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(855) SORAPRO
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VR11 INSTALLATION GUIDE

Real Time Energy Metering

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IMPORTANT SAFETY INFORMATION

This manual contains important safety and operating information. Please read and follow the instructions in this manual. Failure to do so could be hazardous and result in damage to the hardware.

DANGER! HIGH VOLTAGE HAZARD

LINE VOLTAGES OF UP TO 600 VAC ARE PRESENT ON THE INPUT TERMINALS OF THE DEVICE AND THROUGHOUT THE CONNECTED LINE CIRCUITS DURING NORMAL OPERATION. THESE VOLTAGES MAY CAUSE SEVERE INJURY OR DEATH.

INSTALLATION OF ANY SORAPRO IS FOR QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT INSTALL OR SERVICE ANY SORAPRO HARDWARE UNLESS YOU ARE A QUALIFIED TO DO SO. INSTALLATION OF ANY SORAPRO IS FOR QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT INSTALL OR SERVICE ANY SORAPRO HARDWARE UNLESS YOU ARE A QUALIFIED TO DO SO.



GETTING STARTED

This guide will help you properly install the SORAPRO monitoring equipment. It is important to read through all of the installation steps prior to installing any equipment. Read through the instructions, visualize where all the equipment will need to be installed and do a soft installation before mounting any equipment. If you do not understand the instructions in full, please contact SORAPRO Support at (855) 767-2776.

How SORAPRO Works:

SORAPRO was developed to be easy to install while providing Real Time energy metering and monitoring from anywhere on the planet. The metering equipment gathers revenue grade (ANSI C12) data from the site through Current Transformers (CT's). This information is transferred to remote servers through an internet gateway and is processed for accuracy before being stored. Once stored, this data is analyzed to establish if the solar array is working properly, based on criteria specified by the installer through the user interface. Any discrepancies are reported to specified users as warning or errors through email alerts. The errors will report to the users until the discrepancies are rectified.





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Inside This Package:

Prior to commencing installation, please confirm that the following components were received in your SORAPRO installation package:

1. Hinged-Cover Lift-Off Type 3R Enclosures
2. Metering equipment (pre-assembled)
3. Current Transformers (1 per phase)

The following equipment is also required to complete the SORAPRO installation. Manufacturer of each component will vary depending on the equipment specified for the solar installation.

1. 2-Pole 20A Circuit Breaker
2. 14 AWG, 600V wire
3. ¾" Conduit (or larger) with Liquid-Tite fittings
4. CAT5 cable

SORAPRO HARDWARE

Within the SORAPRO monitoring device are several pieces of hardware that serve individual purposes.

Power Supply:

The unit contains a power supply. This power supply takes a 120VAC input and transforms it to 24VDC for supply to the revenue meter(s) and the datalogging device. On the power supply is a green LED indicator. Contact SORAPRO immediately if this indicator is not lit green when commissioned.



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Revenue Meter(S):

The unit contains a revenue grade metering device for measuring power data. The unit uses current transformers to measure amperage through a wire. **DO NOT USE ANY OTHER CT's WITH THIS DEVICE THAN THE ONES CONTAINED IN THE SORAPRO PACKAGE.** Use of other CT's could damage metering equipment and cause product failures.

The data is measured by the metering device and send via RS485 transmission the data acquisition center for logging and transmission through the internet gateway.

INSTALLATION OVERVIEW

See Appendix A for a Quick Installation Guide.

Each device in contained within the SORAPRO unit is pre-configured and assembled by SORAPRO before shipping. To install the device, follow the following steps and reference the Quick Installation Guide.

1. Choose a location for the SORAPRO unit that is within 10' of the solar output source. You may connect the device to the main interconnection panel or a solar subpanel as long as the device is within 10' from the source to be metered and there are enough open breaker spaces to connect the proper breaker to.
2. The SORAPRO unit will need a 2-pole circuit breaker in a single, or split phase application. A VR11 cannot be installed in a three phase application.
3. Install the proper breaker to supply AC power to the unit. In order to ensure proper metering, the CT's must be installed in the same panel as the breaker you are installing in this step.
4. Install the CT's on the solar output wires.
5. Install a watertight, 3/4" or larger conduit from the breaker panel to the SORAPRO device.



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6. Using the conduit from step 5, run 14 AWG, solid, copper wire from the breaker panel to the SORAPRO device. Complete in conjunction with step 7, when applicable.
7. Using the conduit from step 5, run the CT wires from the breaker panel to the SORAPRO device. You will have to extend the CT wires in order to
8. Connect the AC supply wire from the breaker to the V1, V2 to the terminal block within the unit. NOTE: V3 remains unused in the VR11.
9. Connect the CT wire the CT inputs on the metering device. These inputs should be clearly labeled as I11, I12, I21, I22. NOTE: I31, I32 remain unused in the VR11.
10. Connect the Ethernet (LAN) wire to the port labeled "Ethernet" on the bottom of the Elkor ETnet.
11. Turn on power to the SORAPRO device and ensure the following:
 - a. A green LED is lit on the top of the metering device.
 - b. A green LED is lit on the top of the power supply.
 - c. A green LED is lit on the bottom of the gateway device and the orange LED is flashing intermittently.
 - d. If the red LED is lit on the top of the Elkor, one or more of your CT's are installed backwards. CT's must be installed with the identified side facing the PV source.
12. Call SORAPRO to complete the commissioning of the device with the SORAPRO online software.



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INSTALLATION CHECKLIST

Always contact the local network administrator or home owner and verify the following:

1. Network Port 80 is open for both incoming and outgoing signals
2. The network router is configured to use DHCP.
3. If the network cannot be configured to use DHCP, contact SORAPRO to prior to shipping in order to have the unit preprogrammed with a static IP address

After installing SORAPRO hardware, make sure the following has been completed before leaving the site:

1. The CT's are installed on the correct lines and that they are facing the correct direction of current flow.
2. All accessories that you have installed have been installed according to their installation manuals.
3. After you have verified that the installation has been done correctly and that the network is sending and receiving information, call SORAPRO to activate the device at (855) 767-2776 before leaving the site.





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TROUBLESHOOTING

Line voltages up to 600 VAC are present on the input terminals of the device and throughout the connected line circuits during normal operation.

***THESE VOLTAGES MAY CAUSE SEVERE INJURY OR DEATH.
INSTALLATION AND SERVICING MUST BE PERFORMED ONLY BY QUALIFIED,
PROPERLY TRAINED PERSONNEL.***

The Following Tools Are Helpful In Diagnosing Hardware Installation Issues:

1. Digital Multimeter capable of mV AC and mA AC measurements
2. Clamp on Amp meter to verify current in line (if possible)
3. Basic electrician tools



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Troubleshooting steps for Elkor WattsOn Meter:



WattsOn Meters calibrated for use with 5A CTs have special precautions that must be taken. NEVER disconnect a 5A CT without shorting it first. These CTs are capable of producing very high voltages and arcing when not shorted, and as a result may cause serious injury or death!

Always ensure that 5A CTs are shorted via a shorting block, or that power to the circuit which the CT is installed on is off before disconnecting from the meter.

WattsOn meters with 5A inputs may be identified by the part number (ie: WattsOn-1100-5A), or by the yellow sticker on the face of the unit as below:

Before commencing other troubleshooting steps, ensure that the WattsOn is receiving a proper power supply. Power to the WattsOn is provided by to the upper left (black) plug in two-position connector.

The green Power LED should illuminate when the WattsOn is receiving power, however note that the LED will continue to be illuminated even during low voltage conditions. That is, the LED is not an indication of WattsOn "sanity" or "operation", but rather that power is simply available. Note that voltages can sag when other equipment is powered on, especially when using a small VA control transformer. Therefore, it is best to verify the input voltage using a DMM, on the terminals of the black plug-in power connector to ensure that the proper voltage is present.



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LED State Condition:

The Red DIAG (diagnostic) LED has a variety of functions. Depending on the state of the LED, it can signify a number of conditions. The table below summarizes the LED states and related conditions:

LED State	Condition
OFF	Normal operation, or insufficient power supply voltage (see step 1)
Fast Flashing	Input Voltages below threshold (typically ≤ 25 VAC)
Solid (ON)	Reverse NET Power (kW) condition
Slow Flashing	Reverse Sequence (typically this is disabled from the factory)
Double-Flash, pause, Double-Flash	Firmware update mode check: DIP Address switch must not be "0". Potential firmware problem.

To test for WattsOn functionality, it is best to connect power and disconnect voltage inputs. In this configuration, the RED LED should flash rapidly. This is an indication of proper operation.

During normal measurement operation (i.e. voltage inputs above 25VAC), the DIAG LED should be OFF. If the LED stays ON constantly, or turns on an off erratically, it is an indication of reverse power detection. This condition arises when the SUM of the real power (watts) in all three phases is negative. Please note however, in a three-phase system (assuming balanced phases), if only one of the phases is reversed, the NET will continue to be positive.



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TECHNICAL DATA

SORAPRO VR11	
INPUTS	
Voltage	100 to 240 VAC
Voltage Range	88 to 264 VAC
Current	1.8A max
Frequency	60 Hz
OUTPUTS	
Wh/Qh	solid state relay
RS485	Modbus RTU
Start Time	1000 ms max
Rise Time	30 ms max
DEVISE	
Power Supply	24 VDC
Accuracy	ANSI C12.20 Class 0.2%
Operating Temp	-10 to 60 C
Isolation	2500 VAC to one minute / 1500 VDC
Enclosure	10x8x6 NEMA3R
Weight	8 lbs



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We encourage your feedback. Please contact us by mail at:

Future Solutions Technologies, LLC
120 Route 156
Yardville, NJ 08620

Phone Support is available between the hours of 8:00AM and 6:00PM EST.
For phone support, please call:

(855) SORAPRO (Phone)
(609) 888-3971 (Fax)

Email Support is also available at:

support@sorapro.com

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WARRANTY

5 Year Warranty:

A five year warranty applies to the following products: VR11, VC11, VC21.

Extended Warranty:

An extended 5 year warranty can be purchased for any device with a 5 Year Standard warranty. This extended warranty is an extension of 5 years on the Standard Warranty, from the date of the original warranty period.

Please contact the SORAPRO service line at (855) SORAPRO for more details regarding the extended warranty.

The Standard Warranty covers any repair or replacement costs incurred during the warranty period, beginning on the device's purchase date, subject to the following conditions.

Warranty Conditions:

If after contacting SORAPRO for support it has been determined that a device is defective, one of the following services will be selected by Future Solutions Technologies, will be performed at no charge for materials or labor costs:

- Repair at Future Solutions Technologies
- Exchange for an equivalent Replacement Device

In the event of receipt of a Replacement Device, the warranty will continue on the new device from the original purchase date of the defective device. The defective device should be packaged in the same packaging and returned to Future Solutions Technologies. If the defective device is not received by Future Solutions Technologies with 5 business days, charges for the Replacement Device will apply.

Please contact support at (855) SORAPRO with questions regarding potentially defective devices.

Warranty Exclusions:

The following will result in Warrant Exclusions:

- Incorrect installation
- Tampering with pre-configured components
- Attempted repairs not conveyed by Future Solutions Technologies support personnel
- Incorrect use
- Improper device ventilation
- Installation in direct sunlight, without optional sun deflector
- Force Majeure (i.e. lightning, fire, animals, etc)

Claims for compensation for damages due to loss of profits or due costs are excluded if no legal liability applies.