Solar + Battery Power Station

For installing the preassembled enclosure and solar panel on a suitable pole, then powering compatible low-power devices.

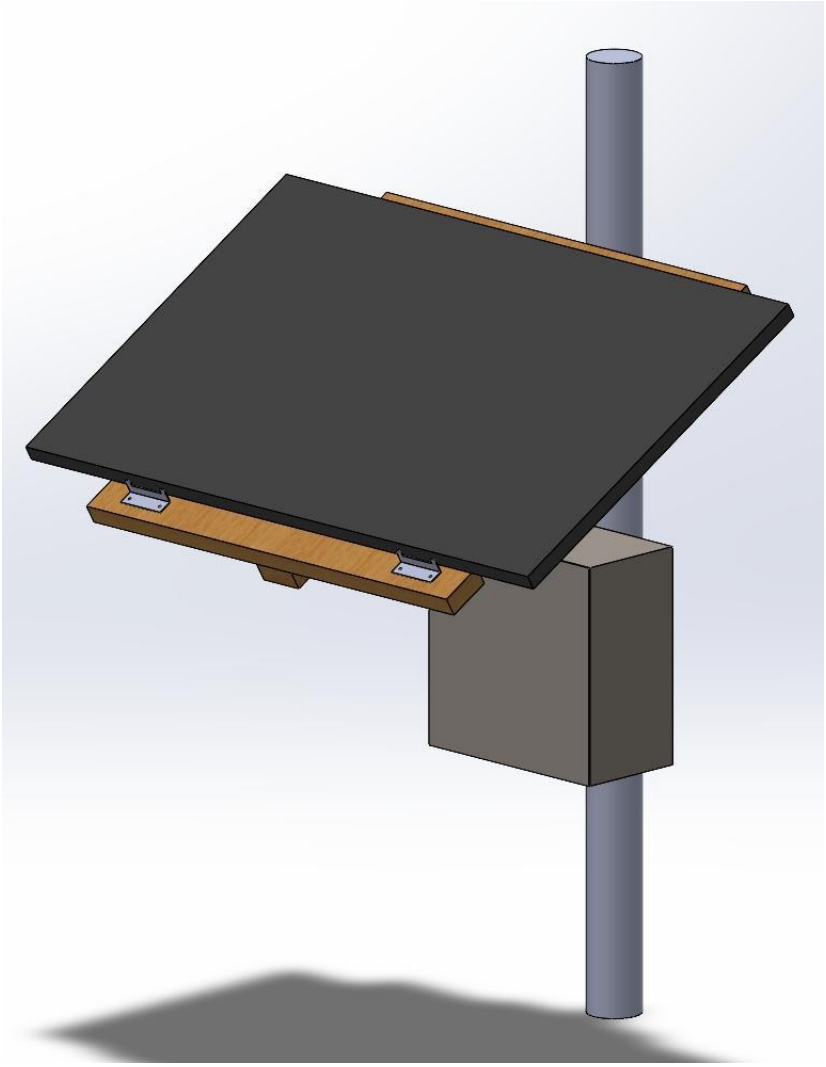


Figure 1. CAD overview of the solar panel, enclosure, and supporting pole. See Section 3 for mounting details.

Read before installation
Read the safety section and connection sequence before lifting or connecting the station. Connect the battery before the solar panel. For full shutdown, disconnect solar before the battery.

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Know your station

The station collects energy from a solar panel, stores it in a lithium iron phosphate (LiFePO4) battery, and supplies a connected device through a regulated USB output. The charge controller manages charging automatically. A camera, sensor, weather station, or networking device is a **load**: equipment that consumes the supplied power.

Item	Role in the assembled station
Solar panel and aluminum support	Arrive assembled with pole-mount hardware. Face the panel toward clear sunlight.
Battery enclosure	Houses the battery, controller, and output hardware. Keep the door closed during use.
SmartSolar MPPT 75/15	The maximum power point tracking (MPPT) controller regulates solar charging. PV means photovoltaic, or solar-panel input.
12.8 V, 50 Ah LiFePO4 battery	Label visible in bench photo. Nominal stored energy is 640 Wh (12.8 V × 50 Ah), not guaranteed usable energy.
USB-C output	Connects a compatible device through the regulated USB module. Use a cable and device compatible with the outlet's voltage and power rating.

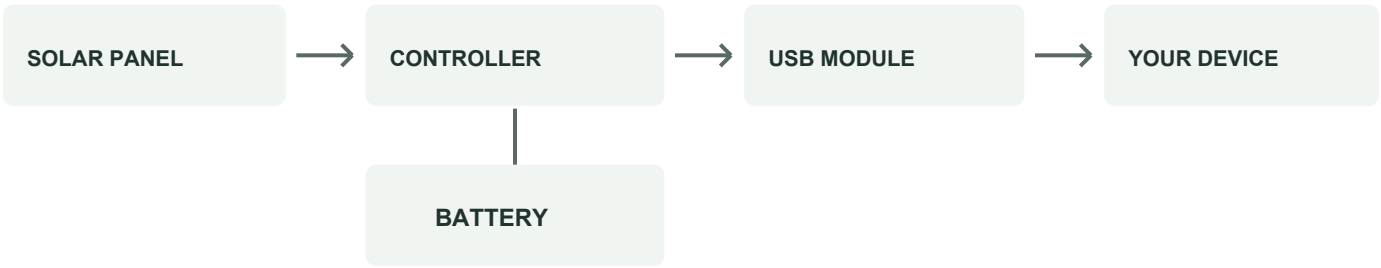


Figure 2. Functional power path. The battery stores energy and supplies the controller/load path when sunlight is insufficient.

Power expectations
The device is designed to supply up to 15 W continuously. Runtime depends on sunlight, charge level, conversion losses, temperature, and load. Nominal battery energy does not guarantee a particular operating time.

Read before you begin

WARNING — Low voltage still requires care
This is a low-voltage DC system with a nominal 12.8 V battery, not a household mains supply. Shock risk is lower than with mains power, but exposed contacts must still be avoided. A battery short circuit can produce high current, burns, arcing, or fire. The battery stores energy at night, and the panel generates electricity in light.

Hazard	How to reduce the risk
Short circuit, arcing, or burns	Remove metal jewelry and use insulated tools. Never bridge terminals, reverse polarity, bypass protection, or connect a load directly to the battery. Do not separate solar connectors while current is flowing.
Falling panel or enclosure	Use two people or suitable lifting support. Hold each assembly until its own mounting hardware is secure. Keep people clear below it. Do not lift by cables, the lid, or panel glass.
Sharp edges and pinch points	Wear work gloves for brackets. Keep fingers clear between the pole and bands, at frame joints, and along the enclosure hinge. Control the door in wind.
Heat, moisture, and corrosion	Keep the enclosure closed and cable entries sealed. Do not install in standing water or service in rain. Keep vents clear. Follow the battery manufacturer’s charging temperature limits.
Fire or damaged battery	If smoke, hissing, swelling, strong odor, or rapid heating occurs, move away, keep others clear, and contact emergency services. Do not approach to disconnect or move a distressed battery.

Personal protective equipment

Wear safety glasses and closed-toe footwear. Use work gloves when handling metal brackets, and suitable access equipment and site-required head protection for elevated work. Remove rings and watches before handling battery leads. Ordinary work gloves do not provide electrical protection.

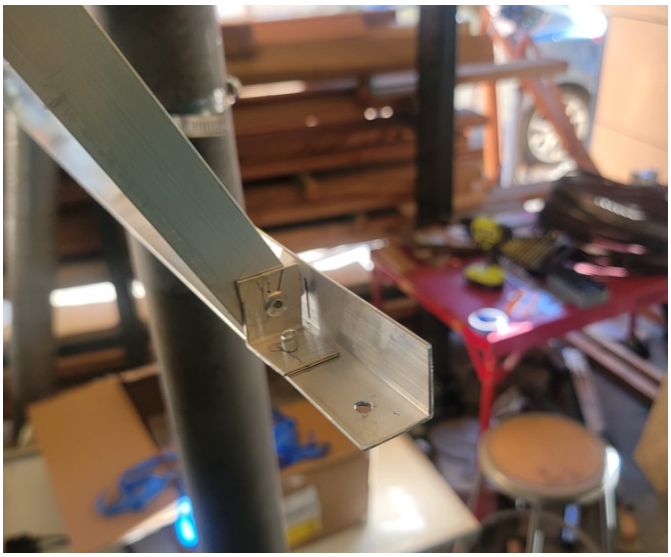
Know the connection order

Start: battery leads first → wait at least 10 seconds → solar plugs.
Stop: unplug the USB device → stop solar charging and disconnect PV → disconnect the battery. Follow the complete procedure in Section 6; unplugging a USB device does not switch off the station.

Mount the two assemblies

Before lifting: use a stable, suitable pole with a **4–6 inch diameter**, the supplied mounting bands, a Phillips screwdriver or Phillips drill/driver, and a helper or lifting support. Work in calm, dry conditions. Leave the battery leads and solar plugs disconnected.





Figures 3–4. Left: the enclosure's two hose clamps wrap around the pole through the rear brackets. Right: the panel support and pole attachment.

1. **Choose the position.** Use a site with clear sunlight, safe enclosure access, and clearance below the panel. In the Northern Hemisphere, face the panel toward **true south year-round**; its compass direction does not need to change with the seasons. Keep the supplied tilt angle and avoid shade, especially when the winter sun is low. Check that the pole and foundation can carry the assemblies and local wind loading.

2. **Attach the enclosure first.** Support the box at the chosen height. Seat both rear brackets against the pole, then wrap and engage both bands. Keep cables clear. Use the Phillips tool to snug the clamps; finish firmly by hand. If using a drill/driver, use a low clutch setting and finish with a screwdriver. Do not overtighten or use impact mode.

3. **Attach the panel assembly.** With a helper supporting the frame, position its bracket above the box and secure its supplied mounting band to the pole. Tighten firmly by hand. Keep supporting the assembly until it is secure.

4. **Check before connecting.** Make sure neither assembly slips or rotates under a gentle hand check, the door opens freely, and cables have slack and are clear of sharp edges and the clamps. A hand check does not establish a wind-load rating.

Connect the battery first

The controller and output module are already wired. Initial setup requires attaching the supplied ring-terminal battery leads and then plugging in the solar leads. Use insulated tools and work on one battery terminal at a time.





Figures 5–6. Left: battery posts without station leads. Right: ring-terminal leads attached in the bench photo. Use the + and − markings on the battery to identify polarity.

1. **Prepare the station.** Mount both assemblies securely. Leave the solar plugs disconnected and protect their ends from contact, dirt, and moisture. Unplug USB devices. Check that the battery is secured and that the leads, ring terminals, and terminal hardware are undamaged.

2. **Identify the leads.** Match the positive lead to the battery's **+** post and the negative lead to the **−** post. The photographed leads are red (+) and black (−), but confirm the markings instead of relying on color alone.

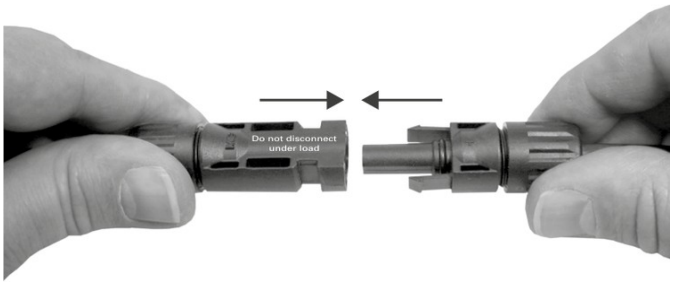
3. **Attach positive first.** Remove the positive terminal bolt, place the positive ring terminal flat against its contact surface, and refit the supplied terminal hardware in the battery manufacturer's specified order. Tighten the terminal bolt firmly by hand with an insulated hand tool; do not use a drill. Cover the positive connection.

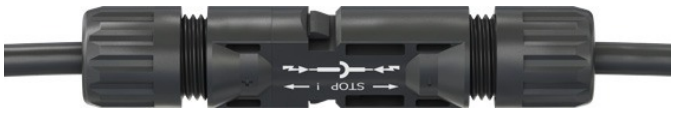
4. **Attach negative second.** Repeat for the negative lead and − post. Keep the tool clear of the opposite terminal and metal enclosure. Check that both lugs are secure and cannot rotate, then restore terminal covers.

5. **Allow the controller to start.** Wait at least **10 seconds**. Check in VictronConnect that the controller recognizes the 12 V system and reports no error. See **Section 5 / Operation** for pairing and monitoring instructions. Leave the supplied battery settings unchanged. Continue with the solar connection on the next page.

Plug in the panel and start

The panel connects to the controller's **PV input** through the supplied solar leads. Join the matching plugs on those leads; the owner does not need to open the controller's screw terminals.





Figures 7–8. Example locking solar connectors: separated (left) and fully engaged (right). Images: Stäubli MC4 instructions, MA231. Use the supplied matching pair; connector shape alone does not identify polarity.



Identify the controller connections
BATT + / −: battery leads
PV + / −: solar-panel leads
LOAD + / −: output module

Figure 9. Bench photo, cropped for identification. Terminal wiring stays in place during owner setup.

1. **Check the battery connection.** Complete the battery procedure first. Leave the USB load disconnected. Keep the panel fully covered with an opaque cover while joining the solar plugs; do not touch the contacts.

2. **Match and seat both solar plugs.** Follow the supplied lead labels: panel positive to the controller's PV-positive lead, and panel negative to its PV-negative lead. Never join the panel's two leads to each other. Check that the plugs are clean and dry, then push each matching pair together until it locks. Gently check engagement by the connector bodies; do not pull on the wires.

3. **Start solar charging.** Remove the panel cover. In sunlight, check VictronConnect for solar input and a normal charging state. A full battery may draw little charging current. Stop if an error, unusual heat, or odor appears.

4. **Finish the setup.** Support the cables, keep them clear of the door and sharp edges, and close and latch the enclosure. Connect a compatible device using Section 5. For disconnection, follow Section 6: solar first, battery second.

Use the station day to day

1. **Look over the station.** Check for a loose mount, cracked panel, damaged cable, open door, water, or unusual odor. If anything is abnormal, keep the load disconnected and use the troubleshooting guide.
2. **Connect a compatible device.** Check the device's voltage and power requirements against the output label. **The station is designed to supply up to 15 W continuously.** Insert the supplied or approved cable fully into the USB-C output and the device. Do not force a connector or attach an inverter, bare-wire adapter, or unapproved splitter.
3. **Confirm the device operates.** Check its power/charging indicator. Keep the cable supported and away from pinch points, the ground, and standing water. Close the enclosure and any unused port covers.
4. **Monitor the station.** Use VictronConnect to connect wirelessly to the SmartSolar charge controller. Follow the pairing instructions supplied on the controller. Check charging state, solar input, battery voltage, and load current reported by the controller.
5. **Let charging run automatically.** Leave the solar connection in place during normal use. Sunlight supports the load and battery charging; the battery supplies the load when sunlight is insufficient. Reduce unnecessary loads during extended cloudy weather.
6. **Finish using the device.** Shut down the device normally, then unplug its USB cable by the connector body. The station may remain charging; this is not a full electrical shutdown.

Read the controller status

With Bluetooth enabled, open VictronConnect near the station and select its SmartSolar 75/15. The Status and History views show charging information and errors. Load current is the controller's measured output, not necessarily the USB device's exact power draw. Do not change charging or load-protection settings during normal use.

Indicator / observation	Meaning and user action
Bulk / blue	Main charging stage. A brief blue blink can indicate insufficient solar power to begin charging.
Absorption / yellow	A later charging stage. Allow the configured cycle to continue.
Float / green	Maintenance stage after the charge cycle; not a precise battery-capacity gauge.
Unexpected flashing or error	Check the app's error code and the SmartSolar manual. Do not repeatedly reset the station.

Stop safely

WARNING — Load off is not power off
The controller has no built-in master on/off switch. Battery and solar circuits can remain energized after the USB device is unplugged. Do not separate solar plugs while current is flowing, and never bridge the battery terminals.

Normal pause in use

Shut down and unplug the connected device. Close the port cover and enclosure. Leave the station charging if it remains in a safe installation; there is no need to disconnect the panel every evening.

Full shutdown for servicing or removal

1. **Stop the load.** Shut down the connected device and unplug it from the USB output.
2. **Disconnect solar first.** Fully cover the panel with an opaque cover and confirm that solar charging current has stopped before unplugging. If you cannot confirm this, leave the plugs connected and have a competent installer check them. Disconnect both solar plug pairs at the panel, holding the connector bodies rather than the wires. Treat panel contacts as live whenever light reaches the panel.
3. **Disconnect the battery second.** With solar disconnected, use an insulated hand tool to remove the **negative (−) lead first**, then the **positive (+) lead**. Keep each loose lug insulated and away from the other post and enclosure. Cover both battery posts; they still contain stored energy.
4. **Before internal work, verify.** A person competent in low-voltage DC service should verify the intended work points with a suitable meter. Dark indicator lights do not prove that wiring is safe to touch.
5. **For removal, support each assembly.** After electrical disconnection and cable removal, support and remove the panel first, then the enclosure. Keep hands clear of band ends and pinch points.

Storage and restarting

Store the disconnected assemblies dry and protected from impacts, with battery terminals covered. Follow the battery manufacturer’s storage charge, temperature, and inspection instructions. Do not leave a depleted battery unattended in long-term storage.

Before restarting, inspect mounts, cables, seals, and battery condition. Reconnect the battery before PV using Section 4. Do not restart after water ingress, a battery abnormality, or a recurring fault until the cause has been corrected.

Find the symptom, then act

Begin with external observations and the controller’s error message. If safe checks do not solve the issue, stop and contact a qualified service person. Do not open the battery or bypass a protective device.

What you notice	Safe check or action	When to stop
USB device will not power on	Check the device’s power requirement, output port, and cable seating. Try one known-good compatible cable/device. Check for a controller load-off or low-battery indication.	No output with a known-good device, damage, or repeated shutdown.
No solar charging	At night or in shade, low input is expected. In daylight, look for shading or dirt and read controller status. A full battery may need little charging.	Clear sun plus persistent zero input or an error. Have an installer check wiring and protection.
Device switches off overnight	The battery may be depleted or a protection limit reached. Remove unnecessary loads and allow normal solar recharge.	Do not bypass low-voltage protection or repeatedly force the output back on.
USB connection feels hot	Stop the device and disconnect only if safe to do so. Inspect externally for damage or poor seating.	Melting, odor, discoloration, arcing, or recurring heating.
Moisture inside the enclosure	Stop use. Keep clear of exposed electrical parts. Arrange safe shutdown and inspection.	Do not restart merely because visible water has dried.
Mount slips, rattles, or bends	Keep people out of the area below it. Arrange support before any fastener is loosened or adjusted.	Do not climb the pole, tighten an unsupported assembly, or continue operation.
Controller error or unusual LEDs	Read the error code and use the SmartSolar manual to identify the fault.	A persistent or recurring fault needs diagnosis before restarting.
Smoke, hissing, swelling, or rapid heating	Move away, keep others clear, and contact emergency services.	Do not approach to disconnect wiring or move the battery.

Keep it ready for use

Inspect more often after severe weather or in dusty or corrosive conditions. Internal work requires the shutdown and verification procedure in Section 6.

When	Task
Before use / after a storm	Look for movement, loose bands, damaged glass, fallen objects, damaged cables, and water entry. Keep clear of an unstable mount.
Monthly	Inspect accessible mounts, corrosion, door gasket, cable glands, port covers, and external cable supports. Check that the door closes evenly and vents are clear.
When the panel is dirty	From safe ground-level access, use a soft cloth and the panel maker’s cleaning method. Avoid abrasive tools and pressure washing. Never climb or lean on the panel.
At service / before redeployment	Have an installer check fasteners, internal terminal condition, circuit protection, battery condition, and controller settings against the component instructions.

Replace a damaged USB cable

Shut down the device and unplug both ends by the connector bodies. Fit an undamaged cable with the required connector and power rating. Check normal operation, then restore cable support and port protection.

Repairs that require a service person

Mounting hardware: fully support the panel or box before replacing a band, bolt, or brace. Use the same approved part and tightening specification. Inspect the pole and bracket for damage before returning to use.

Battery, controller, output module, or internal lead: shut down and verify first. Replace only with a matching component, preserve polarity and circuit protection, restore strain relief and seals, and repeat startup checks. Never repair inside the battery pack or bypass protection to stop repeated shutdowns.

Identify a replacement correctly

Match the installed component’s label, dimensions, connections, and electrical rating before ordering. Similar-looking parts may have different limits. Internal electrical components should be replaced by a qualified service person.

Part	Qty.	Identification / compatibility
Charge controller	1	Victron SmartSolar MPPT 75/15. Preserve the installed battery and load-protection settings.
Battery	1	12.8 V, 50 Ah LiFePO4. Match terminal orientation, dimensions, protection, and charging requirements.
Solar panel	1	Nominal 200 W. Match the installed panel’s voltage/current limits, dimensions, mounting holes, and connector type.
USB-C module / cable	1 set	Match the output profile, connector type, cable rating, and mounting arrangement. A module’s advertised maximum wattage is not the station’s continuous output rating.
Pole mounting fixtures	As fitted	Two enclosure band mounts and the panel-frame mount. Match the supplied brackets and 4–6 inch pole application.
Frame bolts, nuts, washers	As fitted	1/4-20 × 1 in stainless hex bolts, 1/4-20 nylon lock nuts, and 1/4 × 1-1/4 in fender washers where fitted. Match each actual joint before replacement.
Enclosure seals / cable glands	As fitted	Match the enclosure profile and cable diameter so the door and cable entries remain sealed.

Manufacturer instructions

Victron SmartSolar 75/15 manual — connection order, monitoring, and error codes.
Kepworth — request instructions for the exact installed battery model.
Keep the battery, panel, and connector instructions with this manual.