

# StorEdge™ Solution Applications with the StorEdge Inverter and LG Chem Batteries – Connection and Configuration (Australia)

SolarEdge's StorEdge Solution can be used for various applications that enable energy independence for system owners, by utilizing a battery to store power and supply power as needed. The StorEdge Solution is based on and managed by the SolarEdge inverter for both PV and battery management and is compatible with LG Chem High Voltage RESU 7H and RESU 10H Batteries.

This document explains how to set up your StorEdge system to work in different configurations.

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## Revision History

- November 2018 – Version 1.0 (initial)

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## Overview

### StorEdge Operation Modes

The StorEdge Inverter solution can be used in two different operating modes, described in the following sections:

- Smart Energy Management with Backup Power
- Backup Power only

**NOTE**

The StorEdge inverter requires CPU version 3.18xx and above. If an upgrade is required contact SolarEdge support for an upgrade file and instructions.

All modes can be used together with the export limitation application. For details on export limitation, refer to [https://www.solaredge.com/sites/default/files/feed-in\\_limitation\\_application\\_note.pdf](https://www.solaredge.com/sites/default/files/feed-in_limitation_application_note.pdf).

### Smart Energy Management with Backup Power

This combined mode allows use some of the stored energy for backup power and the rest for smart energy management applications. The StorEdge inverter monitors the grid, and when there is a power outage, it automatically switches to backup mode, disconnecting from the grid and supplying power to backed-up loads.

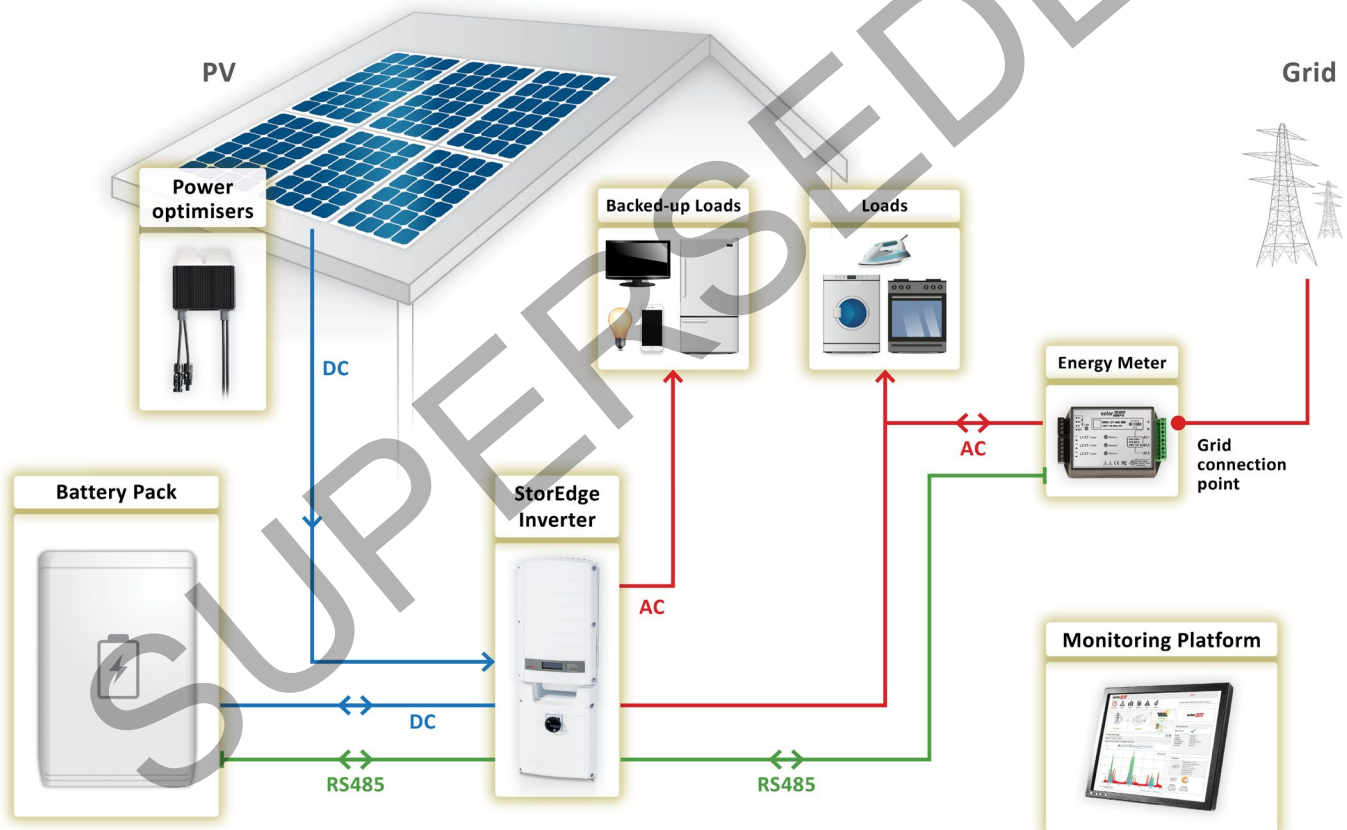


Figure 1: Smart Energy Management with Backup Power

### Backup Power Only

This mode is used to store energy for backup power only. The StorEdge inverter monitors the grid, and when the grid is down it automatically switches to backup mode, disconnecting from the grid and supplying power to backed-up loads. In cases where battery charging from the grid is permitted, this mode can be used without PV modules.

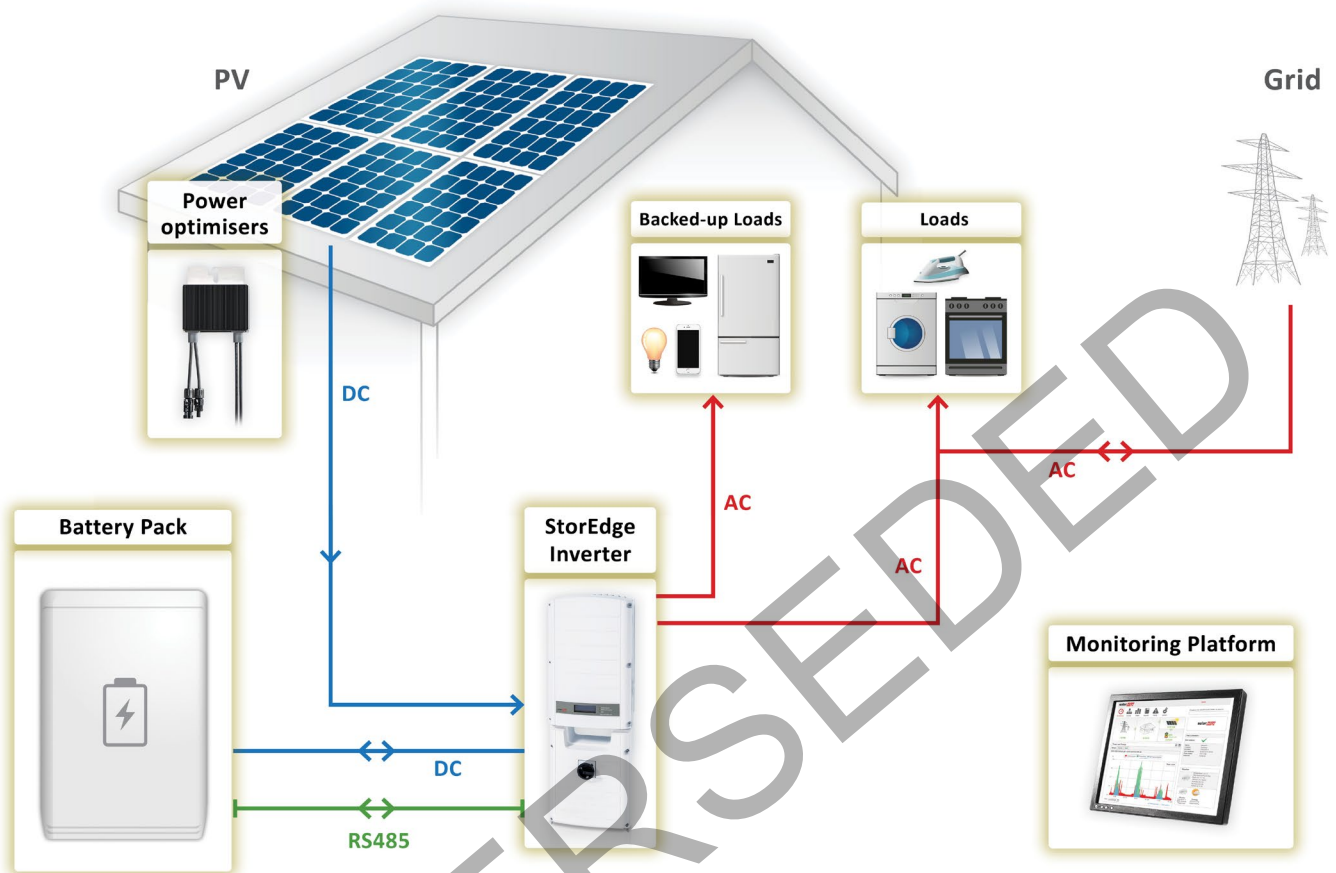


Figure 2: Backup Power only

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## System Components

The StorEdge Solution is comprised of the following components:

- **StorEdge Inverter** – the single phase StorEdge inverter manages battery and system energy in addition to its traditional functionality as a DC-optimized PV inverter.
- **Energy Meter** – the meter is used by the inverter for import/export or consumption readings, and manages the battery charge/discharge for Smart Energy Management applications in accordance with the readings. The meter readings are displayed in the SolarEdge Monitoring Platform. The meter is optional for Backup Power Only mode.
- **Backed-up loads panel** – loads that should be supplied with backup power in case of a power outage should be wired through a separate load panel. In systems with multiple StorEdge inverters, a backed-up loads panel is required for each inverter.
- **Optional: RS485 Plug-in** – the kit is used for systems with more than one SolarEdge inverter where the inverter connected to the battery has only a single RS485 bus, or systems with a third-party controller. The kit provides an additional RS485 port within the inverter for connection. For instructions on how to check if the inverter has a single RS485 bus or two, refer to *Appendix C – Check Number of RS485 Buses*.
- **LG Chem RESU 7H/RESU 10H Battery** – a DC-coupled battery designed to work with the StorEdge solution.

## System Configurations

The configurations described in the application note are the following:

Use Case	Description
<b>Basic Configuration</b>	In a basic configuration, one of each of the above-described StorEdge components is installed in accordance with the system operation mode. This configuration is suitable for most residential systems.
<b>Large Residential PV Systems</b>	For residential sites with large PV systems, a StorEdge inverter and a SolarEdge single phase inverter may be installed together. The StorEdge inverter manages the battery and functions as a PV inverter, and the second inverter is used for production of the additional PV power. During power outages, the StorEdge inverter provides power to backed-up loads, and the second inverter remains shut down until grid power is restored.
<b>Additional Capacity with Two Batteries<sup>1</sup></b>	For sites where additional battery capacity is needed (for example, to enable backed-up loads to be powered from the battery for longer periods), two batteries may be connected to a single StorEdge inverter. In this configuration, only one battery operates at any given time – i.e. the two batteries provide additional capacity only, not additional power.
<b>Additional Capacity and Power with Multiple Inverters<sup>2</sup></b>	For three-phase installations where additional capacity and power with multiple inverters is needed (for example, to enable more backed-up loads to be powered simultaneously). In this case up to three StorEdge inverters, each connected to the PV, and three batteries may be installed. Each battery connects through a separate StorEdge Inverter, and each inverter manages the battery and the PV connected to it. Backed-up loads are connected to each inverter through separate load panels. The inverter connected to the meter operates as the system manager.
<b>AC Coupling using a non-SolarEdge Inverter</b>	For sites with an already-installed PV system with a non-SolarEdge inverter, the StorEdge inverter can be AC-coupled to the existing inverter, i.e. the StorEdge inverter used to manage the battery is connected to the AC output of the existing inverter and charges the battery using the PV power produced by the non-SolarEdge inverter. In case the system is in backup, the non-SolarEdge inverter will not stay on.

<sup>1</sup> When connecting two LG Chem batteries, each battery must have a different part number; supporting SolarEdge firmware required – CPU version 3.2305 and above

<sup>2</sup> Additional capacity and power with multiple inverters requires CPU version 3.24XX and above

## Compatibility Information

The following table lists the StorEdge applications that can be used for each system configuration:

System Configuration	Smart Energy Management Applications			
	Maximize Self-consumption	Charge/Discharge Profile Programing	Zero Export Limitation	Non-Zero Export Limitation
Basic Configuration	✓	✓	✓	✓
Large Residential PV Systems	✓	✓	✓	✓
Additional Capacity with Two Batteries	✓	✓	✓	✓
Additional Capacity and Power with Multiple Inverters	✓	✓	✓	✓
AC Coupling using a non-SolarEdge Inverter	✓			✓

## Related Documentation

For detailed installation and configuration instructions of the system components, refer to the following installation guides:

- StorEdge Solution Installation Guide: [https://www.solaredge.com/sites/default/files/storedge\\_backup\\_installation\\_guide\\_with\\_LG.pdf](https://www.solaredge.com/sites/default/files/storedge_backup_installation_guide_with_LG.pdf)
- Electricity meter installation: <https://www.solaredge.com/sites/default/files/solaredge-meter-installation-guide.pdf>
- Wiring guide and onsite checklist: [https://www.solaredge.com/sites/default/files/storedge\\_inverter\\_wiring\\_quick\\_guide\\_and\\_on\\_site\\_checklist\\_aus.pdf](https://www.solaredge.com/sites/default/files/storedge_inverter_wiring_quick_guide_and_on_site_checklist_aus.pdf)
- Charge/discharge profile programming: [https://www.solaredge.com/sites/default/files/storedge\\_charge\\_discharge\\_profile\\_programming.pdf](https://www.solaredge.com/sites/default/files/storedge_charge_discharge_profile_programming.pdf)
- Export limitation: [https://www.solaredge.com/sites/default/files/feed-in\\_limitation\\_application\\_note.pdf](https://www.solaredge.com/sites/default/files/feed-in_limitation_application_note.pdf)

# Smart Energy Management with Backup Power – System Configurations

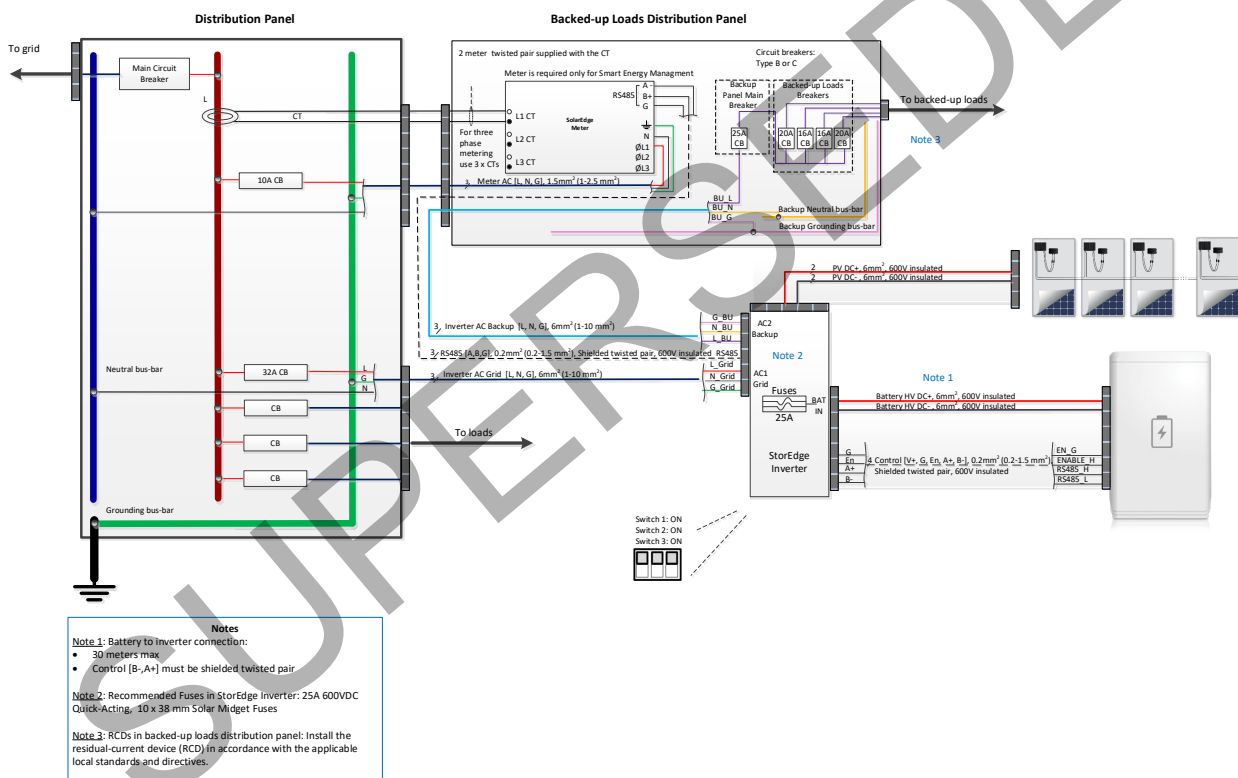
In this mode, some of the battery energy is reserved for backup power and the rest can be used for Smart Energy Management applications. In case of a power outage, the inverter automatically switches to backup mode, disconnecting from the grid and supplying power to backed-up loads.

For configurations with more than one SolarEdge inverter, the inverters are connected to each other with RS485, with one inverter configured as the master and connected to the SolarEdge monitoring server. If the master inverter has a single RS485 bus, an RS485 Plug-in should be installed in the inverter for connection of the meter on a second RS485 bus. For instructions on how to check if the inverter has a single RS485 bus or two, refer to *Appendix C – Check Number of RS485 Buses*.

## System Connection

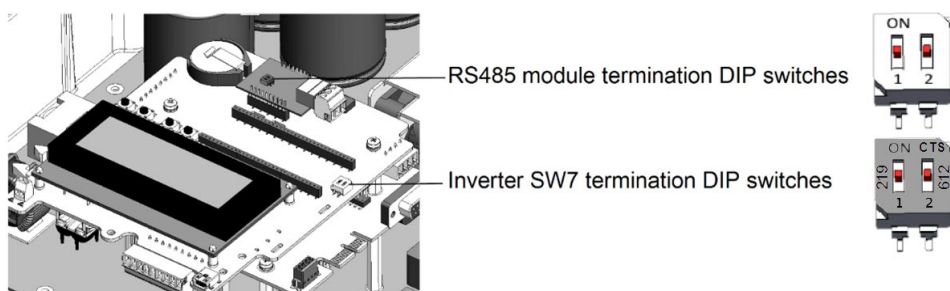
The following diagram illustrates the connection of the system components when using the basic configuration for Smart Energy Management with backup power: one StorEdge inverter, one meter and one battery. For enlarged segments of this diagram, refer to *Appendix D – Detailed System Connection Drawings*.

**NOTE**  
Install the GFDI (Ground-Fault Detector Interrupter) in accordance with applicable local standards and directives.



**Figure 3: Smart Energy Management with Backup Power – Basic Configuration**

The following diagram shows the RS485 termination switch location on the inverter communication board (SW7) and on the RS485 Plug-in (RS485 module).



**Figure 4: RS485 Termination Switch Location**



Set the SW7 DIP switches as follows:

- Left switch (RS485-1 port): ON (up) = terminated, OFF (down) = non terminated
- Right switch (RS485-2 port, if installed): ON (up) = terminated, OFF (down) = non terminated

The following diagram illustrates the connection of the system components when using two batteries. In this case, an external combiner box is needed. For enlarged segments of this diagram refer to *Appendix D – Detailed System Connection Drawings*.

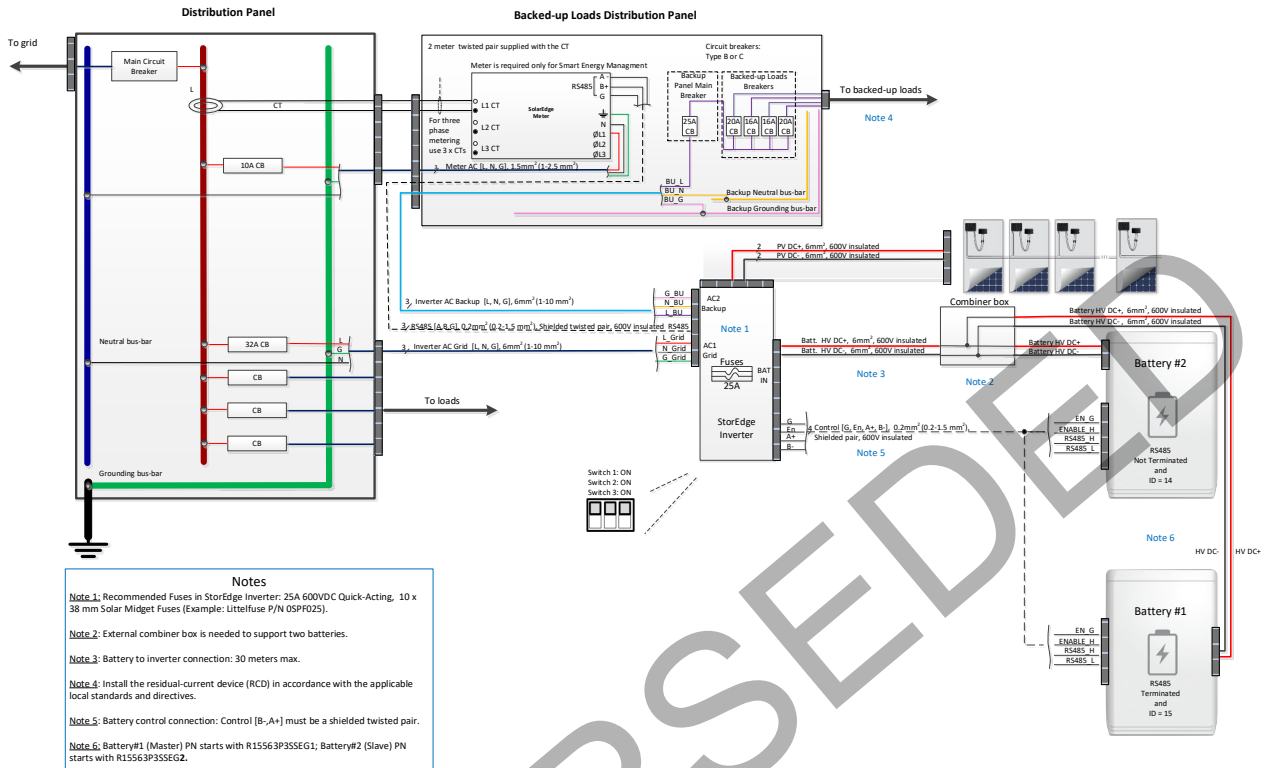


Figure 5: Smart Energy Management with Backup Power – Using Two Batteries

The following diagram illustrates the connection of the system components when using three inverters and three batteries. In this case, the first inverter is connected to the meter through RS485-1, and the second and the third inverter are connected to the first inverter through RS485-2. For enlarged segments of this diagram, refer to *Appendix D – Detailed System Connection Drawings*.

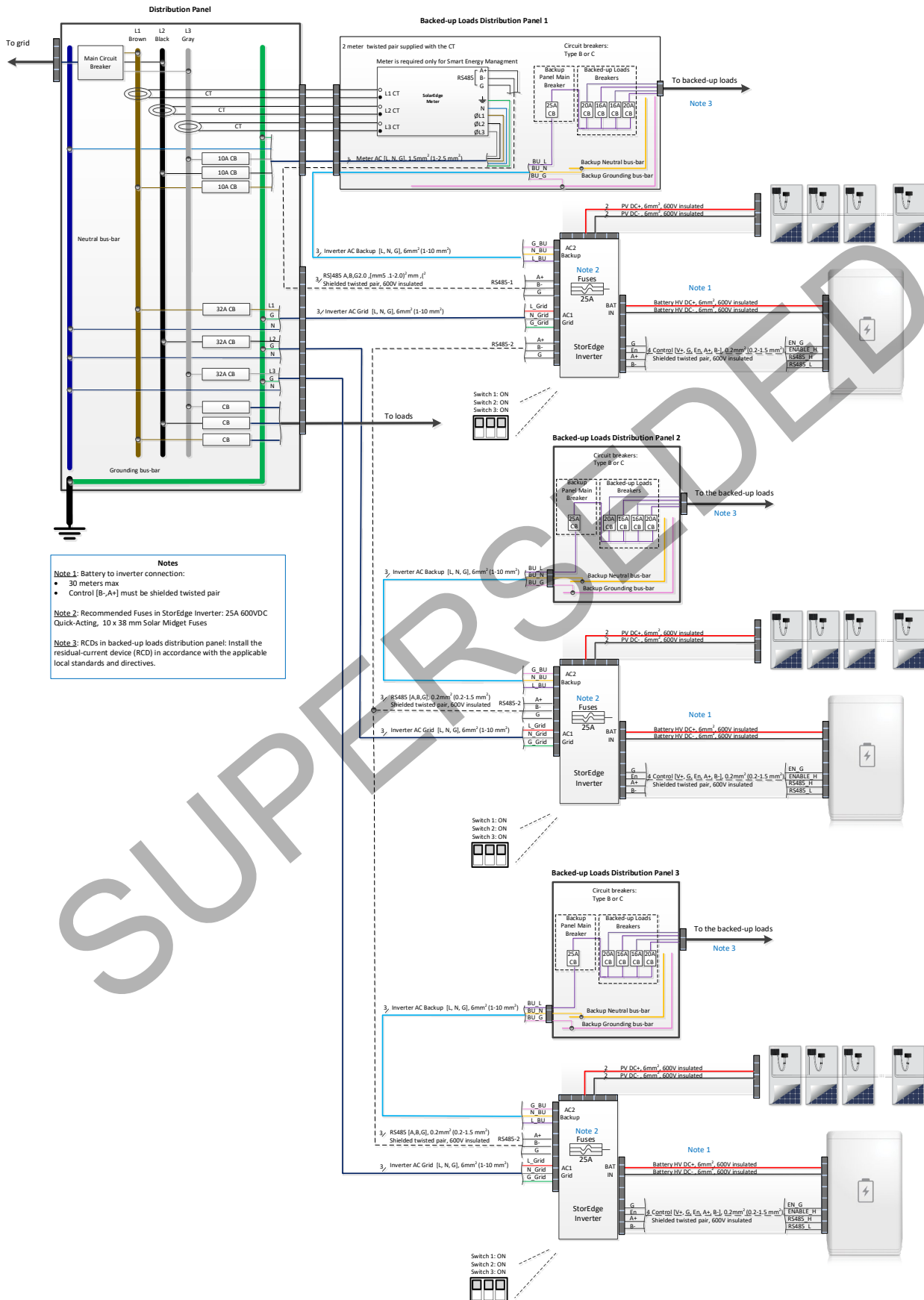


Figure 6: Smart Energy Management with Backup Power – Using Three Inverters and Three Batteries

## Basic Configuration

This configuration is based on one of each of the StorEdge components and is suitable for most residential systems.

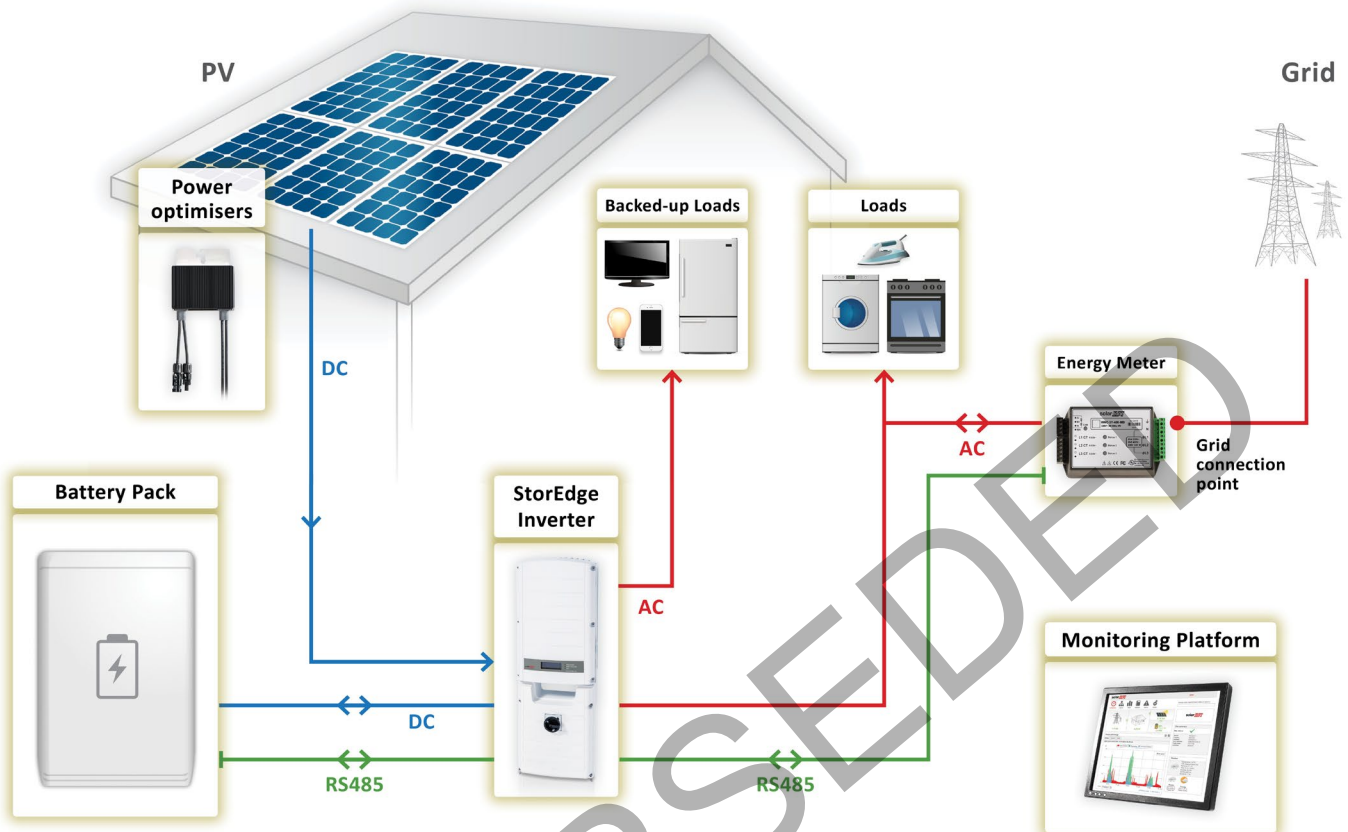
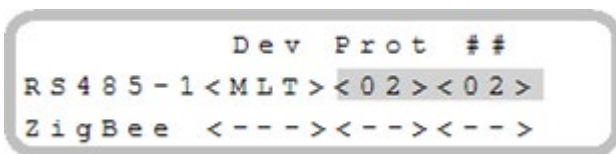


Figure 7: Smart Energy Management with Backup Power – Basic Configuration

► **To Connect and Configure the Meter and the Battery:**

1. Make sure the wiring is connected as specified in the diagram above. For detailed instructions, see the StorEdge Inverter Wiring Guide & On Site Checklist: [https://www.solaredge.com/sites/default/files/storedge\\_inverter\\_wiring\\_quick\\_guide\\_and\\_on\\_site\\_checklist\\_aus.pdf](https://www.solaredge.com/sites/default/files/storedge_inverter_wiring_quick_guide_and_on_site_checklist_aus.pdf)
2. Depending on your battery model, turn on the battery’s disconnect switch or auxiliary power switch. For details, see *Appendix E – Powering the LG Chem Battery off and on* on 43.
3. Turn ON the battery Circuit Breakers.
4. Turn ON the AC Breaker of the inverter.
5. If a firmware upgrade is required, see the StorEdge Inverter Wiring Guide & On Site Checklist: [https://www.solaredge.com/sites/default/files/storedge\\_inverter\\_wiring\\_quick\\_guide\\_and\\_on\\_site\\_checklist\\_aus.pdf](https://www.solaredge.com/sites/default/files/storedge_inverter_wiring_quick_guide_and_on_site_checklist_aus.pdf)
6. Check the **Communication status** screen and verify that the battery and the meter are properly connected and configured:
  - **Dev** – The type of device configured for connection to the port.
  - **Prot** – the number of devices configured to communicate with the inverter on the RS485-1 bus.
  - **##** – the number of devices that communicate with the inverter on the RS485-1 bus.

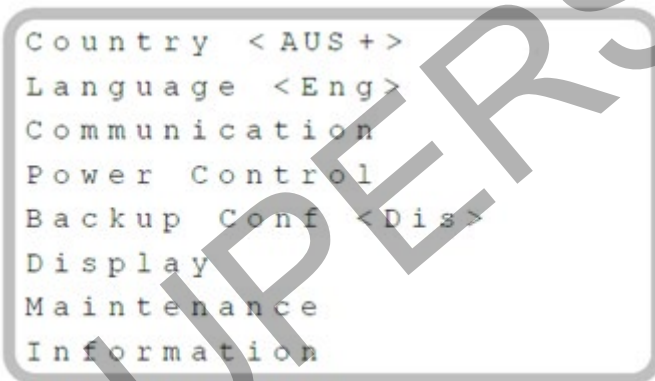


7. If Dev is not “MLT”, the system is not pre-configured and requires full configuration. Proceed with Step 9 below.
  - Verify that the number under Prot displays the number of configured devices. If not, proceed with Step 9 below.

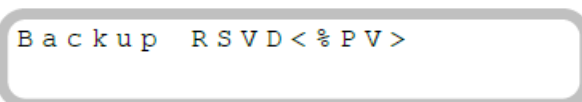
- Verify that the number under ## displays the number of communicating devices. If not, proceed with Step 9 below.
8. In order to complete the meter setting check that the meter CT rating is set to the correct value as appears on the CT label. Select **Communication** → **RS485-1 Conf** → **Device type** → **Multi Devices** → **Meter 2** → **Device Type** → **Revenue Meter**. The meter configuration screen is displayed. Configure the meter:
    - a. Check that the CT value is set as it appears on the CT label. If it is not configured correctly, verify the communication as described below.
    - b. If communication is verified, skip Steps 9 to 11 and proceed with the backup power setup as described below.
  9. Select **Communication** → **RS485-1 Conf** → **Device Type** → **Multi-devices**. A list of devices is displayed.
  10. Select **Meter 2**. The meter configuration screen is displayed. Configure the meter:
    - a. Select **Device Type** → **Revenue Meter**.
    - b. Select **CT Rating** → **<xxxxA>** to check if the CT value is set as it appears on the CT label. If not, use the up/down arrows to set each character, press **Enter** to set the character and move to the next one, then long press on **Enter** to set the value.
    - c. Select **Meter Func.** and select the function according to the meter CT(s) location:
      - i. **Export + Import**: meter CT(s) at grid connection point (as shown in the diagram above)
      - ii. **Consumption**: meter CT(s) at load consumption point
  11. Select **Battery 1**. The battery configuration screen is displayed. Configure the battery:
    - a. Select **Device Type** → **Battery Pack**.
    - b. Select the battery protocol: **LG Battery**, and **ID: 15**.

#### ► To Set Up Backup Power:

1. To Enable backup capability:
  - a. Enter Setup mode to display the main menu:



- b. From the main menu, select **Backup Conf**.
  - c. Select **Backup** and set it to **Enable**.
2. To set a minimum battery charge level, so that the battery will always have energy stored in case backup power is needed:
  - a. Select **Power Control** → **Energy Manager** → **Storage Control**. The following is displayed:



- b. Select **Backup RSVD** and set the required level as percentage of the battery capacity. Set %PV according to user requirement.
3. After configuring the meter, the battery and backup power, proceed with Smart Energy Management application configuration for maximize self-consumption or for charge/discharge profile programming.

#### ► To Set Up Maximize Self-consumption:

- Select **Power Control** → **Energy Manager** → **Energy Ctrl** → **Max Self-Consume**.

### ► To Set Up Charge/Discharge Profile Programming:

1. Select **Power Control** → **Energy Manager** → **Energy Ctrl** → **Time of Use**.
2. Select **Storage Ctrl** → **AC Charge Lim** → **Limit Type**, and set one of the following limits:
  - Set **%PV** to enter a limit as a percentage of year-to-date energy production.
  - Set **kWh** to enter a fixed annual energy limit.
  - Set **None** to unlimit the charging.
3. Profile loading can be done remotely from the Monitoring Platform. See *Appendix A – Creating a Charge/Discharge Profile* for information on creating a charge/discharge profile.
  - a. In the Monitoring Platform, click the **Admin** icon and select the **Energy Manager** tab.
  - b. Select the **Set profile from server** check box.
  - c. Select **Apply this profile** and select the profile name from the drop-down list. The profile is applied to all inverters in the site.
  - d. Click **Save**. The **Energy Manager** window displays:
    - i. In the **Storage mode** column: **Storage Profile** (if you applied a profile)
    - ii. In the **Storage profile name** column: The specific profile that was applied to the site, as reported by each inverter.

### ► To verify communication:

After connecting and configuring a communication option, perform the following steps to check that the connection to the monitoring server has been successfully established.

1. Turn on the AC to the inverter by turning ON the circuit breaker on the main distribution panel.
2. Wait for the inverter to connect to the SolarEdge Monitoring Platform. This may take up to two minutes.
3. Push the **OK / LCD** button several times, until you see the communication screen on the LCD panel:

```
Vac [V]  Vdc [V]  Pac [W]
230.2    18.4     0
P_OK: 000/000  <S_OK>
                OFF
```

**S\_OK:** Indicates that the connection to the SolarEdge Monitoring Platform is successful.

4. For additional verification, refer to *Appendix B – Verifying StorEdge Functionality*.

### ► To test the battery:

The test is available in CPU version 3.24xx and higher (but not in version 4.x.xxx).

If two batteries are installed, the active battery will be tested first, and then the standby battery. If the active battery fails the test, the test will stop and the standby battery will not be tested.

1. Verify that AC is ON.
2. Turn the inverter ON/OFF switch to ON.
3. Make sure the Connection Unit is ON.
4. Enter Setup mode and select **Maintenance** → **StorEdge Self-Test** → **Start Test**. The battery charges and discharges within approximately two minutes to check performance.

During the test, the following message is displayed:

```
Short test in
progress...

Any button to stop
```

Upon the test completion, the following message is displayed:

```
Self-test completed
successfully

Any button to cont.
```

If an error message is displayed during the test, use the following table to resolve the error.

Error	Solution
<b>Bat 1 charge failed</b>	Check that the power and communication cables between the battery and inverter are properly connected.
<b>Bat 1 discharge failed</b>	Check that the power and communication cables between the battery and inverter are properly connected.
<b>Low SOE</b>	Charge the battery to 20 percent SOE at least.
<b>Battery comm. error</b>	Check that the communication cables between the battery and inverter are properly connected.
<b>Turn switch to On</b>	Turn the inverter ON/OFF switch to ON.

## Large Residential PV Systems

For residential sites with large PV systems, a StorEdge inverter and a SolarEdge single phase inverter may be installed together. The StorEdge inverter manages the battery and functions as a PV inverter, and the second inverter is used for the production of additional PV power. During power outages, the StorEdge inverter provides power to backed-up loads, and the second inverter remains shut down until the grid is back.

If the inverter connected to the battery has only a single RS485 bus, installation of an RS485 Plug-in is required. Refer to the RS485 Plug-in Installation Guide at: [http://www.solaredge.com/files/pdfs/RS485\\_expansion\\_kit\\_installation\\_guide.pdf](http://www.solaredge.com/files/pdfs/RS485_expansion_kit_installation_guide.pdf). For instructions on how to check if the inverter has a single RS485 bus or two, refer to *Appendix C – Check Number of RS485 Buses*.

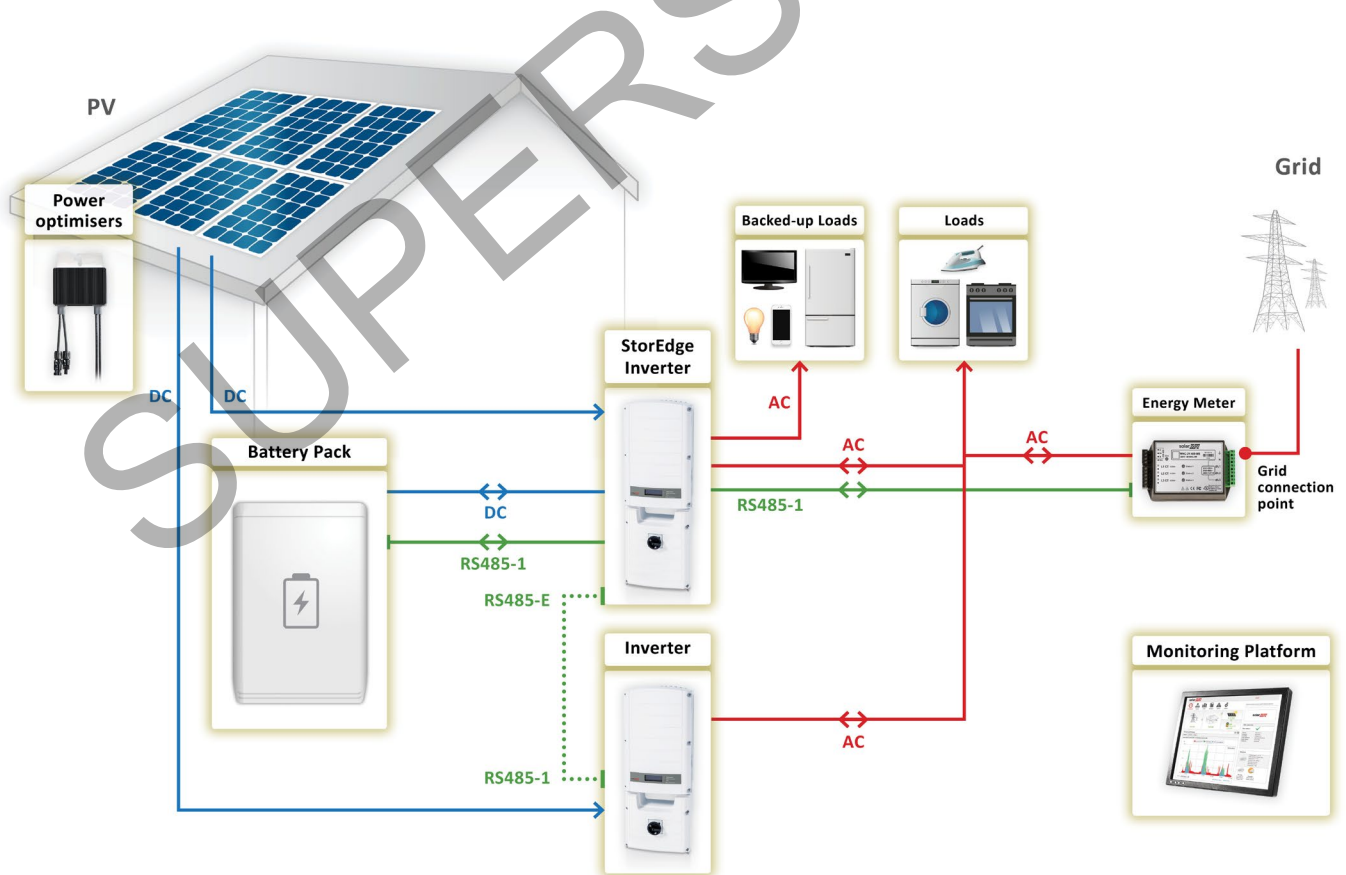


Figure 8: Smart Energy Management with Backup Power – Large Residential PV Systems



**► To configure the system:**

1. Configure the meter, battery and backup power of the StorEdge inverter as described in *Basic Configuration* on page 11.
2. Configure the second inverter as described in [https://www.solaredge.com/sites/default/files/storedge\\_backup\\_installation\\_guide\\_with\\_LG.pdf](https://www.solaredge.com/sites/default/files/storedge_backup_installation_guide_with_LG.pdf)

**NOTE**

Both inverters must have the same CPU version.

**► To set up Smart Energy Management:**

- After configuring the meter, battery and backup power, proceed with maximizing self-consumption or charge/discharge profile programming as described in *Basic Configuration* on page 11.

**► To configure inverter communication:**

1. If needed, install the RS485 Plug-in in the StorEdge inverter. If there is an RS485-2 port in the inverter, use it instead of the expansion kit. The RS485-E port in the following instructions refers either to the Expansion port or to the RS485-2 port.
2. Connect the StorEdge inverter RS485-E port to the second inverter's RS485-1 port using an RS485 twisted pair cable. Terminate both sides. From the StorEdge inverter:
  - a. Select **Communication** → **RS485-E Conf** → **Enable**. Press **Enter** to continue.
  - b. Select **Protocol** → **Master**.
  - c. Select **Slave Detect**. Verify that the inverter reports the correct number of secondary inverters.

**NOTE**

The second inverter does not require communication configuration.

**► To verify communication:**

- Verify communication as described in *Basic Configuration* on page 11.

**► To test the battery:**

- Test the battery as described in *Basic Configuration* on page 11.

## Additional Capacity with Two Batteries

For sites where additional battery capacity is needed (for example, to enable backed-up loads to be powered from the battery for longer periods), two batteries may be connected to a single StorEdge inverter.

In this configuration, only one battery operates at any given time – i.e. the two batteries provide additional capacity only, not additional power.

Two-battery installations must meet the following requirements:

- The two batteries must have a different part number and ID.
- Both inverters require CPU version 3.2305 and above.
- Only LG Chem RESU10H batteries can be used.

If an upgrade is needed, refer to the StorEdge and Smart Energy Firmware Updates page at:

<https://www.solaredge.com/aus/storedge/firmware>.

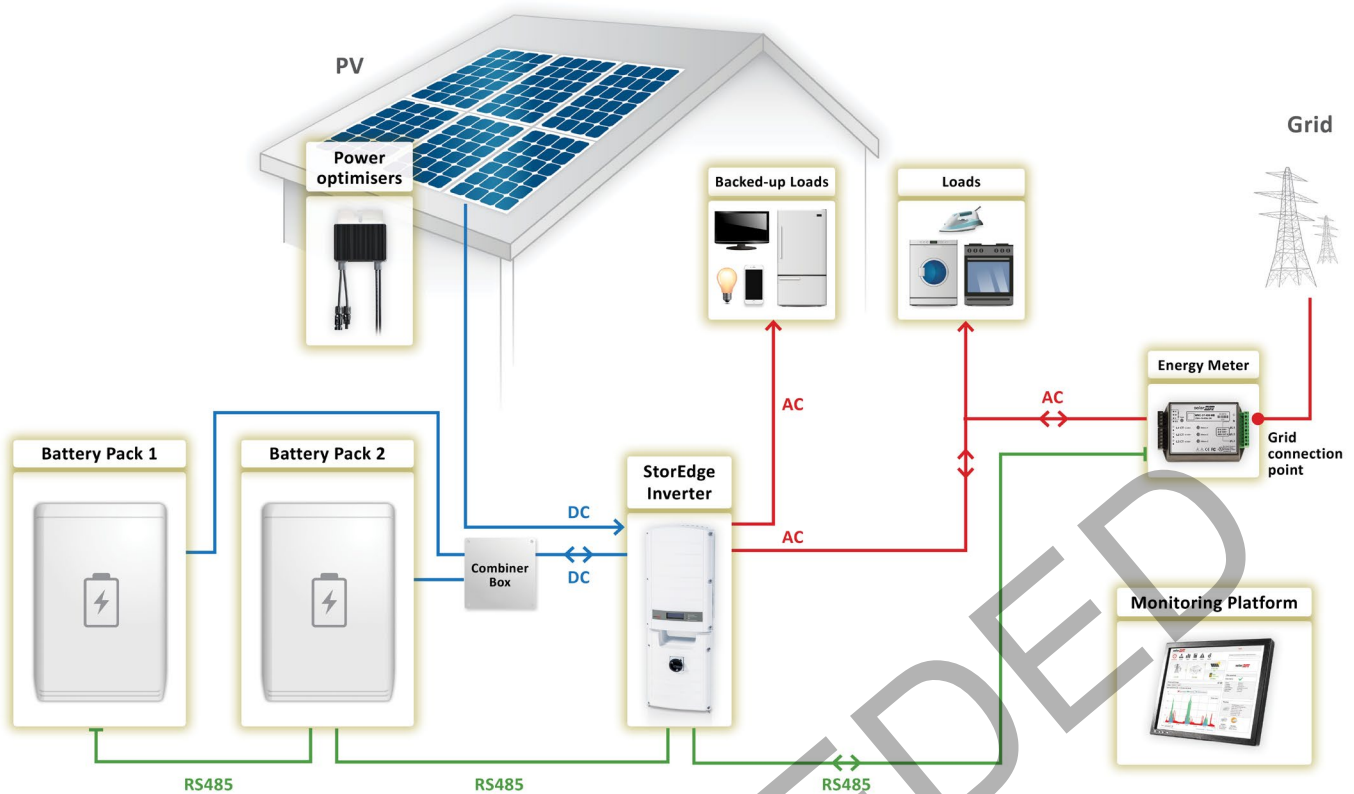


Figure 9: Smart Energy Management with Backup Power - Additional Capacity with Two Batteries

► **To configure the system:**

1. Configure the meter, Battery 1 and backup power as described in *Basic Configuration* on page 11.
2. Configure Battery 2:
  - a. Select **Communication** → **RS485-1 Conf** → **Device Type** → **Multi-devices**. A list of devices is displayed.
  - b. Select **Battery 2**. The battery configuration screen is displayed.
  - c. Select **Device Type** → **Battery Pack**. Battery 2 is pre-configured to LG with device ID 14.

► **To set up Smart Energy Management:**

- After configuring the meter, battery and backup power, proceed with maximizing self-consumption or charge/discharge profile programming as described in *Basic Configuration* on page 11. Repeat this configuration for each of the inverters.

► **To verify communication:**

- Verify communication as described in *Basic Configuration* on page 11.

► **To test the battery:**

- Test the battery as described in *Basic Configuration* on page 11.

## Additional Capacity and Power with Multiple Inverters

For sites where additional capacity and power with multiple inverters is needed (for example, to enable more backed-up loads to be powered simultaneously), up to three StorEdge inverters and three batteries may be installed. Each battery connects through a separate StorEdge Inverter, and each inverter manages the battery and the PV connected to it. Backed-up loads are connected to each inverter through separate load panels. The inverter connected to the meter operates as the system manager.

For these installations, all inverters require CPU version 3.24XX and above. If an upgrade is needed, refer to the StorEdge and Smart Energy Firmware Updates page at: <https://www.solaredge.com/aus/storedge/firmware>.



If the inverter connected to the battery only has a single RS485 bus, installation of an RS485 Plug-in is required. Refer to the RS485 Plug-in Installation Guide at: [http://www.solaredge.com/files/pdfs/RS485\\_expansion\\_kit\\_installation\\_guide.pdf](http://www.solaredge.com/files/pdfs/RS485_expansion_kit_installation_guide.pdf). For instructions on how to check if the inverter has a single RS485 bus or two, refer to *Appendix C – Check Number of RS485 Buses*.

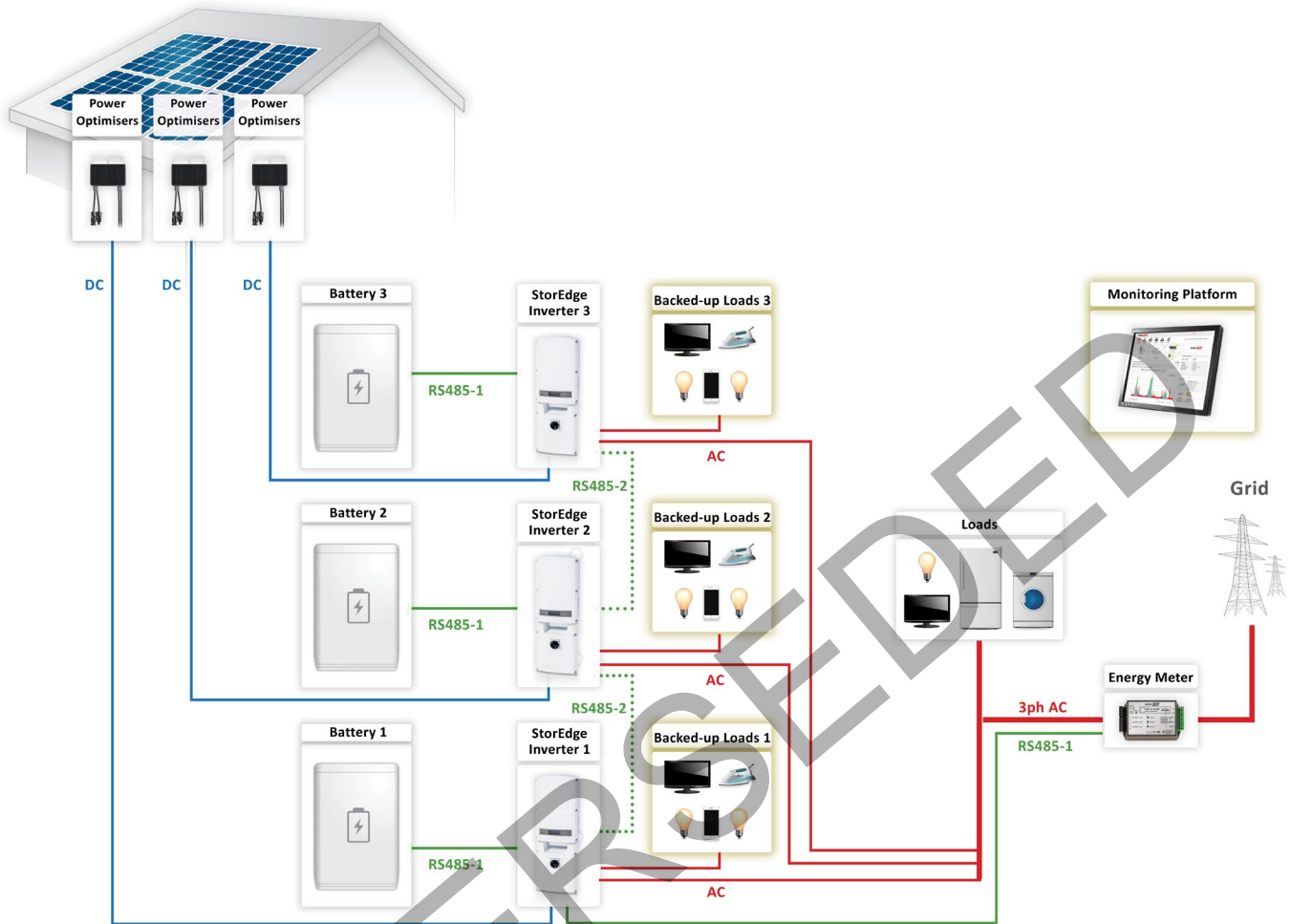


Figure 10: Smart Energy Management with Backup Power - Additional Capacity and Power with Multiple Inverters

#### ► To configure RS485 communication:

1. If needed, install the RS485 Plug-in in the StorEdge inverter. If there is an RS485-2 port in the inverter, use it instead of the expansion kit. The RS485-E port in the following instructions refers either to the Expansion port or to the RS485-2 port.
2. Connect the Inverter 1 RS485-E port to the Inverter 2 RS485-E port using an RS485 twisted pair cable. Make sure to terminate both sides.
3. Configure the Inverter 2 RS485-E port: Select **Communication** → **RS485-E Conf** → **Enable**.
4. Configure the Inverter 1 RS485-E port:
  - a. Select **Communication** → **RS485-E Conf** → **Enable**. Press **Enter** to continue.
  - b. Select **Protocol** → **Master**.
  - c. Select **Slave Detect** on Inverter 1. Verify that the inverter reports the correct number of secondary inverters.

#### ► To configure the system:

1. Configure the meter, battery and backup power of Inverter 1 as described in *Basic Configuration* on page 11.
2. Configure the battery and backup power of Inverter 2 as described in *Basic Configuration* on page 11.
3. Make sure that the meter is not configured on Inverter 2:
  - a. Select **Communication** → **RS485-1 Conf** → **Device Type** → **Multi-devices**.
  - b. Select **Meter2** → **Meter Type** → **None**.

► **To set up Smart Energy Management:**

- After configuring the meter, battery and backup power, proceed with maximizing self-consumption or charge/discharge profile programming as described in *Basic Configuration* on page 11. Repeat this configuration for each of the inverters.

► **To verify communication:**

- Verify communication of both inverters as described in *Basic Configuration* on page 11.

► **To test the battery:**

- Test the battery as described in *Basic Configuration* on page 11.

## AC Coupling using a non-SolarEdge Inverter

For sites with an already installed PV system with a non-SolarEdge inverter, the StorEdge inverter can be AC-coupled to the existing inverter, i.e. the StorEdge inverter used to manage the battery is connected to the AC output of the existing inverter and charges the battery using the PV power produced by the non-SolarEdge inverter.



**NOTE**

The meter is used for Smart Energy Management and does not measure the non-SolarEdge inverter production. The production and self-consumption information in the monitoring portal does not take into account this production.

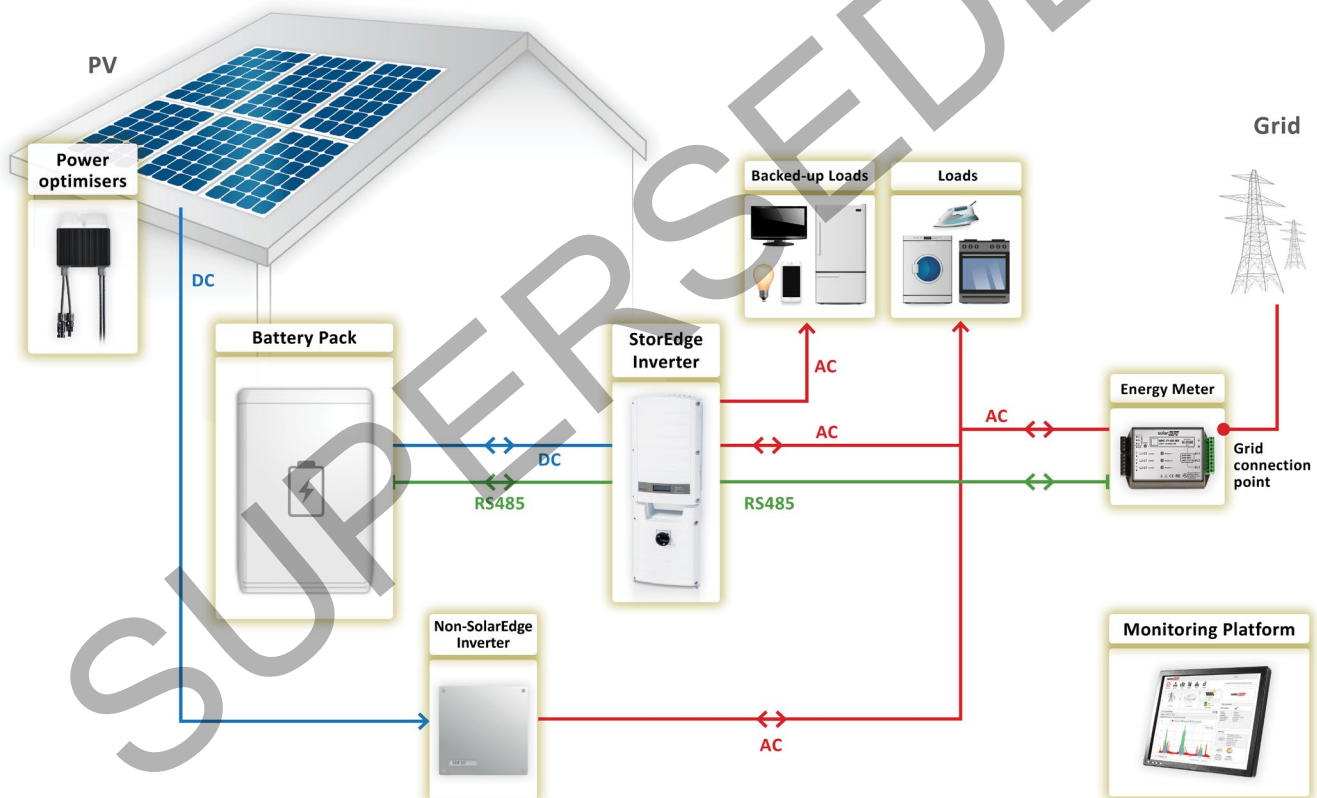


Figure 11: Smart Energy Management with Backup Power - AC Coupling Using a non-SolarEdge Inverter

► **To configure the meter and the battery:**

- Configure the meter, battery and backup power as described in *Basic Configuration* on page 11.

► **To set up Smart Energy Management:**

- After configuring the meter, battery and backup power, proceed with maximizing self-consumption as described in *Basic Configuration* on page 11.

▶ **To verify communication:**

- Verify communication as described in *Basic Configuration* on page 11.

▶ **To test the battery:**

- Test the battery as described in *Basic Configuration* on page 11.

SUPERSEDED

## Backup Power Only – System Configurations

In this mode, stored energy is used for backup power only. In case of a power outage, the inverter automatically switches to backup mode, disconnecting from the grid and supplying power to backed-up loads.

A backup power only system can be upgraded to support Smart Energy Management applications by installing a SolarEdge Energy Meter and reconfiguring the system as described in *Smart Energy Management with Backup Power* on page 4.

Configuration is performed as described in *Smart Energy Management with Backup Power* on page 4, without the *Setting up smart energy management*.

### System Connection

The following diagram illustrates the connection of the system components when using the basic configuration for backup power only—one StorEdge inverter and one battery. For enlarged segments of this diagram, refer to *Appendix D – Detailed System Connection Drawings*.

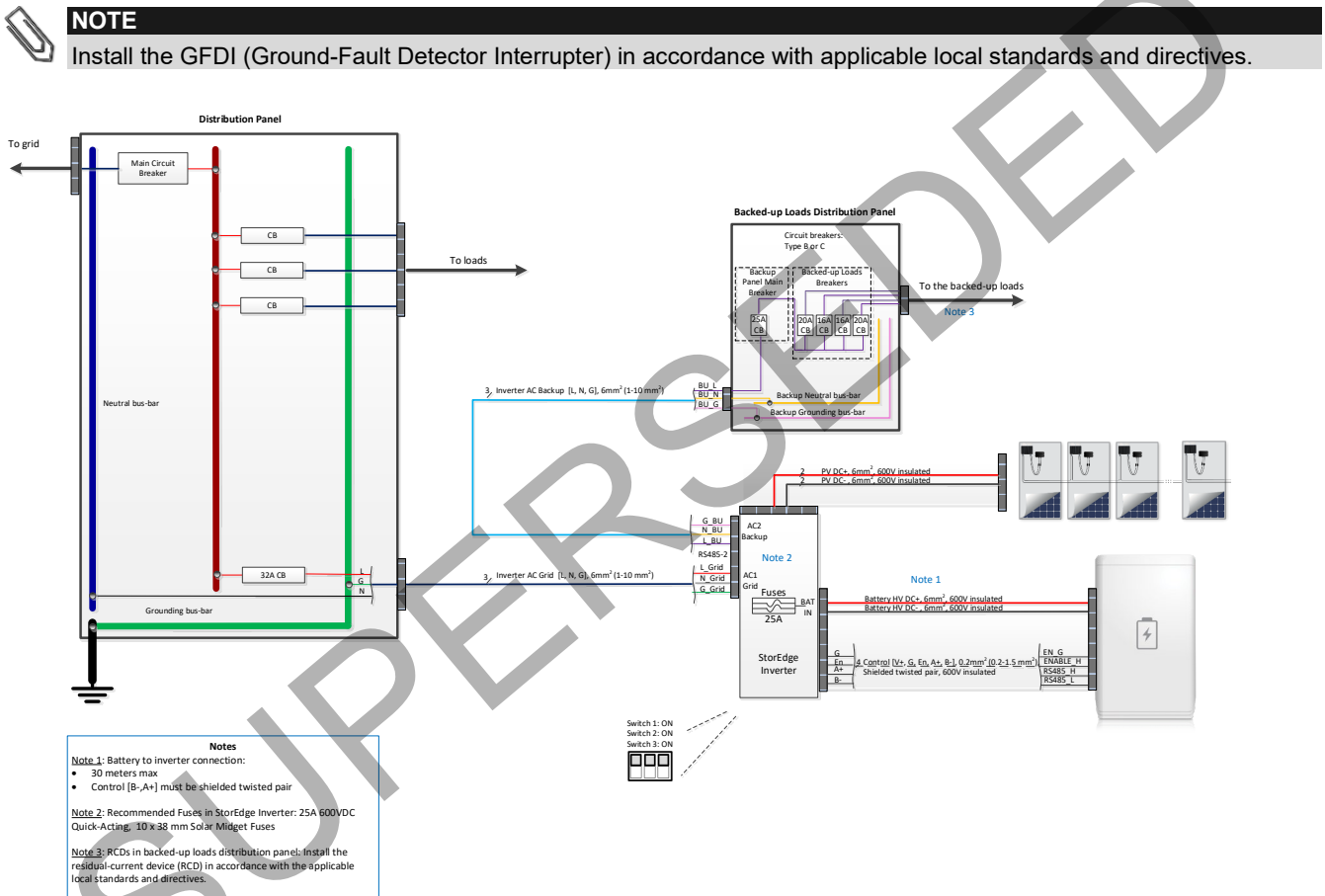


Figure 12: Backup Power only – Basic Configuration

The following diagram illustrates the connection of the system components when using two batteries. In this case, an external combiner box is needed. For enlarged segments of this diagram refer to *Appendix D – Detailed System Connection Drawings*.

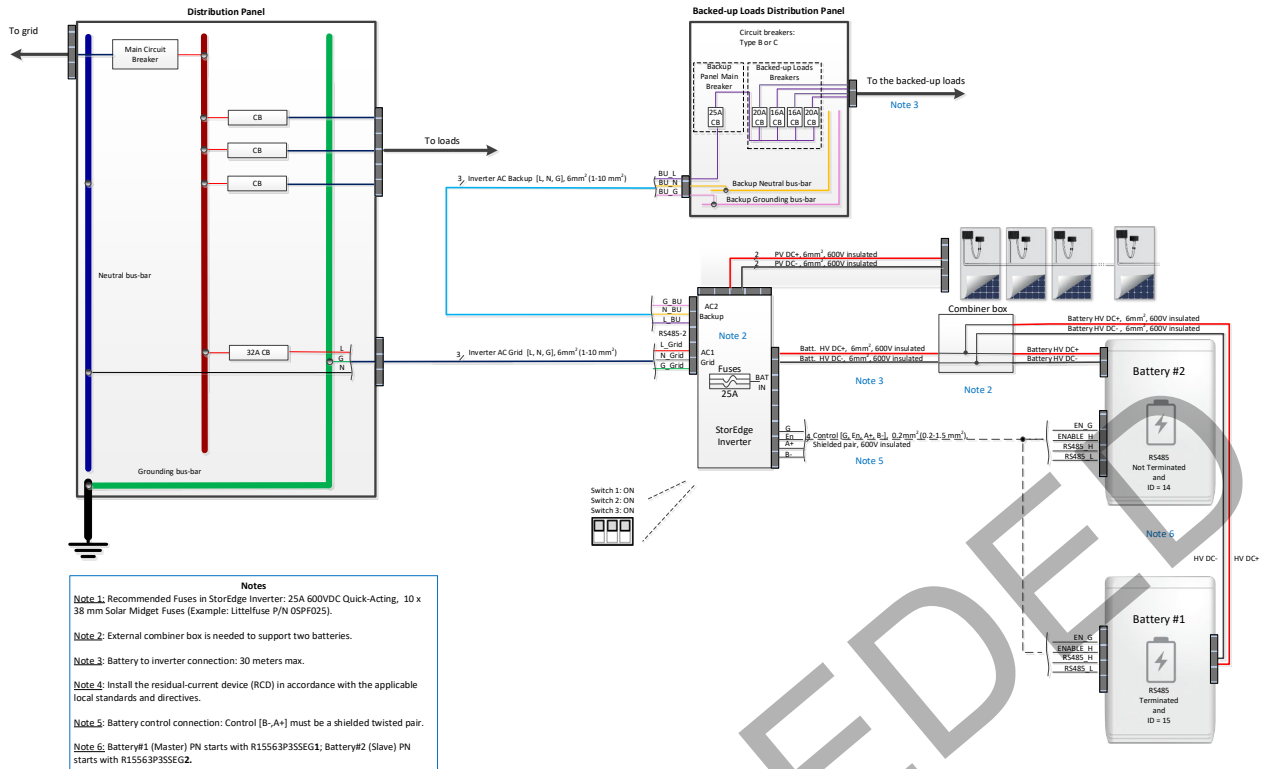


Figure 13: Backup Power only – Using Two Batteries

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The following diagram illustrates the connection of the system components when using three inverters and three batteries. For enlarged segments of this diagram, refer to *Appendix D – Detailed System Connection Drawings*.

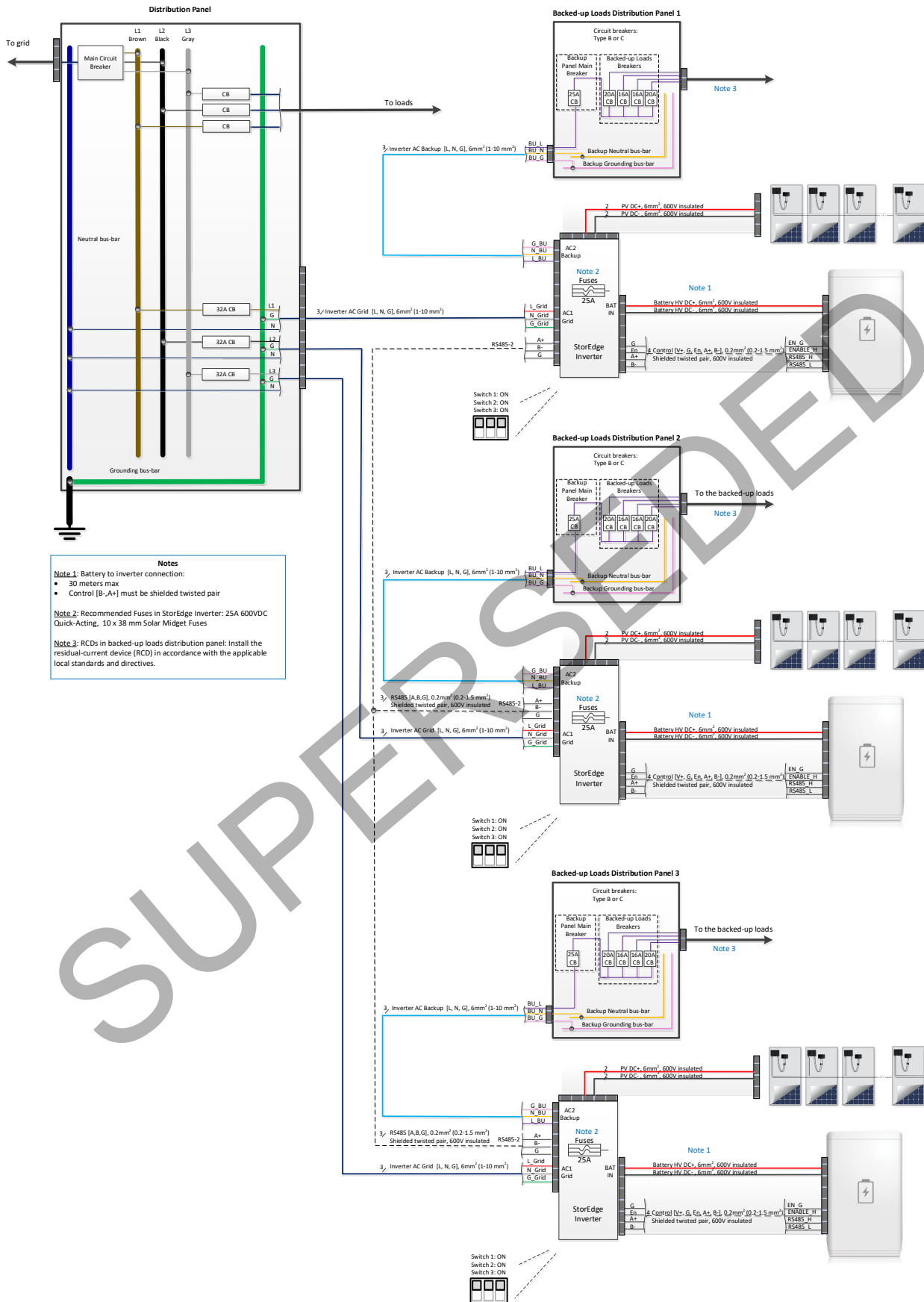


Figure 14: Backup Power only – Using Three Inverters and Three Batteries

## Basic Configuration

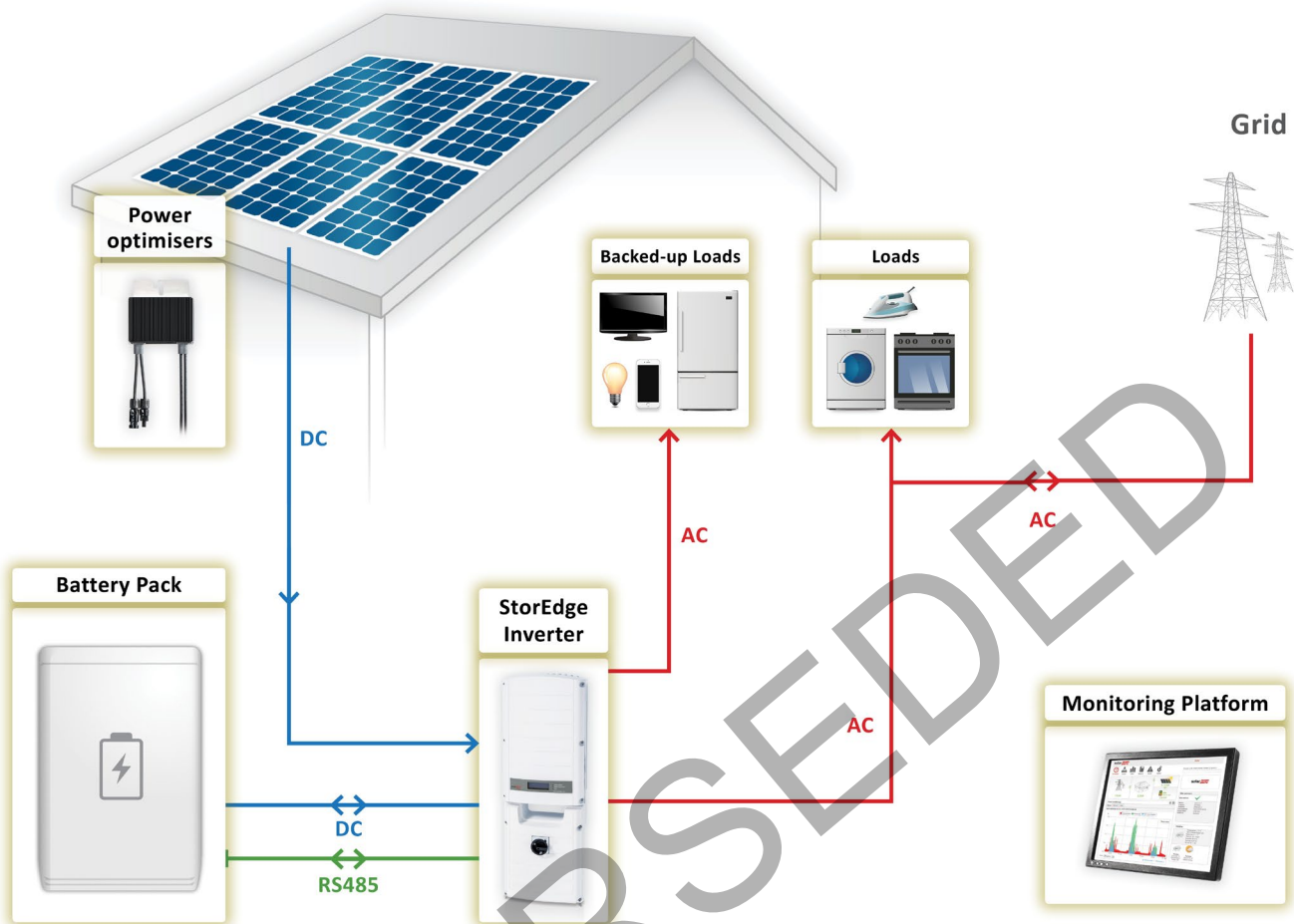


Figure 15: Backup Power Only – Basic Configuration

The following procedure is intended for **backup power only** configurations. For all other procedures, follow the steps provided in the Basic Configuration section of the Smart Energy Management with Backup Power chapter.

► **To configure the system:**

1. Make sure the wiring is connected according to the diagram above.
2. Configure Meter 2 to None:
  - a. Select **Communication** → **RS485-1 Conf** → **Device Type** → **Multi-devices**.
  - b. Select **Meter2** → **Meter Type** → **None**.
3. Check the Communication status screen and verify that the battery is properly connected and configured:

```

Dev Prot ##
RS485-1 <MLT> <02> <02>
ZigBee <---> <---> <--->
    
```

- If Dev is not MLT, the system is not pre-configured and requires full configuration. Proceed with step 4 below.
  - If ## ≠ 01 or Prot ≠ 01, the battery and/or meter are not configured or communicating correctly. Check the configuration. Check the wiring connection. Proceed with step 4 below.
  - If ## = 01 and Prot = 01 – the battery is configured and communicating properly. Skip steps 4 to 3b below and proceed with set up backup power only as described below.
4. Select **Communication** → **RS485-1 Conf** → **Device Type** → **Multi-devices**. A list of devices is displayed.
  5. Configure Battery 1:

- a. Select Battery 1. The battery configuration screen is displayed.
- b. Configure the battery: **Device Type** → **Battery Pack**.

**NOTE**

When using a revenue grade StorEdge inverter:

- The built-in meter is pre-configured as Meter 1 and as a Production meter.
- The Prot and ## in the Communication status screen will increase by 1. For example, if there is an internal meter, an external meter and a battery, the screen should display Prot=03 and ##=03.

► **To Set Up Backup Power Only:**

1. Enter the Setup mode to display the main menu.
2. From the main menu, select **Power Control**. A menu similar to the following is displayed:

```
Grid Control <En>
Energy Manager
RRCR Conf.
Reactive Pwr Conf.
Active Pwr Conf.
Phase Balance <Dis>
Wakeup Conf.
P(f)
Advanced
Load Defaults
```

3. Select **Energy Manager**. The following screen is displayed:

```
Limit Control<Dis>
Energy Ctrl <Dis>
Storage Control
```

4. Select Energy Ctrl.
5. Select **Backup only**. The **Energy Manager** screen changes to display the following:

```
Limit Control<Dis>
Energy Ctrl <Dis>
Storage Control
```

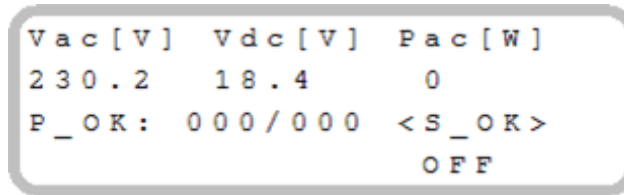
► **To verify communication:**

After connecting and configuring a communication option, perform the following steps to check that the connection to the monitoring server has been successfully established.

1. Turn on the AC to the inverter by turning ON the circuit breaker on the main distribution panel.
2. Wait for the inverter to connect to the SolarEdge Monitoring Platform. This may take up to two minutes.



3. Push the **OK / LCD** button several times, until you see the communication screen on the LCD panel:



**S\_OK:** Indicates that the connection to the SolarEdge Monitoring Platform is successful.

4. For additional verification, refer to *Appendix B – Verifying StorEdge Functionality*.

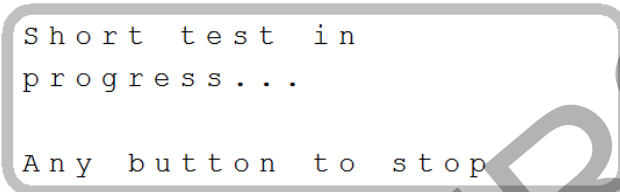
► **To test the battery:**

The test is available in CPU version 3.24xx and higher (but not in version 4.x.xxx).

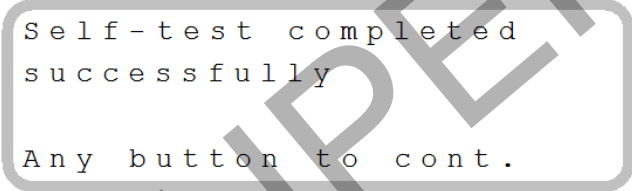
If two batteries are installed, the active battery will be tested first, and then the standby battery. If the active battery fails the test, the test will stop and the standby battery will not be tested.

1. Verify that AC is ON.
2. Turn the inverter ON/OFF switch to ON.
3. Make sure the Connection Unit is ON.
4. Enter Setup mode and select **Maintenance → StorEdge Self-Test → Start Test**. The battery charges and discharges within approximately two minutes to check performance. During the test, the following message is displayed:

During the test, the following message is displayed:



Upon the test completion, the following message is displayed:



If an error message is displayed during the test, use the following table to resolve the error.

Error	Solution
<b>Bat 1 charge failed</b>	Check that the power and communication cables between the battery and inverter are properly connected.
<b>Bat 1 discharge failed</b>	Check that the power and communication cables between the battery and inverter are properly connected.
<b>Low SOE</b>	Charge the battery to 20 percent SOE at least.
<b>Battery comm. error</b>	Check that the communication cables between the battery and inverter are properly connected.
<b>Turn switch to On</b>	Turn the inverter ON/OFF switch to ON.

## Large Residential PV Systems

For residential sites with large PV systems, a StorEdge inverter and a SolarEdge single phase inverter may be installed together. The StorEdge inverter manages the battery and functions as a PV inverter, and the second inverter is used for production of the additional PV power. During power outages, the StorEdge inverter provides power to backed-up loads, and the second inverter remains shut down until the grid is back.

If the inverter connected to the battery only has a single RS485 bus, installation of an RS485 Plug-in is required. Refer to the RS485 Plug-in Installation Guide at: [http://www.solaredge.com/files/pdfs/RS485\\_expansion\\_kit\\_installation\\_guide.pdf](http://www.solaredge.com/files/pdfs/RS485_expansion_kit_installation_guide.pdf). For instructions on how to check if the inverter has a single RS485 bus or two, refer to *Appendix C – Check Number of RS485 Buses*.

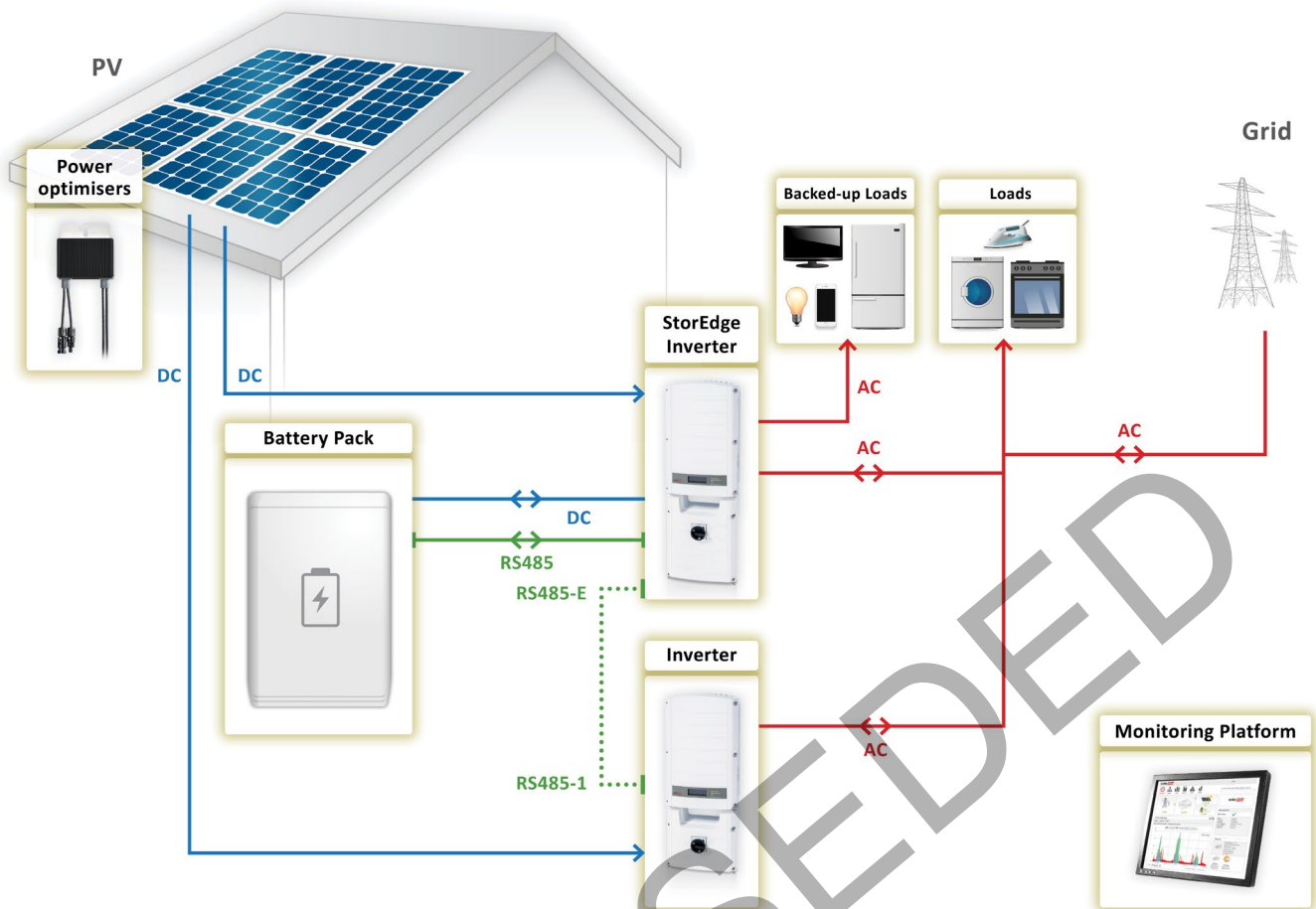


Figure 16: Backup Power Only – Large Residential PV Systems

► **To configure inverter RS485 communication:**

1. If needed, install the RS485 Plug-in in the inverter connected to the battery (the StorEdge inverter in Figure 17). If there is an RS485-2 port in the inverter, use it instead of the expansion kit. The RS485-E port in the following instructions refers either to the Expansion port or to the RS485-2 port.
2. Connect StorEdge inverter RS485-E port to SolarEdge standard inverter RS485-1 port using an RS485 twisted pair cable. Terminate both sides.
3. Select **Communication** → **RS485-E Conf** → **Enable**. Press **Enter** to continue.
4. Select **Protocol** → **Master**.
5. Select **Slave Detect**. Verify that the inverter reports the correct number of secondary inverters.
6. SolarEdge standard Inverter does not require communication configuration.

► **To configure the system:**

1. Configure the StorEdge inverter battery and backup power as described in *Basic Configuration* on page 23.
2. Configure the second SolarEdge inverter as described in [https://www.solaredge.com/sites/default/files/storedge\\_backup\\_installation\\_guide\\_with\\_LG.pdf](https://www.solaredge.com/sites/default/files/storedge_backup_installation_guide_with_LG.pdf).

► **To verify communication:**

- Verify SolarEdge inverter communication as described in *Basic Configuration* on page 23.

► **To test the battery:**

- Test the battery as described in *Basic Configuration* on page 23.

## Additional Capacity with Two Batteries

For sites where additional battery capacity is needed (for example, to enable backed-up loads to be powered from the batteries for longer periods), two batteries may be connected to a single StorEdge Inverter.

In this configuration, only one battery operates at any given time. This means that the two batteries provide additional capacity only, not additional power.

Two-battery installations must meet the following requirements:

- The two batteries must have a different part number and ID.
- Both inverters require CPU version 3.2305 and above.
- Only LG Chem RESU10H batteries can be used.

If an upgrade is needed, refer to the StorEdge and Smart Energy Firmware Updates page at:

<https://www.solaredge.com/aus/storedge/firmware>.

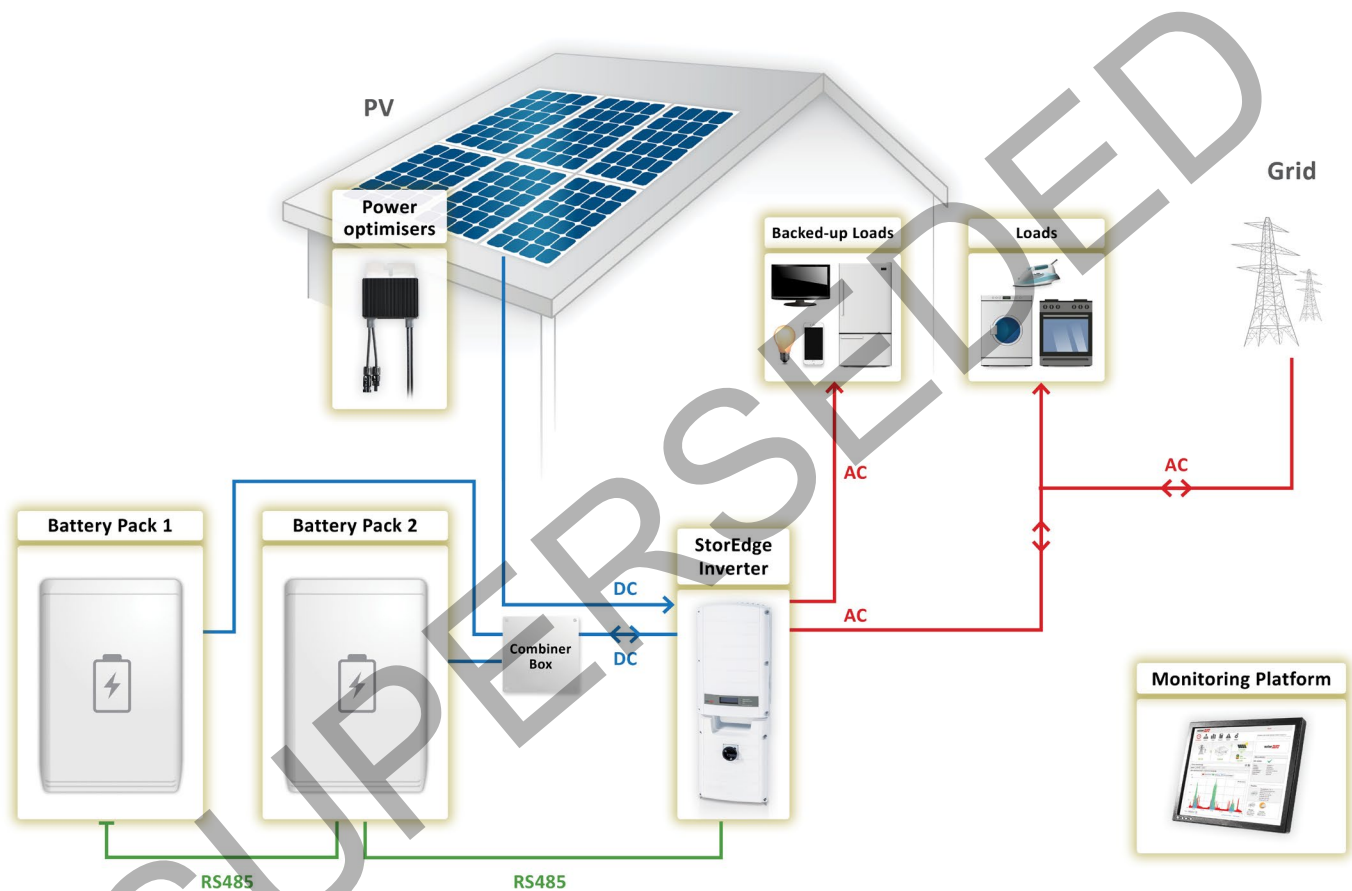


Figure 17: Backup Power Only – Additional Capacity with Two Batteries

### ► To configure the system:

1. Configure Battery 1 and backup power as described in *Basic Configuration* on page 23.
2. Configure Battery 2:
  - a. Select **Communication** → **RS485-1 Conf** → **Device Type** → **Multi-devices**. A list of devices is displayed.
  - b. Select **Battery 2**. The battery configuration screen is displayed.
  - c. Configure the battery: Select **Device Type** → **Battery Pack**.
  - d. Battery 2 is pre-configured to LG with device ID 14.

### ► To verify communication:

- Verify communication as described in *Basic Configuration* on page 23.

### ► To test the battery:

- Test the battery as described in *Basic Configuration* on page 23.

## Additional Capacity and Power with Multiple Inverters

For sites where additional capacity and power with multiple inverters are needed (for example, to enable more backed-up loads to be powered simultaneously), up to three StorEdge inverters and three batteries may be installed. Each battery connects through a separate StorEdge Inverter, and each inverter manages the battery and the PV connected to it. Backed-up loads are connected to each inverter through separate load panels. The inverter connected to the meter operates as the system manager.

For these installations, both inverters require CPU version 3.24XX and above. If an upgrade is needed, refer to the StorEdge and Smart Energy Firmware Updates page at: <https://www.solaredge.com/aus/storedge/firmware>.

If the inverter connected to the battery only has a single RS485 bus, installation of an RS485 Plug-in is required. Refer to the RS485 Plug-in Installation Guide at: [http://www.solaredge.com/files/pdfs/RS485\\_expansion\\_kit\\_installation\\_guide.pdf](http://www.solaredge.com/files/pdfs/RS485_expansion_kit_installation_guide.pdf). For instructions on how to check if the inverter has a single RS485 bus or two, refer to *Appendix C – Check Number of RS485 Buses*.

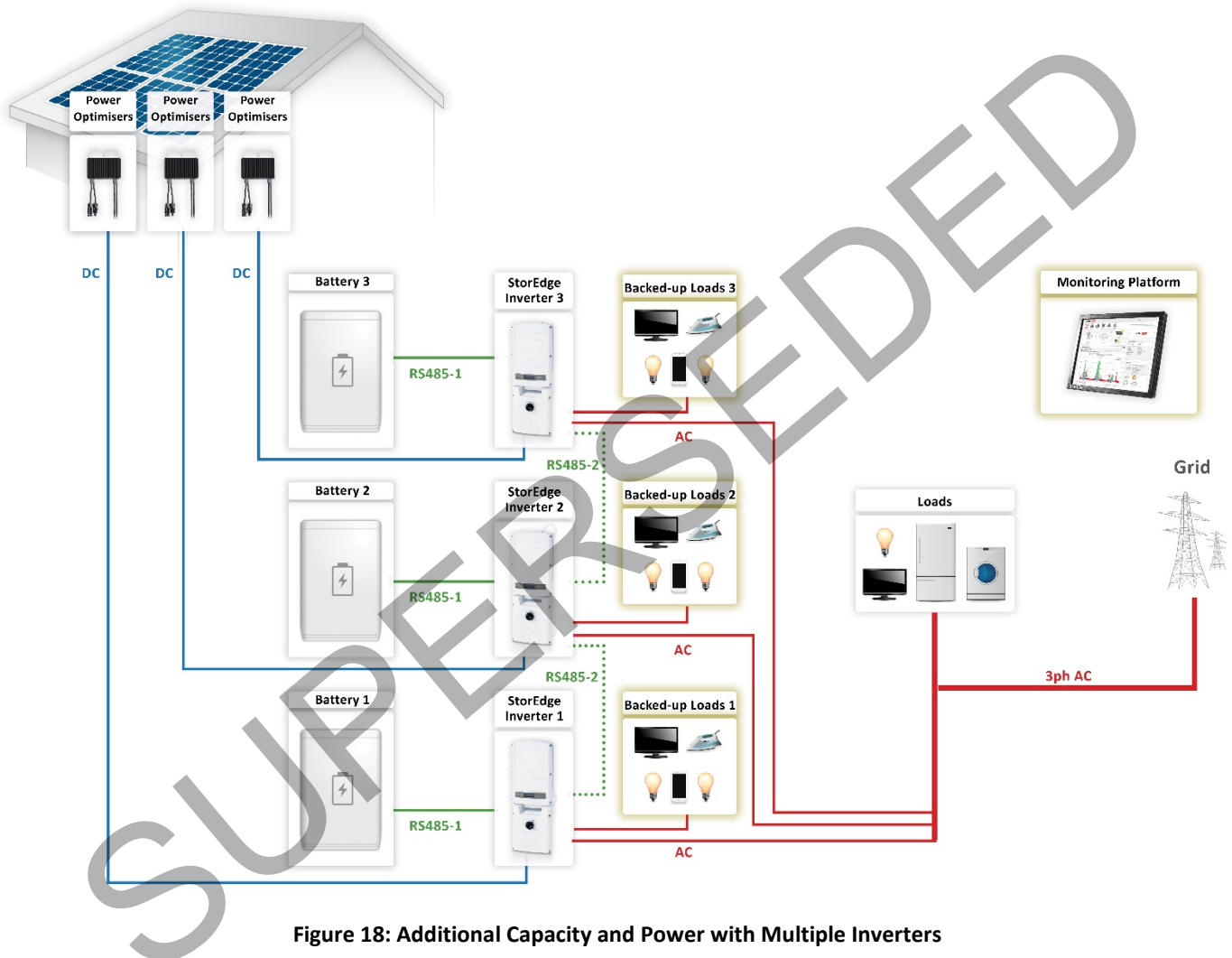


Figure 18: Additional Capacity and Power with Multiple Inverters

### ► To configure RS485 communication:

1. If needed, install an RS485 Plug-in in each inverter. If there is an RS485-2 port in the inverter, use it instead of the expansion kit. The RS485-E port in the following instructions refers either to the Expansion port or to the RS485-2 port.
2. Connect the Inverter 1 RS485-E port to the Inverter 2 RS485-E port using an RS485 twisted pair cable. Make sure to terminate both sides (see *Figure 4*).
3. Configure Inverter 2 RS485 Expansion port: Select **Communication** → **RS485-E Conf** → **Enable**.
4. Configure Inverter 1 RS485 Expansion port:
  - a. Select **Communication** → **RS485-E Conf** → **Enable**. Press **Enter** to continue.
  - b. Select **Protocol** → **Master**.
5. Configure Inverter 2 an RS485 Expansion port:
  - a. Select **Communication** → **RS485-E Conf** → **Enable**. Press **Enter** to continue.

- b. Make sure that the connection is configured to Slave. Select Protocol → Slave
- c. Establish communication between Inverter 1 and Inverter 2:
  - i. Select **Slave Detect** on Inverter 1.
  - ii. Verify that the inverter reports the correct number of secondary inverters. It needs to be done before configuring secondary inverters.

▶ **To configure the inverters:**

- Configure the battery and backup power of both inverters as described in *Basic Configuration* on page 23.

▶ **To verify communication:**

- Verify communication of both inverters as described in *Basic Configuration* on page 23.

▶ **To test the battery:**

- Test the battery as described in *Basic Configuration* on page 23.

## AC Coupling using a non-SolarEdge Inverter

For sites with an already installed PV system with a non-SolarEdge inverter, the StorEdge inverter can be AC-coupled to the existing inverter, i.e. the StorEdge inverter used to manage the battery is connected to the AC output of the existing inverter and charges the battery using the PV power produced by the non-SolarEdge inverter.



### NOTE

The non-SolarEdge inverter production is not measured. The production information in the Monitoring Platform does not take into account this production.

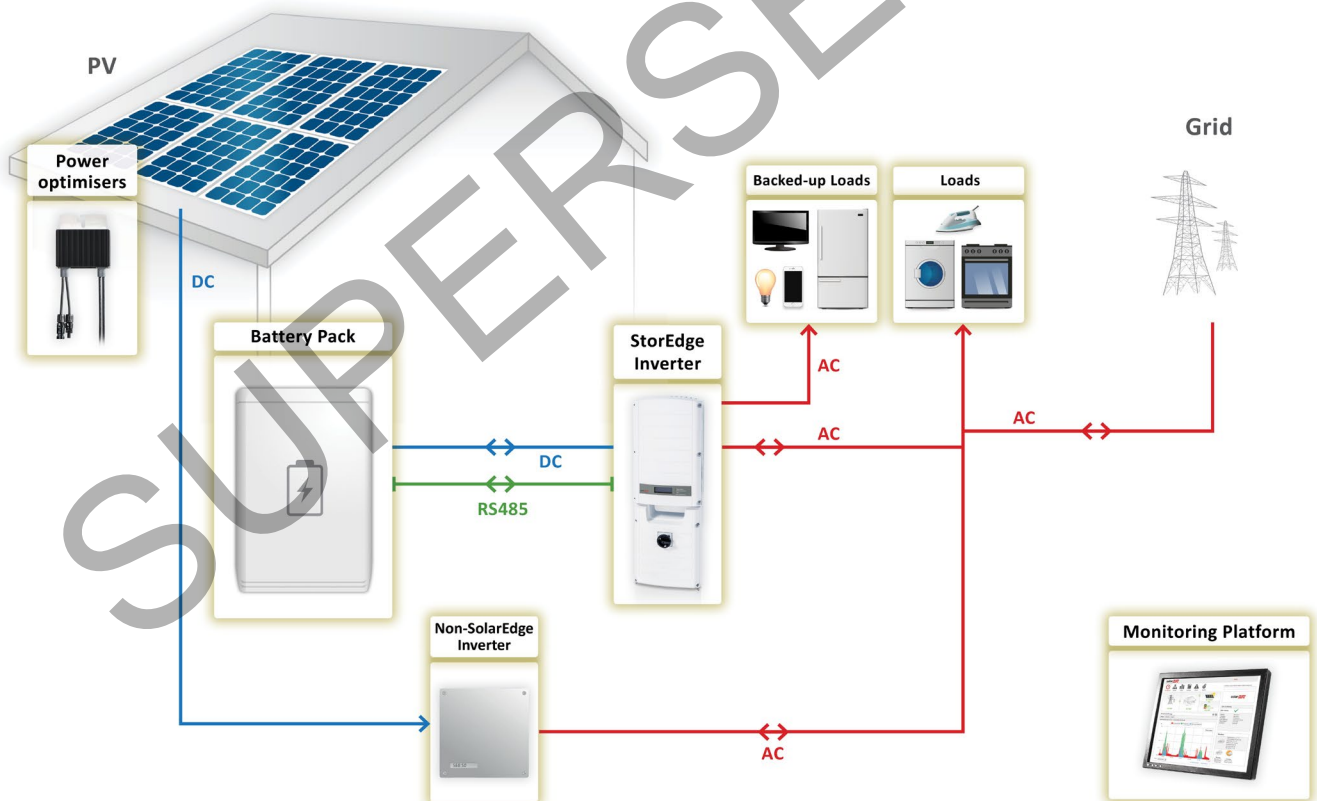


Figure 19: Backup Power Only – AC Coupling using a non-SolarEdge Inverter

▶ **To configure the meter and the battery:**

- Configure the battery and backup power as described in *Basic Configuration* on page 23.

▶ **To verify communication:**

- Verify communication as described in *Basic Configuration* on page 23.

▶ **To test the battery:**

- Test the battery as described in *Basic Configuration* on page 23.

SUPERSEDED



## Appendix A – Creating a Charge/Discharge Profile

A charge/discharge profile is created from a yearly calendar, repeated for 20 years as long as no profile changes are made. The yearly calendar is divided into segments, with one of seven charge/discharge modes assigned to each segment.

A profile comprises three components:

1. Daily profile type: defines the charge/discharge modes throughout a day. Different day types may be defined, for example, winter weekday, spring weekday, weekend, holiday, etc.
2. A seasonal profile: defines weekly profiles to use during specified periods of the year. These periods must cover the entire year. A typical use case is creating seasonal profiles corresponding to the seasonal changes of electricity rates.
3. Special day type: defines dates that should have a specific daily profile instead of the profile defined for the relevant period. For example, if you defined a seasonal profile from Dec. 15 to Jan. 15 but want the system to have a different daily profile for New Years, define a special day. Special days can be set as one-time events or as recurring events.

### Charge/Discharge Modes

Mode	Description	Example Use case
<b>Solar power only</b>	No battery charging/discharging; for using the system without StorEdge capabilities	To avoid excess battery charge/discharge and prolong battery life
<b>Charge from clipped solar power</b>	If PV production > inverter maximum production for self-consumption and grid export (up to the grid export limit and never more than inverter nameplate power), charge the battery	When grid export tariff and PV production are high; for example, during the summer and peak daytime production
<b>Charge from solar power</b>	Charge battery from PV production until it is full, and only then use PV production for self-consumption and grid export	When import rate and PV production are low; for example, during the winter and afternoon
<b>Charge from solar power and grid</b>	Charge battery from PV production and grid power (if needed) until it is full. Only then use PV production for self-consumption and grid export	When import rate is low and when AC charge is allowed by local regulations
<b>Discharge to maximize export</b>	If PV production < inverter maximum production (nameplate or limited power), discharge battery for self-consumption and grid export until the inverter reaches its power limit	When grid export tariff is high and PV production is not enough for self-consumption and grid export
<b>Discharge to minimize import</b>	If PV production < consumption, discharge battery only for self-consumption, not for grid export	When grid export is not allowed
<b>Maximize self-consumption</b>	Use PV production for self-consumption, then charge/discharge battery as needed to maximize self-consumption	When grid export tariffs are low or export is not allowed; reduce grid dependency

Table 1: Charge/Discharge Modes

### Creating a Profile

This procedure can be completed before the system is installed or connected to the portal, that is, the site was defined in the Monitoring Platform but not connected.

#### ► To create a profile:

- Perform steps 1-9 in the *To create a storage profile* procedure of the application note titled *Charge/Discharge Profile Programming through the Monitoring Platform* at: [https://www.solaredge.com/sites/default/files/storedge\\_charge\\_discharge\\_profile\\_programming.pdf](https://www.solaredge.com/sites/default/files/storedge_charge_discharge_profile_programming.pdf).

## Appendix B – Verifying StorEdge Functionality

After system installation and configuration is completed, verify that the system is properly operating:

### ► Verify the meter function:

1. Make sure other power sources (e.g. non-SolarEdge PV inverter) are not producing power.
2. Verify the AC is ON.
3. Check the meter installed at the grid connection point:
  - a. Turn the inverter ON/OFF switch to OFF.
  - b. Connect loads on one of the measured phases.
  - c. Press the external LCD light button to display the Import or Export meter status screen, and check that the import or export power is greater than zero:

```

Import Meter
Status:      <OK/ERROR>
Power [W]:   xxxxx.x
Energy [Wh]: xxxxx.x
  
```

- d. Press the LCD light button to display the Export meter status screen, and check that the Export power is equal to zero. If it is not equal to zero check the CT direction on all connected phases.

### ► Verify maximized self-consumption:

1. Verify the inverter ON/OFF switch is ON.
2. Turn on as many loads as needed so that consumption will be greater than the inverter's maximum AC power. In the inverter LCD check that the Meter status screen is displaying import power greater than zero.
3. Press the inverter LCD light button to display the Smart Energy Management and the Battery status screens, and check that:
  - **State** = Discharging (assuming consumption > PV production, inverter maximum AC power > PV production)
  - **PWR** > 0

```

BSN: XXXXXXXXXXXX ID: 24
SOE: 89%          PWR: 2W
Total: <x>Wh
State: Discharging
  
```

4. While the PV modules are exposed to sunlight, verify that the battery is charging properly:
  - a. Minimize consumption by turning off all the load circuit breakers, except for the inverter.
  - b. In the inverter LCD check that the Meter status screen is displaying import power close to zero.
  - c. Press the external LCD light button to display the Battery status screen, and check that:
    - **State** = Charging
    - **SOE** percentage is increasing
    - **PWR** > 0

```

BSN: XXXXXXXXXXXX ID: 24
SOE: 89%          PWR: 2W
Total: <x>Wh
State: Charging
  
```



## Appendix C – Check Number of RS485 Buses

If the inverter connected to the battery has only a single RS485 bus, or the system has a third-party controller, installation of an RS485 Plug-in is required. The kit provides an additional RS485 port within the inverter for connection.

► **To check the number of RS485 buses in the inverter:**

1. Select **Communication**.
2. If the inverter has two RS485 buses, an RS485-2 port configuration option will appear on the screen:

```
Server <LAN>
LAN Conf
RS485-1 Conf <M>
RS485-2 Conf <S>
```

3. If the inverter has a single RS485 bus, the RS485-2 port configuration option will not appear on the screen:

```
Server <LAN>
LAN Conf
RS485-1 Conf <M>
Cellular Conf <N/A>
```

4. To install an RS485 Plug-in, refer to the RS485 Plug-in Installation Guide at:  
[http://www.solaredge.com/files/pdfs/RS485\\_expansion\\_kit\\_installation\\_guide.pdf](http://www.solaredge.com/files/pdfs/RS485_expansion_kit_installation_guide.pdf)

SUPERSEDED

## Appendix D – Detailed System Connection Drawings

### Smart Energy Management with Backup Power – Basic Configuration

The detailed system connection drawings in this Appendix are based on the basic Smart Energy Management with Backup Power configuration.

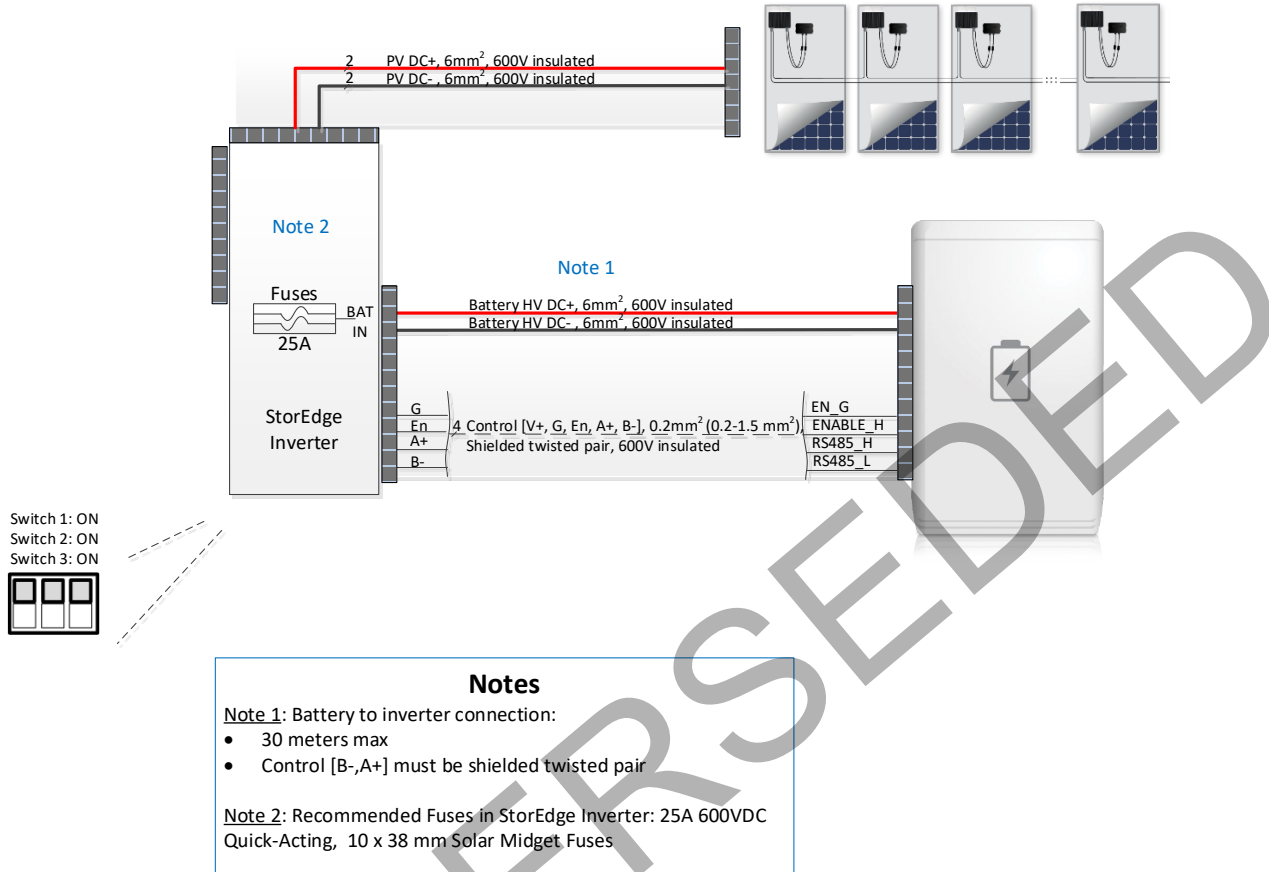


Figure 20: Basic Configuration – StorEdge Inverter, Power Optimisers and Battery

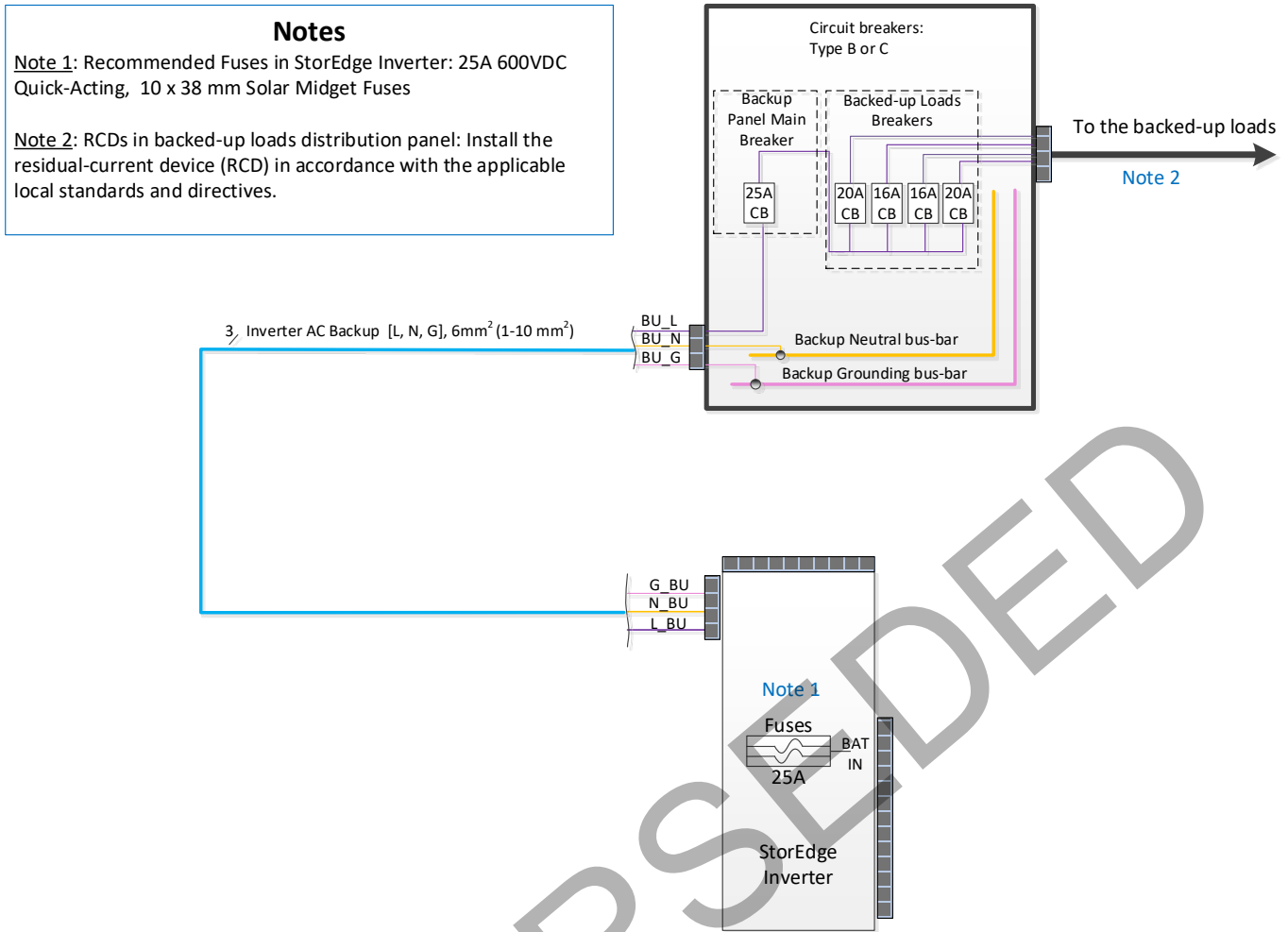


Figure 21: Basic Configuration – StorEdge Inverter and Backed-up Loads Distribution Panel

SUPERSEDED

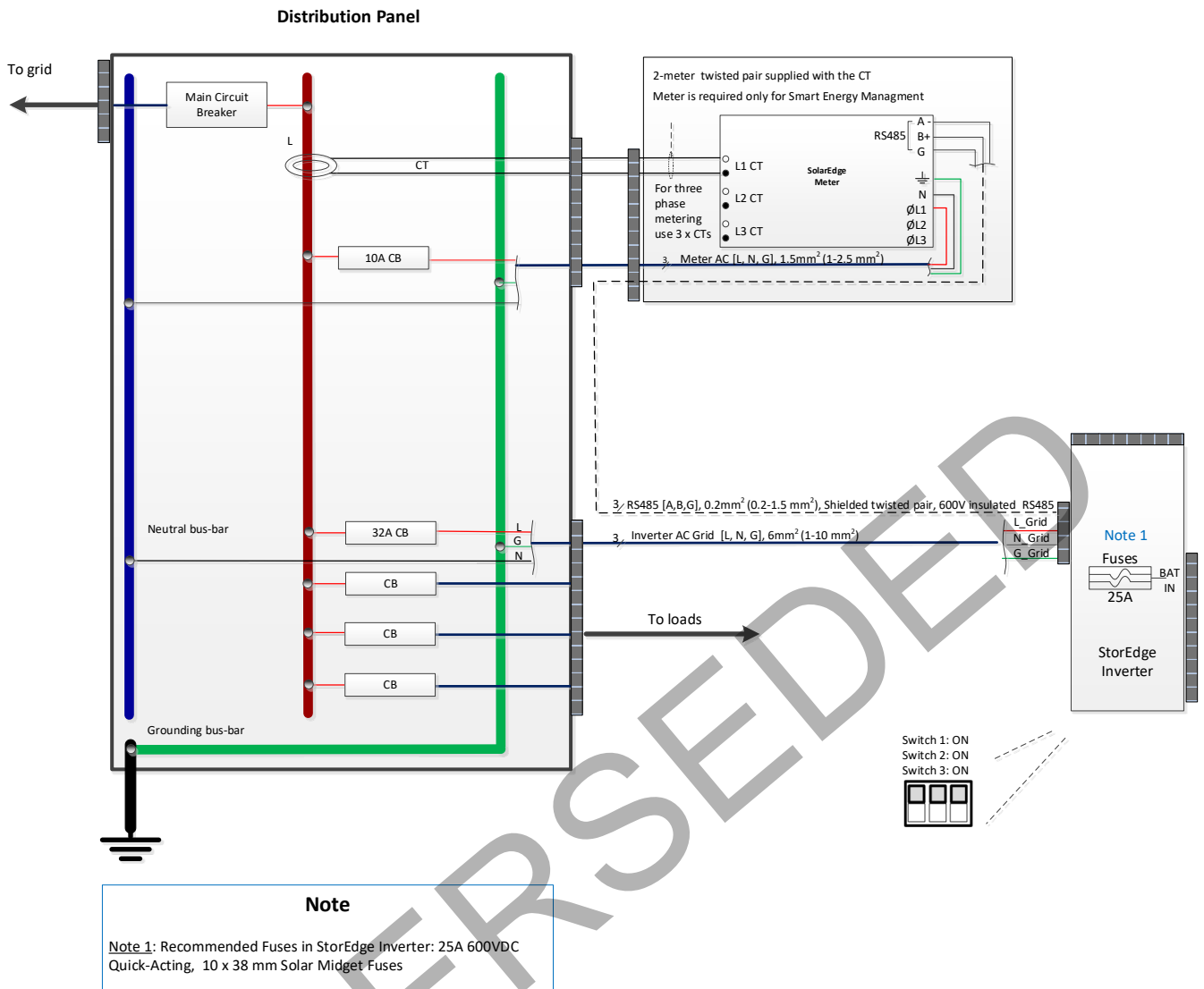


Figure 22: Basic Configuration – StorEdge Inverter, Meter and Main Distribution Panel

## Smart Energy Management with Backup Power – Basic Configuration (Two Batteries)

The detailed system connection drawings in this Appendix are based on the basic Smart Energy Management with Backup Power configuration for two batteries.

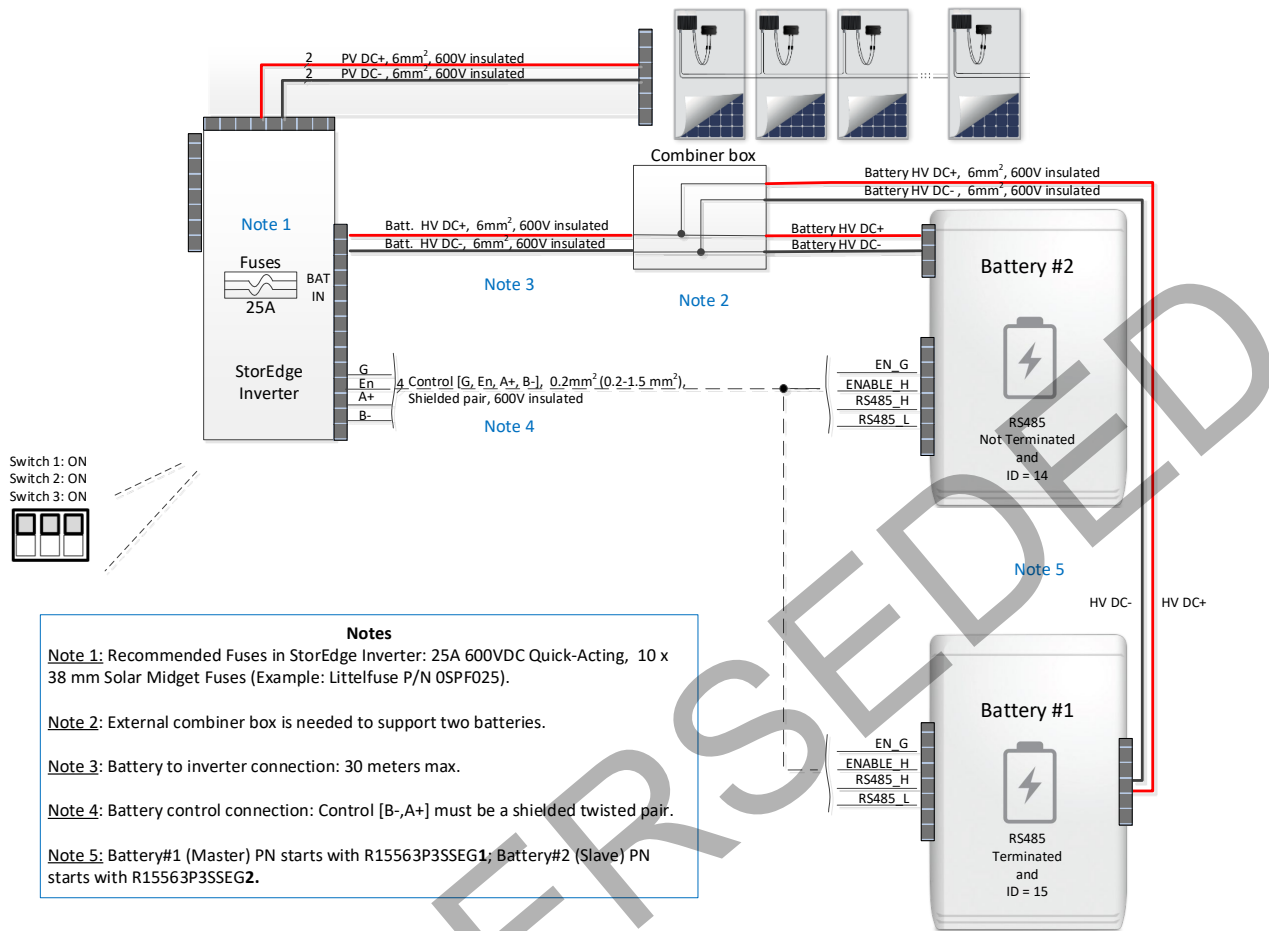


Figure 23: Basic Two-Battery Configuration – StorEdge Inverter, Power Optimisers and Batteries

**Notes**

Note 1: Recommended Fuses in StorEdge Inverter: 25A 600VDC Quick-Acting, 10 x 38 mm Solar Midget Fuses

Note 2: RCDs in backed-up loads distribution panel: Install the residual-current device (RCD) in accordance with the applicable local standards and directives.

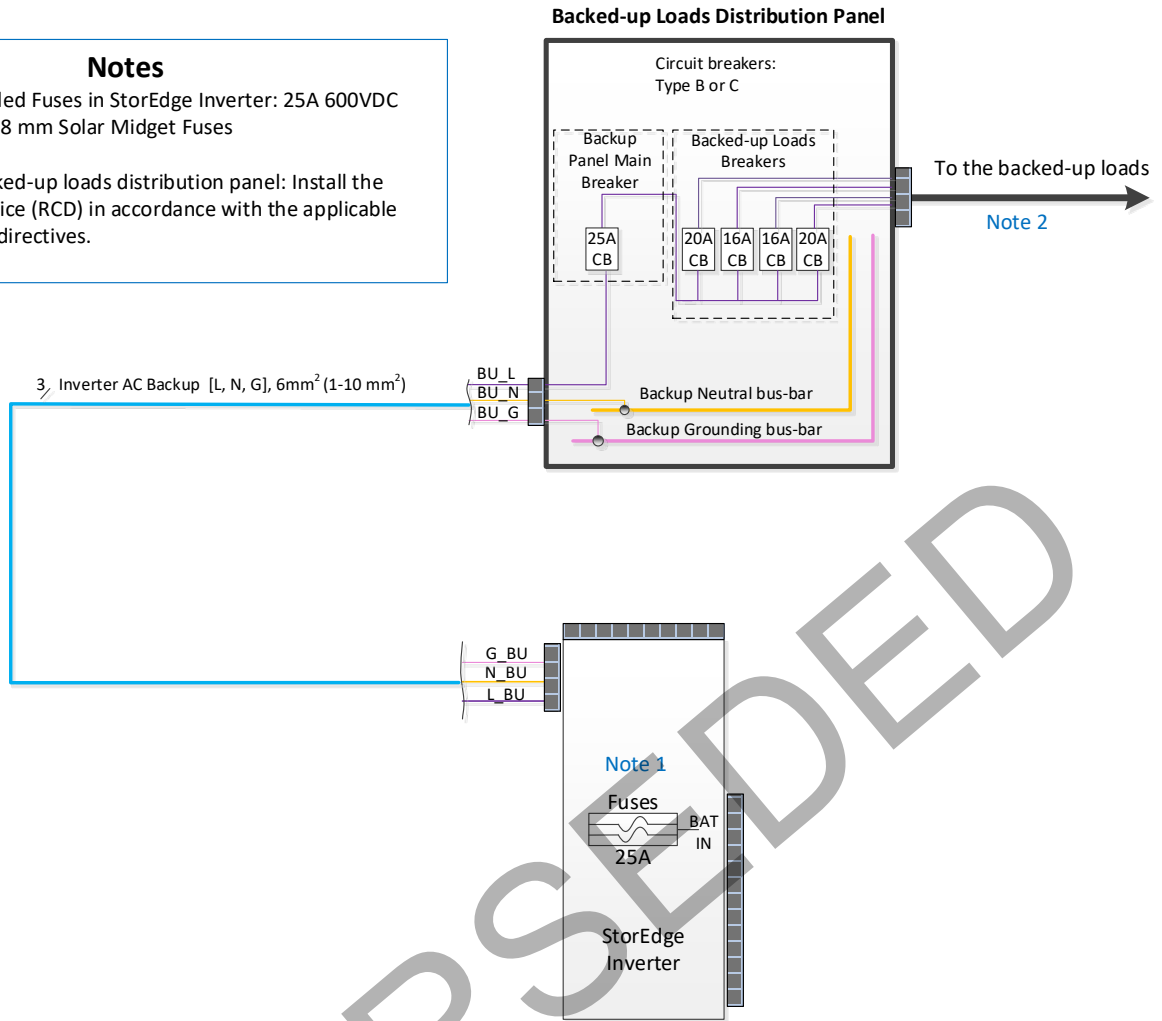


Figure 24: Basic Two-Battery Configuration – StorEdge Inverter and Backed-up Loads Distribution Panel

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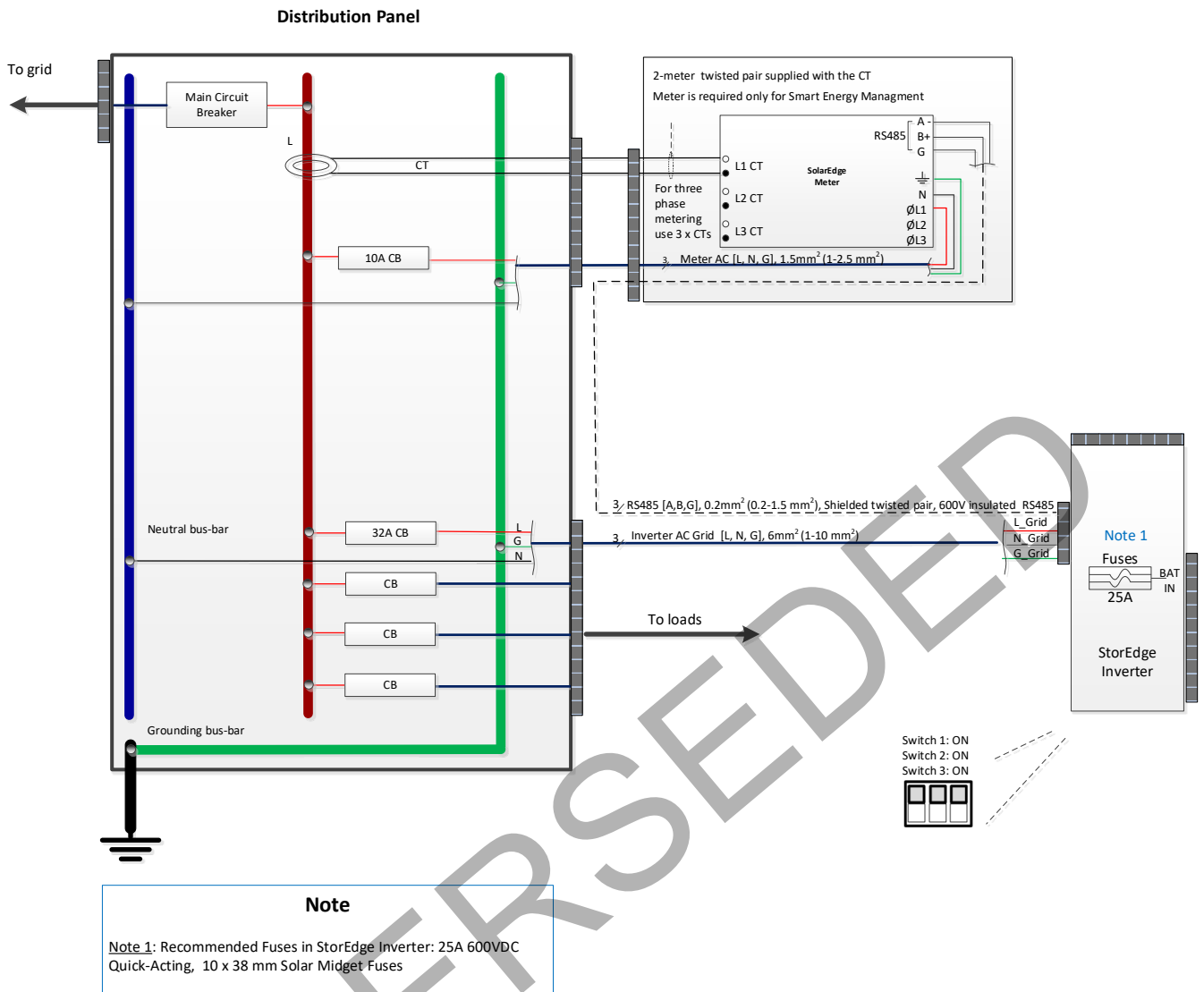


Figure 25: Basic Two-Battery Configuration – StorEdge Inverter, Meter and Main Distribution Panel

## Smart Energy Management with Backup Power – Basic Configuration (Three Inverters and Three Batteries)

The detailed system connection drawings in this Appendix are based on the basic Smart Energy Management with Backup Power configuration for three inverters and three batteries.

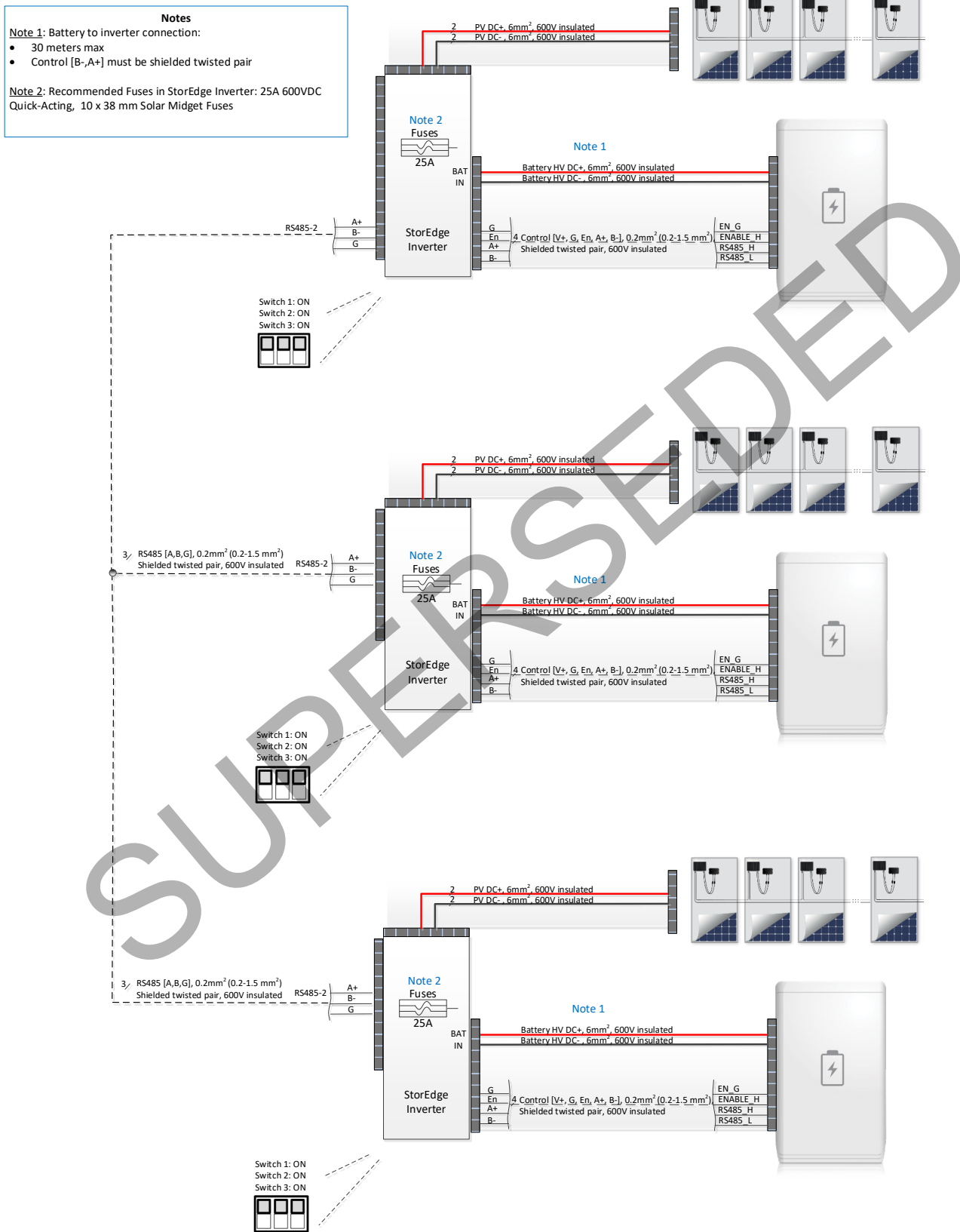


Figure 26: Basic Three-Inverter, Three-Battery Configuration – StorEdge Inverter, Power Optimisers and Batteries



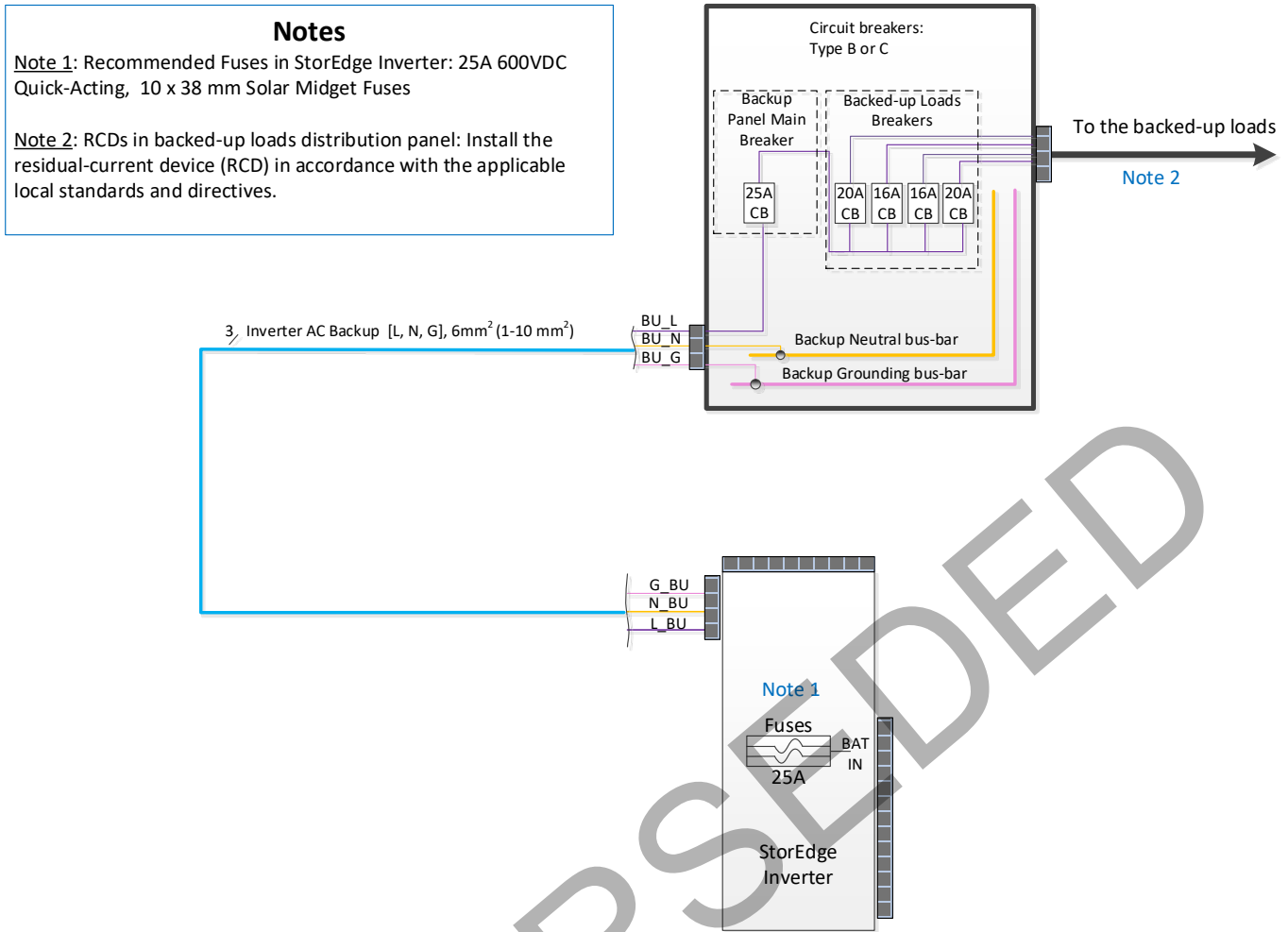


Figure 27: Basic Three-Inverter, Three-Battery Configuration – StorEdge Inverter and Backed-up Loads Distribution Panel

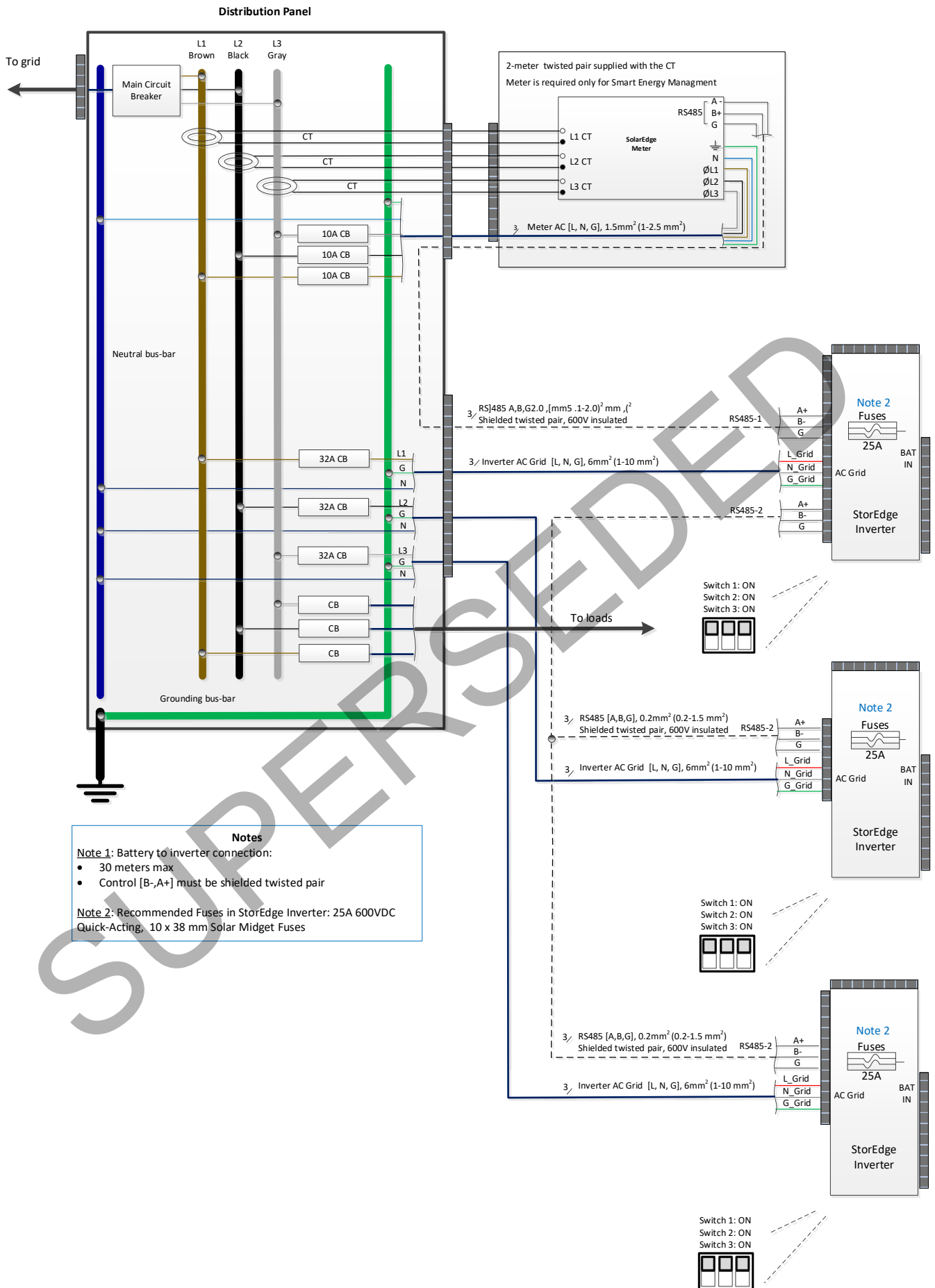
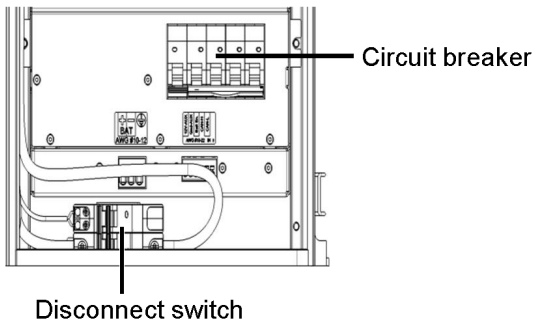


Figure 28: Basic Three-Inverter, Three-Battery Configuration – StorEdge Inverter, Meter and Main Distribution Panel

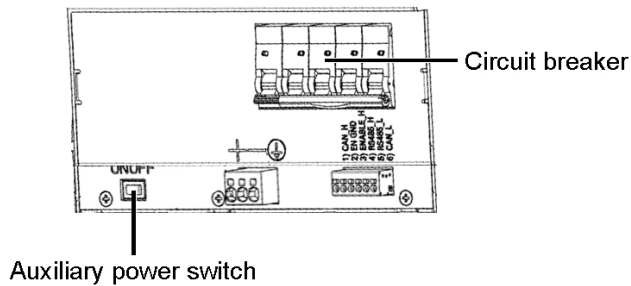
## Appendix E – Powering the LG Chem Battery off and on

LG Chem batteries are available with either of the following two types of powering mechanism design:

- With the disconnect switch (requires Firmware version 3.24xx or later):



- With the auxiliary power switch:



### ▶ To power off the battery:

- Turn off the circuit breaker.
- Turn off the disconnect/auxiliary power switch.

### ▶ power the battery back on:

- Turn on the disconnect/auxiliary power switch.
- Turn on the circuit breaker.

SUPERSEDED

## SolarEdge Support Contact Information

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

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