SolarEdge Solution Connection and Configuration Guide for Australia

Here you can find information on how to connect the SolarEdge Home Battery ("the battery") and LG Prime batteries to a SolarEdge inverter, either directly or via the DC Combiner, as well as the wiring steps for the SolarEdge Backup Interface and how to configure them using SetApp after the commissioning.

Contents

Revision History

Version 1.0 – May 2022

First release of this document

Version 2.0 – June 2022

Update of Figure 20: Genesis SE10000H-BPV maximum oversizing example.

Additional x6 SLD's 18-23.

CT setting clarification for Backup Interface

EN line update for SolarEdge Home Battery when connected HD Wave/Genesis

Version 3.0 – July 2022

Update of pre-startup Battery Polarity Check.

CT Extension information

3Ph Metering Voltage reference connections

Multiple Inverter Metering requirements

Updates to SLD’s

Updates to Residential STC kWp Calculations

Connecting Battery Communication and DC.

For setting up communication between the battery and the inverter, SolarEdge strongly recommends using the SolarEdge Home Network.

If for some reason the SolarEdge Home Network cannot be used, you can set up communication using an RS485 port, as explained in this section.

If x3 batteries are to be installed on a single inverter the DC Combiner must be used. Use the following cable types:

DC - 6mm - 10mm CSA 600V insulated depending on route length.

Communication - CAT6

WARNING!

Read carefully all handling and safety instructions in the installation guides that come with the battery and the inverter.

WARNING!

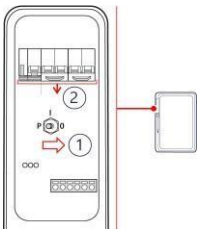
The inverter cover must be opened only after switching the inverter ON/OFF/P switch located at the bottom of the inverter to OFF. This disables the DC voltage inside the inverter. Wait five minutes before opening the cover.

WARNING!

Ensure that the correct battery polarity is always observed. Turning on the battery with reverse polarity may permanently damage the battery

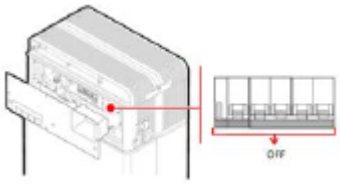
WARNING!

Before connecting the battery to the inverter, ensure the battery power is off.



SolarEdge Energy Bank

1. Toggle off the battery ON/OFF/P switch.
2. Turn off the battery circuit breaker.



LG Prime Battery

1. Turn off the battery circuit breaker.

Single Phase Energy Hub Inverter

WARNING!

Read carefully all handling and safety instructions in the installation guides that come with the SolarEdge Home Network card and the inverter.

→ To connect communication via SolarEdge Home Network:

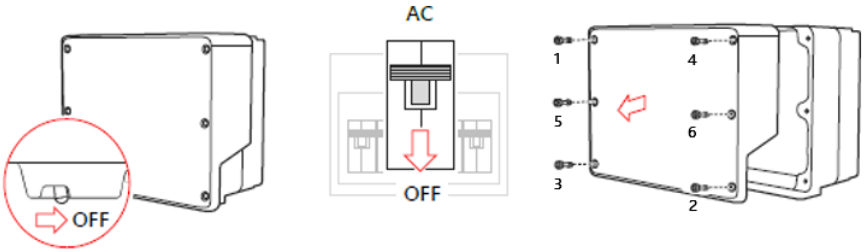
Remove the inverter cover.

Switch off the inverter ON/OFF/P switch and wait 5 minutes for the internal capacitors to discharge.

Switch off the AC circuit breaker on the main distribution panel.

1. Open the Allen screws of the inverter cover and carefully pull the cover horizontally before lowering it.

Open the inverter cover as shown below.



Connect the SolarEdge Home Network plug-into the socket on communication board.

Connect the antenna, pass antenna cable through communication gland.

Clip antenna (supplied) to heatsink fin.

Tie antenna cable to communication board bracket with plastic tie (supplied).

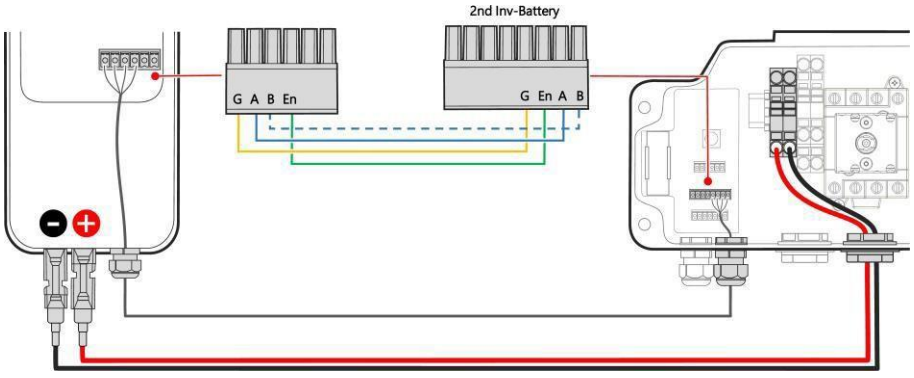
Replace the inverter cover and Connection Unit cover (DCD). Tighten screws to 8.4Nm.

Restart inverter and verify device in SetApp, select Status > Communication > Energy Net OK.

→ To connect communication between the inverter and SolarEdge Home Battery via RS485:

1. Connect the communication cable to the battery's RS485 connector as shown below.
2. Open Communication Gland 2 at the bottom of the inverter's Connection Unit.
3. Feed the other end of the communication cable through one of the gland openings
4. Remove the connector from the port labeled 2nd Inv-Battery on the communication board.
5. Connect the communication cable to the connector, as shown below.
6. if 2 or more batteries are being connected, daisy chain the connections between each battery.
7. Close Communication Gland 2 with a torque of 5 Nm.

NOTE: When connecting the SolarEdge Home Battery to an HD Wave or Genesis the EN line connection is not required.



→ To connect DC cables:

Connect the DC cables to the battery, as explained in the installation guide that comes with the battery.

Pass the other end of the DC cable through the Battery conduit of the inverter.

Connect the wires to the DC terminals.

WARNING!

Make sure to connect the cables at correct polarity. Connecting the cables at reverse polarity may result in damage to the inverter or battery.

Proceed with the battery installation, as explained in the battery installation guide.

→ To connect communication between inverter and LG Prime Battery via RS485:

Connect the communication cable to the battery's RS485 connector as shown below.

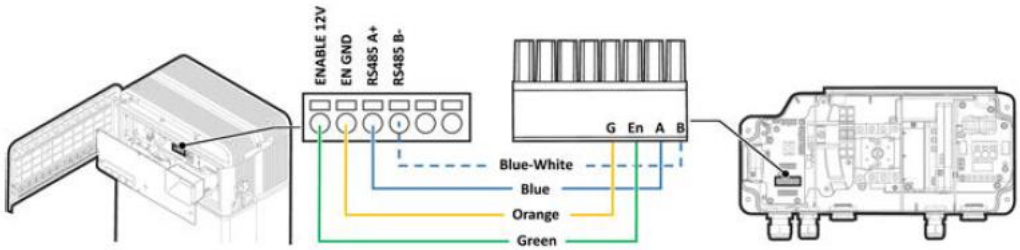
Open Communication Gland 2 at the bottom of the inverter's Connection Unit.

Feed the other end of the communication cable through one of the gland openings

Remove the connector from the port labeled 2nd Inv-Battery on the communication board.

Connect the communication cable to the connector, as shown below.

Close Communication Gland 2 with a torque of 5 Nm.



→ To connect DC cables:

1. Connect the DC cables to the battery, as explained in the installation guide that comes with the battery.
2. Pass the other end of the DC cable through to the DC Combiner.
3. Connect the wires to the DC battery terminals within the DC Combiner.

WARNING!

Make sure to connect the cables at correct polarity. Connecting the cables at reverse polarity may result in damage to the inverter or battery.

2. Proceed with the DC Combiner connections as per the installation guide.

Connecting DC Combiner Cables

For installing x3 SolarEdge Home Batteries the DC Combiner must be used as there is only a single DC input in the inverters connection unit. For one or two SolarEdge Home Battery installations the DC Combiner is optional.

Use the following cable types:

DC - 6mm - 10mm CSA 600V insulated depending on route length.

WARNING!

Read carefully all handling and safety instructions in the installation guides that comes with the DC Combiner, Battery and the inverter.

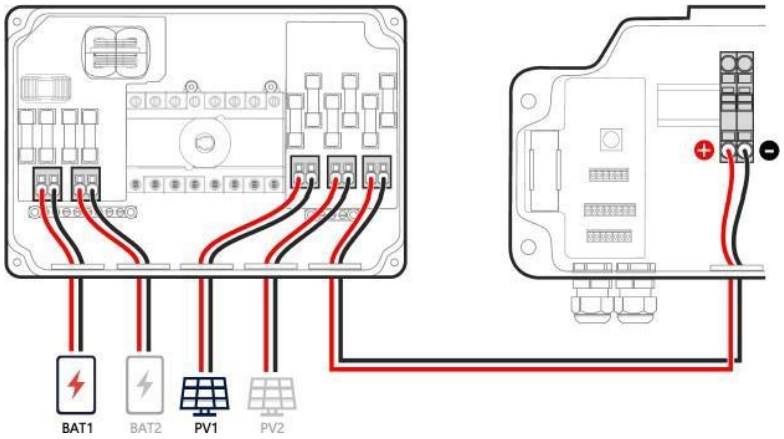
WARNING!

Before connecting the DC Combiner and battery to the inverter, ensure the battery and inverter power is off.

→ To connect DC between the battery and the inverter:

1. Open cover of the DC Combiner.
2. Open the conduit entries at the bottom of the DC Combiner and install conduits, as required by local regulations. Maximum supported conduit is diameter of 32 mm.
3. Connect the DC cable from the batteries as shown below.
4. Connect the DC cables form the PV array/s as shown below

3. Connect the ground to the combiner box by connecting it to the inverter.
4. Close cover of the DC Combiner with a torque of 1.2 Nm.

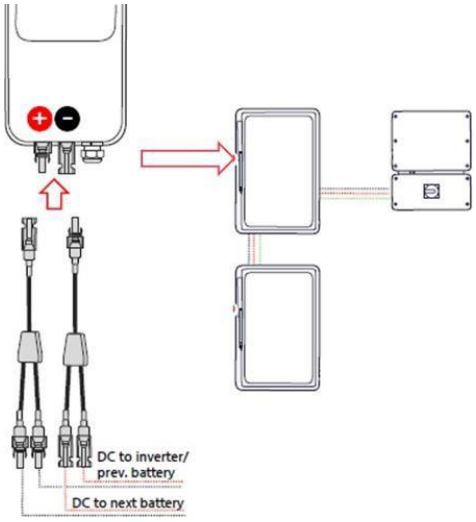


Connecting When the DC Combiner Is Not Used

The combining of multiple DC supplies will be required when the DC Combiner is not used as the DC terminal inside the inverter's DCD connection unit only has a single input.

If there are two or more PV Array's on the roof the recommendation is that these be combined into a single home run supply to the inverter, either at the roof or at a location prior to entering the inverter's DCD connection unit.

When two SolarEdge Energy Bank batteries are to be installed ensure that the branch connectors are used.



As the inverter's DCD connection unit only has a single input, and there will be two DC connections to bring together, one the from Power Optimisers as well as one from the batteries, crimp the DC cables together using a two into one bootlace ferrule before inserting into the DC terminal. Ensure that there is sufficient length to enable full purchase withing the DCD DC connector, with some bootlace ferrules it may be necessary to leave 4-6mm of cable protruding from the end.

Pre-startup Battery Polarity Check

Before energizing the battery ensure that the polarity of the DC connections is correct, +to+ and -to-.

Use the following cable types:

Use a voltmeter set to DC

WARNING!

Startup of the Battery in reverse polarity may cause permanent failure of the battery not covered under warranty

→ To check the DC Polarity between the battery and the PV (Optimisers):

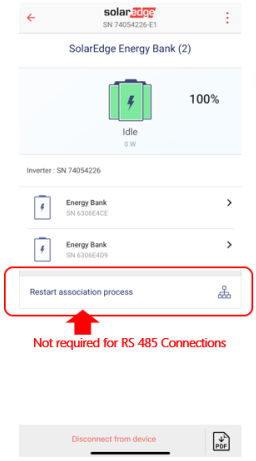
Ensure that the AC to the inverter is OFF.

5. Ensure that the DC Isolator on the DCD is in the OFF position
6. If a DC Combiner is connected ensure the DC Isolator is in the ON position.
7. With the MC4 connections at the Battery terminal removed, test for the nominal Safe DC string voltage. If a string contains x20 Optimizers then expect a 20Vdc result.
8. Ensure that the + plug reads a + voltage value.
9. Repeat for all batteries connected.

Battery Association Note

When running through the battery commissioning stages please note that the 'Association' stage is only required for batteries connection via the SolarEdge Home Network' protocol.

For batteries connection via RS-485 the Association stage is not required.



Running a Battery Self-test

You can run a battery self-test only after finishing the battery installation and configuration (refer to the battery installation guide).

The purpose of the battery self-test is to check the battery's charge and discharge functionality.

→ To run a battery self-test:

1. Make sure the battery's circuit breaker switch is ON.
2. Switch the inverter ON/OFF/P switch to ON.
3. In SetApp, select Commissioning > Maintenance > Diagnostics > Self-Test Battery Self-Test > Run Test.
4. Wait for all tests to complete and check the results in the summary table.

5. If any of the tests have failed, see the table below for possible solutions:

Test Results	Solution
Charge failed	Check that the power and communication cables between the battery and inverter are properly connected.
Discharge failed	Check that the power and communication cables between the battery and inverter are properly connected.
Communication	Check that the communication cables between the battery and inverter are properly connected.
Inverter switch is off	Switch the inverter ON/OFF/P switch to ON.

→ **To show the last test results:**

Select **Commissioning > Maintenance > Diagnostics > Self-Test > Battery Self-Test > Show Last Results**.

Connecting Backup Interface Communication Cables

For setting up the Backup Interface, for backup operation, a communication connection between the Backup Interface and the inverter needs to be made.

Use the following cable types:

Communication - CAT6

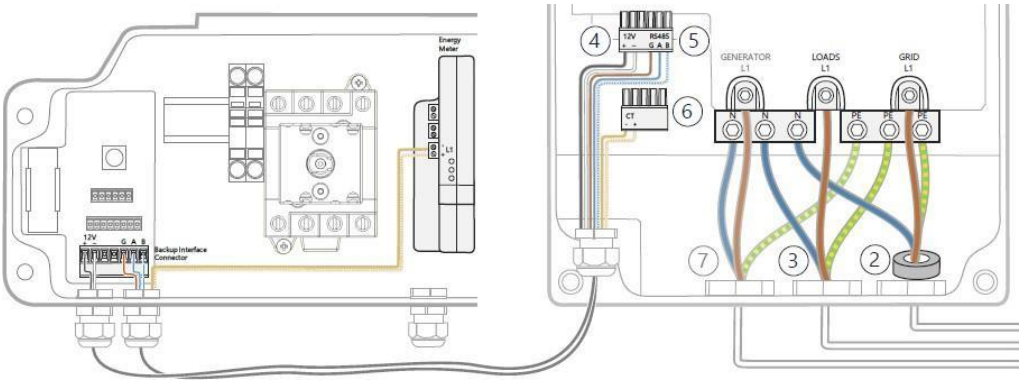
WARNING!

Read carefully all handling and safety instructions in the installation guides that comes with the Backup Interface and the inverter.

WARNING!

Before connecting the Backup Interface to the inverter, ensure the battery and inverter power is off.

As only x7 cores are required for all Backup Interface to Energy Hub connections a single CAT6 cable with a minimum of x4 twisted pairs can be used.



CT Connections

Ensure that the following polarity for the CT connections are made:
Connection inside Backup Interface:

- **L1** – Positive
- **CT** – Negative

Connection inside DCD Inbuilt Meter

- ● – Positive
- ○ – Negative

Single Phase Energy Hub Inverter

→ **To connect communication between the Backup Interface and the inverter:**

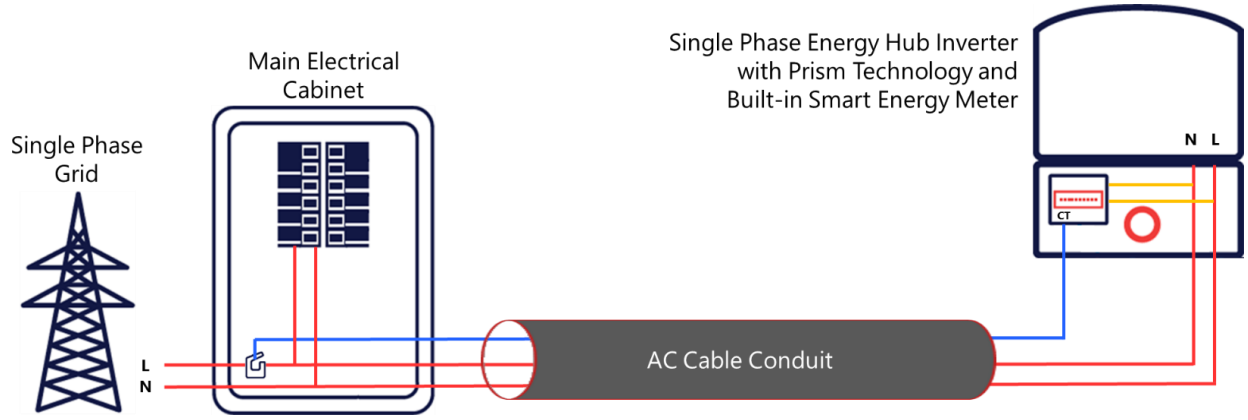
1. Open communication gland at the bottom of the Backup Interface and feed one other end of the communication cable through one of the gland openings at the bottom of the Backup Interface.
2. Connect the communication cable to the Backup Interface's RS485 connector as shown below. (Item 5)
3. Connect the 12V power supply connection to the Backup Interface's Modbus connector as shown below. (Item 4)
4. Connect the CT connection to the Backup Interface's CT terminal connector as shown below. (Item 6)
5. Open communication gland at the bottom of the inverter's Connection Unit.
6. Feed the other end of the communication cable through one of the gland openings.
7. Remove the connector from the port labeled Backup Interface on the communication board.
8. Connect the RS485 communication cable to the connector, as shown below.
9. Connect the 12V power supply connection to the connector, as shown below.
10. Connect the CT connection to the L1 terminal of the in built Modbus meter within the inverter's Connection Unit, as shown below.
11. Close Communication Gland 2 with a torque of 5 Nm.

Current Transformer (CT) Installation

10. If the Backup Interface is not being installed, or if the CT within the Backup Interface is not being connected, this section describes the installation and extension process.
11. As the Energy Hub inverter has a built in Modbus meter within the DC Connections module (DCD), in most cases when the CT is installed within the meter board the CT connection will need to be extended. A CAT6 shielded extension cable shall be used to connect the CT twisted pair to the meter. The extension cable is routed via the AC conduit, together with the AC wiring.
12. Wire the meter in accordance with the connection diagram in the scenario: Export/Import Energy Metering in a Single-Phase Grid Installation.

Export/Import Energy Metering in a Single Phase Grid Installation

In the single-phase grid example in the figure below, one CT is installed for Export/Import metering.



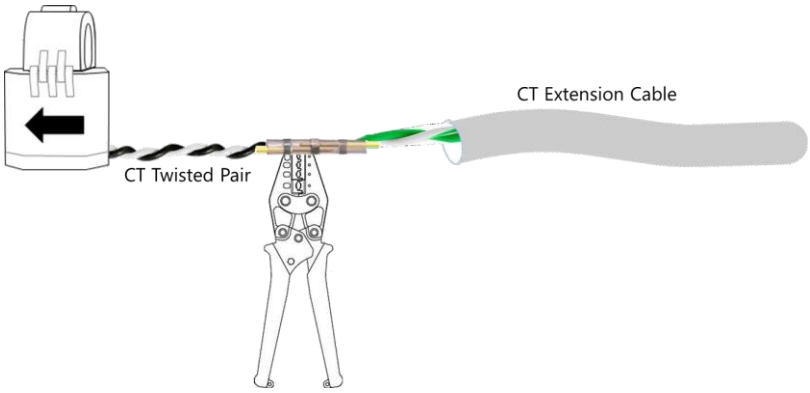
→ 13. To install the CT:

Power off the inverter and disconnect its main circuit breaker.

Attach the CT to the relevant AC wire, in accordance with the connection diagram in the scenario: Export/Import Energy Metering in a Single-Phase Grid Installation.

When attaching the CT to the conductor to be measured, the arrow on the CT should point in the direction of the current source.

Cut the CT's black-and-white twisted wire pair to the required length (leaving some additional spare length) and connect the pair to the shielded CT extension cable, splicing them using a crimping tool, as shown in the figure below.



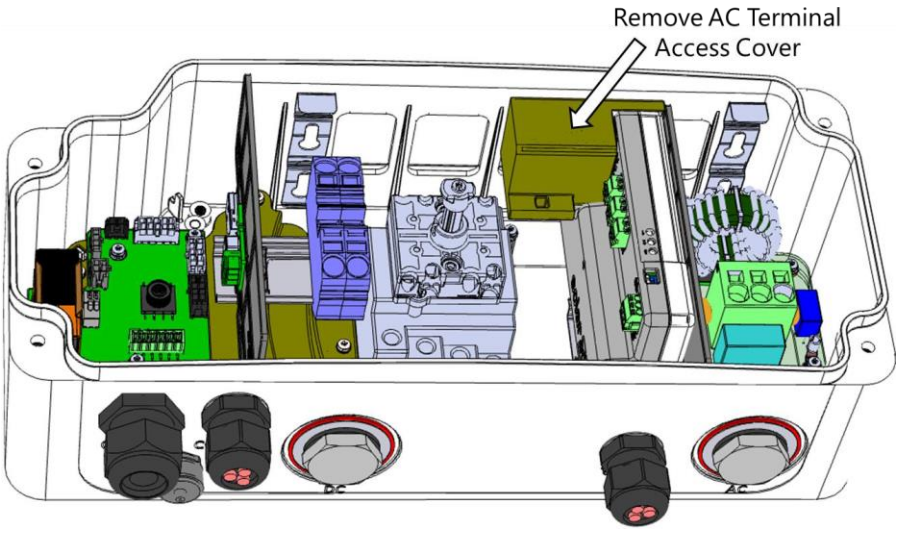
Do not use the method of twisting the wires and taping them together. This type of connection is not reliable, and the wires may eventually disconnect from each other.

CT's can be extended up to 100m. Connect the grid AC wiring – L and N – to the designated terminal blocks.

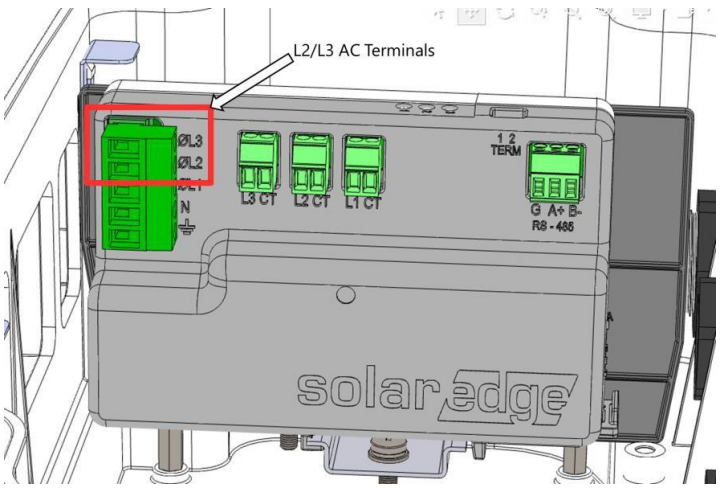
Energy Hub 3Ph Metering Voltage Connections

When metering is required for a 3Ph site the following procedure is required to enable the additional voltage references.

To prepare the installation for use at a 3Ph site:



1. Remove the meter's AC terminal access cover.
2. Connect the L2 and L3 AC lines from the AC supply.



1. Replace AC terminal cover.
2. Fit two additional current transformers for L2 and L3.

14.

Metering Connections for Multiple Inverter Sites

15. When sites are being installed with multiple Energy Hub inverters in leader/follower configuration, only the leader inverter requires a metering connection.
16. The Energy Hub inverters come with a pre-installed Modbus meter, any follower inverter will have to have this meter either disabled and removed via SetApp, or alternatively physically disconnected inside the DCD by unplugging the RS485 terminal prior to turning on the inverter.
17.

Setting Backup Interface CT Value

This section describes how to configure your system for correct metering configuration when connecting the inbuilt Energy Hub meter to the CT terminal inside the Backup Interface.

The default CT setting for the meter within the Energy Hub is 70A. The CT value for the device within the Backup Interface is 100A and the default setting needs to be updated.

Open SetApp and select **Commissioning > Site Communication > RS485-1 > Modbus Meter > CT Rating > 100A**.

Enabling Backup Applications

This section describes how to configure your system for backup via the StorEdge application options. Before enabling StorEdge applications, make sure to:

Finish battery installation and configuration (refer to the battery installation guide).

Run a battery self-test, as described above.

Backup Power Applications

The produced power stored in the battery maybe used during power outages. When there is a grid outage, the Backup Interface automatically detects the grid failure and switches into Backup mode, disconnecting from the grid. The Energy Hub inverter will switch over to backup mode (approx. 3 seconds) and will supply power to the

backed-up loads.

This application requires connection to the Backup Interface and backed-up loads (pre-selected dedicated loads or the entire home).

To start using StorEdge (backup) applications, you first need to enable the Backup Configuration functionality. The Backup function is disabled by default and once enabled it will support the following two configurations:

Backup with Smart Energy Management – Battery energy is used for maximizing self-consumption (MSC) or charge/ discharge profile programming (for time of use arbitrage) and backup power applications.

Backup only – energy stored in the battery is reserved and discharged only for backup power needs when there is no power from the grid.

If Backup Configuration is disabled, the system will continue to use the battery energy in MSC or charge/ discharge profile programs, but it will NOT provide Backup to designated loads in case of a power outage.

→ **To enable Backup Configuration:**

Open SetApp and select **Commissioning > Power Control > Energy Manager > Backup Configuration > Backup > Enable**.

After the Backup Configuration is enabled, the Backup Interface is automatically configured.

→ To enable a StorEdge application:

1. Select **Power Control > Energy Manager > Energy Control**.
2. Select one of the following applications:

   Backup only - Set the system to supply power to backed-up loads only in case of a power outage.

   Time of use - Set a charge/discharge profile and the level of charging the battery from AC.

   Maximum Self Consumption (MSC) - Set the system to maximize self- consumption, and then the level of stored energy to be reserved for backup.

System Startup and Shutdown

→ To start up the system:

1. Turn ON the SolarEdge Home Battery MCB.
2. Move the SolarEdge Home Battery toggle to the ON position.
3. Switch to the ON position, the DC Isolator on the DC Combiner (If installed).
4. Switch to the ON position, the DC Isolator on the inverter DCD.
5. Move the SolarEdge inverter toggle to the ON position.
6. Switch to the ON position, the AC to the inverter at the adjacent AC isolator (if installed) and inside the main switch board.

→ To shut down the system:

1. Move the SolarEdge inverter toggle to the OFF position and wait until the green LED is blinking, indicating that the DC voltage is safe (<50V), or wait five minutes before continuing to the next step.
2. Switch to the OFF position, the AC to the inverter at the adjacent AC isolator (if installed) and inside the main switch board.
3. Switch to the OFF position the DC Isolator on the inverter DCD.
4. Switch to the OFF position the DC Isolator on the DC Combiner (If installed).
5. Move the SolarEdge Home Battery toggle to the OFF position.
6. Turn OFF the SolarEdge Home Battery MCB.

→ To shut down the system in case of emergency:

1. Switch to the OFF position, the AC to the inverter at the adjacent AC isolator (if installed) and inside the main switch board.
2. Switch to the OFF position the DC Isolator on the inverter DCD.
3. Switch to the OFF position the DC Isolator on the DC Combiner (If installed).
4. Turn OFF the SolarEdge Home Battery MCB.

Common Installation Configurations

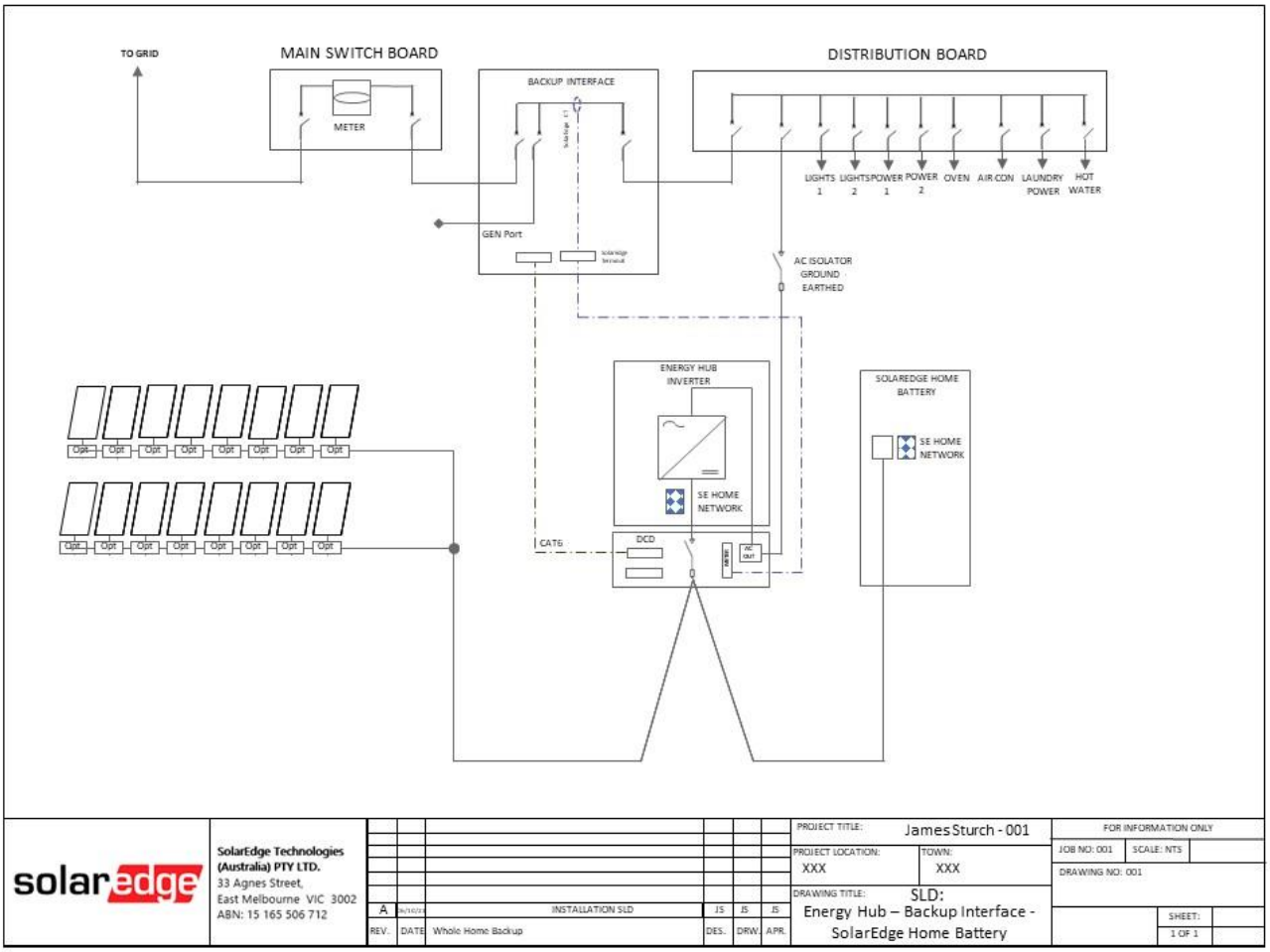


Figure 1:

Energy Hub, Backup Interface, SolarEdge Home Battery, Full Home Backup.

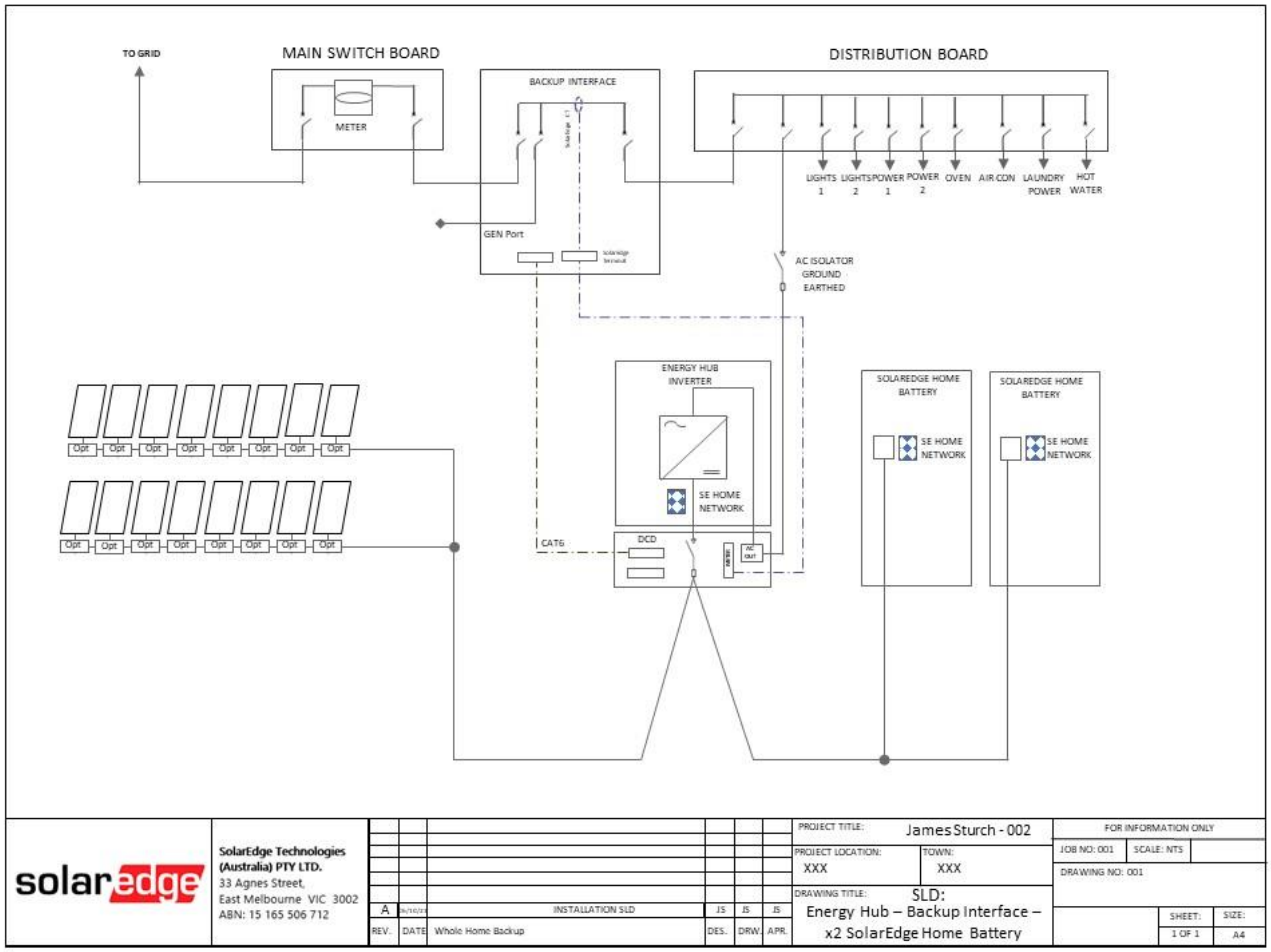


Figure 2:

Energy Hub, Backup Interface, Dual SolarEdge Home Batteries, Full Home Backup.

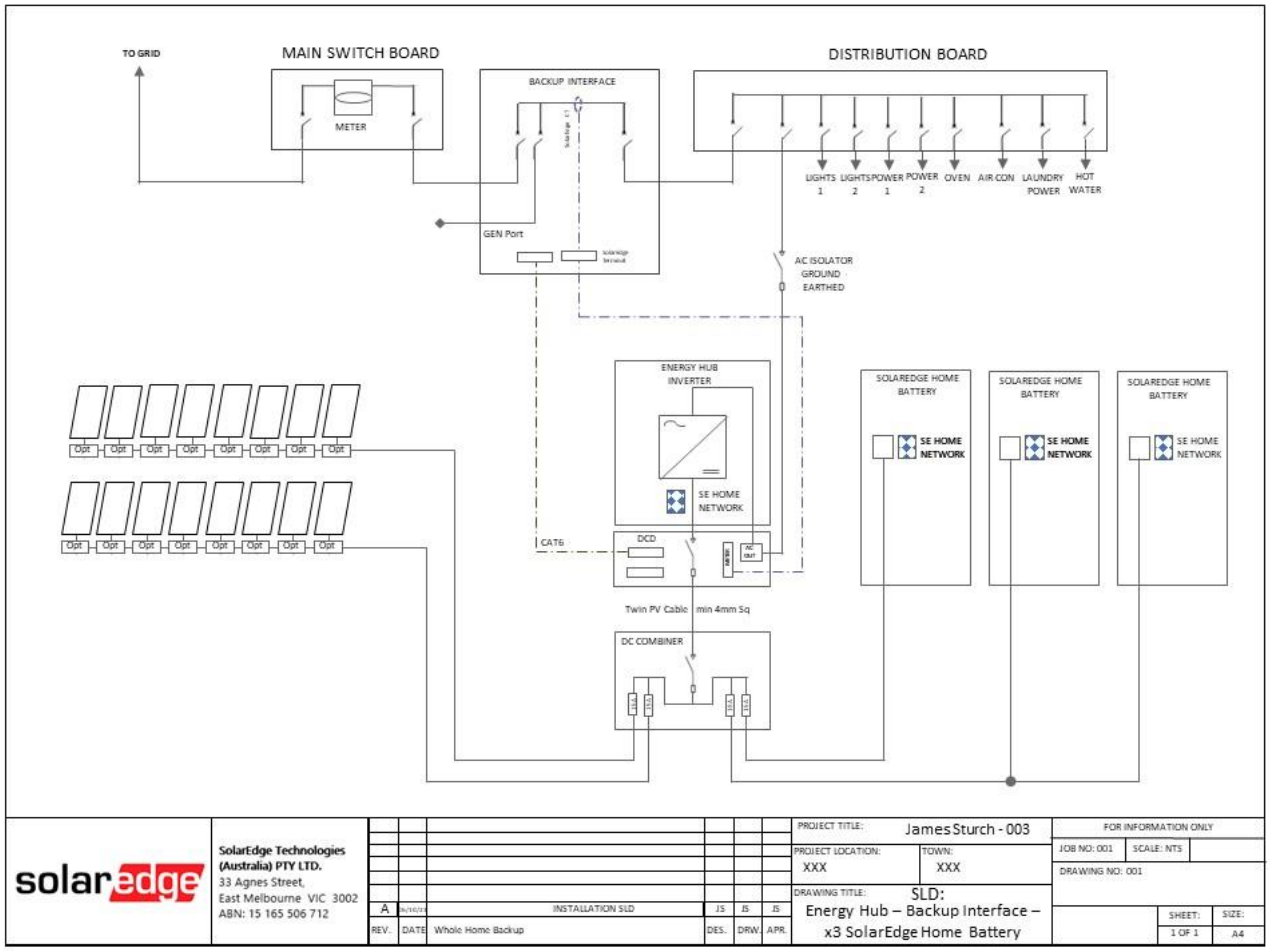


Figure 3:

Energy Hub, Backup Interface, x3 SolarEdge Home Batteries, DC Combiner, Full Home Backup, Metering Option A.

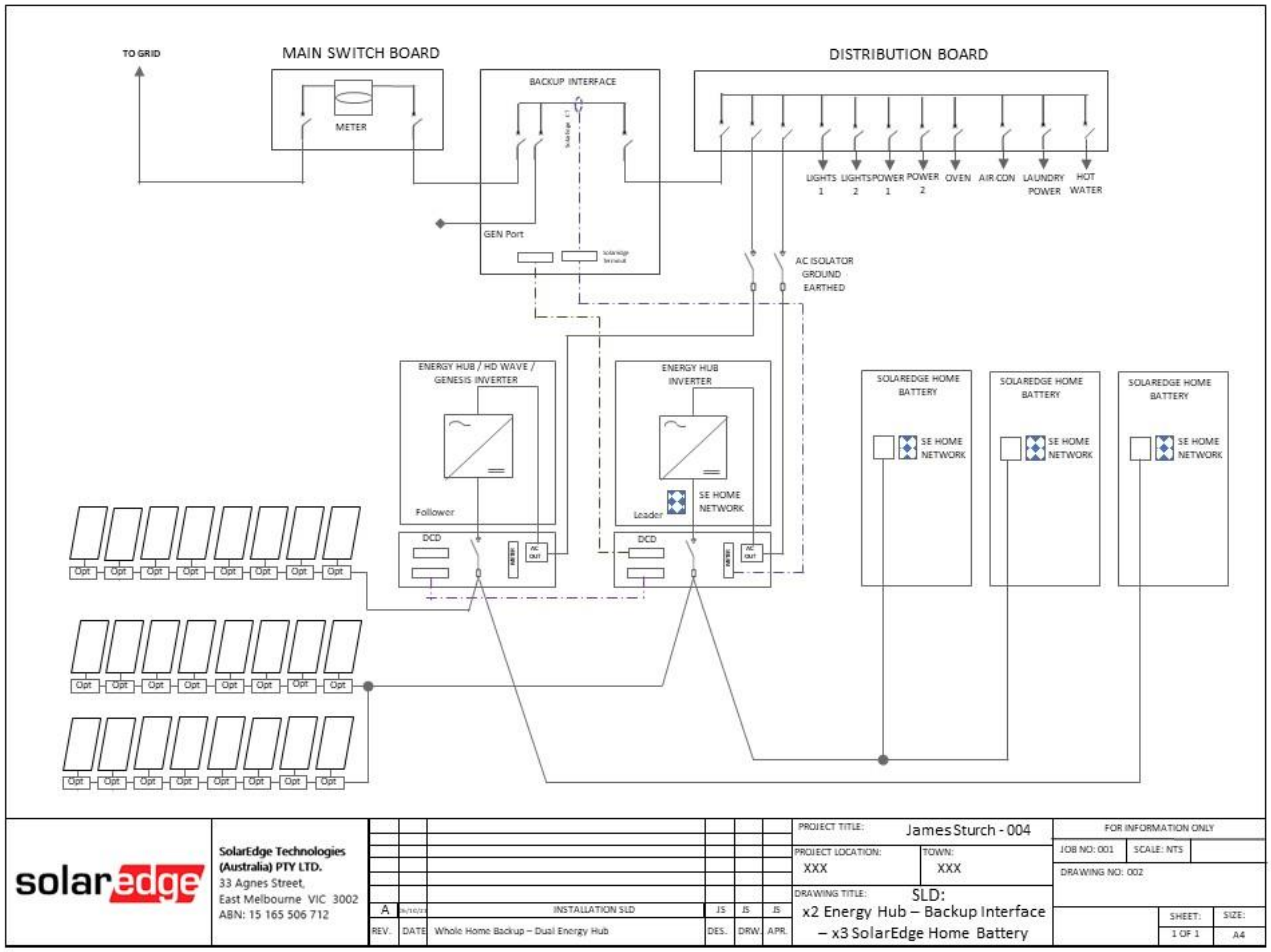


Figure 4:

Twin Energy Hub, Backup Interface, Three SolarEdge Home Batteries, Full Home Backup, Metering Option A.

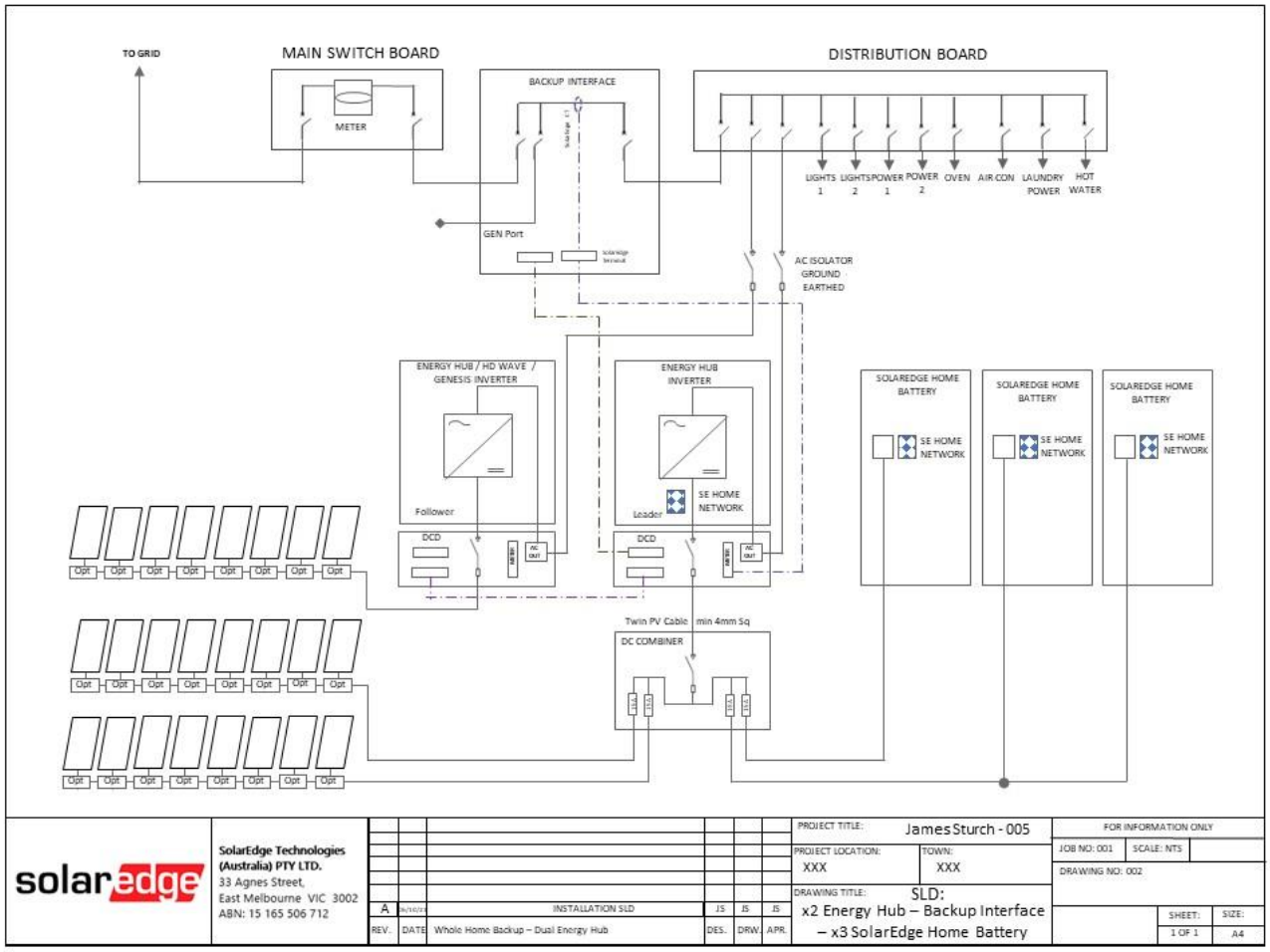


Figure 5:

Twin Energy Hub, Backup Interface, Three SolarEdge Home Batteries, DC Combiner, Full Home Backup, Metering Option B.

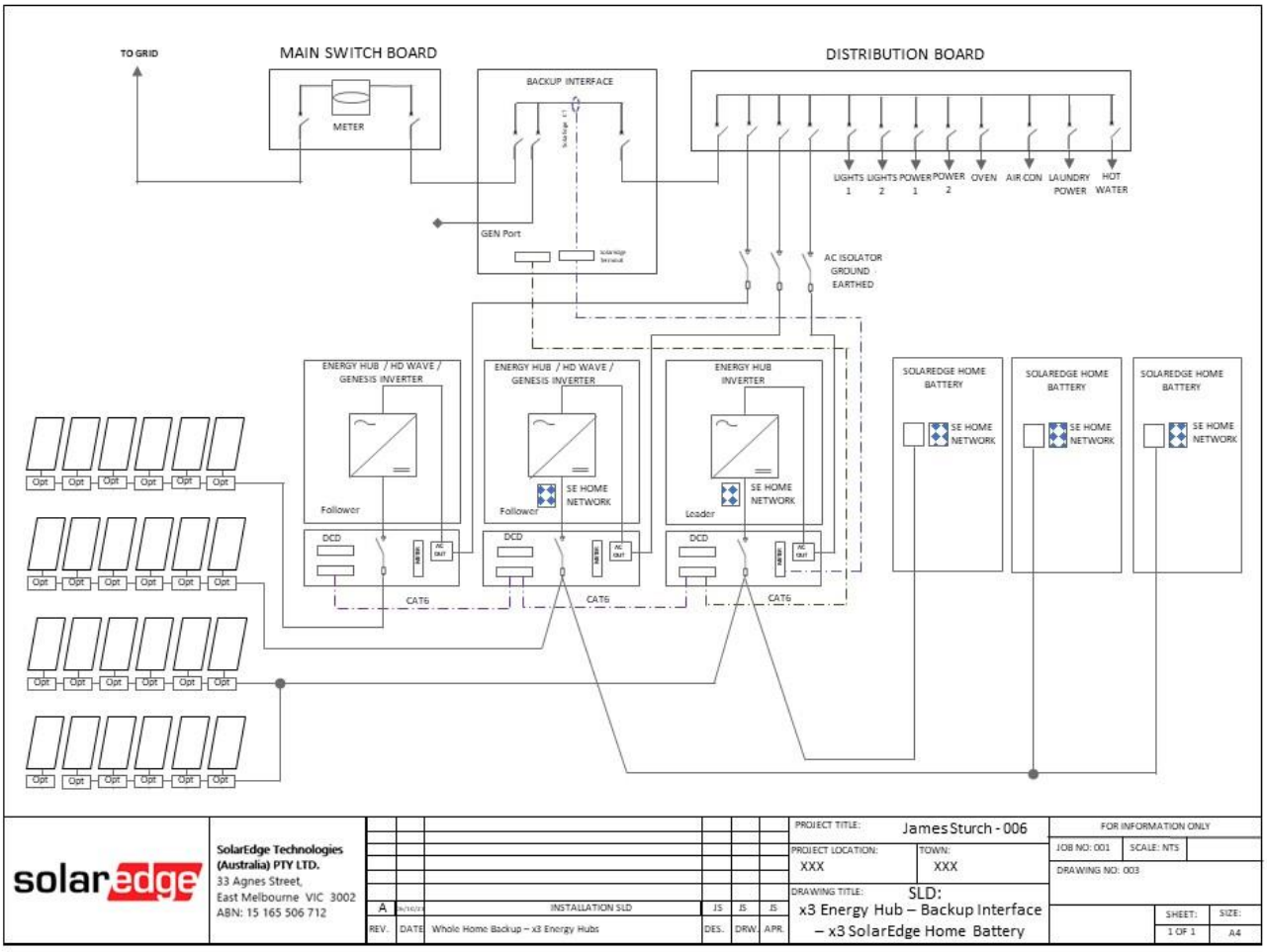


Figure 6:

Three Energy Hub, Backup Interface, Three SolarEdge Home Batteries, Full Home Backup, Meteriing Option A.

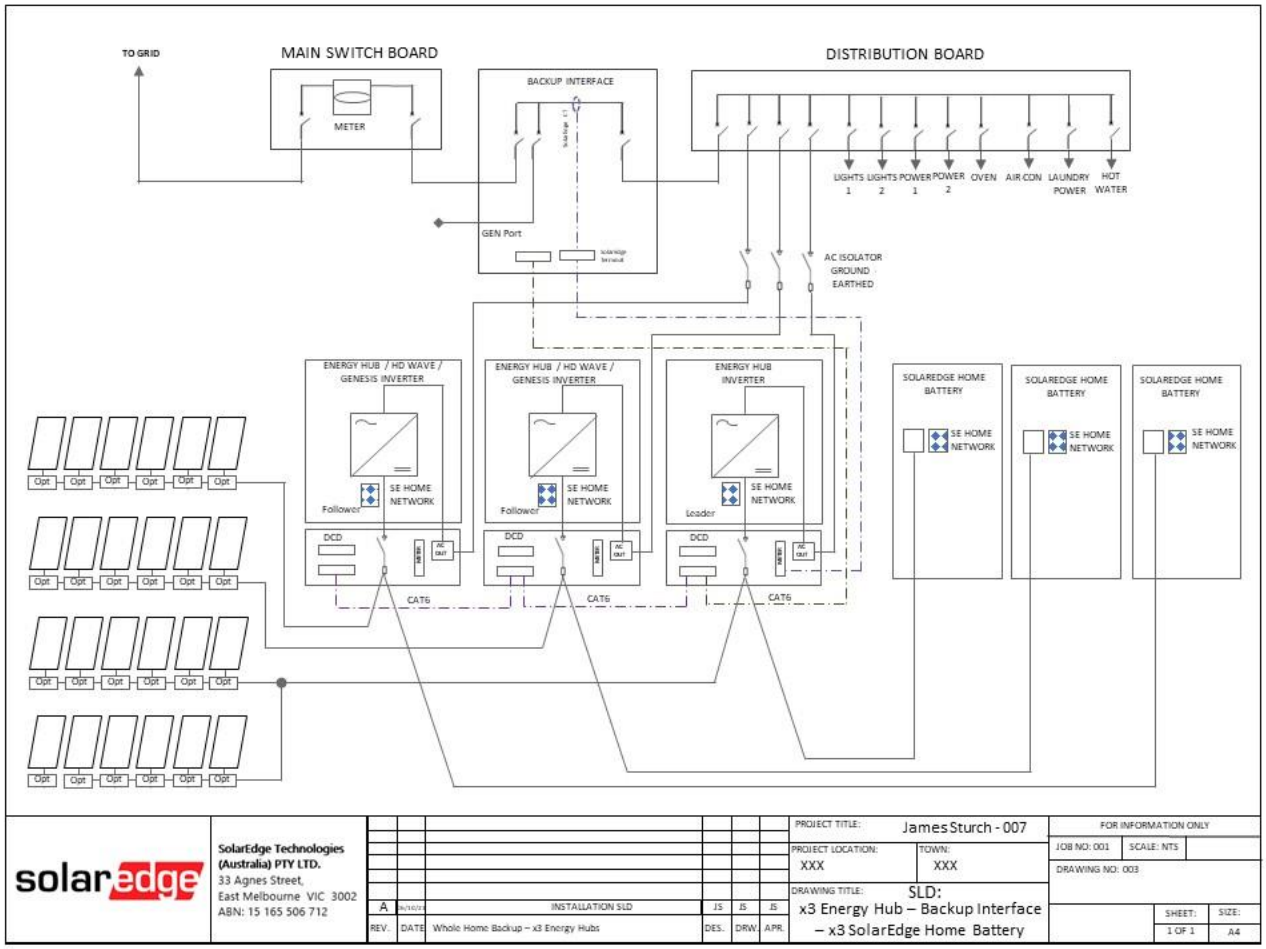


Figure 7:

Three Energy Hub, Backup Interface, Three SolarEdge Home Batteries, DC Combiner, Full Home Backup, Metering Option B.

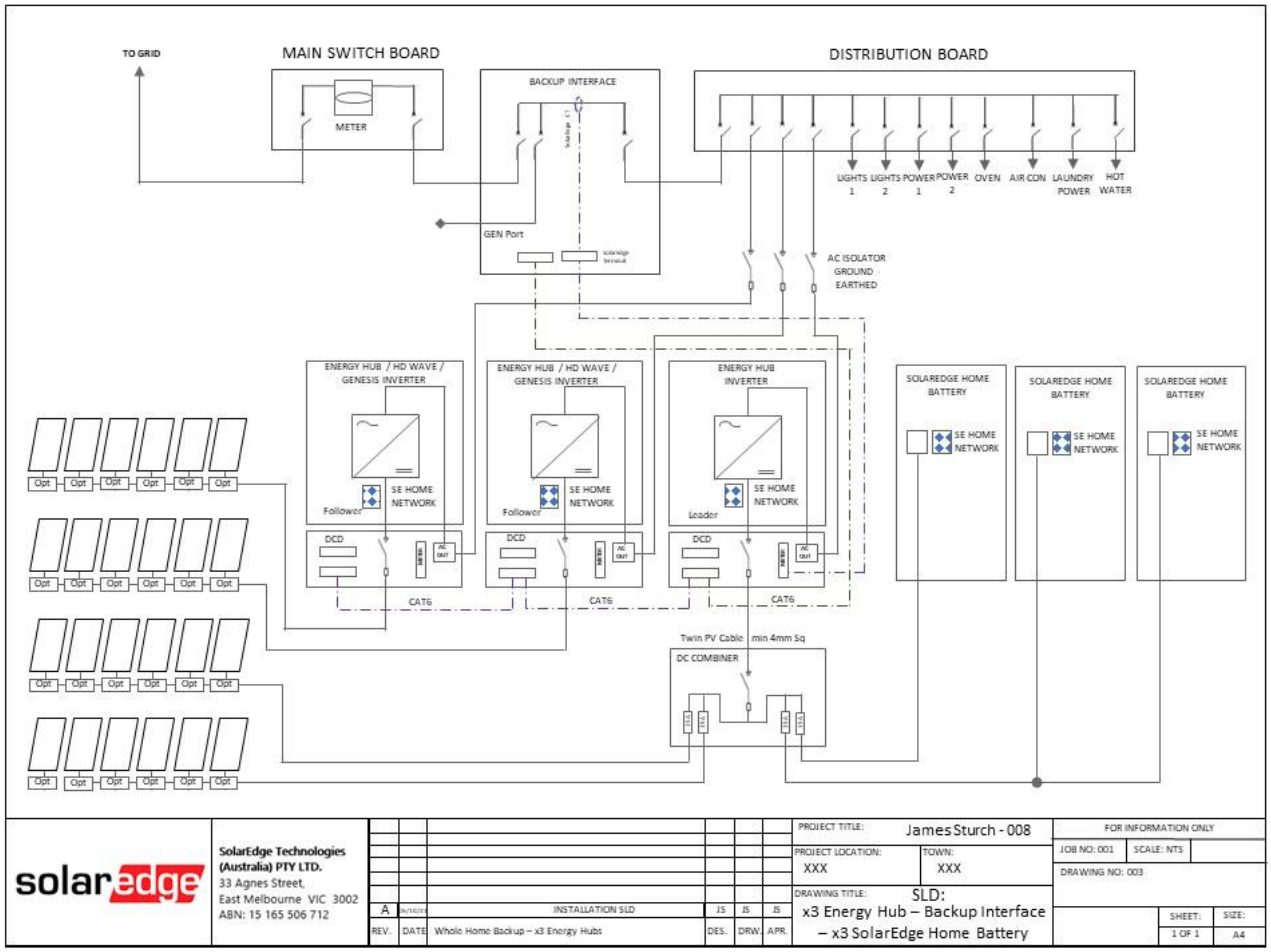


Figure 8:

Three Energy Hub, Backup Interface, Three SolarEdge Home Batteries, Full Home Backup, Metering Option C

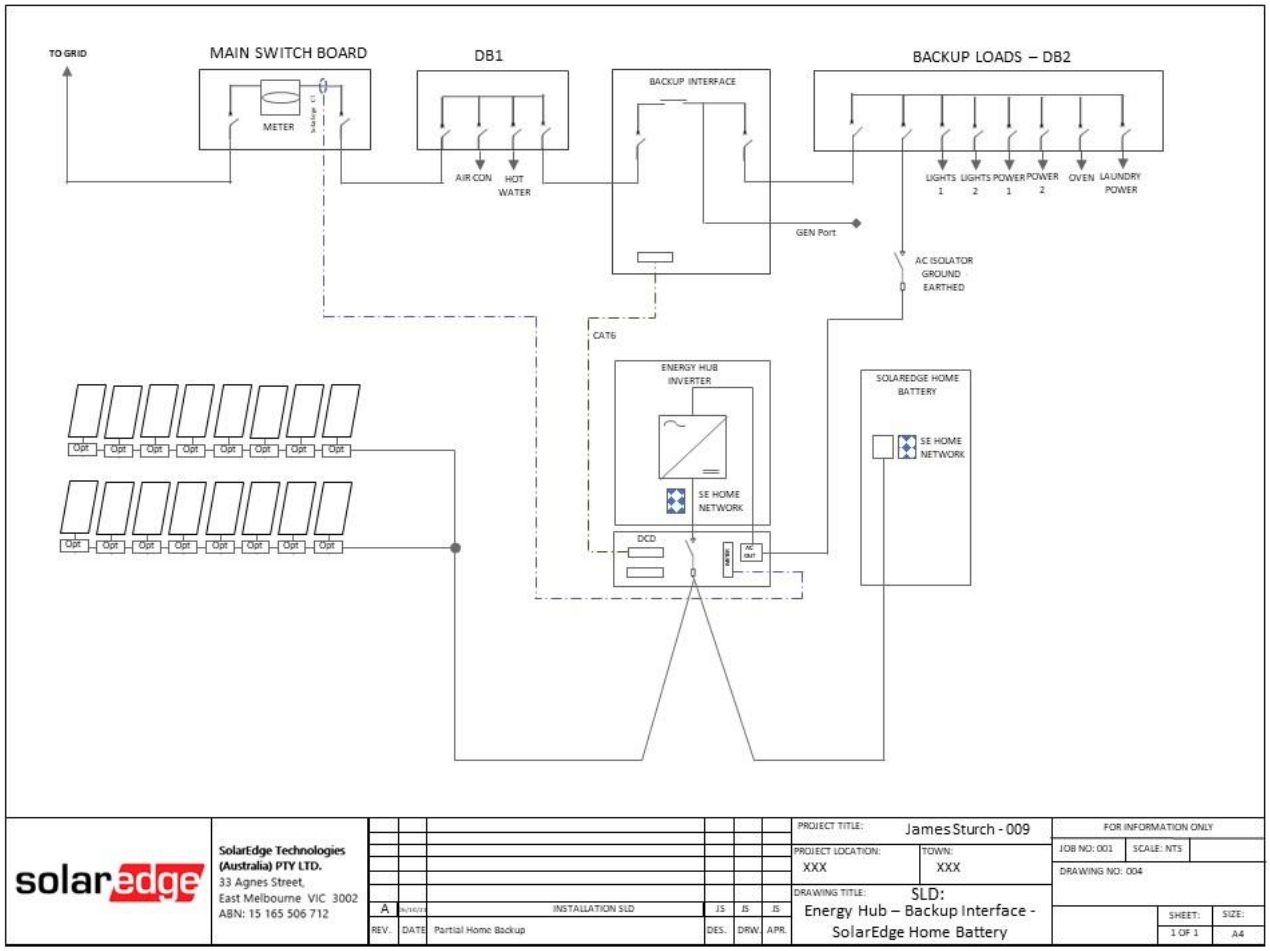


Figure 9:

Energy Hub, Backup Interface, and SolarEdge Home Battery, Partial Home Backup.

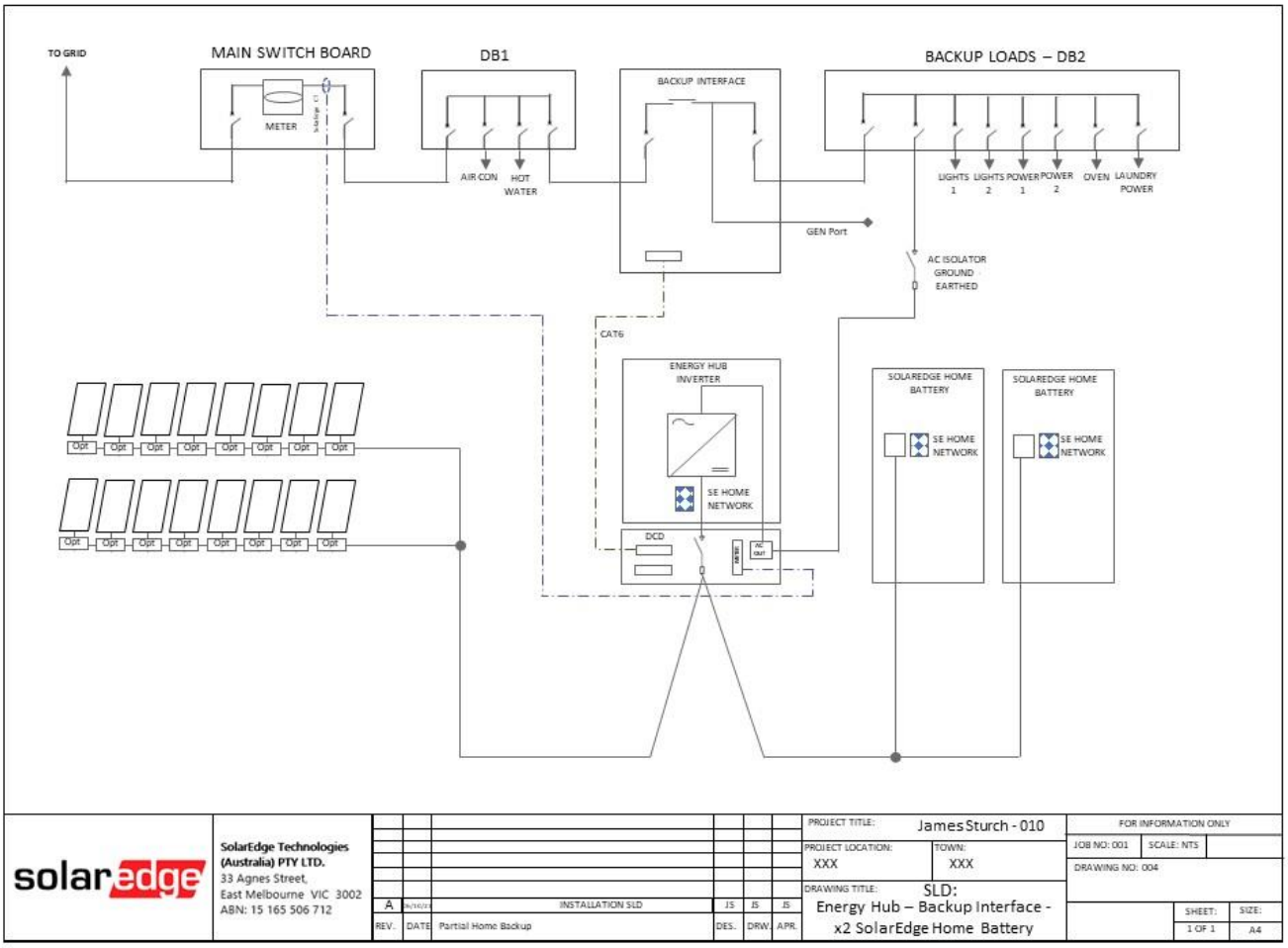


Figure 10:

Energy Hub, Backup Interface, Dual SolarEdge Home Batteries, Partial Home Backup

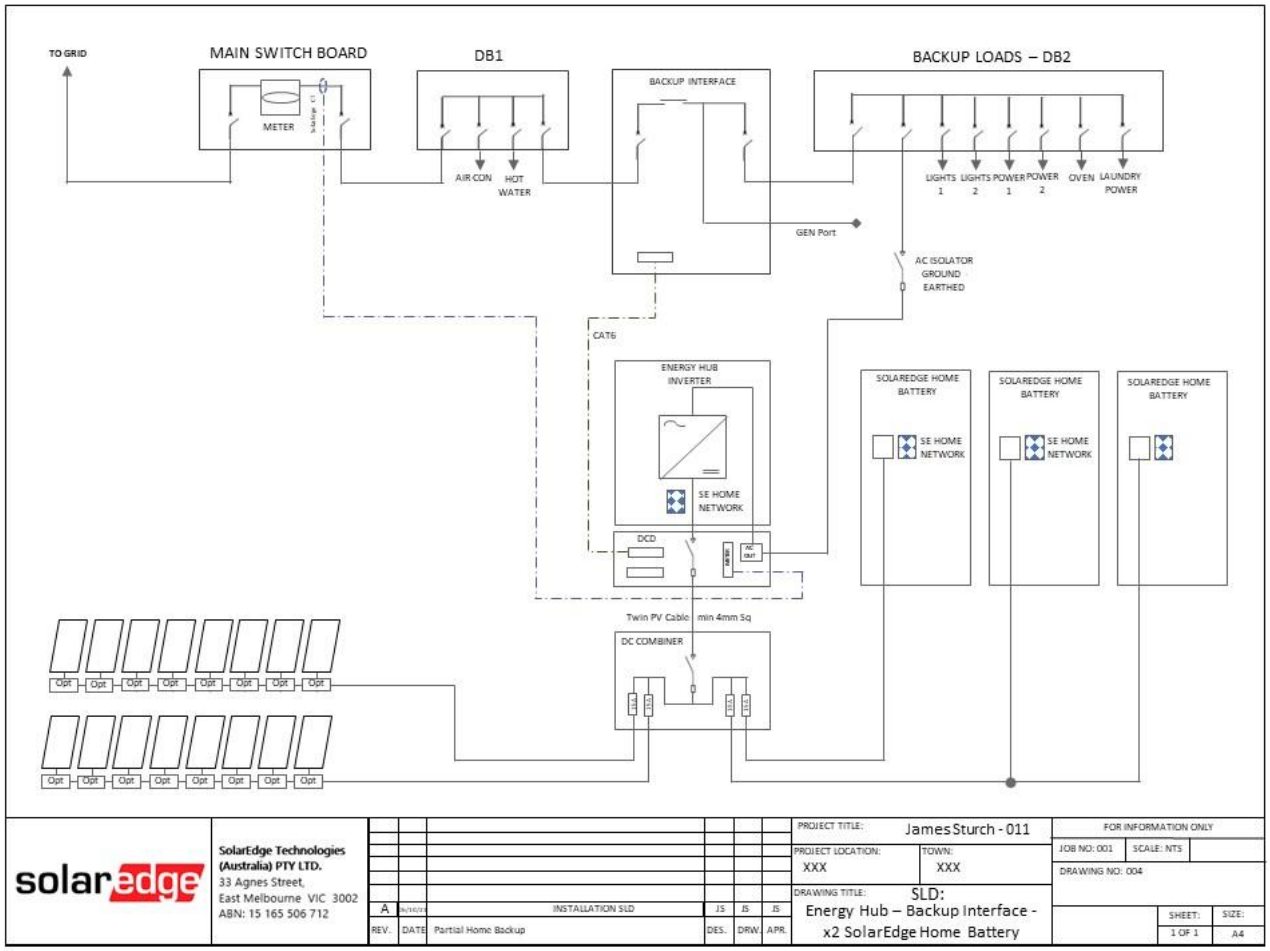


Figure 11:

Energy Hub, Backup Interface, Three SolarEdge Home Batteries, DC Combiner, Partial Home Backup

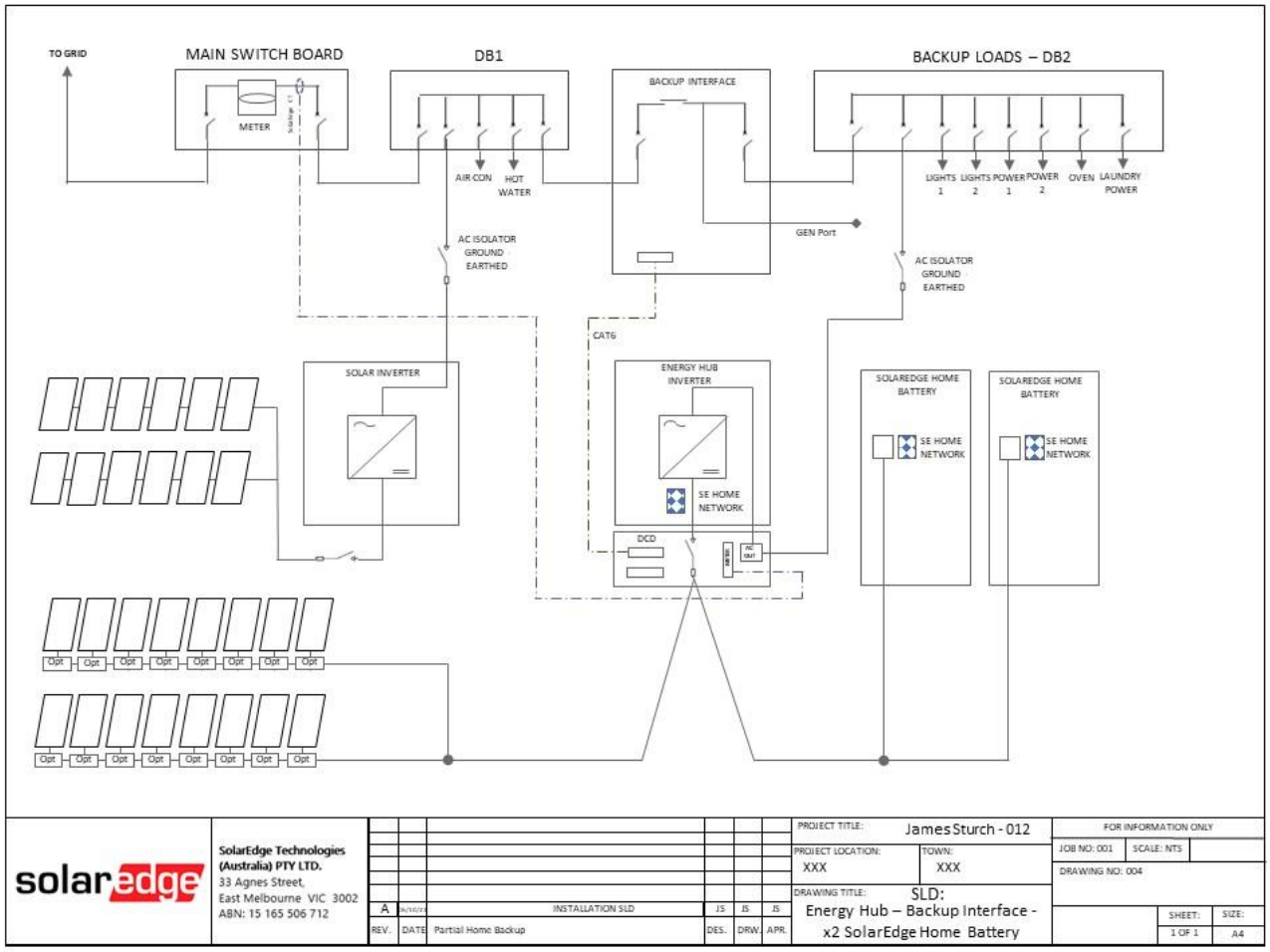


Figure 12:

Energy Hub, Backup Interface, Dual SolarEdge Home Batteries, Partial Home Backup and AC Coupled Inverter.

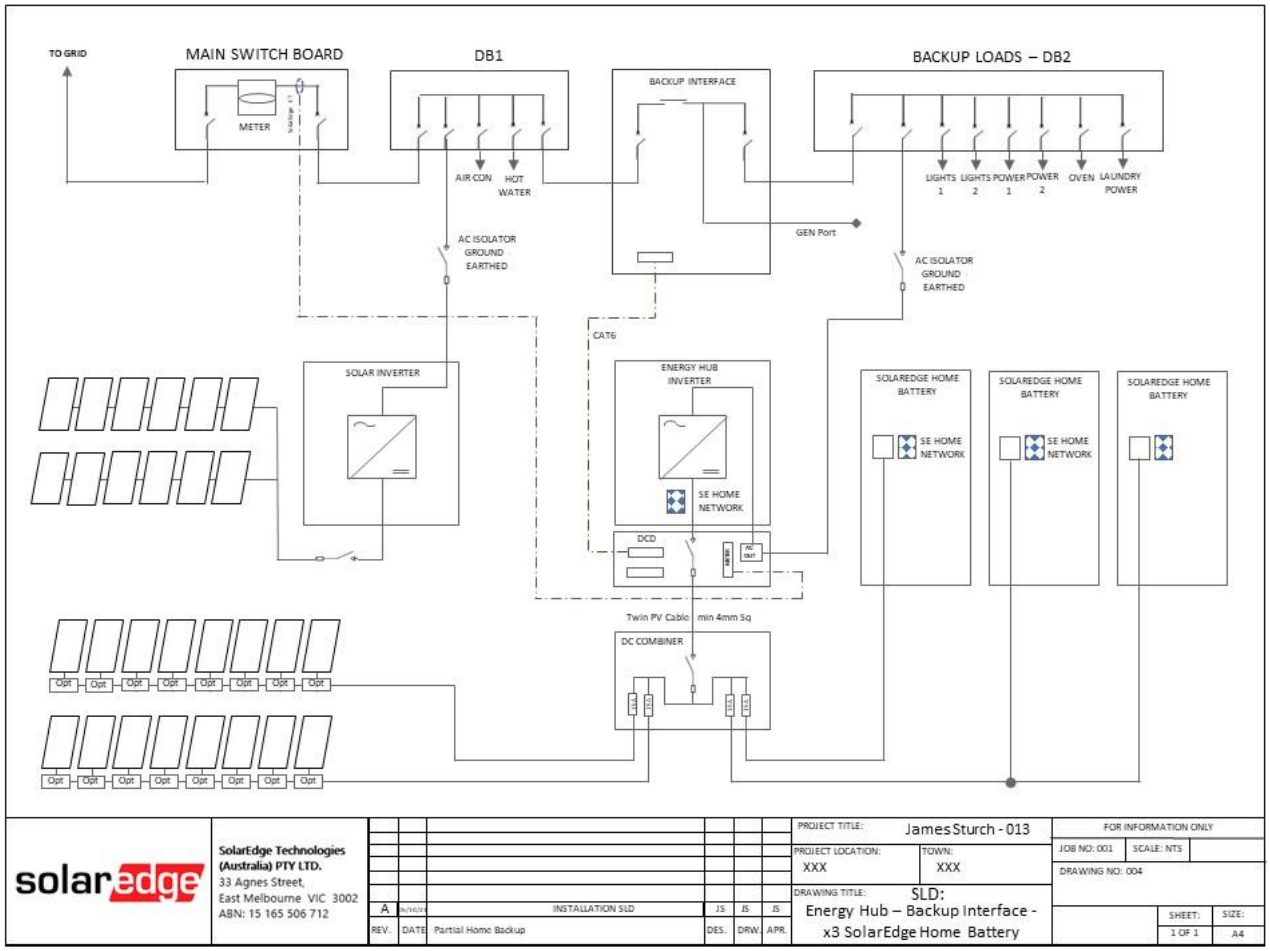


Figure 13:

Energy Hub, Backup Interface, Three SolarEdge Home Batteries, DC Combiner, Partial Home Backup and AC Coupled Inverter

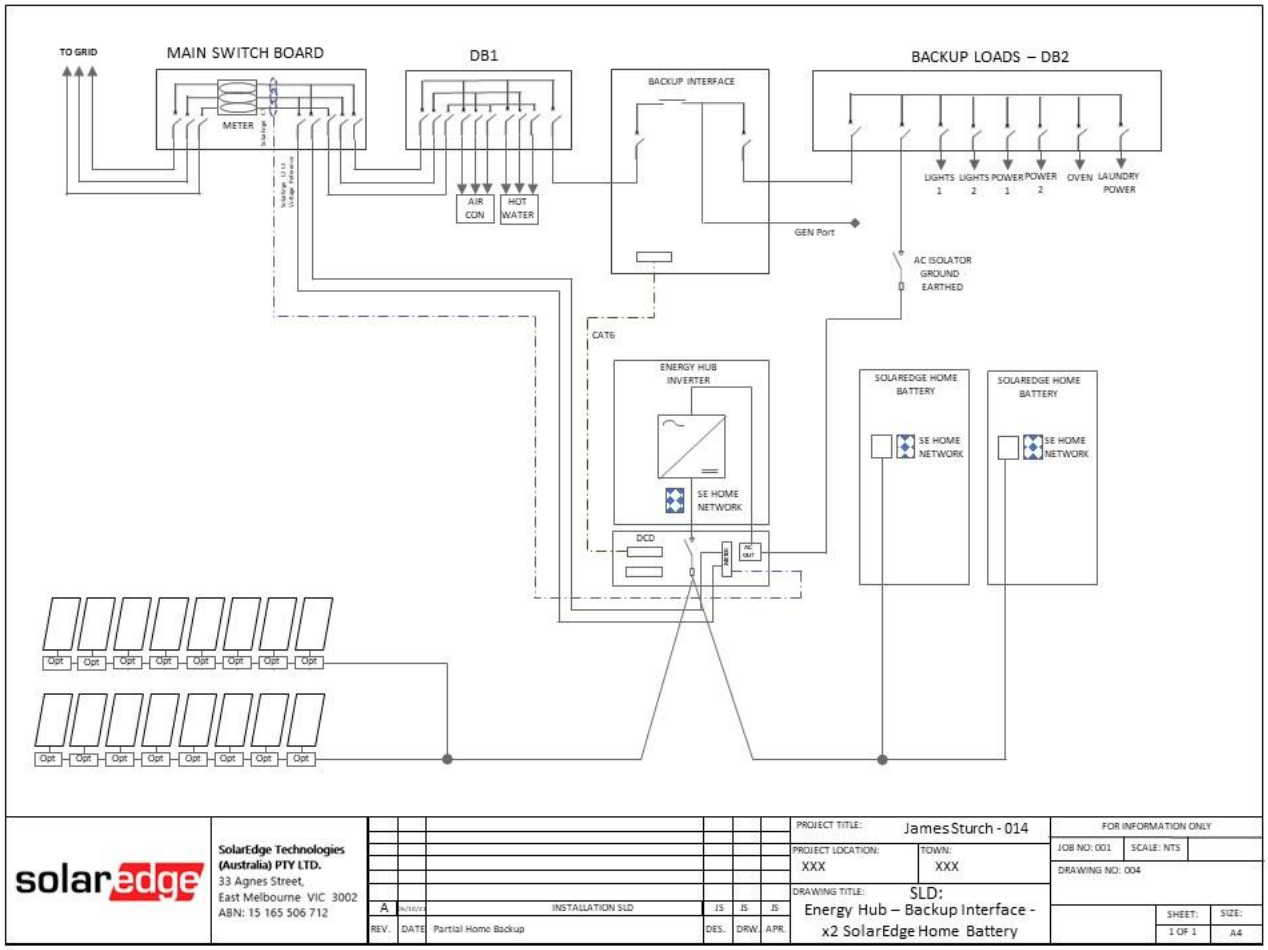


Figure 14:

Energy Hub, Backup Interface, Dual SolarEdge Home Batteries, Partial Home Backup, 3Ph Grid.

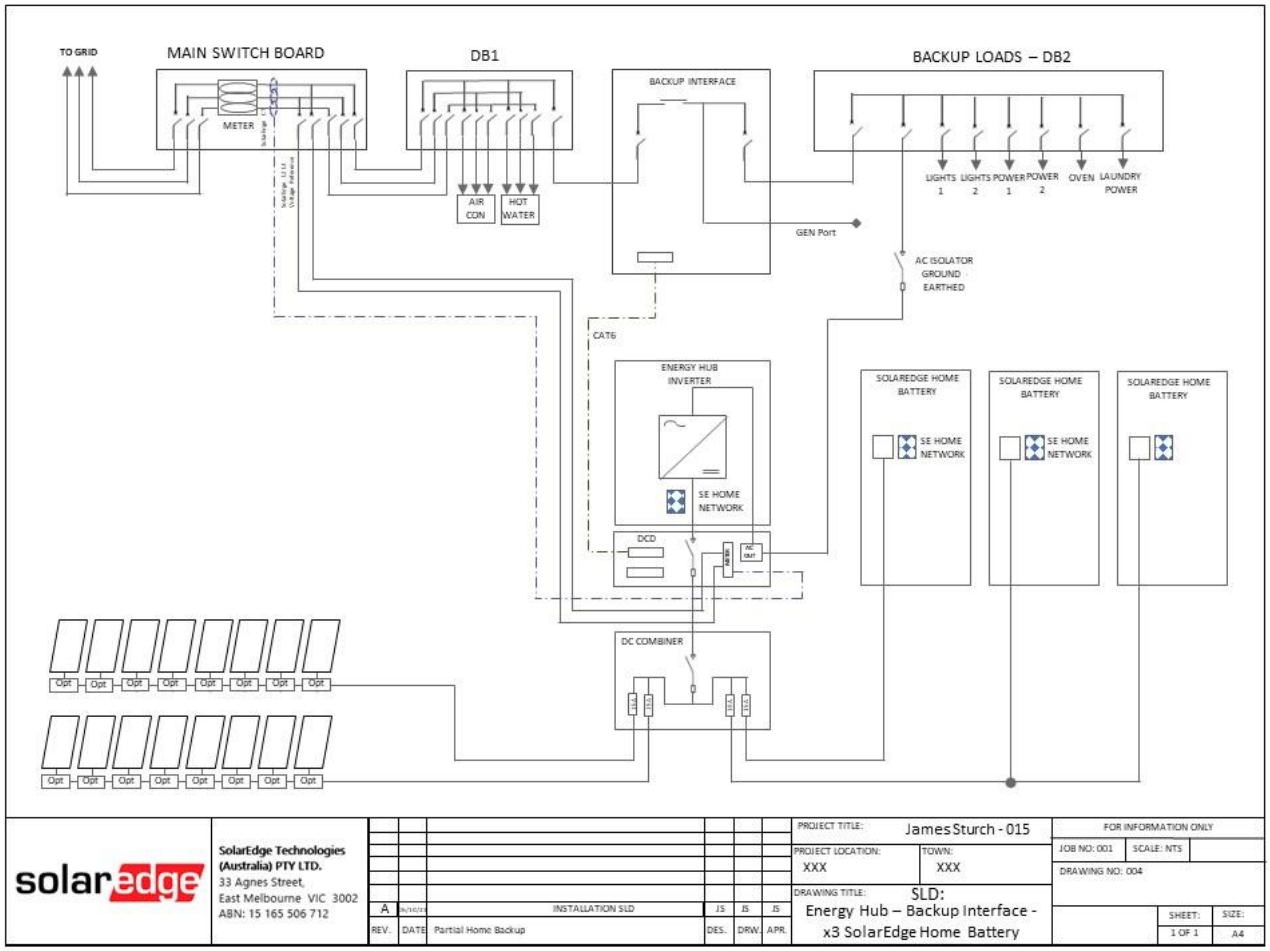


Figure 15:

Energy Hub, Backup Interface, Three SolarEdge Home Batteries, DC Combiner and Partial Home Backup, 3Ph Grid.

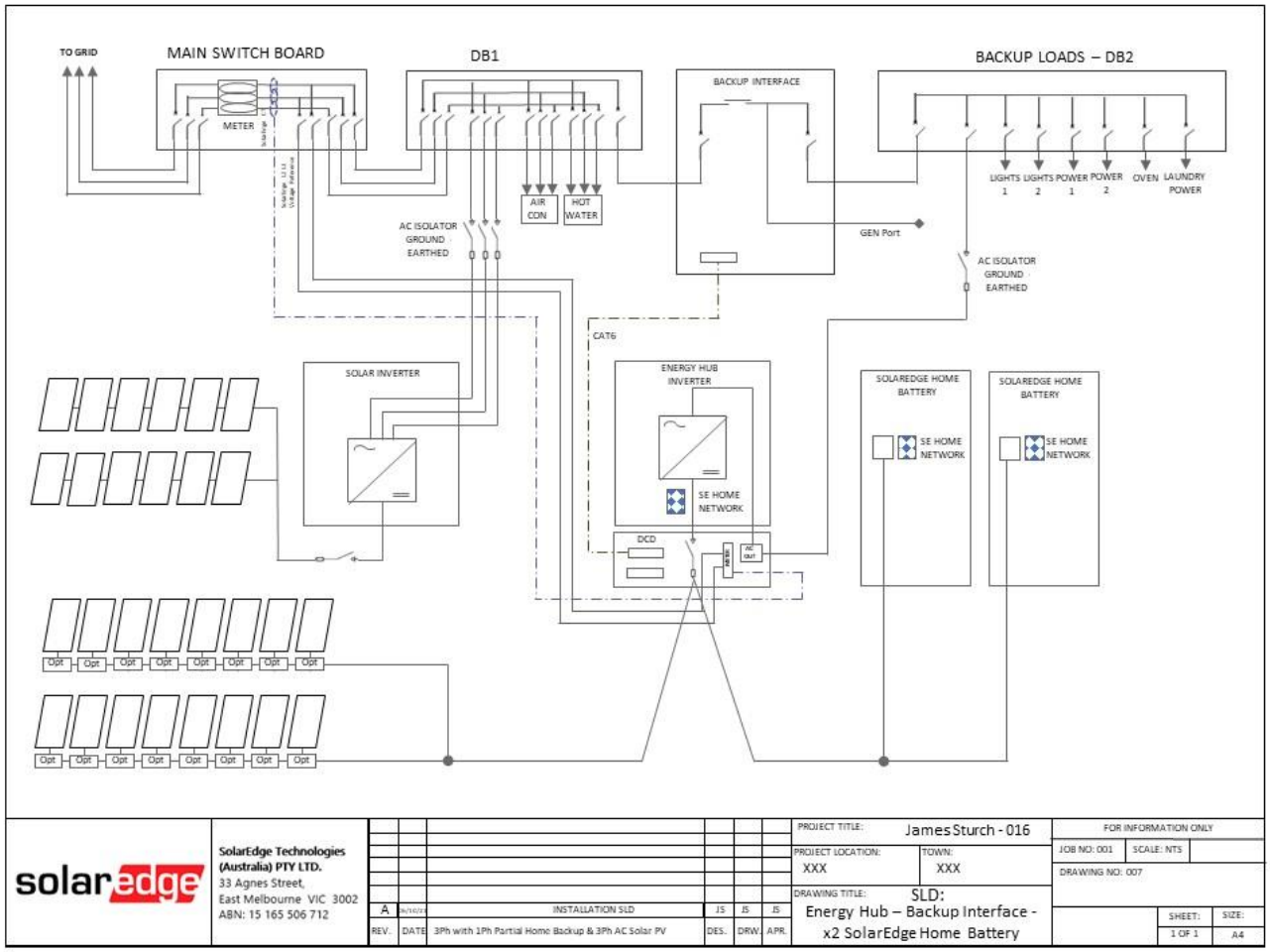


Figure 16:

Energy Hub, Backup Interface, Dual SolarEdge Home Batteries, Partial Home Backup, 3Ph Grid and AC Coupled Inverter.

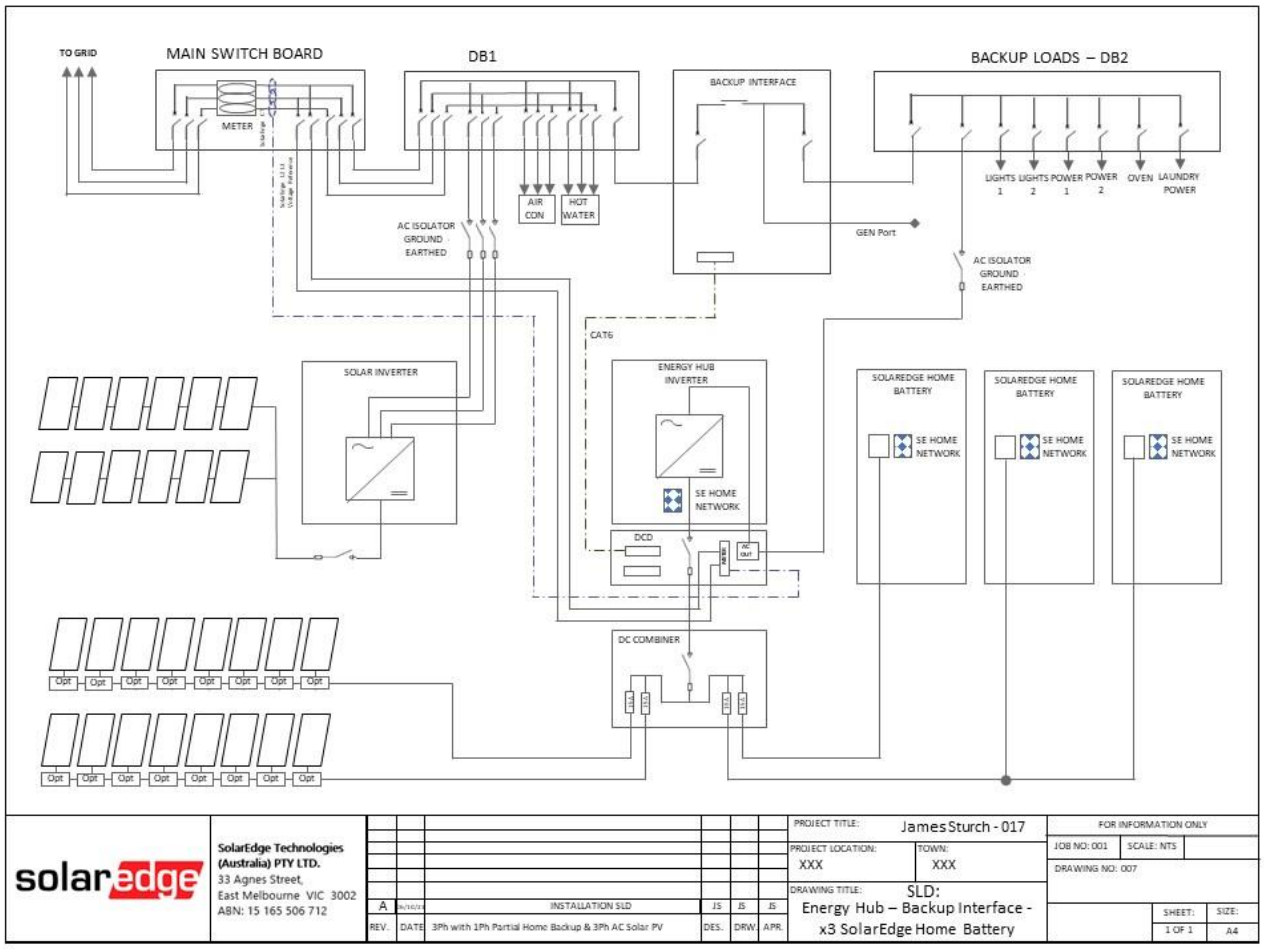


Figure 17:

Energy Hub, Backup Interface, Three SolarEdge Home Batteries, DC Combiner and Partial Home Backup, 3Ph Grid and AC Coupled Inverter.

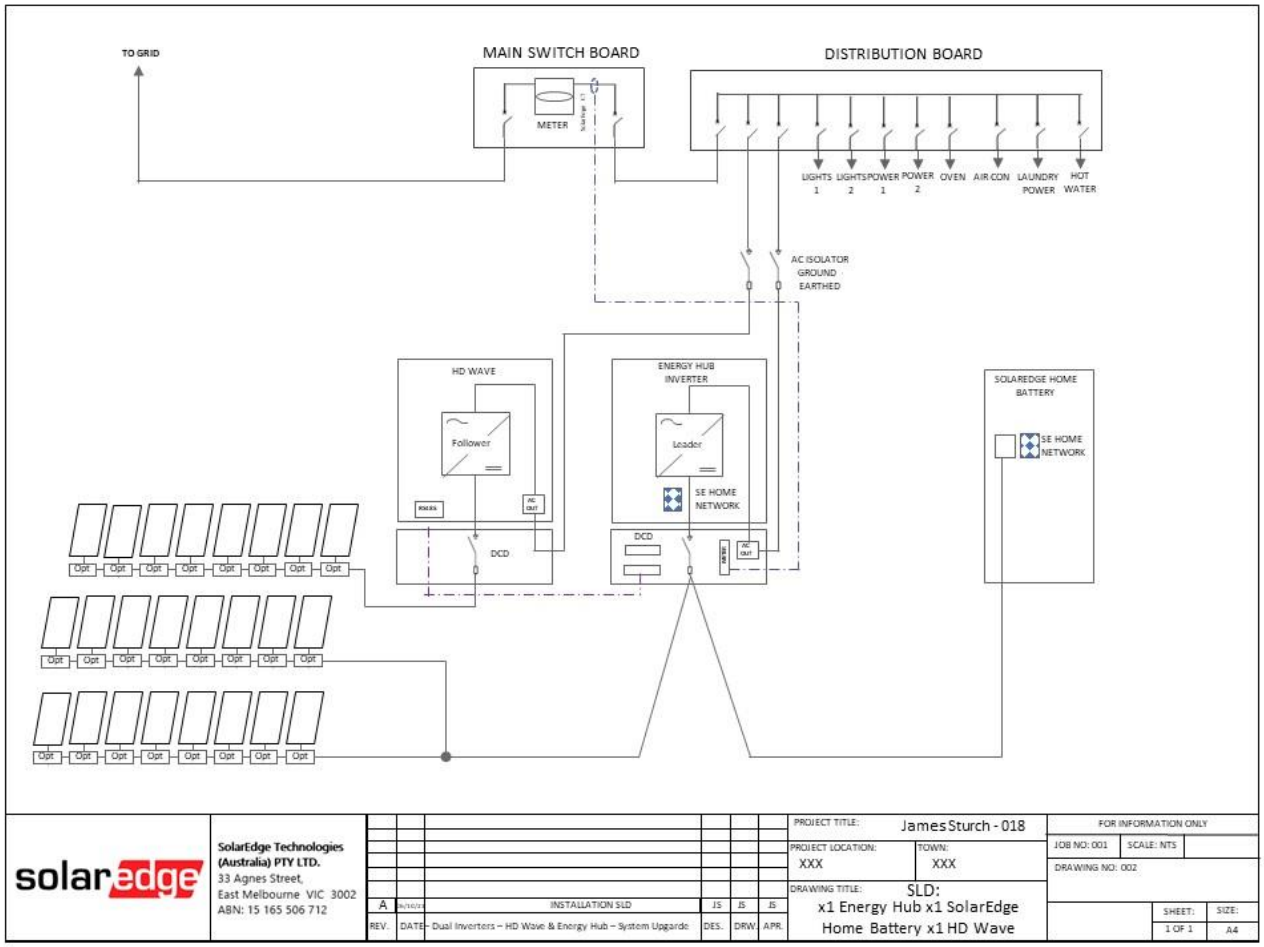


Figure 18:

Energy Hub, SolarEdge Home Battery additon to site with HD W1Ph Grid, metering option 1 – Existing CT.

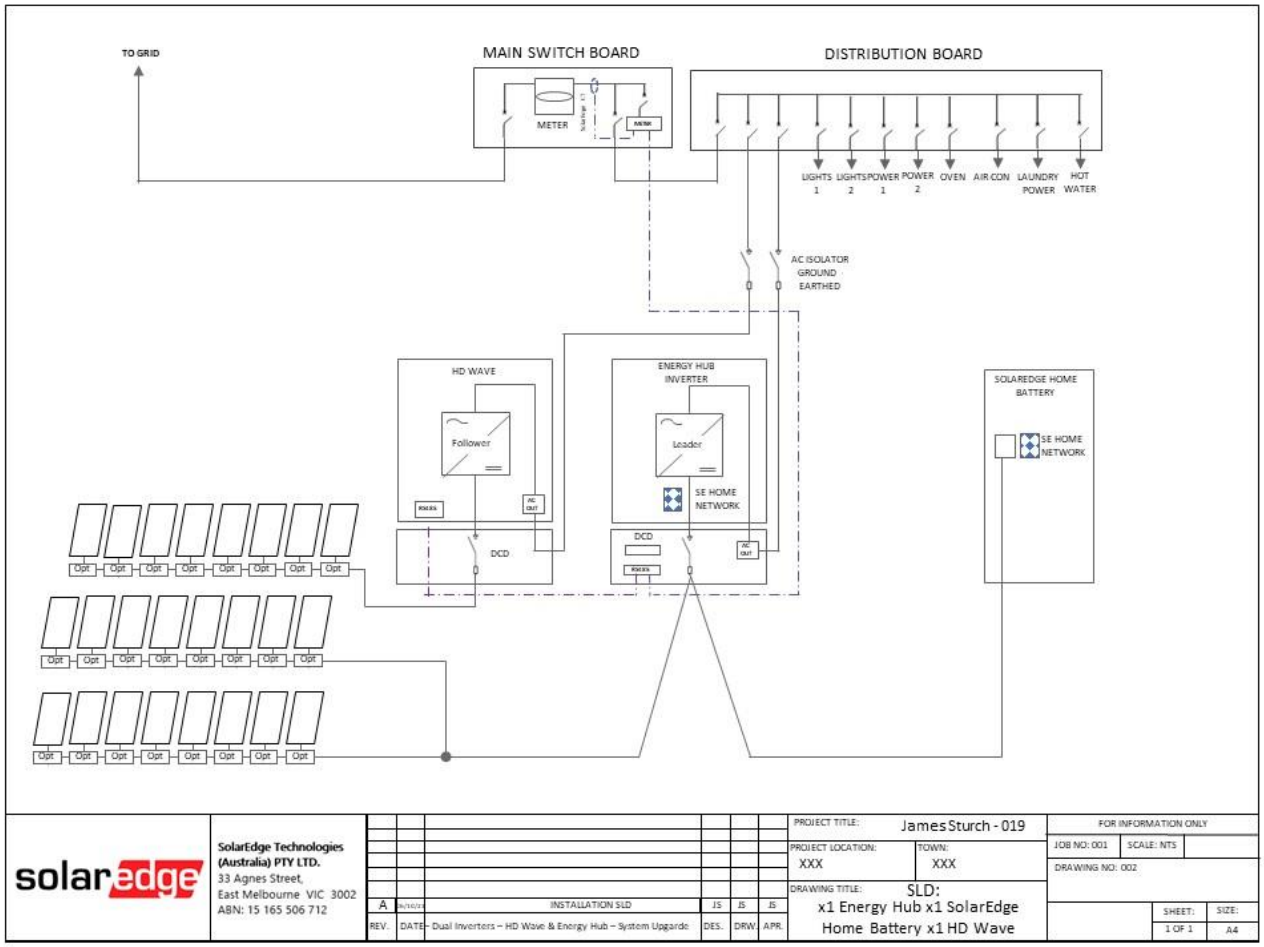


Figure 19:

Energy Hub, SolarEdge Home Battery additon to site with HD Wave, 1Ph Grid, metering option 2 – Existing metering.

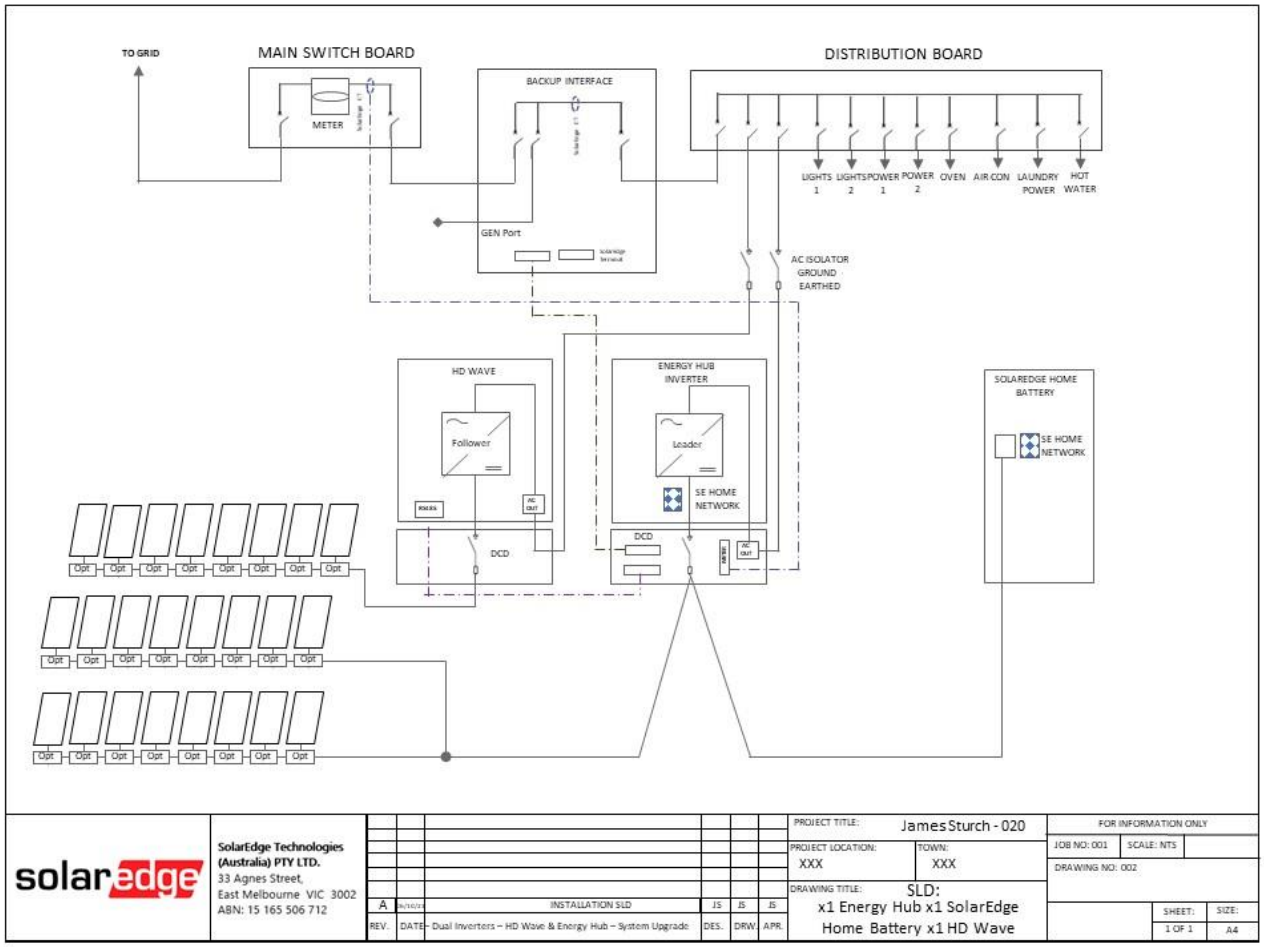


Figure 20:

Energy Hub, Backup Interface, SolarEdge Home Battery additon to site with HD Wave, 1Ph Grid, metering option 1 – Existing CT.

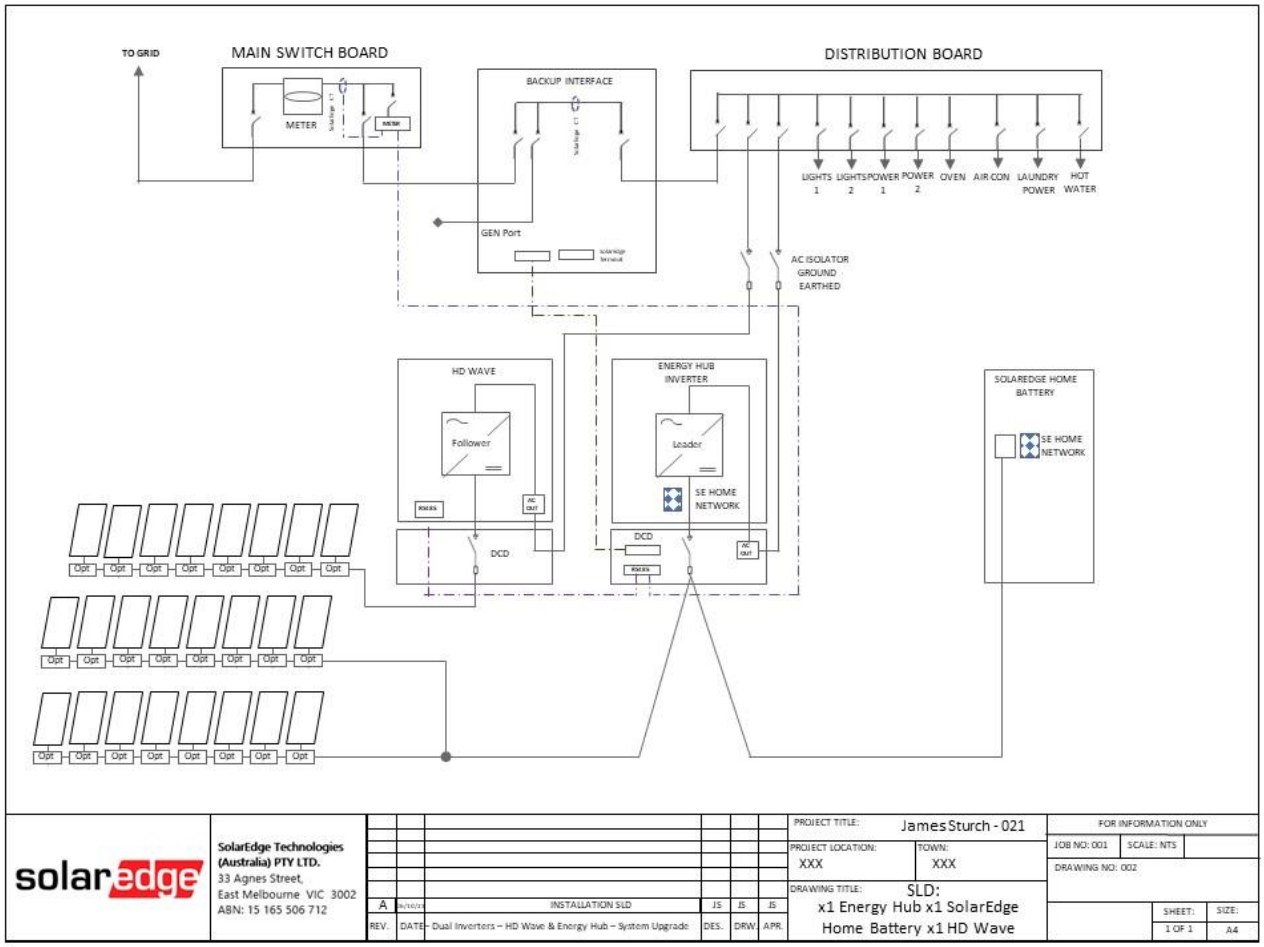


Figure 21:

Energy Hub, Backup Interface, SolarEdge Home Battery additon to site with HD Wave, 1Ph Grid, metering option 2 – Existing Metering.

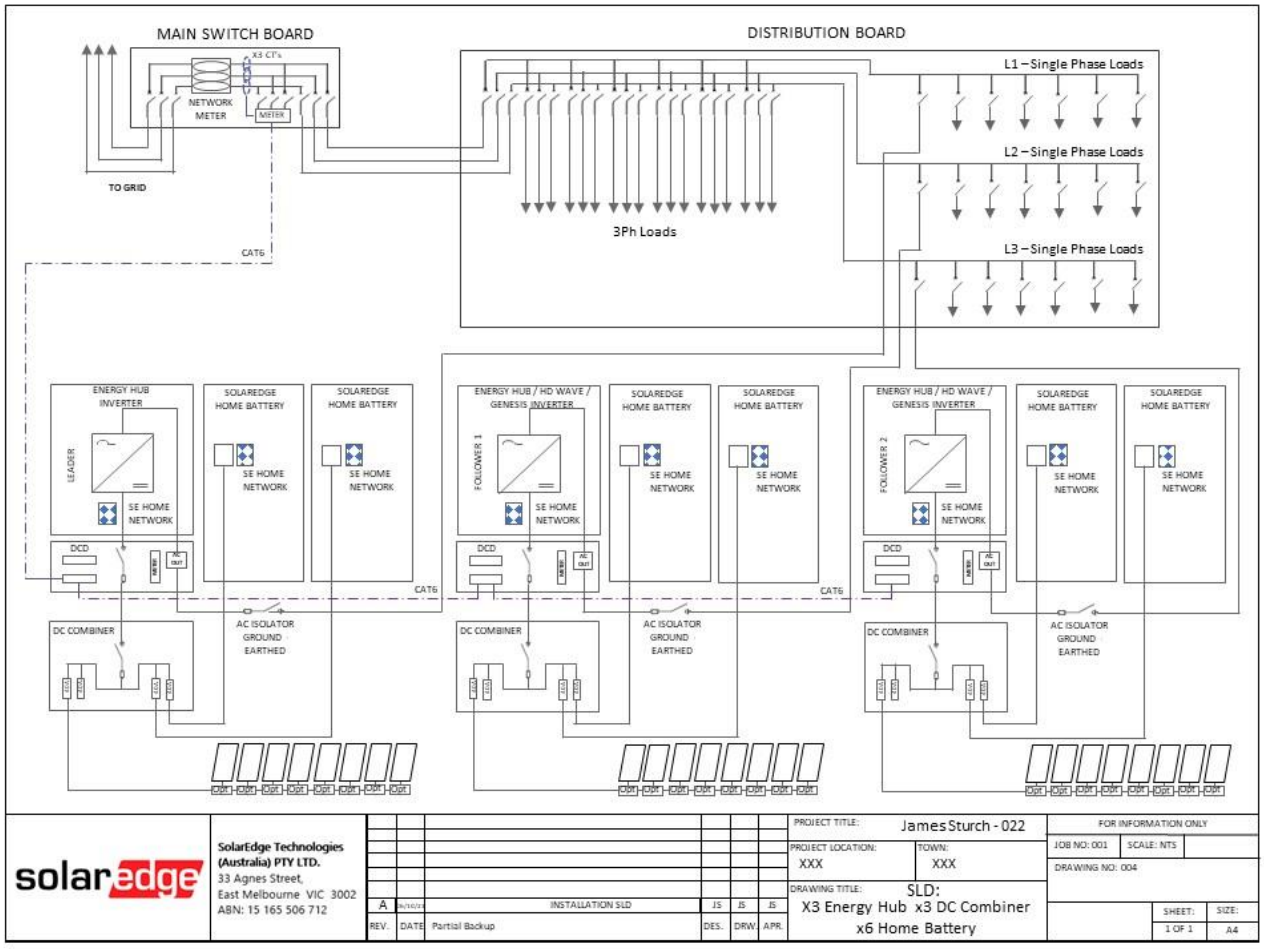


Figure 22:

Three Energy Hub's, x6 SolarEdge Home Batteries, 3Ph metering in existing switch board.

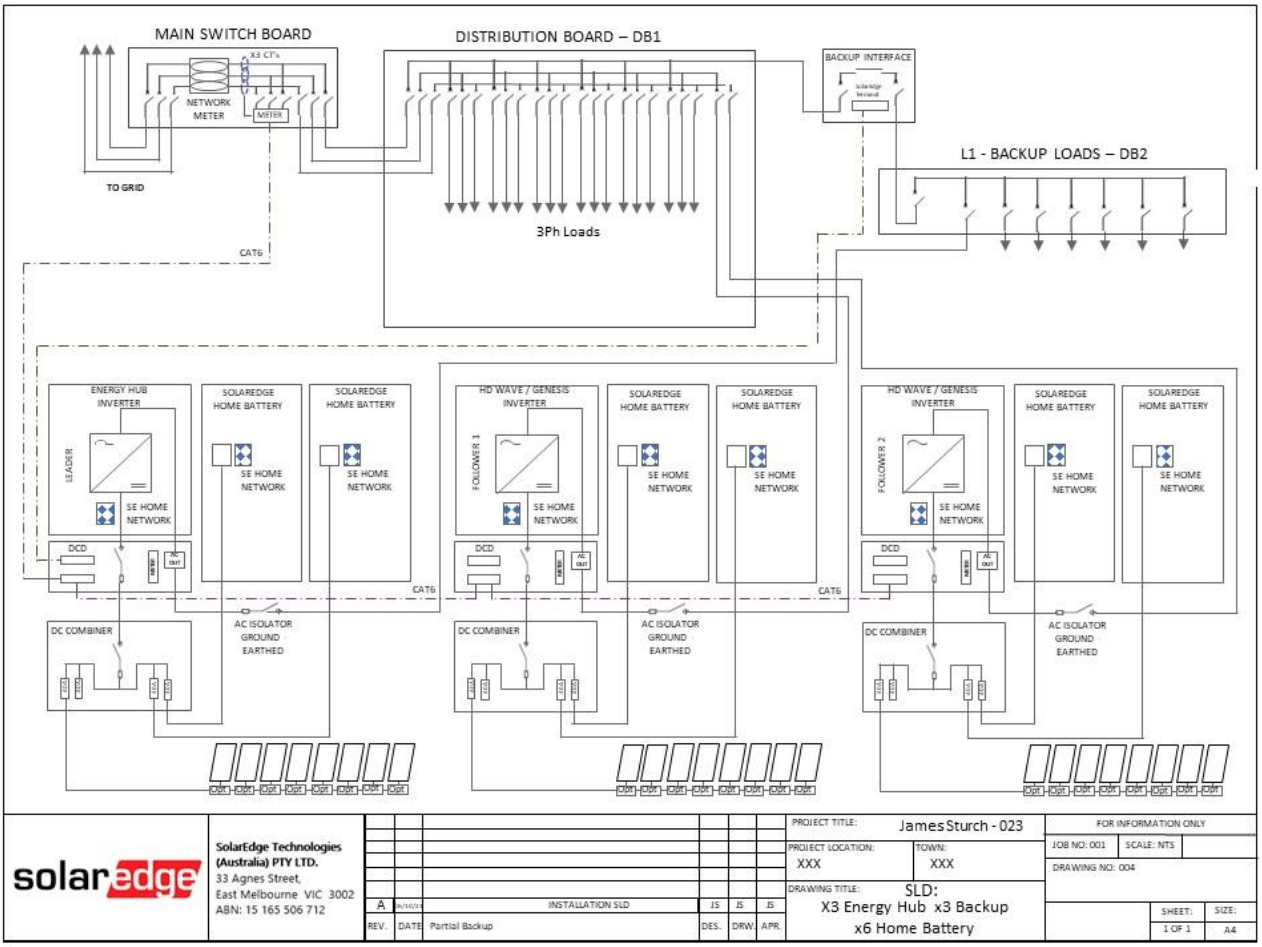


Figure 23:

Three Energy Hub's, x6 SolarEdge Home Batteries, 3Ph metering in existing switch board, Partial Backup on one phase only.

<u>NOTE</u>: Inverters on non-backup phases shall only be HD Wave or Genesis (non-backup).

In mutli-phase situtans it is only possible to backup one phase.

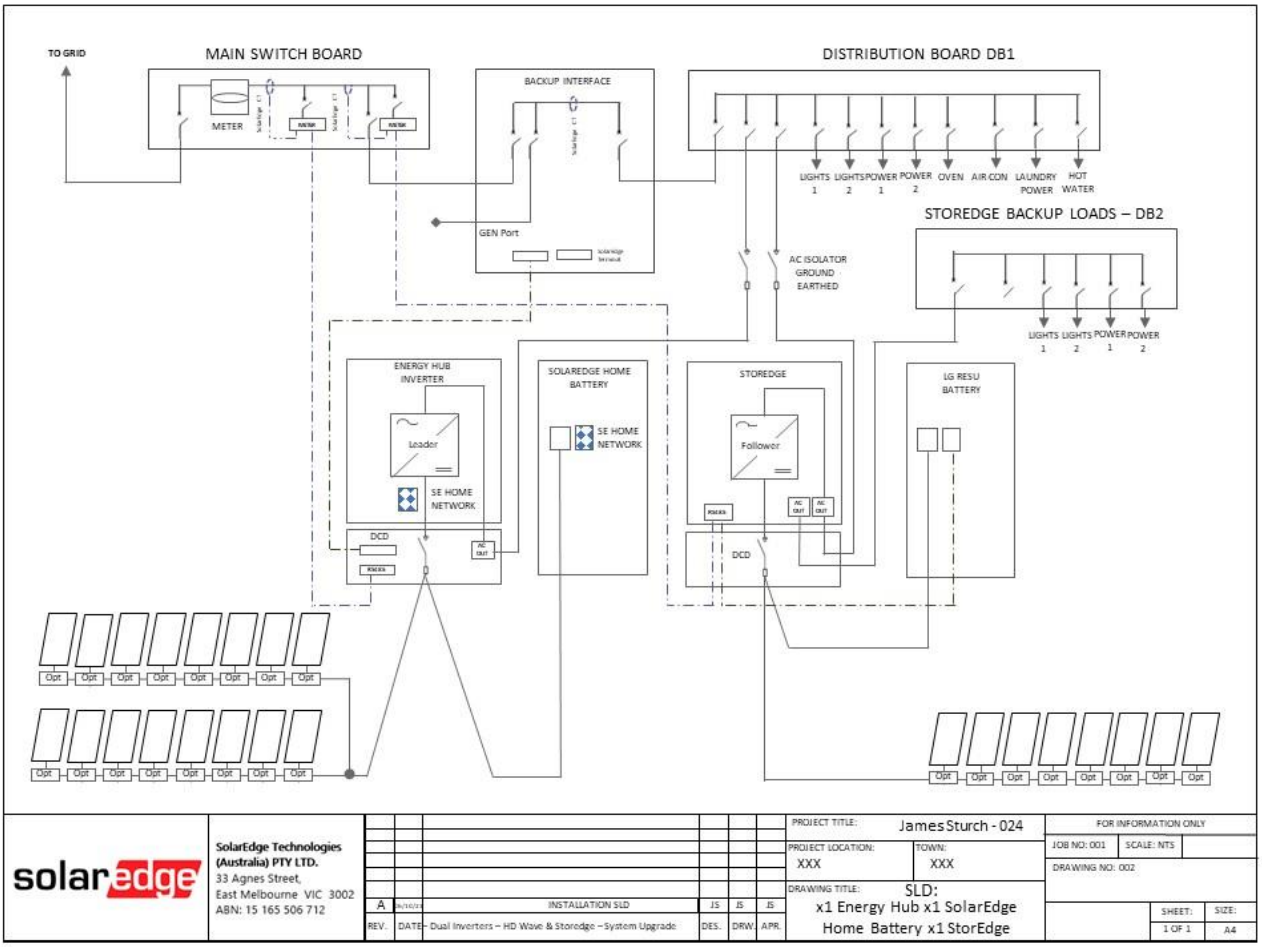


Figure 24:

Energy Hub, SolarEdge Home Batterie, Partial Backup, StorEdge, LG RESU, Metering Option A.

<u>NOTE:</u> The Energy Hub and StorEdge inverters are separate systems (No Leader Follower configuration). Both systems require their own individual site ID as they cannot be combined in the moniting portal.

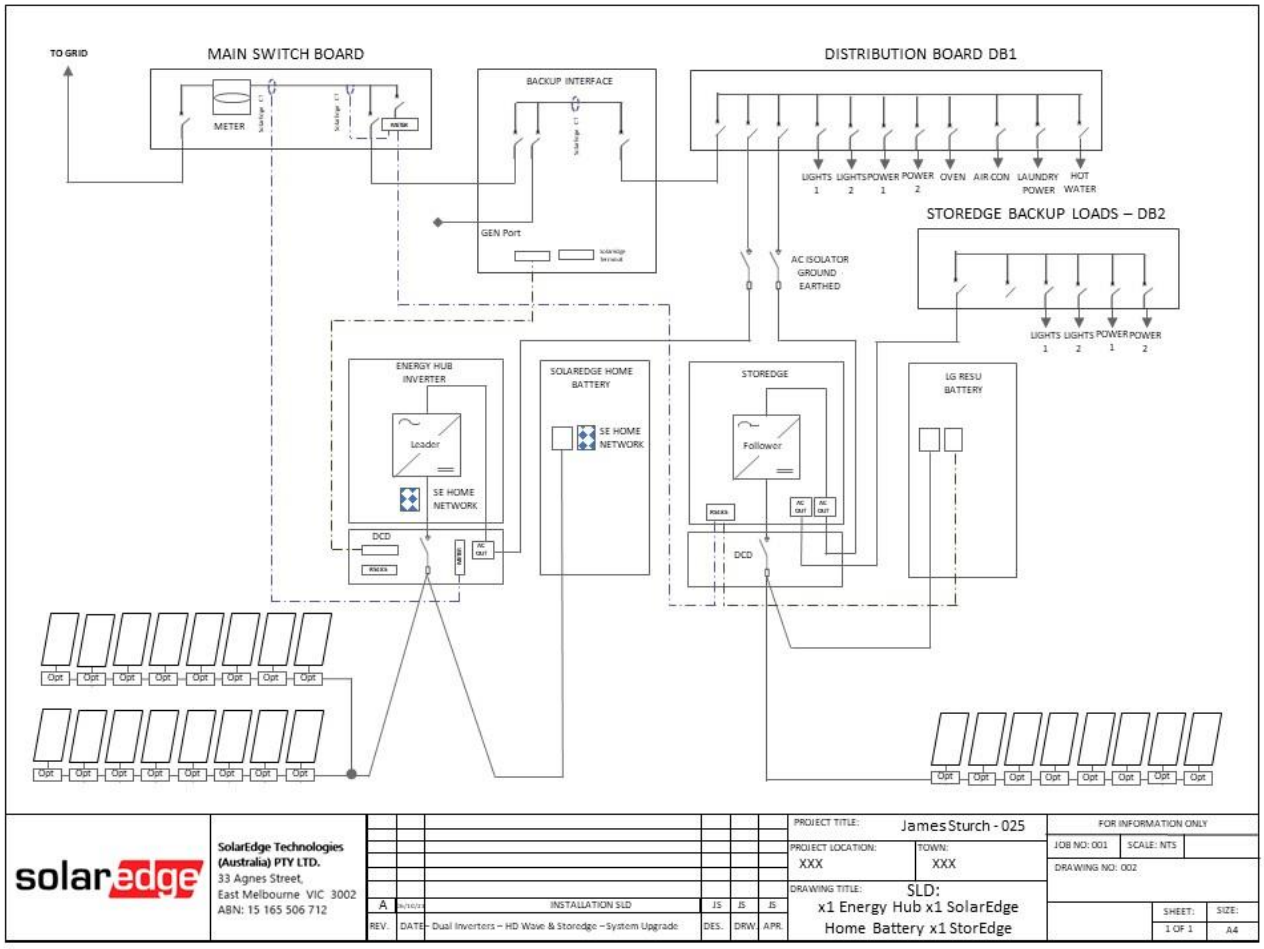


Figure 25:

Energy Hub, SolarEdge Home Batterie, Partial Backup, StorEdge, LG RESU, Metering Option B.

<u>NOTE:</u> The Energy Hub and StorEdge inverters are separate systems (No Leader Follower configuration). Both systems require their own individual site ID as they cannot be combined in the moniting portal.

AS/NZS 4777.2:2020 Residential STC kWp Calculations

New Labelling Requirements

To align with the new testing requirements and product definitions contained within AS/NZS 4777.2:2020. All SolarEdge inverters have labelling to reflect the new requirements illustrated in Table 1.

Depending upon additional hardware components installed, the inverter and overall system will fall into one of three definitions across two main categories:

18. Non-multiple mode inverters – incapable of providing backup. HD-Wave, HD- Wave Genesis, HD-Wave EV and Residential 3Ø inverters.
19. Multiple mode inverters – capable of providing backup. The Energy Hub inverter with Backup Interface.

Inverter/System Definition	Backup	System Configuration	Product Code Suffix
PV & Battery Inverter	-	Solar + DC-Coupled Battery	SExxxxH
Multiple Mode Inverter	Y	Solar + DC-Coupled Battery + Backup	SExxxxH-MM

Table 1: Definitions and corresponding Product Code suffix designations.

Guidance Relating to PV DC Oversizing of SolarEdge Systems

To SolarEdge inverters provide the ability to significantly oversize the system's PV array once a battery is connected to facilitate improved battery charging performance.

The following table details the maximum volume of PV DC Capacity and therefore number of STC's, which can be generated based on the inverter capacity and associated hardware components.

Energy Hub Inverter	STC Calculation for PV Oversizing
PV only	133.3% x inverter AC output
PV + Battery	300% x inverter AC output (See Table 3) with battery
HD-Wave & Genesis	**STC Calculation for PV Oversizing**
PV only	133.3% x inverter AC output
PV + Battery	200% x inverter AC output (Inverter + DC Combiner)

Table 2: System Definition and STC Calculation for PV oversizing

Energy Hub as a multiple mode inverter allows greater PV DC oversizing than the non-multiple mode inverters, such as the Genesis inverter.

When adding extra PV DC capacity for battery charging, we suggest using the following methodology:

1. Oversize the inverter by 133.3% in-line with CER recommendation.
2. Connect up to 5kW for each battery up to the maximum allowable level specified on the Energy Hub datasheet.

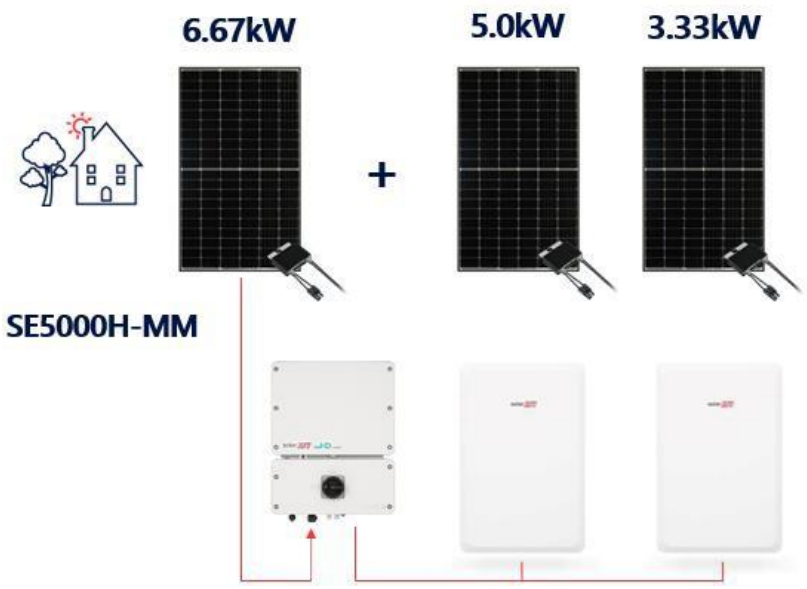


Figure 18: Energy Hub SE5000H-MM maximum oversizing example.

Guidance Relating to kWp Ratio for STC Calculations – SolarEdge Home Battery

The applicable volume of STC's is defined by the inverter type and its definition.

Energy Hub is a multiple mode inverter which allows for greater PV DC oversizing than the non- multiple mode inverters such as the Genesis inverter.

Non-multiple mode inverters do not specifically require a DC Combiner Box for battery connection, rather it is needed to facilitate extra PV STC claims for battery charging.

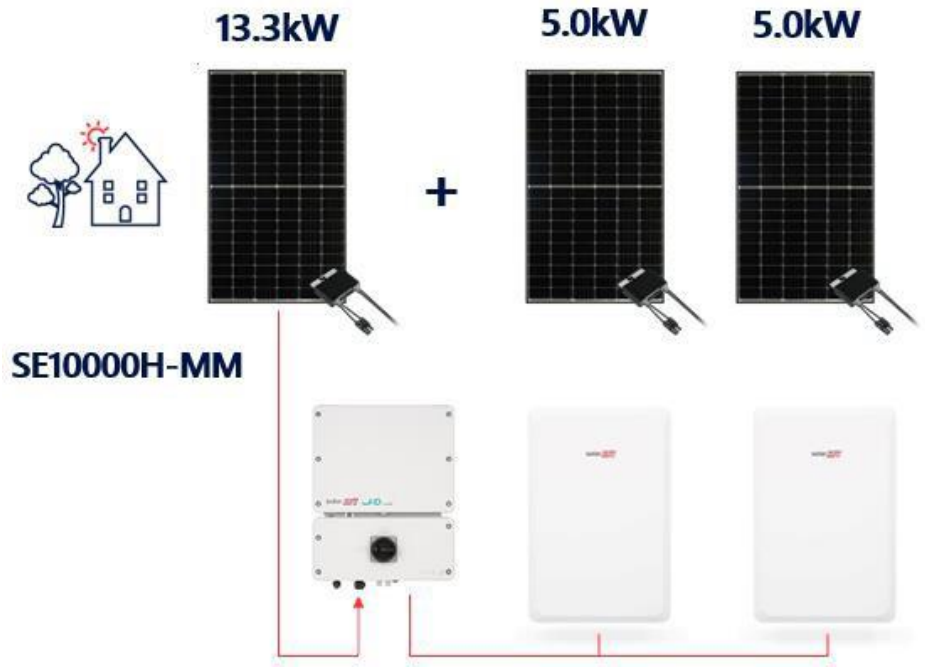


Figure 19: Energy Hub SE10000H-MM maximum oversizing example.

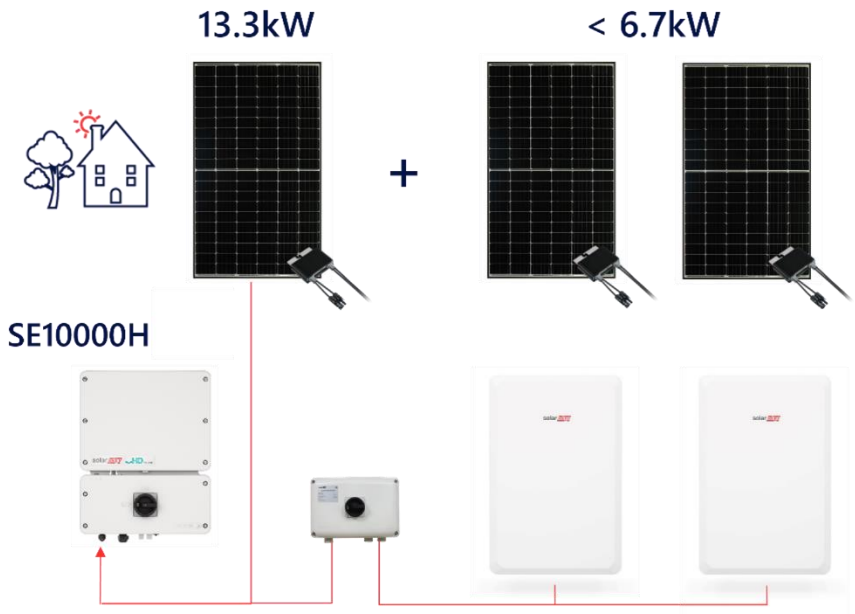


Figure 20: Genesis SE10000H maximum oversizing example.

Inverter	Inverter Model	DC Combiner	SEDG Energy Bank	
			Battery No.	PV kWp
Energy Hub	SE3000H-MM	-	1	9.0
	SE4000H-MM	-	1	10.0
	SE5000H-MM	-	1-2	15.0
	SE6000H-MM	-	1-2	18.0
	SE8250H-MM	Y*	1-3	22.0
	SE10000H-MM	Y*	1-3	22.0
HD Wave EV & Genesis	SE3000H	Y	1	6.0
	SE5000H	Y	1-2	10.0
	SE6000H	Y	1-2	12.0
	SE8250H	Y	1-3	16.5
	SE10000H	Y	1-3	20.0

(*) DC Combiner Required for connection of 3rd. SEDG Home Battery

Table 3: Maximum PV Oversizing guidelines

Guidance Relating to RCD Requirements

PV System Residual Current Factors

In every PV installation, several elements contribute to the current leakage to protective earth (PE). These elements can be divided into two main types:

Capacitive discharge current - Discharge current is generated mainly by the parasitic capacitance of the PV modules to PE. The module type, the environmental conditions (rain, humidity) and even the distance of the modules from the roof can affect the discharge current. Other factors that may contribute to the parasitic capacitance are the inverter's internal capacitance to PE and external protection elements such as lightning protection.

During operation, the DC bus is connected to the alternating current grid via the inverter. Thus, a portion of the alternating voltage amplitude arrives at the DC bus. The fluctuating voltage constantly changes the charge state of the parasitic PV capacitor (i.e. capacitance to PE). This is associated with a displacement current, which is proportional to the capacitance and the applied voltage amplitude.

Residual current - if there is a fault, such as defective insulation, where an energized cable comes into contact with a grounded person, an additional current flows, known as a residual current.

Residual Current Device (RCD)

All SolarEdge inverters incorporate a certified internal RCD (Residual Current Device) to protect against possible electrocution in case of a malfunction of the PV array, cables or inverter (DC). The RCD in the SolarEdge inverter can detect leakage on the DC side. There are 2 trip thresholds for the RCD as required by the DIN VDE 0126-1-1 standard. A low threshold is used to protect against rapid changes in leakage typical of direct contact by people. A higher threshold is used for slowly rising leakage currents, to limit the current in grounding conductors for fire safety. The default value for higher speed personnel protection is 30mA, and 300mA per unit for lower speed fire safety.

Installation and Selection of an External RCD Device

Section 7.3.4.1 of AS/NZS 3000:2018 details the general requirements for the AC isolation switch in accordance with clause 2.3.2.2. Requirements of AS/NZS 4777 series are deemed to satisfy these requirements, however. Section 2.6.2.2 defines the specific types of RCD's and their application. There are 6 different types of RCD's available and complaint for installation depending upon the characteristic of supply, these being:

Type A RCD	- Residential sinusoidal waveforms.
Type A RCD	- Residential pulsating direct currents
Type I RCD	- Residual alternating currents not exceeding 10mA, interrupt time not exceeding 40ms
Type F RCD	- Composite residua, pulsating direct or high frequency leakage currents
Type B RCD	- Residual sinusoidal up to 1000Hz, alternating or pulsating, residual direct currents
Type S RCD	- Specifically designed where tripping is delayed after a pre-determined time

Mitigation of Nuisance Tripping

Section 2.6.3.2.3.3 of AS/NZS 3000:2018 details the requirements wherever a 30mA RCD shall be provided for final subcircuits with a rating not exceeding 32A. However, exceptions to these requirements apply as per clause 2.6.3.2.3.3 Exceptions 3 (II) which states that 'These requirements need not apply to the following'...'may cause spurious nuisance tripping through high leakage currents being generated in the normal operation of the equipment'.

Installation and Selection of an External RCD Device

Installation of an RCD must always be conducted in accordance with local electrical regulations and standards. SolarEdge recommends the use of a type-A RCD. Unless a lower value is required by the specific local electric regulations.

For Single Phase inverter installations SolarEdge suggests an RCD value between 30mA and 100mA. If an RCD is used, 100mA is required for installations above 20kWdc whereas a 30mA RCD is required for installations below 20kWdc.