



Solar Assisted UPS, 90W

Installation Manual & Maintenance Guide

June 2026

Unlock Energy Intelligence



Solar Assisted UPS Assembly Installation Manual & Maintenance Guide

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Installation Personnel

Installation and maintenance of the solar assisted UPS should only be performed by qualified, competent personnel who have appropriate training and experience with photovoltaic systems, low-voltage DC wiring, and battery-backed electronic equipment. The assembly must be installed in accordance with all Local and National Electrical Safety Codes.

Warning

PV source voltages from the solar panel can reach approximately 22–24 VDC at open circuit and may rise further at low ambient temperatures. The DC-DC converter output is 24 VDC nominal feeding a 24 VDC UPS bus.

These voltages, while low, can damage downstream equipment if mis-wired. Reverse polarity, short circuits, or wiring to incorrect terminals may damage the UPS or converter. Installation and servicing should be performed only by qualified, properly trained personnel.

FCC Statement

This device is classified as a Class A digital device.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operations.

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1. General

1.1 Scope

This document covers the installation and maintenance of the solar assisted UPS assembly, which provides extended battery autonomy for remote monitoring sites by supplementing the primary AC-fed UPS with photovoltaic input.

Use this document in conjunction with the OEM manuals for the solar panel and UPS for complete understanding of the system.

1.2 Overview

The Solar Assisted UPS is an enclosed assembly that provides battery-backed 24 VDC to loads at remote sites where AC service is intermittent or where solar augmentation is needed to extend site autonomy. The enclosure houses an AC/DC power supply, a DC/DC solar converter, a redundancy module, a UPS, and the battery bank. The redundancy module combines two 24 VDC source paths — site AC through the integrated power supply, and an external 90 W photovoltaic panel through the integrated DC-DC converter — and feeds the UPS. When sunlight is available, the solar path contributes alongside the AC source, reducing AC line draw and sustaining the battery.

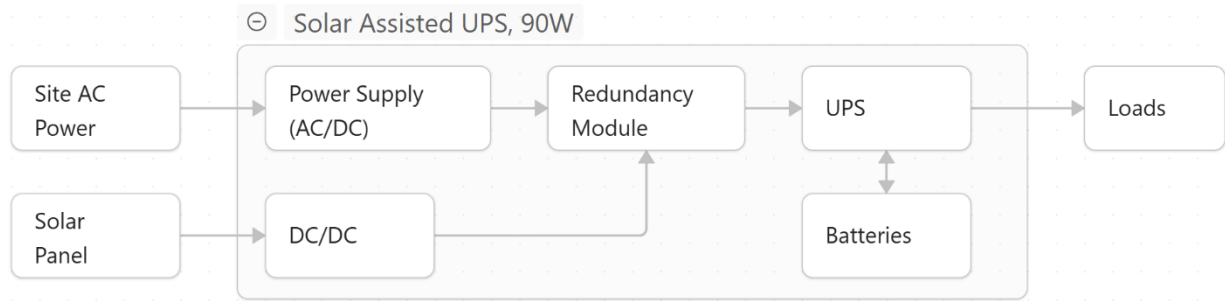


Figure 1: Simplified Functional Diagram

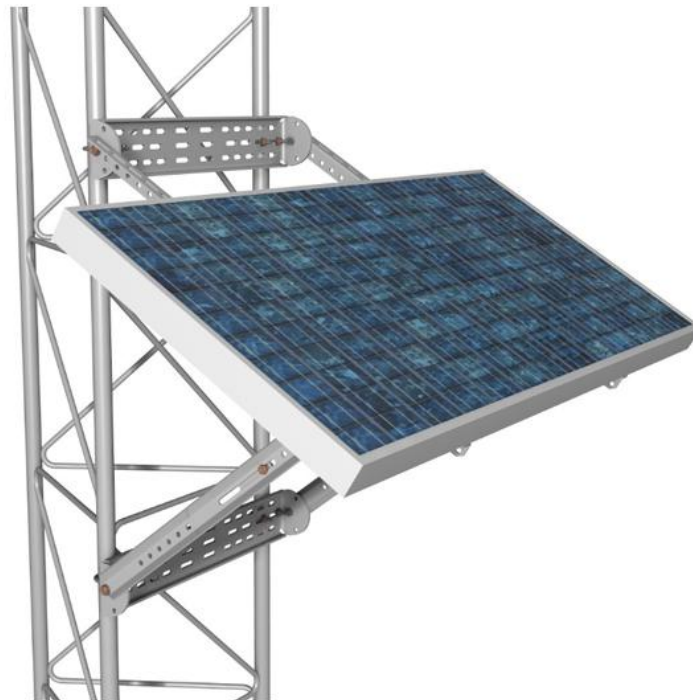


Figure 2: Solar Panel with the Extended Mounting Kit
Mounting Structure Sole Separately
(Photo Source: Campbell Scientific, Inc SP90 Product Manual)

2. Mechanical Installation

2.1 Safety

⚠ WARNING

Always read the OEM manual for the solar panel before mounting or connecting the panel. Failure to do so can result in injury or damage to the panel.

2.2 Moving and Handling (Solar Panel)

Always refer to the OEM manual for additional safety and installation guidance specific to the solar panel.

- The solar panel weighs approximately 17 lbs.
- Do not lift or carry the panel by its electrical leads. Use the mounting frame edges or bracket attachment points.
- Avoid placing the panel face-down on any surface that may scratch the glass.

2.3 Mounting the Solar Panel

- Mount the solar panel per the OEM manual to receive maximum incident solar radiation over the course of a year. South-facing tilt approximately equal to site latitude is the typical default.
- Avoid installation locations subject to long-duration shading from buildings, trees, or other panels.
- Use only stainless steel or galvanized hardware for outdoor mounting. Mixing dissimilar metals at the bracket interface promotes galvanic corrosion.
- Maintain the manufacturer-specified clearance behind the panel for ventilation. Restricted airflow reduces panel output.
- Route the DC output leads with a drip loop to prevent water from running directly into cable entry points.
- Mount the solar panel as close as possible to the UPS enclosure. It is not recommended to mount the solar panel in a location that requires more than 38ft of wire length. See [Table 1](#).
- Cover the solar panel or place face-down until it has been connected to the UPS input breaker to prevent electrical shock or damage to equipment.
- All field wiring must use stranded copper conductors rated for outdoor / wet-location use.

2.4 Mounting the enclosure

Mount the UPS enclosure containing the Solar Assisted UPS per the [Stem General Installation Guide](#).

3. Electrical Installation

3.1 Safety

⚠ WARNING

The solar panel produces DC voltage whenever exposed to sunlight. Cover the panel face with an opaque material or disconnect at the panel junction before making any wiring connections.

Turn off all AC and DC breakers before installation or servicing.

3.2 System Wiring Overview

The Solar Assisted UPS requires AC mains input. It is not intended to operate solely on solar power.

The figure below represents typical system wiring. Always refer to the drawing package provided with your equipment.

The Solar Assisted UPS requires five connections (See Figure 3):

1. RJ45/Ethernet to the UPS module
2. AC mains to the AC input breaker
3. Ground
4. Solar panel to the DC input breaker
5. UPS output terminals to loads

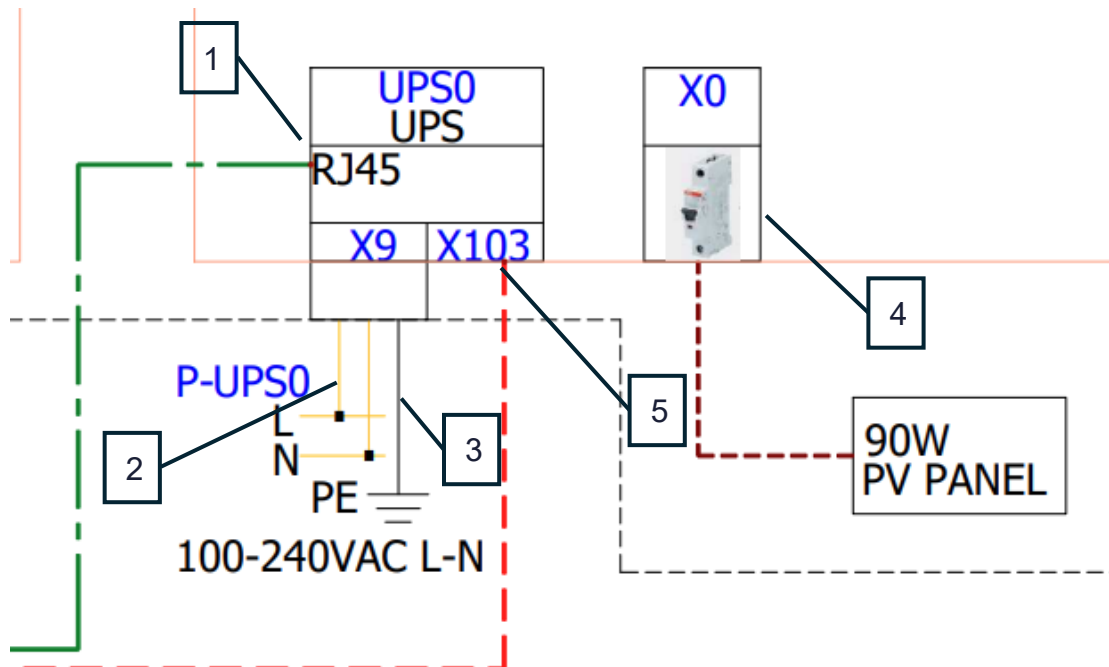


Figure 3: Typical System Wiring from Single Line Diagram

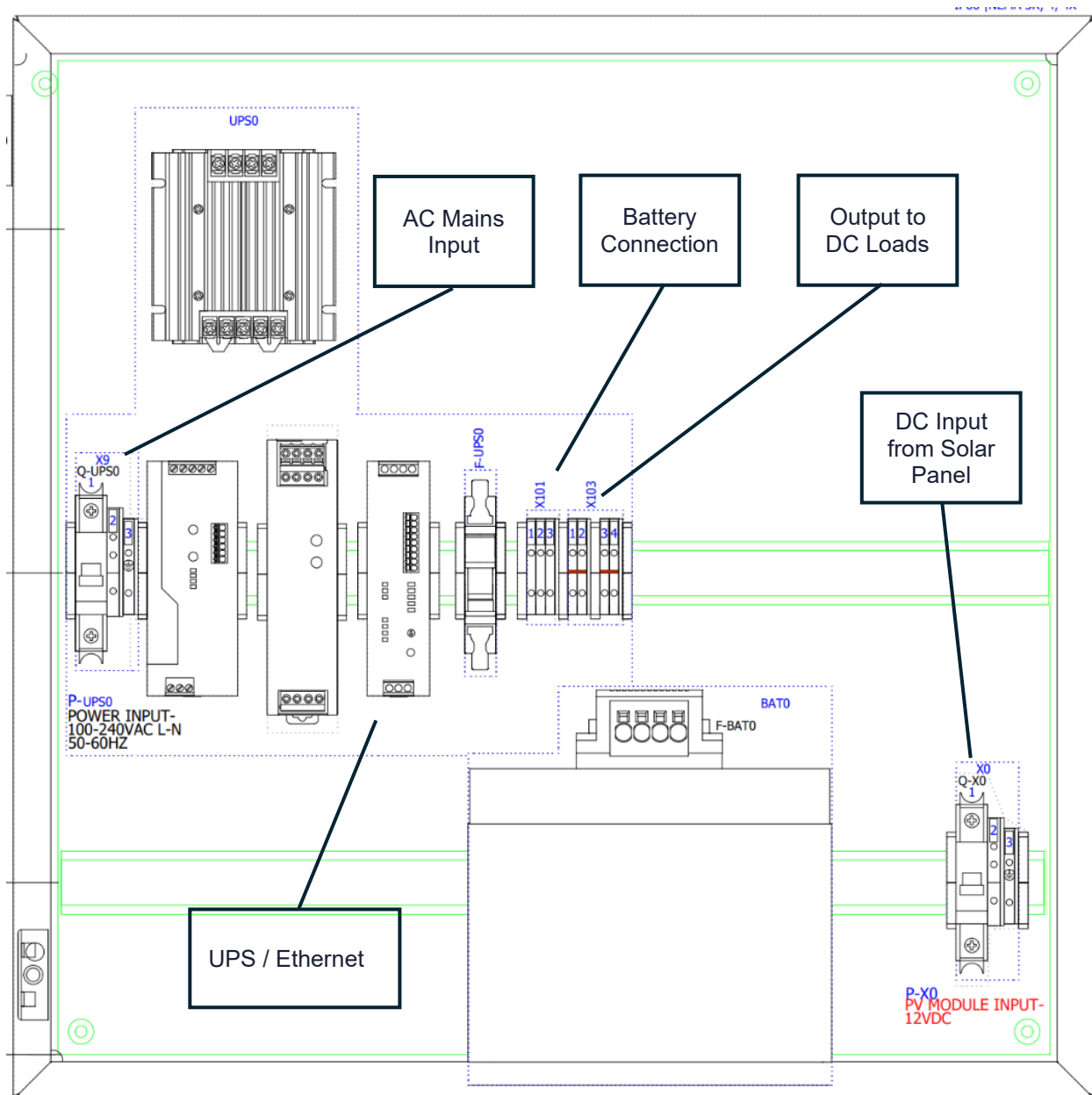


Figure 4 – Typical Solar Assisted UPS Cabinet Panel Layout

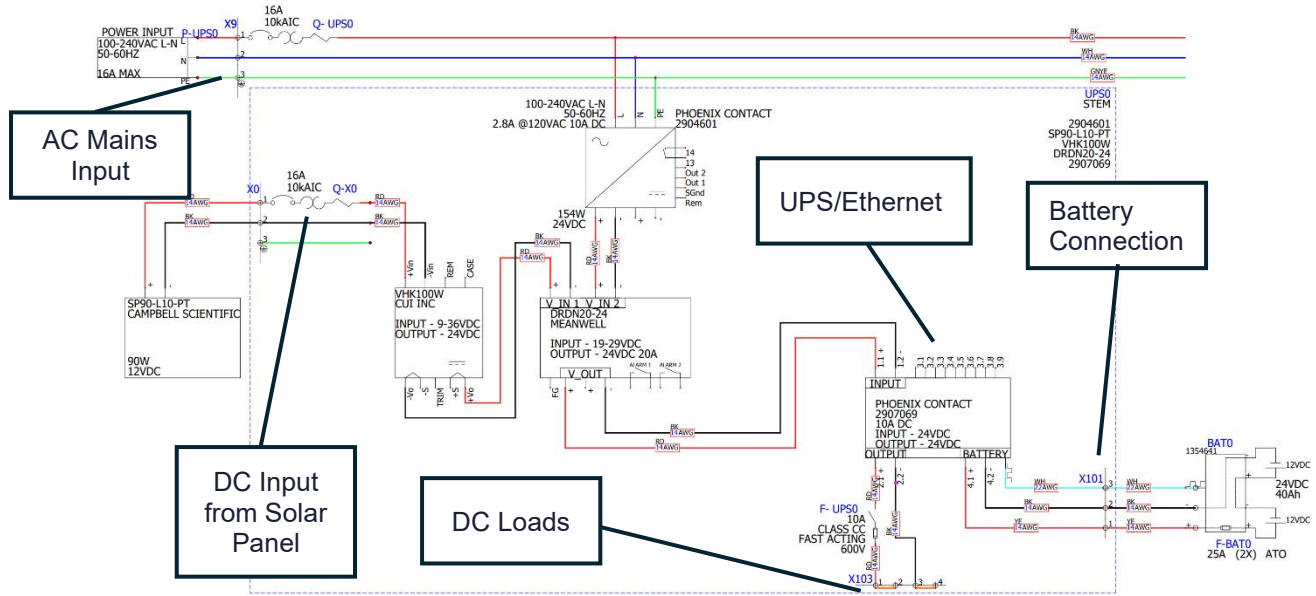


Figure 5 - Typical Solar Assisted UPS Schematic

3.3 Extending the Solar Panel Wiring

Extend the solar panel wire leads if necessary to reach the UPS enclosure. See [Table 1](#). Use stranded copper conductor sized for the panel short-circuit current with appropriate temperature derating.

Maximum Solar Panel Wire Length	
Maximum Distance*	Wire Gauge
15 ft	16 AWG
24 ft	14 AWG
38 ft	12 AWG
> 38 ft	Not Recommended

Table 1: Solar Panel to UPS Wire Length

*Total wire length from solar panel to breaker including built-in wire leads.

3.4 Solar Panel to UPS Wiring

Refer to [Figure 4](#) and Figure 5 above.

1. Verify the panel is covered or otherwise prevented from producing output before making connections.
2. Verify the UPS DC input breaker (X0) is in the OFF position.
3. Connect the panel positive lead to the enclosure DC input breaker (X0-1).
4. Connect the panel negative lead to the enclosure input (X0-2) terminal.
5. Uncover the solar panel.
6. At the UPS enclosure, verify positive polarity with a multimeter between the DC input breaker and ground. (Requires solar panel to be in sunlight)
7. If polarity is incorrect, cover the solar panel and repeat steps 3-6.

3.5 Enclosure Wiring

Refer to [Figure 4](#) and Figure 5 above.

Wire the enclosure AC mains, output loads and solar panel input per the included system diagrams, Section 3.4 above and/or the [Stem General Installation Guide](#) section “Uninterruptible Power Supply (UPS) Installation”.

3.6 Installing the Batteries

Refer to the [Stem General Installation Guide](#) for details.

WARNING: UPS service mode must be disabled before leaving the site or damage to the batteries can occur. See section 3.8 below.

1. Unbox the batteries being sure to also unbox the battery control module and included wiring. **Do not accidentally discard the battery control module. This module cannot be purchased separately.**
2. Set the batteries in the bottom of the enclosure (See Figure 7)
3. Connect the battery control module to the batteries using the supplied wiring. (See information packet supplied in the battery shipping box)
4. Connect the battery control module to the UPS X101 terminals using the wiring packet supplied with the enclosure. (See [Figure 4](#) and Figure 5 above)

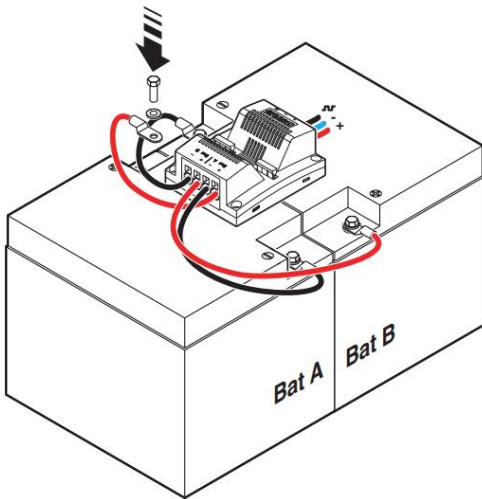


Figure 6 - Batteries connected to Included Control Module

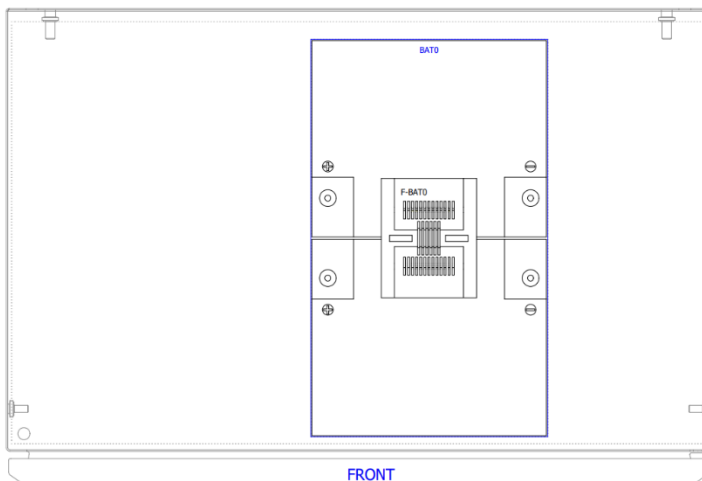


Figure 7 - Battery Orientation Inside Cabinet

3.7 Energizing the System

1. Energize the system per the [Stem General Installation Guide](#) section “Uninterruptible Power Supply (UPS) Installation”.
2. Verify the UPS is operating normally on its primary AC input before introducing the solar source.
 - 2.1. Verify the “LED 2” light on the redundancy module is illuminated.
3. Turn on the UPS DC input breaker (X0).
4. Verify the “LED 1” light on the redundancy module is illuminated. (Requires solar panel to be in direct sunlight)



Figure 8 - Power Redundancy Module

3.8 Service Mode

1. **Service mode must be disabled before leaving the site or damage to the batteries can occur.**
2. If the State of Charge (SOC) indicator is not lit:
 - 2.1. Press and hold the service button on the front of the UPS for more than one second, but less than six seconds.
3. Ensure the Alarm LED is OFF
4. Ensure the SOC indicator shows that the batteries are charging or charged.

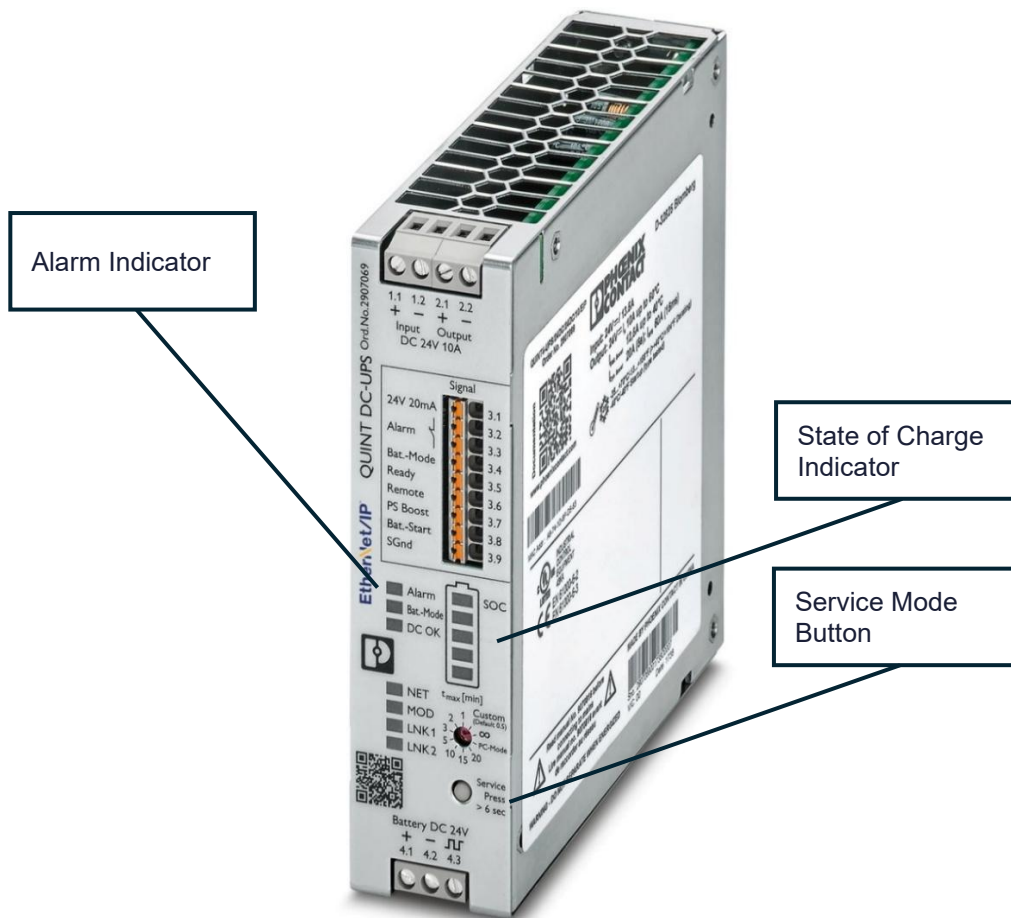


Figure 9 - UPS Module

3.9 Before You Leave

1. Record the angle and azimuth of the solar panel.
2. Record the open circuit voltage of the solar panel.
 - 2.1. Ensure the solar panel is in full direct sunlight.
 - 2.2. Turn off the DC input breaker (X0) in the UPS cabinet.
 - 2.3. Using a multimeter take a DC voltage measurement from the input side of the DC input breaker (X0-1) to the (-) input terminal (X0-2).
3. Take picture of the solar panel installation site and send to Stem support (support@alsoenergy.com).
 - 3.1. Include pictures that depict the overall structure, the direction of where the solar panel is, and the angle at which the panel has been mounted.

4. Preventative Maintenance

4.1 Overview

This maintenance program covers all subsystems of the Solar Assisted UPS. The schedule is designed for solar monitoring and SCADA sites where equipment is exposed to dust, pollen, temperature extremes, insects, and weather. All items should be performed during routine site visits or dedicated maintenance trips.

Maintenance is organized into two tiers: quarterly inspections (quick visual checks that can be combined with routine site visits) and annual inspections (more thorough service requiring more time and potentially specialty tools). Sites in harsh environments — desert, agricultural, coastal-adjacent — should increase quarterly items to monthly.

⚠ WARNING

Cover or disconnect the solar panel before performing any maintenance that involves opening connections at the UPS. Even at low irradiance, the panel can produce voltage capable of arcing across opened terminal screws.

4.2 Maintenance Checklist

Q = Quarterly (or monthly at harsh sites) | A = Annual | ✓ = Applicable interval

#	Subsystem	Maintenance Item	Q	A	Notes / Acceptance Criteria
1	Panel	Visual inspection of panel face for cracks, delamination, hot spots, or yellowing of encapsulant	✓		Any cracking of the glass requires panel replacement
2	Panel	Clean panel face (remove dust, pollen, bird droppings, agricultural debris)	✓		Use clean water, a small amount of dishwashing detergent and a soft cloth or squeegee. Avoid abrasive cleaners.
3	Panel	Inspect panel mounting bracket and hardware for corrosion, looseness, or fatigue		✓	Tighten mounting hardware
4	Panel	Inspect panel junction box and cable strain relief for water ingress, corrosion, or insect intrusion		✓	Re-seal with outdoor-rated silicone sealant if compromised
5	Panel	Verify panel orientation and tilt are unchanged from commissioning	✓		Wind, vibration, or fastener loosening can shift panel orientation over time
6	Panel	Measure panel open-circuit voltage (Voc) in full sun and compare to commissioning baseline		✓	A drop greater than 0.5% per year from baseline may indicate degradation
7	Cabling	Inspect outdoor cable runs for UV degradation, abrasion, or rodent damage	✓		Replace any cable with cracked or chalky jacket
8	Cabling	Verify cable strain reliefs and glands are tight and waterproof at all entry points	✓		Reseal any failed glands

#	Subsystem	Maintenance Item	Q	A	Notes / Acceptance Criteria
9	Cabling	Check drip loops are intact at all cable entry points	✓		Drip loops prevent water from running into the cabinet
10	UPS	See Stem Operation and Maintenance Manual			
11	Site	Clear vegetation and debris from around the panel (full sun exposure, no shade casting)	✓		Tree and shrub growth is the most common cause of declining panel output
12	Site	Inspect for pest/insect intrusion at panel J-box, cable entries, and converter enclosure	✓		Check for wasp nests, mud daubers, ants, rodent damage
13	Site	Verify panel mounting structure (pole, mast, or rooftop bracket) is plumb and structurally sound		✓	Wind load, frost heave, or settling can shift the structure over time



5. Support Contact

Stem SupportTrack

Direct access 7 days a week to best-in-class support resources and specialists.

Open a case at: <https://home.alsoenergy.com/support>

For onsite appointments:

If you know you are going to be onsite, it's best to schedule an appointment beforehand with our call center support staff.

Use our easy scheduling tool at: <https://home.alsoenergy.com/support>

If you would like to schedule a site visit from a Stem Field Technician, please send an email to onsiteservice@alsoenergy.com.

For phone assistance:

Contact us at 866-303-5668

Weekdays: 8 am – 9 pm US-EST

Weekends: 11 am – 7 pm US-EST