming, register access, protocol behavior, and host system integration are outside the scope of this manual.

1.3 PowerScout FLEX Concepts and Data Structure

PowerScout™ FLEX meters use **Virtual Meters (VMs)** to represent electrical loads. A Virtual Meter replaces the fixed element concept used in earlier PowerScout™ models, such as PowerScout™ HD.

In earlier PowerScout meters, measurement channels were grouped into fixed three-channel elements. PowerScout™ FLEX uses a more flexible data structure that allows current inputs to be assigned to Virtual Meters based on the loads being measured.



Virtual Meter

A Virtual Meter represents a logical electrical load. It is the primary grouping used for configuration, measurement reporting, and integration data.

Each Virtual Meter may include one, two, or three current channels, depending on the service type and load being measured. Virtual Meters can be configured independently for service type, voltage reference, CT selection, scaling, phase correction, and labeling.

Channel

A Channel is a current channel within a Virtual Meter. Channels are identified as **CH1**, **CH2**, and **CH3** within each Virtual Meter.

Each Channel can be assigned to a physical CT input on the meter. This allows the meter's available CT inputs to be used more flexibly than fixed three-channel element groupings.

Physical CT Input

A Physical CT Input is an actual current transformer input terminal on the meter hardware. Depending on the model, a PowerScout™ FLEX meter may include 3, 12, 24, or 48 physical CT inputs.

Physical CT inputs are assigned to Virtual Channels during configuration.

System Scope

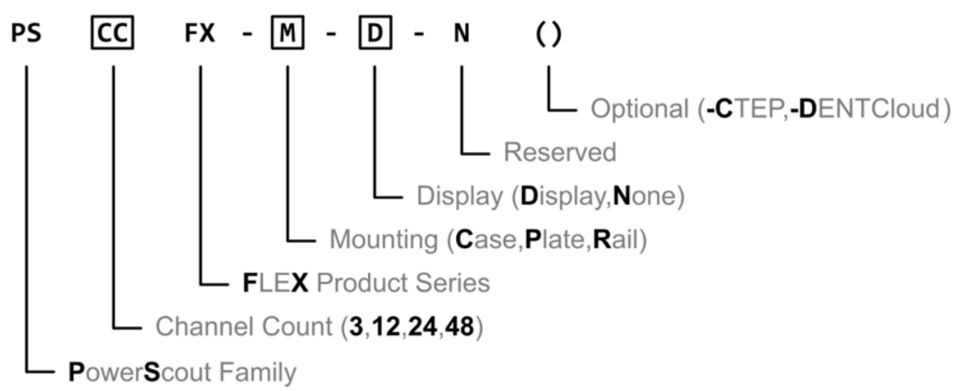
System scope refers to values or settings that apply to the meter as a whole rather than to a specific Virtual Meter. These may include meter identification, communication settings, security settings, voltage input scaling, or other global parameters.

Integration Data Structure

For Modbus and BACnet integrations, PowerScout™ FLEX data is organized around Virtual Meters, Virtual Channels, and System-level values.

1.4 Supported Models

PowerScout™ FLEX meters are available in multiple configurations. The full model number identifies the base meter, enclosure type, display option, communication features, and any special options or certifications.



PowerScout™ FLEX Part Numbering Scheme

1.5 What's Included

Each PowerScout™ FLEX shipment includes the following items:

- PowerScout™ FLEX meter, as ordered
- Pluggable terminal connectors
- USB-C configuration cable
- Certificate of Calibration (COC)
- FLEXPoint™ software access information (Quick Start Guide download link)
- Product documentation

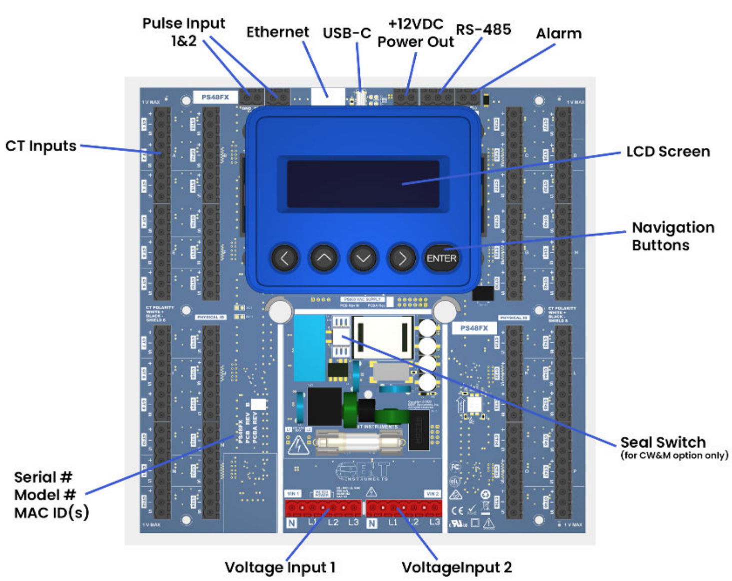
Depending on the model and options ordered, the shipment may also include:

- LCD user interface
- DIN-rail mounting hardware
- Tamper-evident seals for CTEP-certified models

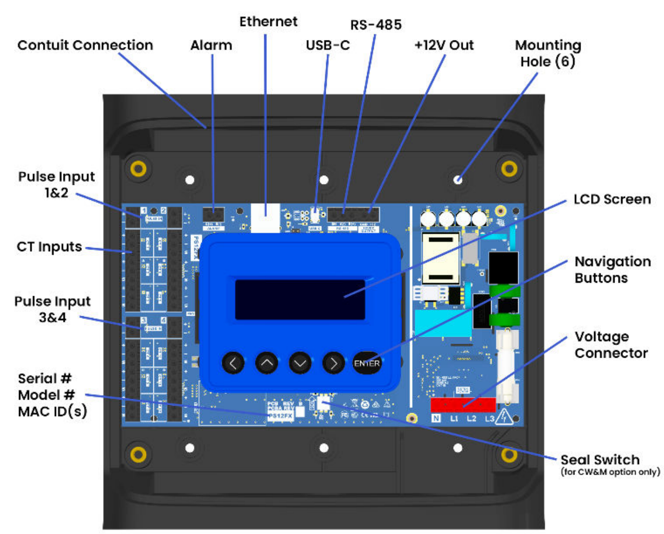
1.6 PowerScout™ FLEX Anatomy

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

PowerScout™ FLEX 24/48

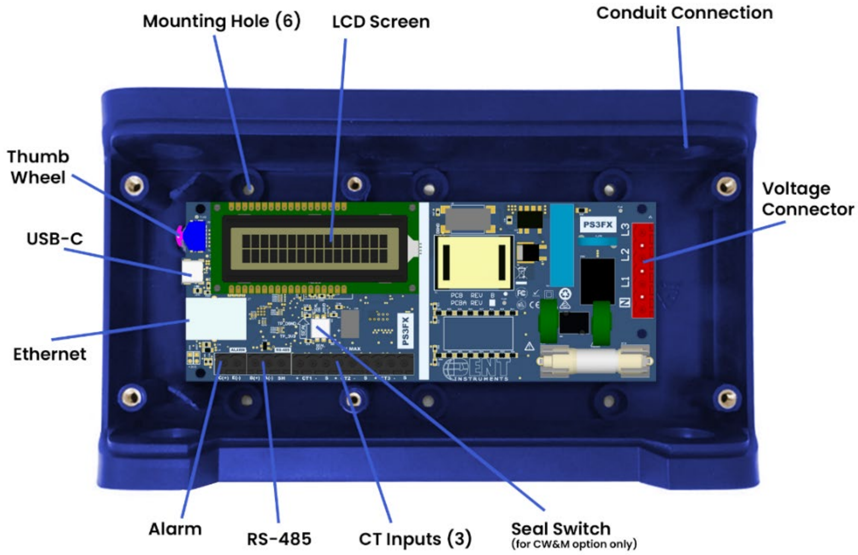


PowerScout™ FLEX 12



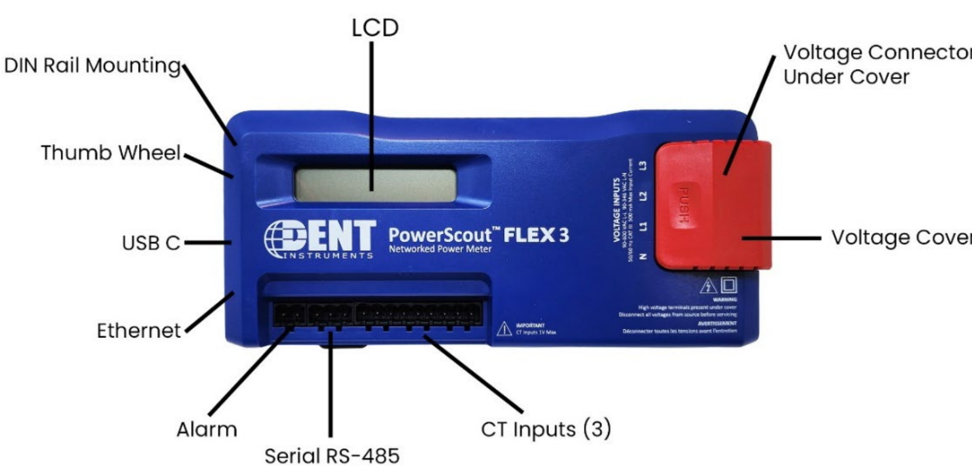
PS12FX-C (Enclosure with cover removed)

PowerScout™ FLEX 3 Available Configurations



PS3FX-C Wall Mount Option (Enclosure with Cover Removed)

Note: Must use the supplied USB C right angle cable. A standard USB C straight connector will not fit the PS3FX-C Wall Mount meter.



PS3FX-R DIN Rail Mount Option

2 Safety

This chapter summarizes important safety information for installing, wiring, operating, and servicing the PowerScout™ FLEX meter. Read and understand this section before installing the meter or making any electrical connections.

PowerScout™ FLEX meters are installed in electrical equipment where hazardous voltages may be present. Installation and service must be performed only by qualified personnel in accordance with this manual, applicable electrical codes, and site safety procedures.

Safety markings on the meter and safety symbols used in this manual identify important hazards, precautions, and compliance information. Failure to follow these instructions may result in equipment damage, inaccurate measurement, electrical shock, serious injury, or death.

2.1 Safety Responsibility and Intended Use

The PowerScout™ FLEX meter is intended for use as an electrical measurement and monitoring device in commercial, industrial, and similar electrical installations. The meter must be installed, configured, operated, and serviced only as described in this manual and in accordance with applicable electrical codes, regulations, and site safety procedures.

Installation and service must be performed only by qualified personnel who are trained and authorized to work on electrical equipment. The installer is responsible for verifying that the meter, current sensors, wiring methods, overcurrent protection, disconnecting means, enclosure, and installation environment are appropriate for the application.

This manual does not replace or supersede national, state, provincial, local, or site-specific electrical codes or safety requirements. Where requirements differ, the more restrictive requirement or the requirement specified by the authority having jurisdiction shall apply.

Do not use the meter in any manner not specified by DENT Instruments. Use of the meter outside the specified ratings, with incompatible current sensors, without required covers or enclosures, or in a manner not described in this manual may impair the protection provided by the equipment and may result in equipment damage, inaccurate measurements, electrical shock, serious injury, or death.

DENT Instruments is not responsible for damage, injury, measurement errors, or system failures caused by improper installation, incorrect configuration, unauthorized modification, use outside the meter’s specified ratings, use with incompatible equipment, or failure to follow the instructions in this manual.

2.2 Electrical Safety Precautions

Before installing, wiring, servicing, or removing the PowerScout™ FLEX meter, de-energize all circuits connected to the meter and follow applicable lockout/tagout procedures. Verify absence of voltage before touching conductors or terminals.

Do not exceed the published voltage, current input, environmental, or enclosure ratings of the meter or connected current sensors. Exceeding rated limits may damage the equipment, impair the protection provided by the equipment, and create a hazardous condition.

Use only wiring methods, overcurrent protection, disconnecting means, enclosures, and accessories suitable for the installation environment and approved by applicable codes and the authority having jurisdiction.

2.3 Meter Safety Requirements

PowerScout™ FLEX meters must be installed and used only as described in this manual.

Board-level and panel-mount PowerScout™ FLEX models must be installed in a suitable user-supplied UL Listed or Recognized enclosure in accordance with NEC and local electrical codes.

The PowerScout™ FLEX is a **600 V Overvoltage Category III** device. Use approved protection when installing, operating, or servicing the meter.

Caution: This meter may contain life-threatening voltages. Qualified personnel must disconnect all high-voltage wiring before servicing the meter with the high-voltage TouchSāf™ cover removed.

Do not energize the meter with the high-voltage TouchSāf™ cover removed.

2.4 Symbols in Documentation

WARNING: This identifies crucial safety information.

IMPORTANT: Additional information that is very relevant to the instructions.

Caution: You should be careful when completing this step.

Note: This is a note please edit

2.5 Symbols on Equipment

Symbol	Definition
	Denotes caution. Refer to the manual for information about the nature of the hazard and required precautions.
	Denotes high voltage. Risk of electrical shock. Life-threatening voltages may be present. Qualified personnel only.
	Equipment protected throughout by double insulation or reinforced insulation.
	Indicates conformity with applicable European health,safety, and environmental protection requirements.
c UL us LISTED E186827	Indicates that the marked product has been evaluated as a complete listed product for the U.S. and Canadian markets.
c US	Indicates that the marked product has been evaluated as a recognized component for use within another product or suitable enclosure.
RoHS	Restriction of Hazardous Substances. PowerScout™ FLEX Series is RoHS Compliant.
	Indicates conformity to mandatory compliance for most electrical, electronic, and telecommunications products sold in Australia and New Zealand.
	Indicates conformity to the legal obligations placed on businesses that manufacture, import, or sell electrical and electronic equipment (EEE) to ensure their products are safely collected, recycled, and disposed of at the end of their lifespan.

2.6 Compliance and Standards Summary

PowerScout™ FLEX meters are evaluated for safety and regulatory compliance as a product family. Certification status varies by model configuration: enclosure and wall-mount meters are UL Listed, while rail and plate versions are UL Recognized components. Refer to the product label for the certification markings applicable to the installed meter.

Category	Standard / Requirement	FLEX Wall Mount	FLEX Rail / Plate
Safety	UL 61010-1, 3rd Edition	UL Listed	UL Recognized
Safety	UL 61010-2-30:2010	UL Listed	UL Recognized
Safety	CSA C22.2 No. 61010-1, 3rd Edition	Certified / Listed configuration	Certified / Recognized component configuration
CE – Low Voltage Directive	EN 61010-1	Applies	Applies
CE – EMC	EN 61326-1	Applies	Applies
RoHS	EN 50581	Applies	Applies
FCC	FCC Part 15, Class A digital device	Applies	Applies

2.7 Maintenance

PowerScout™ FLEX requires no routine maintenance. Observe the following guidelines:

Cleaning
Do not use water, solvents, or other cleaning agents on the PowerScout™ FLEX meter.

Accessories
Use only accessories specified in current DENT Instruments product literature.

Damaged or Defective Equipment
If the meter appears damaged or defective, disconnect all power to the meter before further handling. Contact DENT technical support for assistance.

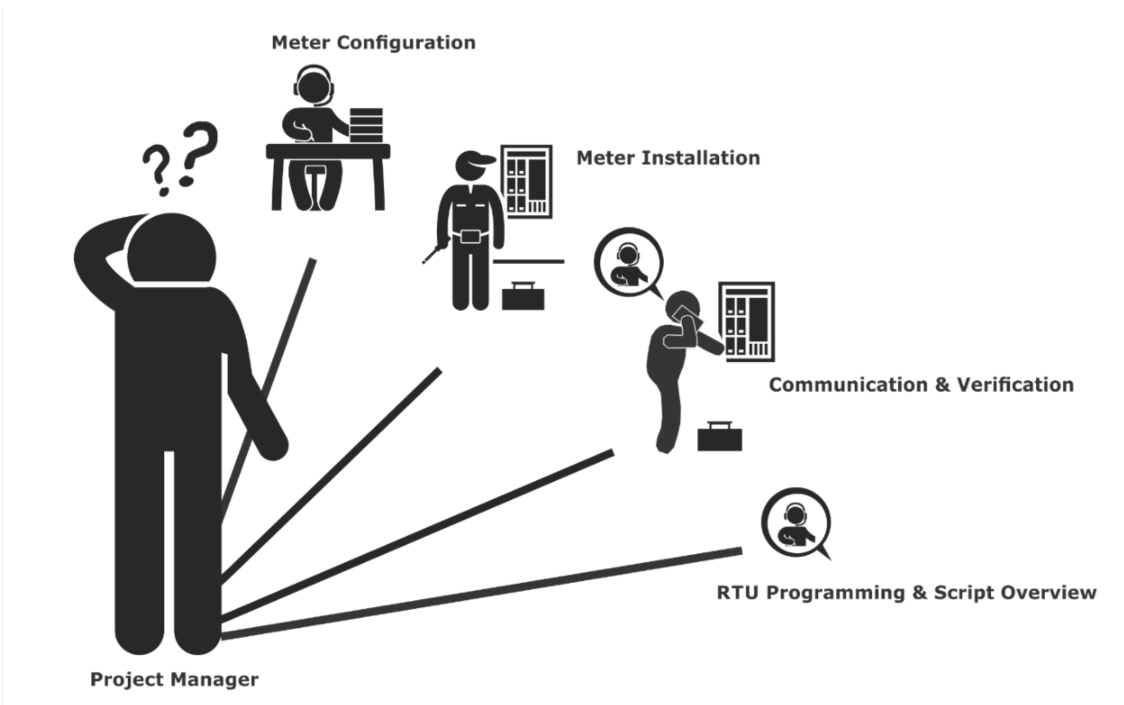
DENT Instruments, Inc.
925 SW Emkay Drive
Bend, OR 97702 USA
Phone: 541.388.4774
www.DENTinstruments.com
Email: support@DENTinstruments.com

3 Planning

3.1 Project Coordination

Installation of a PowerScout™ FLEX meter may involve coordination among installers, electricians, controls contractors, and commissioning personnel. Before field work begins, confirm which individual or team is responsible for each task and verify that all required tools, software, credentials, and network information are available.

Typical pre-installation activities may include selecting the communication method, assigning network or device addresses, obtaining required PINs or login credentials, and confirming integration requirements with the host system. Completing these items before arriving on site can reduce commissioning time and minimize field errors.



3.2 Pre-Installation Checklist

Before arriving on site or beginning installation, confirm the following:

- Correct meter model and current sensors have been selected.
- Panel schedules, one-line diagrams, and point lists are available.
- Service voltage and communication method have been confirmed.
- Device addressing, protocol settings, and register list are available.
- Installation location, disconnecting means, and working clearance are adequate.
- Mounting method and required accessories are confirmed.
- Required host-system integration details are available.
- Commissioning responsibilities are assigned. Configuration and Viewing Interfaces

3.3 Required Tools and Materials

Verify that the following are available before installation:

Tools

- Insulated hand tools
- Wire stripper/cutter
- Screwdrivers
- Drill and bits, if required
- Digital multimeter
- Laptop, tablet, or smartphone for setup
- Required PPE

Installer-Supplied Materials

- **Power and voltage wiring**:
  - 14 AWG minimum THHN wire rated for 600 VAC, or equivalent wiring appropriate for the installation
- **Dedicated breaker or disconnect**
  - Required for meter voltage/power connection
- **Communication wiring, as applicable**
  - RS-485, Ethernet, pulse input, alarm output, or other project-specific wiring
- **Conduit and fittings, as required**
  - 1 in. conduit connection for PS12FX / PS24FX / PS48FX wall-mount enclosures
  - 1/2 in. conduit connection for PS3FX wall-mount enclosure
- **Mounting hardware**
  - Installer supplied unless provided with the meter or enclosure
- **Current sensors specified for the installation**

Supplied with Meter

- PowerScout™ FLEX meter
- Pluggable terminal connectors
- USB-C configuration cable
- Certificate of Calibration
- FLEXPoint™ access information
- Product documentation

3.4 Configuration and Viewing Interfaces

PowerScout™ FLEX meters support multiple interfaces for configuration and data viewing, including FLEXPoint™, FLEXPoint™ Go, the optional LCD user interface, and host-system access through an RTU or other supervisory platform.

FLEXPoint™ is the primary and most capable configuration tool. FLEXPoint™ Go supports convenient field access for common setup and viewing tasks. The LCD user interface supports limited local observation and communication setup. When communication settings have already been established, some configuration and data access may also be available through the host system.

Detailed procedures for configuration, communication setup, and verification are provided in the sections that follow.

4 Meter Installation

This section provides guidance for physical installation of the PowerScout™ FLEX meter, including enclosure mounting, voltage wiring, and proper installation of the current sensors within the electrical panel and at the meter. Current sensors may include 333 mV CTs or DENT Rogowski coils, depending on the installation.

PowerScout™ FLEX meters are available in wall-mount, DIN-rail, and plate-mount configurations. Installation should be performed by qualified personnel in accordance with applicable codes and site safety procedures.

4.1 Meter Mounting Configurations

DENT PowerScout™ FLEX meters are available in several mounting configurations. Wall-mount enclosures are designed for attachment to electrical conduit and surface mounting. Plate-mount and DIN-rail versions are intended for installation inside a user-supplied UL- or NEMA-rated enclosure appropriate for the application.

Use care during installation to avoid flexing the circuit board or placing mechanical stress on the meter assembly.

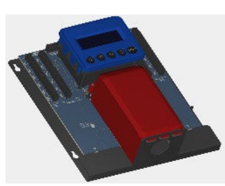
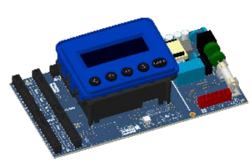
Mounting Options	PS48FX/PS24FX	PS12FX	PS3FX
Enclosure	 **PS24FX-C-D-N** **PS48FX-C-D-N**	 **PS12FX-C-D-N**	 **PS3FX-R-D-N**  **PS3FX-C-D-N**
OEM Plate	 **PS24FX-P-D-N** **PS48FX-P-D-N**	 **PS12FX-P-D-N**	**N/A**

Figure X. Mounting configurations by model

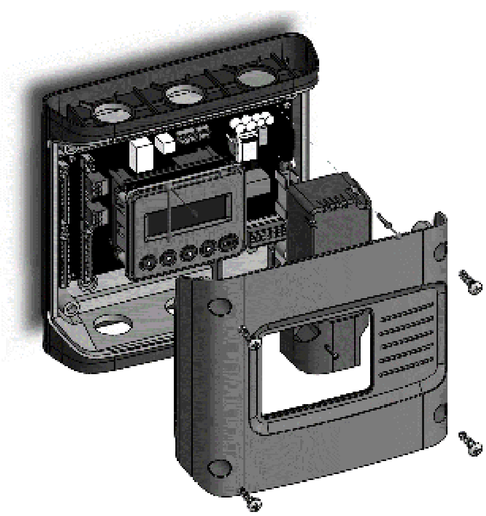
4.2 all and Plate Mount Installation

Refer to Section 6 for complete wiring instructions.

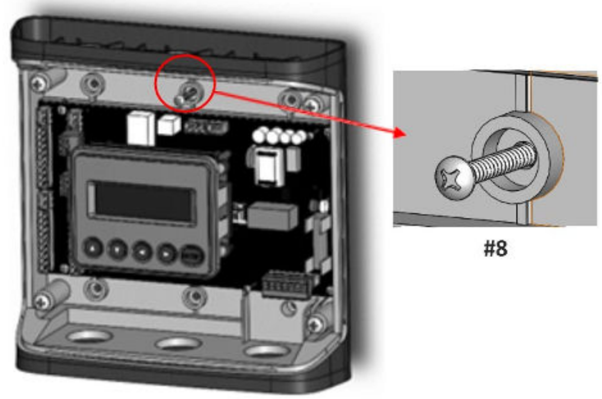
Installation Sequence for Wall-Mount and Plate-Mount Models

The following procedure illustrates a **PowerScout™ FLEX 12** wall-mount model (**PS12FX-C-D-N**). Other PowerScout™ FLEX wall-mount and plate-mount models may differ slightly in appearance, but the basic installation sequence is similar. For plate-mount models, install the meter onto a suitable mounting surface or inside an appropriate enclosure using the applicable mounting hole locations.

STEP 1) Remove the (4) enclosure top cover screws, **if applicable**, and remove the (2) high-voltage cover screws.



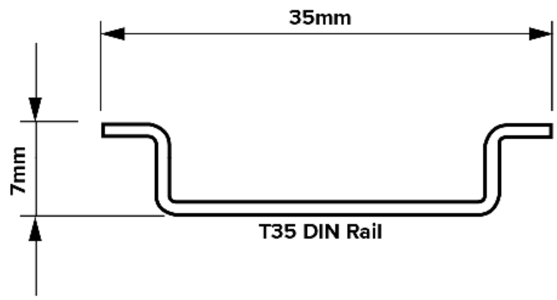
STEP 2) Using the enclosure or mounting plate as a template, locate and mark the mounting points. Drill the required mounting holes for the user-supplied hardware.



If the meter is not available to use as a drilling template, refer to the dimensional drawing in the appendix for mounting hole spacing. The centerline mounting holes are intended for attachment to wall studs. For hollow-wall installations, use of the outer four mounting points is recommended.

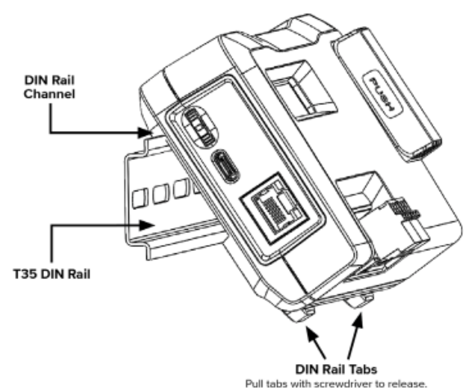
4.3 Installation Sequence for PS3FX-R-D-N

The following section illustrates the PS3FX-R-D-N model, which is equipped with a built-in DIN rail channel for easy installation. The PS3FX-R-D-N must be installed inside a UL approved electrical enclosure.



STEP 1) Within a suitable UL-approved enclosure, attach a section of T35 DIN rail on which the PS3FX will be mounted. Remember to leave enough clearance for voltage, CT, and communication wires to be routed within the enclosure. The UL-approved enclosure is customer supplied.

STEP 2) Mount the meter on the DIN rail by pressing the top edge of the DIN rail channel on the meter into the top of the DIN rail itself and then pushing the meter firmly towards the DIN rail so that it clicks into place. The meter can be released from the DIN rail by using a screwdriver to pull the DIN rail tabs at the bottom of the meter.



Link to: **Mounting Templates**

5 Wiring – Voltage Connections and Service Types

This section describes how to connect voltage wiring to the PowerScout™ FLEX meter and how those voltage connections relate to supported service types. Voltage connections provide the meter with the voltage reference required for measurement. On all PowerScout™ FLEX models, Voltage Input 1 also provides operating power to the meter.

> **WARNING:** Do not exceed the published voltage, current input, environmental, or enclosure ratings of the meter or connected current sensors. Exceeding rated limits may damage the equipment and create a hazardous condition.

Current sensor installation is covered separately in **Section 6, Wiring – Current Sensor Installation**.

5.1 Voltage Wiring Safety

PowerScout™ FLEX meters are connected directly to building voltage. Installation must be performed by qualified personnel in accordance with applicable electrical codes and site safety procedures.

> **WARNING:** High voltage may be present. Risk of electric shock. Life-threatening voltages may be present. Qualified personnel only.

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

> **WARNING:** Do not energize the meter with the TouchSāf™ high-voltage cover removed.

Before connecting voltage wiring:

- Verify that the meter is securely mounted.
- Verify that the disconnecting means is open and locked out as required by site procedure.
- Verify that voltage conductors are properly identified.
- Confirm that the installation voltage is within the meter input rating.
- Confirm that the correct meter model and voltage input terminals are being used.

5.2 Voltage Input Ratings

Connect the voltage leads **L1, L2, L3, and N**, as required by the service type, to the meter through a dedicated disconnect or circuit breaker.

Use **14 AWG minimum THHN wire rated for 600 VAC**, or equivalent wiring appropriate for the installation.

WARNING: 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 PowerScout™ FLEX is a 600 Volt Over Voltage Category III device.

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

PowerScout™ FLEX voltage inputs are rated for:

Voltage Measurement	Rating
Line-to-Neutral	90–346 VAC
Line-to-Line	Up to 600 VAC
Installation Category	CAT III

For voltages above the meter's direct input rating, use properly rated potential transformers (PTs) and configure the appropriate voltage multiplier during meter setup.

5.3 Voltage Input 1 and Voltage Input 2

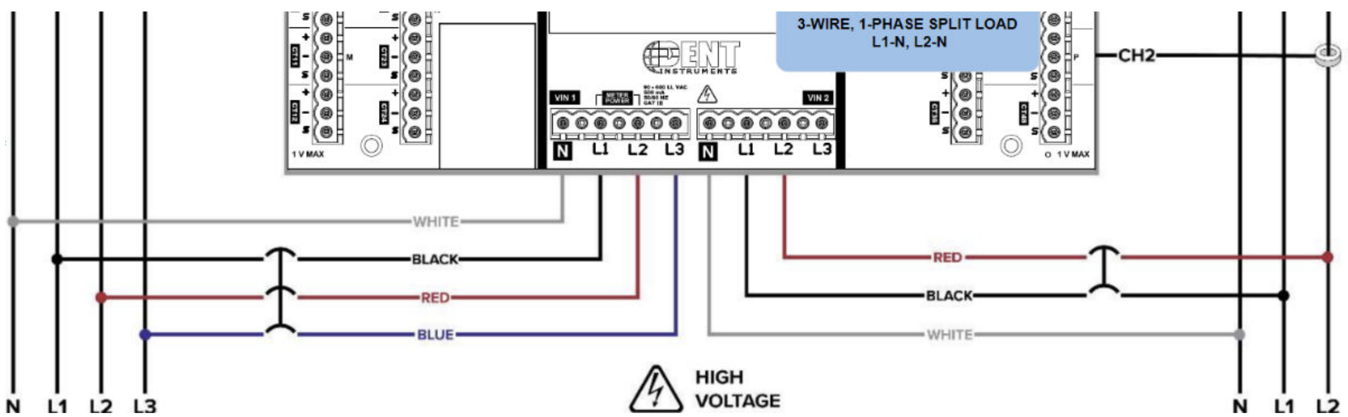
PowerScout™ FLEX 24 (**PS24FX**) and PowerScout™ FLEX 48 (**PS48FX**) meters include two sets of voltage reference inputs. These inputs allow Virtual Meters to reference different voltage sources when required by the installation.

The meter is internally powered from **Voltage Input 1**, through the voltage between **L1 and L2**. **Voltage Input 2 is a measurement reference only and cannot be used to power the meter.**

When using Voltage Input 2:

- Voltage Input 1 must still be connected to provide meter power.
- Voltage Input 2 may be used as a voltage reference for Virtual Meters assigned to that voltage source.
- Voltage Input 2 conductors should be connected according to the service type and voltage reference required for the loads being measured.
- Voltage Input 2 does not replace the required power connection on Voltage Input 1.

IMPORTANT: DO not rely on Voltage Input 2 to power the meter. If Voltage Input 1 is not energized, the meter will not operate, even if voltage is present on Voltage Input 2.



5.4 Systems Without a Neutral Conductor

Some service types, including certain Delta services, may not include a neutral conductor. The PowerScout™ FLEX meter uses the **N terminal as the voltage reference point** for line-to-neutral measurements.

For systems without a neutral conductor, connect the **N terminal** according to the project wiring requirements and applicable electrical codes. In many grounded Delta installations, the grounding conductor may be used as the meter's reference connection at the **N terminal**.

If the N terminal is left open, line-to-line measurements may remain accurate, but line-to-neutral measurements may not be balanced or symmetrical. When a grounding conductor is connected to the N terminal as the voltage reference, less than **500 µA** flows into the grounding conductor.

IMPORTANT: The N terminal reference connection is used for voltage measurement reference only. It does not replace required grounding or bonding practices for the electrical system.

5.5 Power Meter Requirements

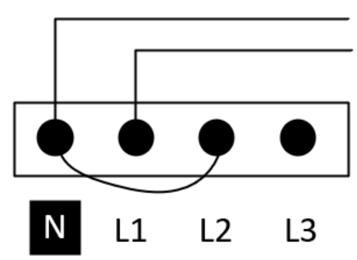
PowerScout™ FLEX meters are powered from the voltage connected between **L1 and L2 on Voltage Input 1**.

For three-phase and split-phase systems, this voltage is normally present as part of the standard voltage connection. For single-phase applications where no L2 conductor exists, an additional connection is required so the meter can power up correctly.

Voltage Input 1 must be connected and energized for the meter to operate from line power.

5.6 Single-Phase Powering Requirement

The PowerScout™ FLEX meter is internally powered through the voltage between L1 and L2. For Single Phase installations where no L2 exists it is advised to jumper N to L2. This connection provides power to the meter while maintaining Neutral as the metering voltage reference.



5.7 Voltage Wiring Sequence

For wall-mount models, conduit fittings and blanking plugs should be installed before voltage wiring. For DIN-rail models, all wiring must be completed inside a suitable customer-supplied enclosure.

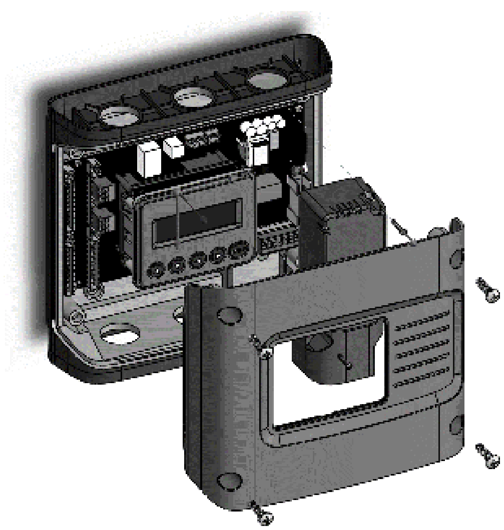
For wall-mount and DIN-rail models, complete voltage wiring before installing current sensors or communication wiring.

Multi-Circuit Wall-Mount Models

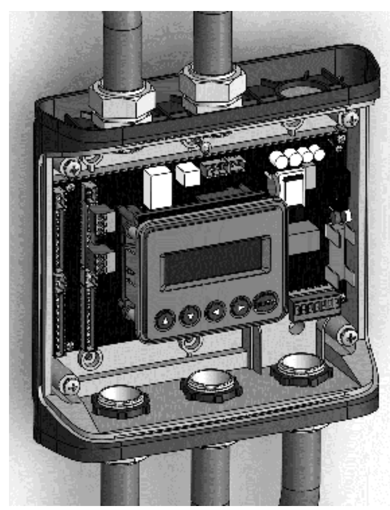
The following sequence applies generally to PowerScout™ FLEX 12 (**PS12FX**), PowerScout™ FLEX 24 (**PS24FX**), and PowerScout™ FLEX 48 (**PS48FX**) wall-mount models. Component layout may vary slightly by model.

WARNING: Do not energize the meter with the TouchSāf high-voltage cover removed.

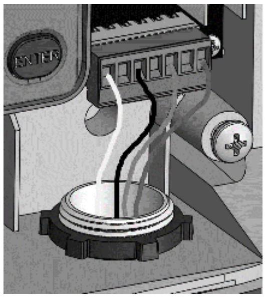
STEP 1) Remove top cover screws (4x) and high voltage cover screws (2x) – provided



STEP 2) Mount conduit fittings, conduits, and blanking plugs

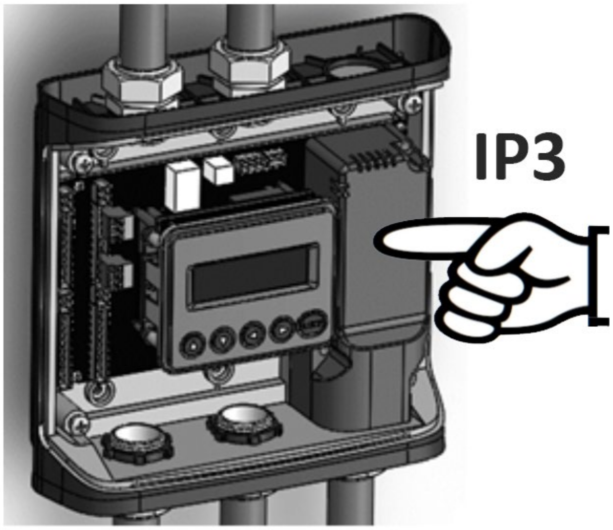


STEP 3) Connect voltage leads



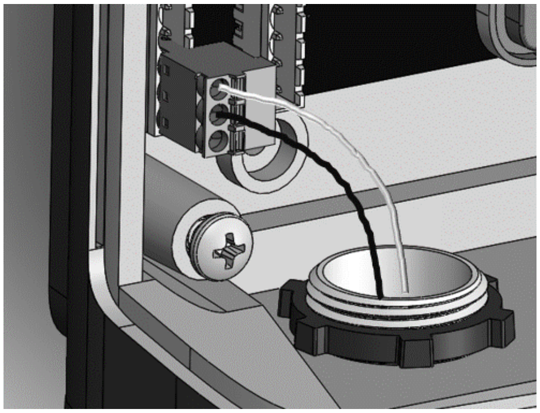
WARNING: DO NOT ENERGIZE METER WITH VOLTAGE COVER REMOVED!

STEP 4) Attach the TouchSāf™ high voltage cover



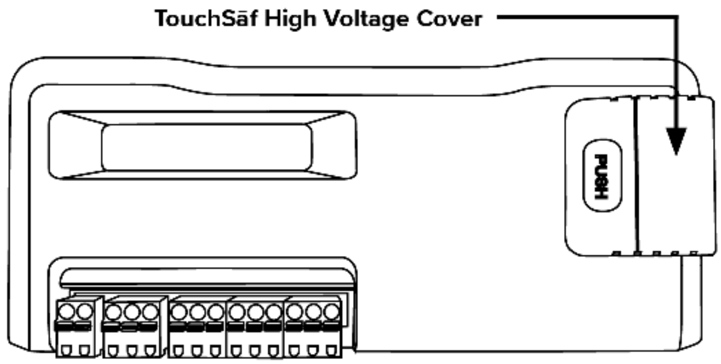
TOUCH SAFE
(with internal high voltage cover installed)

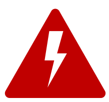
STEP 5) Connect CT and Communications Wiring



Voltage Wiring Sequence for PowerScout™ FLEX 3

STEP 1) Remove the TouchSāf™ high voltage cover and connect the voltage leads to the meter.

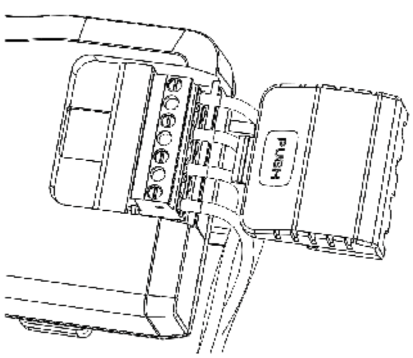


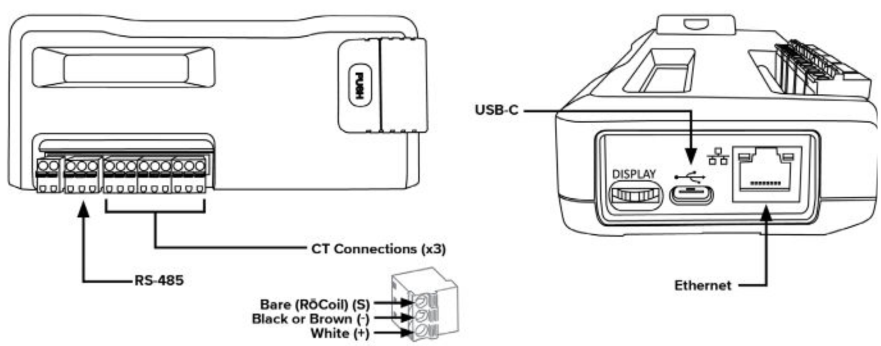


WARNING: DO NOT ENERGIZE METER WITH VOLTAGE COVER REMOVED!

STEP 2) Reattach the TouchSāf™ high voltage cover

STEP 3) Connect CT and Communications Wiring.





5.8 Service Type Overview

The service type defines the electrical system or load configuration being measured. The selected service type determines how the meter interprets voltage and current measurements for each Virtual Meter.

Service type selection is completed during meter configuration, but it must match the physical voltage and current sensor wiring.

Service Type	Typical Use	Voltage Reference
2-Wire Single Phase, Line-to-Neutral	120 V or 277 V branch loads with one phase conductor and neutral	L1-N, L2-N, or L3-N
2-Wire Single Phase, Line-to-Line	208 V, 240 V, or 480 V two-wire loads without neutral	L1-L2, L2-L3, or L3-L1
3-Wire Split Phase / Single Phase	120/240 V services or loads with L1, L2, and Neutral	L1-N and L2-N
Three-Phase Wye	Four-wire three-phase systems	L1-N, L2-N, L3-N
Three-Phase Delta	Three-wire three-phase systems without neutral	Line-to-line references

5.9 Service Wiring Examples

The following examples illustrate common service types and voltage reference connections for PowerScout™ FLEX meters. These examples are intended to show typical voltage wiring arrangements only. Current sensor installation and CT input assignment are covered in **Section 6, Wiring – Current Sensor Installation**.

PowerScout™ FLEX voltage terminals are labeled **L1, L2, L3, and N**. In project drawings, host systems, or downstream documentation, these conductors may also be referred to as **Phase A, Phase B, Phase C, and Neutral**.

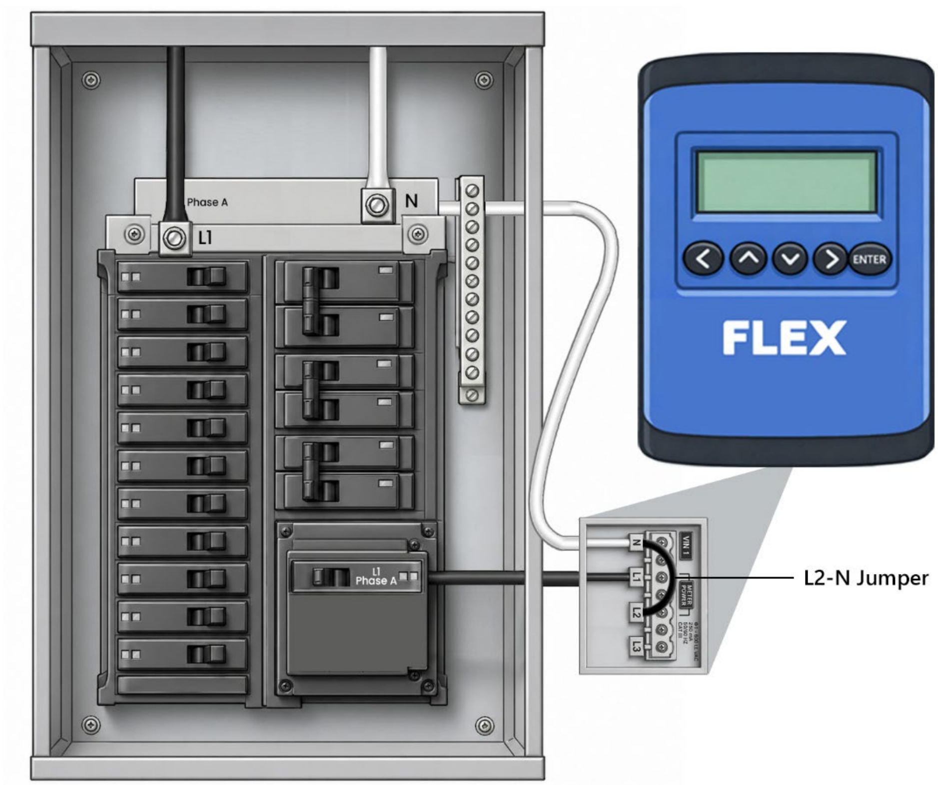
Meter Label	Common Phase Name
L1	Phase A
L2	Phase B
L3	Phase C
N	Neutral

Connect voltage leads through a dedicated disconnect or circuit breaker as described earlier in this chapter. The disconnect should be clearly marked as the meter disconnect.

IMPORTANT: PowerScout™ FLEX meters are powered from L1 to L2 on the VIN1 connector. On PowerScout™ FLEX 24 and PowerScout™ FLEX 48 meters, the second voltage input connector may be used as an additional voltage reference, but it does not power the meter.

Two-Wire Single-Phase Service

Use this example for single-phase line-to-neutral applications where the measured service or load uses **L1-N**.



In this configuration, connect the line conductor to **L1** and the neutral conductor to **N**. The meter uses Neutral as the voltage reference for the measured load.

For single-phase installations where no L2 conductor is available, connect a jumper from **N to L2** on the VIN1 connector. This allows the meter to power from **L1 to L2** while maintaining Neutral as the metering voltage reference.

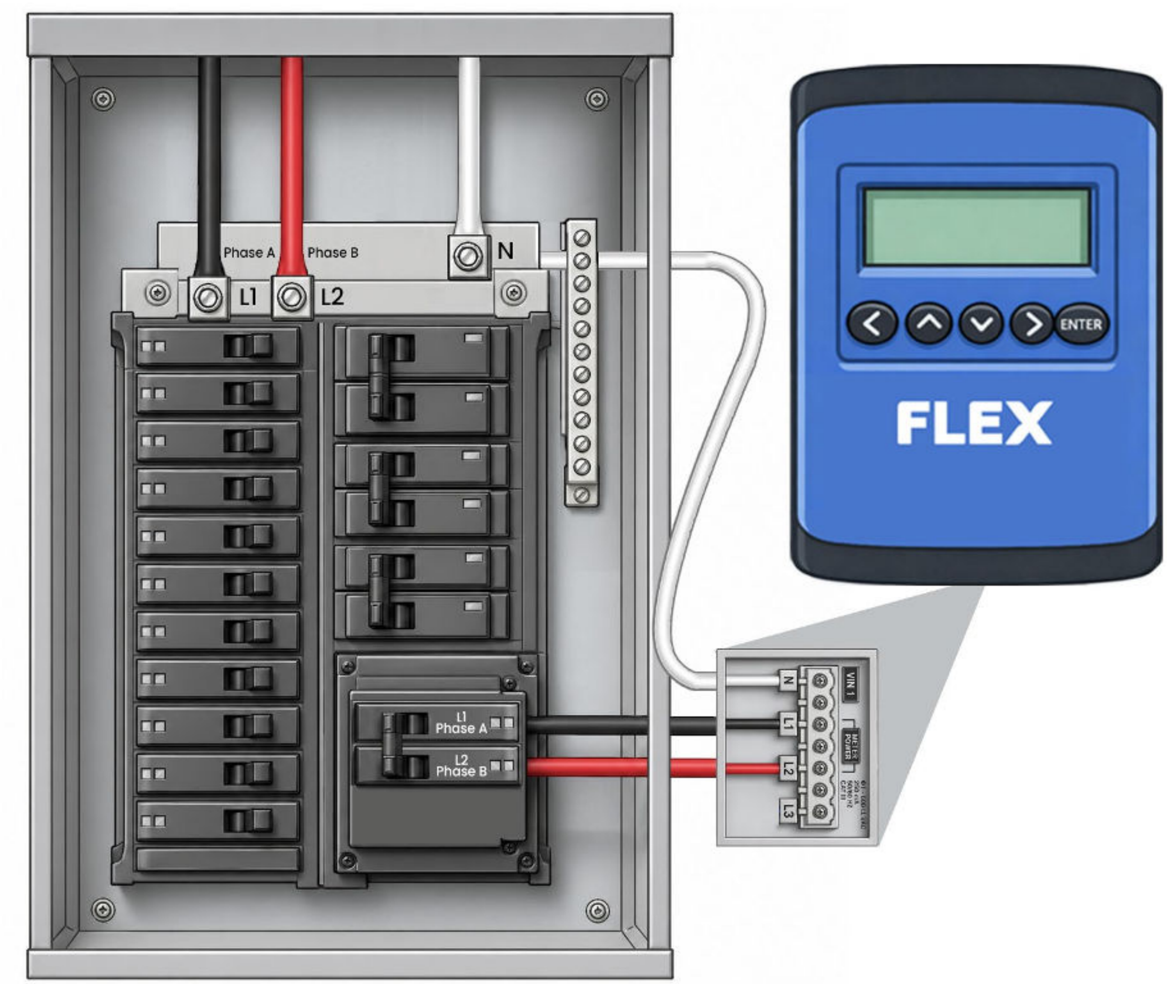
Typical uses include:

Example Load	Typical Voltage Reference
Single-phase branch circuit	L1-N
Lighting circuit	L1-N
Plug load circuit	L1-N
Other line-to-neutral load	L1-N

IMPORTANT: The N-to-L2 jumper is used only when required to power the meter in a single-phase installation where no L2 conductor exists. Always follow applicable electrical codes and project wiring requirements.

3-Wire, Split-Phase Service Panel

Use this example for common North American split-phase services with **L1, L2, and Neutral**. This service type is often used for 120/240 V panels.



In this configuration, connect **L1**, **L2**, and **N** to the VIN1 connector through the dedicated meter disconnect. The meter is powered from **L1 to L2** and uses Neutral as the reference for line-to-neutral measurements.

This service type can support multiple load types:

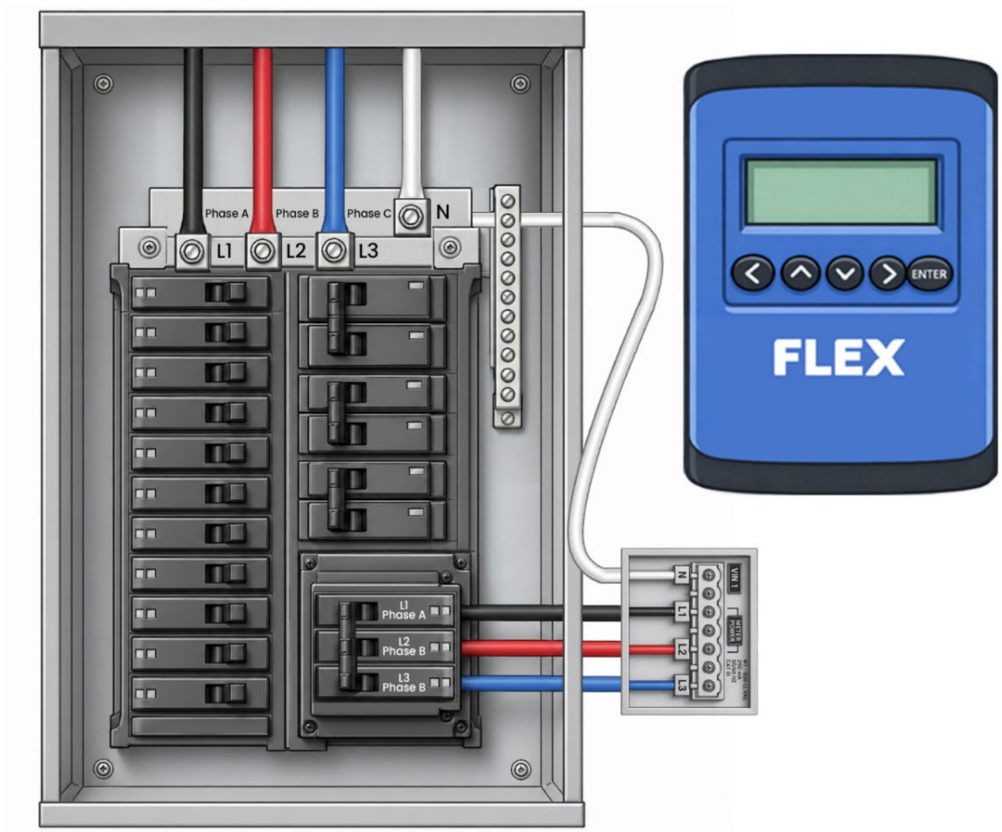
Example Load	**Typical Voltage Reference**
Line-to-neutral branch load on Phase A	L1-N
Line-to-neutral branch load on Phase B	L2-N
Line-to-line load	L1-L2
Split-phase load using both legs	L1-N and L2-N

For line-to-neutral loads, match the current sensor placement to the corresponding conductor. For example, a load configured with an **L1-N** voltage reference should have the current sensor installed on the associated **L1 / Phase A** conductor.

For loads connected between two phase conductors, such as an **L1-L2** load in a split-phase panel, install the current sensor according to the selected service type in FLEXPoint™. For typical single-phase line-to-line measurements, install the current sensor on the first conductor listed in the voltage reference. For example, if the load is configured as **L1-L2**, install the current sensor on the **L1 / Phase A** conductor feeding that load.

4-Wire, Three-Phase Service Panel

Use this example for three-phase Wye services with **L1, L2, L3,** and Neutral. These conductors may also be identified as Phase A, Phase B, Phase C, and Neutral.



In this configuration, connect **L1**, **L2**, **L3**, and **N** to the meter voltage input through the dedicated meter disconnect. The meter is powered from **L1 to L2** on VIN1 and uses the connected voltage references for measurement.

Typical uses include:

Example Load	**Typical Voltage Reference**
Three-phase Wye load	L1-N, L2-N, L3-N
Single-phase branch load on Phase A	L1-N
Single-phase branch load on Phase B	L2-N
Single-phase branch load on Phase C	L3-N
Line-to-line load	L1-L2, L2-L3, or L3-L1

For three-phase Wye loads, match each current sensor to the corresponding voltage reference. For example, the current sensor for **L1-N** should be installed on **L1 / Phase A**, the current sensor for **L2-N** should be installed on **L2 / Phase B**, and the current sensor for **L3-N** should be installed on **L3 / Phase C**.

For Delta services or other systems without a neutral conductor, refer to **Section 5.4, Systems Without a Neutral Conductor**, before wiring the voltage reference.

5.10 Using Potential Transformers

Use potential transformers when the measured voltage exceeds the direct input rating of the meter.

Potential transformers reduce the measured primary voltage to a secondary voltage that is within the meter input rating. Do not use or rely on a potential transformer as a voltage isolation device.

When PTs are used:

- Confirm that the PT secondary voltage is within the meter input rating.
- Connect the PT secondary wiring to the appropriate voltage input terminals.
- Configure the voltage multiplier using FLEXPoint™ so reported voltage values represent the primary voltage.
- Verify measured voltage values during commissioning.

Voltage multipliers apply to the voltage input, not to an individual current channel.

6 Wiring – Current Sensor Installation

This section describes how to select, install, wire, and configure current sensors for the PowerScout™ FLEX meter. Current sensors provide the current measurement used with the voltage reference connections described in Section 5.

PowerScout™ FLEX meters use physical current sensor inputs that are assigned to Virtual Meter channels during configuration. A current sensor must be physically connected to the meter and assigned to the correct Virtual Meter channel in FLEXPoint™ before the measured load can be reported correctly.

IMPORTANT: Measurement accuracy depends on proper current sensor selection, installation, orientation, wiring, and configuration. DENT Instruments cannot guarantee measurement accuracy when unsupported or incorrectly configured third-party current sensors are used.

Voltage connections and service type selection are covered in **Section 5, Wiring – Voltage Connections and Service Types**. Communication wiring is covered in **Section 7, Wiring – Communication Connections**.

6.1 Current Sensor Requirements

PowerScout™ FLEX meters support compatible low-voltage current sensors, including **333 mV voltage-output current transformers** and **DENT RōCoil™ Rogowski coils**.

Supported current sensor types may include:

- Split-core CTs
- Hinged CTs
- Solid-core CTs
- DENT RōCoil Rogowski coils

PowerScout™ FLEX current inputs are designed for low-voltage current sensor signals. **Do not connect CTs with 1 A or 5 A secondary current outputs to the meter.**

Selecting the Current Sensor Range

Select a current sensor with a rated current appropriate for the circuit being measured. For best measurement performance, choose a range that is high enough for the maximum expected current but not unnecessarily oversized for the normal operating current.

When selecting a current sensor range, consider:

- Normal operating current
- Expected peak current
- Circuit breaker rating
- Load type
- Future load changes

Oversized current sensors may reduce measurement resolution at low current levels. Undersized current sensors may exceed their rated range and reduce accuracy.

DENT Current Sensors and CT Picker

Current transformers can introduce a small phase shift between the measured current and the CT output signal. For power and energy measurements, phase shift can affect accuracy because the meter calculates power using the timing relationship between voltage and current.

DENT-supplied current sensors are recommended for use with PowerScout™ FLEX meters because their scaling and phase characteristics are known and supported. When a supported DENT current sensor is selected using the built-in **CT Picker** in FLEXPoint™, the appropriate scaling and phase correction values are loaded automatically.

Using supported DENT current sensors and the CT Picker helps reduce setup time, minimize configuration errors, and support the meter's published accuracy performance. FLEXPoint™ configuration includes CT type, range, phase shift, multiplier, and CT sign settings for each configured current channel.

RōCoil Rogowski Coils

DENT RōCoil Rogowski coils are flexible current sensors used for larger conductors or higher-current applications. RōCoils must be configured as RōCoil current sensors in FLEXPoint™.

The RōCoil output scaling is configured in FLEXPoint™ using the RōCoil output setting, expressed in **mV/kA at 60 Hz**. The default DENT RōCoil gain setting is **131 mV/kA at 60 Hz**.

Rogowski coils must include the required electronics or integrator so the meter receives a voltage output proportional to current. Do not connect a raw Rogowski coil directly to the meter unless it is specifically designed and configured for use with PowerScout™ FLEX.

Third-Party Current Sensors

When using third-party current sensors, the customer is responsible for confirming compatibility and configuring the correct settings.

When using third-party current sensors:

- The customer is responsible for configuring the correct CT ratio or scaling.
- Any required phase correction must be configured by the customer.
- Rogowski coils must include an integrator and provide a voltage output proportional to current.
- The current sensor output must remain within the meter's allowable input range.
- CTs with **1 A or 5 A secondary current outputs are not compatible**.

Because current sensor electrical characteristics vary between manufacturers, DENT cannot support or guarantee measurement accuracy when non-DENT current sensors are used. PowerScout™ FLEX meters are factory calibrated and accuracy-specified using DENT current sensors. For best performance, simplified configuration, and supported phase shift compensation, DENT recommends using supported DENT current sensor models selected through the CT Picker.

6.2 Installing Current Sensors

Current sensors must be installed by qualified personnel in accordance with applicable electrical codes, site safety procedures, and the instructions provided with the current sensor.

WARNING: High voltage may be present. Risk of electric shock. Life-threatening voltages may be present. Qualified personnel only.

Before installing current sensors:

- Verify the circuit or load to be measured.
- Confirm the service type and voltage reference.
- Confirm that the current sensor range is appropriate for the load.
- Verify current sensor orientation and polarity markings.
- Confirm that current sensor leads can be routed safely to the meter.
- Avoid routing current sensor leads across sharp edges, breaker arc vent areas, or exposed high-voltage terminals.

Current Sensor Placement

Install each current sensor on the conductor associated with the voltage reference used for that Virtual Meter channel.

PowerScout™ FLEX voltage inputs are labeled **L1, L2, L3, and N** at the meter. In electrical drawings, downstream documentation, and host systems, these same conductors may be referred to as **Phase A, Phase B, and Phase C**. For typical installations:

Meter Label	Common Phase Name
L1	Phase A
L2	Phase B
L3	Phase C
N	Neutral

For example, if a Virtual Meter channel is configured with an **L1-N** voltage reference, install the current sensor on the corresponding **L1 / Phase A** conductor for that load. If a channel is configured with an **L2-N** voltage reference, install the current sensor on the corresponding **L2 / Phase B** conductor.

For line-to-line loads, install the current sensor according to the selected service type and voltage reference. In typical single-phase line-to-line applications, the current sensor is installed on the first conductor of the selected voltage reference. For example, a channel configured as **L1-L2** would typically use a current sensor installed on **L1 / Phase A**.

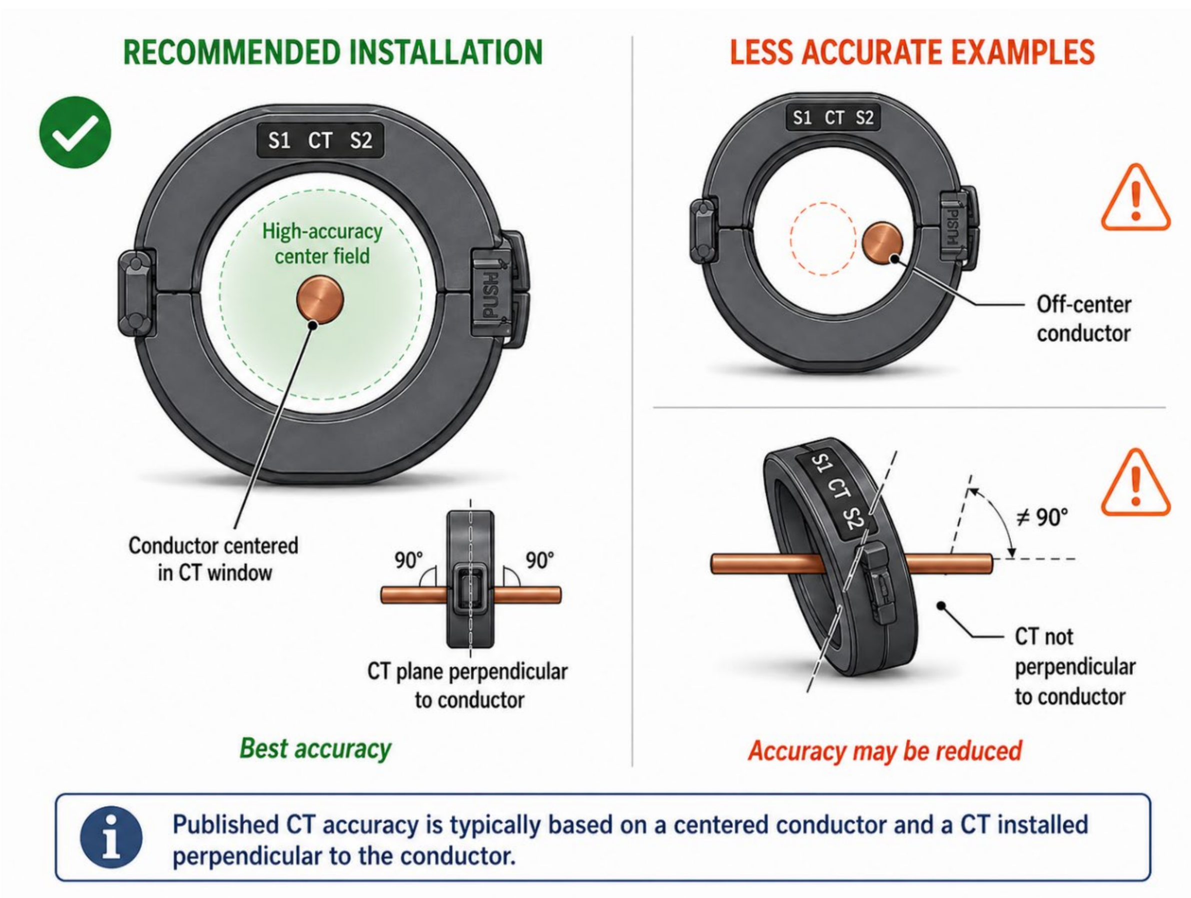
Confirm phase naming against the project drawings or site labeling before installation. Phase names and conductor colors may vary by facility, region, or documentation standard.

Current Sensor Fit, Position and Clearance

Current sensor accuracy is affected by how the sensor is positioned on the conductor. Published accuracy ratings are typically based on the conductor being centered within the CT window or RōCoil loop, with the sensor installed perpendicular to the conductor.

For best measurement accuracy:

- Center the conductor within the current sensor opening whenever possible.
- Install the current sensor so the sensor body is perpendicular to the conductor.
- Confirm that split-core and hinged CTs are fully closed and latched.
- Avoid installing the sensor at an angle, around a bend, or where the conductor is pressed against one side of the sensor opening.
- Avoid forcing the sensor into crowded wiring spaces.
- Select a larger sensor size or a different installation location if the conductor cannot be positioned cleanly.



Install each current sensor so that it surrounds only the conductor being measured. Do not install a current sensor around multiple conductors unless the measurement is specifically intended to capture the combined current of those conductors.

For RōCoil installations, avoid sharp bends, kinks, or twisting that may distort the coil shape. The coil should form a smooth loop around the conductor, with the conductor positioned as close to the center of the loop as practical.

Do not install current sensors where they interfere with breaker operation, panel covers, ventilation openings, or breaker arc venting areas. Route current sensor leads so they do not contact live terminals, bus bars, sharp edges, or moving parts. Existing safety guidance also notes that CTs should not exceed available wiring space, block ventilation openings, be installed in breaker arc venting areas, or have leads routed where they contact live terminals or bus.

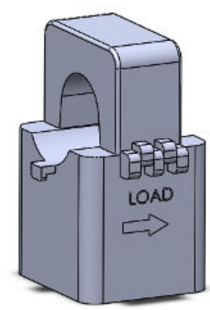
If the current sensor cannot be installed with proper clearance and alignment, measurement accuracy may be reduced.

Current Sensor Orientation

For typical load monitoring, install the current sensor so the arrow or polarity marking points **toward the load**, unless otherwise indicated by the current sensor label or project documentation.

Some current sensors may be labeled **Toward Source**. When labeled this way, orient the current sensor so the labeled side faces back toward the panel, source, or supply side of the circuit.

Incorrect orientation will cause power and energy values to report with the wrong sign. Incorrect placement will cause low power factor, incorrect power values, or phase verification errors.



If a current sensor is installed backwards and cannot be physically reoriented, use the **CT Sign** setting in FLEXPoint™ to reverse the channel polarity in software. After changing CT Sign, verify the installation using real-time power values, PhaseChek™, phasor plot, or other commissioning procedures.

6.3 Wiring Current Sensors to the Meter

Connect current sensor leads to the appropriate current input terminals on the PowerScout™ FLEX meter. Observe the polarity markings on the current sensor and the terminal markings on the meter.

Current sensor wiring should be completed after the meter is mounted and voltage wiring is complete, but before commissioning in FLEXPoint™.

Wiring Guide for CT Types

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

IMPORTANT: Use the shield terminal where provided. Do not connect shield wires to current input positive or negative terminals.

Wiring Practices

Keep current sensor wiring neat and traceable. Label current sensor leads or document the physical CT input number during installation.

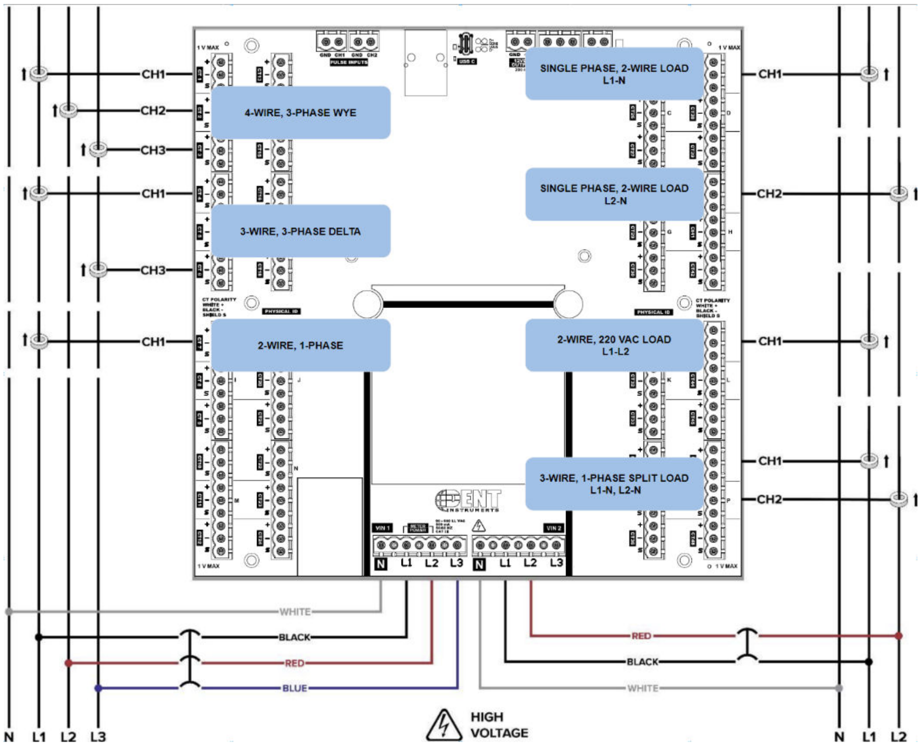
This is especially important on PowerScout™ FLEX meters because physical CT inputs are assigned to measured loads during FLEXPoint™ commissioning. Do not assume that the physical CT input number automatically determines the Virtual Meter or load assignment.

Route current sensor leads so they do not contact live terminals, bus bars, sharp edges, breaker arc vent areas, ventilation openings, or moving parts. Secure current sensor leads in accordance with applicable electrical codes and site practices.

Where practical, group and route current sensor leads so they can be traced from the current sensor back to the meter input. Avoid excess lead length inside the enclosure.

Wiring CTs to Multi-Circuit PowerScout™ FLEX Meters

The image below is the counterpart to the service panel illustration and shows how current sensors connect to multi-circuit PowerScout™ FLEX meters.



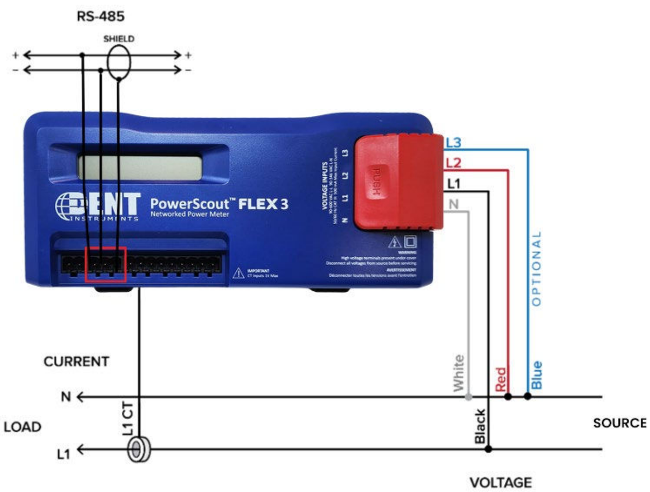
For service types that are not specifically shown, configure the load using the closest applicable service type in FLEXPoint™. Single-phase loads may be configured individually, and physical CT inputs may be assigned to the appropriate Virtual Meter during commissioning.

Three-phase and split-phase loads are shown as examples only. PowerScout™ FLEX meters use Virtual Meters, so physical current sensor inputs are not permanently tied to fixed three-channel elements. Document the physical CT input number and measured load for each installed current sensor before commissioning.

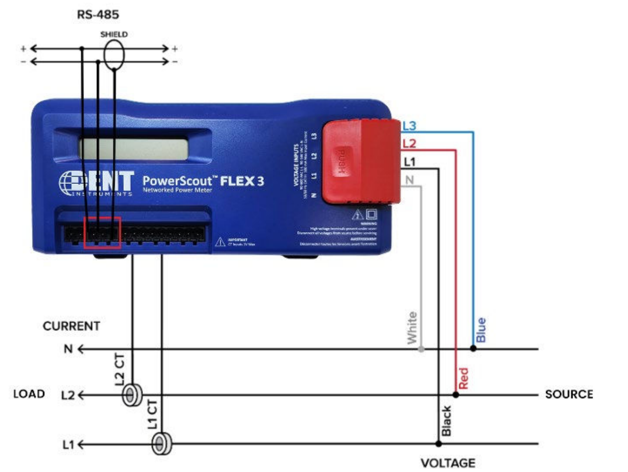
Wiring CTs to PowerScout™ FLEX 3 Meters

The images below show typical current sensor and voltage connections for the PowerScout™ FLEX 3.

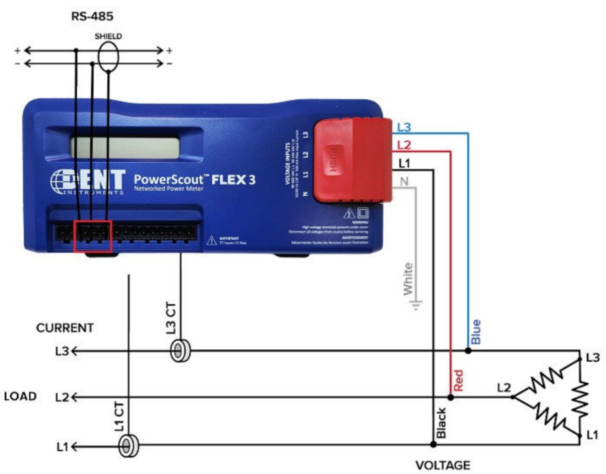
Two Wire Single Phase



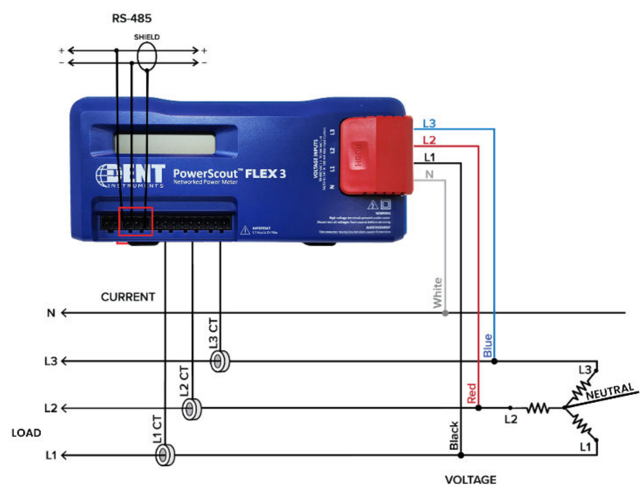
Three Wire Single Phase



Two CT Three Wire Delta



Four Wire Three Phase



For specific wiring questions outside the scope of this manual, contact DENT technical support.

6.4 Documenting CT Inputs for FLEXPoint™ Commissioning

After current sensors are installed and wired, document the physical CT input used for each measured load. This information is required during FLEXPoint™ commissioning to assign installed current sensors to the correct Virtual Meters.

At minimum, record the following information for each current sensor:

Field	Example
Physical CT input	CT 17
Load or circuit name	Panel A Lighting
Phase / conductor	L1 / Phase A
Voltage reference	L1-N
Current sensor type	Split-core CT
Current sensor range	200 A
Orientation note	Arrow toward load / label toward source
Special notes	CT Sign corrected in FLEXPoint™, if applicable

The physical CT input number should be recorded before the panel is closed or before wiring becomes difficult to trace. Do not assume that the CT input number identifies the load by itself. The load name, phase/conductor, and voltage reference are needed to complete configuration accurately.

Refer to the **FLEXPoint™ Commissioning Guide** for detailed instructions on creating Virtual Meters, assigning physical CT inputs, selecting CT types, setting voltage references, using the CT Picker, applying CT Sign correction, and verifying real-time measurements.

After commissioning, confirm that measured current, power, power factor, and energy direction are reasonable for each configured load.

7 Wiring – Communications Connections

PowerScout™ FLEX meters support communication by **USB, Ethernet, and RS-485**. USB is typically used for local setup and commissioning. Ethernet and RS-485 are typically used for permanent connection to a building automation system, data logger, RTU, gateway, or other host system.

This section covers only the physical communication wiring connection. Communication setup, protocol settings, network addressing, and verification are covered in **Chapter 11, Communication Setup**.

IMPORTANT: PowerScout™ FLEX meters do not support Power over Ethernet. When using Ethernet, the meter must be powered from line voltage or USB during setup.

7.1 Ethernet Connection

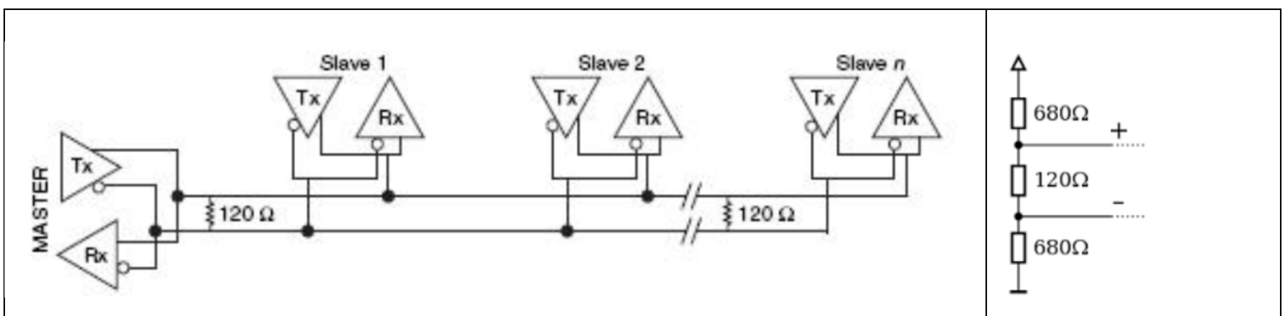
Connect the Ethernet cable to the meter's Ethernet port and to the appropriate network switch, router, gateway, or host device.

Ethernet may be used for FLEXPoint™, FLEXPoint™ Go, Modbus TCP, or BACnet/IP communication. Network configuration and verification are covered in **Chapter 11, Communication Setup**.

7.2 RS-485 Connection

Connect the RS-485 communication conductors to the meter's RS-485 terminals.

PowerScout™ FLEX uses a **2-wire half-duplex RS-485** connection. RS-485 networks should be wired in a daisy-chain topology. If the meter is installed at the end of the RS-485 daisy chain, install a user supplied termination resistor as required by the network design.



2-Wire Multidrop Network using Terminating Resistors

Terminal naming conventions vary by manufacturer. On PowerScout™ FLEX, **A corresponds to -** and **B corresponds to +**.

RS-485 topology, termination, biasing, addressing, and protocol verification are covered in **Chapter 11, Communication Setup**.

7.3 USB Connection

Connect the supplied USB cable between the meter and the computer running FLEXPoint™.

USB may be used for local setup, commissioning, and service access. USB is not typically used as the permanent communication connection to the host system.

8 Wiring – Auxiliary Inputs and Outputs

This section describes auxiliary wiring connections available on applicable PowerScout™ FLEX models. Auxiliary features may include pulse inputs, alarm output, and auxiliary power output depending on meter model and configuration.

Configuration, scaling, alarm setup, and verification are covered in **Chapter 11, Communication Setup** and the **FLEXPoint™ Commissioning Guide**.

8.1 Available Auxiliary Connections

PowerScout™ FLEX auxiliary connections vary by model. Confirm the meter model before wiring pulse inputs or auxiliary power.

Connection	PowerScout FLEX 3	PowerScout FLEX 12	PowerScout FLEX 24	PowerScout FLEX 48
Pulse Inputs	None	4 inputs	2 inputs	2 inputs
Alarm Output	Yes	Yes	Yes	Yes
12 V Auxiliary Power	Not available	200 mA max	200 mA max	200 mA max

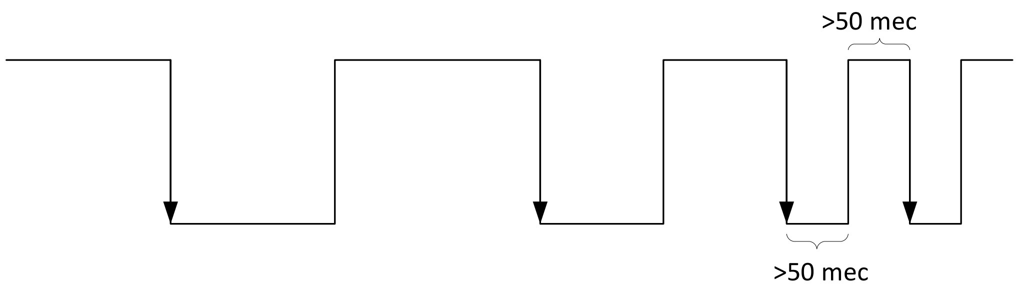
8.2 Pulse Inputs

Pulse inputs are used to count pulses from external devices such as water, gas, thermal, or other utility meters with compatible pulse outputs.

PowerScout™ FLEX pulse inputs are intended for **dry contact connections only**. Do **not** apply external voltage to the pulse input terminals. The meter provides an internal, current-limited sensing voltage for dry contact pulse detection.

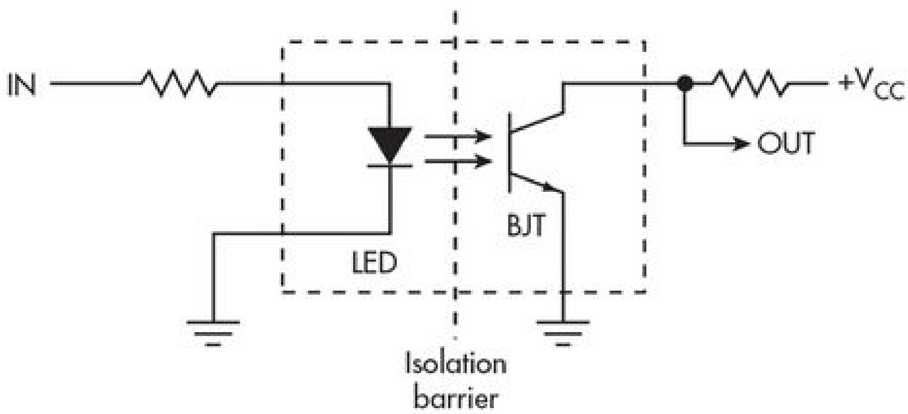
Connect the external pulse output device to the appropriate pulse input terminals on the PowerScout™ FLEX meter. Follow the wiring requirements for the external device and verify compatibility before connection.

Pulse inputs are intended for low-speed pulse counting. The pulse duration must exceed 50 ms in both the logic low and logic high state, allowing a maximum input frequency of 10 Hz.



Pulse scaling, reset functions, and accumulated pulse values are configured and viewed through FLEXPoint™ or the host system.

8.3 Alarm Output Wiring



The alarm output may be used to signal an alarm condition to external equipment or a host system input. The output is intended for low-voltage DC signaling and requires an external DC source between **5–24 VDC** with a customer-supplied pull-up resistor. A **10 kΩ, ¼ W** pull-up resistor is recommended.

Wire the alarm output according to the electrical requirements of the connected device. Do not exceed the rated voltage or current for the alarm output circuit.

Alarm conditions and alarm thresholds are configured in FLEXPoint™. Refer to the FLEXPoint™ Commissioning Guide for alarm setup and verification.

Note: The Master Alarm output is intended for low-voltage DC connections only.

8.4 12-Volt Auxiliary Power Output

PowerScout™ FLEX 12, PowerScout™ FLEX 24, and PowerScout™ FLEX 48 meters provide a 12 V auxiliary power output rated for **200 mA maximum**.

The auxiliary power output may be used to power compatible low-current external devices. Verify that the connected device is compatible with the available voltage and current before wiring.

IMPORTANT: Do not exceed the rated auxiliary power output. The 12 V auxiliary power output is not available on PowerScout™ FLEX 3 meters.

9 Basic Meter Configuration

This section is intended to give a brief overview of how meter configuration is performed using either the FLEXPoint™ software or the FLEXPoint™ Go on board webserver. For complete configuration details and instructions please refer to the PowerScout™ FLEX Programing and Integration Guide.

9.1 Powering Up

In order to configure the meter, it must be powered. This can either be accomplished by having the meter wired to a live voltage feed (See section 5.3), or by connecting to a computer through the USB port.

9.2 Communication Interfaces

The PowerScout™ FLEX meter communication interfaces include Ethernet (LAN) or RS-485 serial. 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 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.

Note: BACnet MS/TP is not supported when Ethernet connection is present.

9.3 Meter Configuration Using FLEXPoint™

This section describes how to configure the PowerScout™ FLEX meter using the FLEXPoint™ Windows application. In many installations, meter settings are prepared in advance using project documentation so the meter can be deployed with a predefined configuration. In other cases, configuration may be completed on site to match as-built conditions.

IMPORTANT: PowerScout™ FLEX cannot be configured with FLEXPoint™ over an RS-485 serial connection. If RS-485 is used for network communications, serial settings must be established in advance or configured through a Modbus or BACnet host system.

IMPORTANT: If the FLEXPoint™ Windows application cannot be used, refer to the FLEXPoint™ Go section for the simplified web-based interface. FLEXPoint™ Go can be accessed through the USB port and supports browser-based access, including on macOS systems.

9.4 FLEXPoint™ Software Installation

These instructions apply to a new FLEXPoint™ installation. If you are upgrading from an earlier version, complete the uninstallation procedure at the end of this section before installing the new version. Refer to the upgrade instructions included with the installer package, if applicable.

IMPORTANT: FLEXPoint™ Does NOT support ARM Processors!

Installation

Download the latest version of the FLEXPoint™ software from
https://www.dentinstruments.com/software-downloads

You will need to have **administrative privileges** on your PC to properly install the software. This ensures that Windows permissions are in place to allow the software to access or create the required directories.

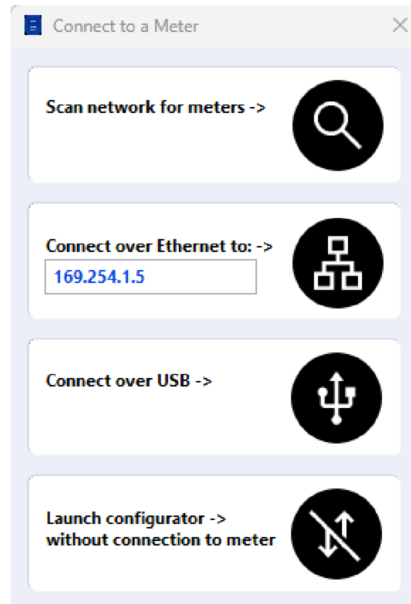
1. **Checking for User Account Permissions**
    a. Access the **Control Panel** on your computer
    b. Click on **User Accounts**
    c. **Confirm Permission**
        i. User types are Administrator, Standard, and Guest

2. **Install as Administrator**

If your user profile is not listed as an Administrator, some installations allow a temporary permission as follows:

a. Right-click on the "**FLEXPoint™ Installer.exe**" and select "Run as administrator"

Operation



The FLEXPoint™ software requires the LabView runtime engine to operate. If necessary, the installer will install the necessary runtime files to allow for full functionality.

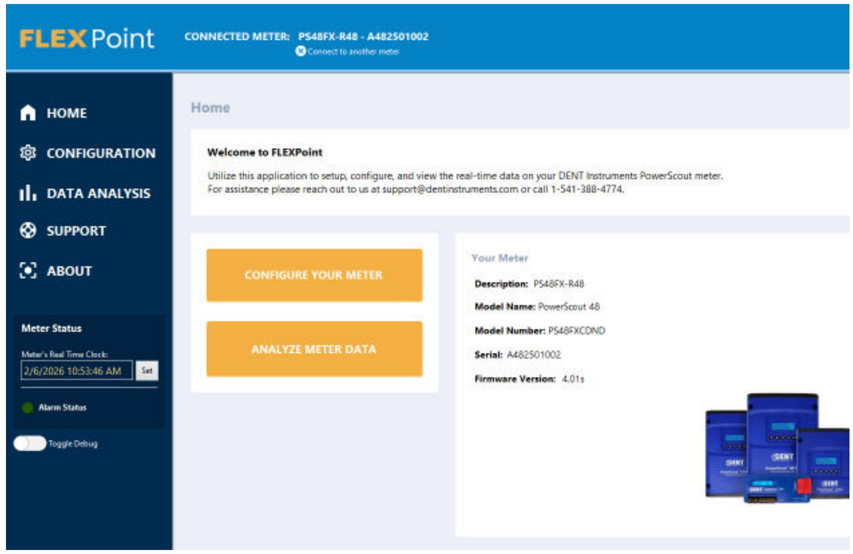
When the FLEXPoint™ application is launched, it will prompt the user to select one of four connectivity options.

- Scan Network for Meters
- Connect over Ethernet to a Predetermined IP address
- Connect over USB cable (A to C)
- Launch without connection (no meter connected)

Note: The USB connection method is recommended for new users who have physical access to the meter and the appropriate USB cable (supplied)

Layout and Overview

FLEXPoint™ is a Windows application designed to easily configure, manage, and view your PowerScout™ FLEX meter setup and data. The application has been created with user experience in mind and modeled after modern application design best practices and standards.



The application interface is broken down into clear navigable sections to quickly and easily configure your meter, view the real-time data, and get support for your POWERSCOUT™ FLEX meter.

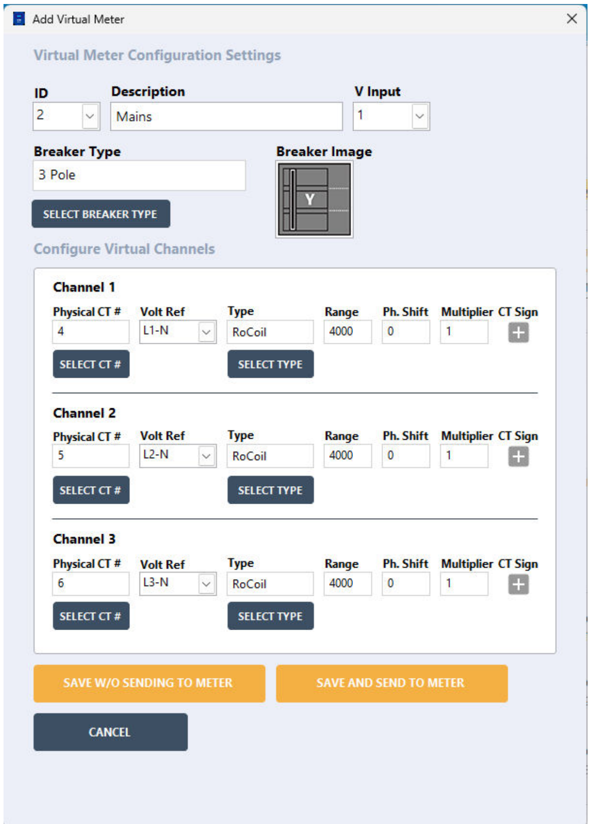
Virtual Meters Configuration Overview

Virtual meters are the primary advantage of the PowerScout™ FLEX product line. Your PowerScout™ FLEX meter is designed with maximum flexibility in mind. You can configure as many virtual meters as needed for your requirements up to the maximum number of virtual meters supported by your specific model.

Note: The USB connection method is recommended for new users who have physical access to the meter and the appropriate USB cable (supplied)

By default, your PowerScout™ FLEX meter has no factory virtual meters configured.

To create your first virtual meter, click the "Add Virtual Meter" button.



For each virtual meter, you will configure the following options:

- **Description**
- **Voltage Input**
- **Breaker Type**
- **Virtual Channels (CT Selection)**

  For each virtual channel, you will identify the following configuration options:

  - **Physical CT#**
  - **Volt Reference**
  - **CT Type**
  - **Range**
  - **Phase Shift**
  - **Multiplier**
  - **CT Sign**

Configure your virtual meter options according to the physical setup on your electrical loads you intend to monitor.

9.5 Basic Workflow

Installation Preparation

Identify and plan your meter installation by identifying loads to be measured, load types, service types, CT types, and communication methods.

↓

Connect to your meter

Install the FLEXPoint software and connect to your meter via USB or Ethernet.

↓

Configure Virtual Meters

According to your specific requirements, configure the necessary virtual meters. For detailed instruction, follow the steps outlined in the "Virtual Meter Setup" section below.

↓

Adjust Device Settings

Make any necessary device settings changes. For detailed instruction, follow the steps outlined in the "Device Settings Configuration" section below

↓

Install Meter (If not yet installed)

As outlined in the installation manual, install the meter in the site location and make all necessary wiring and CT connections as needed for your requirements.

↓

Verify Real Time Data

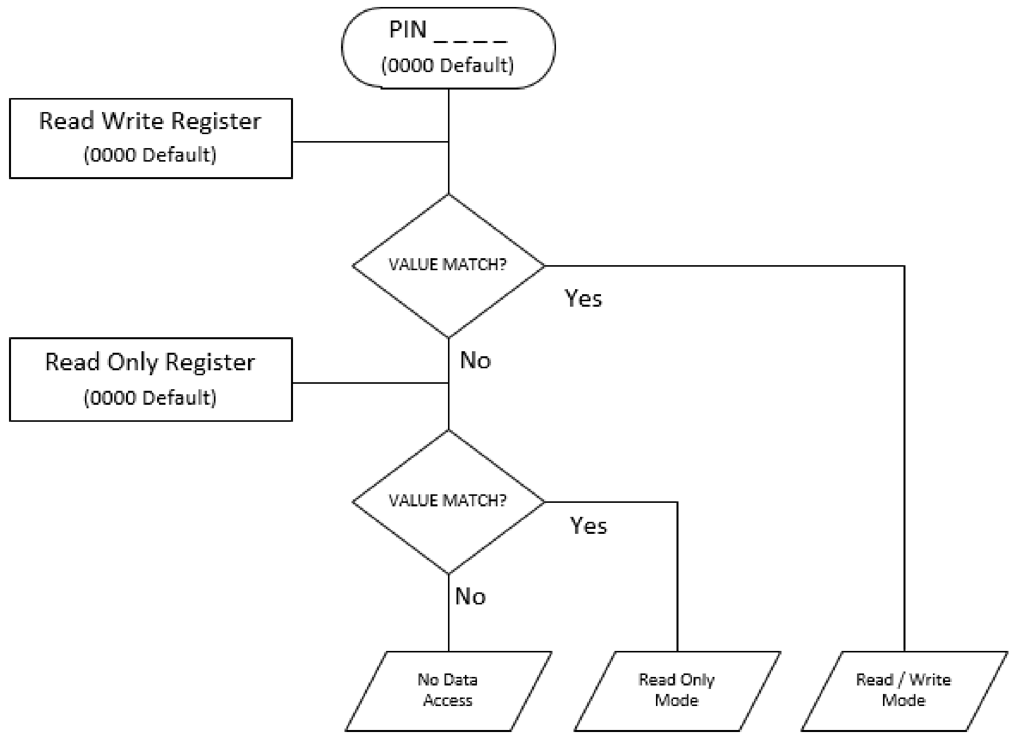
In the FLEXPoint application, navigate to the "Data Analysis" screen to view and validate the real-time data values coming from the meter.

9.6 Access Restriction Limitations

If security levels have been set up in the meter, no data is accessible through the LCD user interface or FLEXPoint™ Go 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.

9.7 Security PIN Protection

PowerScout™ FLEX 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 POWERSCOUT™ FLEX meter uses both a "Read Only" register and a "Read / Write" register to compare against user entrees from the meter's keypad or FLEXPoint™ Go 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, a situation may occur where a user intends to restrict access to "Read Only" by setting only this PIN unaware of the fact that the default PIN still matches the criteria for "Read / Write" which will accidentally promote the user. FLEXPoint™ and the FLEXPoint™ Go 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.

Use the FLEXPoint™ software to configure the Read Only PIN. FLEXPoint™ Go does not currently support setting or changing PINs.

Read/Write Permission Register

Read/Write permissions allow users to read and write configuration items and to reset PINs. This level of authorization is required by any technician or user who needs the ability to correct setup errors in the meter.

Use the FLEXPoint™ software to configure or reset the Read/Write PIN. The default PIN [0000] allows initial access until the PINs are changed. Permissions cannot be set through the LCD interface or FLEXPoint™ Go.

Reading PINs Over Modbus

FLEXPoint™ can be used to directly report the Read Only and Read/Write PINs under the Advanced tab. The value reported by FLEXPoint™ is the value entered when the PIN was configured.

PINs are also accessible as Modbus registers but are encoded so that reading the value of the register through an RTU does not reveal the PIN. This feature allows DENT Instruments to support retrieval of forgotten PINs if network access is available.

FLEXPoint™ – Unrestricted Access

The FLEXPoint™ software tool can be used to read and write configuration information to the meter without entering credentials.

NOTE:. FLEXPoint™ is currently the only DENT software tool for setting, changing, or resetting access restriction PINs. FLEXPoint™ Go can require a configured PIN for access, but PIN setup must be performed in FLEXPoint™.

10 Verification of Installation

After the PowerScout™ FLEX meter has been installed, configured, and connected to the host system or commissioning tool, verify that voltage references, current sensors, CT orientation, and communication settings are correct.

Verification should be performed before the panel is closed out and before the system is handed over to the customer or integrator.

Typical verification includes:

- Confirming measured voltage values
- Confirming measured current values
- Confirming CT orientation and power sign
- Confirming CT-to-voltage phasing
- Confirming communication with the host system
- Confirming that Virtual Meter names and point mappings match the project documentation

Verification may be performed using FLEXPoint™, FLEXPoint™ Go, the LCD user interface if equipped, or the host system.

10.1 Real-Time Value Check

Use FLEXPoint™, FLEXPoint™ Go, or the LCD user interface to review real-time values for each configured Virtual Meter.

For each Virtual Meter, confirm that the following values are reasonable for the connected load:

- Voltage
- Current
- kW
- kVA
- kVAR
- Power factor
- Energy direction
- Frequency

Compare displayed values against expected circuit voltage, load type, breaker size, and operating condition. If a value appears incorrect, verify the physical wiring, CT placement, voltage reference, CT range, CT assignment, and Virtual Meter configuration.

A digital multimeter or clamp meter may be used to confirm voltage and current values during commissioning.

10.2 PhaseChek™ Verification

The PowerScout™ FLEX meter includes patent-protected PhaseChek™, a verification feature used to identify likely CT phasing or wiring issues. PhaseChek™ evaluates enabled Virtual Meters and flags channels where the measured power factor suggests that a CT may be associated with the wrong voltage reference or installed on the wrong conductor.

PhaseChek™ may indicate a potential issue when the absolute power factor is below 0.55.

PhaseChek™ can be viewed using:

- **FLEXPoint™:** Real-Time Values
- **FLEXPoint™ Go:** Real-Time Values
- **LCD user interface:** Verify Installation

In FLEXPoint™ and FLEXPoint™ Go, PhaseChek™ runs continuously on all enabled Virtual Meters. Channels with low power factor are shown in red or with a red indicator.

PhaseChek™ is applied only to enabled Virtual Meters.

Using the LCD user interface, navigate to **VERIFY INSTALLATION** and press **ENTER**. The LCD lists any enabled Virtual Meters with at least one channel below the PhaseChek™ threshold.

CHECK Virtual Meters

A EF

Use the navigation buttons to highlight a specific Virtual Meter, then press **ENTER**. Within each Virtual Meter, the LCD identifies each channel as **OK** or **Bad**.

Virtual Meter 4

CH1 OK

CH2 Bad

CH3 Bad

Two **Bad** channels on the same Virtual Meter may indicate that two CTs have been swapped or assigned to the wrong voltage references. When all enabled channels are above the PhaseChek™ threshold, the meter reports:

CHECK Virtual Meters

ALL Virtual Meters **OK**

If PhaseChek™ identifies a potential issue, verify that the CT is installed on the correct conductor, assigned to the correct Virtual Meter channel, and paired with the correct voltage reference. Also confirm that the service type is configured correctly and that the load is operating under normal conditions.

PhaseChek™ is advisory only. Some loads may legitimately operate below 0.55 power factor, such as lightly loaded motors or unusual reactive loads. Use measured voltage, current, power, and field conditions to confirm whether a wiring correction is required.

10.3 CT Orientation Check

For typical load monitoring, install each CT so the arrow or polarity marking points toward the load, unless the CT label or project documentation indicates otherwise.

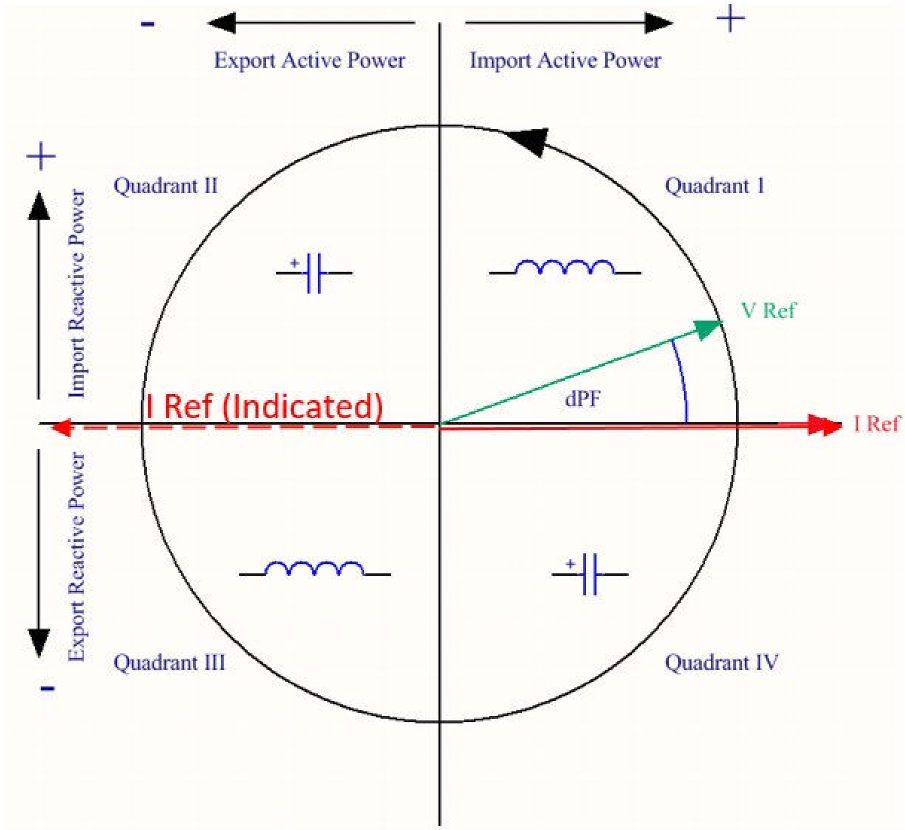
Incorrect CT orientation will cause power and energy values to report with the wrong sign. The PowerScout™ FLEX meter reports power and energy direction using import and export values. When a CT is installed backward, the indicated current vector is approximately 180 degrees from the expected position. Current magnitude will still appear correct, but real power, reactive power, and energy direction will report with the opposite sign.

In many load-monitoring applications, this means import power or energy may read near zero while export power or energy shows a value. A moderate power factor, such as greater than 0.7, together with negative real power is a common indication that the CT is on the correct phase but reversed. A reversed CT does not change the magnitude of the power factor.

Check CT orientation by confirming the sign of real power for each Virtual Meter or channel.

Use one of the following methods:

- **FLEXPoint™:** Real-Time Values
- **FLEXPoint™ Go:** Real-Time Values
- **LCD user interface:** Real-Time Values
- **Host system:** kW and energy registers



Electrical Power Quadrants with Reversed CT shown

IMPORTANT: If a CT is discovered to be backward after installation is complete and cannot be physically reoriented, use the CT Sign setting in FLEXPoint™ to reverse the channel polarity in software. CT Sign may also be configured through the applicable user configuration registers. Refer to the PowerScout™ FLEX Programming Guide for register details

10.4 Phasor Plot Verification

FLEXPoint™ includes a phasor plot that can be used to review voltage and current phase relationships for a Virtual Meter.

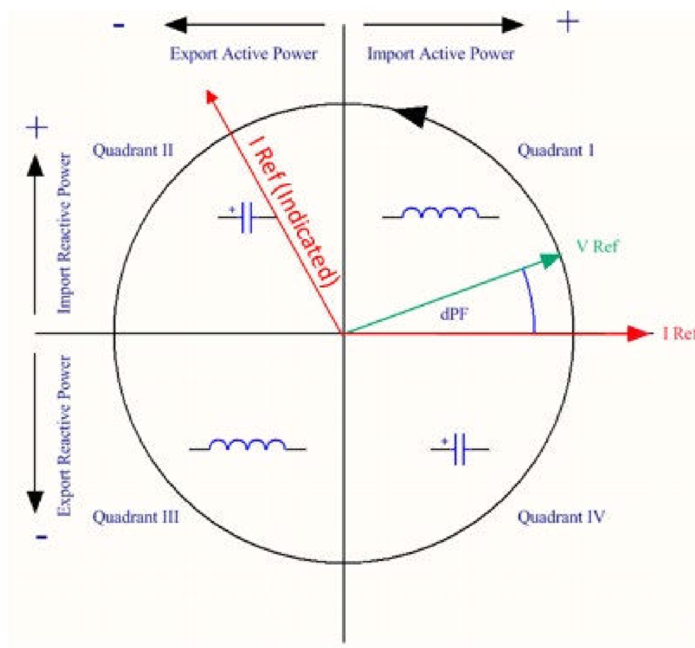
Use the phasor plot when PhaseChek™ flags a possible issue or when real-time values do not match expected load behavior.

The phasor plot can help identify:

- CTs installed on the wrong conductor or phase
- CTs assigned to the wrong voltage reference
- Reversed CT orientation
- Unexpected leading or lagging power factor
- Abnormal phase relationships

When a CT is associated with the incorrect voltage reference, the indicated current vector may appear approximately 180 degrees from the expected position in a split-phase system or approximately 120 degrees from the expected position in a three-phase system. This typically causes a significant decrease in reported power factor, even if the CT is also reversed.

Use the phasor plot together with PhaseChek™, real-time values, field wiring documentation, measured voltage, measured current, and load operating conditions.



Electrical Power Quadrants with Incorrect CT Phase shown

10.5 Communication Verification

After electrical verification is complete, confirm that the meter is communicating with the intended host system, RTU, BMS, gateway, or software platform.

For Ethernet installations, verify:

- IP address
- Subnet mask

- Gateway, if required
- Protocol selection
- Modbus TCP or BACnet/IP communication
- Host system discovery or point readout

For RS-485 installations, verify:

- RS-485 polarity
- Baud rate
- Parity
- Stop bits
- Modbus slave address or BACnet MS/TP address
- Network termination, if required
- Host system communication

Communication settings may be reviewed using FLEXPoint™, FLEXPoint™ Go, the LCD user interface if equipped, or the host system.

Detailed communication setup is covered in Section 12, Communication Setup.

10.6 Host System Point Verification

For integrated systems, confirm that the host system is reading the intended values from each Virtual Meter.

Verify that:

- Virtual Meter names match the project documentation.
- Point names match the intended loads.
- CT input assignments match the installed CTs.
- Voltage references match the configured service type.
- Units are correct.
- Energy, demand, and power values are mapped correctly.
- BACnet objects or Modbus registers match the integration documentation.

If Virtual Meter configuration changes are made after host system integration, the host system may need to rediscover the meter, refresh its object list, or update point mappings.

10.7 Commissioning Closeout

Before completing commissioning, record or export the final meter configuration.

Recommended closeout items include:

- Meter model and serial number
- Firmware version
- Network settings
- Protocol settings
- Virtual Meter names
- Service type for each Virtual Meter
- Voltage reference for each Virtual Meter or channel
- Physical CT input assignments
- CT type and range
- CT Sign settings
- PhaseChek™ results
- Host system point mapping
- Any field corrections made during commissioning

Save the final FLEXPoint™ configuration file with the project documentation.

11 Integration & Programming

This section provides guidance for integrating the PowerScout™ FLEX meter with a host system, including RTUs, BMS platforms, and software tools. It outlines the Virtual Meter data model, Modbus access models, and basic configuration concepts required for successful integration.

Unlike earlier PowerScout™ models, PowerScout™ FLEX uses **Virtual Meter** architecture, which allows flexible assignment of current sensors and more adaptable data organization.

11.1 Integration Overview

PowerScout™ FLEX meters may be integrated with host systems using Modbus RTU, Modbus TCP, BACnet MS/TP, or BACnet/IP. Integration setup depends on the selected communication interface, protocol, addressing method, and Virtual Meter configuration.

Unlike earlier PowerScout™ models, PowerScout™ FLEX uses Virtual Meters to represent configured loads. Virtual Meters affect how measurement data is organized, addressed, and presented to host systems.

For detailed setup, programming, register mapping, BACnet object information, and integration examples, refer to the **PowerScout™ FLEX Programming & Integration Guide** and the applicable register list.

11.2 Information Covered in the Programming & Integration Guide

Topic	Refer To
FLEXPoint software setup	Programming & Integration Guide
USB and Ethernet connection methods	Programming & Integration Guide
FLEXPoint GO web app	Programming & Integration Guide
Virtual Meter configuration	Programming & Integration Guide
Modbus RTU and Modbus TCP setup	Programming & Integration Guide
Flattened Modbus register model	Programming & Integration Guide
BACnet MS/TP and BACnet/IP setup	Programming & Integration Guide
Register organization and data acquisition	Programming & Integration Guide
Advanced settings, CT multipliers, and phase shift compensation	Programming & Integration Guide
Communication troubleshooting	Programming & Integration Guide

12 Communication Setup

This section describes basic communication setup and verification for the PowerScout™ FLEX meter. Communication settings may be confirmed using the LCD user interface, FLEXPoint™, FLEXPoint™ Go, or the host system, depending on the installation.

If electrical installation and commissioning are performed by different personnel, communication setup may require coordination between field technicians and remote controls or integration staff.

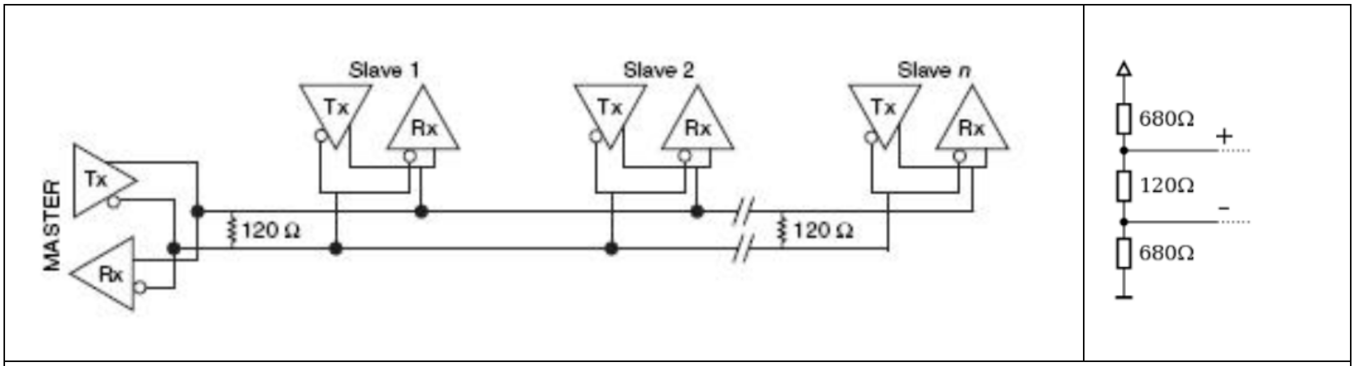
Once the meter is powered from line voltage, ONLY TOUCH THE METER IF THE TOUCHSĀF™ HIGH VOLTAGE COVER IS INSTALLED. For multi-circuit meters, it is safe to touch the meter (including the user buttons) with the top cover removed ONLY if the TouchSāf™ high voltage cover is installed.

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

12.1 RS-485 Network

Physical Connections on an RS-485 Multidrop Network

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



2-Wire Multidrop Network using Terminating Resistors

- **Termination Resistors**
  Termination resistors are not provided with the meter. When a PowerScout™ FLEX meter is installed at the end of an RS-485 daisy chain, install a 120 ohm terminating resistor between the **+** and **-** terminals.
- **Bias Resistors**
  Bias resistors are not provided with the meter. Biasing is required when needed to maintain a known idle bus state. These resistors are typically installed at the master node and are commonly 680 ohms for RS-485 networks.
- **Network Topology**
  RS-485 is intended for daisy-chain wiring. Star and other branched topologies should be avoided.
- **Signal Names**
  Terminal naming conventions vary among manufacturers. Some devices use **A/B**, while others use **+/-**. On PowerScout™ FLEX, **A corresponds to -** and **B corresponds to +**.
- **Bus Loading**
  Each PowerScout™ FLEX meter represents a 1/8 unit load, allowing up to 256 similar devices on a single RS-485 segment.

12.2 Communication Verification

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

LCD User Interface

The optional LCD user interface can be used to confirm the communication settings required for the selected interface and protocol. Related settings are grouped together within the menu structure for easier review.

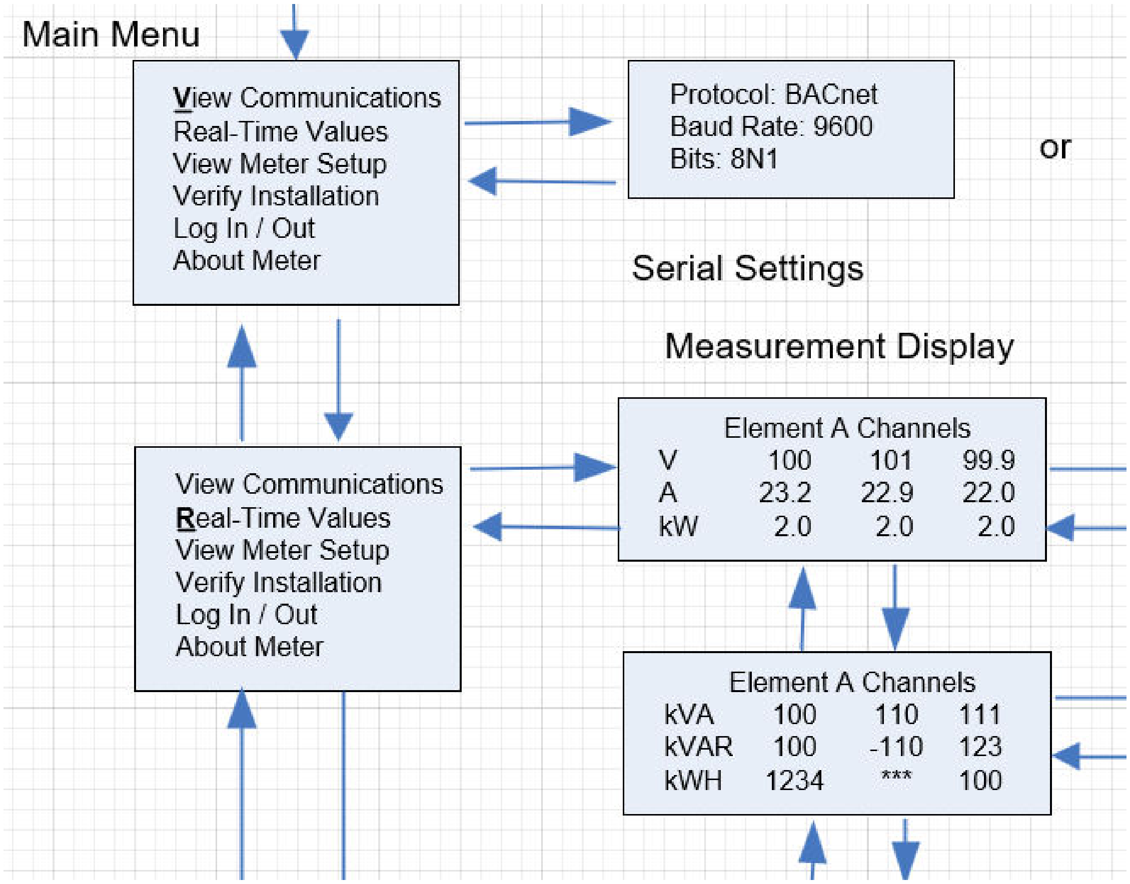
A complete menu map for the PowerScout™ FLEX 12, PowerScout™ FLEX 24, and PowerScout™ FLEX 48 is provided in Appendix A. Arrows in the appendix indicate how to move from one display to the next. In the menu documentation, the highlighted entry identifies the active menu item. On the physical LCD, the active item is indicated by a blinking character.

Use the **ENTER** button to select a menu item or property. Use the **Up** and **Down** buttons to scroll through menu options and available values.

Changes made through the LCD are limited to communication settings. Other configuration changes, including current sensor selection and other advanced setup options, must be completed using a software interface such as FLEXPoint™.

The PowerScout™ FLEX 3 uses a different LCD arrangement than the PowerScout™ FLEX 12, PowerScout™ FLEX 24, and PowerScout™ FLEX 48. Its two-line display and thumbwheel navigation differ from the four-line button-based interface used on the larger models. For wall-mount versions, the thumbwheel is accessible by removing the top enclosure.

The LCD interface can also be used to view real-time values, but it does not support advanced meter configuration. FLEXPoint™ is the recommended tool for full meter setup.



Example LCD Navigation

FLEXPoint™ / FLEXPoint™ Go Web App

If the PowerScout™ FLEX meter does not include an LCD user interface, or if verification will be performed in software, use FLEXPoint™ ™ or the FLEXPoint™ Go web app to confirm communication settings and review live meter data. FLEXPoint™ and FLEXPoint™ Go use a similar interface structure and support software-based verification of the installation.

Refer to the configuration section or the FLEXPoint™ Commissioning Manual for an overview of these tools and related instructional resources.

12.3 Ethernet Setup

Network Verification

PowerScout™ FLEX communicates over IEEE 802.3 Ethernet at 10/100 Mbps. Verification of Ethernet communication includes confirming that the meter has a valid IP configuration for the target network. For static IP installations, verify that the meter IP address, subnet mask, and gateway settings are compatible with the host network. For DHCP installations, verify that the meter is configured for DHCP and has received a valid IP address from the DHCP server.

DHCP

If the PowerScout™ FLEX meter is configured for DHCP, it will request an IP address from the DHCP server when the meter is powered or connected to the network. The assigned address may be displayed on the LCD user interface or viewed through FLEXPoint™ or FLEXPoint™ Go.

Because DHCP-assigned addresses may change between power cycles or network events, DHCP is typically used for discovery or initial connection rather than long-term fixed integration, unless the network is managed accordingly.

STATIC IP

If the PowerScout™ FLEX meter is configured for a static IP address, the address should be assigned in accordance with the site network plan to avoid address conflicts. Static addressing is commonly used when an RTU, BMS, or other host system expects to find the meter at a known IP address.

12.4 Protocol Verification

The network protocol is typically specified as part of the installation. BACnet MS/TP and Modbus RTU operate over RS-485, while BACnet/IP and Modbus TCP operate over Ethernet. Each interface and protocol combination requires specific communication settings.

The purpose of this section is to confirm or adjust those settings to match the installation requirements. Additional integration and optimization guidance is provided in the Programming and Integration Guide.

12.5 Modbus Settings

Modbus RTU Settings

In a Modbus RTU network, each device must be assigned a unique slave address. Valid Modbus addresses are 1 to 240. The configured address must match the address expected by the RTU or host system.

The default Modbus address setting for Virtual Meter 1 or Element A is 1. For multi-element models, adjacent elements data can be accessed by incrementing the slave address by 1 up to the maximum number of 3 channel elements in the meter.

Note: The PS48 requires 15 addresses beyond VM1, the PS24 requires 7 addresses beyond VM1, and the PS12HD requires 3 addresses beyond VM1.

Modbus TCP Settings

Modbus Port: Modbus TCP uses the standard port **502**. This port number cannot be changed.

12.6 BACnet Settings

In a BACnet network, each device must be assigned a unique Device ID. This applies to both BACnet MS/TP and BACnet/IP. The Device ID may be changed using FLEXPoint™, FLEXPoint™ Go, or a BACnet explorer tool.

BACnet MSTP

Device Address
DENT meters are BACnet MS/TP master devices and must use addresses in the range from 0 to 127. Each address must be unique on the network.

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

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

12.7 BACnet/IP

BACnet Port
The default BACnet/IP port is **47808** and does not usually need to be changed.

BBMD
The BACnet/IP Broadcast Management Device setting defaults to **0.0.0.0** and may be changed through a software tool if discovery across networks is required.

Appendix A - Glossary of Terms

Term	Definition
Accuracy Class	A designation describing expected meter or CT accuracy under defined conditions. Actual measurement accuracy depends on the meter, CTs, installation, configuration, loading, and applicable standards.
Alarm	A meter-generated status condition that indicates a configured threshold or event has occurred. Alarms may be viewed in software, read through registers, or reported through a hardware output depending on model and configuration.
Alarm Persistence	The amount of time an alarm condition must remain continuously active before the alarm is triggered. This helps reduce nuisance alarms from short-duration events.
Analog Input (AI)	A BACnet object type typically used to represent floating-point meter readings.
Analog Value (AV)	A BACnet object type typically used to represent writable or configurable floating-point values.
ANSI Power Factor Convention	A power factor sign convention where positive power factor indicates lagging current, typically associated with inductive loads, and negative power factor indicates leading current, typically associated with capacitive loads.
Apparent Power	The total power supplied to a load, including both real and reactive components. Apparent power is measured in volt-amperes, or VA.
Auxiliary Power Output	A low-voltage output provided by some meter models for powering external devices such as radios or sensors. Use only within the specified voltage and current limits.
BACnet	Building Automation and Control Network. A communication protocol commonly used in building automation systems.
BACnet/IP	BACnet communication over Ethernet/IP networks.
BACnet MS/TP	BACnet communication over an RS-485 serial network. MS/TP stands for Master-Slave/Token-Passing.
BACnet Object	A data point exposed through BACnet communication. BACnet objects may represent meter readings, configuration values, status values, or text values depending on the object type.
BACnet Port	The network port used for BACnet/IP communication. The default BACnet/IP port is typically 47808.

BBMD	BACnet/IP Broadcast Management Device. A BACnet device or function used to support BACnet broadcast traffic across IP subnets.
Binary Value (BV)	A BACnet object type typically used to represent Boolean settings or two-state values.
BitString Value (BSV)	A BACnet object type typically used to represent bitfield status words or grouped binary flags.
Building Management System (BMS)	A host system used to monitor and control building equipment. A BMS may communicate with the meter using Modbus or BACnet.
Burden	The electrical load connected to a CT secondary circuit. Burden can affect CT accuracy, especially for current-output CTs.
Channel	An individual current measurement path within a Virtual Meter. Channels are identified as CH1, CH2, and CH3 within each Virtual Meter.
Character String Value (CSV)	A BACnet object type used to represent text string values.
Commissioning	The process of configuring, verifying, and documenting meter operation after installation. Commissioning commonly includes checking wiring, CT orientation, communication settings, and reported values.
Communication Interface	The physical communication connection used by the meter, such as Ethernet, USB, or RS-485.
Communication Protocol	The data communication method used between the meter and a host system, such as Modbus RTU, Modbus TCP, BACnet MS/TP, or BACnet/IP.
CT	Current Transformer. A sensor that produces an output signal proportional to current flowing through a conductor.
CT Picker	A FLEXPoint™ configuration tool used to select supported DENT CT models. When a supported CT is selected, FLEXPoint™ automatically loads related configuration values such as CT range and phase shift.
CT Range	The rated current of the connected CT. The meter uses this value to scale the CT output signal into measured current.
CT Secondary Output	The signal produced by the CT and connected to the meter input. PowerScout™ FLEX meters are designed for 333 mV voltage-output CTs. CTs with 1 A or 5 A secondary current outputs are not compatible.
CT Sign	A channel-level polarity setting used to correct current direction. If a CT is installed backward, the CT sign setting can be used to reverse the measured current direction in software.

CT Phase Shift	The small timing difference between the actual current waveform and the CT output signal. CT phase shift can affect power and energy accuracy. FLEXPoint™ can compensate for CT phase shift when the correct value is configured.
Current	The flow of electric charge through a conductor, measured in amperes.
Demand	The average rate of power usage over a defined time interval. Demand values are commonly used for billing, capacity planning, and load analysis.
Demand Interval	The time window used to calculate demand. PowerScout™ meters use a 15-minute demand interval for present and peak demand values.
DHCP	Dynamic Host Configuration Protocol. A network service that automatically assigns IP addresses and related network settings to devices.
Displacement Power Factor	The power factor component based on the phase angle between the fundamental voltage and current waveforms. It does not include harmonic distortion effects.
Distortion Power Factor	The power factor component that reflects the effect of harmonic current distortion on total RMS current.
Element	A fixed measurement grouping used in earlier PowerScout™ meters. In PowerScout™ FLEX, the fixed element concept is replaced by Virtual Meters.
Ethernet	A wired network interface used for IP-based communication, including Modbus TCP and BACnet/IP.
Factory Calibration	The process used to verify or adjust meter performance during manufacturing. Published accuracy specifications are based on supported meter and CT configurations.
Firmware	Internal software running on the meter hardware. Firmware may be updated through supported DENT software tools and release packages.
Flattened Register List	A Modbus register organization method where Virtual Meter data is available through a single slave address, with each Virtual Meter assigned its own register block. This differs from earlier PowerScout™ meters where elements were commonly accessed by incrementing the slave address.
FLEXPoint	DENT software used to configure, manage, and view PowerScout™ FLEX meter setup and data.
FLEXPoint GO	The on-device web app used to configure the meter and view selected real-time data through a web browser.
Four-Quadrant Measurement	Measurement of power or energy flow in all four electrical quadrants, accounting for import/export direction and inductive/capacitive reactive behavior.

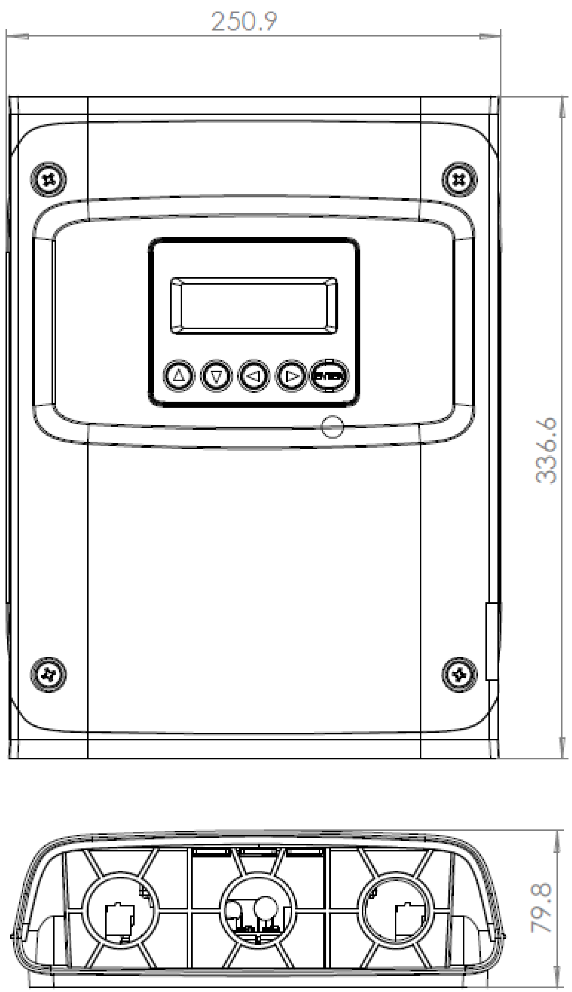
Full Scale	The rated maximum input value for a measurement channel or CT range.
Gateway Address	A network setting that identifies the router used to reach devices outside the local subnet.
Harmonics	Frequency components of a waveform that occur at integer multiples of the fundamental frequency. Harmonics are commonly caused by nonlinear loads.
Host System	An external system that communicates with the meter, such as a BMS, RTU, SCADA system, PLC, or data logger.
IEEE Power Factor Convention	A power factor sign convention where the sign of power factor follows the sign of real power.
Interval Data	Meter-recorded data stored at regular time intervals. PowerScout™ meters record 15-minute interval data that can be downloaded for historical review or gap filling.
IP Address	A network address used to identify the meter on an Ethernet/IP network.
Line Frequency	The frequency of the AC electrical system, typically 50 Hz or 60 Hz.
Line-to-Line Voltage	Voltage measured between two phase conductors, such as L1-L2, L2-L3, or L3-L1.
Line-to-Neutral Voltage	Voltage measured between a phase conductor and neutral, such as L1-N, L2-N, or L3-N.
MAC Address	A unique hardware address assigned to a network interface.
Media Release	A coordinated package of firmware, software, register lists, and documentation. Mixing files from different media releases is not recommended.
Modbus	A communication protocol commonly used by industrial and building automation systems to read and write register-based data.
Modbus Register	A numbered data location used for Modbus communication. Registers are used to read measurement data, write configuration settings, and issue certain meter commands.
Modbus RTU	Modbus communication over an RS-485 serial network.
Modbus TCP	Modbus communication over an Ethernet/IP network, typically using port 502.
MSW / LSW	Most Significant Word and Least Significant Word. These terms describe the two 16-bit register words used to represent certain 32-bit values, such as floating-point numbers.

Multi-State Value (MSV)	A BACnet object type typically used to represent enumerated settings.
Network Scan	A software function used to discover compatible meters on the local Ethernet network.
Over-Voltage Category III	A safety category for equipment connected to building electrical distribution systems.
Phase Angle	The angular difference between voltage and current waveforms, typically measured in degrees.
PhaseChek™	A DENT verification feature used to identify likely CT phasing or wiring issues based on measured power factor conditions.
Phasor Plot	A graphical representation of voltage and current magnitude and phase angle. It is useful for checking CT orientation, phase relationships, and wiring correctness.
Physical CT Input	An actual current input terminal on the meter hardware. Depending on the model, the meter may include 3, 12, 24, or 48 physical CT inputs.
PLC	Programmable Logic Controller. A host or control device that may communicate with the meter using supported protocols.
Positive Integer Value (PIV)	A BACnet object type typically used to represent restricted-range integer settings.
Potential Transformer (PT)	A transformer used to step down voltage in applications where the measured voltage exceeds the meter's direct input rating.
Power Factor	The ratio of real power to apparent power. Power factor describes how effectively electrical power is being converted into useful work.
Pulse Input	A meter input used to count pulses from an external device, such as another meter with a dry-contact or open-collector output.
Read Only PIN	A security PIN level that allows data and configuration values to be viewed but not changed through supported user interfaces.
Read/Write PIN	A security PIN level that allows configuration values to be viewed and changed through supported user interfaces.
Real Time Clock (RTC)	A clock circuit used to timestamp interval data. The RTC is used for data logging timestamps and is not used for meter calculations.
Real-Time Data	Measurement values reported by the meter during operation, such as voltage, current, power, power factor, and frequency.

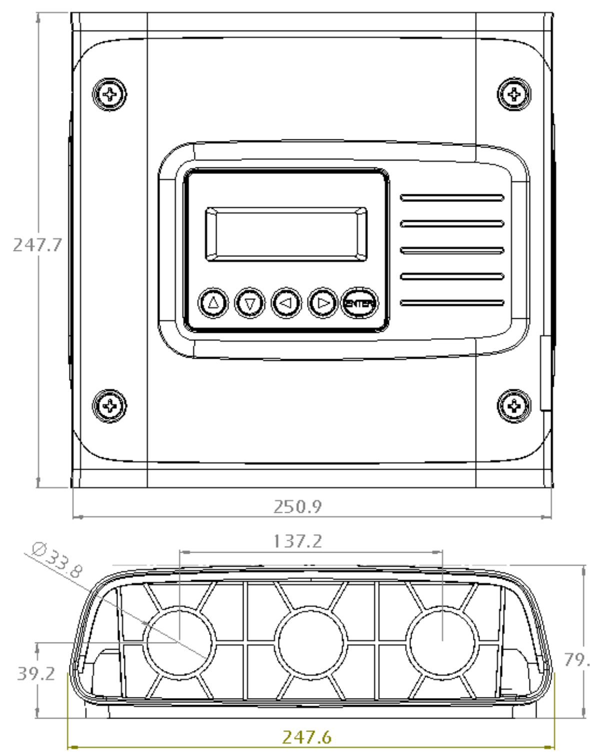
Register List	A document or table that defines the Modbus registers and BACnet objects supported by the meter.
Revenue Grade	A general term for metering equipment or CTs designed for high-accuracy energy measurement applications. Revenue-grade performance depends on the meter, CTs, configuration, installation, and any applicable certification requirements.
Rogowski Coil	A flexible current sensor used to measure AC current. For use with PowerScout™ FLEX.
RS-485	A two-wire serial communication physical layer commonly used for Modbus RTU and BACnet MS/TP networks.
RTU	Remote Terminal Unit. A host device that collects data from field equipment and may pass it to a larger automation, monitoring, or control system.
Scaling	The process of converting meter input signals into reported engineering values. Scaling may include CT range, CT multiplier, voltage multiplier, and related configuration settings.
SCADA	Supervisory Control and Data Acquisition. A system used for monitoring and control of industrial or facility equipment.
Secondary Current Output CT	A CT that outputs a current signal, commonly 1 A or 5 A, at rated current. These CTs are not compatible with PowerScout™ FLEX meter inputs.
Segmentation	A BACnet feature used when data is too large for a single packet. PowerScout™ meters may have limitations related to BACnet segmentation, depending on model and object type.
Service Type	The electrical system or load configuration assigned to a Virtual Meter, such as single-phase, split-phase, three-phase Wye, or three-phase Delta.
Slave Address	The Modbus address assigned to a device on a Modbus RTU network. Each device must have a unique slave address.
Snap Threshold	A threshold that tells the meter to report zero when a measured signal is small enough that it may be indistinguishable from noise.
Soft Reset	A restart of the meter processor without removing power. Some configuration changes may require a soft reset before they take effect.
Split-Core CT	A current transformer that opens and closes around a conductor, allowing installation without disconnecting the conductor.
Static IP Address	A manually assigned IP address that does not change unless reconfigured.
Structured View	A BACnet organization method that groups related objects logically, such as by Virtual Meter and system-level data.

Subnet Mask	A network setting that determines which IP addresses are considered part of the local network.
System Scope	Values or settings that apply to the meter as a whole rather than to a specific Virtual Meter or channel.
System Description	A user-configurable text field used to identify the meter, often by location or application.
THD	Total Harmonic Distortion. A measure of waveform distortion relative to the fundamental frequency.
TouchSāf™ Cover	A protective high-voltage cover used on certain PowerScout™ models to reduce risk of contact with hazardous voltage terminals.
True RMS	A measurement method that accurately represents the effective value of AC voltage or current, including non-sinusoidal waveforms.
USB	A local communication and power interface commonly used for meter configuration.
Virtual Channel	A current channel within a Virtual Meter. Each Virtual Channel can be mapped to a physical CT input and configured independently.
Virtual Meter (VM)	A logical meter grouping used by PowerScout™ FLEX to represent an electrical load. A Virtual Meter replaces the fixed element concept used in earlier PowerScout™ meters.
Voltage Input	A physical voltage measurement connection used by the meter. Some models include multiple voltage inputs.
Voltage Multiplier	A scaling factor applied to a voltage input, commonly used with potential transformers or other voltage scaling arrangements.
Voltage Reference	The voltage phase relationship used with a channel's current measurement, such as L1-N, L2-N, L3-N, or line-to-line references.
Waveform Capture	A feature that records high-resolution voltage and current waveform data for analysis of signal shape, harmonics, and other power quality conditions.
Wye	A three-phase service configuration with phase-to-neutral voltage references. Also called a star configuration.
Delta	A three-phase service configuration that commonly uses line-to-line voltage references and may not include a neutral conductor.

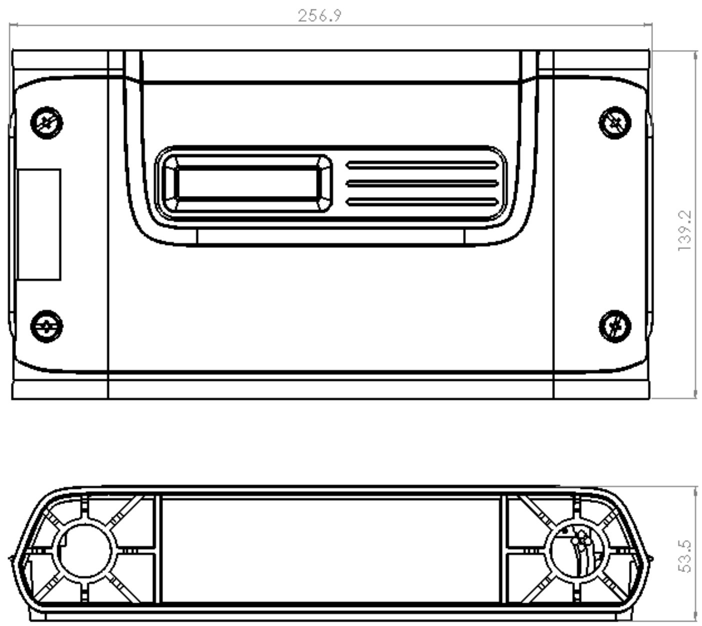
Appendix B - Enclosure Dimensions



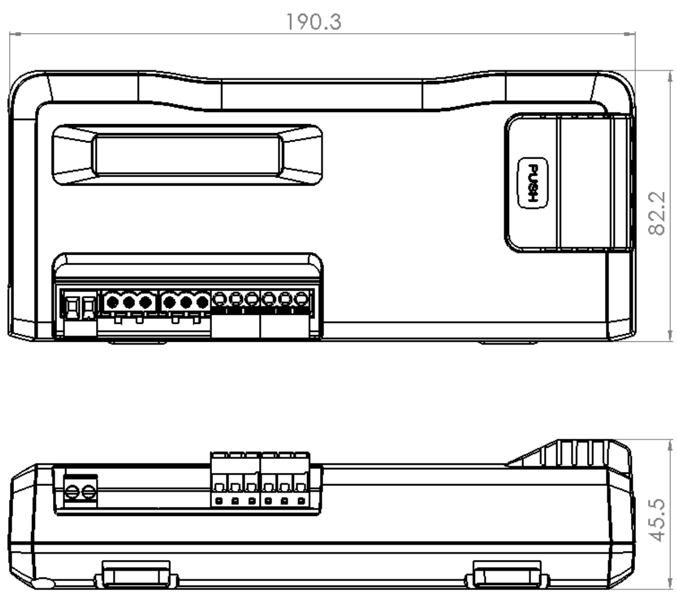
PS24FX/PS48FX Enclosure Dimensions



PS12FX Enclosure Dimensions



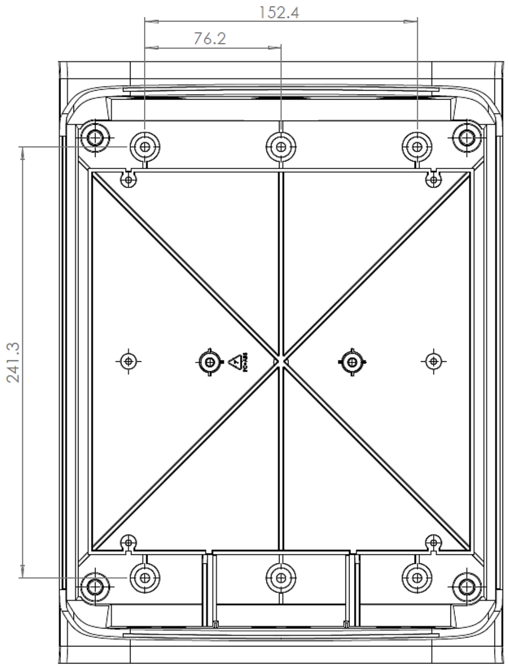
PS3FX Wall Mount Enclosure Dimensions



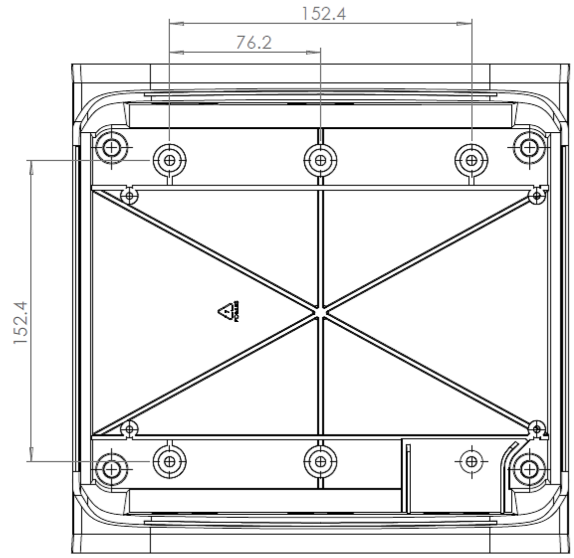
PS3FX DIN Rail Enclosure Dimensions

Appendix C - Mounting Templates

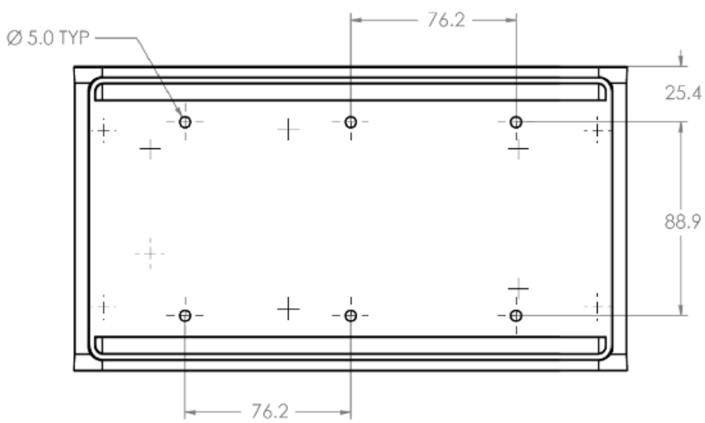
C.1 Enclosure Internal Mounting Hole Locations (Not to Scale)



PS24FX/PS48FX Drill Template



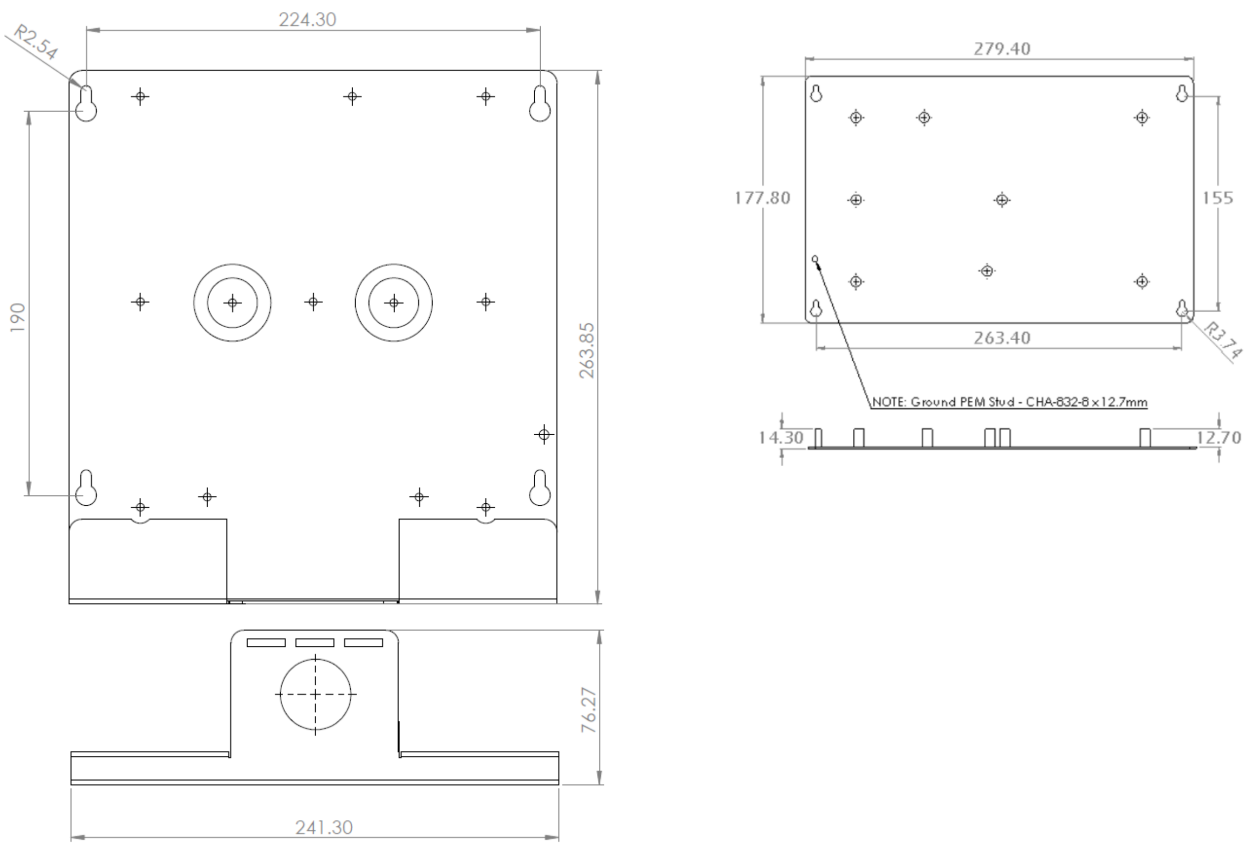
PS12FX Drill Template



PS3FX Drill Template

C.2 Sheet Metal Plate Mounting Hole Locations (PS12FX/PS24FX/PS48FX only)

Not to Scale



PS24FX/PS48FX Mounting Plate Drill Template

Appendix D - PowerScout FLEX 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 (PS48FX and PS24FX only)
Current Channels	3 (PS3FX) or 12 (PS12FX) or 24 (PS24FX) or 48 (PS48FX) 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 (45 - 70 Hz measurable range) – measurement taken L1-N
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	PS12FX/PS24FX/PS48FX only: Unregulated 12VDC output, 200 mA, self-resetting fuse
Waveform Sampling	PS3FX/PS12FX/PS24FX 7.2 kHz; PS48FX 3.6 kHz
Parameter Update Rate	1 second
Interval Data Recording	Energy (kWh) values are recorded every 15 minutes for 63 days (downloadable log) Each record is time stamped.
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,

Specification	Description
	Net kVARh, THD, Theta, Frequency. All parameters for each phase and system total.
Accuracy	0.2% ANSI C12.20-2015 Class 0.2
Resolution	Values reported in IEEE-754 single precision floating point format (32 bit)
Indicators	PS3FX: Standard 2-line display, tri-color backlight (PhaseChek™) PS12FX/PS24FX/PS48FX: Optional 4-line display, tri-color backlight (PhaseChek™)
Alarm Output	User-configurable alarm with open collector output
Pulse Inputs	PS3FX - None PS12FX - 4 inputs PS24FX – 2 inputs PS48FX - 2 inputs 3.3V sourcing voltage (current limited) to user dry contact pulse output Maximum Pulse Rate 10 HZ (50 msec minimum transition time)
Communication	
Hardware	RS-485, Ethernet (IPv4 only), and USB
Supported Protocols	Modbus RTU or BACnet Master Slave Token Passing protocol (MS/TP) 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, 19200, 38400, 76800
Data Bits	8
Parity	None, Even, Odd
Stop Bit	2, 1
Termination	None provided

Specification	Description
Data Formats	Modbus RTU, BACnet MS/TP, Modbus TCP or BACnet IP
Mechanical	
Wire Connections	12-28 AWG 600 VAC, Voltage connection must be #14 AWG or larger & 600 VAC rated
Mounting	Enclosure or Panel Mount
High Voltage Cover	IP30. Included with all models except PS12FX-P-D-N
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 Conduit Connections: 1" (PS12FX/PS48FX Wall Mount enclosures) or ½" (PS3FX Wall Mount enclosure)
PS24FX/PS48FX Dimensions	(L) 33.7cm x (W) 25.1cm x (H) 8.0 cm (13.3" x 9.8" x 3.1") (enclosure version) (L) 26.2cm x (W) 24.1cm x (H) 8.0 cm (10.3" x 9.5" x 3.1") (mounting plate version)
PS12FX Dimensions	(L) 24.8cm x (W) 25.1cm x (H) 8.0 cm (9.8" x 9.8" x 3.1") (enclosure version) (L) 17.8cm x (W) 26.3cm x (H) 8.0 cm (7.0" x 10.4" x 3.1") (mounting plate version)
PS3FX Dimensions	(L) 19.1cm x (W) 8.2cm x (H) 3.8cm (7.5" x 3.2" x 1.5") (DIN Rail Version) (L) 25.7cm x (W) 14.0cm x (H) 5.4cm (10.1" x 5.5" x 2.1") (Wall Mount Version)
FLEXPoint™ HD Minimum System Requirements	
Operating System	Windows® 10, Windows® 11 (Does NOT support ARM Processors)
Communications Port	USB or Ethernet connection
Certifications	
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

Specification	Description
	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.
Safety	The following are UL Recognized: ▪ PS12FX-B-y-z ▪ PS12FX-P-y-z ▪ PS24FX-P-y-z ▪ PS48FX-B-y-z ▪ PS48FX-P-y-z ▪ PS3FX-R-D-N The following are UL Listed: ▪ PS12FX-C-y-z ▪ PS48FX-C-y-z ▪ PS24FX-C-D-N ▪ PS3FX-C-D-N Conforms to UL Std 61010-1, 3rd Edition, UL 61010-2-30:2010 Certified to CSA Std C22.2 No. 61010-1, 3rd Edition
CE	LVD (EN61010-1) EMC (EN61326-1) RoHS 2 (EN50581)