

# **Export Power Control Solution**

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### **Energy communication unit ECU-C&ECU-R**



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Tip: APsystems has adapted the following meters, which must be supplied by APsystems; otherwise, self-purchased meters will not be compatible.

# Part1: ECU-C's Export Power Control

### **1.ECU-C Meter Function**

**Export Limit Function:** After turning on the Export Limit Function function, if the power limit value is not filled, the default is 0, that is, when the ECU-C detects that the power generated by the photovoltaic system is uploaded to the grid (reverse power), it immediately sends a command to reduce the output power of the inverter to eliminate reverse power, when the forward power flowing from the grid to the load increases, the inverter output power increases again to dynamically adjust, which can not only achieve the anti-backflow function, but also maximize the use of solar energy.

**Power to the grid limit:** Limiting the reverse power value, such as input 3, represents the upper limit of the reverse power uploaded to the grid by the ECU through the control system power generation power limit is 3KW, and the default value is 0 by default, which is the 0-export function.

**Three-phase configuration:** If a three-phase system composed of APsystems's single-phase micro-inverters needs to realize the function of independent anti-backflow of each phase or limit the grid power, it is necessary to register the micro-inverters connected to each phase separately in the corresponding boxes.

### **1.1 Export Limit Function**

#### 1.1.1 Single-phase Export Limit (System wiring diagram)



#### 1.1.2 Three-phase Export Limit (System wiring diagram)



### **1.2 Relay Control**

This function is to control the opening of the external AC contactor by closing the ECU-C relay when the power of the uploaded power grid reaches a certain power value, so as to supply power to external electrical equipment (such as a water heater), try to consume the electrical energy uploaded to the grid at the local load.

**Threshold:** It indicates that when the power of the uploaded power grid reaches this value, the relay is closed, and the external contactor is controlled to conduct. For example, the power of the water heater is 2KW, and the turn-on threshold can be set to 2KW, so that when the upload grid power exceeds 2KW, the water heater is powered by the relay control and does not consume grid power.

# *Note: This function is currently only applicable to single-phase systems.Once the microinverter's output power hits the preset threshold, the relay closes and remains latched for a minimum of 300 seconds before any state transition is permitted.*



### **1.3 Three phase Balance**

When using APsystems single-phase micro-inverse to form a three-phasesvstem, the three-phase balance function can be turned on to ensure that the three-phase currenidifference does not exceed 16A.

The three-phase balance function can be connected to the detection current through an external, and the response speed is faster'it can also be collected by the ECU to collect micro-inversedata on each phase for detection. At this time, no external CT is required, but the response speecwill be slow, and the general maximum duration is 5 minutes. And at this function, you need to reister separately according to the micro-inverse serial numbelof each phase in the three-phase configuration.



### 2.ECU-C Meter Setting

### 2.1 Electric Meter Configuration on APP (Local access)

The functions of the electricity meter include three types: **1. Export Limit Function 2. Relay Control 3. Three Phase Balance** 

When choosing "Single-Phase System" (where all the micro-inverters must be APsystems' single-phase microinverters), according to actual requirements, select either "Export Limit Function" or "Relay Control" working modes. When choosing "Three-Phase System" (where all the microinverters must be APsystems' three-phase microinverters), the "Export Limit Function" working mode can be used.

When the microinverters are Single-Phase microinverters and connected to a three-phase power grid, and a three-phase balance state is simultaneously achieved, the "Three-Phase Balance" working mode can be used (to ensure that the current between the three phases does not exceed 16A.)



### 2.2 Electric Meter Configuration on EMA Web(Remote Control)

#### 2.2.1. Export Limit Function

Enable "Export Limit" and set the reverse current allowance value. For example, the value set in the figure is 3000W for the reverse current allowance per phase.

HISTORY	~			
F REMOTE CONTROL	~	ECU ID	21500007	Ŧ
ECU STATUS				
ECU SETTING		Meter Display	Open	*
GRID PROFILE		Funant Limit/Dalau Contro	I Evport Limit	_
AC PARAMETERS		Export Limit/Relay Contro	Export Linit	•
SWITCH ON/OFF		Power Limit(W)	3000	
METER SETTING				
INVERTER IRD/GFDI			Three-Phase Setting	Send
INVERTER POWER				

#### 2.2.2.Relay Control

When the uploaded power to grid reaches the set value, it will be preferentially consumed by the load. This is only applicable to single-phase systems.

REPORT	~	METER SETTING	
HISTORY	~		
REMOTE CONTROL	~	ECU ID	2150000
ECU STATUS			
ECU SETTING		Meter Display	Open 💌
GRID PROFILE			
AC PARAMETERS		Export Limit/Relay Control	Relay Control
SWITCH ON/OFF		Power Limit(W)	1000
METER SETTING			
INVERTER IRD/GFDI			Send
INVERTER POWER			

#### 2.2.3.Three-Phase Balance

Ensure the current between each two phase is in a stable range. If a tri-phase system comprised of single-phase inverters, you need to configure the inverters into three phases.





### 2.3 Energy Analysis (EMA Web)

The figure shows: the amount of electricity generated by photovoltaic power on that day, the electricity consumed by users, the electricity fed into the grid, and the electricity purchased.



# Part2: ECU-R&Chint Meter Export Limit Control

(Applicable scenarios: Add Meter to ECU-R to realize the function of electricity meter.)

Tip: APsystems has adapted the following meters, which must be supplied by APsystems; otherwise, self-purchased meters will not be compatible.

### **1.Single-Phase Meter**

### 1.1 ECU-R&DDSU666-5(80)-230V

#### (Total current in the load or PV system less than 80A)

#### 1.1.1 Schematic diagram of the system principle

#### 1 One Meter:

It is installed on the grid side already enables **Export Limit Function.(Used to capture feed-in and bought-in electricity)** 



#### ② Two Meters:

**PV Side Meter:**can only collect photovoltaic data; **GRID Side Meter:**Acts as Export Limit Function.(**For capturing feed-in power, purchased power, PV generation, and customer consumption.**)



#### 1.1.2 Meter Wiring Diagram

Installation method for one meter:



Installation method for Two meters:



#### Tips:

- > RS485 Signal Cable It is recommended to use 0.5mm<sup>2</sup> shielded twisted pair cable or 0.5mm<sup>2</sup> copper cable.
- > Use DDSU666-5(80)-230V load total current not to exceed 80A.
- PV Side Meter and Grid Side Meter can realize the function independently. According to the number of meters selected for the actual functional requirements, the factory default Modbus address of each meter is 1. If you need to modify the Modbus of the PV Side Meter to 2, you need to modify it manually .The operation process is as follows:

1.Long press the "-----" key for 3 to 5 seconds. When "8n1" appears, release it.

2.Wait for the interface to automatically jump to "001", then press " $\rightarrow$ " once again, and it will become "002". 3.Wait for the automatic jump to the home page.



### 1.2 ECU-R&DDSU666-CT-1.5(6)A-230V

(There is no current limitation, but CT needs to be purchased by yourself, and the CT ratio is less than 9999, The secondary current of CT can only be 1A or 5A.)

#### 1.2.1 Schematic diagram of the system principle

#### 1 One Meter:

It is installed on the grid side already enables **Export Limit Function.(Used to capture feed-in and bought-in electricity)** 



#### ② Two Meters:

**PV Side Meter:**can only collect photovoltaic data; **GRID Side Meter:**Acts as Export Limit Function.(**For capturing feed-in power, purchased power, PV generation, and customer consumption.**)



#### 1.2.2 Meter Wiring Diagram

Installation method for one meter:



#### > Installation method for Two meters:



#### Tips:

- > RS485 Signal Cable It is recommended to use 0.5mm<sup>2</sup> shielded twisted pair cable or 0.5mm<sup>2</sup> copper cable.
- DDSU666-1.5(6)-230V CT needs to be prepared by the customer, the secondary side current of CT must be 1A or 5A, the formula of current ratio = primary side current/secondary side current, for example: CT is 200/5A, current ratio = 40.
- PV Side Meter and Grid Side Meter can realize the function independently. According to the number of meters selected for the actual functional requirements, the factory default Modbus address of each meter is 1. If you need to modify the Modbus of the PV Side Meter to 2, you need to modify it manually .The operation process is as follows:

Long press the " $\rightarrow$ " key for 3 to 5 seconds. When "1" appears, release it. Then press " $\rightarrow$ " once again, and it will become "2". Wait for the automatic jump to the home page.

![](_page_12_Figure_10.jpeg)

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### 2. Three Phase-Four Wire Meter

### 2.1 ECU-R&DTSU666-250A/50mA-3×230V400V

(Total current in the load or PV system less than 250A)

#### 2.1.1 Schematic diagram of the system principle

#### ① One Meter:

> It is installed on the grid side already enables Export Limit Function.

![](_page_13_Figure_6.jpeg)

#### ② Two Meters:

**PV Side Meter:** can only collect photovoltaic data **GRID Side Meter:** Acts as Export Limit Function.(For capturing feed-in power, purchased power, PV generation, and customer consumption.)

![](_page_13_Figure_9.jpeg)

#### 2.1.2 Meter Wiring Diagram

Installation method for one meter:

![](_page_14_Figure_2.jpeg)

#### Tips:

- $\triangleright$  RS485 Signal Cable It is recommended to use 0.5mm<sup>2</sup> shielded twisted pair cable or 0.5mm<sup>2</sup> copper cable.
- PV Side Meter and Grid Side Meter can realize the function independently. According to the number of meters selected for the actual functional requirements, the factory default Modbus address of each meter is 1. If you need to modify the Modbus of the PV Side Meter to 2, you need to modify it manually .The operation process is as follows:

![](_page_14_Figure_6.jpeg)

### 2.2 ECU-R&DTSU666-1.5(6)-3×230/400V

(No current limitation, but CT needs to be purchased by yourself, and the CT ratio is less than 9999, The secondary current of CT can only be 1A or 5A.)

#### 2.2.1 Schematic diagram of the system principle

#### 1 One Meter

It is installed on the grid side already enables Export Limit Function.

![](_page_15_Figure_5.jpeg)

#### **2** Two Meters

**PV Side Meter:**can only collect photovoltaic data; **GRID Side Meter:**Acts as Export Limit Function.(For capturing feed-in power, purchased power, PV generation, and customer consumption.)

![](_page_15_Figure_8.jpeg)

#### 2.2.2 Meter Wiring Diagram

![](_page_16_Figure_1.jpeg)

![](_page_16_Figure_2.jpeg)

#### Installation method for Two meters:

![](_page_16_Figure_4.jpeg)

#### Tips:

- > RS485 Signal Cable It is recommended to use 0.5mm<sup>2</sup> shielded twisted pair cable or 0.5mm<sup>2</sup> copper cable.
- DTSU666-1.5(6)-230/400V CT needs to be prepared by the customer, the secondary side current of CT must be 1A or 5A, the formula of current ratio = primary side current /secondary side current, for example: CT is 200/5A, current ratio = 40.
- PV Side Meter and Grid Side Meter can realize the function independently. According to the number of meters selected for the actual functional requirements, the factory default Modbus address of each meter is 1. If you need to modify the Modbus of the PV Side Meter to 2, you need to modify it manually. The operation process is as follows:

![](_page_16_Figure_9.jpeg)

### **3. Electric Meter Settings**

### **3.1 Electric Meter Configuration on ECU-R(Local access)**

By connecting to the ECU-R hotspot via mobile phone, enter the Workspace and select "Meter Settings". Then, configure the electric meter information and set the power limit. At present, if you only have one Meter and need to realize the function of export power control, you can only fill in "Grid side meter" in "Configure Meter", and if you need to realize the function of measuring PV power generation data, you can fill in "PV side meter".Fill in the "Power Limit" value for the permitted reverse current to the grid according to the local grid standard.(For example, In this case, the permissible reverse current power per phase is 1kW.)

![](_page_17_Figure_3.jpeg)

#### > APP meter type selection and nameplate relationship

![](_page_17_Figure_5.jpeg)

#### 3.1.1 The Modbus address is consistent

When configuring the meter for local access, it is important to note that the information filled in is consistent with the actual internal Modbus address of the meter(For example:**DDSU666-1.5(6)**, **DTSU666-1.5(6)**Need to fill in the **current transfomer ratio**, If CT is 200/5A, current ratio = 40.)

![](_page_18_Figure_2.jpeg)

# **3.1.2 Configuration for Single-phase Inverters doing three-phase grid connection (Export Limit Function)**

Workspace	< ID Management	Workspace	< Configure Meter	< Work Mode
System Configuration 👻	UID number: 3	Automatic Do-It- System Yourself Check Registration	Third Party Meter Configured >	Power Limit 0 kW
Automatic Do-It- System Yourself Check Registration	UID Sync status     703000334470 OK	Inverter Configuration 👻	Meter Function	grid cannot exceed to the power limit. If a tri- phase system comprised of single-phase inverters, you need to configure the inverters into three phases.
Inverter Configuration -	<ul> <li>702000245472</li> <li>703001204409</li> <li>0K</li> </ul>	ID Grid Profile Connection Management Grid Profile Progress	System Type Three-phase system	Phase A Clear All
ID Inverter Management Grid Profile Connection Progress			Please select the system type based on the actual configuration on-site. The work mode will be adapted according to the system type.	703000334470 ×
	Single-phase Microinverter UID	Network ECU AP ECU Date Settings Settings Settings	Work Mode None >	Phase B Clear All
Network ECU AP ECU Date Settings Settings Settings		ECU software upgrade Meter Configuration		702000245472 ×
ECU software upgrade				Config Inverter
		Meter Settings Sunspec Configuration 👻		703001204409 ×
Meter Settinos				Config Inverter
Home Module Data Workspace Settings	Ada Byve Delate Heterical (2)	Hame Module Data Workspace Sectings		ок

Single-phase Inverters doing three-phase grid connection, The meter must be of 3P4W(L1-L2-L3-N) type.

< Third Party Meter		< Third Party Meter	< Third Party Meter
Please configure the meter parameters according to the actual electricity meter on-site.	Please configure the meter parameters according to the actual electricity meter on-site.	Please configure the meter parameters according to the actual electricity meter on-site.	Please configure the meter parameters according to the actual electricity meter on-site.
Grid side meter	Grid side meter	Grid side meter	Grid side meter
Type DTSU666-250A/50mA >	Type DTSU666-250A/50mA >	Type DTSU666-250A/50mA >	Type DTSU666-250A/50mA >
Current transformer ratio 1	Current transformer ratio 1	Current transformer ratio 1	Current transformer ratio 1
Meter Address ① 1 >	Meter Address ① 1 >	Meter Address ① 1 >	Meter Address () 1>
Connect the grid side for export limitation.		Connect the grid side for export limitation.	Connect the grid side for export limitation.
PV side meter	PV side meter	PV side meter	PV side meter
Type DTSU666-250A/50mA >	Type DTSU666-250A/50mA >	Type DTSU666-250A/50mA >	Type DTSU666-250A/50mA >
Current transformer ratio 1	Current transformer ratio 1	Current transformer ratio 1	Current transformer ratio 1
Cancel OK	Cancel OK	Cancel OK	Cancel OK
DTSU666-100A/40mA	DTSU666-5(80)A		
DTSU666-250A/50mA	DTSU666-100A/40mA		DDSU666-1.5(6)A
DTSU666-1.5(6)A	DTSU666-250A/50mA	DDSU666-1.5(6)A	DDSU666-5(80)
DSSU666-5(80)A	DTSU666-1.5(6)A	DDSU666-5(80)	DDSU666-100A/40mA
DSSU666-1.5(6)A	DSSU666-5(80)A	DDSU666-100A/40mA	DTSU666-5(80)A

①"DDSU666-5(80)-230V" corresponds to "DDSU666-5(80)".

- **2**"DDSU666-CT-1.5(6)A-230V" corresponds to "DDSU666-1.5(6)".
- **③"DTSU666-1.5(6)-3X230/400V**" corresponds to "**DTSU666-1.5(6)**".
- TSU666-250/50mA-3X230/400V" corresponds to "DTSU666-250/50mA".

### **3.2 Electric Meter Configuration on EMA Web (Remote Control)**

After you configure the electric meter information on ECU-R local, the EMA Web will display the configuration. The EMA page supports remote configuration antion of electric meter information.

		Present User PARTIES
Current User: DDSU666	Meter Configue	Meter Configue
DASHBOARD		DASHBOARD You can selectively turn on the function of Merce Configure And set related parameters.
MODULE	You can selectively turn on the nusclosin of meter contrigue, and set related parameters.	III MODULE
📑 REPORT 🗸 🗸	METER CONFIGUE	INFORT Y METER CONFIGUE
HISTORY ~		E711B 73600033035 Y
🖌 REMOTE CONTROL 🗸	ECU ID 216208032835 *	F REMUTE CONTROL V
ECU STATUS	GRID SAMPLING METER Dakes	ECUSIANDS GRID SAMPLING METER Downs
GRID PROFILE AC PARAMETERS	Type *	GIAD HINKE. AC PRAMILIES Type PSDM66-508(A + 
METER SETTING	Modbus Address 1 v	METTRA SETTING Modilar Address T *
INVERTER IND/GFDI	PV SAMPLING METER Configue	POWERTACTOR PV SAMPLING METER Dates
INVERTER POWER	No Configue	GET ECU CONFOCIERATIONS Type DISSURGE Stells *
ANTI-THEFT SETTING	Setting Back	ANTI-HULTSTEING Nedbur Address 2 *
SETTING LIST		SETTING LIST Setting Back
		🛕 ALARM INFORMATION 🧹
	Scene1	Scene2

Scene1: Configure only"GRID SAMPLING METER" for Export Limit Function.

**Scene2**: Configuration of **"GRID SAMPLING METER"** and **"PV SAMPLING METER"** for simultaneous Export Limit Function and PV generation measurement.

#### 3.2.1 Power Limit Setting on EMA

After you configure the electric meter information, the system applies the configuration and redirects to the meter function settings page within 15–20 minutes. If you want to modify the electric meter configuration, click "Back" to go back to the meter configuration page.Fill in the "Power Limit" value for the permitted reverse current to the grid according to the local grid standard.(For example, In this case, the permissible reverse current power per phase is 1000W.)

REPORT	~	METER SETTING			
HISTORY	~				
F REMOTE CONTROL	~	ECU ID		21620001.	•
ECU STATUS					
ECU SETTING		Meter Display		Open	•
GRID PROFILE		Fundat Linda (Dalara Can	tral	Evnort Limit	
AC PARAMETERS		Export Limit/Relay Control		Export Limit	•
SWITCH ON/OFF		Power Limit(W)		1000	
METER SETTING					
INVERTER IRD/GFDI		Meter Configue	Thre	e-Phase Setting	Send
POWER FACTOR					
INVERTER POWER					

### 4.Data Display on EMA Web

The electric meter transfers export/import power data and photovoltaic power generation data to the ECU-R via RS485. Then, the ECU-R uploads the data to the EMA platform by using the router or a wireless network. Users can view energy information on the EMA platform or through the mobile application.

### 4.1 Export/Import Data (Meter is installed on the Grid Side)

![](_page_21_Figure_3.jpeg)

### 4.2 PV Power Generation Data (Meter is installed on the PV Side)

![](_page_21_Figure_5.jpeg)

### **4.3 PV Power Generation, Consume energy, and Export/Import** energy Data (Meter is installed on the PV Side and Grid Side)

![](_page_21_Figure_7.jpeg)

### **5.Meter Selection**

Grid Type Material		CHINT Meter Model	Reference Voltage &	Current Access	СТ	Application
Single-phase (1P2W)	2273020003	DDSU666-5(80)A	220/230V 50/60Hz	Direct connection	No need	Circuits whose current is within 80A
	2273002013	DDSU666-1.5(6)A	220/230V 50/60Hz	Via CT	Purchased by the customer: 1 CT, secondary current must be 1A or 5A.	Maximum CT ratio less than 9999
					1	1
Three-phase four-wire (3P4W)	2270105003	DTSU666-250A/50mA	3×230/400V 50/60Hz	Via CT	Standard configuration: 3 CTs of 250A, with package;	Circuits whose current is within 250A
	2270107003	DTSU666-1.5(6)A	3×230/400V 50/60Hz	Via CT	Purchased by the customer: 3 CTs, secondary current must be 1A or 5A.	Maximum CT ratio less than 9999