SolShare Design and Installation Guide
Version D.4   for SOLSHARE-3P-35A-04

DISCLAIMER

This document is intended to provide guidance on how to design a safe and effective shared solar system using the SolShare. This document does not override the 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.

SOLSHARE SYSTEM DESIGN

There are certain criteria that should be kept to when designing SolShare systems.

All referenced documents (including the most up-to-date version of this document) can be found on Allume's website.

A.   POWER INPUT

The SolShare power input is three-phase. Any three-phase supply can be used, including multiple inverters connected in parallel.

The total input (including from the inverter and any AC-coupled batteries) must not exceed the maximum current rating of the SolShare. The SolShare35 is rated to 35 amps per phase.

Further information on the rating of the SolShare35 can be found on the product datasheet.

Typically, the input of a SolShare will be connected to the output of a 3 phase string inverter (rated at 20kW or less). However, as long as the total input per SolShare does not exceed 35A per phase, other options include 3 x single phase inverters, or the gateway of multiple string inverters.

B.   SOLSHARE CONNECTIONS

A SolShare unit has 5 x three-phase outputs, which can be split and connected as individual phases to create 15 single-phase outputs. These outputs can be connected in any configuration, as long as:

- Each SolShare's **L1**-1, **L2**-1 and **L3**-1 outputs have connections.
- The phase of each SolShare output matches the phase of its corresponding grid connection.
- Each SolShare has least 2 connections (out of 5) per phase.

Not all 15 outputs need to be used. Example configurations:

- 4 x three-phase connections. 3 connections not used.
- 11 x single-phase connections. 4 connections not used.
- 2 x three-phase & 4 x single-phase connections. 5 connections not used.

In certain circumstances, the SolShare can connect to just one or two phases of a three-phase connected unit. Please refer to 'Installing the SolShare onto Three-Phase Apartments' document for more information on this.

PHASE BALANCING

A three-phase inverter splits the generated power across its three phases. For example, a 15 kW three-phase inverter will supply 5kW of power on each phase. The SolShare distributes the power on each phase separately: 5 connections on **L1**, 5 connections on **L2**, and 5 connections on **L3** phase.

The solar can only be shared between units on the same phase, so this should be considered when designing the system. Designing the system to balance the loads on each phase will help ensure all participants receive a compelling and equitable allocation of solar energy.

For example, if a 15kW system has been installed and connected to 14 single-phase apartments, with 5 apartment connections on **L1** phase, another 5 apartment connections on **L2** phase and the last 4 apartment connections on **L3** phase, then the 5 on **L1** phase will share 5kW (averaging 1kW each), the 5 on **L2** phase will share 5kW (averaging 1kW), and the 4 on **L3** phase will share 5kW (averaging 1.25kW). Therefore, the 4 apartments on **L3** phase will receive slightly more solar than the 10 apartments on **L1** phase and **L2** phase.

For installations where 3 phase units receive solar to all three phases, the above does not apply.

SERVICE SIDE VS. LOAD SIDE POINT OF CONNECTION (POC)

SolShare installations must follow one of the options provided in the following sub-sections for the relevant geography. As mentioned in the Disclaimer above, how the installer wires the SolShare connections is ultimately their choice and responsibility.

It is important that an installer inform Allume if an installation does not follow one of the below options, as this would be non-compliant with Allume's guidance.

New Zealand, QLD, NSW, VIC & TAS
There are 2 options:

1. It is highly recommended that the SolShare's outputs' point of connection (POC) be behind the meter, on the **service (line) side of the *Tenancy Main Switch (Normal Supply)*[1]**. When a SolShare is wired this way, the appropriate warning label supplied with the SolShare should be applied to the meter panel to indicate service side wiring.

2. Should the installer decide to connect the SolShare's outputs on the load side of the *Tenancy Main Switch (Normal Supply)*, **the installer must use a 2 pole breaker** for the *Tenancy Main Switch (Normal Supply)* and *Tenancy Main Switch (Inverter Supply)*.

South Australia
Follow 1 of the 4 options in the *SAPN Interconnection Requirements for SolShare* document.

ACT
There is 1 option:

EvoEnergy has stated that the SolShare's outputs' point of connection (POC) should be behind the meter, on the **service (line) side of the *Tenancy Main Switch (Normal Supply)*[1]**. When a SolShare is wired this way, the appropriate warning label supplied with the SolShare should be applied to the MSB to indicate service side wiring.

1. See Section H for more information about switchgear and the template SLD at the end of this document

NEUTRAL CONNECTION

The SolShare must have **one** neutral connection, regardless of the number of switchboard/s the SolShare is connected to. This should be a direct connection to MEN Link.

The SolShare also provides an option to provide a neutral connection to the inverter, if the inverter does not have its own separate neutral connection.

C.   METERING

RETAIL ELECTRICITY METERS

The apartments must be fitted with bi-directional capable 'smart' meters. These meters should be ganged on a central meter panel, or on separate meter panels for each floor.

SOLSHARE CT METERING

15 current transformers (CTs) are supplied with each SolShare, one corresponding to each output connection. These CTs must be clipped on the incoming supply to each participating unit, between their meter and the solar point of connection (POC). See the Installation Manual and template SLD on the last page of this document for further detail.

A SolShare may be delivered with any one of the following CT types. Only one CT type is to be used on each SolShare (i.e., a single SolShare cannot make use of both 75A CTs and 120A CTs, or both 75A CTs and 200A CTs). Please advise Allume at the time of ordering the SolShare if any of these options will not be suitable for your installation:

	75A CT (previously standard, now ordered on request)	120A CT (standard)	200A CT (ordered on request)
Dimensions (outer)	39 x 26 x 23 mm	46 x 32 x 32 mm	66 x 45 x 35 mm
Designed to clip over cable gauges	16mm2 or smaller (internal hole diameter 10mm)	25mm2 or smaller (internal hole diameter 17mm)	25mm2 + (internal hole diameter 24mm)
Max. CT tail length (10m supplied tail + extension)	When measuring <63A: 100m When measuring 63A < 75A: 50m	100m	100m

Each CT comes with 10m of tail connected to the CT. If CT tails need to be extended for an installation, only shielded, twisted pair, 24 AWG cabling should be used to extend the lengths, with a butt splice connector or similar.

D.   SOLSHARE INSTALLATION LOCATION

The SolShare can be installed indoors or outdoors. It has been tested and certified for IP56, meaning it can be installed in outdoor unconditioned environments out of direct sunlight and out of the path of falling debris (such as leaves). A cover above the SolShare should be provided if installed outdoors.

When installing SolShare outdoors, minimum IP56 rated liquid-tight cables or conduit glands should be used that are suitable for the SolShare's panel hole dimensions (panel thickness: 4mm | Hole diameter: 32mm). The fitted membrane glands in the base panel that are provided with the SoLShare should be replaced with this conduit fitting.
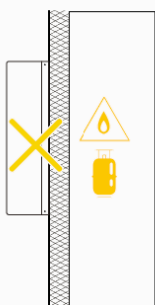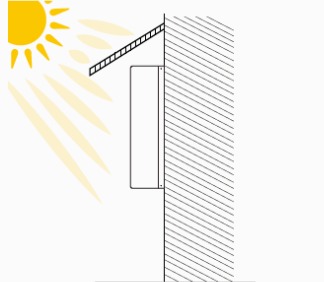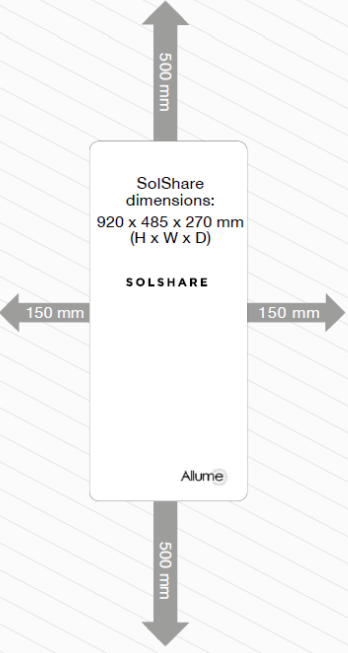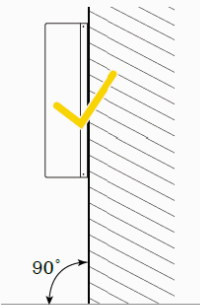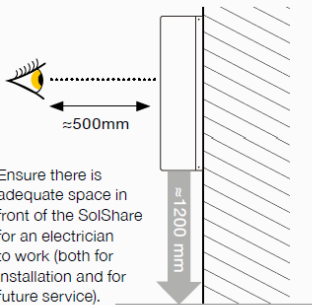
For airflow considerations, ideally, the SolShare should be installed in an open room or area to allow airflow over its heatsinks. However, if the SolShare is to be installed inside a cabinet or enclosure

(e.g., for security reasons), there should be a vent directly above the SolShare to allow hot air to rise out of the enclosure and a vent at the bottom to let cooler air in. A minimu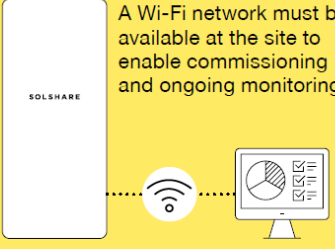m of 50mm between the front face of the SolShare and the enclosure door is recommended, where the front of the SolShare can be fully accessed by opening the cupboard/enclosure.

To minimise cabling cost and prevent extension of CT tails being required, it is recommended that the SolShare be installed as close to the location of the *Tenancy Main Switches (Normal Supply)* as possible (e.g., adjacent to the MSB).

E.   SOLSHARE DIMENSIONS AND CLEARANCES

The dimensions and clearance requirements of the SolShare provided here below. Most crucially, there needs to be a 500mm clearance both above and below the SolShare enclosure, and 150mm to the left and right, as well as space in front of the SolShare for an electrician to easily work.

Do not mount the SolShare on flammable wall material

Do not mount the SolShare near flammable material or gases

Install a shade cover over the SolShare when installed outdoors in direct sunlight or when in the path of debris (e.g. under a tree with falling leaves)

Requirement for installation space

500 mm

SolShare dimensions: 920 x 485 x 270 mm (H x W x D)

SOLSHARE

150 mm   150 mm

Allume

500 mm

Mount vertically

90°

Install in an easy to observe and operate location

≈500mm

Ensure there is adequate space in front of the SolShare for an electrician to work (both for installation and for future service).

≈1200 mm

Environmental boundaries

Max ambient temperature: 50°C (+122°F)

Min ambient temperature: -10°C (-13°F)

Relative humidity: 0-90%

Internet communications

A Wi-Fi network must be available at the site to enable commissioning and ongoing monitoring.

SOLSHARE

Note: Where possible, do not install the SolShare below a cable tray - this may affect the SolShare's ability to connect reliably with the Wi-Fi at site.

F.   ENCLOSURES AND CABINETS

As an IP56-rated product, the SolShare does not require a dedicated enclosure or cabinet. Ideally for heat dissipation, the SolShare should be installed in an open room or outside undercover. However, if the project requires installation in an enclosed area like a cabinet or enclosure, there should be:

- a vent directly above the SolShare to allow hot air to rise out of the enclosure
- a vent at the bottom to let cooler air into the enclosure
- Minimum 50mm clearance between the front of the SolShare and the cabinet/enclosure door (opening the cupboard/enclosure door should allow for the clearances required in Section E).

G.   CABLING

4 core + earth cable is recommend for both the input and output connections to the SolShare. For the output cables, a cable tray is recommended to allow all output cables to be laid quickly and easily.

The gauge of the AC output cable of the inverter should be sized in the same way as is done for a standard solar installation, considering max current, distance to POC, temperature, cable specifications and cable spacing. This cable will form the input to the SolShare.

All output cables of the SolShare must be the same gauge as this input cable, as at points in time the SolShare may direct all current to one unit on each phase.

H.   SWITCHGEAR

Please refer to the template SLD provided at the end of this document for context on the following switchgear categories.

INVERTER SUPPLY MAIN SWITCH

Each shared solar system must have a single point of isolation. This should be labelled the *Inverter Supply Main Switch*. Its location should be accessible and clearly labelled from the main switchboard (MSB). The SolShare's input will be fed from the *Inverter Supply Main Switch.*

TENANCY MAIN SWITCHES (NORMAL SUPPLY)

Tenancy Main Switches (Normal Supply) are the main switches for each tenancy or unit allowing isolation from the grid. Centrally located Tenancy Main Switches (or "Unit Main Switches") on the load side of each unit's meter are required for SolShare connection. These switches are the point of connection (POC) of the SolShare outputs. Typically, these are in an MSB adjacent to the meter panel. If this is not the case, then a switchboard will need to be installed with Tenancy Main Switches included.

The SolShare's connection to these *Tenancy Main Switches (Normal Supply)* will depend on the installation design adopted, see Section B.

TENANCY MAIN SWITCHES (INVERTER SUPPLY)

Each connected unit requires its own individual *Tenancy Main Switch (Inverter Supply).* This breaker will need to be wired between the output of the SolShare and the POC of that unit.

If space permits, the *Tenancy Main Switches (Inverter Supply)* should be installed adjacent to their respective *Tenancy Main Switches (Normal Supply)* in the MSB. If space does not allow for this, it is advised that the *Inverter Supply Main Switch* of the whole system be mounted in the MSB. In this

case, the location of the *Tenancy Main Switches (Inverter Supply)* should be indicated via a label in the MSB.

The *Tenancy Main Switches (Inverter Supply)* should be sized above the max current output of the inverter, e.g., 40A if a 20kW system is installed.

SOLSHARE MAINTENANCE ISOLATORS (GRID)

For ease of isolation of the SolShare, it is highly recommended that an enclosure be installed below the SolShare containing *SolShare Maintenance Isolators (Grid)* for each output. Only once all these isolators are open, along with the *Inverter Supply Main Switch*, will the SolShare be isolated. As the SolShare is a 3-phase device, it is recommended that these Maintenance Isolators are 3 pole.

The *SolShare Maintenance Isolators* should have the same current rating as the *Tenancy Main Switches (Inverter Supply)*.

I.   NETWORK PROTECTION UNITS (NPU)

As with other solar installations more generally, NPUs may be required in installations involving a SolShare, based on rules set out by the relevant DNSP, Australian/New Zealand Standards or other regulations. Please consult Allume's *0370_NPU_Guide_for_SolShare_Installations* document for more information.

J.   WI-FI INTERNET

A Wi-Fi internet network must be made available at the SolShare's installation location. The SolShare cannot be commissioned (and ongoing monitoring cannot be provided without an internet connection. The SolShare does not support a wired internet connection. More information is available in the *0389_SolShare Wi-Fi FAQs* document. It is also recommended that the SolShare not be installed directly under a cable tray or similar, which could block or weaken Wi-Fi signals.

K.   LABELLING

A label kit is provided with each SolShare. This label kit contains those labels specific to the SolShare. Other labels for other parts of the solar system should be provided by the installer. Please consult Allume's *0355_SolShare_Labelling_Advice* document for more information.

L.   SHARING

The SolShare is a smart solar sharing device, sensing which tenants are using electricity, and sending solar generation to where it is needed most on a continual basis. This sharing is done between tenants connected to the same phase outputs of a SolShare (no sharing is done between phases).

During commissioning of the SolShare, one of three solar sharing modes can be chosen. These are:

- **Optimised mode:** The SolShare sends solar generation to any tenancy or connection using meaningful load, leading to optimal self-consumption of solar in the building as a whole. As such, higher energy consumers will receive more solar generation than low energy consumers.
- **Optimised and Even mode:** The SolShare follows the same logic as the *Optimised mode*, but over the course of each calendar month, the SolShare will adjust sharing so that each connection or tenancy receives the same allocation of solar energy (in kWh) as other connections on the same phase. This allows for an even share of solar among all connections.

- **Optimised and Uneven mode:** The SolShare follows the same logic as the *Optimised mode*, but over the course of each calendar month, the SolShare will adjust sharing so that each connection or tenancy receives a pre-determined uneven allocation of solar energy (in kWh).

The *0446_SolShare_Solar_Sharing_Modes* document provides more information about SolShare's various sharing mode options.

M. MULTIPLE SOLSHARES

When designing a system that will use multiple SolShares (for example, if you need to connect more than 15 tenants to solar), treat each SolShare system separately. By rule of thumb, there should be a dedicated set of PV panels connected to 1 inverter (or set of inverters) that is connected to 1 SolShare, which is then connected to a set of apartments. Separately, another dedicated set of PV panels should be connected to another inverter (or set of inverters) that is connected to another SolShare, which is then connected to another set of apartments, and so on.

Avoid connecting more than 1 SolShare to 1 inverter, because this may cause overloading to 1 SolShare if another SolShare is offline for any reason.

Multiple 3-phase inverters may be connected in parallel to form the input to the SolShare if required.

Since each SolShare system is treated separately, the tenant loads should be distributed across the SolShares in proportion to the respective PV generation connected to each SolShare, and the solar share each tenant should receive.

For more information about providing network protection for larger solar systems, see Section I.

N. DNSP DESIGN CONSIDERATIONS

Some DNSPs impose system design constraints in addition to those outlined in this document. In addition, the process of applying for interconnection differs between DNSPs (with some requiring pre-installation approvals).

Allume has collated information about design considerations by DNSP, and how to apply for interconnection for systems involving SolShare in *0186_DNSP Interconnection Guide*. It is highly recommended that you consult this guide while designing systems, and prior to making any interconnection applications.

It is also highly recommended for installations in most DNSP jurisdictions that all NMIs for the site be collected early on in the process, as this will be needed for interconnection applications, and collating a list of NMIs early will help to speed up this process.

A summary of Australian DNSPs where the SolShare is approved for installation is provided below.

DNSP	Approval to install
CitiPower/PowerCor	Yes
Jemena	Yes
United	Yes
AusNet	Pending
Tas Networks	Yes
South Australian Power Networks	Yes
AusGrid	Yes
Endeavour Energy	Yes
Essential Energy	Yes
Energex / Ergon	Yes
Evo Energy	Yes
Western Power	Pending
NT Power and Water Corporation	Pending

For more information about approvals with Line Companies in New Zealand, please contact Allume.

O.   TEMPLATE SLD

The template SLD on the following page shows an example configuration suitable in most jurisdictions for a typical single SolShare installation, supplying solar to 15 single phase tenancies. Notes are included in the SLD to annotate key considerations of your design.

SOLAR PV ARRAY

ROOF

Transformer

MAIN SWITCHBOARD

INCOMING
SUPPLY
MAIN
SWITCH (3P)

DC
ISOLATOR

3P INVERTER

INVERTER
AC ISOLATOR

INVERTER
SUPPLY MAIN
SWITCH (3P)   Ⓒ

L1 L2 L3 L1 L2 L3 L1 L2 L3 L1 L2 L3 L1 L2 L3

Ⓖ   SOLSHARE
    MAINTENANCE
    ISOLATOR (INVERTER)

Ⓐ

RETAIL
ELECTRICITY
METERS

SOLSHARE
INPUT

SOLSHARE
METERING
INPUT

SOLSHARE
METERING

SOLSHARE

SOLSHARE
MAINTENANCE
ISOLATORS (GRID)

TENANCY MAIN SWITCHES
(INVERTER SUPPLY)

Ⓑ

L1-1   UNIT 1
L2-1   UNIT 2
L3-1   UNIT 3
L1-2   UNIT 4
L2-2   UNIT 5
L3-2   UNIT 6
L1-3   UNIT 7
L2-3   UNIT 8
L3-3   UNIT 9
L1-4   UNIT 10
L2-4   UNIT 11
L3-4   UNIT 12
L1-5   UNIT 13
L2-5   UNIT 14
L3-5   UNIT 15

SOLSHARE
OUTPUTS

Ⓕ   Ⓓ   Ⓔ

TENANCY
MAIN
SWITCHES
(NORMAL
SUPPLY)

UNIT 1 UNIT 2 UNIT 3 UNIT 4 UNIT 5 UNIT 6 UNIT 7 UNIT 8 UNIT 9 UNIT 10 UNIT 11 UNIT 12 UNIT 13 UNIT 14 UNIT 15

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NOTES

Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ
In South Australia Service Side fuses will be replaced by meter isolators. If this is the case the system should be configured for SYSTEM LEVEL ANTI-ISLANDING.	It is advised that the point of connection is on the service side of the Main Switch (Normal Supply) for each unit. This means operating the Tenancy Main Switch (Normal Supply) will isolate both grid and solar supply to tenancy. Clear labelling must be included on the meter panel to indicate this wiring configuration (label provided with SolShare).	If possible, the Inverter Supply Main Switch should be housed in the MSB. If not possible then clear labeling of location of Inverter Supply Main Switch must be included in MSB	Tenancy Main Switches (Inverter Supply) should be housed in MSB. If this is not possible then Inverter Supply Main Switch must be in MSB (see point C).	Cable gauge from Tenancy Main Switches (Inverter Supply) should match cable gauge of grid into Tenancy Main Switches (Normal Supply).	SolShare Maintenance Isolators (Grid) are highly recommended, and are required if Tenancy Main Switches (Inverter Supply) are not readily accessible from the SolShare.	SolShare Maintenance Isolator (Inverter) is only required if Inverter Supply Main Switch is not easily accessible from the SolShare.