Battery Guidance for SolShare Installations

Version A.2

DISCLAIMER

This document is intended to provide technical guidance on how to design a safe and effective shared solar system with the SolShare and batteries / energy storage. This document does not override local electrical safety standards and wiring rules. It is the responsibility of the installer to ensure the shared solar installation meets the relevant electrical safety and wiring standards in the installation locality.

Please consult the *0186_DNSP Interconnection Guidelines* document for more information on any additional requirements from DNSPs around installing batteries with the SolShare.

BATTERY GUIDANCE FOR SOLSHARE INSTALLATIONS

Batteries can be installed with the SolShare in shared solar systems. There are multiple configurations and other aspects of battery control to consider before choosing the best solution for a particular site.

A. IMPORTANT CONSIDERATIONS

Here are a number of important considerations for any installation using batteries with the SolShare:

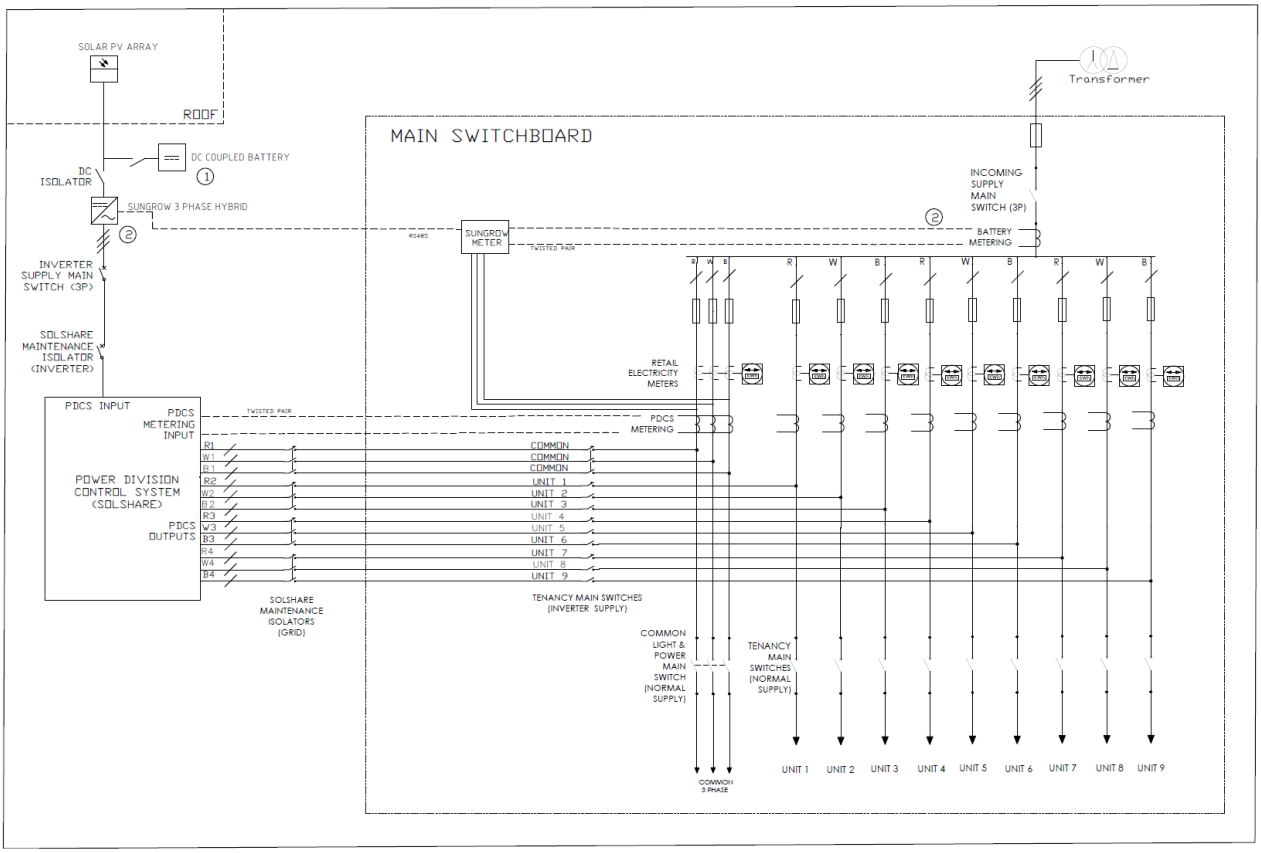
- In scenarios where batteries are intended for shared use between multiple tenants, batteries are installed on the input side of the SolShare. It should be noted that the SolShare is not designed for reverse power flows (i.e. power flows from SolShare outputs to SolShare inputs).
- It is prohibited in Australia to charge batteries from 1 NMI and discharge into a different NMI. Due to the sharing nature of the SolShare, this means that batteries installed with SolShare and intended for shared use between tenants cannot charge from the grid and must only charge from onsite generation (i.e. solar).
- The SolShare requires a 3 phase AC input. The maximum total AC input current to each SolShare is 35A per phase (i.e. approx. maximum 3 phase input power of 22kW). Therefore, the sum of the maximum output power of all inverters and AC-coupled batteries connected to the input of the SolShare needs to be 22kW.
- As with any battery system, any DC-coupled battery will require a hybrid (solar + battery) inverter. Any AC-coupled battery system can utilise a uni-directional solar inverter.
- It is important for optimal battery operation (i.e., when to charge and discharge) that the measured load includes the load of all units (on that phase) that are connected to that battery (via the SolShare). This arrangement is most easily implemented in SolShare installations when there is only 1 SolShare for an incomer and all loads (apartments + common light and power) are connected to the SolShare. See Section C for more information.

B. BATTERY CONFIGURATIONS WITH SOLSHARE

Both AC- and DC-coupled batteries can be installed with the SolShare. The following sections highlight the various possible configurations.

1. DC-COUPLED, 1 x 3 PHASE BATTERY

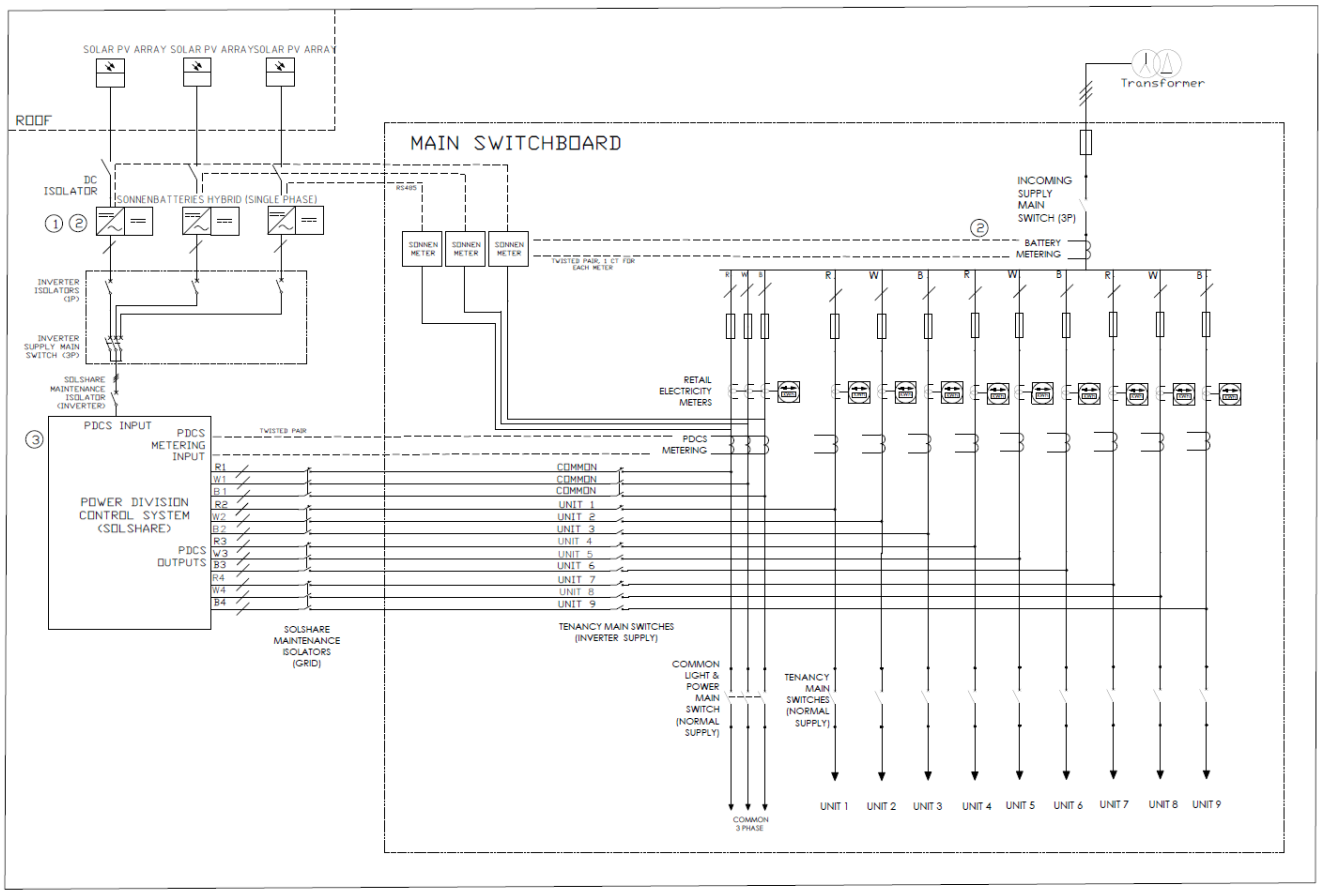
- Examples: BYD, LG Chem, Sungrow
- Positives: Inverter can be sized for SolShare, simple design
- Limitations: Largest 3 phase hybrid inverter on the market is 15kW (10kW also available)



An example of a DC-coupled system with SolShare using a Sungrow battery

2. DC-COUPLED, 3 x SINGLE PHASE BATTERIES

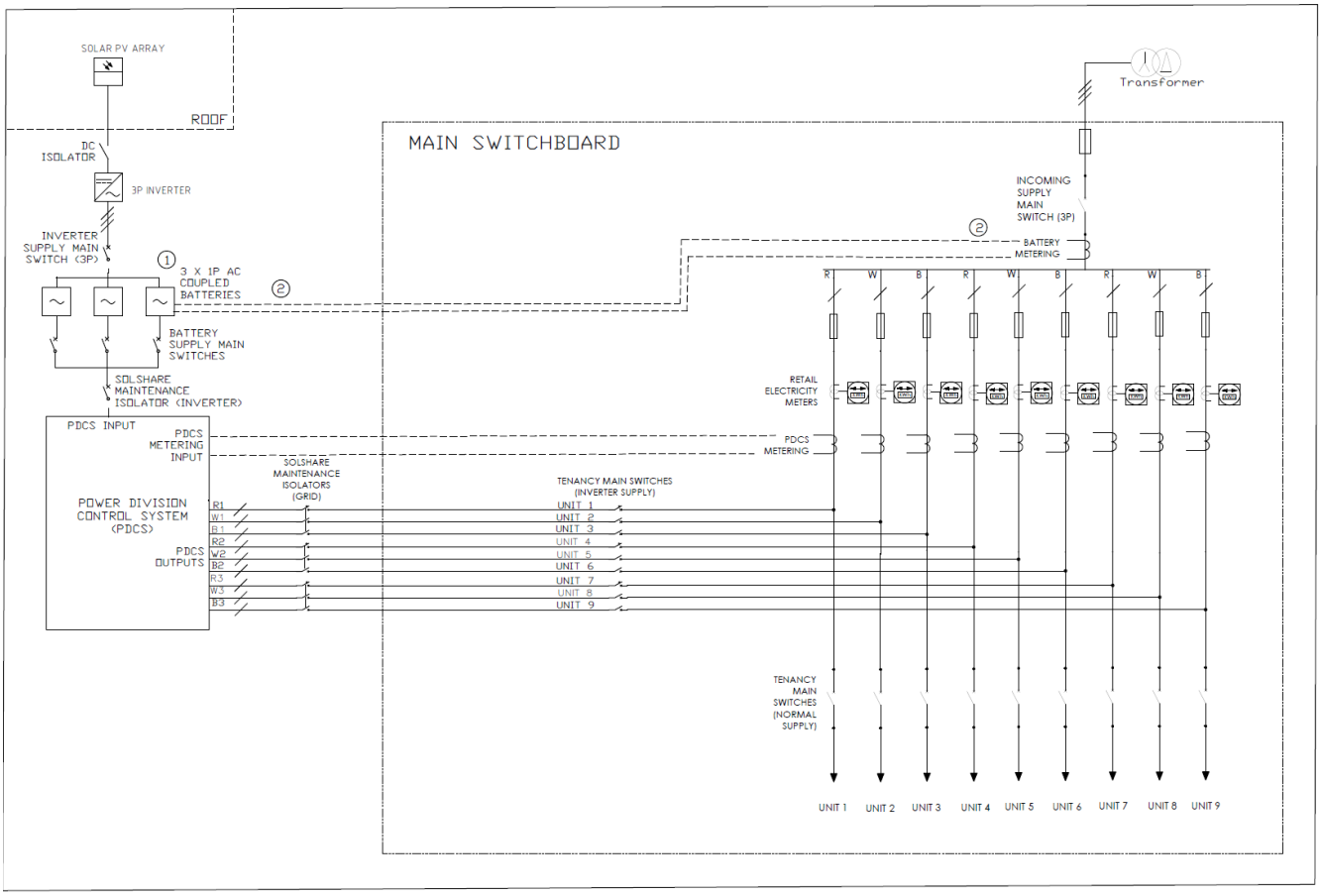
- Examples: Sonnen Batterie Hybrid
- Positives: Inverters can be sized for SolShare
- Limitations: Potential for phase inbalance. The SolShare will suspend operation if total current phase imbalance is >20A.



An example of a DC-coupled system with SolShare using Sonnen Batterie Hybrid batteries

3. AC-COUPLED, 3 x SINGLE PHASE BATTERIES

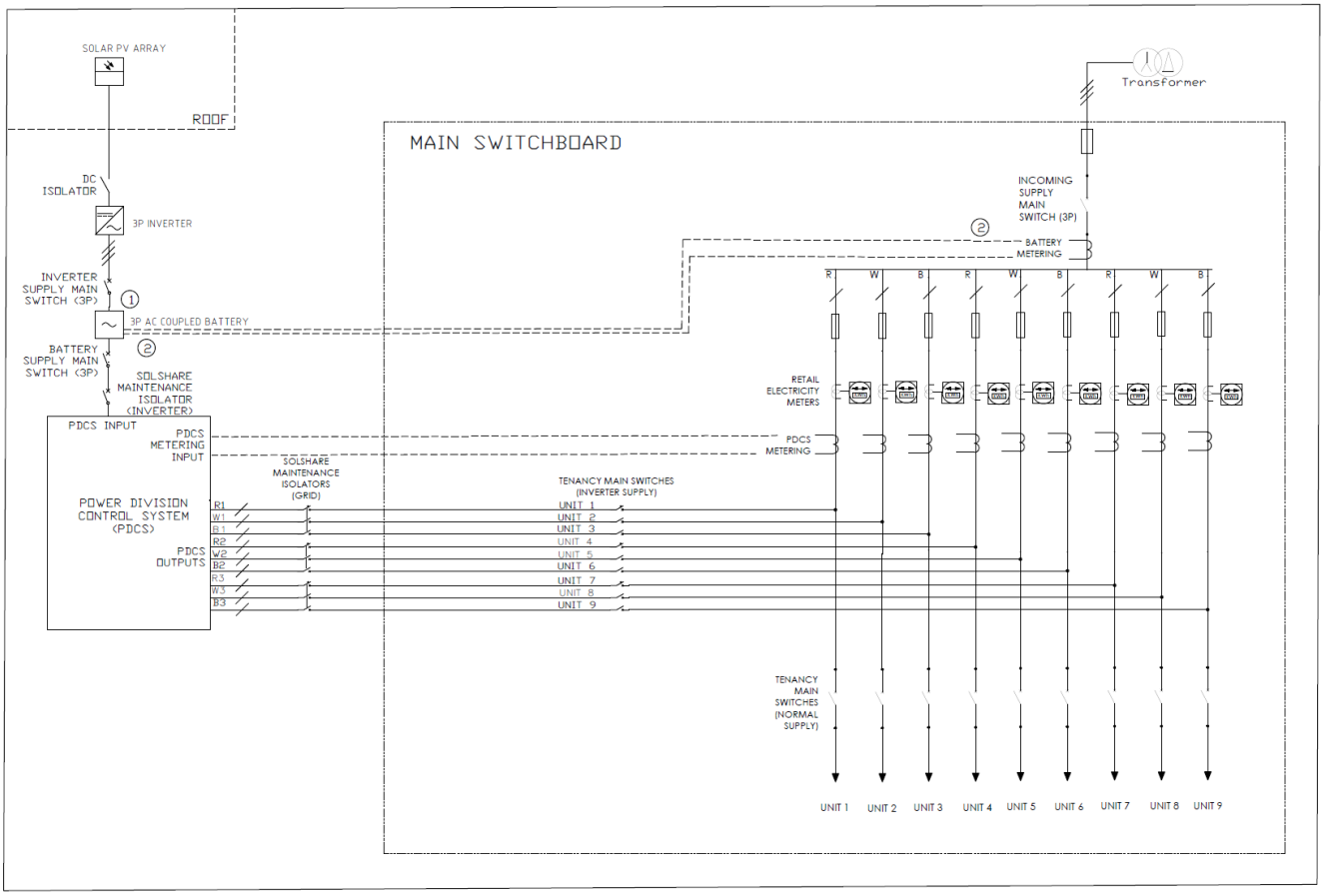
- Examples: Sonnen Batterie Eco, Tesla Powerwall 2
- Positives: Can be retrofitted to existing SolShare installation, more recognisable brands available
- Limitations: Total input power to SolShare cannot exceed 22kW. Therefore, if a 20kW inverter is used, batteries must be limited to discharge only during no solar hours (e.g. at night). If a smaller inverter is used, there will be less surplus generation available to charge batteries. It is important to consider if the batteries will be charged regularly, especially in winter when generation is lower (important if using higher capacity batteries, such as the Tesla Powerwall).



An example of an AC-coupled system with 3 x single phase batteries and a SolShare (utilising only 9 outputs)

4. AC-COUPLED, 1 x 3 PHASE BATTERY

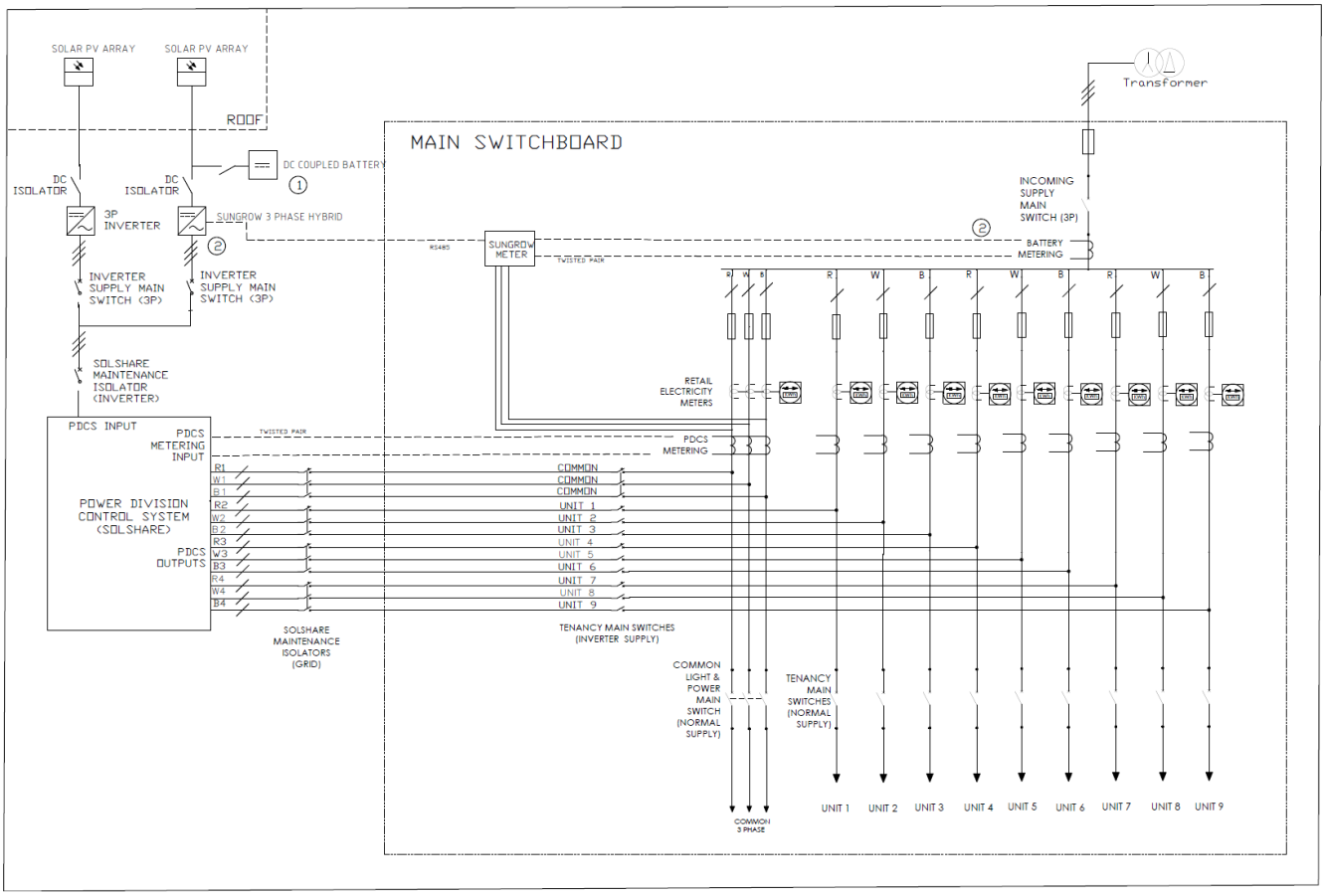
- Examples: Unknown (could use a hybrid inverter with DC battery such BYD, LG Chem)
- Limitations: Suitable products not yet available on the market



An example of an AC-coupled 3 phase battery system with SolShare (utilising only 9 outputs)

5. PV + DC-COUPLED, 1 x 3 PHASE BATTERY

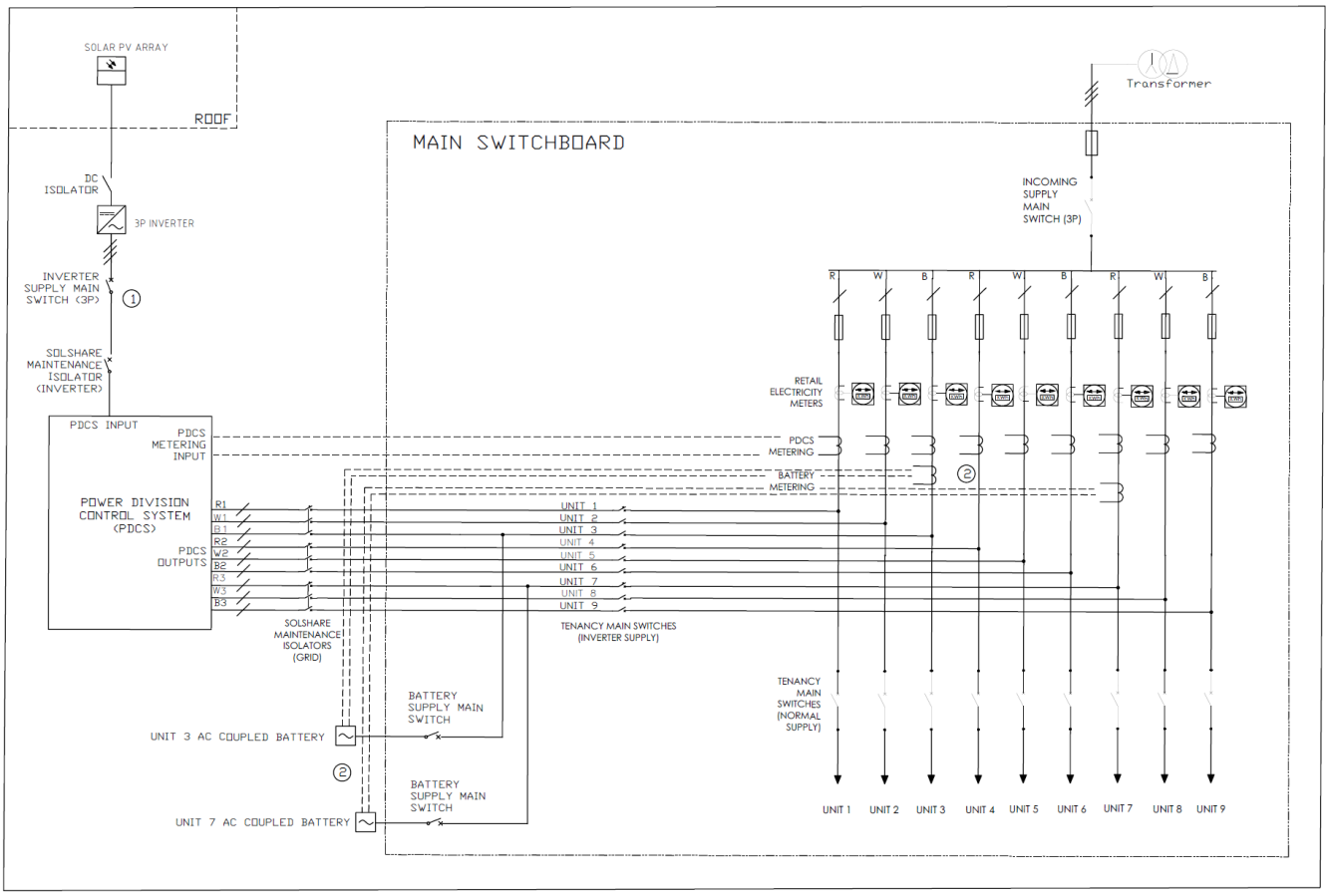
- Examples: BYD, LG Chem
- Positives: Good option to retrofit onto an existing small PV system



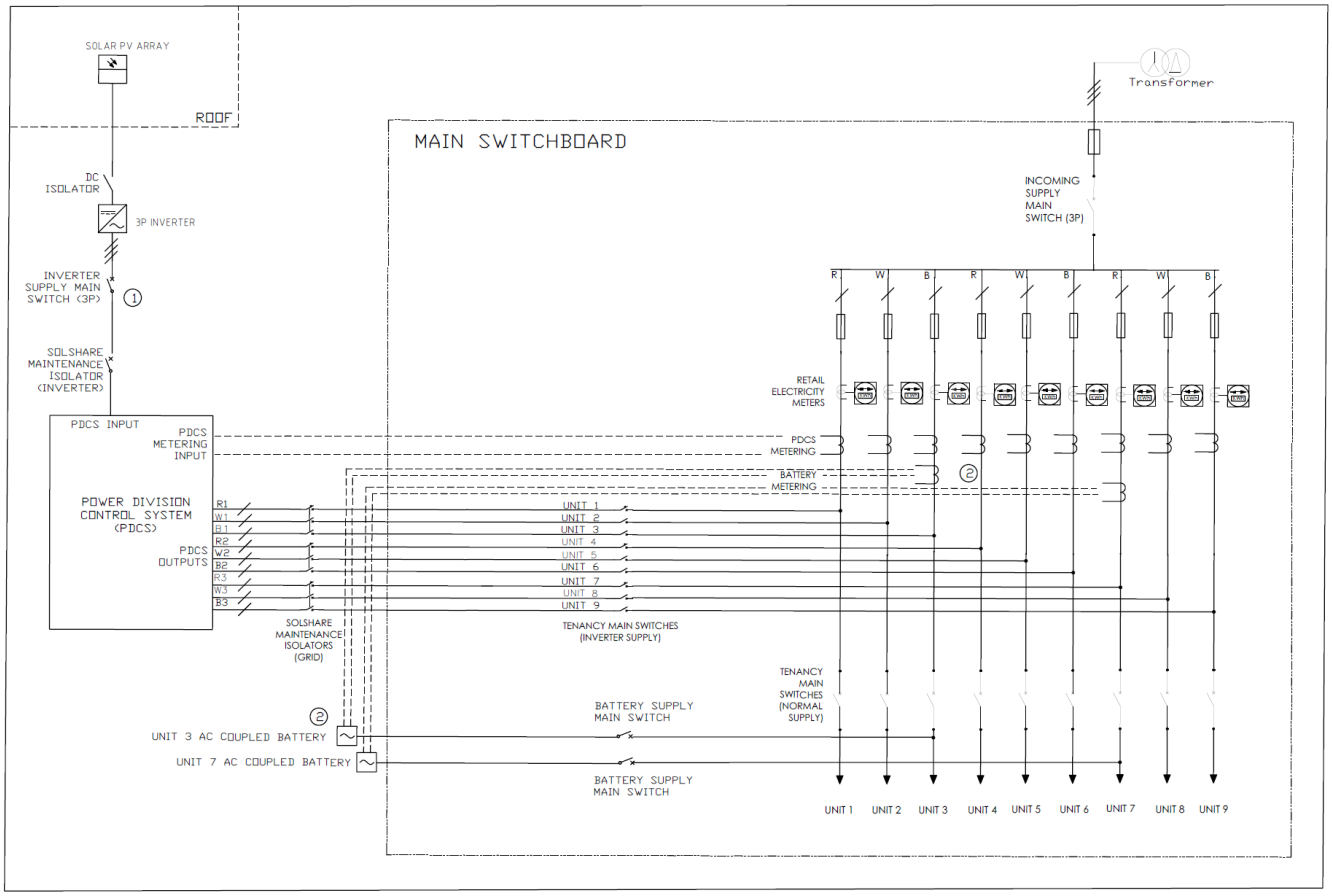
An example of a PV + separate PV/DC-coupled system with SolShare using a Sungrow battery

6. AC-COUPLED BATTERY FOR USE BY SINGLE TENANCY

- Examples: Sonnen Batterie Eco (1 phase tenancy), Tesla Powerwall 2 (3 phase tenancy)
- Positives: Good option to retrofit or install when not all tenants want to invest in batteries
- Note: This is the only battery configuration where batteries can be installed on the output side of the SolShare because each battery is only accessed by 1 tenancy.
- Note: Take notice of battery point of connection in relation to the Tenancy Main Switch (Normal Supply) and the Tenancy Main Switch (Inverter Supply) of each tenancy. The two acceptable configurations have been provided below.



6a: An example of 2 x AC-coupled batteries, each for a single tenancy – one used for Unit 3 and the other for Unit 7. The battery point of connection is between the maintenance isolator and the Tenancy Main Switch (Inverter Supply).



6b: An example of 2 x AC-coupled batteries, each for a single tenancy – one used for Unit 3 and the other for Unit 7. The battery point of connection is between the Tenancy Main Switch (Normal Supply) and the tenancy.

C. BATTERY CTs AND LOAD MONITORING

The SolShare does not currently support communications with battery systems and/or inverters. As such, the signals to charge/discharge a battery, as well as the information needed to decide this (e.g., current load power draw) must be provided by components other than the SolShare.

Most batteries are supplied with a meter including one, or a set, of current transformers (CTs) with which to measure load in real time. This meter is used as an input to charging algorithms, informing the battery management systems (BMS) when to start the battery charging or discharging.

It is important for optimal battery operation (i.e., when to charge and discharge) that the measured load includes **all units (on that phase) that are connected to that battery (via the SolShare)**.

This arrangement is fairly simple in SolShare installations when:

- A battery is only used for 1 tenancy (Configuration #6 in Section B); or
- A battery is shared among multiple tenants (Configurations #1 - #5 in Section B) and there is **only 1 SolShare for an incomer and all loads (apartments + common light and power) are connected to the SolShare**.

If an installation does not fit into either of these scenarios, then it may be difficult to measure the correct loads in practice, so it is the responsibility of the installer to make a decision as to how best to balance optimal battery operation and practical CT placement considerations.