



TECHNICAL NOTE

Hoymiles Export Management using 3rd Gen DTU Pro



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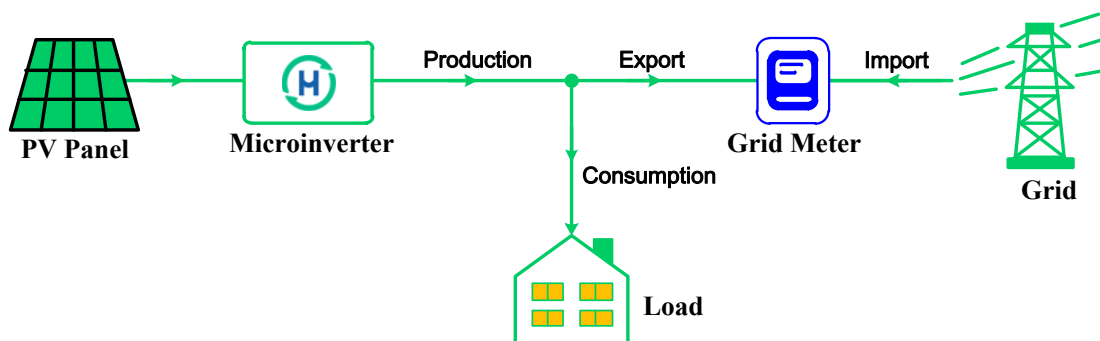
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1. Brief Introduction of Export Management

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.

2. Terms and Definitions

- **Export:** The power export 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 solar microinverters and reads the power/energy produced by the PV microinverter system.
- **Load Meter:** A meter installed at the load consumption side and reads the power/energy consumed by the local load.
- **Grid Meter:** A meter installed at the grid connection side and reads the power/energy exported to the grid.¹
- **Current Transformer (CT):** A transformer clips on the wiring to detect the current flow.
- **Meter:** A device measures for the energy flow.
- **DTU:** Data Transfer Unit, receive the data from microinverter and meter, then upload them to the monitoring platform.

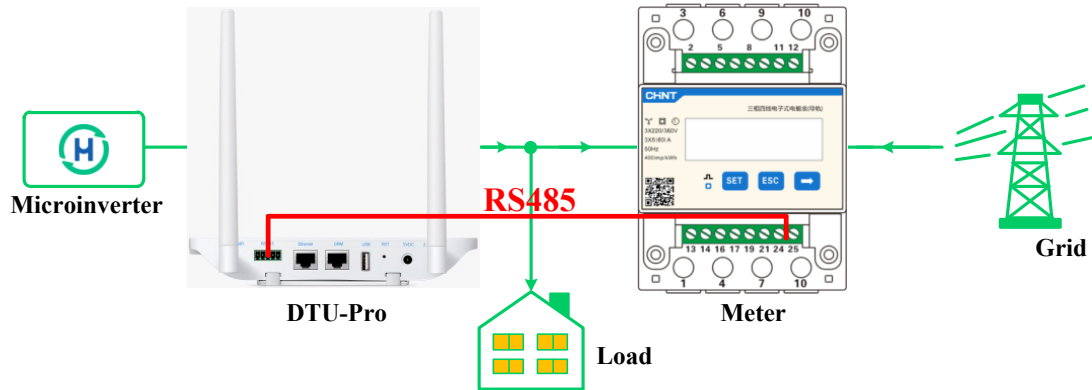


3. Introduction of RS485 connection

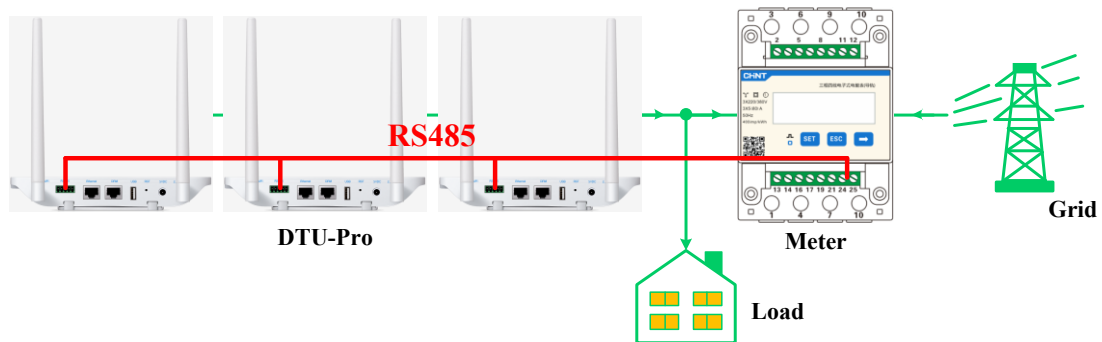
In Hoymiles Export Management system, Hoymiles gateway, DTU-Pro and the meter are needed. The meter is installed at the load side or grid side to measure the consumption or export power. If the export control is enabled, DTU-Pro will adjust the PV power generation to ensure that the export power will not exceed the give limit by the user. If the user just wants to know the accurate PV generation, just install the meter at the solar

side then DTU-Pro will collect the data from this meter and the user will get the PV generation on Hoymiles monitoring platform.

If there is only one DTU used in small size PV system. The RS485 port of the meter is connected directly to the RS485 port of DTU-Pro using shielded twisted pair.



If there are more than one DTU involved in the installation. The RS485 port of the meter is connected directly to the RS485 port of DTU-Pro in turn.



4. Installing the Export Management system

To install the Hoymiles Export Management, please perform the following steps. Before installation, please confirm if you have the permission to this system. If not, please contact your installer, dealer or Hoymiles technical support.

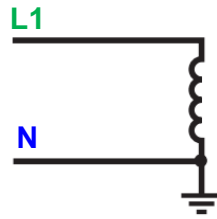
Step 1: Confirm the export control type:

- **Type 1:** Zero Export: to limit the exporting power to zero so that can prevent the generated power feed back to the grid.
- **Type 2:** Export Limit: to limit the exporting power within a certain value.
- **Type 3:** Production and Consumption Monitoring: enable to measure the PV generating under a high accuracy level.

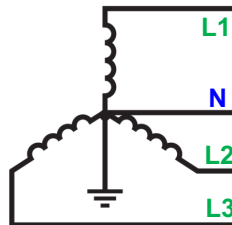
Note: Refer to appendix A for more information about the Export Control.

Step 2: Confirm the Grid type: the grid type varies in different countries, please choose the right grid type accordingly.

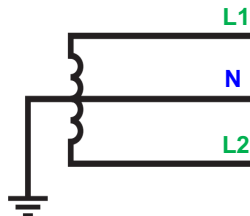
- **Single Phase 230V:** Mainly for residual systems in most countries except North America and South America. The phase voltage may vary from 220V to 240V. The outputs of microinverters are connected between live line and neutral line, L1~N.



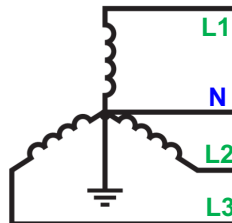
- **Three Phase 230V/400V:** Mainly for commercial systems in most countries except North America and South America. The phase voltage may vary from 220V to 240V. The outputs of microinverters are connected between live line and neutral line, L1~N, L2~N or L3~N.



- **Spilit Phase 120V/240V:** Mainly for residual systems in North America and South America. The phase voltage may vary from 110V to 120V. The outputs of microinverters are connected between two live lines, L1~L2.



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



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

Please make sure the CT/Meter range can cover the maximum loads power or PV system generating power.

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

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



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

For Chint meter, please record the meter SN for further use. Please refer to the pictures below for the Meter SN position:



For DDSU666

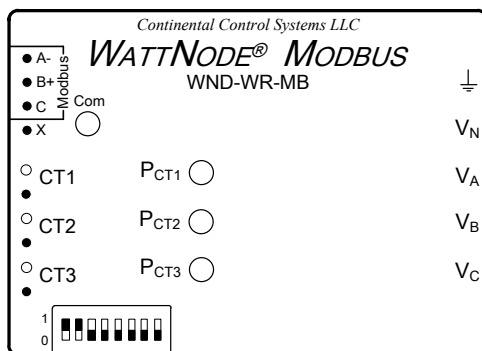


For DTSU666

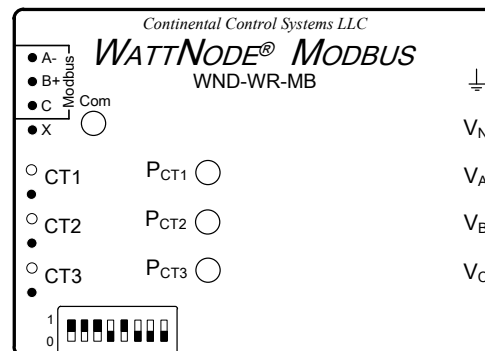
Note: Please make sure the meter SN in one system will not be duplicated.

For WattNode meter, the 12 digits meter's SN start with "10C1" and following 8 digits please refer to the dip switch from the meter. The up position means "1" and down position means "0".

For example:



Meter SN is: 10C111000000



Meter SN is: 10C111101000

Note :

1. Please make sure the meter SN in one system will not be duplicated. You can differentiate the meter SN by re-position the dip switch on the meter.
2. Please only change from the first 6 digits from the left side for meter SN differentiation, and keep the last 2 digits from right side both in the down position.

Step 6: Use RS485 cable connect A port from the meter to A port from DTU and B port from meter to B port from DTU (please refer to Appendix D).

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

Step 8: Complete the settings on the platform.

- Create a new station from the monitoring platform.
- Tick on the Box in front of “Enable Export Management”.

Progress bar: Basic information (checked), Device association (checked), Upload installation diagram (checked), **4 Export Management** (active)

☒ Enable Export Management?

c. Select your Grid type

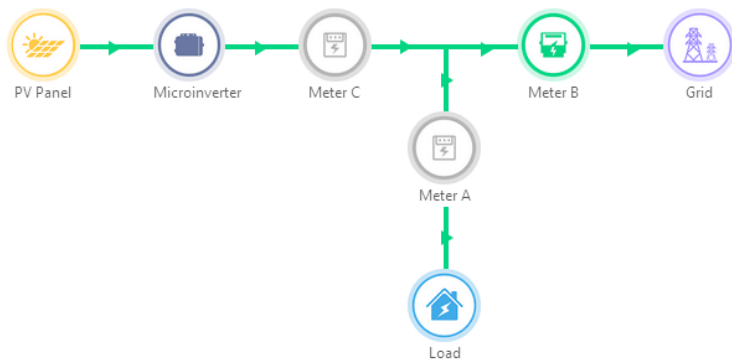
Types of Power Distribution Networks *

			
Single Phase230V	Three Phase230V/400V	Split Phase120V/240V	Three Phase120V/208V

- Choose the location that meter has been installed and input the Meter ID. Please also input the CT rated current if it's required.

Note: Please make sure the meter SN in one system will not be duplicated.

Metering Configuration *



Meter Position :

☐ Load Meter A

☒ Grid Meter B +

Meter ID:

☐ Solar Meter C -

- Enable the Export Power Limit function to enable the export control, input the limit value and click “Finish” to complete the station creation.

Note: For Three phase system, please select the export control method:

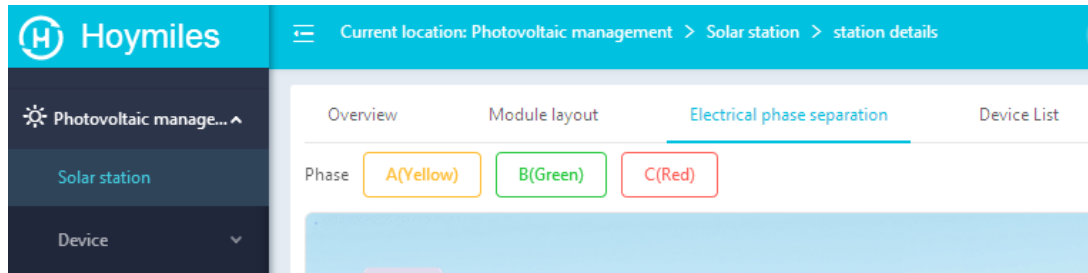
Total: for most of the application will use this method, which controls the export by total value from three phase (eg. Phase A = 500W, Phase B= -300W, Phase C =

-200W);

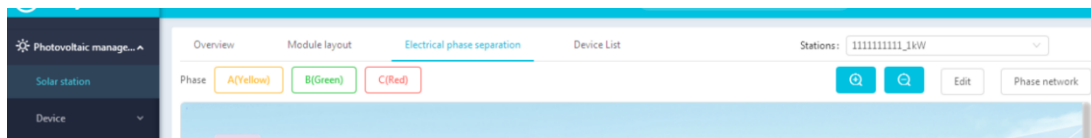
Per Phase: in certain country refer to the local grid authority's requirement, need to control the export on each phase (eg. Phase A = Phase B = Phase C = 0)

- f. Go to the “Electrical phase separation” from station page and allocate all microinverters into each phase (only apply for Three Phase system that use the control export by “Per Phase” method).

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

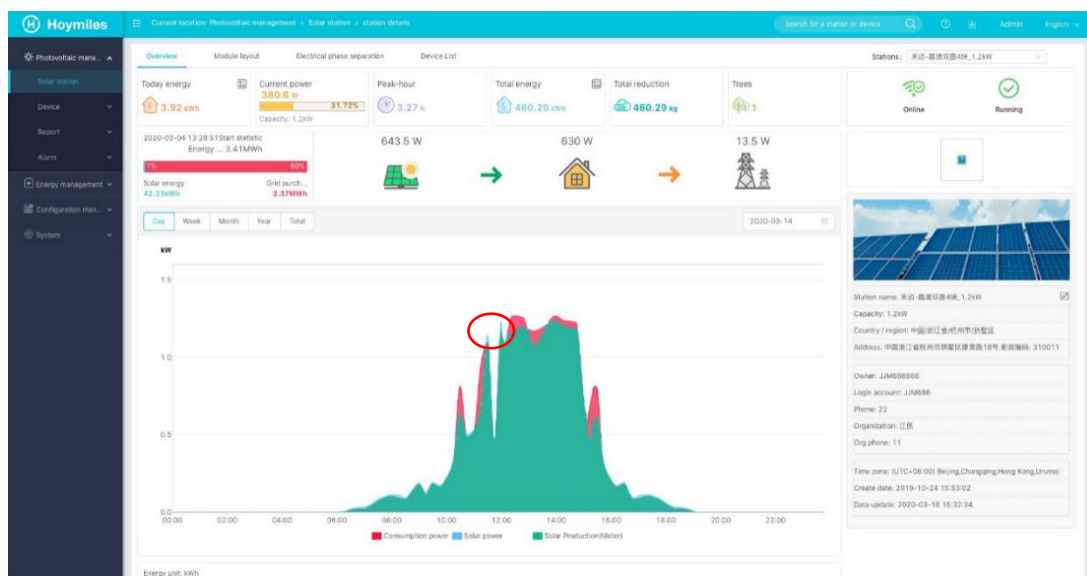


- g. Click the “Phase network” and complete station creation (only apply for Three Phase system that use the control export by “Per Phase” method).



5. Main Web Pages Display Introduction

5.1 “Overview” page under “Solar Station”



Part A (Station Generation Details):

- **Today Energy:** Today's total energy generation.
- **Current Power:** Current power generated.
- **Peak-hour:** Total generation equals to how many hours fully generated.
- **Today Energy:** Total energy generated.
- **Today reduction:** Total CO₂ saved.

Part B (Energy Statistics):

- **Solar energy:** How much energy generated from PV system.
- **Grid purchase:** How much energy purchase from Grid.

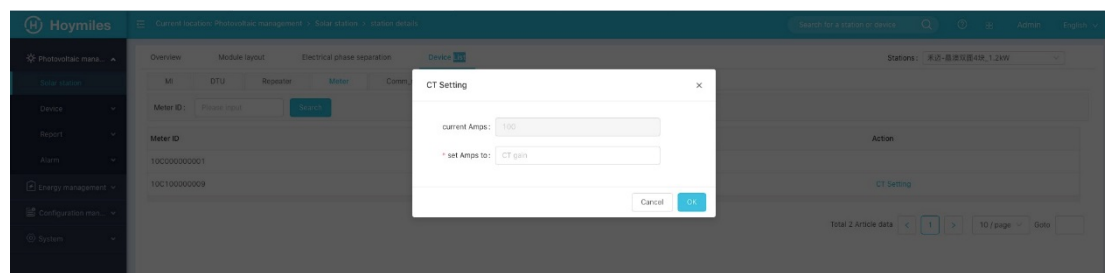
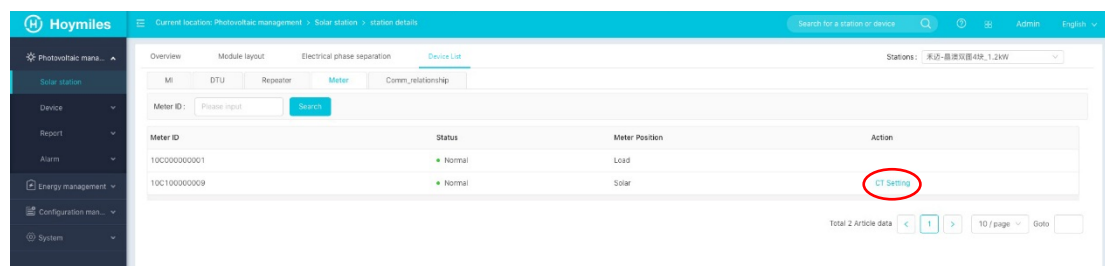
Part C (Generation Diagram):

- **Consumption Power:** The power loads used.
- **Solar Power:** The power generated from PV system.
- **Solar Production (Meter):** The power export/consumed from Grid.

Note: there might be a point of time that from the diagram it shows the Solar Generated power is higher than Consumption Power (as circled in red on the picture above), which is caused by the data obtain timing from meter and DTU is inconsistent. It will not effect on the actual power limit.

5.2 “Meter” page under “Device List”

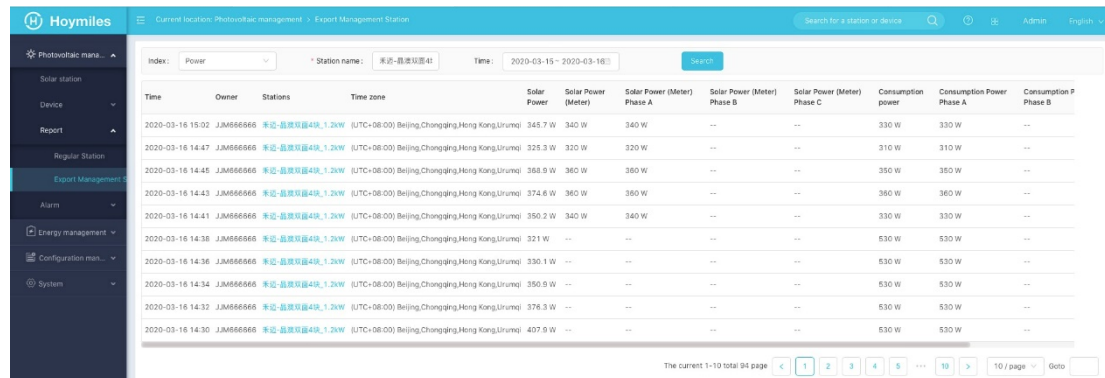
You can change the CT settings from this page by click the “CT setting” bottom on the right side of the list (as circled below).



5.3 Report generating

You can generate the report by choosing “Export management Station” under “Report” bottom from the functional bar on the left side of the page.

Please input the station name and select the period of time on the top to see more details.



Time	Owner	Stations	Time zone	Solar Power	Solar Power (Meter)	Solar Power (Meter) Phase A	Solar Power (Meter) Phase B	Solar Power (Meter) Phase C	Consumption power	Consumption Power Phase A	Consumption P Phase B
2020-03-16 15:02	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	345.7 W	340 W	340 W	--	--	330 W	330 W	--
2020-03-16 14:47	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	328.3 W	320 W	320 W	--	--	310 W	310 W	--
2020-03-16 14:45	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	368.9 W	360 W	360 W	--	--	350 W	350 W	--
2020-03-16 14:43	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	374.6 W	360 W	360 W	--	--	360 W	360 W	--
2020-03-16 14:41	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	350.2 W	340 W	340 W	--	--	330 W	330 W	--
2020-03-16 14:38	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	321 W	--	--	--	--	530 W	530 W	--
2020-03-16 14:36	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	330.1 W	--	--	--	--	530 W	530 W	--
2020-03-16 14:34	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	350.9 W	--	--	--	--	530 W	530 W	--
2020-03-16 14:32	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	376.3 W	--	--	--	--	530 W	530 W	--
2020-03-16 14:30	JJM666666	车站-最远线路4站, 1.2kW	(UTC+08:00) Beijing,Chongqing,Hong Kong,Urumqi	407.9 W	--	--	--	--	530 W	530 W	--

The current 1-10 total 94 page

Appendix A: Examples of Export Control

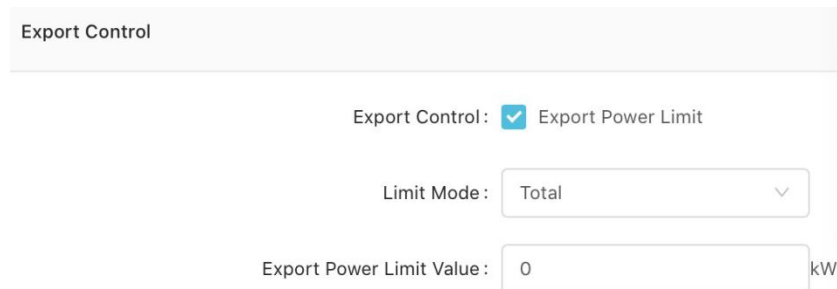
The following examples illustrate that how to use the module of **Export Control** when you create an Export Management Station.

Before enabling the Export Control, Types of Power Distribution Networks must be selected, which are “Single Phase 230V”, “Three Phase 230V/400V”, “Split Phase 120V/240V” and “Three Phase 120V/208V”. These four can cover the power grid types in most countries around the world.



When “Three Phase 230V/400V” is selected, the **Limit Mode** in **Export Control** contains two modes, **Total** and **Per Phase** limit mode, while for other three types there’s only **Total** Limit Mode.

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



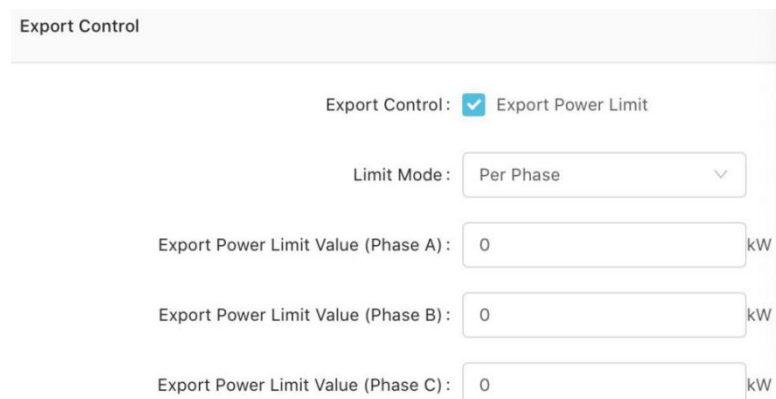
Export Control

Export Control: ☒ Export Power Limit

Limit Mode: Total

Export Power Limit Value: 0 kW

Per Phase (Only for three phase 230V/400V PV system): When the user selects “Three Phase 230V/400V”, which means the outputs of PV microinverters are connected to phase voltage, Per Phase can be selected and limit value of each phase can be entered. 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 solar production minus the load consumption of each phase.



Export Control

Export Control: ☒ Export Power Limit

Limit Mode: Per Phase

Export Power Limit Value (Phase A): 0 kW

Export Power Limit Value (Phase B): 0 kW

Export Power Limit Value (Phase C): 0 kW

The following examples has twelve hoymiles 4 in 1 microinverters HM-1500 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 6kW. In each example, details about how the export power, solar power are influenced by different conditions will be given.

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

Types of Power Distribution Networks *



● 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

Solar production of every phase is lower than the load consumption, so all the loads are powered from the solar production and the grid. Due to no export power to the grid, the solar production will not be limited.

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

Note: The negative "-3" means 3kW power imported from the grid, no power injected into the grid.

Case 2

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

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

Case 3

Total Solar Production is higher than the total load consumption, so the solar production of every phase will be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	4	4	4	12

Load Consumption	4	3	2	9
Real Solar Production	3	3	3	9
Export	-1	0	1	0(zero export)

● **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

Solar production of every phase is lower than the load consumption, so the loads of every phase are powered from the solar production and the grid. Due to no export power to the grid, the solar production will not be limited.

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

Note: The negative “-3” means 3kW power imported from the grid, no power injected into the grid.

Case 2

Solar production of one phase is higher than the load consumption, solar 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
Real Solar Production	3	3	2	8
Export	-1	0	0	-1(zero export)

Case 3

If solar production of any phase is higher than the corresponding load consumption, the solar production of every phase will be limited.

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

● **Example 3:** 70% export power limit, Total limit mode

In Germany, due to the Renewable Energy Sources Act (EEG) 2012, the PV systems with system capacity from 800W to 30kW should regulate output power or fixed limit of 70 percent in total limit mode at the point of common coupling.

In this example, with the PV modules output power 20kW, the export power limit should be $20\text{kW} \times 70\% = 14\text{kW}$.

Case 1

The total solar production lower than the load consumption or higher than the load consumption but not more than 70%, the solar production will not be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	5	4	3	12
Load Consumption	4	3	2	9
Real Solar Production	5	4	3	12
Export	-1	-1	-1	-3

Case 2

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

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	6	6	6	18
Load Consumption	1	0	0	1
Real Solar Production	5	5	5	15
Export	-4	-5	-5	-14

● Example 4: 6kW export power limit, per phase limit mode

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

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 2kW, the solar production will not be limited.

	Phase1/kW	Phase2/kW	Phase3/kW	Total/kW
Ideal Solar Production	5	4	3	12
Load Consumption	4	3	2	9
Real Solar Production	5	4	3	12
Export	-1	-1	-1	-3

Case 2

If the solar production of any phase is 2kW higher than the load consumption or more, the solar 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
Real Solar Production	3	4	4	11
Export	-1	-2	-2	-5

- **Example 5:** No export control, solar production and load consumption display.
Some users do not need the export management, but only want to see the solar production and load consumption on Hoymiles Monitoring Platform. The steps of creating a new station is the same as the export management station, but in the module of Export Control, the function of export power limit should be disable.

Export Control

Export Control: ☐ Export Power Limit

Appendix B: Guideline for CT/Meter Installation

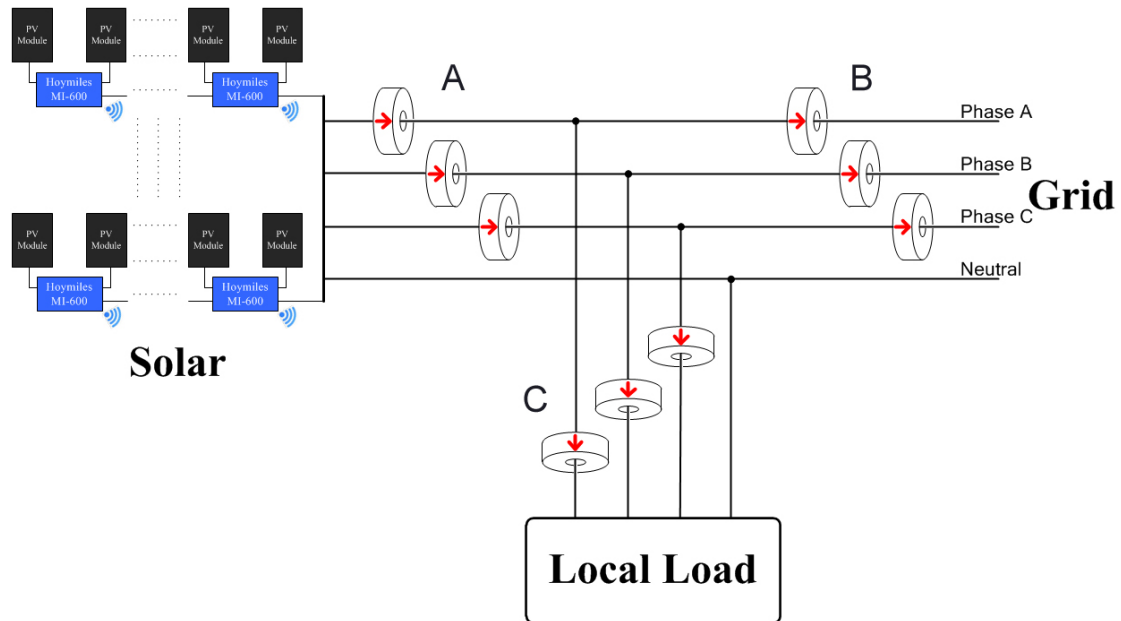
1. CT Installation

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:

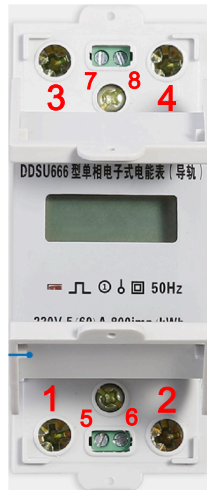
- Position A: Meter install on the PV side, the CT arrow pointed to the Grid.
- Position B: Meter install on the Grid side, the CT arrow pointed to the Grid.
- Position C: Meter install on the Loads side, the CT arrow pointed to the Loads.



2. Meter Installation

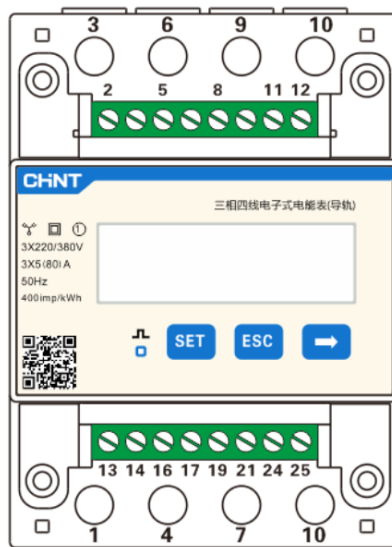
2.1 Meter Port Description

a. Chint DDSU666 Single Phase Meter (Direct connect)



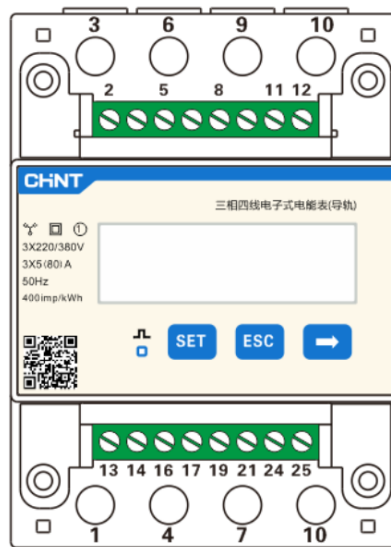
- Port 1: input port, connect to the L line;
- Port 2: output port, connect to the L line;
- Port 3: connect to the N line;
- Port 4: connect to the N line;
- Port 7: connect to the A port from DTU RS485 port;
- Port 8: connect to the B port from DTU RS485 port.

b. Chint DTSU666 Three Phase Meter (Direct connect)



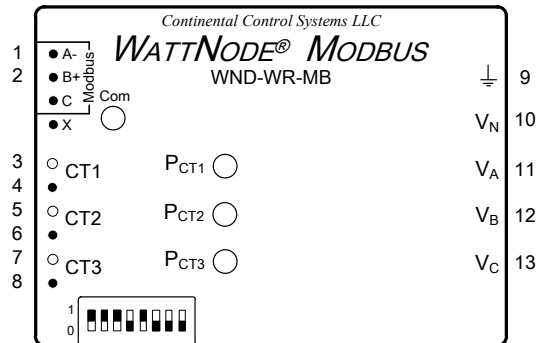
- Port 1: input port, connect to the L line for Phase A;
- Port 3: output port, connect to the L line for Phase A;
- Port 4: input port, connect to the L line for Phase B;
- Port 6: output port, connect to the L line for Phase B;
- Port 7: input port, connect to the L line for Phase C;
- Port 9: output 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.

c. Chint DTSU666 Three Phase Meter (Via CT)



- 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.

d. CCS Wattnode Meter (Via CT)

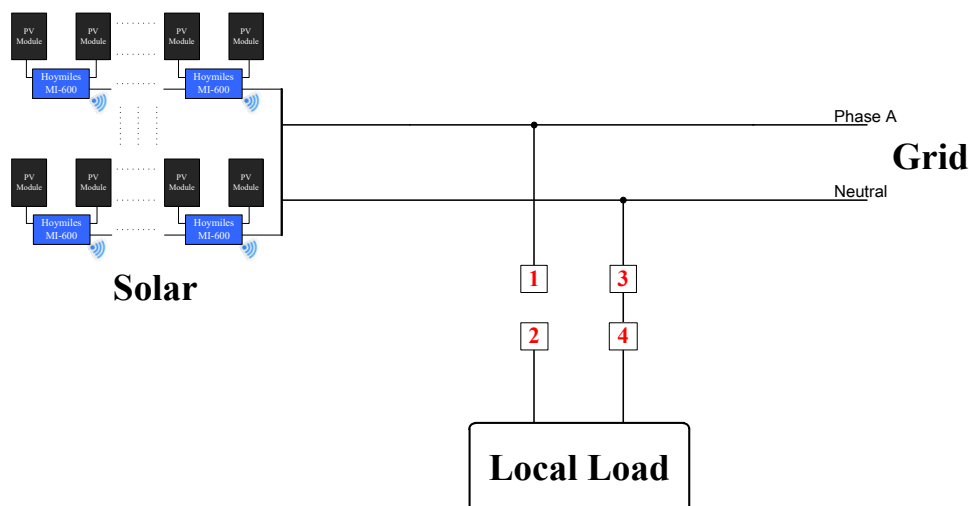


- Port 1: connect to the A port from DTU RS485 port;
- Port 2: connect to the B port from DTU RS485 port;
- Port 3: connect to the white wire of the CT for Phase A;
- Port 4: connect to the black wire of the CT for Phase A;
- Port 5: connect to the white wire of the CT for Phase B;
- Port 6: connect 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

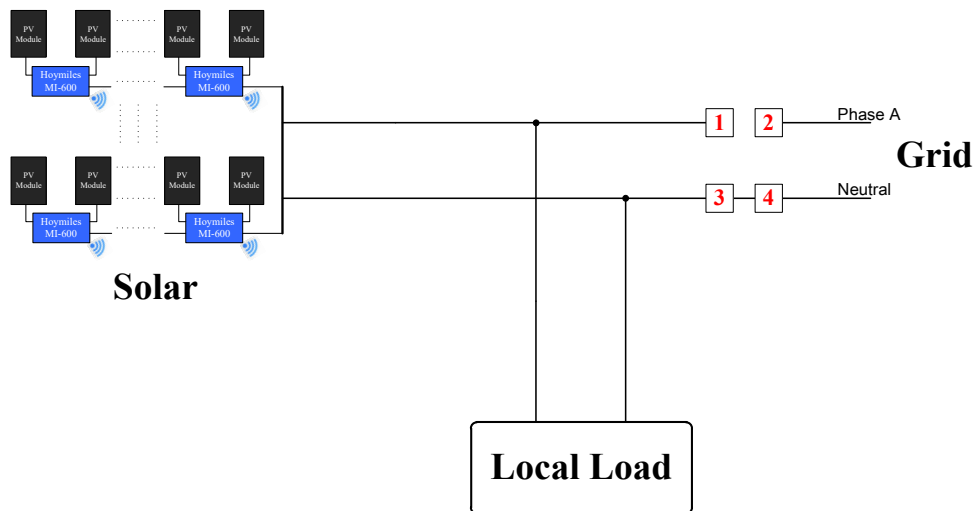
2.2 Chint Meter Installation Direction (Direct Connect)

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

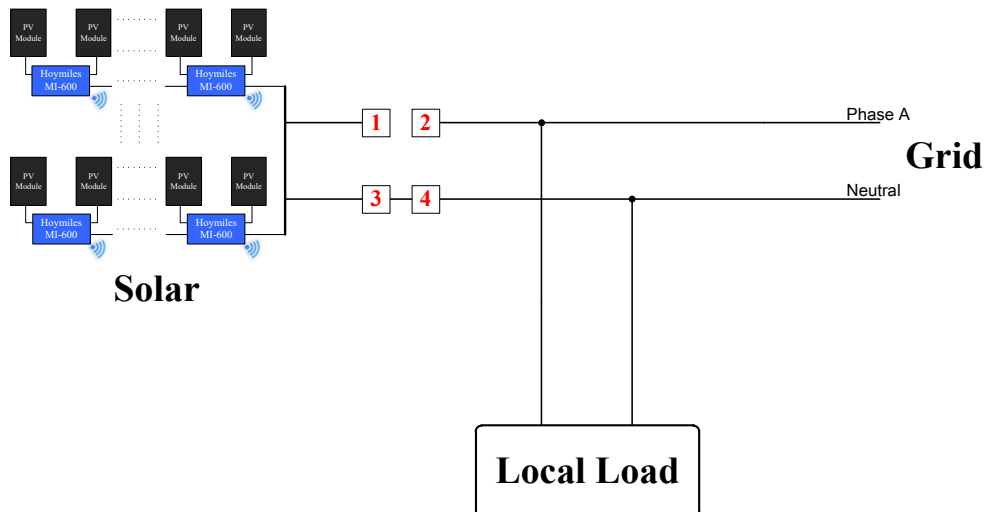
a. Single Phase Meter DDSU666, Load Side, Direct Connect



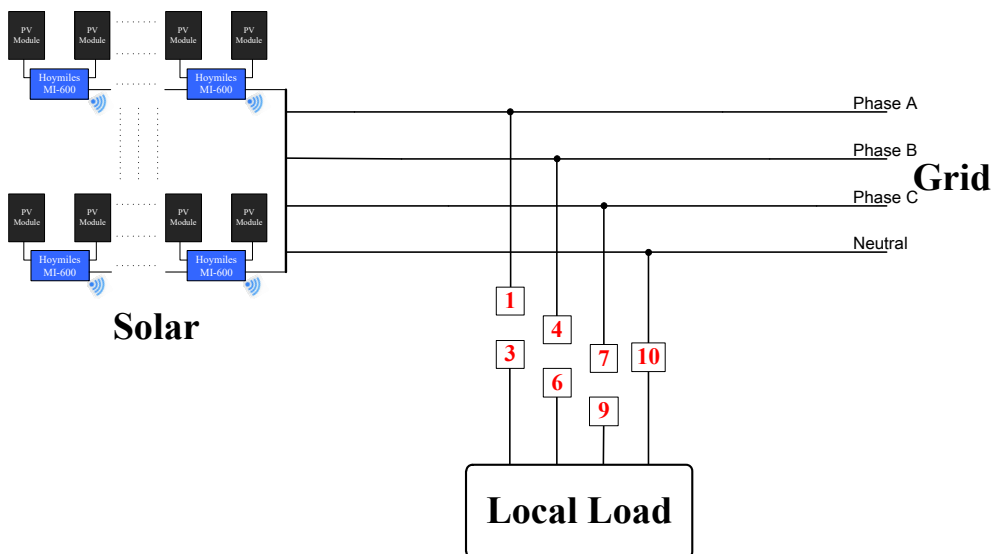
b. Single Phase Meter DDSU666, Grid Side, Direct Connect



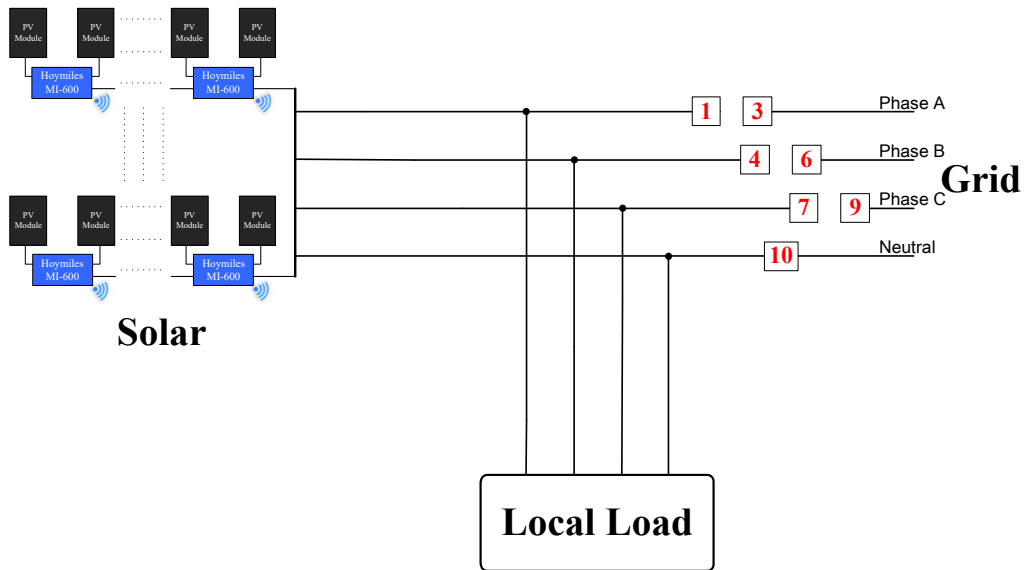
c. Single Phase Meter DDSU666, Solar Side, Direct Connect



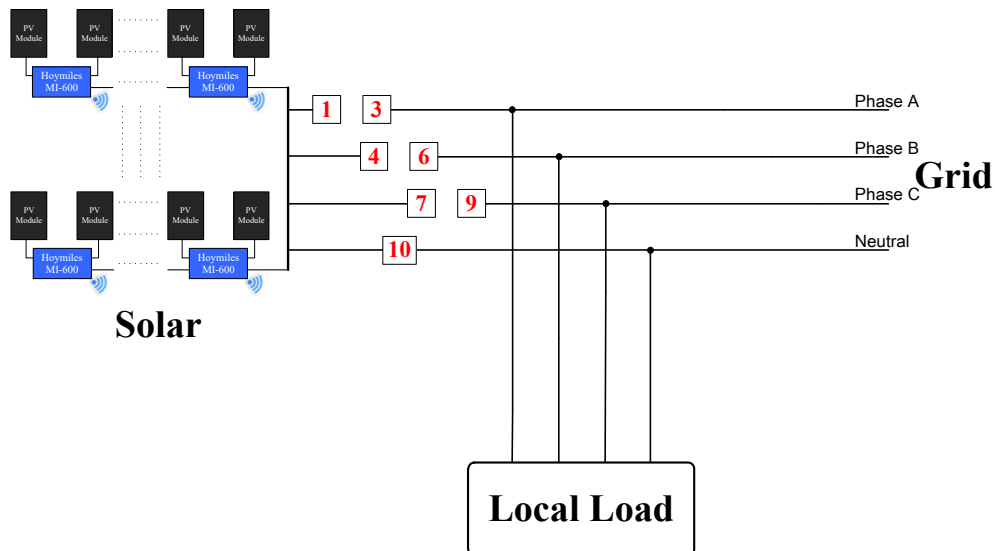
d. Three Phase Meter DTSU666, Load Side, Direct Connect



e. Three Phase Meter DTSU666, Grid Side, Direct Connect



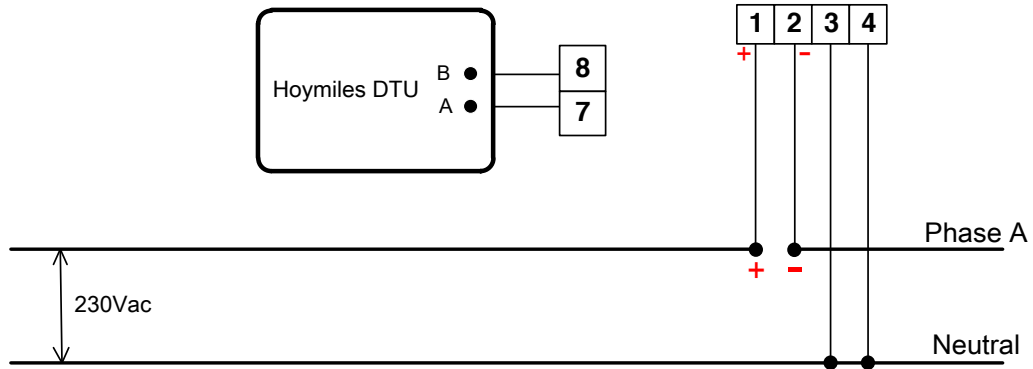
f. Three Phase Meter DTSU666, Solar Side, Direct Connect



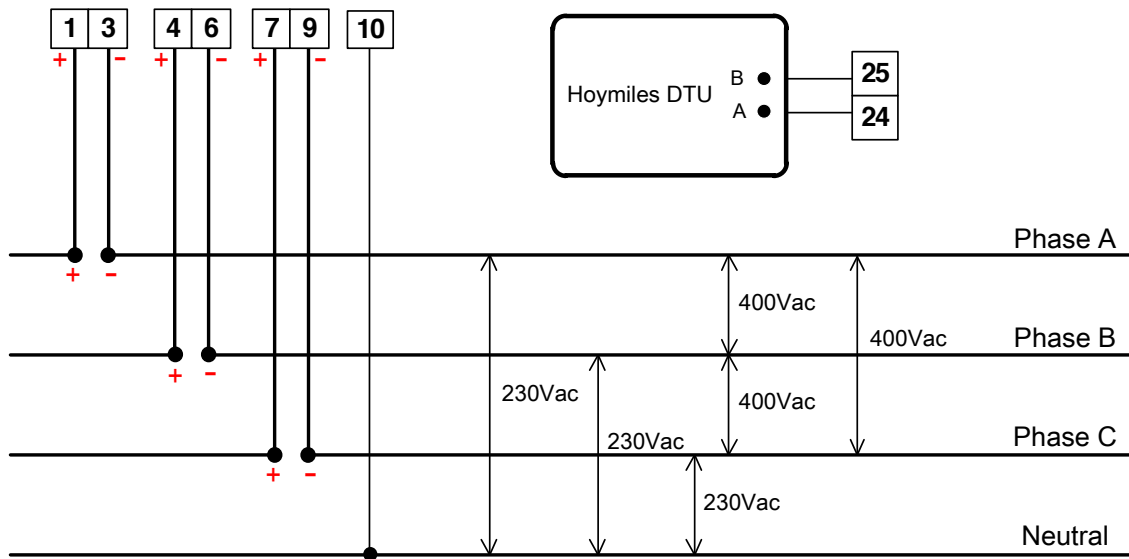
3. Installation Diagram for Chint and Wattnode Meter

3.1 Chint Meter

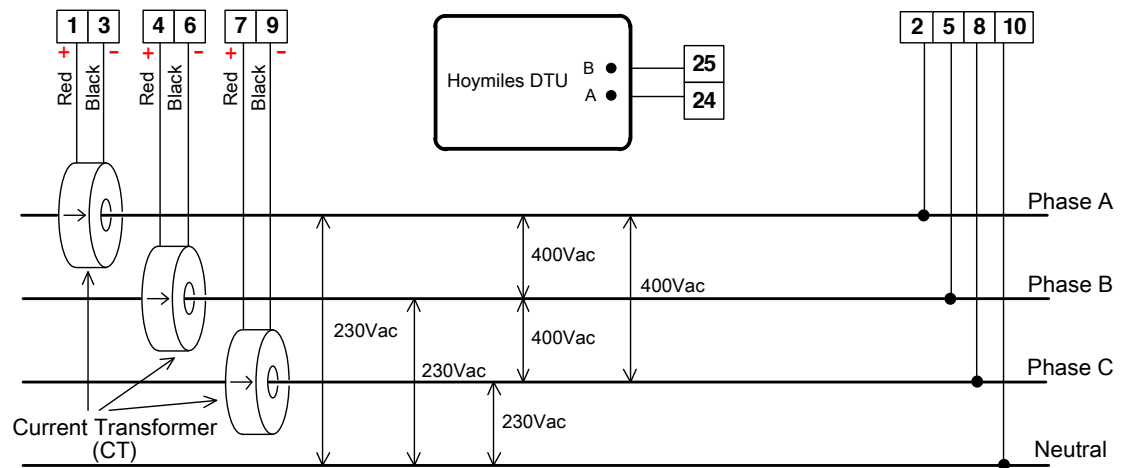
- a. Single Phase Meter with Single phase system (230V, Direct connect):



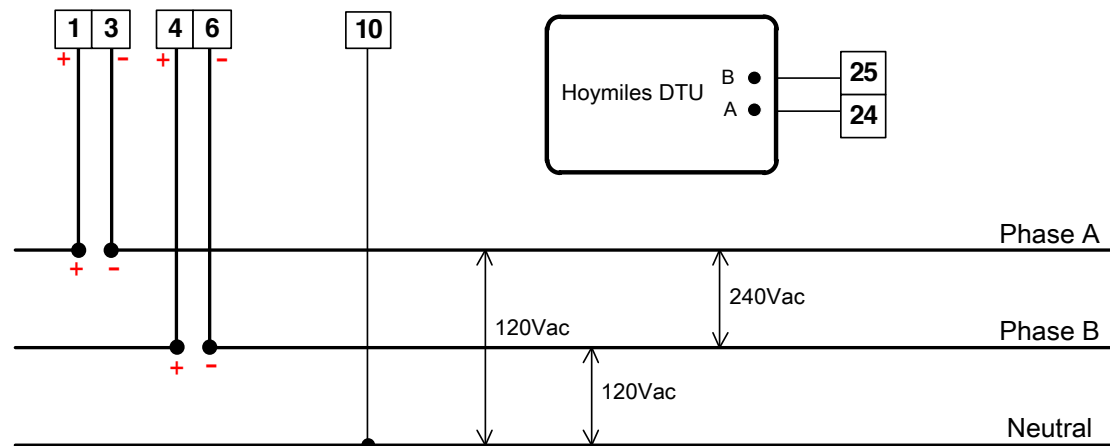
- b. Three Phase Meter with Three Phase system (230V/400V, Direct connect):



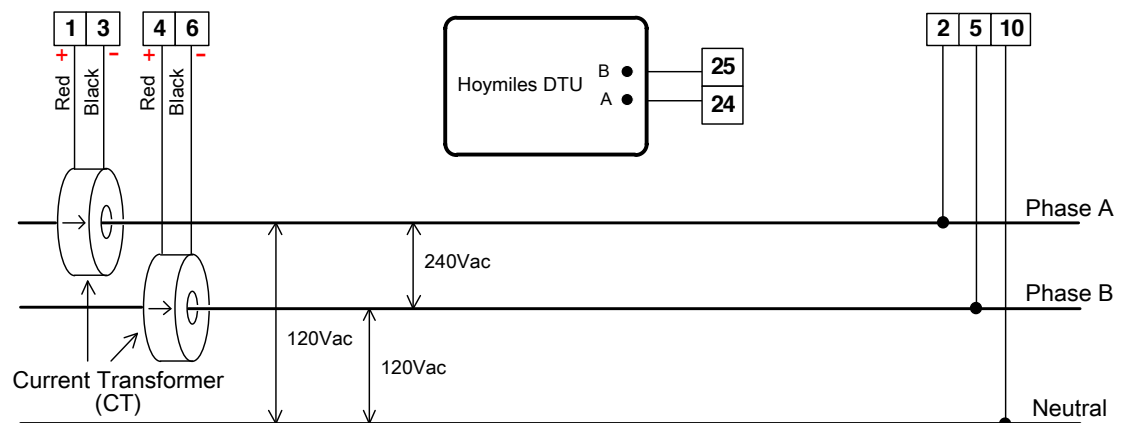
- c. Three Phase Meter with Three Phase system (230V/400V, via CT):



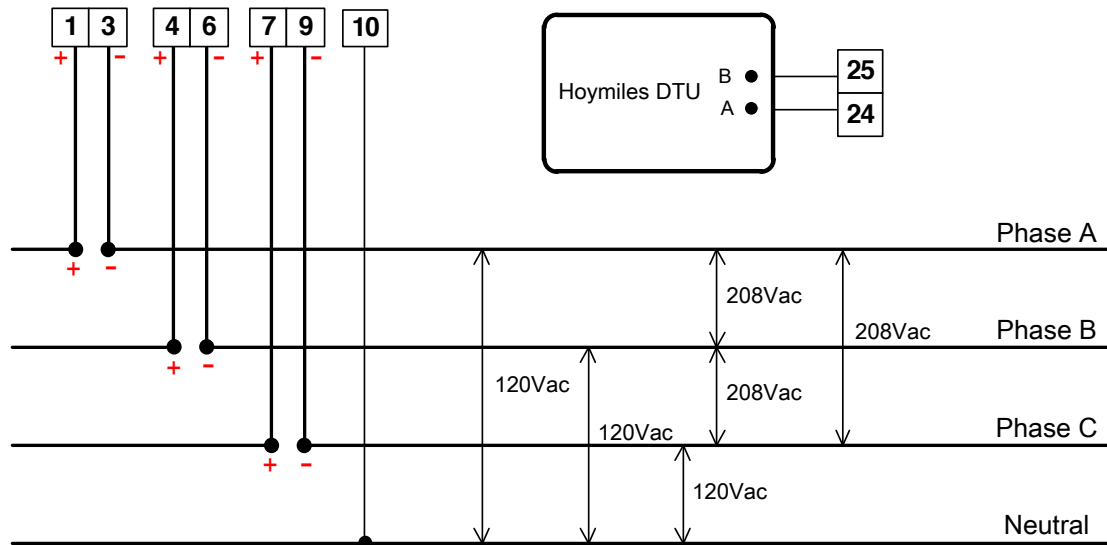
d. Three Phase Meter with Split Phase system (120V/240V, Direct connect):



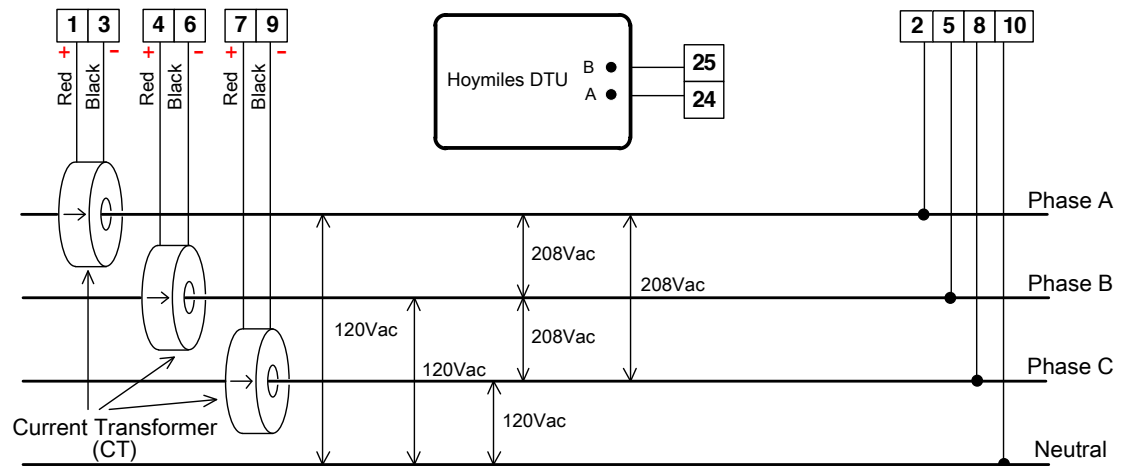
e. Three Phase Meter with Split Phase system (120V/240V, via CT):



f. Three Phase Meter with Three Phase system (120V/208V, Direct connect):

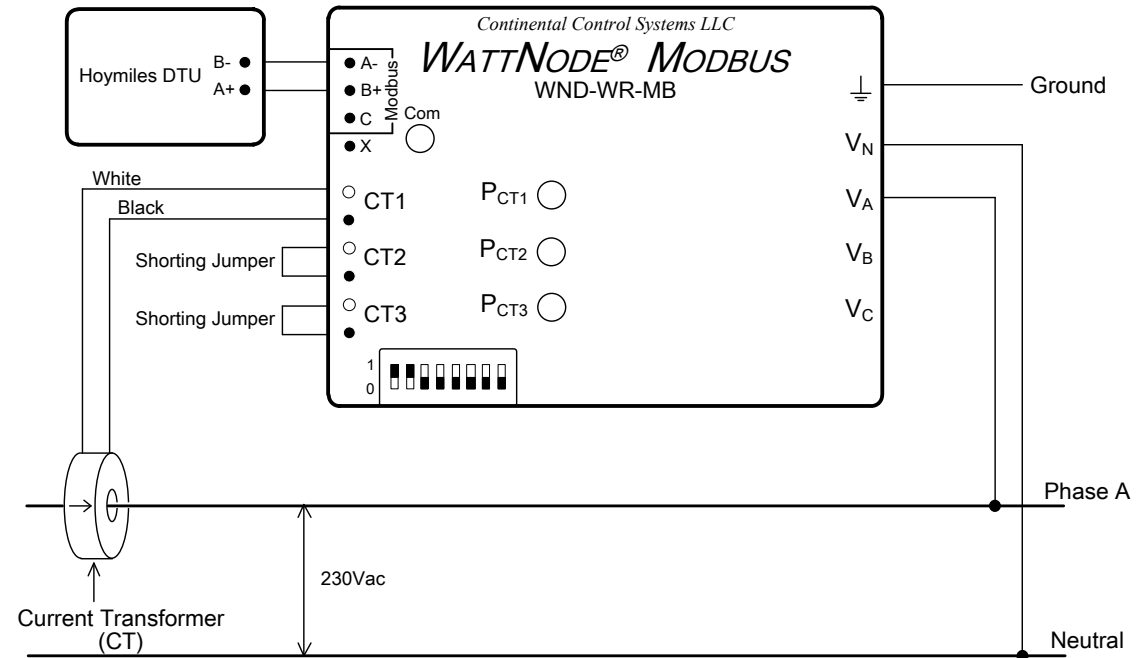


g. Three Phase Meter with Three Phase system (120V/208V, via CT):

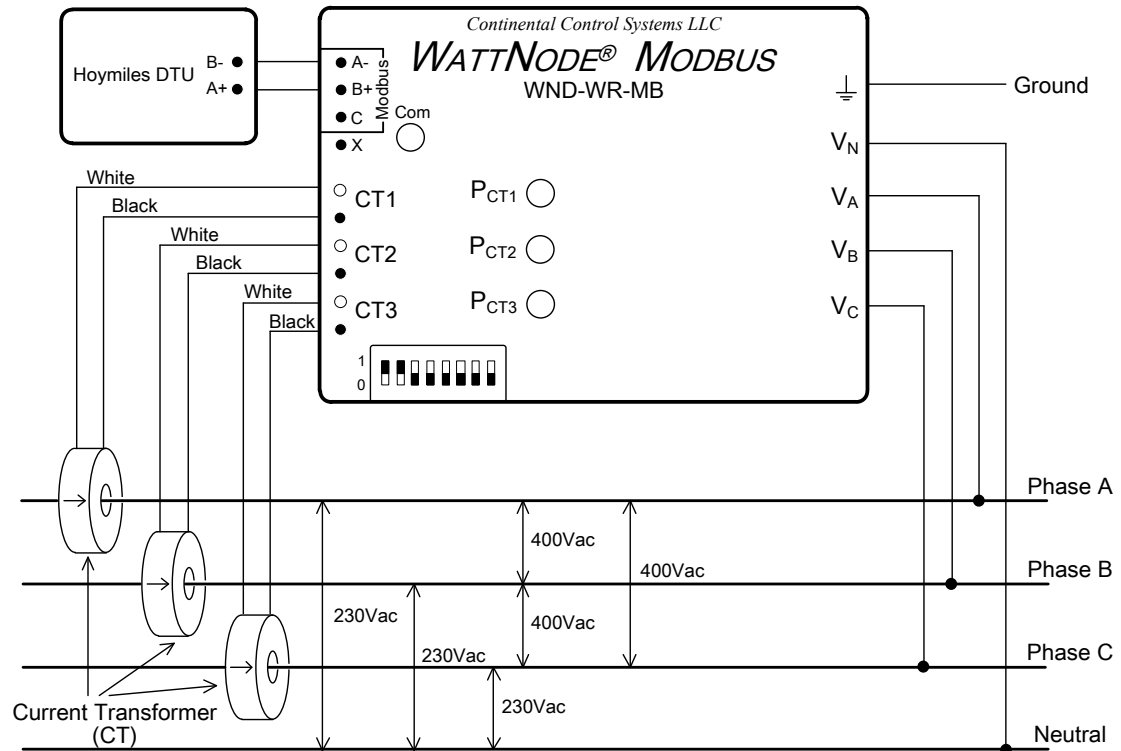


3.2 CCS Wattnode Meter

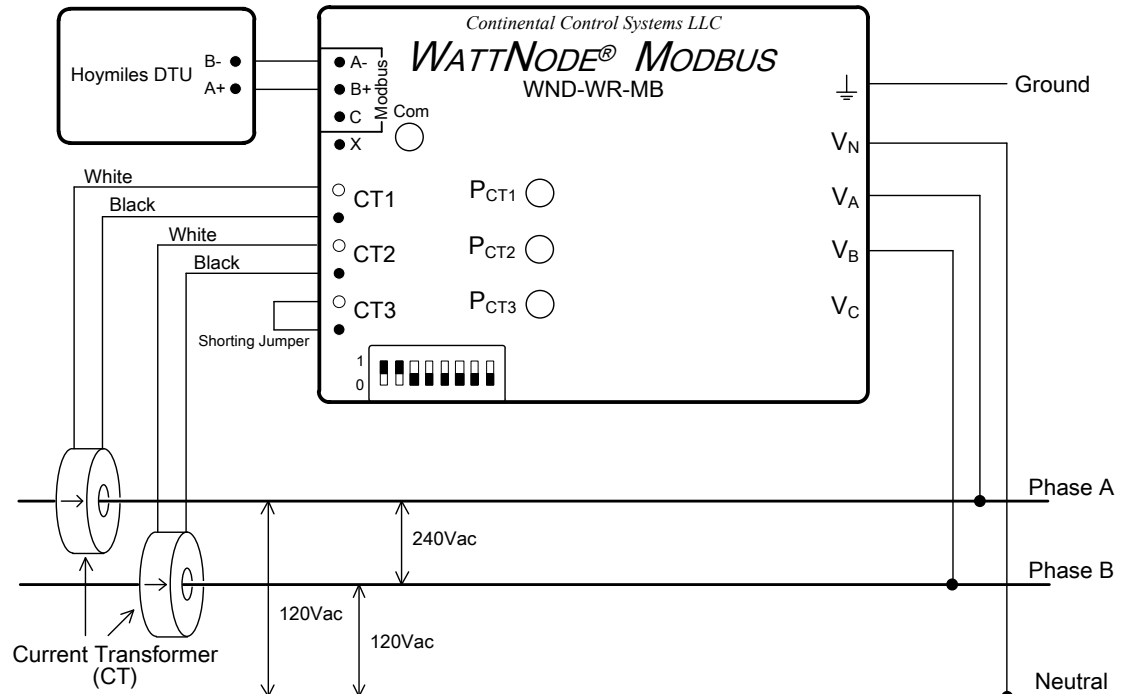
a. WattNode with Single phase system (230V):



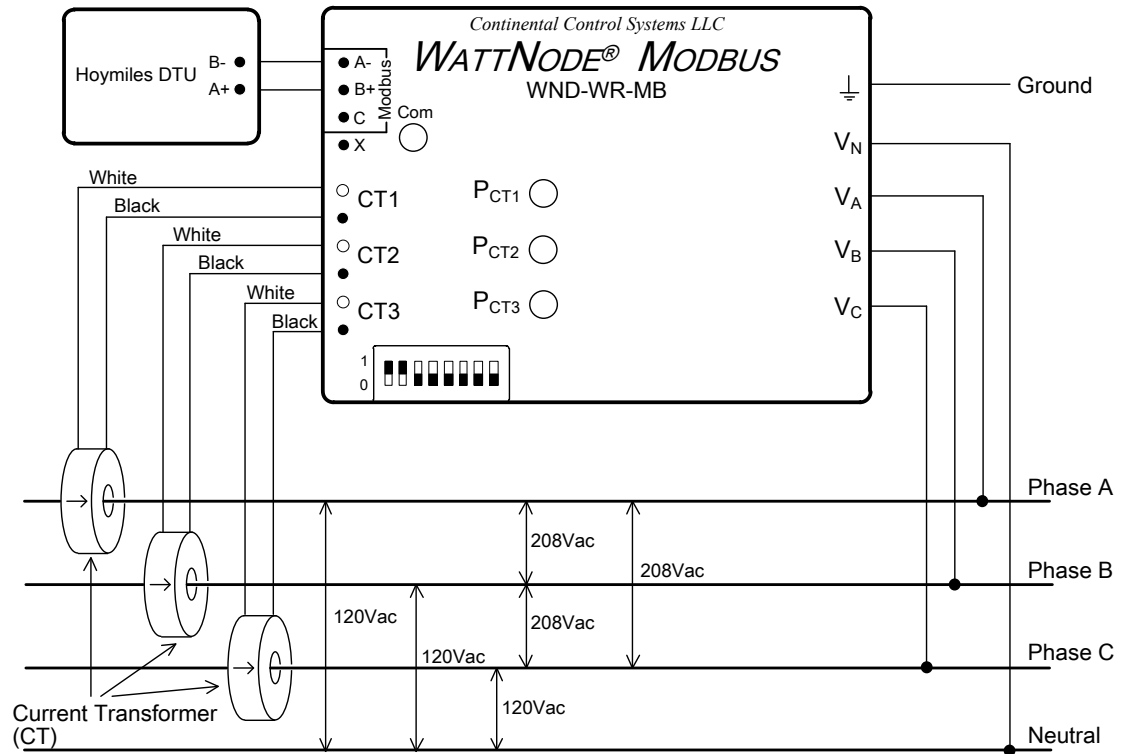
b. WattNode with Three Phase system (230V/400V):



c. WattNode with Split Phase System (120V/240V):



d. WattNode with Three Phase System (120V/208V):



Appendix C: How to choose Chint meter and CT for your Export Management station

There are 3 types of Chint meter and different types of CT that you can choose base on the actual installation requirement.

1. Meter Types

Meter Model	Type	SN	Description
DDSU666 (60A)	Single Phase	10C011XXXXXX	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

- Current ratio: 100A/5A;
- Current ratio: 300A/5A;
- Current ratio: 600A/5A;

3. Meter Application Under Different Grid Type

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

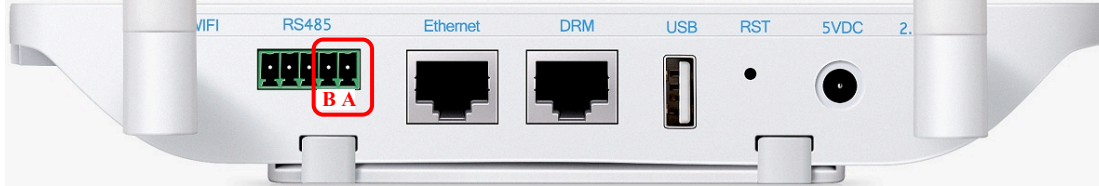
(120V/208V)	Direct Connect	DTSU666 (80A)	DTSU666 (80A)	DTSU666 (80A)
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Note:

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

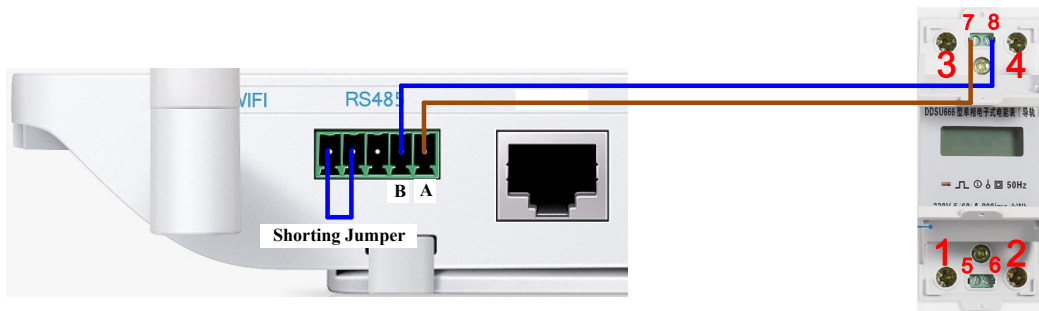
Appendix D: Guidelines for DTU RS485 Connection

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

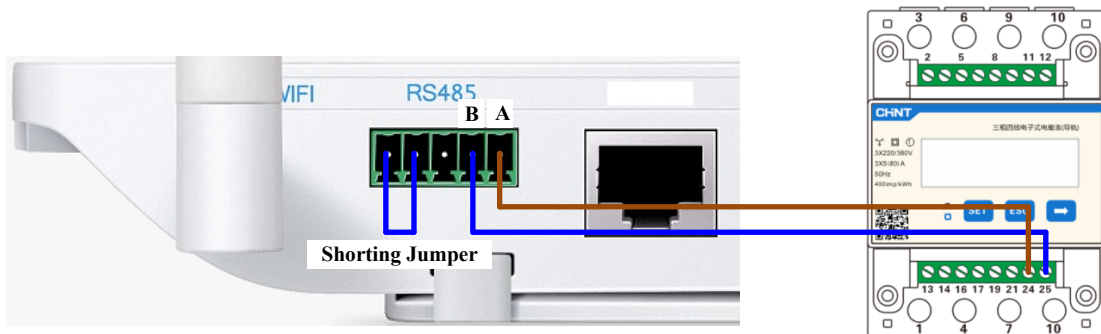


- **Scenario 1:** if only one DTU installed on one system, when the RS485 cable length is more than 200m it will be suggested to use the shorting jumper on the first two ports from DTU's RS485 port.

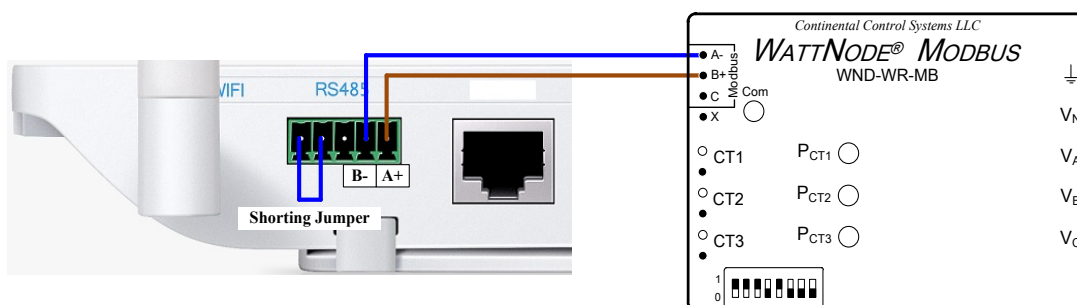
a. For Chint Single Phase Meter



b. For Chint Three Phase Meter



c. For WattNode Meter



- **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 from last DTU will be suggested if the distance between microinverter and the last DTU is more than 200 meters.

a. For Chint Single Phase Meter



b. For Chint Three Phase Meter



c. For WattNode Meter

