Open Energy For All

Technical Note

Export Management Guide of Hoymiles Microinverter System

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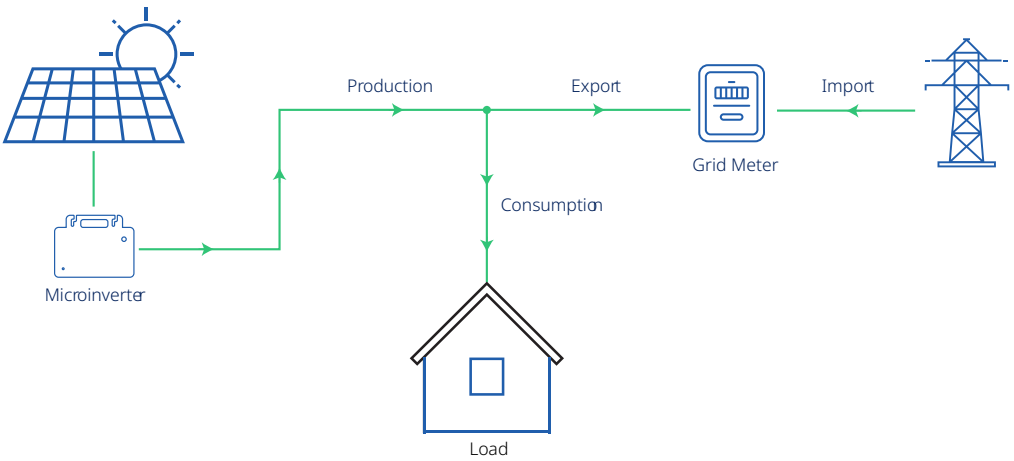
CONTENTS

1 Introduction to Export Management

Local grid authorities in some countries limit the amount of power exported into the grid in order to lest power surges, power issues, or a drop in the quality of the electricity. This requirement has inspired Hoymiles to develop an Export Management Solution, which allows users to install larger PV systems without violating export laws.

Hoymiles Export Management works by installing the Hoymiles gateway DTU-Pro and the smart meter. The meter can be installed on the grid side or the load side to measure consumption or export. With export control enabled, DTU-Pro will adjust PV power generation to ensure that exported power does not exceed a pre-setting limit.

Note that users can also install the meter on the solar side for an accurate PV generation measurement. (Hoymiles export management cannot be enabled by only installing meters on the solar side.) In this case, Hoymiles DTU-Pro will collect the data and users will be able to view their power consumption on the Hoymiles monitoring platform.



2 Terms and Definitions

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

3 Installing the Export Management System

Please follow the instructions below to install the Hoymiles Export Management system. Before installation, please make sure that the export management function has been enabled on your plant. If it has been disabled, please consult your dealer or the Hoymiles technical support team.

Step 1: Choose an export control type.

- Zero Export: Sets the power export value to zero. The meter can be installed either on the load side or the grid side.
- Export Limit: Limit the export of power within a certain range. The meter can be installed either on the load side or the grid side.
- Production and Consumption Monitoring: Accurate display of the PV production and consumption. A meter should be installed on the load side or the grid side of the system in order to monitor consumption readings. The meter should also be installed on the solar side of the system in order to display PV production readings.

Note: Please refer to Appendix I for further information regarding Export Control.

Step 2: Verify the capacity of the loads before selecting the CT and meter type.

- The maximum load current or the maximum current of the PV system should not exceed the CT/Meter range regardless of where the meter is installed.

Note: See Appendix II for information on selecting appropriate Meters and CTs.

- Before installing the Chint meter, please note down the meter SN 10C01XXXXXXX (shown in the circles) for further use.

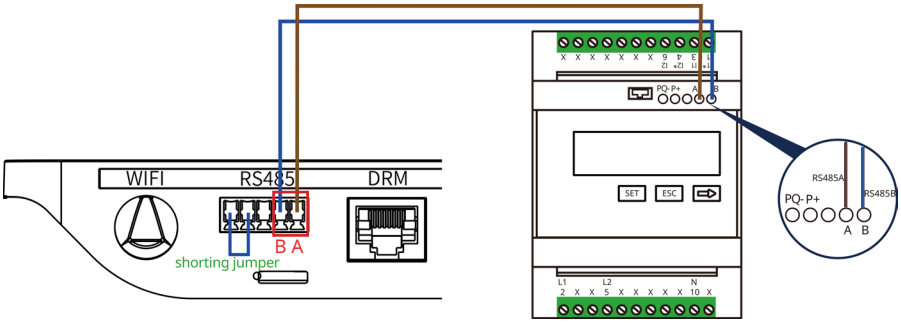
Note: Please make sure the meter SN in one system is not repeated.

- For the export limitation function, only Chint meters purchased from Hoymiles are approved.

Step 3: Prepare the shielded twisted pair RS485 cable with a proper length.

Step 4: Complete the wiring of the meter and CT according to the system requirements (please refer to Appendix III for more details).

Step 5: Connect the RS485 Port A of the meter to the RS485 Port A of the DTU and the RS485 Port B of the meter to the RS485 Port B of the DTU by using an RS485 cable (please refer to Appendix III for more details).

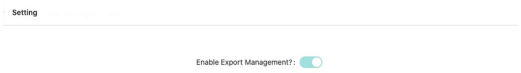


Step 6: Connect the power cable to the DTU and power the DTU on.

Step 7: Complete the settings on the monitoring platform S-Miles Cloud.

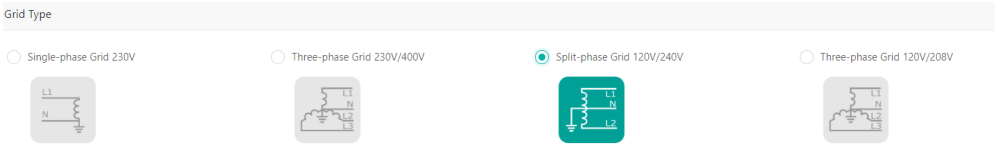
a. Create a new station on the platform.

b. Switch on the slider button of "**Enable Export Management**".



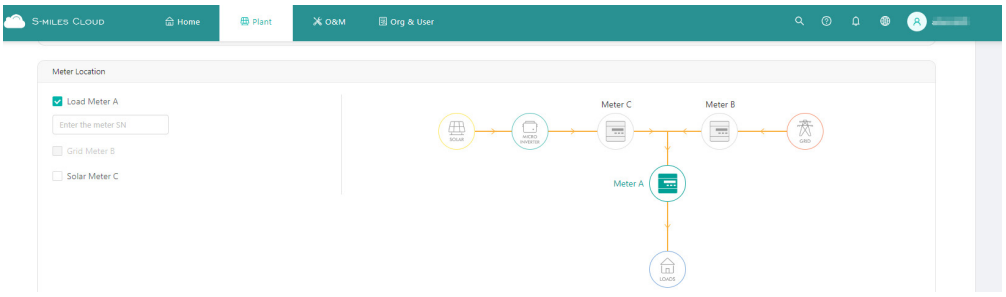
c. Select the "**Split-phase Grid 120V/240V**" Grid type.

*Note: Note that you need to select "**Split-phase Grid 120V/240V**" here.*

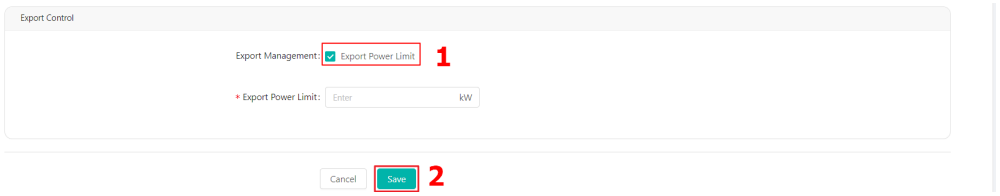


d. Tap the installation location of the meter and enter the Meter SN.

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

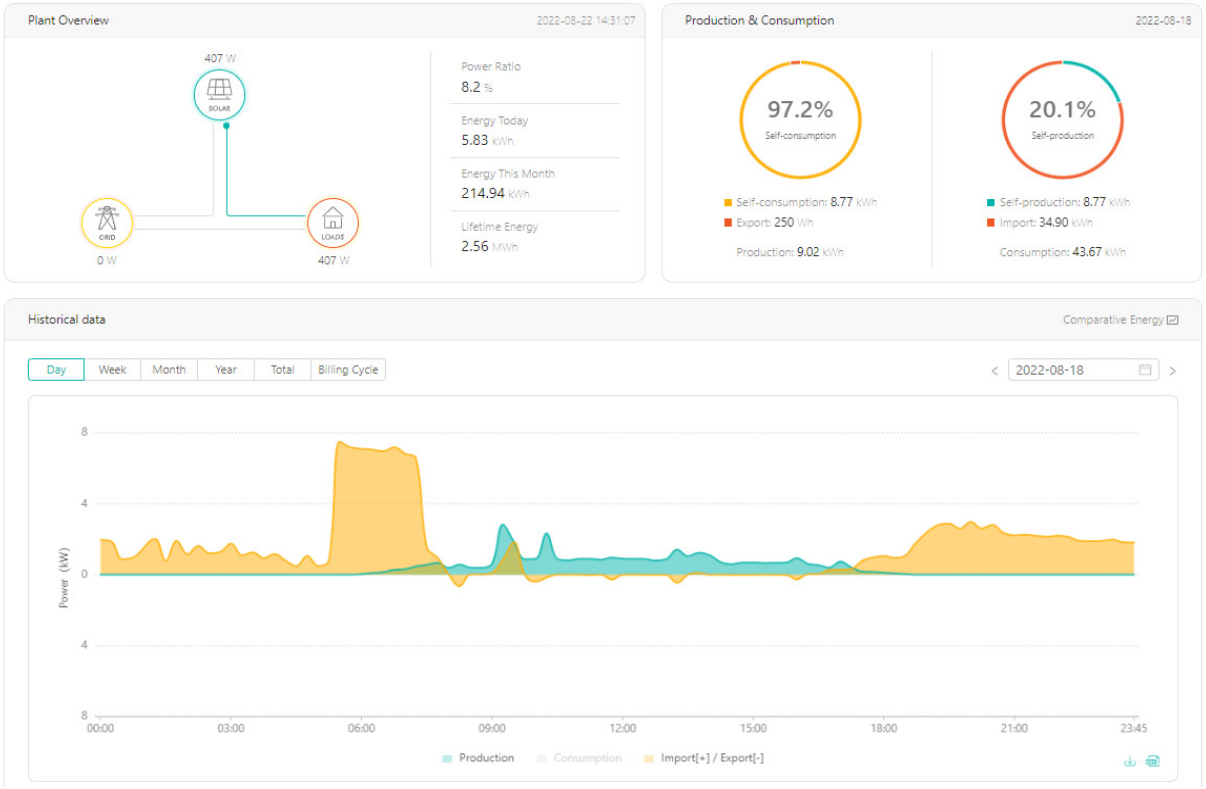


e. Enable export management function by ticking the "**Export Power Limit**" box. Enter the limit value and click on "**Save**" to complete the station creation.



4 Displaying Web Pages

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
- **Export:** Energy exported to the grid

Note: These terms are used when the meter is installed on the grid side.

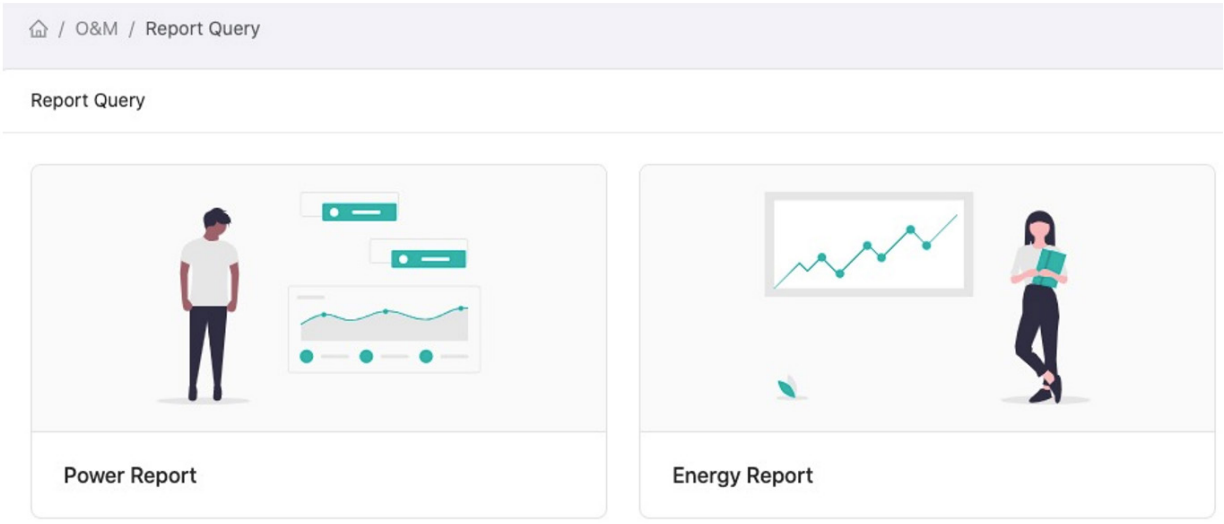
History Data:

- **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: As a result of inconsistent timings obtained from meters and DTUs, PV-generated power can be higher than consumption. This situation will not affect the actual power limit.

4.2 Generating Report

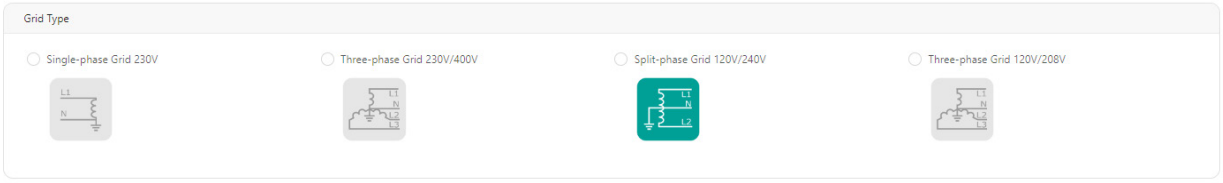
You can generate the report by clicking on “**O&M**” > “Report **Query**”.



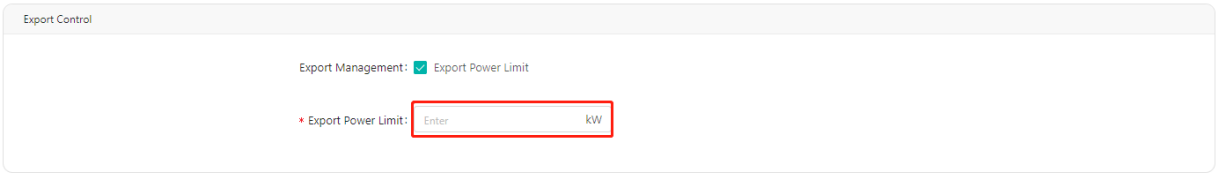
Appendix I: Examples of Export Control

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

Before enabling the Export Management function, you must select a type of power distribution network from “Single-phase 230 V”, “Three-phase 230 V / 400 V”, “Split-phase 120 V/240 V” and “Three-phase 120 V / 208 V”. These four types generally cover major power grid types in most countries around the world. However, here, you can only choose the “**Split-phase 120 V/ 240V**” option.

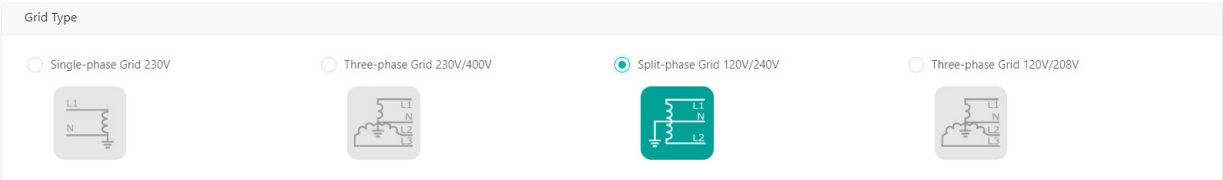


The next step is to enter the export limiting value thus the export power will be limited to the pre-setting value shown in the following figure.



In the following examples, twelve Hoymiles HM-1500 4-in-1 microinverters are connected to a split-phase system. As part of this system, the phase voltage is 120 V, the maximum continuous AC output power is 18 kW, the total output power of all PV modules is 20 kW, and each phase is equipped with four microinverters with a maximum AC power of 6 kW each. Each example shows how exported power and solar power are affected under different conditions.

Here, the “**Split-phase 120 V/ 240V**” power distribution network is selected under the **Grid Type** tab.



Example 1: Zero Export Power Limit

This example sets the export power limit of the entire PV system to zero.

Case 1

If the total PV production is lower than the load consumption, all loads are powered from the PV production and the grid. There is no power export to the grid in this case, so PV production will not be limited.

	Ideal PV Production	Load Consumption	Actual PV Production	Export
Total (kW)	4	7	4	-3

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

Case 2

If the PV production exceeds load consumption in one phase, but is lower in the other phases, and the total PV production is lower than the total load consumption, then the PV production will not be limited.

	Ideal PV Production	Load Consumption	Actual PV Production	Export
Total (kW)	6	6	6	0 (zero export)

Case 3

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

	Ideal PV Production	Load Consumption	Actual PV Production	Export
Total (kW)	8	6	6	0 (zero export)

Example 2: 70% Export Power Limit

If the local grid regulation stipulates that PV systems (with a capacity from 0.8 kW to 30 kW) can not send more than 70% of their rated power to the grid, then users can choose the 70% Export Power Limit mode.

For example, if the output power of a PV system is 20 kW, then the export power limit should be 20 kW × 70% = 14 kW.

Case 1

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

	Ideal PV Production	Load Consumption	Actual PV Production	Export
Total (kW)	9	7	9	2

Note: 2 kW is lower than 70% of 12 kW, so the PV production will not be limited.

Case 2

If the total load consumption is too low, and the Actual PV Production exceeds 70% of the Ideal PV Production, then the PV production will be limited.

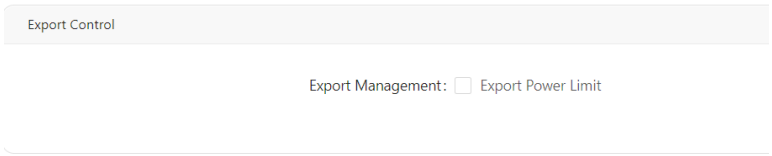
	Ideal PV Production	Load Consumption	Actual PV Production	Export
Total (kW)	10	3	9	6

Note:

Given the above situation, the export management function has been operating, so the power export is limited to 7 kW, which is 70% of 10 kW.

Example 3: No Export Control, Displaying the PV Production and Load Consumption

Some users who do not require the export management function, but only wish to view the PV production and load consumption on the Hoymiles Monitoring Platform. It is the same procedure as setting up the export management function, except that the “Export Power Limit” should be disabled in the module “Export Control”.



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

Based on the actual installation requirements, users can choose from three types of combination meters.

1 Meter Type

Meter Model	Type	SN	Description
DTSU666（CT-2 × 100 A）	Split Phase	10C018XXXXXX	With 2 x 100 A CT
DTSU666（CT-2 × 250 A）	Split Phase	10C019XXXXXX	With 2 x 250 A CT

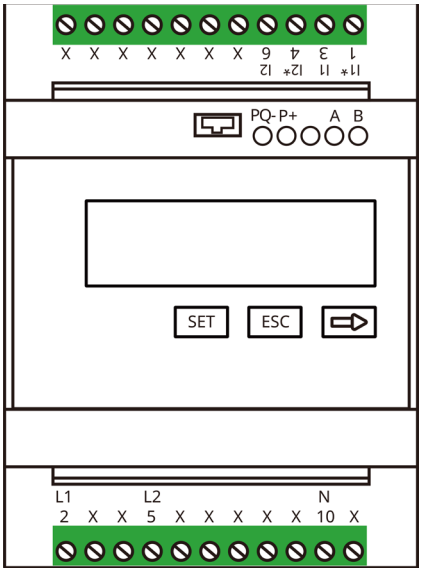
2 Meter Application Under Different Grid Types

Grid Type	Applicable Meter Type
Split Phase System (120 V / 240 V)	DTSU666 (2 × 100 A) DTSU666 (2 × 250 A)

Appendix III: Meter installation

Chint DTSU666 (100/250 A) Three-Phase Meter

1 Meter Port Description



Port 1: connect to the white wire from CT for IA*

Port 2: connect to the L line from Phase A

Port 3: connect to the blue wire from CT for IA

Port 4: connect to the white wire from CT for IB*

Port 5: connect to the L line from Phase B

Port 6: connect to the blue wire from CT for IB

Port 10: connect to the N line from Grid

Port A: connect to the RS485A of the DTU

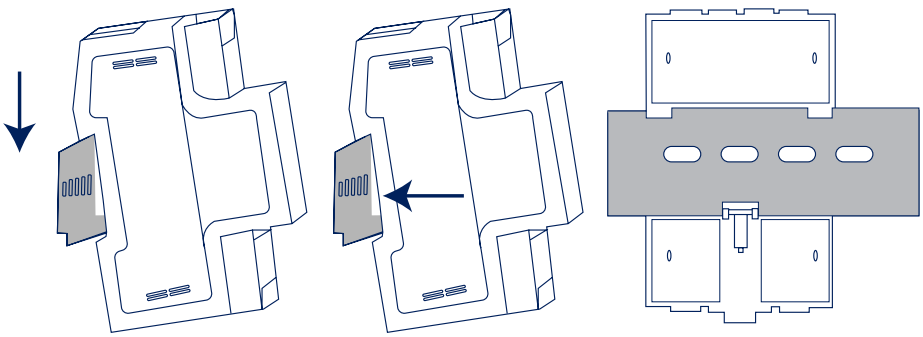
Port B: connect to the RS485B of the DTU

2 Meter Installation

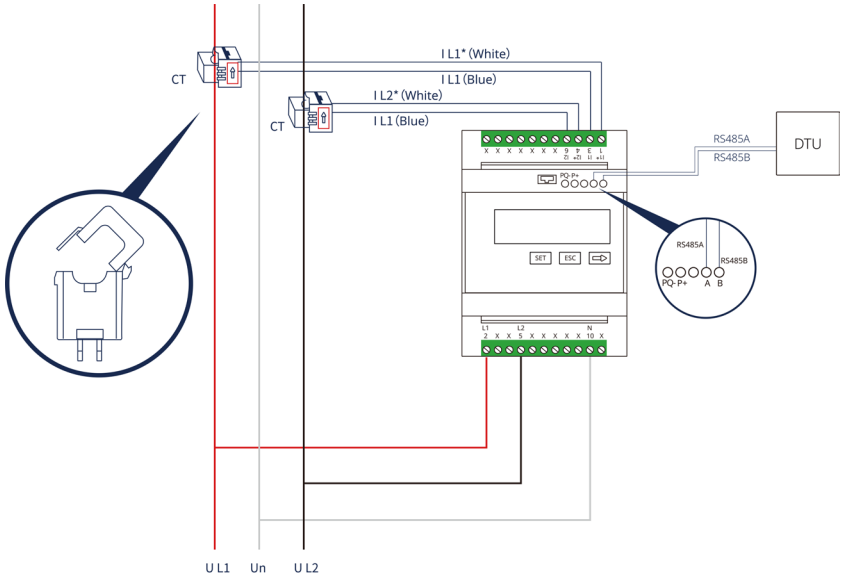
Please follow the steps listed below to fit the meter on the standard din rail of DIN 35mm:

1. Attach the meter to the standard din rail from the top to the bottom.

2. Press the meter onto the din rail from the bottom to the front part.



3 Cable Connection (Split-Phase 120/240 V)



1. Wire the UL1, UL2, and Un cables to the corresponding port 2, port 5, and port 10 of the meter respectively.

Note:

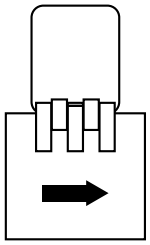
The selected cable shall meet local cable standards for the minimum wire diameter.

2. Wire the CT outlets I1*, I1, I2*, and I2 cables to the corresponding port 1, port 3, port 4, and port 6 of the meter respectively.

3. Install the CT in place with consideration of the wiring diagram.

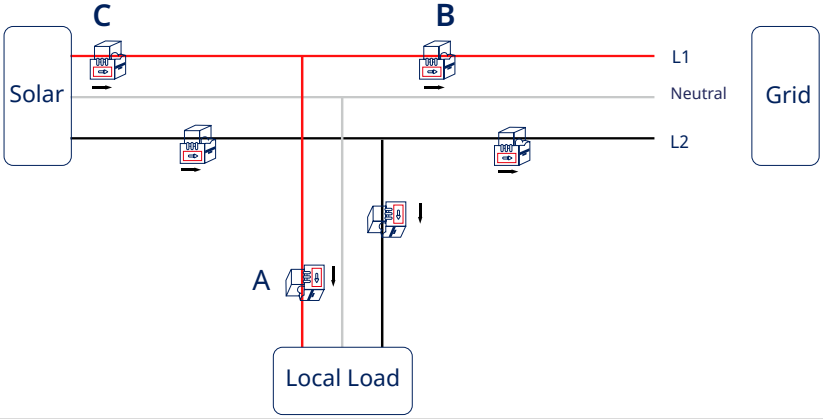
Note:

- *CTs are directional. Check and ensure that I* and I connections are correct as per wiring diagram. If the I* (white) and I (blue) are swapped at the meter, the measured power will be negative.*
- *Be sure to install the CT with the arrow (printed on the shell of the CT) facing toward the current source. Otherwise, there will be incorrect power measurements and problems with the meter.*

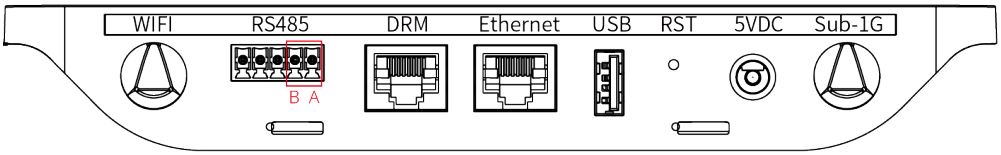


Please refer to the following diagram for different types of CT installation:

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

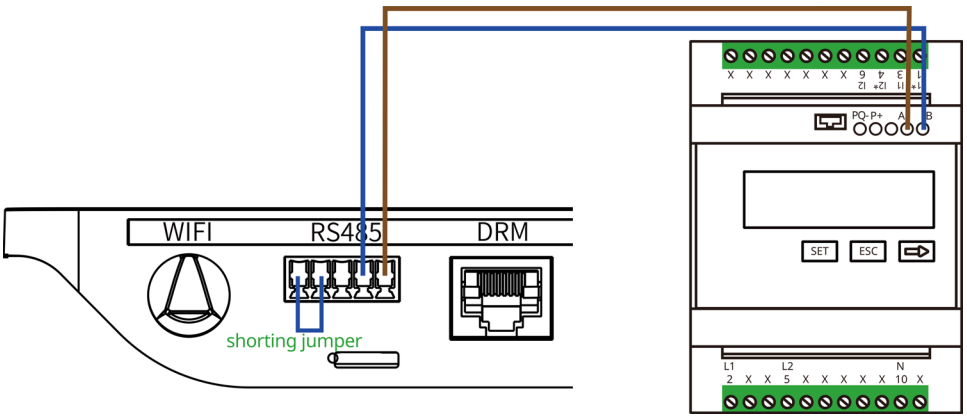


4. Connect RS485 Port A and RS485 Port B to DTU.



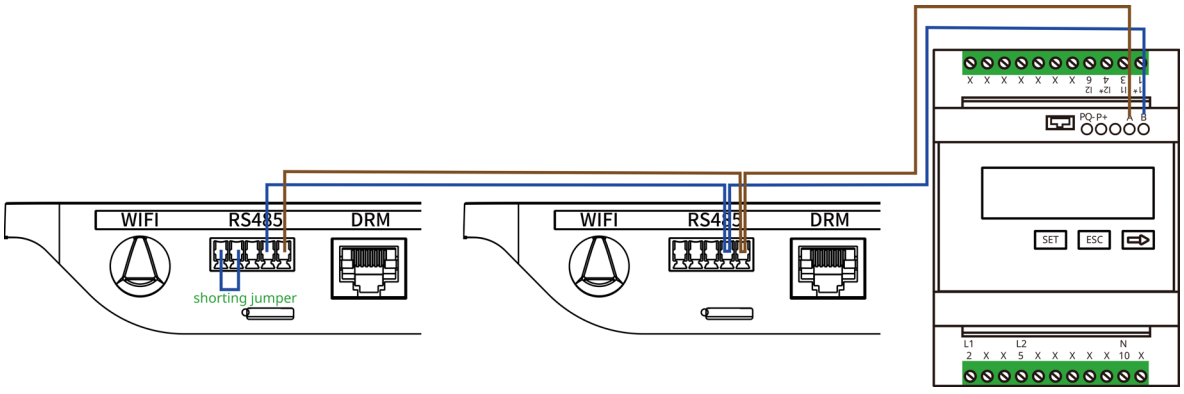
Scenario 1:

When there is only one DTU in a system, and the RS485 cable length exceeds 200 meters, Hoymiles recommends a short jumper (as shown in the diagram below) on the DTU.



Scenario 2:

When there are multiple DTUs in one system, please connect the DTUs one by one (as shown in the diagram below). If the distance between the microinverter and the final DTU exceeds 200 meters, a short jumper will be recommended for the final two RS485 ports on the final DTU.



Appendix IV: Troubleshooting

Fault phenomenon	Reason analysis	Elimination
No display when powered on	1. Incorrect wiring. 2. Abnormal voltage for the instrument.	1. If it is wrongly connected, please reconnect based on the correct wiring mode (see the wiring diagram). 2. If the supplied voltage is abnormal, please choose the specified voltage. 3. If not the above problems, please contact with the local supplier.
Abnormal RS485 communication	1. RS485 communication cable is opened, short circuit or reversely connected. 2. Address, baud rate, data bit and check bit are not in accordance with the host computer. 3. The end of RS485 communication cable has not been matched with resistance (when the distance is over 100 meters) 4. Not matched with the communication protocol order of the host computer.	1. If there is any problem with the communication cable, please change it. 2. Set the address, baud rate, data bit and check bit through buttons and confirm it is the same as the host computer, then set the operation to “parameter settings”. 3. If the communication distance is over 100 meters, and the communication parameter settings are the same as the host computer, but cannot be communicated, then please lower the baud rate or add a resistance of 120Ω at the start Port and ending Port
Inaccurate for energy metering	1. Incorrect wiring, please check whether the corresponding phase sequence of voltage and current are correct. 2. Check whether the high & low end of current transformer inlet is reversely connected. Please observe the power of Pa, Pb, Pc, to be abnormal if there are any negative values.	If the wiring mode is incorrect, please connect based on the correct wiring mode (see the wiring diagram).
Abnormal data for the electrical parameter (voltage, current, power, etc.)	1. The transformer's ratio hasn't been set, and the instrument displays the secondary side data. 2. Wrong wiring.	1. If setting the transformer ratio, please set the voltage and current ratios based on "parameter setting." 2. If wrongly connected, please connect the voltage and current of phase A, B and C to the wiring Port of the instrument.
Abnormal data for the electrical parameter read by communication (voltage, current, power, etc.)	1. Data read by communication is secondary side data without transformer ratio. 2. Wrong analysis for data frame.	1. Multiply the data read by communication with the voltage and current ratios. 2. Analyze the data frame based on the communication protocol format; please pay attention to the mode of the big and small ends of data.

Appendix V: Meter Datasheets

1 DTSU666 (CT-2 × 100 A) Datasheet

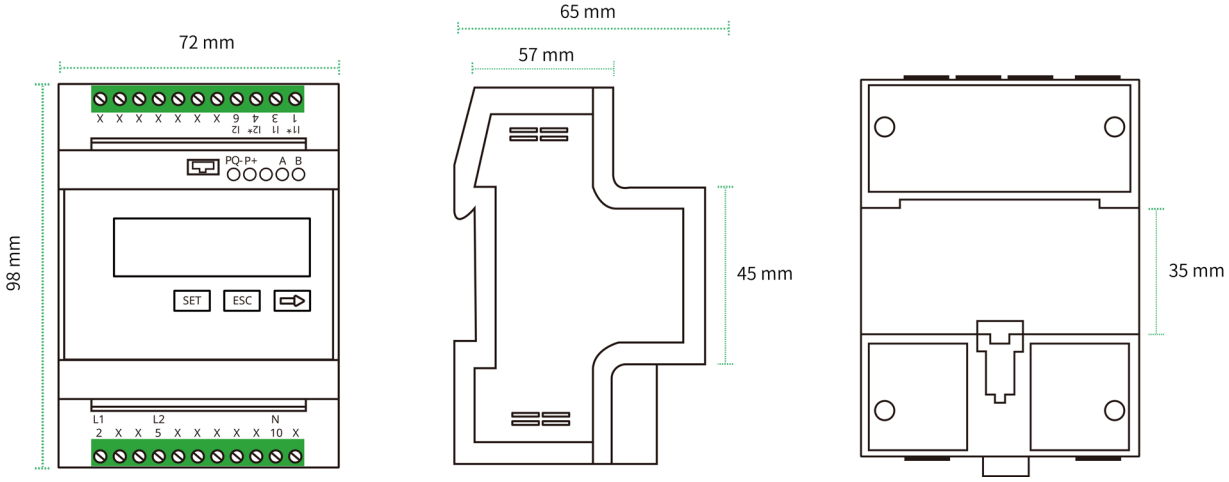
Electrical Data	
Model	DTSU666New-Via-CT-2 ×100A
Referenced Voltage	2 × 120/240 V
Limiting operating voltage range	0. 8 Un to 1.15 Un
Current Specification	100 A / 40 mA
Rated temperature	-25℃ to +70℃
Type	Transformer Access

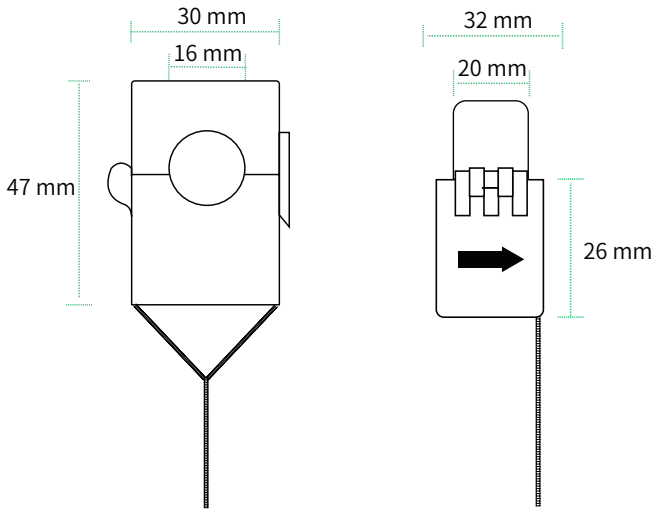
Mechanical Data	
Dimensions (W x H x D)	72 × 98 × 65 mm
DIN Type	35 mm

Power factor	Current value	Percent error limit of Each level meter
1	0.01 In ≤ I ＜ 0.05 In	±1.5
	0.05 In ≤ I ≤ I max	±1.0
0.5 L	0.02 In ≤ I ＜ 0.1 In	±1.5
0.8 C	0.1 In ≤ I ≤ I max	±1.0

Note:

- *In: secondary rated current of the current transformer*
- *L: inductive*
- *C: capacitive*





2 DTSU666 (CT-2 × 250 A) Datasheet

Electrical Data	
Model	DTSU666New-Via-CT-2 × 250 A
Referenced Voltage	2 × 120/240 V
Limiting operating voltage range	0. 8 Un to 1.15 Un
Current Specification	250 A / 50 mA
Rated temperature	-25°C to +70°C
Type	Transformer Access

Mechanical Data	
Dimensions (W x H x D)	72 × 98 × 65 mm
DIN Type	35 mm

Power factor	Current value	Percent error limit of Each level meter
1	0.01 In ≤ I < 0.05 In	±1.5
	0.05 In ≤ I ≤ I max	±1.0
0.5L	0.02 In ≤ I < 0.1 In	±1.5
0.8C	0.1 In ≤ I ≤ I max	±1.0

Note:

- *In: secondary rated current of the current transformer*
- *L: inductive*
- *C: capacitive*