



FranklinWH Three-Phase/Two-Phase Access Solution Technical Brief – AU/NZ

aGate, SKU: AGT-R1V1-AU

Generator Module, SKU: ACCY-GENV1-AU

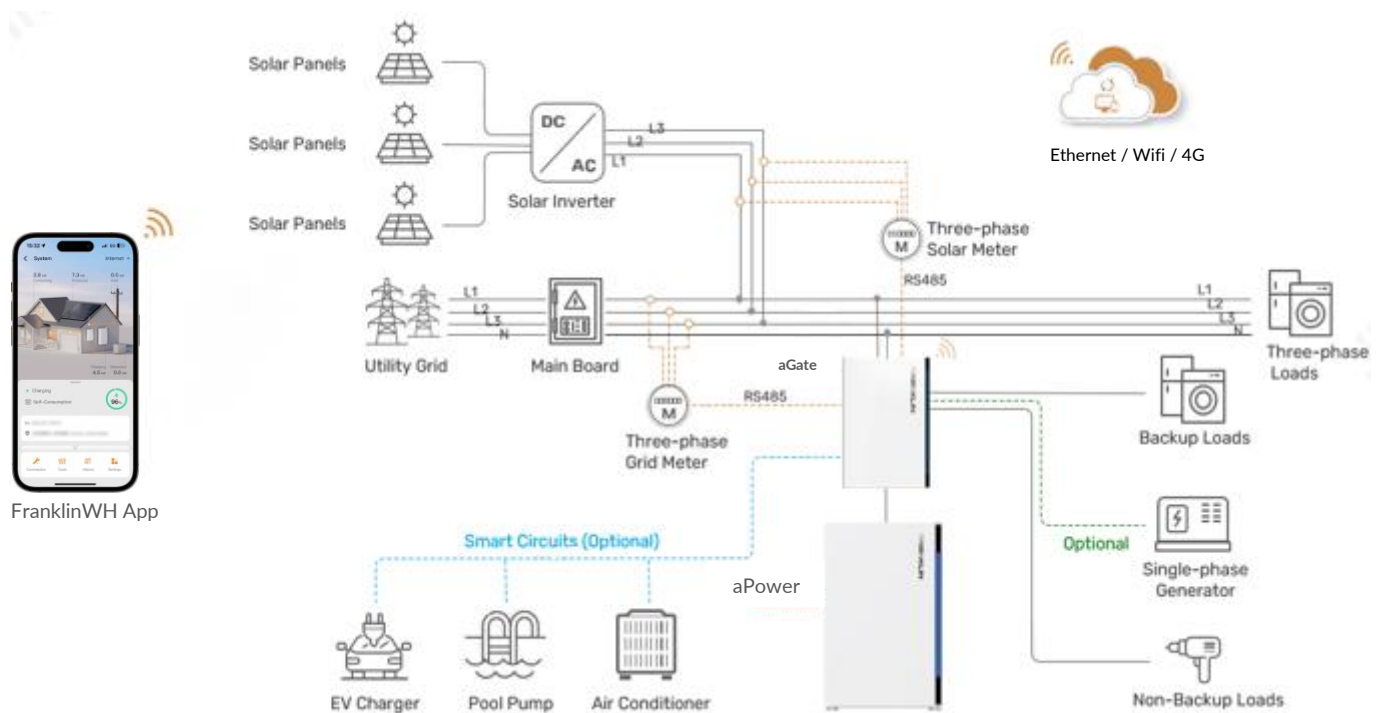
Overview

The FranklinWH System may be installed in a system with a three-phase solar system connected to a three-phase electrical grid, storing excess solar power and providing backup power for single-phase home loads.

It monitors grid electricity consumption and solar production via two separate three-phase meters. During the design phase, the homeowners and installers must determine the backup and non-backup loads. The single-phase loads will be connected to the aGate backup and non-backup ports, while all three-phase loads shall only be connected directly to the main board. As the three-phase loads are not connected to the FranklinWH System, they will lose power when the grid goes down.

This solution is also applicable to systems with a two-phase connection by simply adapting the meter wiring. Use two three-phase meters to separately monitor the PV system and the grid. Additionally, identify the single-phase loads requiring backup power and connect them to the aGate's backup ports.

To install and wire the FranklinWH System in a three-phase and two-phase system, read and follow all the instructions described in this document.



Three-phase Grid + Three-phase Solar Solution Connection Procedure

Solution Description

This solution is designed for homes that have a three-phase grid power connection and three-phase solar system installed. By simply adding two (2) three-phase Meters and two (2) three-phase CTs, installers may enable three-phase compatibility for an FranklinWH System. In this scenario, the FranklinWH System can provide backup power for a single-phase-load on a phase which one of the three phases.

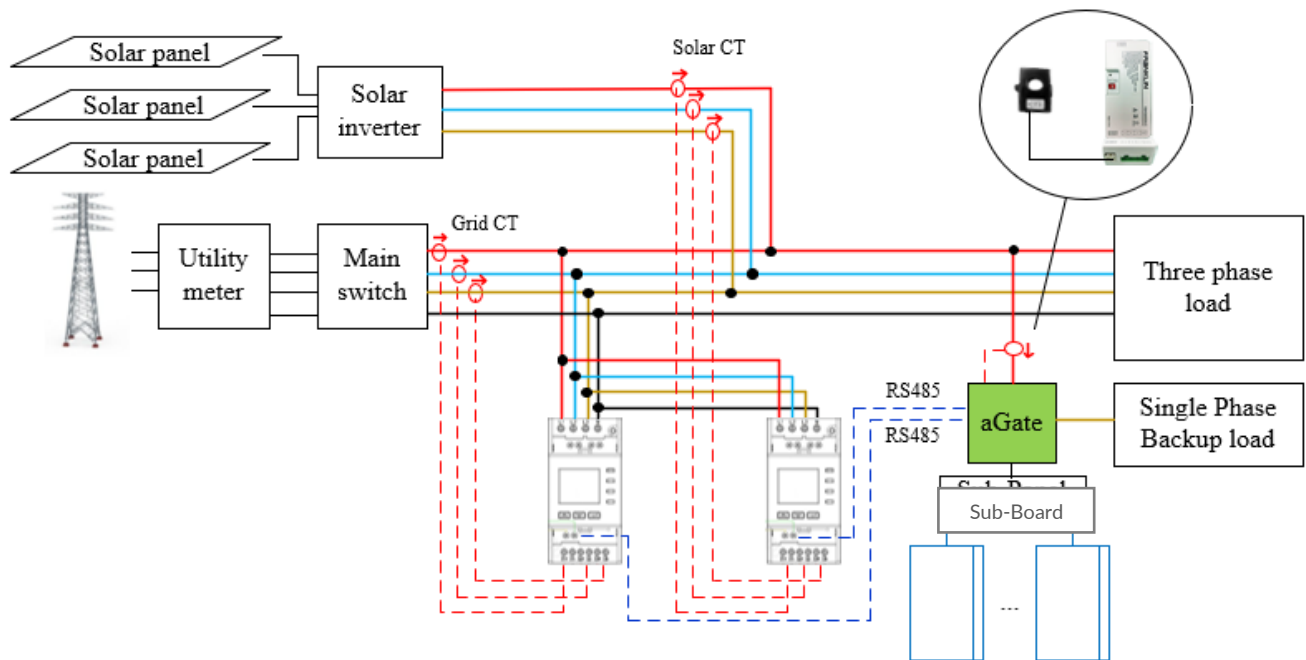
NOTE



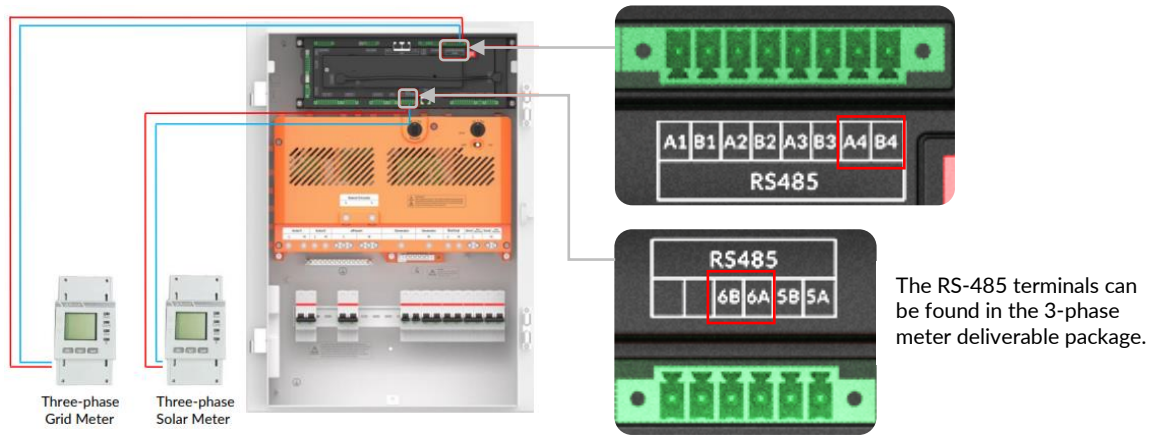
All installations must comply with national and local electrical codes and standards. Only certified installers and qualified electricians shall perform the procedure.

Before installation, turn off all the upstream and downstream breakers and lock them. Wait at least 5 minutes before performing work.

1. Install the FranklinWH System according to *FranklinWH System Installation Guide*.
2. Make sure you have two three-phase meters (Ordered separately from FranklinWH).
3. Choose the locations for the two three-phase meters.
4. Wire the system and three-phase meters as shown in the following image.



- 1) Wire the RS485 communications line A and line B of the three-phase grid meter into A4 and B4 ports, respectively, of the upper RS485 terminals on the aGate.
Wire the RS485 communications line A and line B of the three-phase solar meter into 6A and 6B ports, respectively, of the lower RS485 terminals of aGate.



Refer to the following table for recommended wire gauge.

Connection	Recommended Wire Color	Wire Gauge
Grid Meter Line A	Red	0.32 – 0.13 mm ²
Grid Meter Line B	Blue	0.32 – 0.13 mm ²
Solar Meter Line A	Red	0.32 – 0.13 mm ²
Solar Meter Line B	Blue	0.32 – 0.13 mm ²

- 2) Connect PV output L1, L2, L3, N to the L1, L2, L3, N of the grid, respectively.
- 3) Wire the grid L1, L2, L3, N into the grid meter input terminals.
- 4) Wire the PV output L1, L2, L3, N into the solar meter input terminals.

5. Install CTs

WARNING

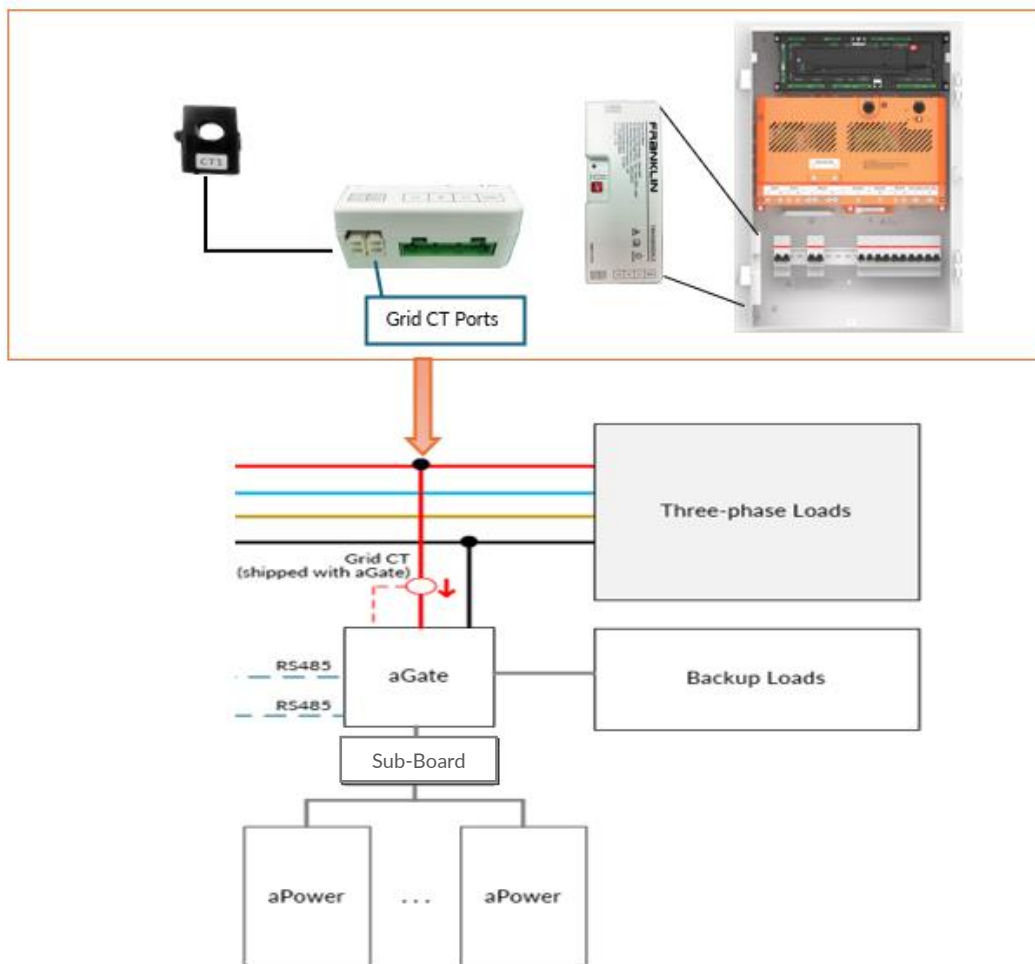


Make sure that the solar CT1, CT2, and CT3 are installed on the same phase lines respectively, as the grid CT1, CT2, and CT3.

Make sure that the CT connected to I1+/I1- ports of the three-phase grid meter is installed on the grid line feeding the aGate.

- 1) Install solar CTs
 - a) Make sure the solar circuits are not energized (breakers OFF).
 - b) Locate solar CT1, CT2, CT3 near solar output circuit L1, L2, and L3, respectively.
 - c) CT connection
 - CT1: Connect the red wire to the I1+ terminal, and the black wire to the I1- terminal of the PV meter.
 - CT2: Connect the red wire to the I2+ terminal, and the black wire to the I2- terminal of the PV meter.
 - CT3: Connect the red wire to the I3+ terminal, and the black wire to the I3- terminal of the PV meter.
 - d) Locate the arrow on the CT label.
 - e) Pass the L1 wire, L2 wire, L3 wire through the CT1, CT2, and CT3, respectively, in the same direction as the arrow on the label of the CT housing pointing toward the grid (away from the solar array).

- 2) Install grid CTs:
 - a) Make sure the main board circuits are not energized (breakers OFF).
 - b) Locate grid CT1, CT2, CT3 near main grid circuit L1, L2, L3, respectively.
 - c) CT connections
 - CT1: Connect the red wire to the I1+ terminal, and the black wire to the I1- terminal of the grid meter.
 - CT2: Connect the red wire to the I2+ terminal, and the black wire to the I2- terminal of the grid meter.
 - CT3: Connect the red wire to the I3+ terminal, and the black wire to the I3- terminal of the grid meter.
 - d) Locate the arrow on the CT label.
 - e) Pass the L1 wire, L2 wire, and L3 wire through CT1, CT2, and CT3, respectively, in the same direction as the arrow on the label of the CT housing pointing toward the loads (away from the grid).
- 3) Install the grid CT (shipped with the aGate). Refer to the image below for CT installation instructions.



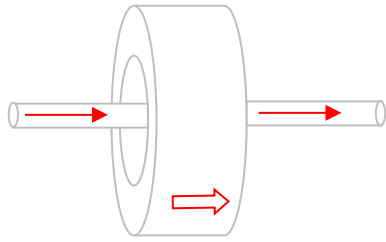
Install the grid CT (shipped with the aGate) with the arrow on the CT housing pointing towards the aGate.

Connect the above CTs to the factory-installed meter inside aGate for each circuit monitoring.

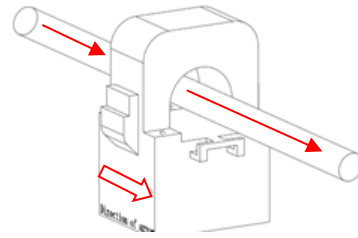
CT Orientation

CTs must be installed and wired with the correct polarity. Refer to the following diagram and table for the CT polarities.

Solar/Grid CT1, CT2, CT3



Grid CT (shipped with the aGate)



CT Usage	CT Orientation
Solar CT1, CT2, CT3	Arrow on the CT pointing toward the grid
Grid CT1, CT2, CT3	Arrow on the CT pointing toward the loads
Grid CT (shipped with the aGate)	Arrow on the CT pointing toward the aGate

CT Wire Lengths

CT leads are 1 m long and can be extended to a maximum length of 15 m.

For a total extended length of up to 15 m, CT wiring can be extended by using wire with the following properties:

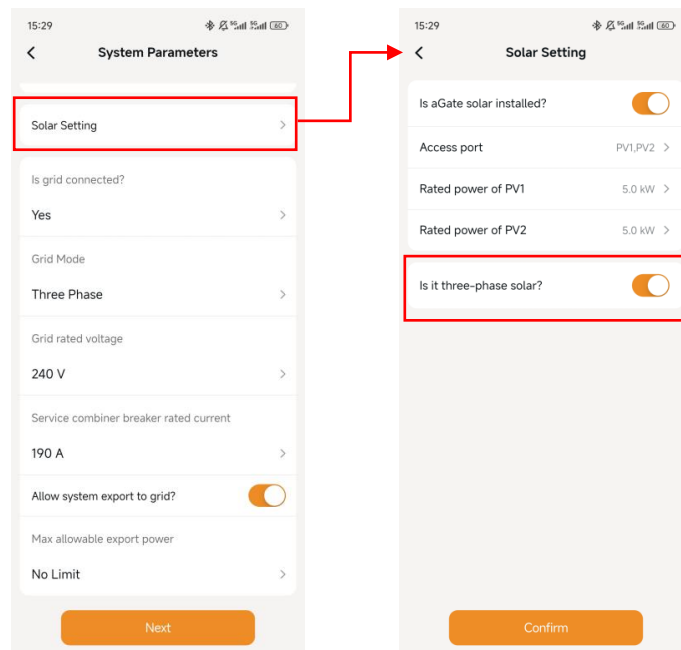
- Shielded, twisted pair wire
- Wire gauge of 0.20 – 0.82 mm²

6. Connect the grid L1, L2, or L3 into the aGate grid terminal. Make sure that the line is being measured by the CT connected to I1+/I1- ports of the three-phase grid meter. In the scenario described in this document, connect grid L1 into the aGate.

System Configuration using the FranklinWH App

After installation, configure the system using the FranklinWH App, refer to *FranklinWH Commissioning Guide* for detailed information.

Note: Enable **Is it three-phase solar?** on the **System Parameters** page during commissioning.



Functional Verification Procedure

1. Start the system, check that the grid meter voltage reading is the same as the solar meter reading. If not, check that all the wiring is properly connected.
2. Check that all CTs are installed with polarity in the correct direction and are well secured.
3. Use a clamp meter to verify CT readings.
4. Check whether the power displayed in the app is the same as the meter reading.

Three-phase Grid + Single-phase Solar Solution Connection Procedure

Solution Description

This solution is typically for a home that has a three-phase grid power connection and single-phase solar system installed. By simply adding a three-phase meter and a CT, the FranklinWH System is compatible with a three-phase grid and single-phase solar solution.

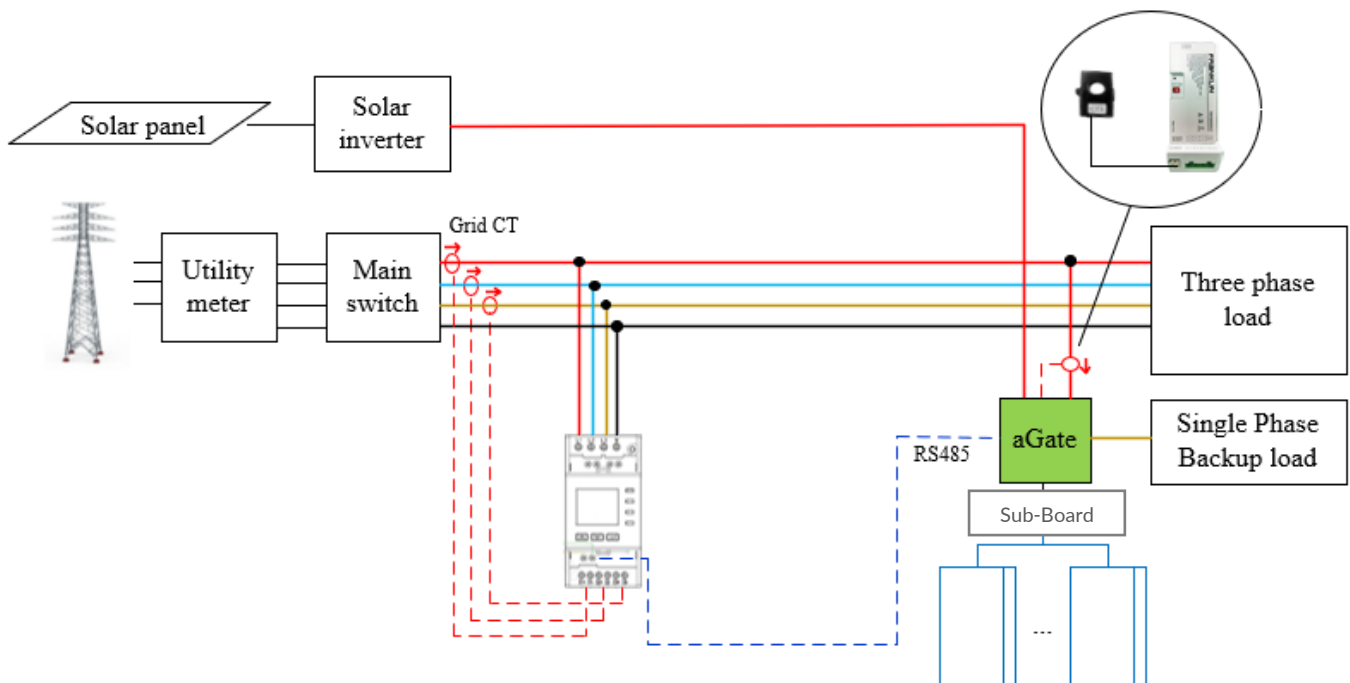


NOTE

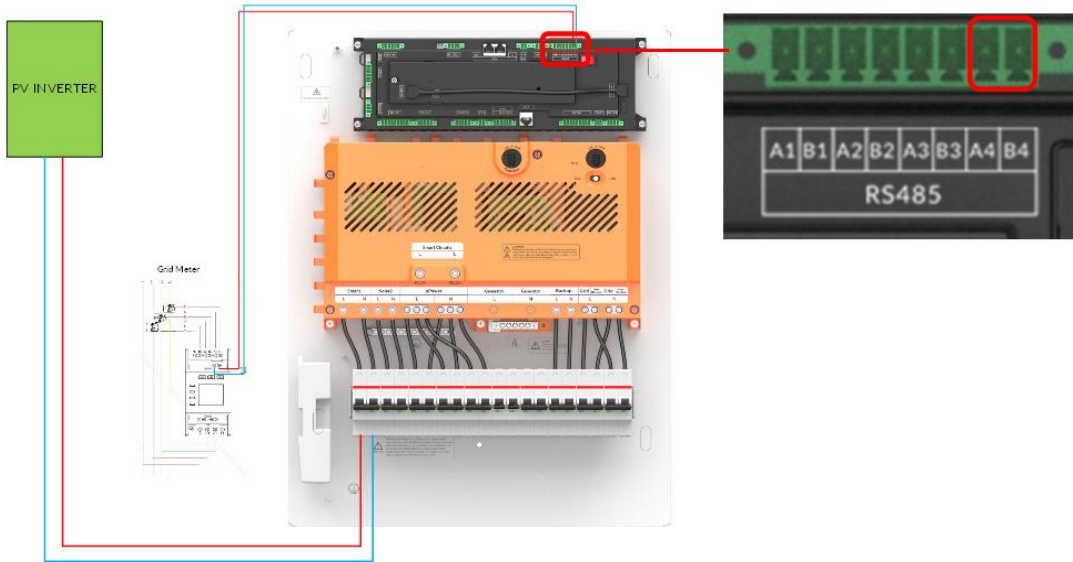
All installations must comply with national and local electrical codes and standards. Only certified installers and qualified electricians shall perform the procedure.

Before installation, turn off all the upstream and downstream switches and breakers and lock them. Wait at least 5 minutes before performing work.

1. Install the FranklinWH System according to **FranklinWH System Installation Guide**.
2. Make sure you have one (1) three-phase meter (Ordered separately from FranklinWH).
3. Choose the installation location for the three-phase meter.
4. Wire the system as shown in the following image.



- 1) Plug the RS485 communications line A and line B of the three-phase grid meter into A4 and B4 ports, respectively, which are located at the EMS RS485 ports.



Refer to the following table for recommended wire gauges.

Connection	Recommended Wire Color	Wire Gauge
Grid Meter Line A	Red	0.32 – 0.13 mm ²
Grid Meter Line B	Blue	0.32 – 0.13 mm ²

2) Wire the grid L1, L2, L3, N into the grid meter input terminals.

5. Install CTs

WARNING



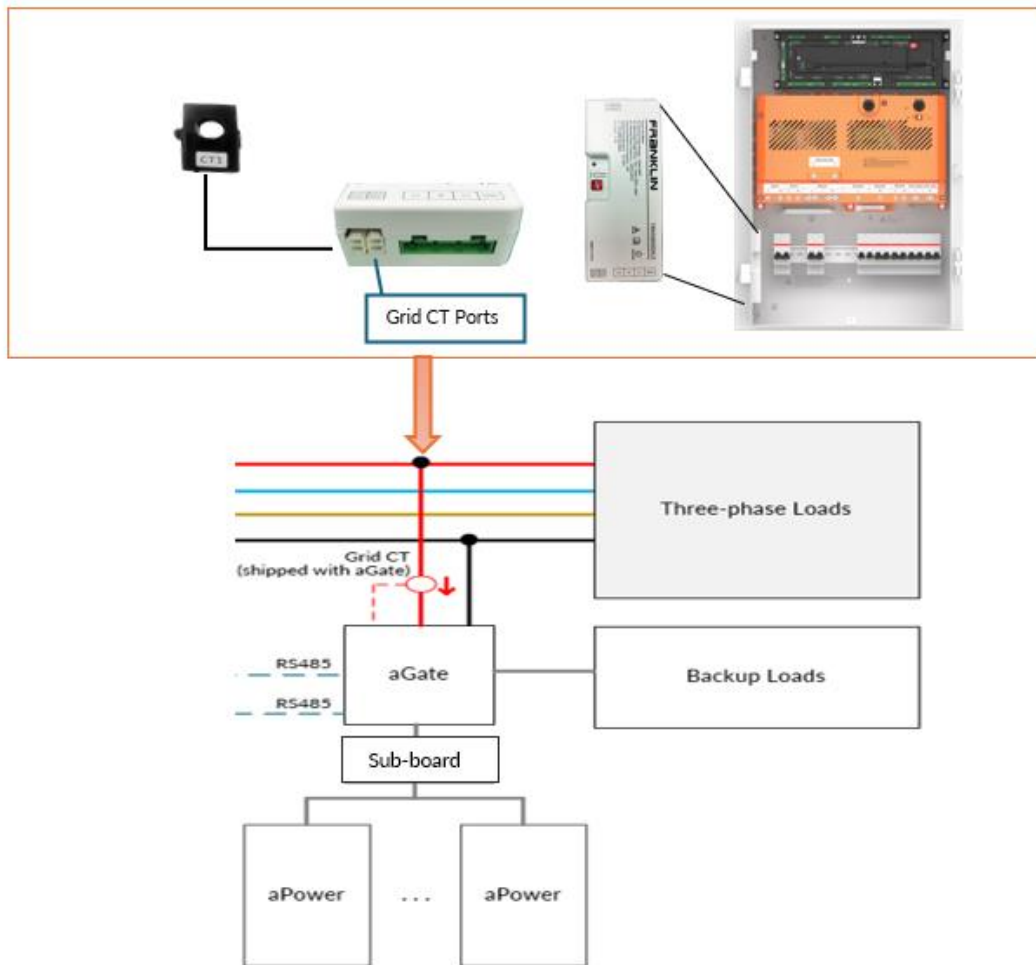
Ensure that the solar CT1, CT2, and CT3 are installed on the same phase lines as the grid CT1, CT2, and CT3.

Ensure that the CT connected to I1+/I1- ports of the three-phase grid meter is installed on the grid line feeding the aGate.

1) Install grid CT:

- a) Make sure the main board circuits are not energized (breakers OFF)
- b) Locate grid CT1, CT2, CT3 near main grid circuit L1, L2, L3, respectively.
- c) CT connections
 - CT1: Connect the red wire to the I1+ terminal, and the black wire to the I1- terminal of the grid meter.
 - CT2: Connect the red wire to the I2+ terminal, and the black wire to the I2- terminal of the grid meter.
 - CT3: Connect the red wire to the I3+ terminal, and the black wire to the I3- terminal of the grid meter.
- d) Locate the arrow on the CT label.
- e) Pass the L1 wire, L2 wire, and L3 wire through CT1, CT2, and CT3, respectively, in the same direction as the arrow on the label of the CT housing pointing toward the loads (away from the grid).

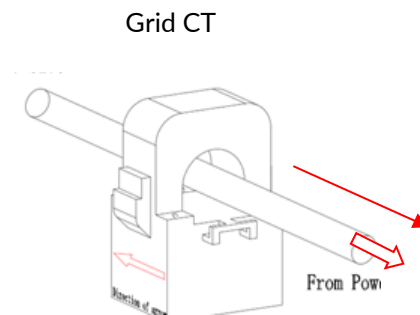
2) Install the grid CT (shipped with the aGate). Refer to the image below for CT installation instructions.



Install the grid CT (shipped with the aGate) with the arrow on the CT housing pointing towards the aGate.

CT Orientation

CTs must be installed and wired with the correct polarity. Refer to the following diagram and table for the CT polarities.



CT Usage	CT Orientation
Grid CT1, CT2, CT3	Arrow on the CT pointing toward the loads
Grid CT (shipped with the aGate)	Arrow on the CT pointing toward the aGate

CT Wire Lengths

CT leads are 1 m long and can be extended to a maximum length of 15 m.

For a total extended length of up to 15 m, CT wiring can be extended by using wire with the following properties:

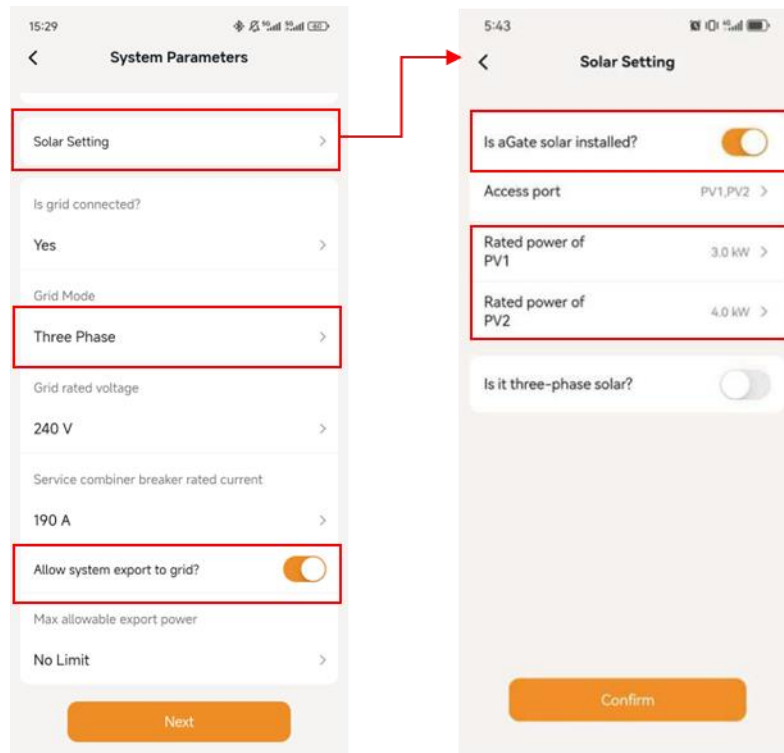
- Shielded, twisted pair wire.
- Wire gauge of 0.20 – 0.82 mm²

6. Connect the grid L1, L2, or L3 into the aGate grid terminal. Make sure that the line is being measured by the CT connected to I1+/I1- ports of the three-phase grid meter. In the scenario described in this document, connect grid L1 into the aGate.

System Configuration using the FranklinWH App

After installation, configure the system using the FranklinWH App, refer to *FranklinWH Commissioning Guide* for detailed information.

Set the function per the following picture. Enable **Is aGate solar installed?** Set **Access port** as per the physical situation. Leave the **Is it three-phase solar?** disabled so that the system recognizes solar as a single-phase PV.



Do not enable Is it three-phase solar? or the system will be automatically recognized as a three-phase grid and single-phase PV installation method, and it will not detect the three-phase PV meter.

Functional Verification Procedure

1. Start the system, check if the grid meter voltage reading is the same as the solar meter reading. If not, check that all the wiring is properly connected.
2. Check that all CTs are installed in the correct direction and well secured.
3. Use a clamp meter to verify CT readings.
4. Check whether the power displayed on the app is the same as the meter reading.

Two-phase Grid + Two Single-phase Solar Solution Connection Procedure

Solution Description

This solution is typically for homes that have a two-phase grid power connection and a two single-phase solar system installed. By simply adding two three-phase meters and a CT, the FranklinWH System is compatible with a two-phase grid and two single-phase solar solution.

Like the installation steps for three-phase grids and three-phase photovoltaic systems, you may remove the voltage and current detection for L3 from the meter and remove grid CT3 and PV CT3.

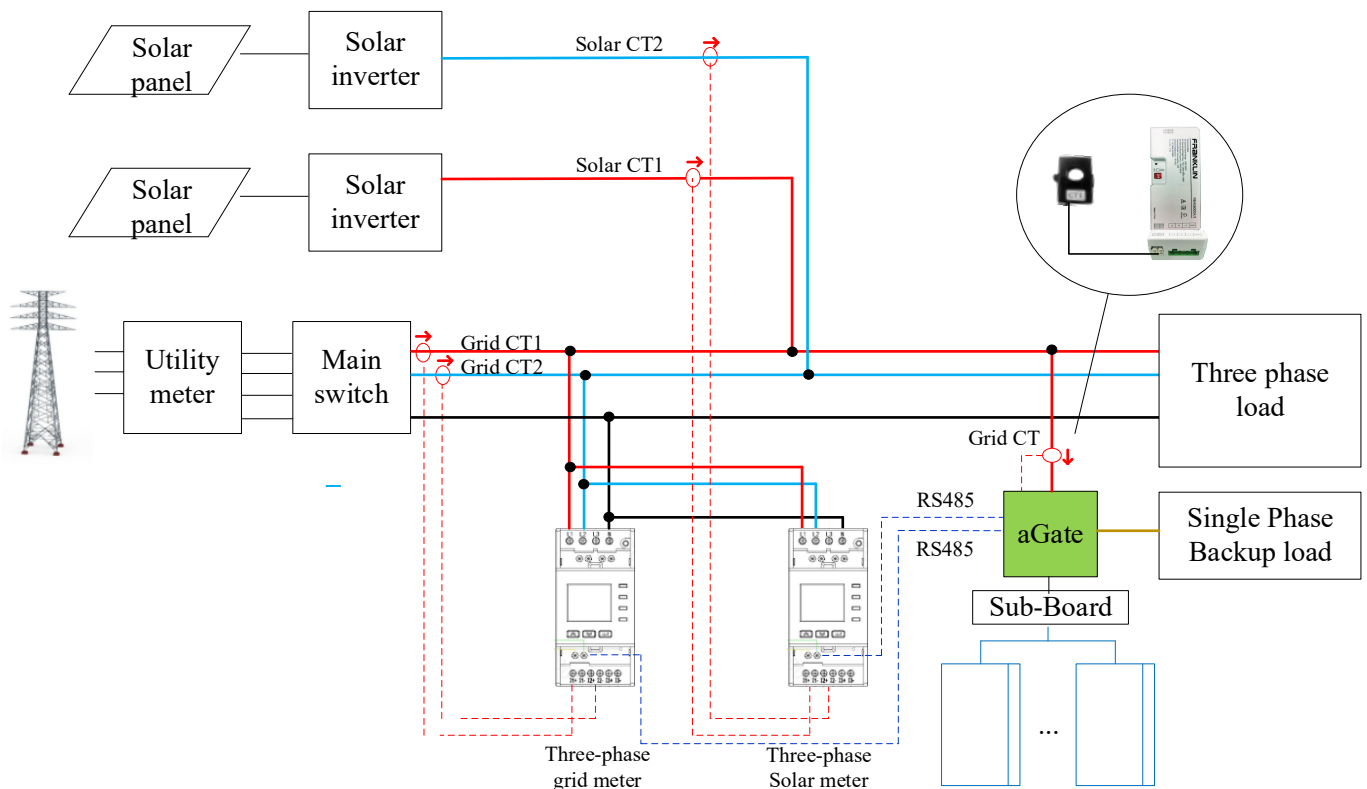


NOTE

All installations must comply with national and local electrical codes and standards. Only certified installers and qualified electricians shall perform the procedure.

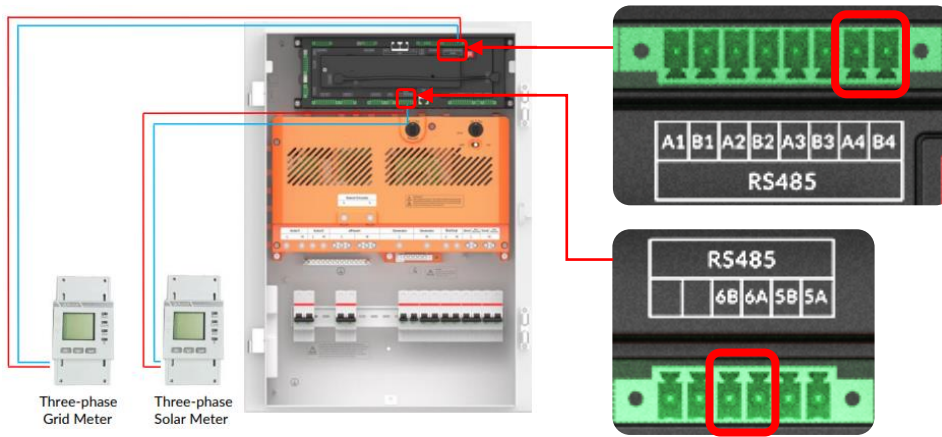
Before installation, turn off all the upstream and downstream switches and breakers and lock them. Wait at least 5 minutes before performing work.

1. Install the FranklinWH System according to *FranklinWH System Installation Guide*.
2. Make sure you have two (1) three-phase meters (Order separately from FranklinWH).
3. Choose the installation location for the three-phase meter.
4. Wire the system as shown in the following image.



- 1) Wire the RS485 communications line A and line B of the three-phase grid meter into A4 and B4 ports, respectively, of the upper RS485 terminals on the aGate.

Wire the RS485 communications line A and line B of the three-phase solar meter into 6A and 6B ports, respectively, of the lower RS485 terminals of aGate.



Refer to the following table for recommended wire gauge.

Connection	Recommended Wire Color	Wire Gauge
Grid Meter Line A	Red	0.32 – 0.13 mm ²
Grid Meter Line B	Blue	0.32 – 0.13 mm ²
Solar Meter Line A	Red	0.32 – 0.13 mm ²
Solar Meter Line B	Blue	0.32 – 0.13 mm ²

- 2) Connect PV output L1, L2, N to the L1, L2, N of the grid, respectively.
- 3) Wire the grid L1, L2, N into the grid meter input terminals.
- 4) Wire the PV output L1, L2, N into the solar meter input terminals.

7. Install CTs

WARNING

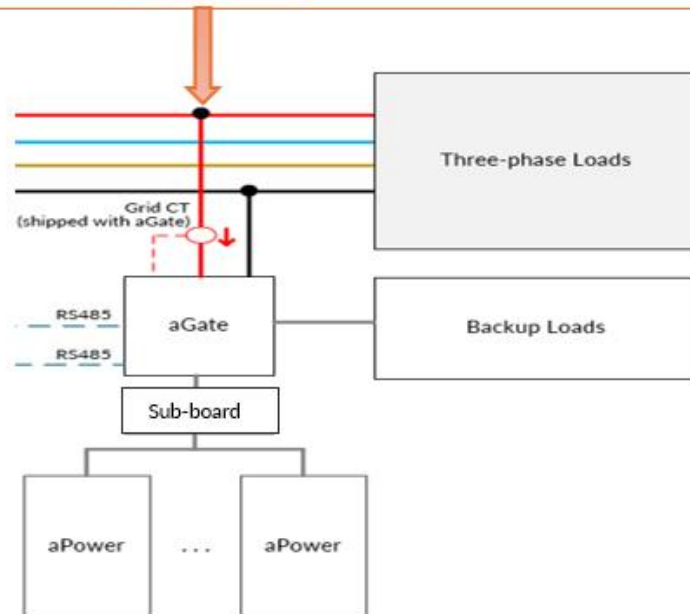
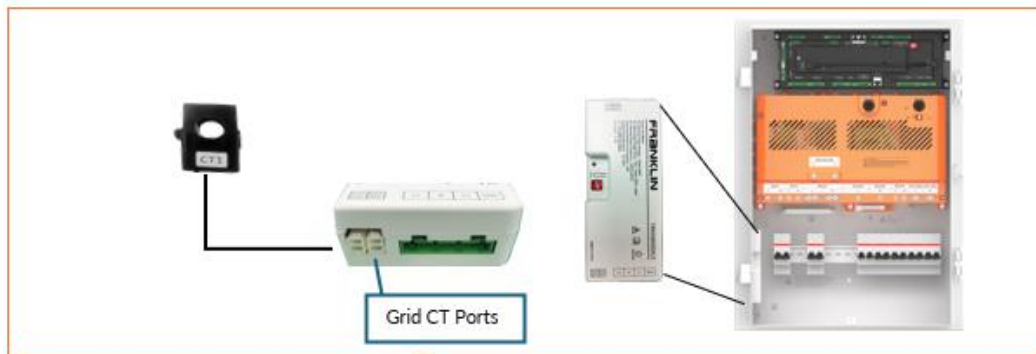


Make sure that the solar CT1 and CT2 are installed on the same phase lines, respectively, as the grid CT1 and CT2.

Make sure that the CT connected to I1+/I1- ports of the three-phase grid meter is installed on the grid line feeding the aGate.

- 1) Install solar CTs
 - a) Make sure the solar circuits are not energized (breakers OFF).
 - b) Locate solar CT1, CT2 near solar output circuit L1 and L2, respectively.
 - c) CT connection
 - CT1: Connect the red wire to the I1+ terminal, and the black wire to the I1- terminal of the PV meter.
 - CT2: Connect the red wire to the I2+ terminal, and the black wire to the I2- terminal of the PV meter.
 - d) Locate the arrow on the CT label.
 - e) Pass the L1 wire, L2 wire through the CT1 and CT2, respectively, in the same direction as the arrow on the label of the CT housing pointing toward the grid (away from the solar array).
- 2) Install grid CTs:
 - f) Make sure the main board circuits are not energized (breakers OFF).
 - g) Locate grid CT1, CT2 near main grid circuit L1, L2 respectively.
 - h) CT connections

- CT1: Connect the red wire to the I1+ terminal, and the black wire to the I1- terminal of the grid meter.
 - CT2: Connect the red wire to the I2+ terminal, and the black wire to the I2- terminal of the grid meter.
 - i) Locate the arrow on the CT label.
 - j) Pass the L1 wire, L2 wire through CT1 and CT2, respectively, in the same direction as the arrow on the label of the CT housing pointing toward the loads (away from the grid).
- 3) Install the grid CT (shipped with the aGate). Refer to the image below for CT installation instructions.



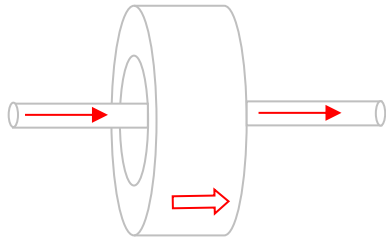
Install the grid CT (shipped with the aGate) with the arrow on the CT housing pointing towards the aGate.

Connect the above CTs to the factory-installed meter inside aGate for each circuit monitoring.

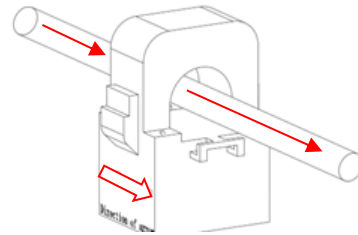
CT Orientation

CTs must be installed and wired with the correct polarity. Refer to the following diagram and table for the CT polarities.

Solar/Grid CT1, CT2, CT3



Grid CT (shipped with the aGate)



CT Usage	CT Orientation
Solar CT1, CT2, CT3	Arrow on the CT pointing toward the grid
Grid CT1, CT2, CT3	Arrow on the CT pointing toward the loads
Grid CT (shipped with the aGate)	Arrow on the CT pointing toward the aGate

CT Wire Lengths

CT leads are 1 m long and can be extended to a maximum length of 15 m.

For a total extended length of up to 15 m, CT wiring can be extended by using wire with the following properties:

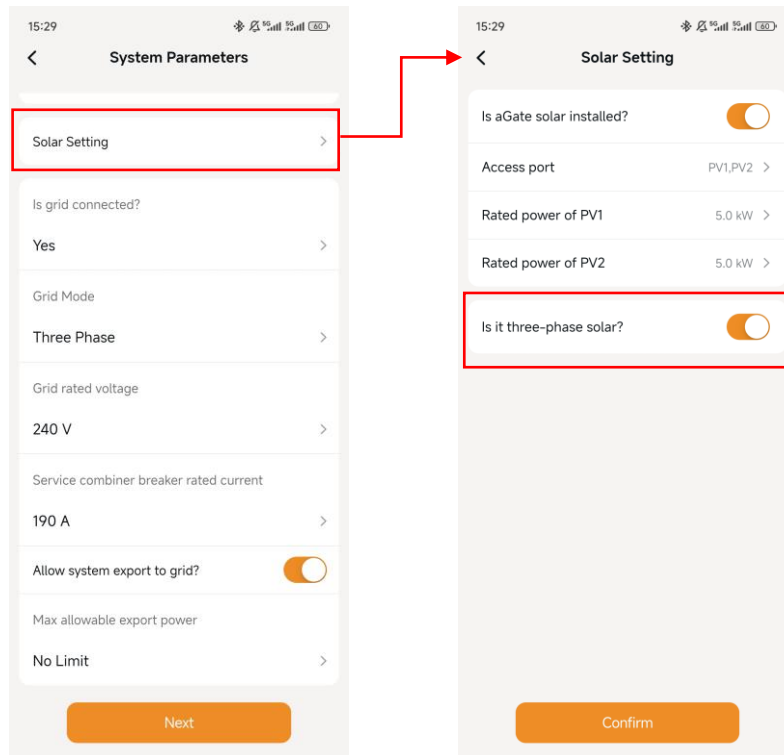
- Shielded, twisted pair wire
- Wire gauge of 0.20 – 0.82 mm²

8. Connect the grid L1, L2, or L3 into the aGate grid terminal. Make sure that the line is being measured by the CT connected to I1+/I1- ports of the three-phase grid meter. In the scenario described in this document, connect grid L1 into the aGate.

System Configuration using the FranklinWH App

After installation, configure the system using the FranklinWH App, refer to *FranklinWH System Commissioning Guide* for detailed information.

Note: Enable **Is it three-phase solar?** on the **System Parameters** page during commissioning.



Functional Verification Procedure

1. Start the system, check that the grid meter voltage reading is the same as the solar meter reading. If not, check that all the wiring is properly connected.
2. Check that all CTs are installed in the correct direction and are well secured.
3. Use a clamp meter to verify CT readings.
4. Check whether the power displayed on the app is the same as the meter reading.

Installation Instructions for a System with 3 aGates

The FranklinWH System provides more powerful backup functionality by integrating three aGates and three aPower batteries.

For a three-phase system with three aGates and aPowers, deploy the system as in the image below.

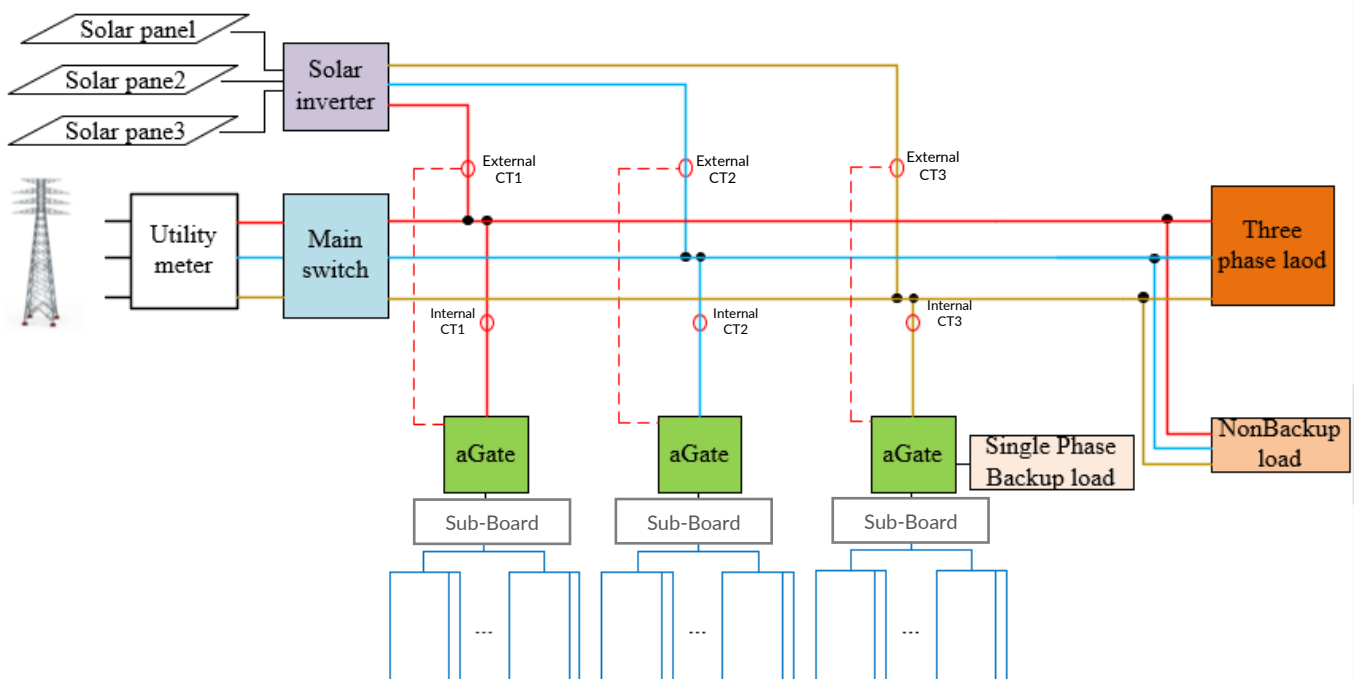
1. Each aGate and aPower combination should be connected to a dedicated grid line i.e., aGate ① to L1, aGate ② to L2, and aGate ③ to L3.

NOTE



All backup loads shall be only connected to one dedicated aGate (depending on the site conditions, can be aGate ① aGate ②, or aGate ③).

For the external CTs shown below, they should be purchased from FranklinWH authorized distributors or installers.



CT Installation

Follow the instructions below to install grid CTs and solar CTs:

- 1) Install grid CT1, CT2, and CT3 onto grid L1, L2, and L3, respectively.
- 2) Install solar CT1, CT2, CT3 onto solar circuit L1, L2, and L3, respectively.
- 3) Connect the CTs to the factory-installed meter inside of each aGate for each monitored circuit. Refer to the image below for CT installation instructions.



2. Repeat the connection procedure for each aGate and aPower pair.
3. Configure and verify the system after completing installation following the instructions described in the previous section.

For scenarios not described in this document, please contact FranklinWH service team at: service-au@franklinwh.com

Appendix

The following tables list the LED indicator status for the meters.

LED	Description
RUN	Running indicator. Flashes at a frequency of 1 Hz under normal operations
COM	Communications indicator. Flashes under normal operations
STA	Reserved
E	Pulse indicator. For example, if the pulse constant is 600, each pulse represents 1/600 kWh.

The factory-installed meter LEDs status

LED	Description
Red light and green light flash alternately for 200 ms	Not connected to the EMS
Red light flashes fast for 200 ms	AFE communications failure or AFE data error
Blue light and green light flash alternately for 500 ms	The system is running