Additional Documentation

The following describes where additional information and manuals can be accessed. For further information, datasheets and the most up-to-date certifications for various products in different countries, please visit the SolarEdge web site: www.solaredge.com.

The following additional manuals can be found on the site:

- SolarEdge Monitoring Portal User Guide
- SolarEdge Configuration Tool Software Guide

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Handling and Safety Instructions

THESE ARE IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS!

During installation, testing and inspection, adherence to the following handling and safety instructions is mandatory.

Safety Symbols

The following safety symbols are used throughout this document. Familiarize yourself with the symbols and their meaning before installing or operating this equipment.

**WARNING!**

Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in *injury or loss of life*. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

Indique un danger. Attire l'attention sur une procédure qui, si elle n'est pas correctement exécutée ou suivie, peut entraîner des *blessures ou la mort*. Ne pas franchir d'étape accompagnée d'une note d'avertissement avant d'avoir entièrement compris et rempli les conditions indiquées.

**CAUTION:**

Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in *damage or destruction of the equipment*. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Indique un danger. Attire l'attention sur une procédure qui, si elle n'est pas correctement exécutée ou suivie, peut *endommager ou détruire l'appareil*. Ne pas franchir d'étape accompagnée d'une note de précaution avant d'avoir entièrement compris et rempli les conditions indiquées.

**NOTE:**

Denotes additional information about the current subject.

**IMPORTANT SAFETY FEATURE:**

Denotes information about safety issues.
Instructions

**WARNING!**
PV modules pass direct current (DC) when the module is under load. Direct current will arc across gaps and may cause injury or death if improper connection or disconnection is made. Do not connect or disconnect wires to the Combiner Box when current from the modules or an external source is present.

---

Les modules PV en fonctionnement génèrent du courant continu (CC). Ce courant peut engendrer des arcs électriques et entraîner des blessures ou la mort en cas de branchement ou débranchement incorrect. En présence de courant provenant du module ou d’une source externe, ne branchez ni débranchez de câble sur la Combiner Box.

**WARNING!**
Voltage is present in open circuit conditions. Photovoltaic modules create voltage anytime light is present.

---

Tension présente lorsque le circuit est ouvert. Les modules photovoltaïques exposés à lumière engendrent une tension.

**WARNING!**
These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

---

Ces instructions de service sont pour une utilisation par du personnel qualifié. Pour réduire le risque de choc électrique, ne pas effectuer d'entretien autre que celui spécifié dans les instructions d'exploitation sauf si vous êtes qualifiés pour le faire.

**CAUTION:**
This equipment cannot be used as the main PV disconnect device. An additional manually operated disconnect switch is required.

---

Cet équipement ne doit pas servir d’appareil de déconnexion PV principal. Il faut mettre en place un sectionneur manuel supplémentaire.

**CAUTION:**
For continued protection against risk of fire, replace fuses with only 600VDC-rated, max. 8A fast-blow midget fuses.

---

Pour maintenir la protection contre les risques d’incendie, les fusibles de remplacement doivent être de type rapide, 600 VCC et 8 A max.

**CAUTION:**
Installation, maintenance and servicing should only be performed by authorized personnel.

---

L’installation, la maintenance et la réparation ne doivent être faites que par un personnel agréé.
Handling and Safety Instructions

CAUTION:
Remove all metallic jewelry prior to installing this product to reduce the chance of accidental exposure to live circuits.

Avant d’installer ce produit, enlever tout bijou métallique pour éviter les risques de contact accidentel avec les circuits sous tension.

CAUTION:
Use insulated tools to reduce risk of electric shock.

Utilisez des outils isolés pour réduire le risque d’électrocution.

CAUTION:
Do not install or handle the Combiner Box if it is wet.

Ne pas manipuler ou installer une Combiner Box humide.

IMPORTANT SAFETY FEATURE:
Make connections in the Combiner Box prior to connecting modules. To work on the Combiner Box after the modules are connected, cover all modules in the PV array with an opaque cloth or material.

NOTE:
All U.S. installations must be performed in compliance with the National Electrical Code (NEC), ANSI/NFPA 70 and any applicable local codes.

NOTE:
All Canadian installations must conform to Canadian Electrical Code Part II and any applicable local codes.
Support and Contact Information

If you have technical problems concerning our products, please contact us:

North America: +1.877.360.5292
Germany: +49.89.45459730
France: 0800 917 410 (Free Local Number)
Israel: +972.73.2403118
Worldwide: +1.650.319.8843
Fax: +972.73.2403117
Email to: support@solaredge.com
          support@solaredge.us
          support@solaredge.de

Before contact, please gather the following information:

- Combiner Box type
- Serial number of the Combiner Box in question
- The error indicated on the LCD screen or on the SolarEdge Monitoring Portal
- System configuration information, including the type and number of modules connected and the number and length of strings
- The communication method to the SolarEdge server

The Support option on the top right of the SolarEdge Configuration Tool’s main window can be used to automatically collect all relevant information to be sent to SolarEdge Professional Services for support. The Configuration Tool can be downloaded from the SolarEdge website downloads section: http://www.solaredge.com/groups/support/downloads.

This option is described in detail in the SolarEdge Configuration Tool Software Guide also available from SolarEdge website downloads section.
Chapter 1
Introducing the SolarEdge Combiner Box

What is the SolarEdge Combiner Box?

The SolarEdge Combiner Box is a monitoring and disconnecting outdoor string combiner box designed for optimal operation and maximum safety. The Combiner Box enables you to enjoy a high level of system performance monitoring, while providing exceptional system safety. The Combiner Box is available in three sizes that can accommodate up to 16, 36 or 64 strings.

The Combiner Box contains built-in fuses that meet U.S. string fusing requirements. It offers the following features:

- Replaceable fuses per string input
- Web-based string performance monitoring (when the cabinet is connected to the Internet)
- Ground fault detection and automatic disconnection per string (optional)
- Automatic self-testing of ground fault isolation functionality
- Communication to a monitoring web server via an Ethernet or ZigBee wireless connection (optional)
- NEMA 4 outdoor installation (NEMA 4X optional)
- Excellent reliability with a five-year warranty (can be optionally extended to 10 years)
- Adjustable set-points
- Integrated LCD for onsite status and fault indication

The Combiner Box with Ground Fault Detection and Interruption (GFDI) also detects string leakage and disconnects faulty strings to ensure that other strings are not affected. To that end, it provides onsite and web indications, as well as email fault notification.

The Combiner Box’s detection and isolation components are continuously monitored, providing an alert if an internal circuit failure is detected, thus ensuring uninterrupted detection.

At any time, disconnecting the AC to the Combiner Box disconnects all the strings connected to it.
SolarEdge Monitoring Portal

The SolarEdge Monitoring Portal enables you to monitor the technical and financial performance of one or more SolarEdge Photovoltaic (PV) sites. It provides information about present and past performance of each string individually and about the system as a whole.

NOTE:

Transport and Storage

Transport

The Combiner Box should be transported in its original packaging, facing up, without exposing it to unnecessary shocks. The Combiner Boxes must never be stacked. If the original package is no longer available, a similar box can be used that can withstand the weight of the Combiner Box (440 lb / 200 kg for a 64-inputs unit), which has a handle system and can be completely closed.

Storage

Store the Combiner Box in a dry place where ambient temperatures are always between -4°F / -20°C and +140°F / 60°C.
Equipment List

**NOTE:**
Use appropriate hardware for mounting the cabinet, as indicated in the cabinet manufacturer’s installation manual. Use the hardware supplied with the cabinet for mounting it to the wall.

Standard tools can be used during the installation of the SolarEdge Combiner Box. The following tools are recommended:

- Flat-head screwdriver
- Electrical screwdriver (tester)
- Drilling machine and bits suitable for a wall or pole, where the Combiner Box is installed
- Provided screws for attaching the Combiner Box to a wall
- Wire cutters
- Wire strippers
- Voltmeter
- Clump-on DC current meter

For installing the communication option, you may also need the following:

- For Ethernet:
  - RJ45 connectors
  - CAT5 twisted-pair Ethernet cable
  - RJ45 crimping tool
Chapter 2

Quick Start Guide

**NOTE:**
Make sure that prior to the start-up procedure, all safety protocols have been implemented and the technician has read the SolarEdge Combiner Box Installation Guide. Ensure that the field wiring tests have been completed and documented.

**NOTE:**
This Quick Start guide summarizes the procedures required to complete the checklist described in Appendix C, Installation Checklist on page 71.

Preparations

1. Visually inspect all connections in the cabinet. Check that the A/C switch (located at the bottom of the cabinet) is in the OFF position. Verify that the plug connectors to the electronic boards (combi) are fully seated.

2. Check that all fuses are in the open position.

3. Check the factory connections to the 12VDC Power Supply Units (PSUs). Verify that the black wire connects to the (L) terminal and that the white wire connects to the (N) terminal of each PSU.

4. Using a Digital Volt Meter (DVM), check that the voltage at the base of the A/C switch is between 90 - 240 VAC.

5. Turn on the A/C switch.

6. Check the communication board display by pressing the LCD light button once to turn on the backlight. The following message is displayed: OK, Combi DSPs <#>. For more information, refer to the Combiner Box LCD Panel and User Buttons section on page 44.

7. Use one of the following options to configure the Combiner Box:
   - **Configure the Combiner Box Using the LCD Panel and User Buttons**, page 44
   - **Configure the Combiner Box Using the SolarEdge Configuration Tool**, page 49

For simplicity, the procedures that follow in this chapter use a combination of the two options.
Communication Setup

The following procedure describes the general steps to be performed to configure Combiner Box communication.

**NOTE:** This section is only required when deploying multiple cabinets and when using the SolarEdge Monitoring Portal.

1. Inter-communication between the multiple Combiner Boxes is achieved using an RS485 connection (see Figure 18 on page 37). You may also refer to Figure 16 on page 35 and Figure 19 on page 38 for the RS485 connection pin assignment, located on plug P305 on the communication board. RS485 wiring must be completed before continuing with this procedure. In some communication boards, only 120Ω, ½-watt terminating resistors need to be added on the end cabinets of the RS485 communications link. For more details, refer to the RS485 Bus Terminations section on page 36. All connections are made with the cabinet A/C power off.

2. Using the LCD panel and user buttons, as shown in Figure 22 on page 45, use the three right-most LCD user buttons inside the Combiner Box (the UP-1, Down-2 and Enter-3 buttons) to type in the following default password: 12312312. This opens the sub-menu shown in Figure 23 on page 46. Use the down button to move the asterisk (*) to the Communication menu (described on page 48), and then press the Enter button. This enables you to define and configure the communication of the Combiner Box.

3. Under the Communication menu, set the preferred Server connection (optional when using the SolarEdge Monitoring Portal).

4. Perform the following to configure Combiner Box RS485 communication:
   - In the Master cabinet (the one that is physically connected to the Internet), under the Communication submenu, move the asterisk (*) by using the down button to RS485 Conf, and then press the Enter button.
   - Select Master Set and press Enter.
   - Use the up button to select Yes.
   - Press Enter to confirm. This sets the cabinet as the master cabinet. The display turns off.
   - Press the LCD display button again to activate and re-enter the password.
   - Return to the Communication menu.
   - Select the RS485 Conf submenu. An additional menu item, Detect Slaves, is now available.
1. Select Detect Slaves and press Enter.
2. Use the up button to select Yes, and then press Enter. The cabinet now starts the slave detection process. The display returns the following message: # of Slaves detected. The numbered displayed in the message should match the number of slave cabinets in the system.

5. Check the OK Notice screen for the <S_OK> indication (see page 44). For installations with multiple cabinets, all cabinets should show the <S_OK> indication.

6. From the master cabinet, reconnect the Configuration Tool. A list of all the Combiner Boxes detected in the system now shown, including a list of serial numbers. Select the Settings tab (see Figure 29 on page 57). Confirm that all the connecting lines are green. If the server connection is red, you must perform a ping test. Follow the prompts and enter the address on the screen.

**Cabinet Configuration and Calibration**

1. Connect a computer or laptop that has the latest SolarEdge Combiner Box Configuration Tool application to the Combiner Box using a USB cable (see Figure 19 on page 38.)

2. Start the Configuration Tool application. Select the COM port in use and click the Connect button (see Figure 25 on page 51). The program launches and displays the main window (see Figure 26 on page 52).

3. Look at the Cabinet List on the left side and confirm that the cabinet ID matches the serial number of the cabinet (see Figure 2 on page 19).

4. Select the Tools tab and then select the Miscellaneous tab (see Figure 39 on page 64) to set the Real Time Clock. Click the Set RTC button to set the computer clock. The GMT offset is automatically set by the server when connected. This step is required when the cabinet is not connected to the monitoring server, in order to confirm the date and time when performing the RCD calibration test. In this window, set the GMT offset for the time zone.
5 Select the **Cabinet Tests** tab and then the **Installation Test** tab to open the window shown in Figure 32 on page 60. Click **Change Existing Setup** under **Cabinet setup** to open the window shown in Figure 33 on page 60, and then select the preferred layout and click **Apply**.

The **Cabinet Setup** window shown in Figure 34 on page 61 opens. Click **Set Default** to activate all the strings for the cabinet. Check the checkboxes in the **On** column for the number of strings in the cabinet. Click the **Apply** button to configure the cabinet. The **Installation Test** window re-opens.

6 Click the **Begin Test** button in the **RCD Calibration** window to begin the RCD calibration process. The default option for the combi board is **All**. Ensure that the cabinet door is closed as much as possible, while making sure to protect the USB cord.

**NOTE:** During the RCD calibration process, you will hear a clicking sound of the relays. The display shows a status window for the calibration process. Depending on the number of strings, the RCD calibration process may take between 5 - 15 minutes.

7 After the RCD calibration is complete, perform the RCD test (see Figure 35 on page 62). In the RCD test window, select **All** and click the **Start** button. The program performs the test. When complete, the results are displayed.

8 Select the **Wiring Test** tab. This action opens the window shown in Figure 37 on page 63). Before conducting this test, you must close all the fuses for the active strings, as well as disconnect the output of the cabinet under test towards the inverter and towards other cabinets.

**NOTE:** It is good practice to verify that the **String Status** for all active strings is open before performing the test. In the **Wiring Test** window, click the **Begin Test** button for the application to verify the polarity and the voltage of each active string in the cabinet. The display shows a condition chart of possible problems.

9 The cabinet is ready to connect all the strings. If there are more cabinets that use the same inverter, perform this cabinet configuration process for each of them.
String Activation and Final Checkup

1. Activate the strings of all the cabinets. This can be performed from the master cabinet using the Configuration Tool. After activation, check the fused (DC+) to unfused (DC-) terminals for PV voltage, as well as from the Ground terminal to fused (DC+) terminal. Typically, voltage is approximately 500 VDC, but it can vary from system to system.

2. Verify the DC voltage at the DC disconnects for each pole to the Ground. Verify that all disconnects are turned OFF. Turn the DC disconnect switch ON and then turn on the inverters.

3. Using the Configuration Tool, from the master cabinet, verify that all cabinets are producing power by viewing the String Status. Check that all strings are active.

The SolarEdge cabinet is now configured and online.
Blank page left intentionally
Chapter 3

Installing the Combiner Box

NOTE:
You may refer to Appendix C, Installation Checklist on page 71 for an installation checklist that can be used to verify that all required steps of the installation process have been performed.

Identifying the Combiner Box

Read the sticker on the right side of the Combiner Box that specifies its Serial # and its Electrical Ratings, including its Max Output Power.

The Combiner Box serial number is also indicated on the enclosed warranty card. Please provide the serial number when contacting the SolarEdge support line. The serial number is also required when creating a new site in the SolarEdge Monitoring Portal.
Inspection and Unpacking

All Combiner Boxes are checked before shipping and packaged in sturdy boxes. Carefully inspect the shipping box and its contents prior to installation. If you detect any damage or missing parts after unpacking, contact SolarEdge immediately to report it.

SolarEdge products are shipped with impact indicator stickers that indicate rough handling. The sticker turns red upon impact. It has 25G sensitivity for detecting a drop of four to eight inches. An example of the sticker is shown below:

![Impact Sticker](image.png)

Figure 3: Impact Sticker

Package contents include the following components:

- Detachable back panel with electronics board (combi)
- Mounting kit from enclosure manufacturer
- Instruction manual from the cabinet manufacturer
- Humidity vent
- Binding screw for the connection of a field-installed equipment-grounding conductor
Selecting the Mounting Location

Conditions for Installation

- **NOTE:** Follow the cabinet manufacturer’s mounting instructions (provided) for proper mounting.

- **NOTE:** Failure to adhere to the following guidelines bears warranty consequences. Consult with SolarEdge before diverting from any of these guidelines.

The mounting location must be suitable for the weight and dimensions of the Combiner Box’s cabinet. Ensure that the following conditions are met when selecting a mounting location:

- Mount the Combiner Box on a solid surface.
- The Combiner Box can be mounting either vertically or horizontally on its back.
- The mounting location must be accessible at all times, and should be within connection distance of the PV installation.
- Do not install the Combiner Box with a forward tilt.
- Do not install the Combiner Box on its side.
- Do not mount the Combiner Box too close to the ground. Leave at least 4” (10cm) spacing.
- Do not expose the Combiner Box to direct sunlight in order to avoid excessive temperatures.
- Do not install at humidity > 80%. Keep the back panel, electronics and cabinet interior dry at all times.

Clearance

The Combiner Box’s heat dissipation solution requires the following clearance areas between the cabinet and all types of obstructions, such as wires and walls:

- 8” (20 cm) from the top and bottom of the cabinet.
- 4” (10 cm) from the right and left of the cabinet.
- For safety reasons, in order to open the door, there must be a minimum of three feet of clear space in front of the cabinet.
Determining Drill Holes and Conduit Placement

Before the cabinet can be mounted, you must determine the proper location for the input/output holes in the cabinet that accommodate the wiring going into and coming out of the cabinet. In addition to the mounting holes, holes for the following must also be drilled prior to mounting the cabinet:

- AC input
- DC inputs (from the strings)
- DC outputs (to the inverter)
- Communications inputs: RS485, Ethernet or ZigBee (optional)

The holes for the communication connections and their conduits must be separate from the power line conduits, in order not to have both low voltage and high voltage in close proximity. The separation must be retained even within the cabinet.

**WARNING**

Wiring methods must be in accordance with NEC/NFPA 70 in the US, and with the Canadian Electrical Code, Part 1 in Canada.

Ensure that each input is at least 1/4” (6.35 mm) from any other conductor at the enclosure entry points. This includes array input lines and input/output(s) and any conductor to the communication wiring.

All holes must be of sufficient size to accommodate the conduits and number of cables to be inserted through them.

For details about the recommended locations for input/output cables and conduits, see step 8 on page 25.
Mounting the Combiner Box

The Combiner Box cabinet comes preassembled, with its electronics board secured inside the cabinet. Before you can hang the cabinet, you must first disassemble the unit and remove the electronics.

► To mount the Combiner Box:

1. Unpack the shipping box and remove the Combiner Box components.
2. Locate the wall or pole on which the Combiner Box is to be mounted. Make sure that this location can support the weight of the unit, and that all location considerations are met, as described in the Conditions for Installation section on page 21.
3. Lay down the cabinet on a flat, stable surface.
4. Open the hinged door on the cabinet using its handle.
5. Unscrew the eight 9/16 nuts (shown below) that connect the back panel to the cabinet.

![Figure 4: Screws Attaching the Back Panel to the Cabinet]
6 Lift out the back panel that contains the electronics board from inside the cabinet and remove the protective foam. To protect it while mounting the cabinet, store the back panel in the shipping box, as shown below:

![Figure 5: Storing the Back Panel in the Shipping Box](image)

**IMPORTANT SAFETY FEATURE:**
Do not place the electronics board on the ground. Close the box to keep the electronics protected while handling the cabinet.

7 Before mounting, and after having removed the back panel, drill through the cabinet to make the required mounting holes in it. Position the drill holes as specified by the cabinet manufacturer. You may refer to the cabinet’s instruction manual for details.

**IMPORTANT SAFETY FEATURE:**
Do not start drilling before removing the back panel containing the electronics board from the cabinet.
Drill holes in the cabinet to accommodate the cable conduits to be inserted into the cabinet and the humidity vent. The locations for these conduits are shown below:

**IMPORTANT SAFETY FEATURE:**

Do not start drilling before removing the back panel containing the electronics board from the cabinet.

- **AC:** AC input conduits may be placed anywhere except in the areas marked with an X (red) in the figure below:

![Figure 6: AC Inputs Conduit Placement Exclusion Zones](image)

<table>
<thead>
<tr>
<th>Exclusion Zone</th>
<th>16-string Box</th>
<th>36-string Box</th>
<th>64-string Box</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Side Dimensions</strong> (D x H)</td>
<td>8 x 36/20 x 45</td>
<td>12 x 42/30 x 53</td>
<td>12 x 30/30 x 76</td>
<td>in/cm</td>
</tr>
<tr>
<td><strong>Bottom Dimensions</strong> (D x L)</td>
<td>8 x 8/20 x 20</td>
<td>12 x 12/30 x 30</td>
<td>12 x 12/30 x 30</td>
<td>in/cm</td>
</tr>
</tbody>
</table>
• **DC Inputs**: DC input conduits may be placed anywhere except in the areas marked with an X (red) in the figure below:

![Figure 7: DC Inputs Exclusion Zones](image)

<table>
<thead>
<tr>
<th>Exclusion Zone</th>
<th>16-string Box</th>
<th>36-string Box</th>
<th>64-string Box</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D x H)</td>
<td>8 x 36/20 x 45</td>
<td>12 x 42/30 x 53</td>
<td>12 x 30/30 x 76</td>
<td>cm/cm</td>
</tr>
<tr>
<td>Bottom Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D x L)</td>
<td>8 x 20/20 x 50</td>
<td>12 x 20/30 x 50</td>
<td>12 x 20/30 x 50</td>
<td>cm/cm</td>
</tr>
</tbody>
</table>
- **DC Outputs**: The recommended locations for the DC output conduits are indicated by the boxes (green) in the figure below. The placement option shown in the figure on the left is only recommended for conduits smaller than 500 kcmil (¾") diameter.

![Figure 8: DC Output Conduits Placement](image)

<table>
<thead>
<tr>
<th>Allowed Zone</th>
<th>16-string Box</th>
<th>36-string Box</th>
<th>64-string Box</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Dimensions</td>
<td>8 x 8/20 x 20</td>
<td>12 x 12/30 x 30</td>
<td>12 x 12/30 x 30</td>
<td>in/cm</td>
</tr>
<tr>
<td>(D x H)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom Dimensions</td>
<td>8 x 8/20 x 20</td>
<td>12 x 12/30 x 30</td>
<td>12 x 12/30 x 30</td>
<td>in/cm</td>
</tr>
</tbody>
</table>
• **Server Communication Connector (Ethernet)** is required when connecting to the SolarEdge Monitoring Portal. **Inter Cabinet Connectors (RS485)** are required when connecting more than one Combiner Box in a daisy-chain connection. Unless an insulated conduit is used, NEC Class 1 wiring methods are to be used for field wiring connections to terminals of the communication connectors (which are a Class 2 circuit). Communication conduits may be placed anywhere except in the areas marked with an X (red) in the figure below:

![Figure 9: Communications Conduits Placement Exclusion Zones]

<table>
<thead>
<tr>
<th>Exclusion Zone</th>
<th>16-string Box</th>
<th>36-string Box</th>
<th>64-string Box</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D x H)</td>
<td>8 x 36/20 x 45</td>
<td>12 x 42/30 x 53</td>
<td>12 x 30/30 x 76</td>
<td>in/cm</td>
</tr>
<tr>
<td>Bottom Dimensions</td>
<td>8 x 8/20 x 20</td>
<td>12 x 12/30 x 30</td>
<td>12 x 12/30 x 30</td>
<td>in/cm</td>
</tr>
</tbody>
</table>

**NOTE:**

If you intend to use wireless communication between cabinets (ZigBee), make sure to drill an appropriate hole for the antenna as well. Please refer to the ZigBee manuals for more information.

- **Humidity Vent**: The humidity vent allows accumulated water to drain out from the lower side of the enclosure. Install the humidity vent in accordance with its installation instructions (provided) at the lower side of the cabinet (bottom side if the cabinet is installed vertically or below the back panel if the cabinet is installed lying down). Be sure to allow adequate internal space for the closing nut, and ensure that there is no interference with the other cables’ conduits.
9 Mount the cabinet on the wall or pole, as described in the cabinet’s instruction manual.

10 Insert all cable conduits into their proper positions within the cabinet. Use of 4, 4X, 6 or 6P rating-compatible conduit fittings is required to maintain the Type 4 rating of the enclosure (use 4X rating-compatible conduit fittings for the 4X cabinet). Make sure that conduits do not protrude more than one-half inch into the cabinet, so as not to interfere with the workings of the unit. Seal with a similarly rated sealant.

**NOTE:**
If you decide not to use any of the mounting holes in the cabinet, then make sure to seal them using the manufacturer’s sealing washers.

11 Insert the back panel containing the electronics board into the cabinet and attach it using the provided screws. Refer to the table below for the tightening torque required for this connection and others. You can now connect the input and output cables to the Combiner Box, as described in the *Connecting the Combiner Box* section on page 30.

**NOTE:**
Return the back panel to the same cabinet for which it was shipped.

Figure 10: Attaching the Back Panel in the Cabinet
Connecting the Combiner Box

**NOTE:**

See the table above for cable gauge and tightening torque requirements.

► **To connect the Combiner Box:**

1. **Connect the AC Input.** This connection provides power to the Combiner Box itself, and connects to the Power Supply Units (PSUs).

   Insert the AC cable through the AC conduit into the cabinet, and connect the live wires to the AC switch. Connect the Ground wire to the Ground terminal block on the lower right side of the cabinet.

![AC Connection Side](image)

Figure 11: AC Switch (Center), Between the Two PSUs
2 Connect the Grounding Terminals. The grounding conductors of the conduits and AC should be bonded to the Grounding Bar located at the right side of the cabinet near the bottom (see below), which is marked with the grounding symbol 🌐.

![Grounding Bar](image)

Figure 12: Grounding Bar

**NOTE:** Some cabinets are installed using two PSUs and some with three PSUs.
3 Connect the DC Inputs. These are the DC inputs from the PV strings to the fuses. Each input consists of two wires: a plus (+) and a minus (-). The plus connects to the fuse holder for the input and the minus connects to the terminal block.

Each input is labeled and numbered. The number of inputs varies, depending on the specific Combiner Box model in use (16, 36 or 64 inputs). Unused DC inputs can remain unconnected.

Figure 13: DC Input Numbering (64-string Cabinet)
Connect the plus (+) wire for each DC input to its fuse holder by loosening the screw on the top of the fuse holder and then inserting the wire through the hole. Then, tighten the screw to hold the wire in place.

![Figure 14: DC Input Connectors and Fuse Holders](image)

**Figure 14: DC Input Connectors and Fuse Holders**

Connect the minus (-) wire for each DC input to the terminal block using a screwdriver to open the spring-cage connection. Repeat for each DC input. Be sure to connect the + and - wires of a string to the same numeric input.

**NOTE:** Connecting the input wires does not require soldering. Simply insert the wires to the fuse holder and terminal block and fasten using a screwdriver. 0.4” (10 mm) stripping of the wire is required for a solid contact with the terminal block.

4 **Connect the DC Output.** The Combiner Box has a two DC output cables sized at up to 500 kcmil, which connect to the inverter. Each DC output conduit contains up to five wires, with two for plus (+), two for minus (-) and one for Ground.

**Disconnect the DC switch at the installation site** and insert the DC cables through the DC output conduit(s) into the cabinet. Connect the plus and minus cables to the terminal block. Connect the Ground wire to the Ground terminal block at the lower-right side of the cabinet.
5 Connect the Server Communication Connectors. Ethernet may be used to connect the Combiner Box to the SolarEdge Monitoring Portal. This connection is optional, and is only required when connecting to the SolarEdge Monitoring Portal. You may refer to Appendix E, Communication Options on page 77 for a description of how to set up these communication options to the SolarEdge Monitoring server.
When installing multiple Combiner Boxes, inter-cabinet communication connection is required. This is achieved via the RS485 connection that is accessible through the terminal block connection on the electronics board (see the terminal marked Inter RS-485 on Figure 19 on page 38). The connector is marked P305 on the printed circuit board. The required cable gauge should be between 16-26 AWG.

Use the following pin assignment:
- Pin 1 – A
- Pin 2 – B
- Pin 5 – GND

Figure 16: RS485 Connection Pin Assignment

You may refer to Appendix E, Communication Options on page 77 for a description of how to set up the RS485 inter-cabinet connection.
RS485 Bus Terminations

The two cabinets at the ends of the chain (meaning the first cabinet and the last cabinet) must be terminated. A SW7 dipswitch is used for RS485 termination. The dipswitch is located on the connection board below the communication board, as shown in Figure 17 on page 36. Move the lower switch to the left to add RS485 termination.

NOTE:
There are boards without an SW7 dipswitch. In this case, you must add an external 120 Ω, ½-watt terminating resistor between pins 1 and 2 of P305 on the end cabinets of the RS485 communications link. The resistors are added in parallel to the wire connection.

Figure 17: RS485 Termination Switch
The figure below shows how to connect multiple Combiner Boxes in a master-slave configuration using RS485 connection and its corresponding termination. In this configuration, only the master Combiner Box is connected to the Internet.

![Diagram of Combiner Box Connection](image)

*Figure 18: Multiple Combiner Boxes, RS485 Bus, Ethernet Server Connection*
The figure below shows the various communication interface connectors available on the electronics board:

Figure 19: Communication Interface Connectors on the Electronics Board

The communication board (top board with the LCD) may look different from the one illustrated in Figure 19 above. It has the same functionality.

Figure 20: Identifying the Communication Board
Completing the Combiner Box Installation

After completing all connections, you must configure the Combiner Box’s strings connection, monitoring and communication options. The Combiner Box may be configured according to the site’s requirements using its internal buttons or by using the SolarEdge Configuration Tool connected to a USB port. For more information, refer to the Configuring the Combiner Box Using the LCD Panel and User Buttons section on page 44.

Connecting to the SolarEdge Monitoring Portal is optional. Combiner Box Ethernet connection configuration is described in Appendix E, Communication Options on page 77.
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Chapter 4
Commissioning the Installation

Step 1, Inspecting the Combiner Box
Before First Use

WARNING!
For your personal safety, the steps described in this section must be completed before installing fuses.

Pour votre sécurité personnelle, les étapes décrites dans cette section doit être remplie avant d'installer les fusibles.

NOTE:
A multimeter is required in order verify the installation process. Check that the multimeter is capable of reading the maximum string voltage and maximum string current before proceeding.

► To inspect the Combiner Box:

NOTE:
You may want to check and verify each string $V_{oc}$ and $I_{sc}$ against its specification before connecting it to the Combiner Box in order to ensure proper operation.

1 Final Inspection: Check the DC voltage from the combined positive output PDB (DC+) to the negative PDB (DC-). Ensure that the voltage has the correct polarity and is within the specified voltage range.

2 Double-check that all conduit penetrations are properly sealed against water and pest intrusion.

3 Close and secure the enclosure door.
Step 2, Connecting Fuses and Switching On the AC to the Combiner Box

➢ To connect the fuses:
1. Connect the fuses in the fuse holders, as shown in Figure 14 on page 33.
2. Switch on the AC to the Combiner Box using the AC switch, as shown in Figure 1 on page 10.

Step 3, Configuring the Combiner Box Using the LCD

After installation of the Combiner Box, a field technician can verify and perform basic configurations of the unit. Configuration of the Combiner Box during the commissioning process involves setting the strings, language, display and communications options for the Combiner Box using its LCD panel. To do so, you must perform the following steps in the To configure the Combiner Box procedure, which begins on page 45, using the LCD panel:

- **String Settings:** Step 7 on page 47
- **Language:** Step 8 on page 47
- **Display:** Step 9 on page 47
- **Communication:** Step 10 on page 48

You may refer to the Configuring the Combiner Box Using the LCD Panel and User Buttons section on page 44 for more details.

Alternatively, you may use the SolarEdge Configuration Tool to configure the Combiner Box, as described in the Configuring the Combiner Box Using the SolarEdge Configuration Tool section on page 49.

*Congratulations! Your SolarEdge Combiner Box is now operational.*
Chapter 5

Combiner Box User Interface

Combiner Box LCD Panel and LEDs

The Combiner Box has an LCD panel with three LEDs, as shown below:

Figure 21: Combiner Box – Front
The LCD panel has three LED indicators, as follows:

- **Initialization phase (Green):** Indicates whether the Combiner Box is in initialization phase or not, as follows:
  - **On:** Combiner Box in initialization phase.
  - **Fault (Red):** Indicates that an error has occurred. In addition, this LED blinks while the Combiner Box is being shut down.

All LEDs are on while the Combiner Box is being configured using the buttons inside the inverter.

**Combiner Box LCD Panel and User Buttons**

**Normal Operation**

Pressing the Combiner Box’s LCD light button located on its bottom turns on the LCD’s backlight and displays the messages on the LCD panel.

The default backlight display time is 30 seconds. The backlight display time is configurable, as described on page 47.

The following screens appear, one after the other, when you press the LCD light button:

- **OK Notice**
- **Main Combiner Box Status Window**, page 44

You can toggle between these windows by clicking the LCD light button.

**Combiner Box OK Notice Window**

- **S_OK:** Verify that S_OK appears on the panel to indicate a functioning connection to the SolarEdge Monitoring Server, which was validated during the last two minutes.

**Main Combiner Box Status Window**

- **Idc [a]:** Specifies the DC output current, in Amperes.
- **Vdc [v]:** Specifies the DC input voltage, in Volts.
- **Pdc [w]:** Specifies the DC output power, in Watts.
Configuring the Combiner Box Using the LCD Panel and User Buttons

After installation of the Combiner Box, a field technician can verify and perform basic configurations of the unit. This section describes the various LCD messages and possible configurations using the user buttons.

**NOTE:**
This process can also be performed using the SolarEdge Configuration Tool by connecting a PC or laptop to the Combiner Box via its USB management port. This tool is described in the *SolarEdge Configuration Tool User Guide*.

► To configure the Combiner Box:

1. Press the LCD Light button once to turn ON the backlight.
2. The following configuration procedures are performed with the Combiner Box cover open.
   Four buttons for controlling the LCD panel menus are then accessible, as shown below:

   ![Figure 22: LCD Panel Menu Buttons](image)

   - **Esc**: Goes to the beginning of the currently entered parameter or to the previous menu.
   - **Up (1)**: Goes up one option in a menu.
• **Down (2):** Goes down one option in a menu.
• **Enter (3):** Confirms the entry or selection of a parameter.

3 Press the **Enter** button for at least five seconds. The following message is displayed:

```
Please enter Password
*****
```

The Combiner Box is now in Setup mode and all its LEDs are lit. The Combiner Box automatically exits Setup mode if no buttons are pressed for more than two minutes.

4 Use the three right-most buttons inside the Combiner Box (the **UP-1, Down-2** and **Enter-3** buttons), shown above, to type in the following default password: **12312312**. The following message is displayed:

```
*1. Monitoring Status
  2. RCD Status
  3. Strings Set
  4. Language <en>
  5. Display
  6. Communication
  7. Info
  8. Factory Reset
  9. Error Log
```

**Figure 23: LCD Menu Options**

Each menu option is described below.

Use the **Up** and **Down** buttons inside the Combiner Box to move the asterisk (*) to the relevant menu option and then press the **Enter** button to select it.

Use the three right-most buttons to type in a number if required.

5 Select the **Monitoring Status** option to view the status of each string currently connected to the Combiner Box. This option displays the current voltage and power for each string in the following format: **String Number: Current [A], Voltage [V], Power [kW]**.

6 Select the **RCD Status** option to view details about whether a string is turned on and its Residual Current Device (RCD) setting. Information is displayed in the following format: **String Number: RCD xxA, Sw[x]**, where x displays X when disconnected, = when connected or ? when unknown.
7 Select the **Strings Set** option to connect and enable a string on the Combiner Box, as follows.

**NOTE:**
This step is mandatory in order to commission the Combiner Box.

The following is displayed:

```
Please Select String Channel:
1
```

- Enter the number of the string channel to be connected on the Combiner Box. The following is displayed:

```
Set state for string 1
Select: Enable
```

- Set the state of the string to **Enable**. A confirmation message is displayed.
- Enter **Yes** to confirm your settings. The following message is displayed, indicating that the state for the selected string is being enabled.

```
Setting State...
```

8 Select the **Language** option to select the language in which the LCD panel displays. The Combiner Box may arrive preconfigured to the local language.

**NOTE:**
This step is mandatory in order to commission the Combiner Box.

9 Select the **Display** option to display the following three options:

- **LCD On Time <30>:** Specifies the number of seconds that the LCD panel backlight is ON after the LCD light button is pressed. <30> represents the default value of 30 seconds. The setting range is 10 – 120 seconds.
- **TLM On Time <15>:** Specifies the number of minutes that the LCD panel backlight is ON while viewing the *Telemetry* window. The default value is 15 minutes. The setting range is 1 – 120 minutes.
• **SW Version:** Displays version information describing various firmware Combiner Box processors, as follows:

<table>
<thead>
<tr>
<th>ID</th>
<th>DSP 1 Ver:</th>
<th>DSP 2 Ver:</th>
<th>CPU Ver:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0 0 0 0 F</td>
<td>1. 88</td>
<td>0. 81</td>
<td>1. 4 7 2 7</td>
</tr>
</tbody>
</table>

- **ID:** Displays the Combiner Box ID, which should be the same as it appears on the Combiner Box sticker. You may refer to the *Identifying the Combiner Box* section on page 19 for a description of this sticker.
- The next three numbers represent the firmware versions of various processors.

**NOTE:** Please have these numbers ready when you contact SolarEdge support.

10 Select the **Communication** option to define and configure the communication option used by the Combiner Box to communicate with the SolarEdge Monitoring Server.

- **1. Server < LAN >**
- **2. LAN Conf**
- **3. RS 485 Conf**
- **4. ZigBee Conf**

**NOTE:** This step is mandatory in order to commission the Combiner Box.

- Select the **Server** option and then select which communication method is used to communicate between this Combiner Box and the SolarEdge Monitoring Portal.
- Refer to *Appendix E, Communication Options* on page 77 for a description of how to set up these communication options to the SolarEdge Monitoring server.

You can also select the **None** option if no server communication is required.

**NOTE:** This menu shows only the actual communication options installed in the Combiner Box, based on the options that were ordered.

11 Select the **Info** option to display the Printed Circuit Board ID and the Combiner Box’s firmware version numbers.

12 Select **Factory Reset** to perform a general reset of the Combiner Box to its default settings.

13 Select **Error Log** to display recent errors.
Configuring the Combiner Box Using the SolarEdge Configuration Tool

The SolarEdge Configuration Tool provides a standard Windows GUI for configuring a single Combiner Box to which it is directly connected. This tool can be accessed by connecting a computer or laptop to the Combiner Box through its USB connector.

This tool provides several additional options than are not accessible using the LCD manual, such as enabling a firmware upgrade of the Combiner Box. The following provides a general description of the Configuration Tool’s main options.

USB Driver Installation

The USB port uses a standard USB driver that can connect to any standard PC or laptop with a Windows operating system.

If for some reason the USB connection is not recognized, a USB driver should be installed.

The latest driver is downloadable directly from the manufacturer website under http://www.ftdichip.com/Drivers/VCP.htm. It is also available on the Configuration Tool installation CD, as well as under the Configuration Tool installation folder: ..\Resources\Drivers.
USB drive-related information can be accessed directly from the Configuration Tool main screen by pressing the button. This action opens a window with the support information. On the bottom left of this window, click the USB driver help button to open the following window:

**Figure 24: USB Driver Help**

Follow the instructions displayed in the window, and if needed, click the Open driver folder button to open the driver installation folder on your computer.
Connect to Device

The Connect to Device window displays by default when the Configuration Tool application is launched. It defines the interface for connecting to the Combiner Box.

![Connect to Device Window](image)

**Figure 25: Connect to Device Window**

This window enables you to set up a serial connection using a USB cable connected directly to the Combiner Box, and to select the appropriate COM port.

**NOTE:**
If your laptop does not identify the USB connection, a USB driver should be installed. Refer to the *USB Driver Installation* section on page 49 for more details.
Click the **Connect** button to display the main window:

![Main Window](image)

**Figure 26: Main Window**

This window has five buttons near the top, each of which displays a different window containing various information and options, as follows:

- **String Status**, page 54
- **System Information**, page 56
- **Settings**, page 57
- **Reports and Events**, page 58
- **Tools**, page 59
The following describes the options and buttons along the top of the window:

- **CONNECTION STATUS:** Displays **ONLINE** when the Configuration Tool is connected to the Combiner Box and **OFFLINE** when it is not.

- **Button:** Disconnects the Configuration Tool from the Combiner Box.

- **Button:** Refreshes the information displayed in the window.

- **Button:** Displays an installation checklist window, which enables you to better manage the installation process, particularly for installations that span dates and installers. For more information, refer to Appendix C, Installation Checklist on page 71.

- **Button:** Displays a window that enables you to contact SolarEdge support directly. For more information about getting support, refer to the Support and Contact Information section on page 8.

- **Button:** Displays a window in which you can redefine the user privilege.

- **Button:** Exits the Configuration Tool application. Make sure to save all changes before exiting. Before disconnecting the Combiner Box, make sure that you have saved all changes and exited the Configuration Tool application.
String Status

This window is the main control interface through which each string’s status can be viewed and changed.

- **On**: Indicates whether the string is to be monitored. This should be set to **On** for all connected strings. Turn this setting to **Off** for strings (inputs in the cabinet) that are not used.
- **String**: Shows the physical string number according to the input to which it is connected in the cabinet.
- **Combi**: Shows the Combi card (distribution board) to which the string is connected.

![Figure 27: String Status](image)
- **V[V]**: Shows the output voltage of the string (only for connected strings), in Volts.
- **I[A]**: Shows the current of the string, in Amperes.
- **Status**: Shows the connection status of the string. This can either be connected, disconnected or with a question mark, signifying that the string was last known to be connected/disconnected, but its current state is unknown due to one of the following reasons:
  - The string current is too low.
  - The string voltage is too low.
  - Communication error.
  Check for errors or set the state again to make sure that the status is as required.
- **Test**: Shows a return value from the electronic boards indicating the possible cause for errors, if any. This may be used by support personnel to help solve an issue. Hover over the value to display a description of the return code.
- **RCD I [mA]**: Shows the RCD current, in mA, of the string, as measured by the GFDI device. This is only valid in Combiner Boxes that have the GFDI feature installed.
- **RCD Thresh.[mA]**: Shows the RCD threshold current of the string, in mA. When this threshold is breached, the string is disconnected. This is only valid in Combiner Boxes that have the GFDI feature installed.
- **Last Events**: Shows the last five event codes associated with the string. This can be expanded in the *Reports and Events* window, which is described on page 58.
- **Telemetry Time**: Shows the date and time when the telemetry was received.
- **On and Off Control Buttons**: Enables you to connect or disconnect a string.
- **Table Control Buttons**: The three buttons on the top left enable you to control the entire cabinet simultaneously in order to either turn on all strings, turn off all strings or to set the RCD threshold for all strings.
- **Table Filter**: Enables you to display all strings, only the connected strings or only the disconnected strings.
- **Trip Time**: Enables you to globally set the RCD trip time.
System Information

This window shows the system firmware versions, the language and server communication settings and the LCD display emulation.

Figure 28: System Information
**Settings**

**Communications Settings**

This window enables you to define the communication interface to the Monitoring Portal and to the inter-cabinet communication.

![Figure 29: Settings](image)

The left side of this window shows the physical interfaces and their status. The right side of this window shows the Server web address, as well as the inter-cabinet communication interface:

- The interface connection lines in this window turn green when the interface is on and red when it is off or malfunctioning.
- The **Inter-Cabinet Comm Status** area shows the interface between multiple cabinets, if applicable. Cabinets may be connected to each other via RS485 cable or wirelessly via a ZigBee add-on module.
Reports and Events

This window lists the recently received errors along with their error codes, time of arrival, relevant string and Combi number. It also displays an accompanying measurement value, when applicable, and an error description.

The list may be exported to an Excel file for further analysis and reporting. The data can be filtered by string ID, Combi ID or event code by clicking the Filter Data button and then selecting the required filter.
Tools

This window provides sub-windows that enable you to control various advanced cabinet functions, as follows:

- **Firmware Upgrade**, page 59
- **Cabinet Tests**, page 59
- **Miscellaneous**, page 64

**Firmware Upgrade**

This window displays the system firmware versions and enables you to upgrade the firmware.

If needed, use the *.Suf files per device supplied by the SolarEdge support team.

![Figure 31: Firmware Upgrade](image)

**Cabinet Tests**

This window provides the following cabinet tests:

- **Installation Tests**, page 60
- **Wiring Tests**, page 63
Installation Tests

This window provides the following tests to be performed after installing the cabinet:

- **Cabinet Setup**, page 60
- **RCD Calibration**, page 61
- **RCD Test**, page 62

![Figure 32: Installation Tests](image)

Cabinet Setup

After installing the Combiner Box, click the **Change Existing Setup** button to display the following window in which you can specify the appropriate layout of the Combiner Box.

![Figure 33: Cabinet Layout](image)
After selecting the appropriate layout, click the **Accept** button to display the following window in which you can specify the strings that are connected to the Combiner Box:

![Cabinet Setup Diagram](image)

**Figure 34: Cabinet Setup**

Each electronics board in the cabinet provides 16 inputs for connecting to 16 strings. An image is displayed in the center of this window depicting each electronics board that is installed.

Check the checkboxes in the **On** column of each input that is connected to a string.

If the active configuration has changed from its preconfigured factory setting, then reconfigure this setting accordingly.

**RCD Calibration**

After installing the cabinet or if an error occurs, use this test option to run the calibration test for each DSP of each installed electronics board.
To run an RCD calibration:

**NOTE:**
Fuse holders should be open before starting the RCD calibration test in order to improve the calibration process.

1. In the Combi dropdown field in the RCD Calibration area, select one or all of the electronics boards installed in the cabinet.
2. Click the Begin Test button to run the calibration test for this Combi.
3. Repeat steps 1 through 2 for each electronics board. For example, for a Combiner Box with two electronics boards (which is 32 inputs), perform steps 1 through 2 twice.

**RCD Test**

This test option enables you to run tests on the system’s RCDs. You should run these tests on the system’s RCDs as part of the installation process or during troubleshooting.

The RCD test can be run on all electronics boards or on a specific electronics board by selecting the required value in the Combi dropdown menu.

**NOTE:**
Fuse holders should be open before starting the RCD calibration test in order to improve the calibration process.

---

**Figure 35: RCD Test**
A popup window is displayed after the test completes, which indicates the test result.

![RCD Test Results](image)

**Figure 36: RCD Test Results**

### Wiring Test

**NOTE:** Insert the fuses and close the fuse holders before starting the wiring test.

This window enables you to run tests that validate string connections and that verify their proper polarity:

- **Use:** Sets the strings under test.
- **String:** Displays the physical string number.
- **Combi:** Specifies the actual electronics board in which the string is connected.
- **V:** Displays the voltage of each input in order to check whether there is a string connected to it.

![Wiring Test](image)

**Figure 37: Wiring Test**
Press **Begin Test** to start the polarity test of each input, in order to check that there are no short circuits, no reverse polarity and no crossbreeding between the wires.

A popup window is displayed to prompt you to check that all the strings under test are physically connected. Click **Yes** to begin the test.

![Wiring Test Message](image1.png)

**Figure 38: Wiring Test Message**

**Miscellaneous**

This window enables you to set the Real Time Clock (RTC) of the Combiner Box. This setting is used to confirm the time and date when performing the RCD calibration test.

![RTC Settings](image2.png)

**Figure 39: Miscellaneous – RTC Settings**
To set the RTC clock to your time zone:

- Click the **Set RTC** button to open the following window:

![Figure 40: Set RTC](image)

- Insert the actual time or click **Get Local Time** to set the time based on the time on your computer.
- Insert the GMT offset of the appropriate time zone.
- Click **Accept** to set the RTC.
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Appendix A

Technical Specifications

<table>
<thead>
<tr>
<th></th>
<th>16-string Box</th>
<th>36-string Box</th>
<th>64-string Box</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical Specifications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Number of Inputs</td>
<td>16</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>Maximum Input Voltage</td>
<td>600 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Input Current per String</td>
<td>9.6 A</td>
<td>6.4 A</td>
<td></td>
</tr>
<tr>
<td>Fuse Rating per Input</td>
<td>12 A</td>
<td>8 A</td>
<td></td>
</tr>
<tr>
<td>Maximum Output Current</td>
<td>192 (1 output)</td>
<td>288 (1 output)</td>
<td>512 (2 outputs) A</td>
</tr>
<tr>
<td>AC Voltage Rating</td>
<td>90 - 264 Vac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Frequency (Nominal)</td>
<td>50 - 60 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>&lt; 80 W</td>
<td>&lt; 150 W</td>
<td>&lt; 250 W</td>
</tr>
<tr>
<td><strong>Ground Fault Detection and Isolation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold Range (Programmable)</td>
<td>50 - 400 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection Resolution</td>
<td>± 10 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Time from Leakage Detection to String Isolation</td>
<td>&lt; 750 msec</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Monitoring and Fault Detection Capabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instantaneous String Current</td>
<td>Yes, ± 5% accuracy</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Output Voltage</td>
<td>Yes, ± 5% accuracy</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Continuous String Charge</td>
<td>Yes, ± 5% accuracy</td>
<td>Wh</td>
<td></td>
</tr>
<tr>
<td>Ground Leakage Detection and Isolation*</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage Sensor and String Circuit Breaker Monitoring*</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combiner Box Web Communications (Data and Control)</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Portal, Email Notification and Logging in Case of Leakage, Sensor Fault and Breaker Fault*</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Technical Specifications

#### SolarEdge Monitoring Combiner Box Installation Guide 1.2 - MAN-01-00018-1.2

<table>
<thead>
<tr>
<th>Feature</th>
<th>16-string Box</th>
<th>36-string Box</th>
<th>64-string Box</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graphic User Interface for Configuration, Monitoring and Control</strong></td>
<td></td>
<td>Yes, onsite via technician laptop</td>
<td></td>
</tr>
<tr>
<td><strong>Additional Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>LCD and LED for full status review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Master Shutdown</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lightning Protection (Per String and Per Cabinet)</td>
<td>Yes, 600 Vdc / 10kA - 8/20 μs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supported Communication Interfaces</td>
<td>RS485, USB, Ethernet, ZigBee (optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard Compliance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electromagnetic Compatibility</td>
<td>FCC Part15 Class B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>ANSI/UL Std. 1741 Certified</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Installation Specifications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions (D x W x H)</td>
<td>8 x 36 x 36/20.3 x 91.4 x 91.4</td>
<td>12 x 36 x 42/30.5 x 91.4 x 106.7</td>
<td>12 x 36 x 60/30.5 x 91.4 x 152.4</td>
</tr>
<tr>
<td>Weight</td>
<td>160 / 73</td>
<td>275 / 125</td>
<td>440 / 220</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-4 to +104 / -20 to +40 °F/°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Rating</td>
<td>NEMA4 (4X optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>0 - 100 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiring Temperature Rating</td>
<td>165 / 74 °F/°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Wiring Gauge</td>
<td>8 - 16 AWG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Wiring Gauge</td>
<td>1 x 350</td>
<td>1 x 500 / 2 x 350</td>
<td>2 x 500 kcmil</td>
</tr>
<tr>
<td>Material</td>
<td>14-gauge steel with polyester powder paint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>-4 to +140 / -20 to +60 °F/°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Humidity Range</td>
<td>0 - 95 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Optional
Appendix B

Cable Gauges and Screw Torques

<table>
<thead>
<tr>
<th>Connection</th>
<th>AWG Range</th>
<th>Min-Max Torque [N·m]</th>
<th>Min-Max Torque [lb·ft]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal Block Din Rail</td>
<td>6 - 20</td>
<td>1.5 - 1.8</td>
<td>1.1 - 1.33</td>
</tr>
<tr>
<td>Fuse holder</td>
<td>6 - 14</td>
<td>1.67</td>
<td>1.23</td>
</tr>
<tr>
<td>Power Distribution Board – Input</td>
<td>14 (2/0)</td>
<td>61</td>
<td>45</td>
</tr>
<tr>
<td>Power Distribution Board – Output</td>
<td>4 (500 kcmil)</td>
<td>325</td>
<td>240</td>
</tr>
<tr>
<td>Surge Protection</td>
<td>4 - 11</td>
<td>1.67</td>
<td>1.23</td>
</tr>
<tr>
<td>Power Supply</td>
<td>12 - 16</td>
<td>0.5 - 0.6</td>
<td>0.37 - 0.44</td>
</tr>
<tr>
<td>Circuit Breaker</td>
<td>4 - 18</td>
<td>1.98</td>
<td>1.46</td>
</tr>
<tr>
<td>PDB Connector</td>
<td>16 - 28</td>
<td>0.2</td>
<td>0.15</td>
</tr>
<tr>
<td>PDB Power Connector</td>
<td>16 - 26</td>
<td>0.5 - 0.6</td>
<td>0.37 - 0.44</td>
</tr>
<tr>
<td>RS485 Interconnect</td>
<td>16 - 26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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### Appendix C

#### Installation Checklist

The SolarEdge Combiner Box Configuration Tool features a computerized checklist feature to better manage the installation process. Refer to the Run Checklist Feature section on page 71 for a description of this feature, or use the following list to manually verify that you have followed all the required steps for the installation process.

<table>
<thead>
<tr>
<th>Check</th>
<th>Process</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn off the inverter using its DC disconnect switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpack the Combiner Box and perform a visual inspection</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Mount the cabinet</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Verify conduit sealing</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Install the humidity vent</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Reassemble the back panel in the cabinet</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Verify the following physical connections:</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>• AC connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Grounding terminals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Intra-RS485 combi boards connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• DC input connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• DC output connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Communication interfaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open fuse holders</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Perform final visual inspection</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Turn on the Combiner Box AC power</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Set up the inter-cabinet communication</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Verify the connection to the server – confirm S-OK indication</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>Use the Configuration Tool to:</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>• Set the Real Time Clock (RTC)</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>• Activate/deactivate relevant strings</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>• Perform RCD calibration</td>
<td></td>
<td>61</td>
</tr>
<tr>
<td>• Perform an RCD test</td>
<td></td>
<td>62</td>
</tr>
<tr>
<td>• Insert fuses and close the fuse holders of all active strings</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>• Perform the wiring test</td>
<td></td>
<td>63</td>
</tr>
<tr>
<td>Turn on all connected strings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn on the DC disconnect switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn on the inverter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Run Checklist Feature

Click Run Checklist on the toolbar at the top of the Configuration Tool window to open the following screen:

![Cabinet Installation Checklist](image)

*Figure 41: Cabinet Installation Checklist*

This screen includes a checklist of the actions to be taken when installing the Monitoring Combiner Box. You should use it to confirm that you have not omitted any important steps in the installation process.
The top pane enables you to enter information about the installation technician, including their name and company.

The main pane displays the checklist, with a checkbox next to each item in the list. You should check off each item after completing the described operation.

The Import CheckList and Export CheckList buttons enable you to import a previously saved checklist or to export the checklist if the installation is to continue at a later date, respectively.

The buttons at the bottom of the window enable you to perform the following operations:

- **Print Report**: Saves an installations report as a PDF file, which can then be printed or shared.
- **Clear**: Clears the checkboxes in the checklist.
- **Close**: Closes the checklist window.
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Appendix D

Errors and Troubleshooting

The Combiner Box’s LCD panel displays a message when an error occurs.
This appendix lists the error messages that may appear on the Combiner Box’s LCD panel, describes their meaning and describes how to troubleshoot each one.

Each message may comprise up to two lines of 20 characters each. The following shows the format of an error message on the Combiner Box LCD panel:

```
Error code XXX
XXXXXXXXXXXXX
XXXXXXXXXXXXXX
```

Each error message is displayed for 30 seconds. If the error no longer exists, the Combiner Box displays the Waking Up message.

The following table lists the error messages that appear on the Combiner Box LCD and describes how to troubleshoot each one.

<table>
<thead>
<tr>
<th>Error #</th>
<th>Description</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>RCD test failure</td>
<td>Replace the faulty string channel and notify SolarEdge support.</td>
</tr>
<tr>
<td>4, 5, 6, 7, 8, 10, 11, 12, 13, 14</td>
<td>Switch test failure</td>
<td>Replace the string channel and notify SolarEdge support.</td>
</tr>
<tr>
<td>16</td>
<td>RCD string trip</td>
<td>Check the string and locate the faulty panel. Replace the faulty panel to return to normal operation.</td>
</tr>
<tr>
<td>17</td>
<td>RCD sensor failure</td>
<td>Repeat the RCD test again. If the error persists, replace the string channel and notify SolarEdge support. If the error was cleared, reconnect the channel to return to normal operation.</td>
</tr>
<tr>
<td>19</td>
<td>RCD leakage persists – string isolation failed</td>
<td>Disconnect the string manually. Check the string and locate the faulty panel. Replace the faulty panel and the string channel. Notify SolarEdge support for a detailed examination of the faulty channel.</td>
</tr>
<tr>
<td>Error #</td>
<td>Description</td>
<td>Troubleshooting</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>20</td>
<td>RCD sensor failure</td>
<td>Repeat the RCD test again. If the error persists, replace the string channel and notify SolarEdge support.</td>
</tr>
<tr>
<td>22, 23</td>
<td>Internal error</td>
<td>Reconnect and notify SolarEdge support.</td>
</tr>
<tr>
<td>24</td>
<td>Switch is still conducting when it should be disconnected</td>
<td>Replace the string channel and notify SolarEdge support.</td>
</tr>
<tr>
<td>26, 28</td>
<td>Switch test failure</td>
<td>Replace the faulty string channel and notify SolarEdge support.</td>
</tr>
<tr>
<td>34, 36, 38</td>
<td>Internal error</td>
<td>Turn off the power to the Combiner Box and turn it on again to return to normal operation. Notify SolarEdge support.</td>
</tr>
<tr>
<td>43</td>
<td>Internal error</td>
<td>Remove the fuses as a safety precaution and notify SolarEdge support.</td>
</tr>
</tbody>
</table>
Appendix E

Communication Options

Multiple Combiner Boxes – RS485 Bus Connection

RS485 Bus Terminations

The two cabinets at the ends of the chain (meaning the first cabinet and the last cabinet) must be terminated. The SW7 dipswitch is used for RS485 termination. The dipswitch is located on the connection board below the communication board, as shown in Figure 42 on page 77. Move the lower switch to the left to add RS485 termination.

NOTE: There are boards without an SW7 dipswitch. In this case, you must add an external 120 Ω, ½-watt terminating resistor between pins 1 and 2 of P305 on the end cabinets of the RS485 communications link. The resistors are added in parallel to the wire connection.

Figure 42: RS485 Termination Switch
RS485 Configuration

For the slave Combiner Boxes, select the following:

1. Press the LCD Light button once to turn ON the backlight.
   Four buttons for controlling the LCD panel menus are then accessible, as shown below:

![Figure 43: LCD Panel User Buttons](image)

- **Esc**: Goes to the beginning of the currently entered parameter or to the previous menu.
- **Up (1)**: Goes up one option in a menu.
- **Down (2)**: Goes down one option in a menu.
- **Enter (3)**: Confirms the entry or selection of a parameter.

2. Press the **Enter** button for at least five seconds. The following message is displayed:

```
Please enter
Password
**********
```

The Combiner Box is now in Setup mode and all its LEDs are lit. The Combiner Box automatically exits Setup mode if no buttons are pressed for more than two minutes.
3 Use the three right-most buttons inside the Combiner Box (the UP-1, Down-2 and Enter-3 buttons), shown above, to type in the following default password: 12312312. The following screen is displayed:

```
*1. Monitoring Status
  2. RCD Status
  3. Strings Set
  4. Language <en>
  5. Display
  6. Communication
  7. Info
  8. Factory Reset
  9. Error Log
```

4 Scroll down to the Communication submenu and select it.

**Communication Submenu:**

```
Server < LAN >
> Bus < ZigBee >
LAN Conf
RS485 Conf < S >
Zigbee Conf < S >
```

5 Select the Bus submenu. Scroll down and select RS485 Slave. The Combiner Box performs a reset immediately after the selection is made.

**Bus Submenu:**

```
Zigbee P2P
Zigbee MP
RS485 Master
> RS485 Slave
None
```

6 Repeat steps 2 through 4 above to enter Setup mode.

7 Select the Server submenu, scroll down to the RS485 option and select it. The Combiner Box performs a reset immediately after the selection is made.

8 Repeat steps 1 through 7 for each slave Combiner Box.

This concludes the setting of the slave Combiner Boxes.
For the master (main) Combiner Box, select the following:

1. Repeat steps 1 through 4, as described above.

2. Select the Bus submenu. Scroll down and select **RS485 Master**. The Combiner Box performs a reset immediately after the selection is made.

   **Bus Submenu:**
   - Zigbee P2P
   - Zigbee MP
   - RS485 Master
   - RS485 Slave
   - None

3. Repeat steps 2 through 4 on page 79 to enter Setup mode.

4. Scroll down to the **RS485 Conf** submenu and select it. Select the **Master Set** option and select **Enable**. The Combiner Box performs a reset immediately after the selection is made.

   **Communication Submenu:**
   - Server < LAN >
   - Bus < ZigBee >
   - LAN Conf
   - > RS485 Conf < S >
   - Zigbee Conf < S >

5. Repeat steps 2 through 4 on page 79 to enter Setup mode.

6. Scroll down to the **RS485 Conf** submenu and select it.

   **Communication Submenu:**
   - Server < LAN >
   - Bus < ZigBee >
   - LAN Conf
   - > RS485 Conf < S >
   - Zigbee Conf < S >

7. Select the **Detect slave** option and select **Yes**. A **Detecting Slaves** message is shown for several seconds as well as the number of detected slaves. The master should report the correct number of slaves on the LCD screen. If it does not, verify the connections and terminations.

8. Press the **ESC** button repeatedly to exit the **Setup** menu.

   This concludes the multi-Combiner Box setup using the user buttons.
Server Communication – Ethernet Connection

For the main Combiner Box, select the following:

1 Press the LCD Light button once to turn ON the backlight.
2 Four buttons for controlling the LCD panel menus are then accessible, as shown below:

![Figure 44: LCD Panel User Buttons](image)

- **Esc**: Goes to the beginning of the currently entered parameter or to the previous menu.
- **Up (1)**: Goes up one option in a menu.
- **Down (2)**: Goes down one option in a menu.
- **Enter (3)**: Confirms the entry or selection of a parameter.

3 Press the **Enter** button for at least five seconds. The following message is displayed:

```
Please enter Password
*
```

The inverter is now in Setup mode and all its LEDs are lit. The Combiner Box automatically exits Setup mode if no buttons are pressed for more than two minutes.
4 Use the three right-most buttons inside the Combiner Box (the **UP-1**, **Down-2** and **Enter-3** buttons), shown above, to type in the following default password: **12312312**. The following screen is displayed:

* 1. Monitoring Status
  2. RCD Status
  3. Strings Set
  4. Language < en >
  5. Display
  6. Communication
  7. Info
  8. Factory Reset
  9. Error Log

5 Scroll down to the **Communication** submenu and select it.

**Communication Submenu:**

Server < LAN >
> Bus < ZigBee >
LAN Conf
RS 4 8 5 Conf < S >
Zigbee Conf < S >

6 Select the **Server** submenu, scroll down to the **LAN** option and select it. The Combiner Box performs a reset immediately after the selection is made.

**Server Submenu:**

> LAN
RS 2 3 2
RS 4 8 5
Zigbee
None

This concludes the server connection configuration using the user buttons.
Verifying the Connection to SolarEdge Monitoring Server

1. Turn ON the AC to the Combiner Box by using the circuit breakers on the main circuit board.
2. Wait for the Combiner Box to connect to the SolarEdge Monitoring Server. This may take up to two minutes.
3. Verify that the LCD panel displays a window similar to the following:

```
OK < S_OK >
Combi DSPs < XXX >
```

- **S_OK**: Verify that S_OK appears on the panel to indicate a functioning connection to the SolarEdge Monitoring Server, which was validated during the last two minutes.

**NOTE:**

If the S_OK indication is not displayed on the master Combiner Box, perform the following:

- Use another method (unrelated to the SolarEdge Combiner Box) to check whether the network and modem are operating properly. For example, connect a laptop to the Ethernet modem and connect to the Internet.
- Check whether a firewall or another device is blocking transmission.
- Check the configuration of the Combiner Box.

If the S_OK indication is not displayed on the slave Combiner Boxes, perform the following:

- Check the configuration of the Combiner Boxes.
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Appendix F

SECB-64 Conduits Example

The following figure shows an example of SECB-64 conduits.

Figure 45: SECB-64 Conduits Example
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If you have technical problems concerning our products, please contact us:

North America: +1.877.360.5292
Germany: +49.89.45459730
France: +0.800.917.410
Israel: +972.73.2403118
Fax: +972.73.2403117
Email to: support@solaredge.com

www.solaredge.com