

### PRODUCT SAFETY

When using electrical equipment, basic safety precautions should always be followed, including the following:



**READ THESE INSTRUCTIONS BEFORE USING THIS PRODUCT.**



Only qualified personnel or licensed electrician should install the SiteWorx Power Meter. The mains voltages of 100-600 VAC can be lethal!



Follow all applicable local and national electrical and safety codes.



The terminal block screws are not insulated. Do not contact metal tools to the screw terminals if the circuit is live.



Verify that circuit voltages and currents are within the proper range for the meter model.



Use only UL Listed or Recognized current transformers (CTs). Depending on the meter options, you may use either CTs with built-in burden resistors that generate 0.333 VAC (333 mV AC) at rated current or milliamp output CTs that generate 40 mA at rated current. **Do not use 1 amp or 5 amp output CTs: they will destroy the meter and may create a shock hazard.**



Protect the line voltage conductors to the

meter with fuses or circuit breakers. See Circuit Protection on page 2).



Disconnect equipment from HAZARDOUS LIVE voltages before access.



If the meter is not installed correctly, the safety protections may be impaired.



This product can expose you to chemicals including Antimony Trioxide, which is known to the State of California to cause cancer. For more information go to: [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)



**SAVE THESE INSTRUCTIONS.**

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### GETTING STARTED

#### Overview

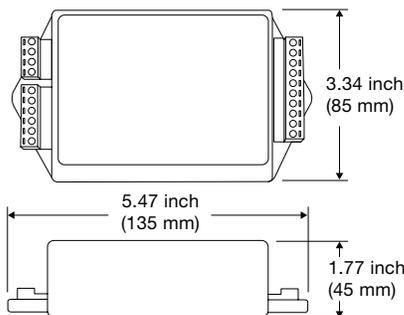
Congratulations on your purchase of the SiteWorx Power Meter. One model can measure 100 to 600 Vac, single-phase or three-phase, wye or delta services. It is designed for use in demand side management (DSM), submetering, energy monitoring, billing and renewable energy applications.

The SiteWorx Power Meter meets the revenue metering ANSI C12.1 Class 1 standard when used with class 0.6 current transformers and meets ANSI C12.20 Class 0.5 when used with class 0.2 or class 0.3 current transformers.

### INSTALLATION STEPS

#### Installation Checklist

- Review the SDN-PWR dimensional drawing below.



- Turn off power before making line voltage connections.
- Mount the meter (**see Mounting pg 2**).
- Connect circuit breakers or fuses and disconnects (**see Circuit Protection pg 2**).
- Connect the line voltage wires to the meter's green terminal block (**see Line Wiring pg 4**).
- Mount the CTs around the line conductors. Make sure the CTs face the source (**see Connect Current Transformers pg 3**).
- Connect the twisted white and black wires from the CTs to the black terminal block on the meter, matching the wire colors to the white and black dots on the meter label (**see CT Wiring pg 3**).
- Check that the CT phases match the line voltage phases: CT1 with VA, CT2 with VB, and CT3 with VC, unless you have specially configured the ConnectionType or MeterConfig registers (**see Connect Current Transformers pg 3**).
- Record the CT rated current for each CT. They will be required during commissioning.
- Check that all the wires are securely installed in the terminal blocks by tugging on each wire.
- Turn on power to the meter.

#### Mounting

- Protect the meter from temperatures below  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) or above  $80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ), excessive moisture, dust, salt spray, or other contamination, using a NEMA rated enclosure if necessary. The meter requires an environment no worse than pollution degree 2 (normally only non-conductive pollution; occasionally, a temporary conductivity caused by condensation).
- The meter must be installed in an electrical service panel or an enclosure.
- Do not use the meter as a drilling guide; the drill chuck can damage the screw terminals and metal shavings may fall into the connectors.

**Note:** The meter has two mounting holes spaced 5.375 in. (137 mm) apart (center-to-center). These mounting holes are normally obscured by the detachable screw terminals. Remove the screw terminals to mark the hole positions and mount the meter.

Self-tapping #8 sheet metal screws are included. Do not over-tighten the screws, as long-term stress on the case can cause cracking.

#### Connect Voltage Terminals

##### Circuit Protection

The SiteWorx Power Meter meter is considered “permanently connected equipment” and requires a disconnect means (circuit breaker or disconnect switch) and overcurrent protection (fuse or circuit breaker).

The meter draws less than 0.1 amp, so the rating of any disconnects, fuses, and/or circuit breakers is determined by the wire gauge, the mains voltage, and the current interrupting rating required.

- The disconnect or circuit breaker must be clearly marked, suitably located, and easily reached.
- Use circuit breakers or fuses rated for 20 amps or less, and rated for the service voltage.
- Use ganged circuit breakers when monitoring more than one line voltage.
- The circuit breakers or fuses must protect whichever of the mains terminals VA, VB, or VC are connected to the mains. Neutral does not need overcurrent protection.
- The circuit protection / disconnect system must meet IEC 60947-1 and IEC 60947-3, as well as all national and local electrical codes. Use ganged circuit breakers when monitoring more than one line voltage.

### Line Wiring

- Always turn off power before connecting the line voltages to the meter.
- For the line voltage wires, Digital Lumens recommends 18 to 12 AWG stranded wire, type THHN, MTW, or THWN, 600 V.
- Use copper conductors only. The screw terminals are only rated for copper wire.
- Do not place more than one wire in a screw terminal; use wire nuts or terminal blocks if needed.
- Verify that the highest line-to-neutral or line-to-line voltage is nominally between 100 and 600 Vac. The absolute maximum operating voltage is 690 Vac.

**Note:** Connect each service conductor to the green terminal block as shown in section 2 above. Torque the screws to 3.5 lbf-in (0.4 N·m).

The screw terminals handle wire up to 12 AWG. Connect each voltage line to the green terminal block as shown in the wiring diagram illustrations below. After connecting the voltage wires, make sure both terminal blocks are fully seated in the meter.

### Grounding

The SiteWorx Power Meter uses a plastic enclosure, insulation, and internal isolation barriers instead of protective earthing. The ground terminal on the green screw terminal block is a functional ground, designed to improve the measurement accuracy and noise immunity. If necessary, this terminal may be left disconnected.

### Connect Current Transformers

To meet the UL listing requirements, the meter must be used with UL Listed or UL Recognized current transformers. Only UL Listed CTs are approved for use in retrofit applications in panel boards; recognized CTs must not be used for this application.

The standard meter supports CTs with a 0.33333 Vac output (one-third volt).

### Current Transformer Installation

See the web article [Selecting Current Transformers](#) for information on selecting appropriate current transformers (CTs).

- **WARNING:** To reduce the risk of electric shock, always open or disconnect circuit from power-distribution system or service of the building before installing or servicing current transformers.
  - **WARNING:** When using UL Recognized CTs, they must be installed on insulated conductors only and maintained away from all live parts.
- Do not use 1 amp or 5 amp current output CTs!
  - The CTs are not suitable for Class 2 wiring methods and must be treated as Class 1 circuits.
  - Use plastic cable ties to secure the current transformers and route the lead wires so that they do not directly contact uninsulated live terminals or conductors.
  - Split-core CTs can be opened for installation around a conductor. A nylon cable tie may be secured around the perimeter of the CT to prevent inadvertent opening.
  - Do not install current transformers where they would: 1) exceed 75 percent of the wiring space of any cross-sectional area within the equipment, 2) would block ventilation openings, or 3) would be in an area of breaker arc venting.
  - To minimize current measurement noise, avoid extending the CT wires beyond 100 feet (30 meters), especially in noisy environments. If it is necessary to extend the wires, use twisted pair wire 22 to 14 AWG, rated for 300 V or 600 V (not less than the service voltage) and shielded if possible.

**Note:** Find the source arrow or label “THIS SIDE TOWARD SOURCE” on the CT and face/point toward the source of current. CTs are directional, so if they are mounted backwards or with their white and black wires swapped the measured power will be negative. The power status LEDs indicate negative measured power by flashing red.

Install the CTs around the phase conductors to be measured as shown in the wiring diagram illustrations below. Connect the CT leads to the meter.

For revenue accuracy, use revenue-grade current transformers; other CTs are less accurate and may not provide revenue accuracy. Contact sales for more information on appropriate CTs.

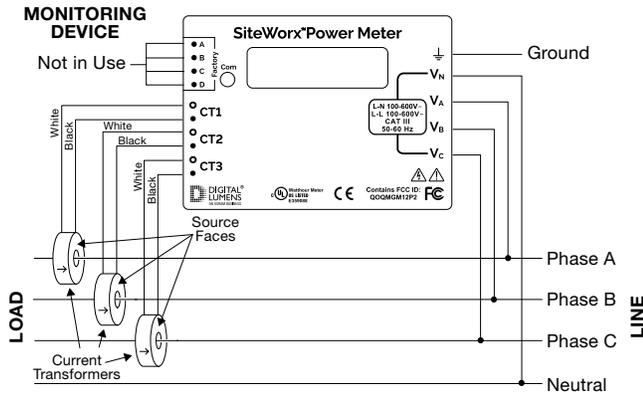
### CT Wiring

The current transformers connect to the six-position black screw terminal block. Connect the white and black CT wires to the meter terminals marked CT1, CT2, and CT3 (**see Electrical Service Type illustration pg 4**). Excess length may be trimmed from the wires if desired. Connect each CT with the white wire aligned with the white dot on the label, and the black wire aligned with the black dot. Note the order in which the phases are connected, as the line voltage phases must match the current phases for accurate power measurement. Torque the screws to 3.5 lbf-in (0.4 N·m).

### WIRING DIAGRAMS

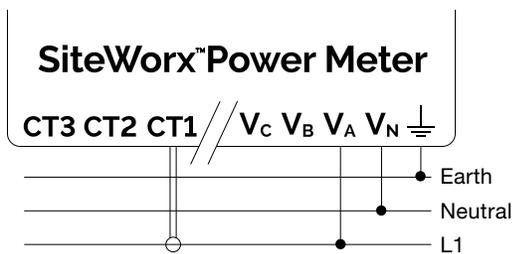
#### Electrical Service Types

The WND-WR-MB meter supports any electrical service from 100 to 600 Vac, line-to-neutral or line-to-line, 50 to 60 Hz, single-phase, split-phase, or three-phase, wye or delta.



#### 1 Single-Phase, Two-Wire, Line-to-Neutral

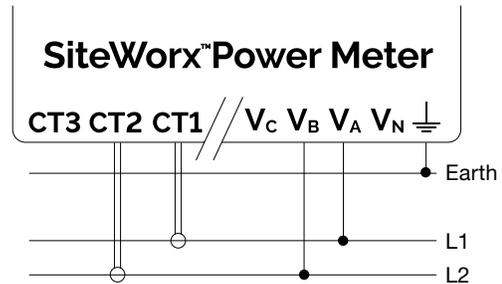
This is a common residential and branch circuit connection. The CT should be placed around the line conductor and connected to the CT1 terminal (**see illustration below**). The meter will be powered from the VN and VA terminals.



#### 2 Single-Phase, Two-Wire, Line-to-Line

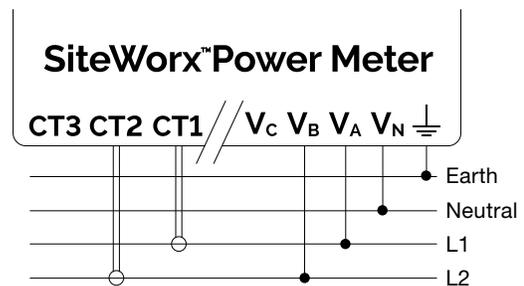
This circuit occurs in residential (commonly 120/240 Vac) and some commercial applications (such as 208 or 480 Vac line-to-line). The meter will be powered from the VA and VB input terminals. Two CTs are typically used as shown below.

- One SiteWorx Power Meter can monitor three single-phase, two-wire, line-to-line circuits.



#### 3 Single-Phase, Three-Wire (Split-Phase)

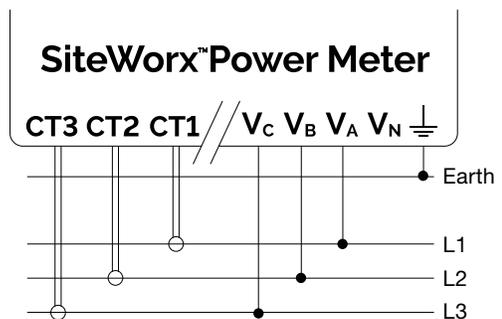
This is a common North American residential service at 120/240 Vac with a neutral connection. The CTs should be placed around the L1 and L2 line conductors and connected to the CT1 and CT2 terminals respectively. The meter will be powered from the VN, VA, and VB terminals.



#### 4 Three-Phase, Three-Wire Delta

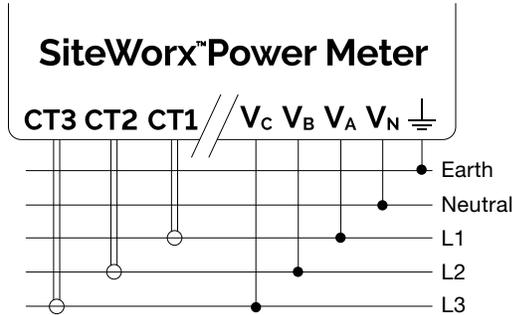
This service is common in commercial and industrial settings. It does not include a neutral conductor. In some cases, the service may be four-wire wye while the load is three wire delta (no neutral). The meter will be powered from the VA and VB terminals.

With the default configuration, three CTs are required as shown below.



### 5 Three-Phase, Four-Wire Wye

This is a common commercial and industrial service that includes a neutral conductor. The CTs should be placed around the L1, L2 and L3 line conductors and connected to the CT1, CT2, and CT3 terminals respectively. The meter will be powered from the VN, VA, and VB terminals.



### 6 Grounded Leg Service

In rare cases with delta services or single-phase two-wire, line-to-line services, one of the phases may be grounded.

The meter will correctly measure services with a grounded leg, but the measured voltage and power for the grounded phase will be zero. The status LEDs will not light for the grounded phase because the voltage is near zero. This type of service may result in unusual power factors.

### 7 Four-Wire Delta Service

There are several names for this service type including “high-leg”, “wild-leg”, “stinger leg”, or “wild phase”. This is a three-phase delta service with a center-tap on one of the transformer windings to create a neutral for single-phase loads. These occur in North America in two configurations: 120/208/240 Vac and 240/415/480 Vac.

With the SiteWorx Power Meter Wide-Range meter, this service type can be measured just like any three-phase, four-wire wye service (**see Three-Phase, Four-Wire Wye illustration pg 5**) using three CTs. By convention, you should connect the VB terminal to the high leg.

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