



Open Energy for All

Technical Note

Export Management
of Hoy miles Microinverter System

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CONTENTS

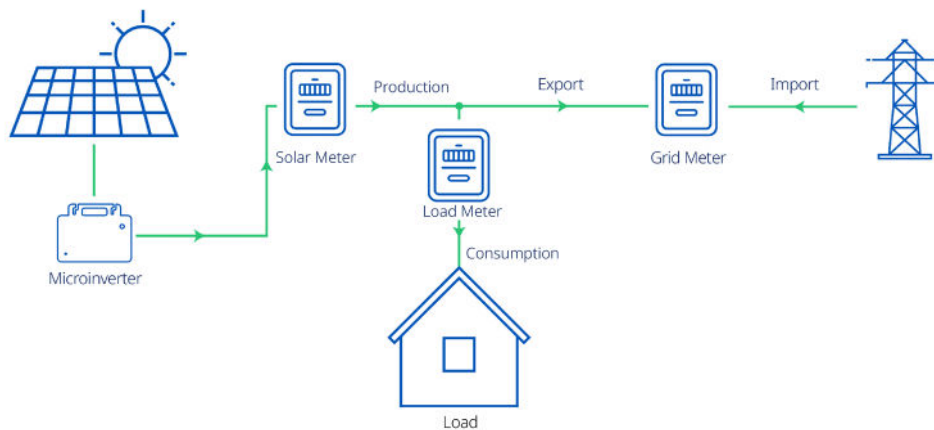
1. Introduction to Export Management	02
2. Terms and Definitions	02
3. Installing the Export Management System	03
4. Web Pages Display	06
4.1 Overview of “Power Station” Page	06
4.2 Report Generating	07
Appendix I: Examples of Export Control	08
1 Example 1: Zero Export Power Limit, Total Limit Mode	09
2 Example 2: Zero Export Power Limit, Per Phase Limit Mode	10
3 Example 3: 70% Export Power Limit, Total Limit Mode	11
4 Example 4: 6 kW Export Power Limit, Per Phase Limit Mode	12
5 Example 5: No Export Control, PV Production and Load Consumption Display	12
Appendix II: How to Choose Meter and CT for Your Export Management Station	13
1 Meter Types	13
2 CT Types	13
3 Meter Application Under Different Grid Types	13
Appendix III: Meter Installation	14
1 Chint DDSU666 (60A) Single Phase Meter (Direct connect)	14
1.1 Meter Port Description	14
1.2 Meter Installation Direction	14
1.3 DTU RS485 Connection	16
2 Chint DDSU666 (80A) Single Phase Meter (Direct Connect)	17
2.1 Meter Port Description	17
2.2 Meter Installation Direction	17
2.3 DTU RS485 Connection	19
3 Chint DTSU666 (80A) Three Phase Meter (Direct connect)	20
3.1 Meter Port Description	20
3.2 Meter Installation Direction	21
3.3 DTU RS485 Connection	22
4 Chint DTSU666 Three Phase Meter (Via CT)	23
4.1 Meter Port Description	23
4.2 CT Installation Direction	24
4.3 Installation Diagram for Meter (Via CT)	25
4.4 DTU RS485 Connection	28
5 CCS Wattnode Three Phase Meter (Via CT)	29
5.1 Meter Port Description	29
5.2 CT Installation Direction	29
5.3 Installation Diagram for Meter (Via CT)	30
5.4 DTU RS485 Connection	32

1. Introduction to Export Management

To maintain the safety and quality level of the grid network, some countries' local grid authorities limit the PV-generated power exporting to the grid. To meet this requirement, Hoymiles has developed an Export Management Solution, which can help users install a bigger PV system without violating export regulations.

The Hoymiles Export Management system is composed of Hoymiles gateway DTU-Pro and meter. The meter can be installed at the load side or grid side to measure power consumption or export. If the export control is enabled, DTU-Pro will adjust the PV power generation to ensure that the export power will not exceed the preset limit.

If you want to know the accurate PV generation, you can install the meter at the solar side, so that our DTU-Pro will collect the data and you can know your power generation on Hoymiles monitoring platform.



2. Terms and Definitions

- **Export:** Power exportation from the PV microinverter system to the grid.
- **Production:** The power produced by the PV microinverter system.
- **Consumption:** The power consumed by the local loads.
- **Solar Meter:** A meter installed at the output of microinverters that reads the power/energy produced by the PV microinverter system.
- **Load Meter:** A meter installed at the load consumption side that reads the power/energy consumed by the local load.
- **Grid Meter:** A meter installed at the grid connection side that reads the power/energy exported to the grid.
- **Current Transformer (CT):** A transformer fixed on the wiring to detect the current flow.
- **Meter:** A device that measures the power flow.
- **DTU:** Hoymiles Data Transfer Unit that receives data from microinverter and meter, and then uploads them to the monitoring platform.

3. Installing the Export Management System

Please follow the instructions to install the Hoymiles Export Management system. Before installation, please make sure the export management function has been enabled on your power station. If not, please contact your dealer or Hoymiles technical support team.

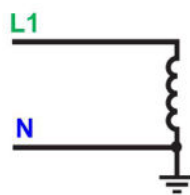
Step 1: Choose an export control type

- Zero Export—Set power export as zero. Install the meter at the load or grid side.
- Export Limit—Limit the power export within a certain value. The meter can be installed at the load or grid side.
- Production and Consumption Monitoring—Accurate display of the PV production and consumption. To display the consumption readings, the meter should be installed at the load or grid side. To display the PV production readings, the meter should be installed at the solar side.

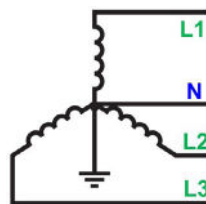
Note: Please do not install the DTU directly above metal or concrete in case of signal interference.

Step 2: Confirm the Grid type (the grid type varies in different countries, please choose the right grid type as you need.)

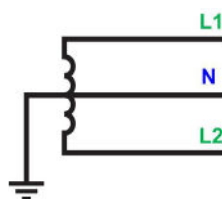
- **Single Phase 230 V:** This is mainly for residential systems in most regions except North America and South America. The phase voltage may vary from 220 V to 240 V. The outputs of microinverters are connected between live line (L1) and neutral line (N).



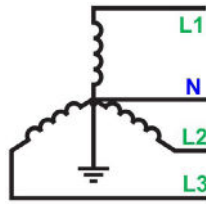
- **Three Phase 230 V / 400 V:** This is mainly for commercial systems in most regions except North America and South America. The phase voltage may vary from 220 V to 240 V. The outputs of microinverters are connected between live line and neutral line (L1 and N, L2 and N, or L3 and N).



- **Split Phase 120 V / 240 V:** This is mainly for residential systems in North America and South America. The phase voltage may vary from 110 V to 120 V. The outputs of microinverters are connected between two live lines (L1 and L2).



- **Three Phase 120 V / 208 V:** This is mainly for commercial systems in North America and South America. The phase voltage may vary from 110 V to 127 V. The outputs of microinverters are connected between two live lines (L1 and L2, L2 and L3, or L3 and L1).



Step 3: Confirm the loads' capacity for CT and Meter type selection:

- Please make sure that the maximum loads current or the maximum current of the PV system is within the CT/Meter range depending on where the meter is installed.

Note: Please refer to Appendix II for Meter and CT model selection.

- Before installing the Chint meter, please note down the meter SN (10CXXXXXXX) for further use.



For DDSU666

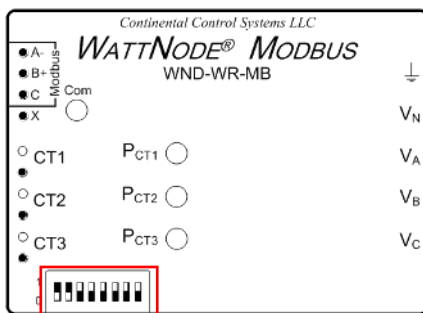


For DTSU666

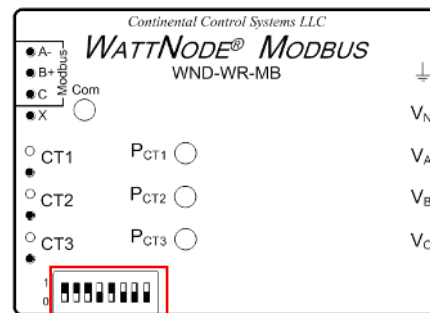
Note: Please make sure the meter SN in one system is not repeated.

- Only Chint meters bought from Hoymiles can be used in Hoymiles export management system.
- For WattNode meter, the 12-digit SN starts with "10C1" and is followed by 8 digits. As shown in the following dip switch of the meter, switching the pin up means "1" and down means "0".

For example:



Meter SN is: 10C111000000



Meter SN is: 10C111101000

Note:

1. Please make sure the meter SN is not repeated in one system. You can differentiate the meter SN by re-positioning the dip switch on the meter.
2. However you change the dip switch, please make sure that the last 2 pins from right are kept down.

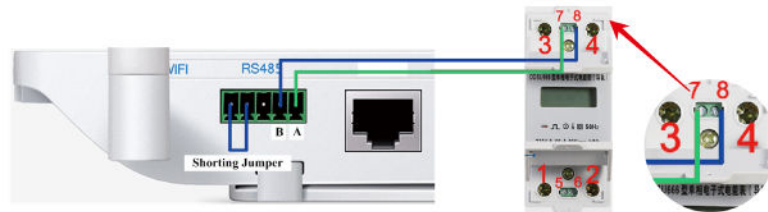
Step 4: Prepare the shielded twisted pair RS485 cable with a proper length.



Step 5: Complete the Meter and CT wiring based on the system requirement (please refer to Appendix III).

Note: The installation direction of the meter and CT is critical for export control and data display. Please refer to Appendix III for more details about the installation.

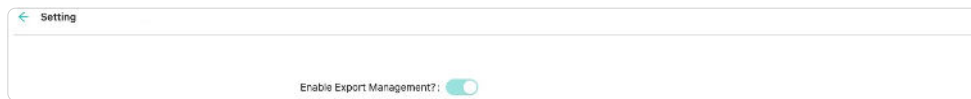
Step 6: Use RS485 cable to connect the meter's A port to the DTU's A port, and the meter's B port to the DTU's B port (please refer to Appendix III for more details).



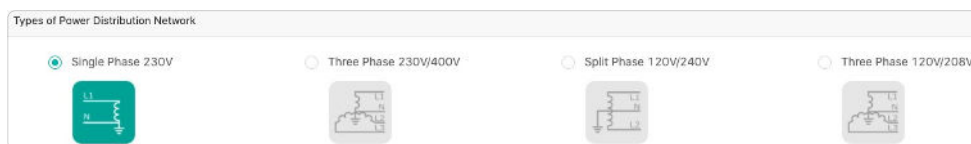
Step 7: Connect the power cable to DTU and power the DTU on.

Step 8: Complete the settings on the monitoring platform S-Miles Cloud.

- a. Create a new station on the platform.
- b. Switch on the slider button of "Enable Export Management".



c. Select your Grid type

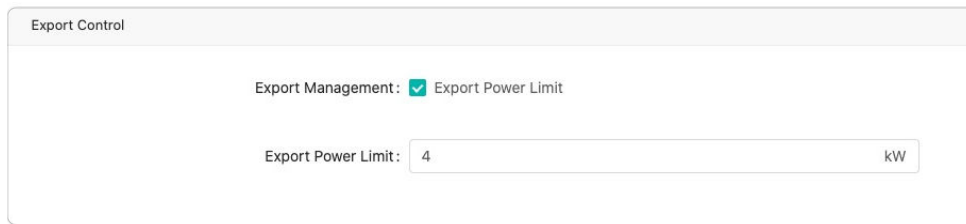


d. Choose the installation location of the meter and input the Meter SN . Please also input the CT rated current if required.

Note: Please make sure the meter SN in one system doesn't repeat.



e. Tick on the Export Power Limit function to enable the export control. Input the limit value and click “Finish” to complete the station creation.

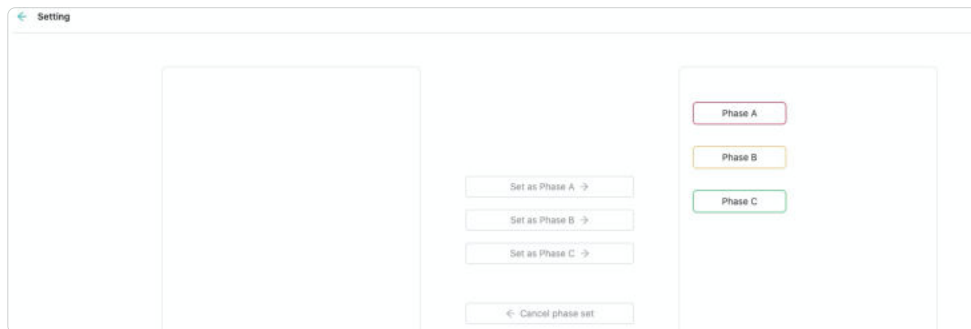


Note: For a three-phase system, please select the export control mode:

- **Total:** This applies to most settings. It controls the total export from the three phases. (Eg. Phase A =500 W, Phase B= -300 W, Phase C = -200 W, then the total power export is zero);
- **Per Phase:** Please refer to the grid requirements in your country. This mode means that power export on each phase is controlled. (E.g. Phase A = Phase B = Phase C = 0)

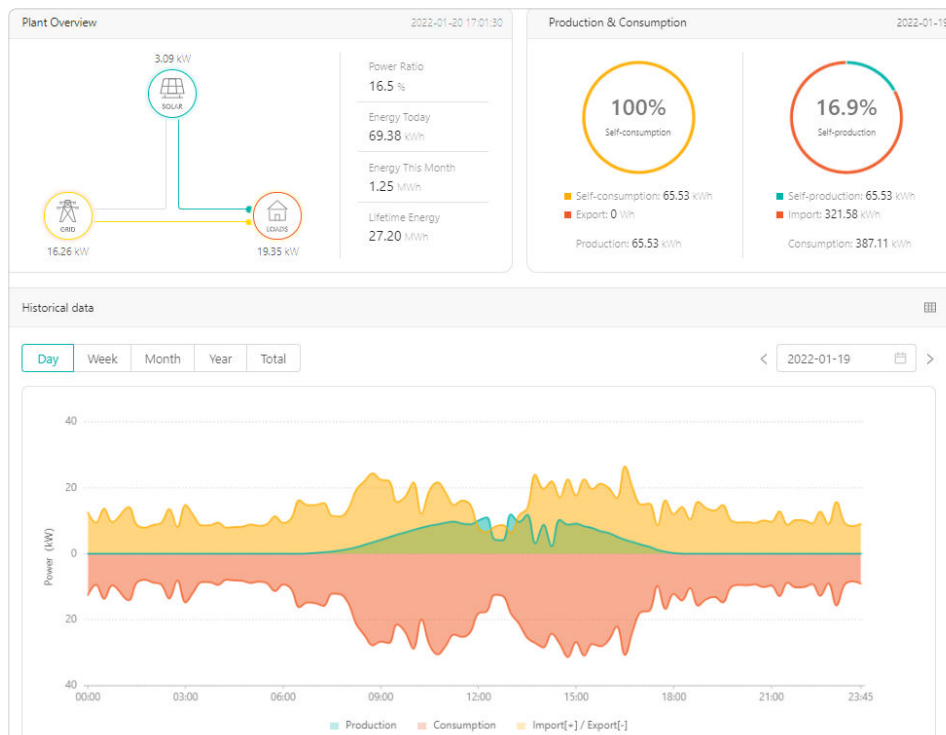
f. For Three Phase system using single phase microinverters and the control export is set as “Per Phase” mode, you need to do the “Electrical Phase Separation” after finishing the Export Management setting.

Note: Please make sure the Microinverters that separated into each phase are matching with the actual installation condition.



4. Web Pages Display

4.1 Overview of “Power Station” Page



Plant Overview:

- Power Ratio: Real-time power of microinverter as a percentage of installed capacity
- Energy Today: Total energy generated
- Energy this Month: Energy generated in this month
- Lifetime Energy: Total energy generated up until now

Production & Consumption:

- Self-consumption: Energy consumption as a percentage of production
- Self-production: Energy production as a percentage of consumption
- Import: Energy imported from the grid
- Export: Energy exported to the grid

Note: This is when meter is installed at the grid side.

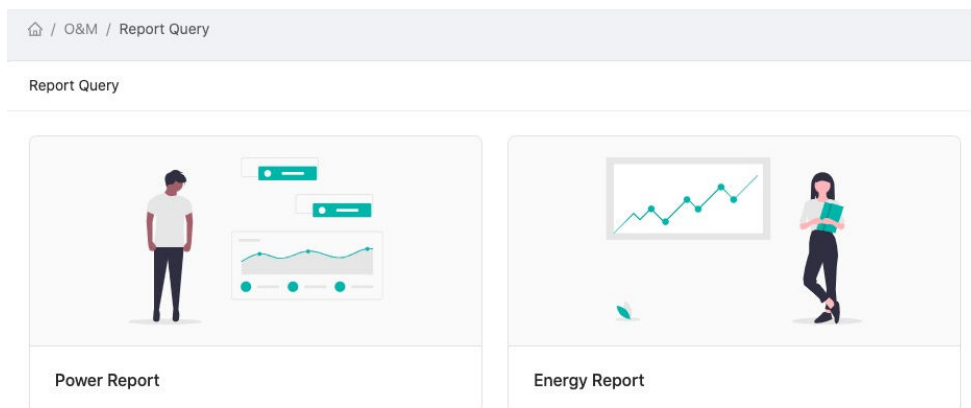
History Data:

- Production: Power generated from the PV system
- Consumption: Power used by the loads
- Import: Power imported from the grid
- Export: Power exported to the grid

Note: A situation can occur where the PV-generated power is higher than consumption, which is because the data obtain timing from meter and DTU is inconsistent. It will not affect the actual power limit.

4.2 Report Generating

You can generate report by clicking "O&M" > "Report Query".



Appendix I: Examples of Export Control

The following examples illustrate how to use Export Control when you create an Export Management Station.

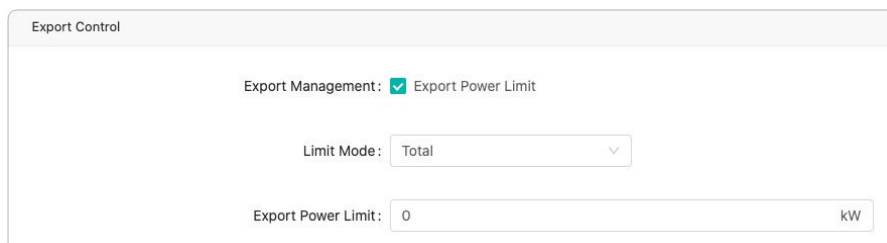
Before enabling the Export Control, you must select a type of power distribution network from “Single Phase 230V”, “Three Phase 230V/400V”, “Split Phase 120V/240V” and “Three Phase 120V/208V”. These four types generally cover major power grid types in most countries. If there are three-phase microinverters in one site, only “Three Phase 230V/400V” is available.



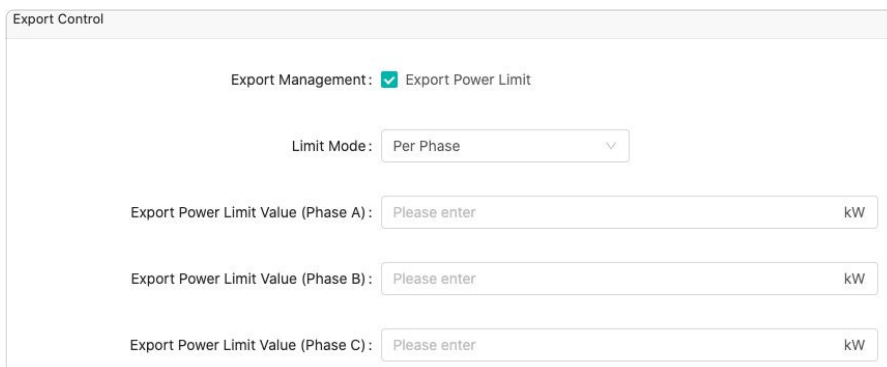
For “Three Phase 230V/400V”, the Limit Mode in Export Control contains two modes, namely Total and Per Phase Limit Mode, while for the other three types, there’s only Total Limit Mode.

Note: If there are three-phase microinverters in one site, only the Total Limit Mode will be available.

Total: The total export power is the total PV production minus the total load consumption. Export power on one phase can compensate for import power of another phase.

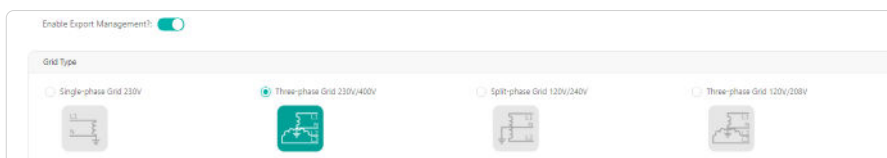


Per Phase (Only for three phase 230V/400V PV system): When you select “Three Phase 230V/400V”, which means the outputs of PV microinverters are connected to phase voltage, Per Phase can be selected and you can enter limit value of each phase. Export power of each phase will be limited to the value as shown in the picture below. The total export power is the sum of the PV production minus the load consumption of each phase.



The following examples display twelve hoymiles HM-1500 4-in-1 microinverters connected to a three-phase system. The phase voltage is 230V and the maximum continuous output AC power of this system is 18kW. The output power of all the PV modules is 20kW. Each phase has four microinverters with maximum AC power of 6kW. Each example shows how the export power and solar power are affected under different conditions.

And in Types of Power Distribution Networks, the Three Phase 230V/400V is selected.



1. Example 1: Zero Export Power Limit, Total Limit Mode

In this example, the export power limit of the whole PV system is set to zero and the Total Limit Mode is enabled.

Case 1

If the total PV production is lower than the load consumption, it means that all the loads are powered from the PV system and the grid. In this case, the PV production will not be limited as there is no power export to the grid.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	2	2	2	6
Load Consumption	4	3	2	9
Actual PV Production	2	2	2	6
Export	-2	-1	0	-3 (zero export)

Note: “-3” means that 3 kW of power is imported from the grid and there is no power fed into the grid.

Case 2

PV production of one phase is higher than the load consumption, but the other two phases are lower. But if the total solar production is lower than the total load consumption, the PV production will not be limited in the Total Limit Mode.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	3	3	3	9
Load Consumption	4	3	2	9
Actual Solar Production	3	3	3	9
Export	-1	0	1	0 (zero export)

Case 3

If total PV production is higher than the total load consumption, all the phases’ PV production will be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	4	4	4	12
Load Consumption	4	3	2	9
Actual Solar Production	3	3	3	9
Export	-1	0	1	0 (zero export)

2. Example 2: Zero Export Power Limit, Per Phase Limit Mode

In this example, the export power limit of the whole PV system is set to zero and the Per Phase Limit Mode is enabled.

Case 1

When all the three phases' PV production is lower than the load consumption, the loads of every phase are powered from the PV production and the grid. Since there is no power export to the grid, the PV production will not be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	2	2	2	6
Load Consumption	4	3	2	9
Actual Solar Production	2	2	2	6
Export	-2	-1	0	-3 (zero export)

Note: "-3" means that 3 kW of power is imported from the grid and there is no power fed into the grid.

Case 2

If the PV production of one phase is higher than the load consumption, the PV production of this phase will be limited in the Per Phase Limit Mode.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	3	3	3	9
Load Consumption	4	3	2	9
Actual PV Production	3	3	2	8
Export	-1	0	0	-1 (zero export)

Case 3

If the PV production of all phases is higher than the corresponding load consumption, their production will be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	4	4	4	12
Load Consumption	4	3	2	9
Actual PV Production	4	3	2	9
Export	0	0	0	0 (zero export)

3. Example 3: 70% Export Power Limit, Total Limit Mode

In Germany, according to Renewable Energy Sources Act (EEG) 2012, PV systems with the capacity from 800 W to 30 kW can only feed a maximum of 70% of installed capacity into the grid under the total limit mode at the point of common coupling.

For example, if the PV modules' output power is 20 kW, then the export power limit should be $20 \text{ kW} \times 70\% = 14 \text{ kW}$.

Case 1

If the total PV production is lower than the load consumption, or no more than 70% higher than the load consumption, the PV production will not be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	5	4	3	12
Load Consumption	4	3	2	9
Actual PV Production	5	4	3	12
Export	1	1	1	3

Note: 3 kw is lower than 70% of 12 kw, so the PV production will not be limited.

Case 2

If the total PV production is more than 70% higher than the load consumption, the solar production will be limited in the Total Limit Mode.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	5	5	5	15
Load Consumption	3	0	0	3
Actual PV Production	4.5	4.5	4.5	13.5
Export	1.5	4.5	4.5	10.5

Note: The export management is working, so the power export is limited to 10.5 kw which is 70% of 15 kw.

4. Example 4: 6 kW Export Power Limit, Per Phase Limit Mode

In this example, the export power limit is set to 6 kW, and the limit of each phase is set to 2 kW.

Case 1

If the solar production of any phase is lower than the corresponding load consumption or higher than the load consumption but not more than 2 kW, the solar production will not be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal PV Production	5	4	3	12
Load Consumption	4	3	2	9
Actual PV Production	5	4	3	12
Export	1	1	1	3

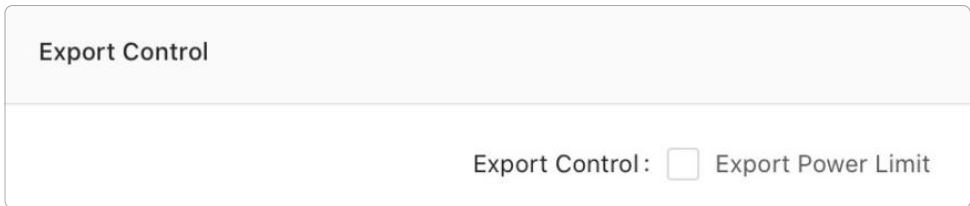
Case 2

If the solar production of any phase is 2 kW higher than the load consumption or more, the PV production will be limited in the Per Phase Total Limit Mode.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	3	4	5	12
Load Consumption	2	2	2	6
Actual PV Production	3	4	4	11
Export	1	2	2	5

5. Example 5: No Export Control, PV Production and Load Consumption Display

Some users do not need the export management function, but only want to see the solar production and load consumption on Hoymiles Monitoring Platform. A new station is created the same way as you set the export management function, but the “Export Power Limit” in the module “Export Control” should be disabled.



Appendix II: How to Choose Meter and CT for Your Export Management Station

There are 4 types of Chint meter and various types of CT that you can choose from based on actual installation requirements.

1. Meter Types

Meter Model	Type	SN	Description
DDSU666 (60A)	Single Phase	10C011XXXXXX	Direct connect, NOT via any kind of CT
DDSU666 (80A)	Single Phase	10C014XXXXXX	Direct connect, NOT via any kind of CT
DTSU666 (80A)	Three Phase	10C013XXXXXX	Direct connect, NOT via any kind of CT
DTSU666 (5A)	Three Phase	10C012XXXXXX	Compatible with 100A/5A, 300A/5A, and 600A/5A CT

2. CT Types

Hoymiles provides the following three types of CT:

- a. Current ratio: 100A/5A;
- b. Current ratio: 300A/5A;
- c. Current ratio: 600A/5A;

3. Meter Application Under Different Grid Types

Grid Type	Install Method	Meter Installed on Load Side	Meter Installed on Grid Side	Meter Installed on PV Side
Single Phase System (230V)	Via CT	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)
	Direct Connect	DDSU666(60A, 80A)	DDSU666(60A, 80A)	DDSU666(60A, 80A)
Three Phase System (230V/400V)	Via CT	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)
	Direct Connect	DTSU666 (80A)	DTSU666 (80A)	DTSU666 (80A)
Split Phase System (120V/240V)	Via CT	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)
	Direct Connect	DTSU666 (80A)	DTSU666 (80A)	DTSU666 (80A)
Three Phase System (120V/208V)	Via CT	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)	DTSU666 (100A/5A, 300A/5A, 600A/5A)
	Direct Connect	DTSU666 (80A)	DTSU666 (80A)	DTSU666 (80A)

Note: CCS Wattnode meter can be used on Load/Grid/PV side.

Appendix III: Meter Installation

1. Chint DDSU666 (60A) Single Phase Meter (Direct connect)

1.1 Meter Port Description

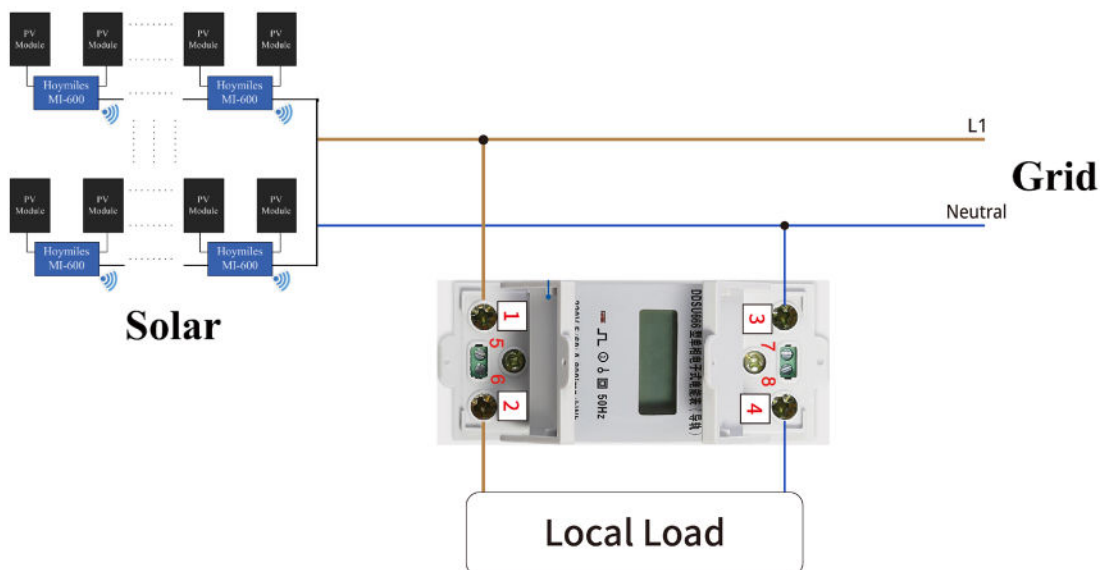


- Port 1:** input port, connect to the L line
- Port 2:** output port, connect to the L line
- Port 3:** connect to the N line
- Port 4:** connect to the N line
- Port 7:** connect to the A port from DTU RS485 port
- Port 8:** connect to the B port from DTU RS485 port

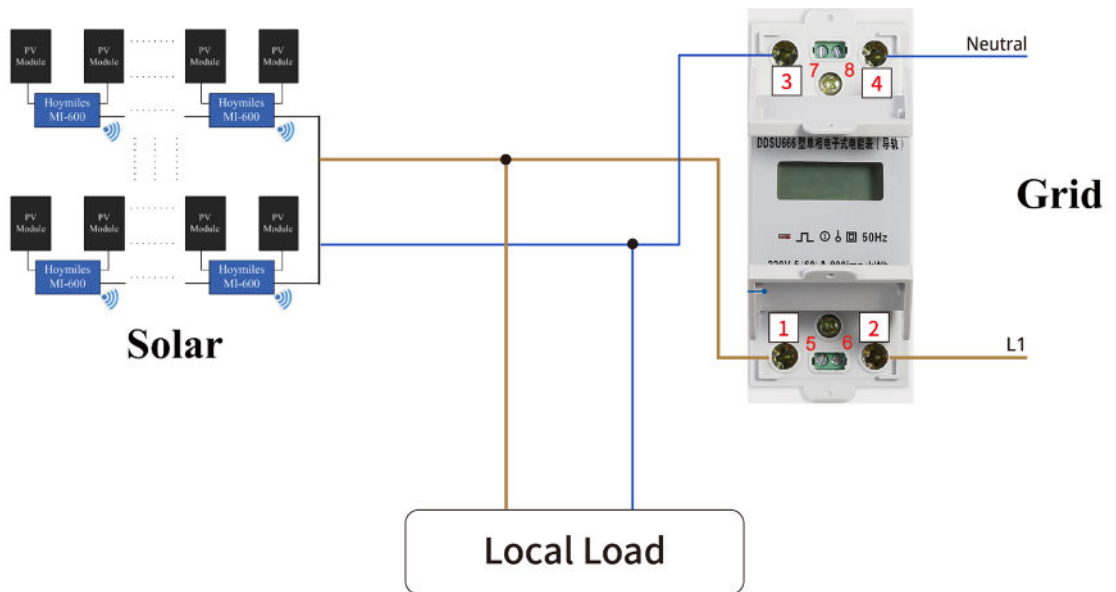
1.2 Meter Installation Direction

Please make sure the Meter has been installed in the correct direction (Direct connect), otherwise it will affect the current readings and Meter function.

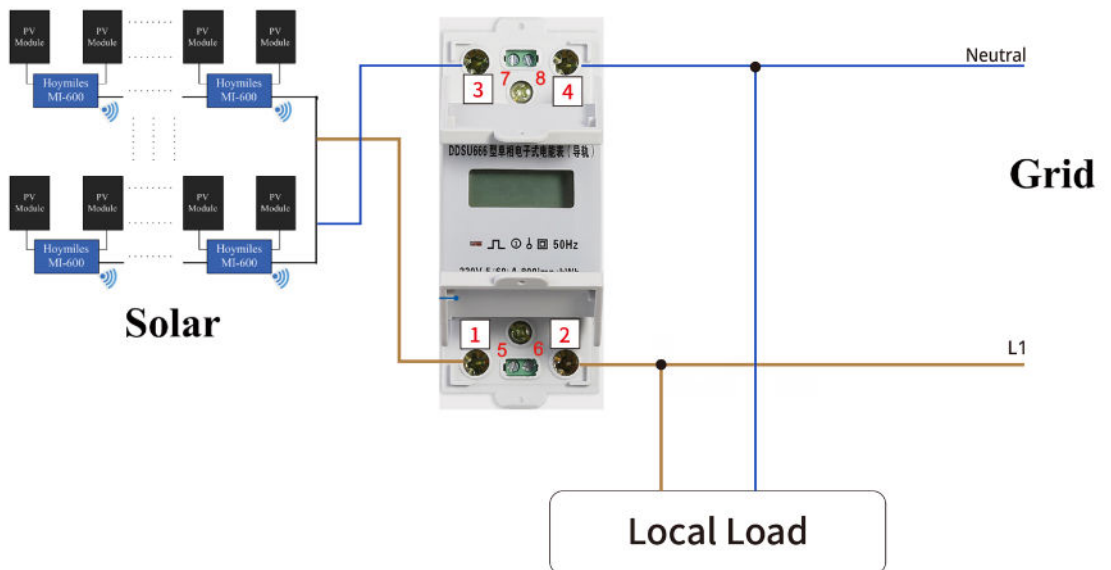
- **Position 1: Load Side, Direct Connect**



- **Position 2: Grid Side, Direct Connect**



- **Position 3: Solar Side, Direct Connect**

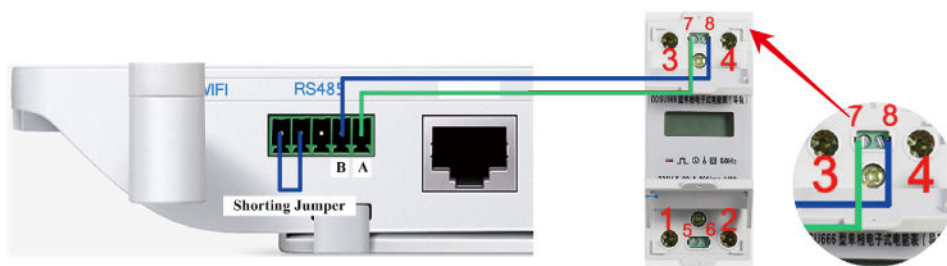


1.3 DTU RS485 Connection

The picture below indicates the RS485 terminal A and terminal B on DTU.



Scenario 1: If there is only one DTU in one system, when the RS485 cable length is more than 200 meters, we would recommend shorting jumpers on the two terminals on the left of the RS485 port.

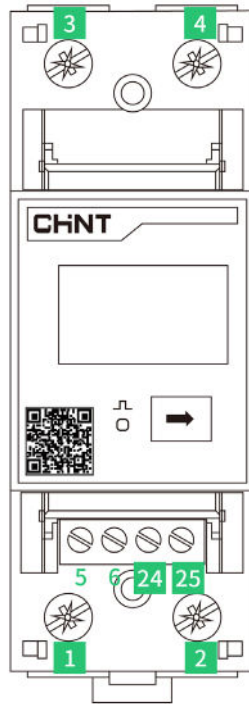


Scenario 2: When there are multiple DTUs in one system, please connect them one by one (as shown in the diagram below). The two shorting jumpers on the left of the on the last DTU will be recommended if the distance between microinverter and the last DTU is more than 200 meters.



2. Chint DDSU666 (80A) Single Phase Meter (Direct connect)

2.1 Meter Port Description

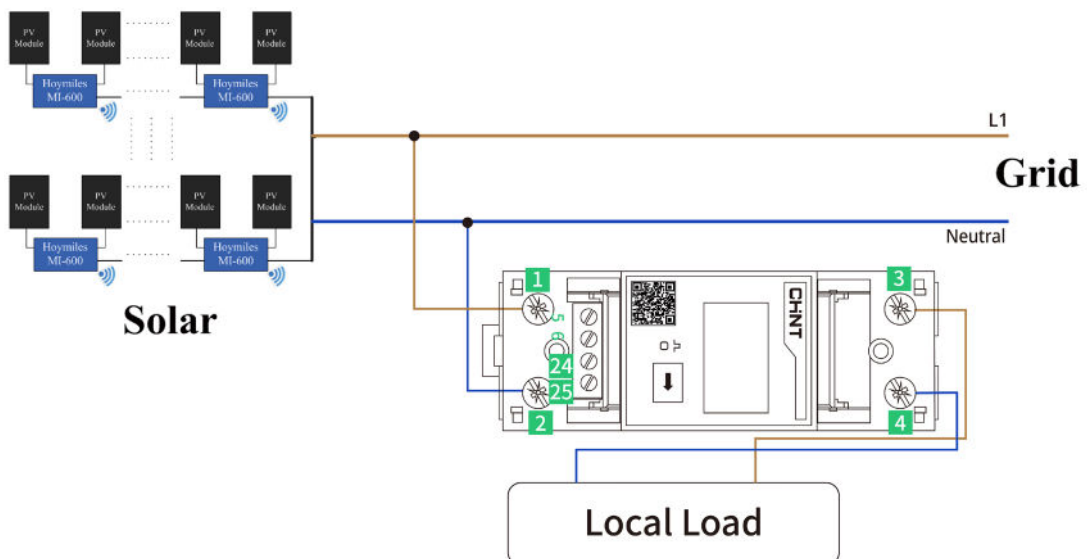


- Port 1:** input port, connect to the L line
- Port 2:** connect to the N line
- Port 3:** output port, connect to the L line
- Port 4:** connect to the N line
- Port 24:** connect to the A port from DTU RS485 port
- Port 25:** connect to the B port from DTU RS485 port

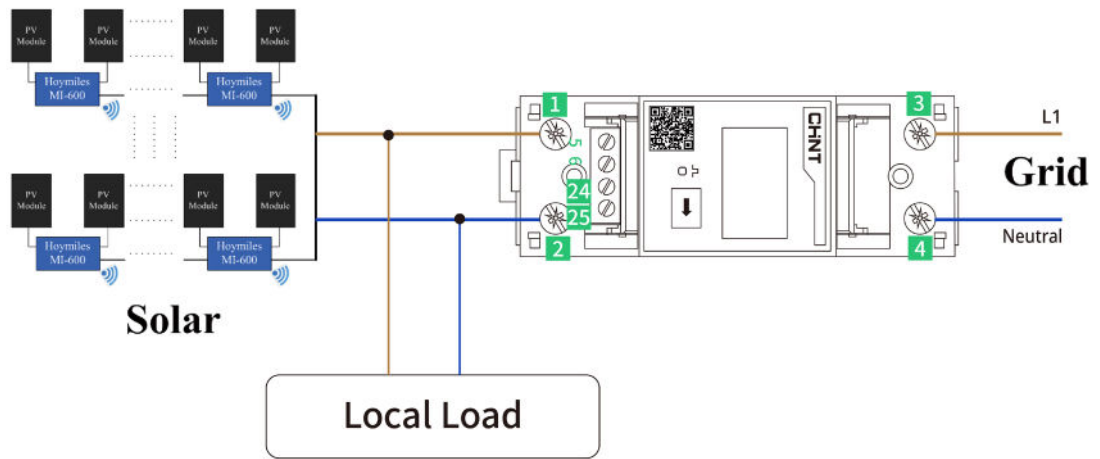
2.2 Meter Installation Direction

Please make sure the Meter has been installed in the right direction (Direct connect), otherwise it will affect the current readings and Meter function.

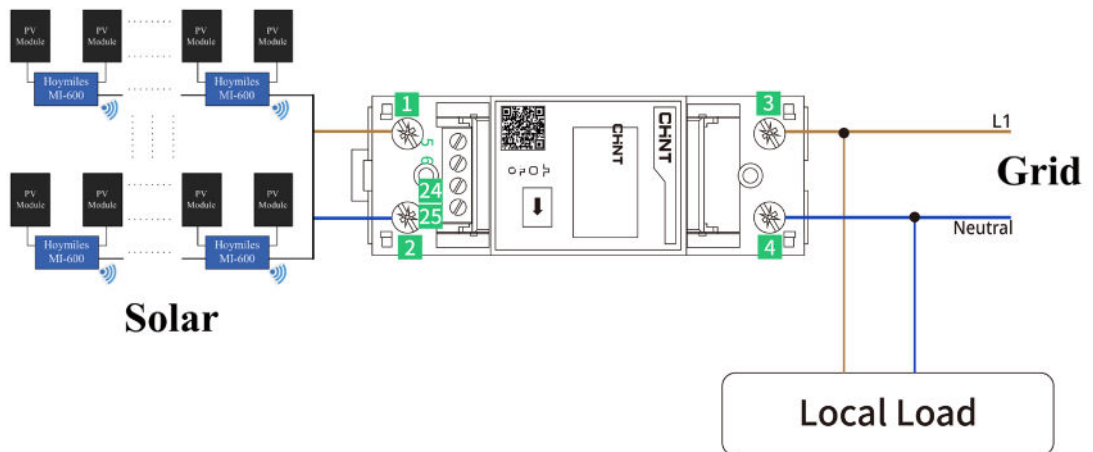
- **Position 1: Load Side, Direct Connect**



- **Position 2: Grid Side, Direct Connect**



- **Position 3: Solar Side, Direct Connect**

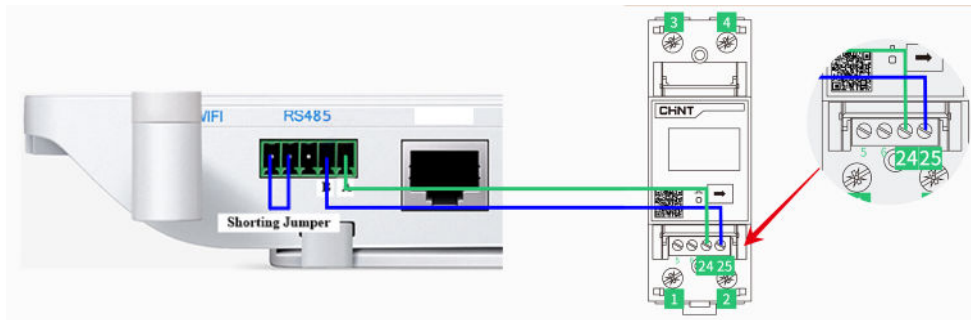


2.3 DTU RS485 Connection

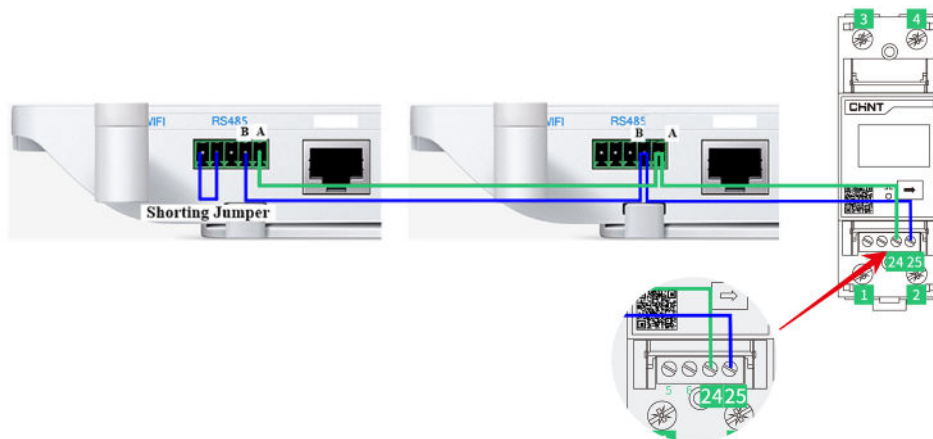
The picture below indicates the RS485 terminal A and Port B on DTU.



- **Scenario 1:** If there is only one DTU in one system, when the RS485 cable length is more than 200m, we would recommend shorting jumpers on the two terminals on the left of the RS485 port.



- **Scenario 2:** When there are multiple DTUs in one system, please connect the DTUs one by one (as shown in the diagram below). Shorting jumper for the last two RS485 ports on the last DTU will be recommended if the distance between microinverter and the last DTU is more than 200 meters.



3. Chint DTSU666 (80A) Three Phase Meter (Direct connect)

3.1 Meter Port Description

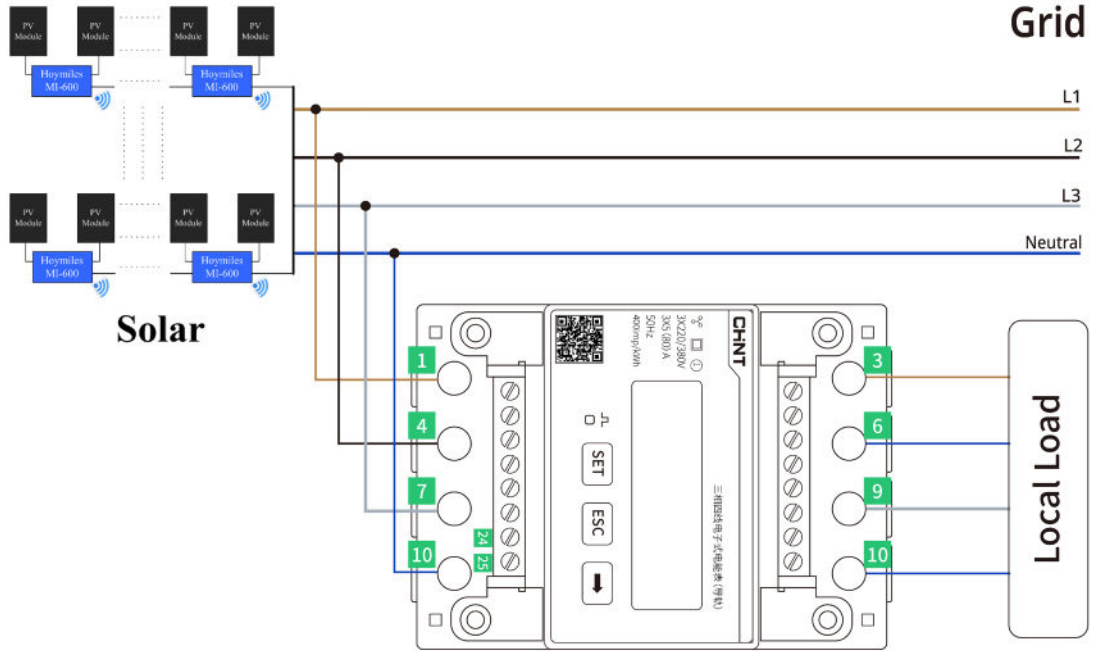


- Port 1:** input port, connect to the L line for Phase A
- Port 3:** output port, connect to the L line for Phase A
- Port 4:** input port, connect to the L line for Phase B
- Port 6:** output port, connect to the L line for Phase B
- Port 7:** input port, connect to the L line for Phase C
- Port 9:** output port, connect to the L line for Phase C
- Port 10:** connect to the N line
- Port 24:** connect to the A port from DTU RS485 port
- Port 25:** connect to the B port from DTU RS485 port

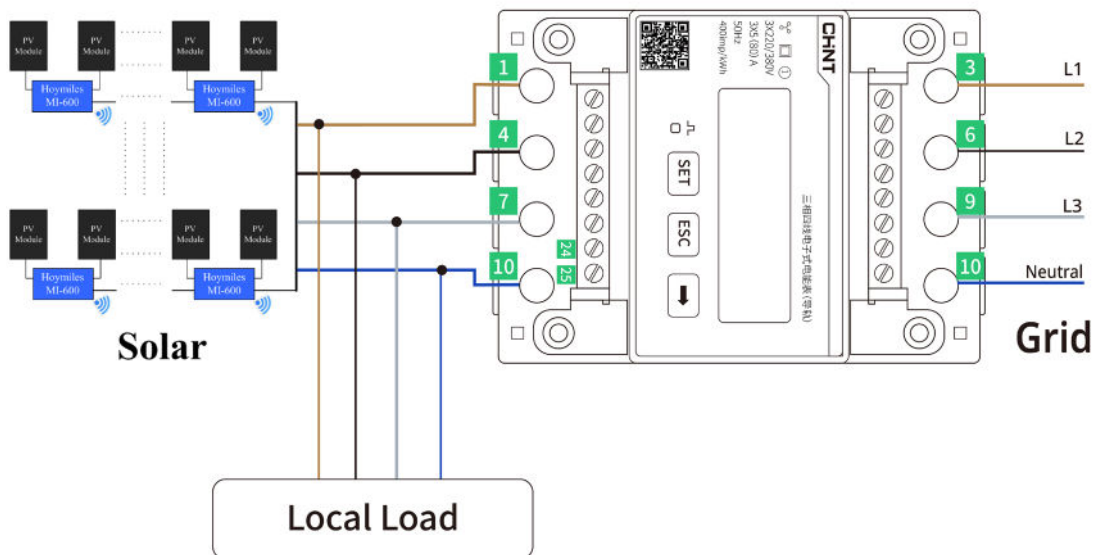
3.2 Meter Installation Direction

Please make sure the Meter has been installed in the right direction (Direct connect), otherwise it will affect the current readings and Meter function.

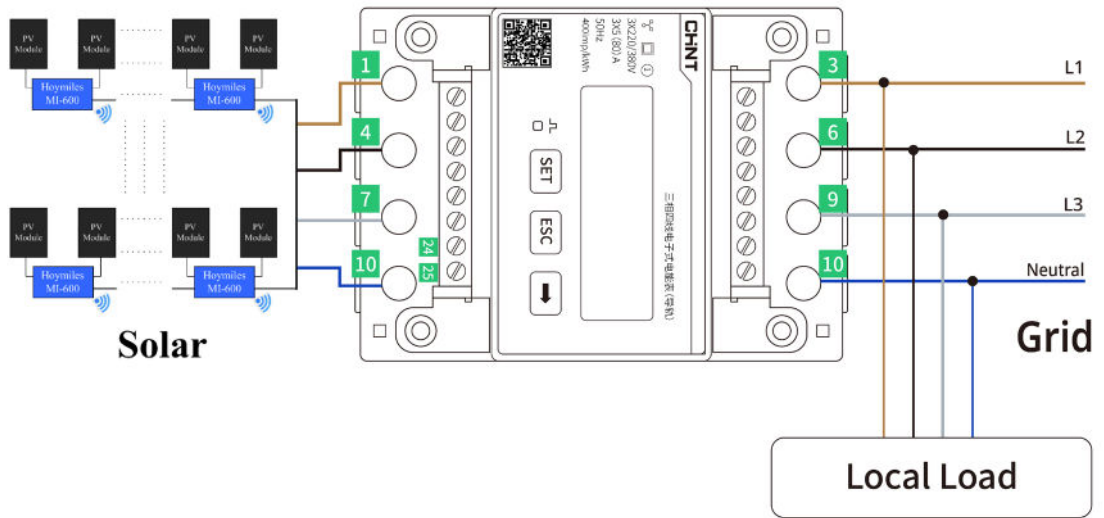
- **Position 1: Load Side, Direct Connect**



- **Position 2: Grid Side, Direct Connect**



- **Position 3:** Solar Side, Direct Connect

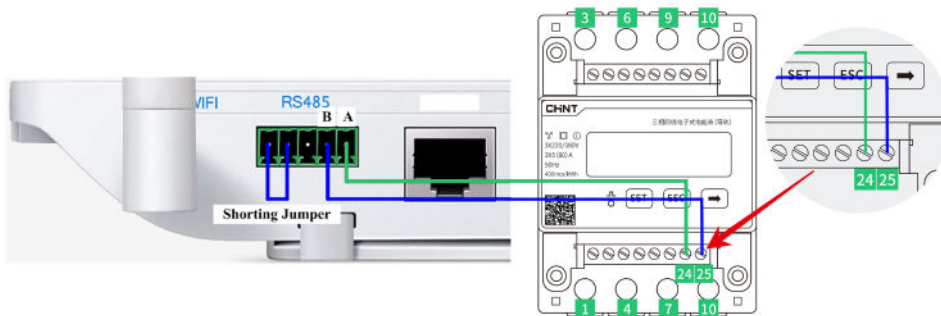


3.3 DTU RS485 Connection

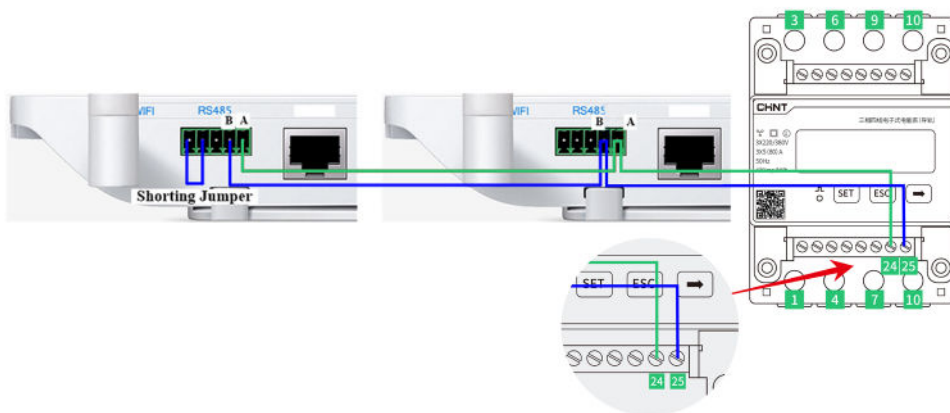
The picture below indicates the RS485 terminal A and B on DTU.



- **Scenario 1:** if only one DTU installed on one system, when the RS485 cable length is more than 200m, we would recommend shorting jumpers on the two terminals on the left of the RS485 port.

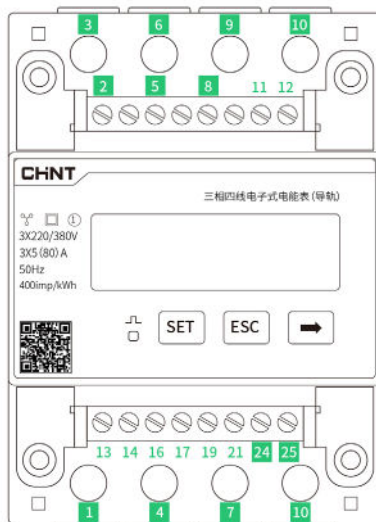


- **Scenario 2:** When there are multiple DTUs in one system, please connect the DTUs one by one (as shown in the diagram below diagram shows below). Shorting jumper for the last two RS485 ports on the last DTU will be suggested if the distance between microinverter and the last DTU is more than 200 meters.



4. Chint DTSU666 Three Phase Meter (Via CT)

4.1 Meter Port Description



- Port 1:** connect to the red wire from CT for Phase A
- Port 2:** connect to the L line from Phase A
- Port 3:** connect to the black wire from CT for Phase A
- Port 4:** connect to the red wire from CT for Phase B
- Port 5:** connect to the L line from Phase B
- Port 6:** connect to the black wire from CT for Phase B
- Port 7:** connect to the red wire from CT for Phase C
- Port 8:** connect to the L line from Phase C
- Port 9:** connect to the black wire from CT for Phase C
- Port 10:** connect to the N line from Grid
- Port 24:** connect to the A port from DTU RS485 port
- Port 25:** connect to the B port from DTU RS485 port

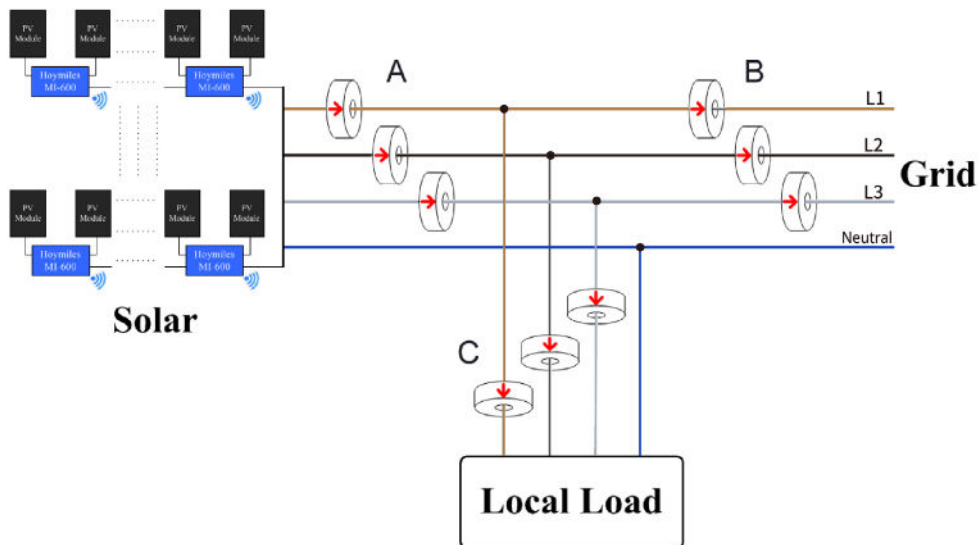
4.2 CT Installation Direction

Please make sure the Current Transformer (CT) has been installed in the right direction, otherwise will affect the current readings and Meter function.



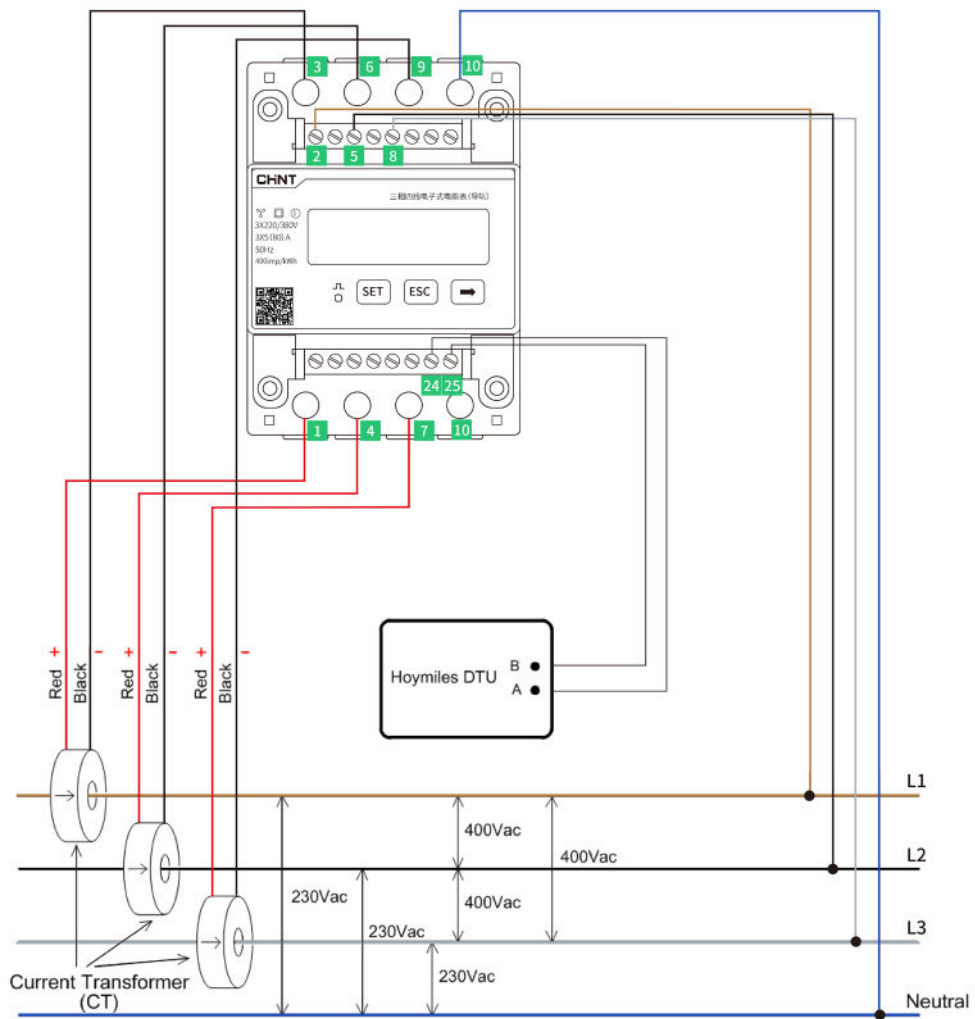
Please refer to the following diagram for different types of CT installation:

- **Position A:** Meter installed on the PV side and the CT arrow pointed to the Grid
- **Position B:** Meter installed on the Grid side and the CT arrow pointed to the Grid
- **Position C:** Meter installed on the Load side and the CT arrow pointed to the Loads

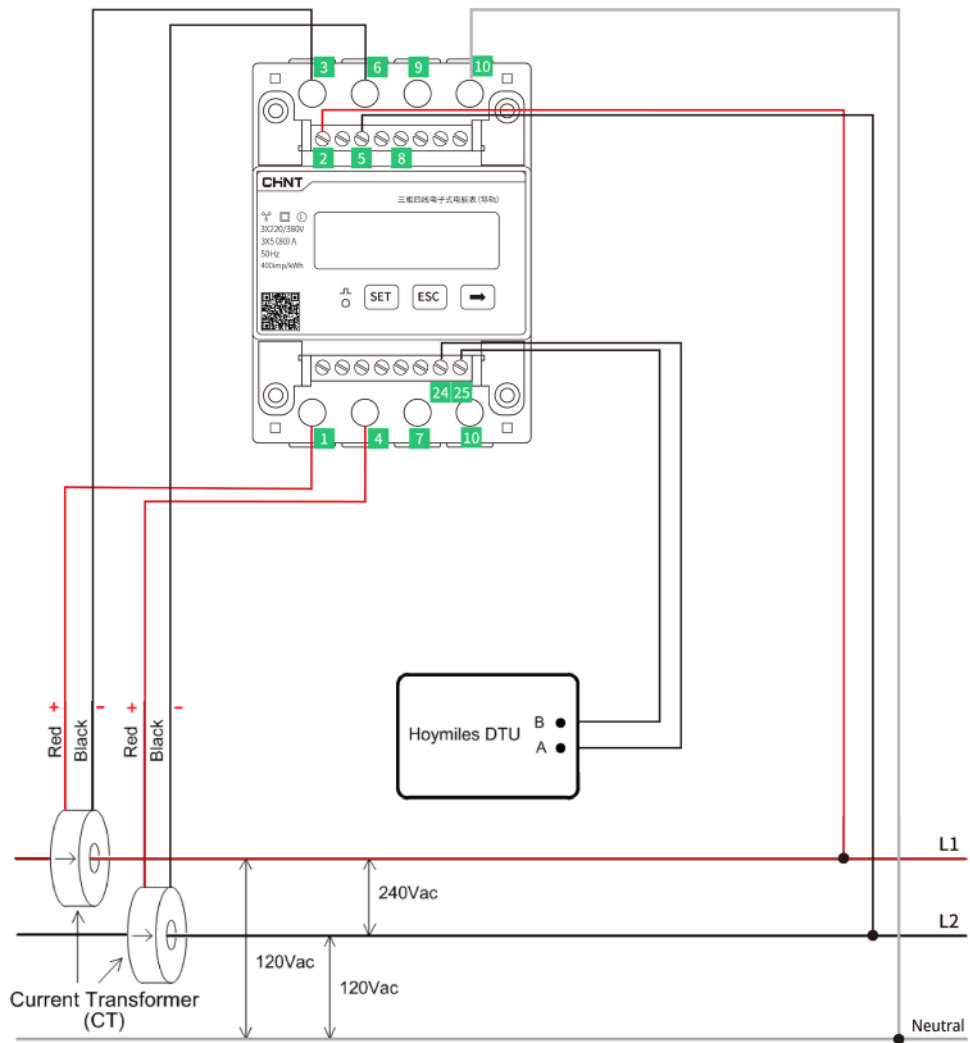


4.3 Installation Diagram for Meter (Via CT)

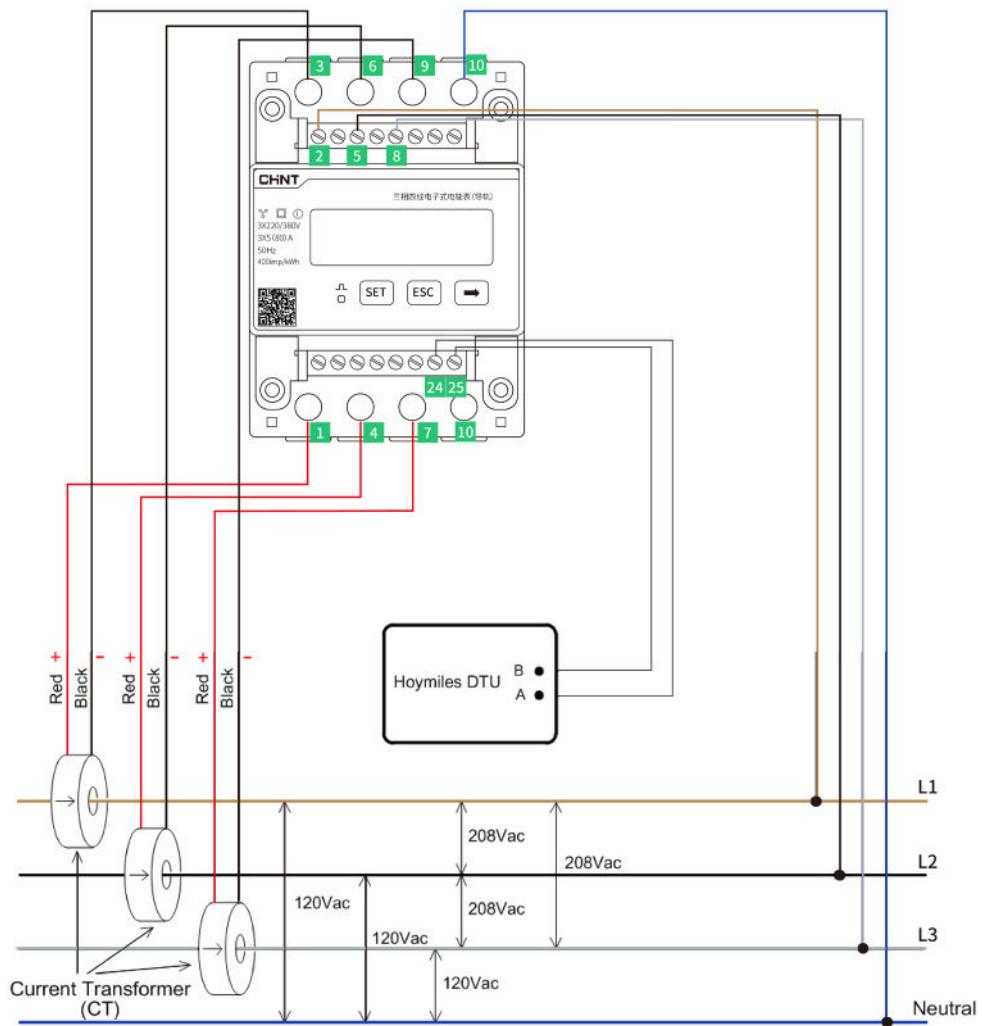
Three Phase Meter with Three Phase system (230V/400V, via CT):



Three Phase Meter with Split Phase system (120V/240V, via CT):



Three Phase Meter with Three Phase system (120V/208V, via CT):

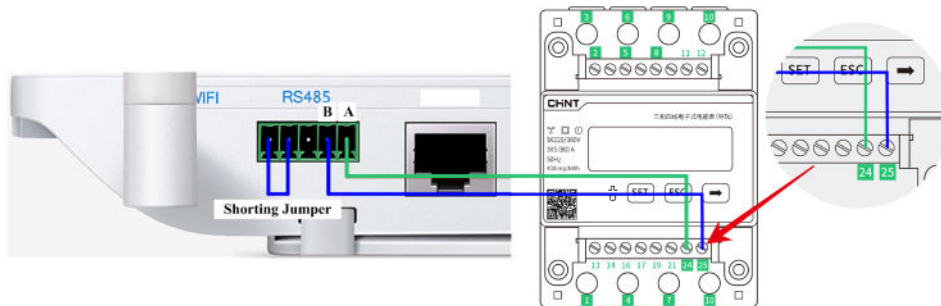


4.4 DTU RS485 Connection

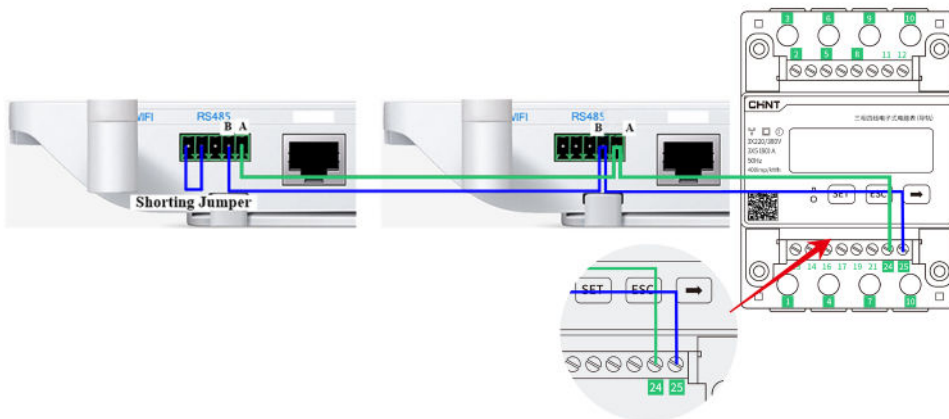
The picture below indicates the RS485 terminal A and terminal B on DTU.



- **Scenario 1:** If there is only one DTU in one system, when the RS485 cable length is more than 200m, we would recommend shorting jumpers on the two terminals on the left of the RS485 port.

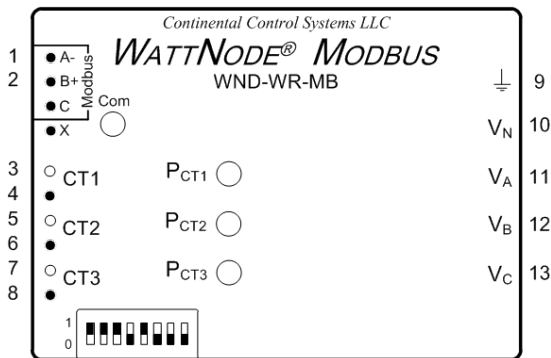


- **Scenario 2:** When multiple DTU installed within one system, please connect the DTUs one by one (as diagram shows below). Shorting jumper for the last two RS485 ports on the last DTU will be suggested if the distance between microinverter and the last DTU is more than 200 meters.



5. CCS Wattnode Three Phase Meter (Via CT)

5.1 Meter Port Description



- Port 1:** connect to the A port from DTU RS485 port;
- Port 2:** connect to the B port from DTU RS485 port;
- Port 3:** connect to the white wire of the CT for Phase A;
- Port 4:** connect to the black wire of the CT for Phase A;
- Port 5:** connect to the white wire of the CT for Phase B;
- Port 6:** connect to the black wire of the CT for Phase B;
- Port 7:** connect to the white wire of the CT for Phase C;
- Port 8:** connect to the black wire of the CT for Phase C;
- Port 9:** connect to the Ground line;
- Port 10:** connect to the N line;
- Port 11:** connect to the L line from phase A;
- Port 12:** connect to the L line from phase B;
- Port 13:** connect to the L line from phase C.

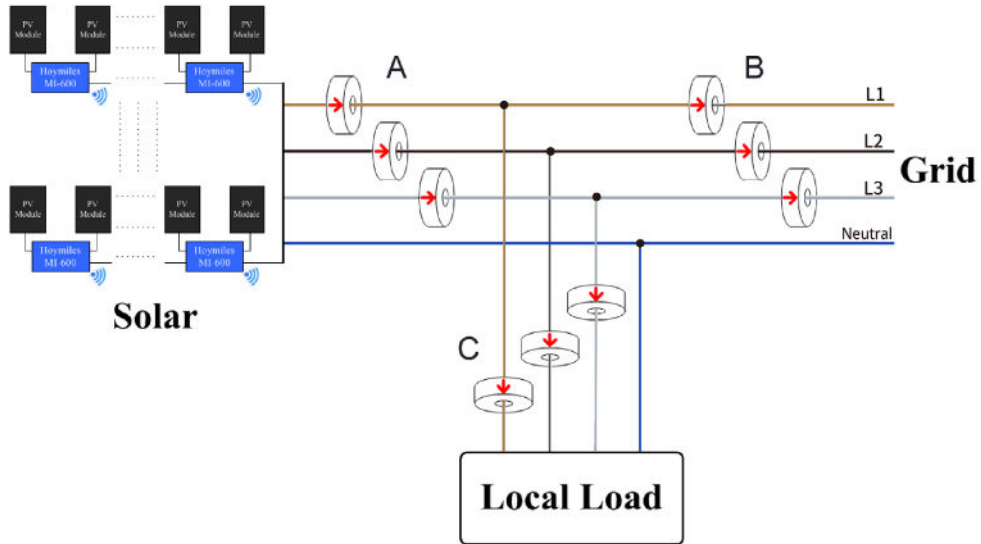
5.2 CT Installation Direction

Please make sure the CT (as known as Current Transformer) has been installed in the right direction, otherwise will affect the current readings and Meter function.



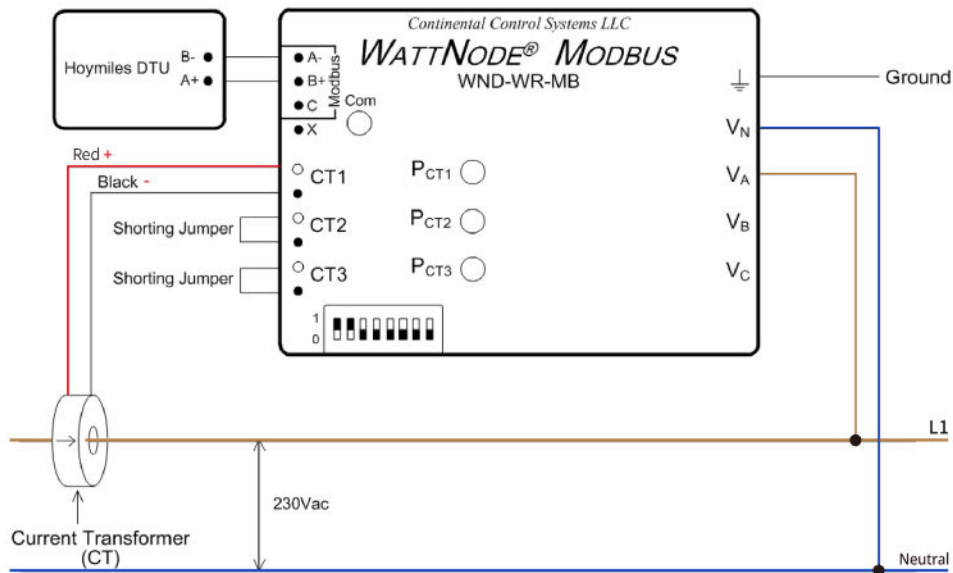
Please refer to the following diagram for different type of CT installation:

- **Position A:** Meter install on the PV side, the CT arrow pointed to the Grid.
- **Position B:** Meter install on the Grid side, the CT arrow pointed to the Grid.
- **Position C:** Meter install on the Loads side, the CT arrow pointed to the Loads.

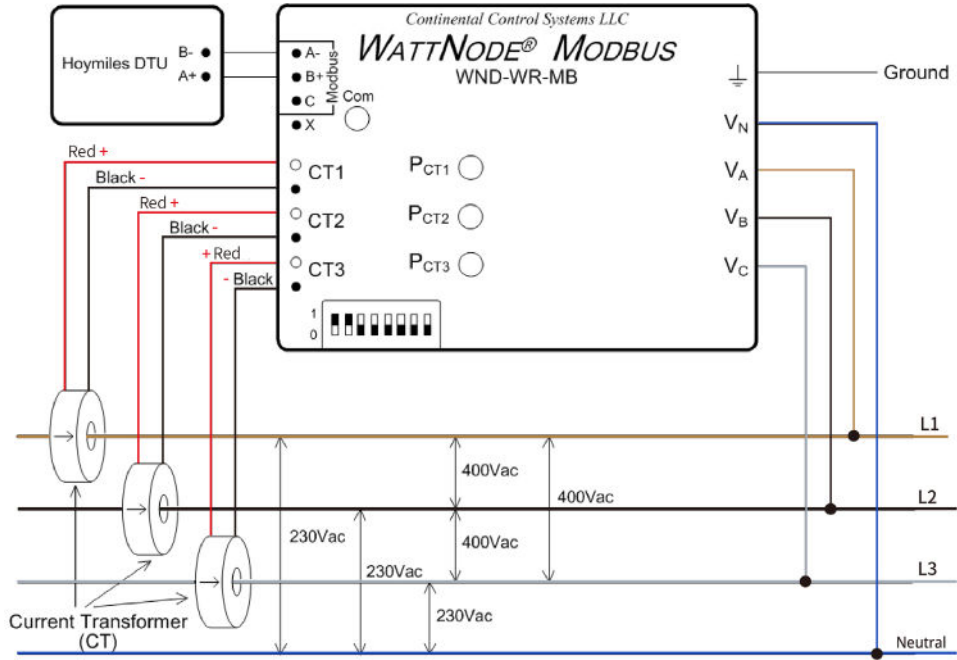


5.3 Installation Diagram for Meter (Via CT)

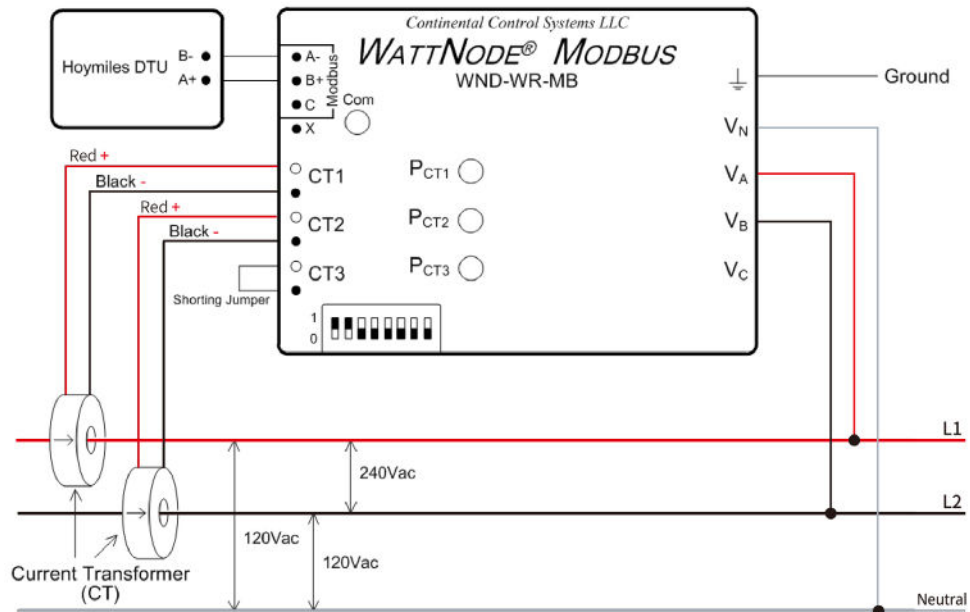
With Single Phase System (230V):



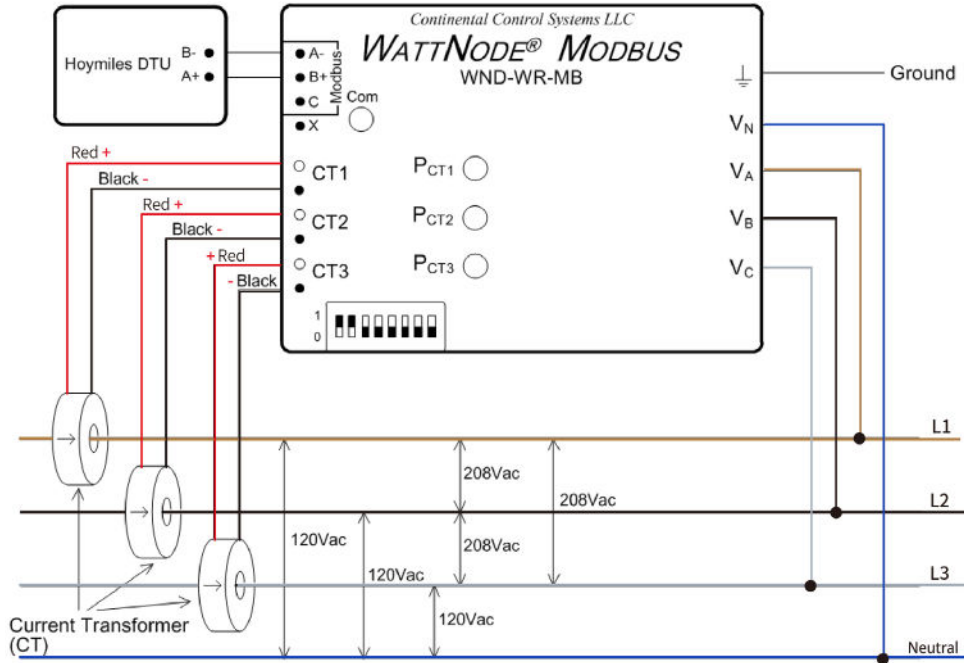
With Three Phase System (230V/400V):



With Split Phase System (120V/240V):



With Three Phase System (120V/208V):

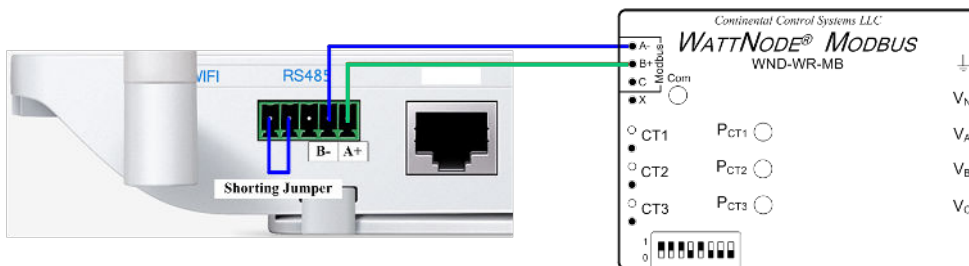


5.4 DTU RS485 Connection

The picture below indicates the RS485 terminal A and terminal B on DTU.



- **Scenario 1:** If only one DTU installed on one system, when the RS485 cable length is more than 200m it will be suggested to use the shorting jumper on the two terminals on the left of the RS485 port.



- **Scenario 2:** When there are multiple DTUs in one system, please connect the DTUs one by one (as shown in the diagram below). Shorting jumper for the last two RS485 ports on the last DTU will be suggested if the distance between microinverter and the last DTU is more than 200 meters.

