INTEG R DATALOGGER

SOLINTEG
INTEGRATE SOLAR INTELLIGENTLY

User Manual

Energy Management Device

RML-1000

ENGLISH VERSION


SOLINTEG
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CONTENTS

CONTENTS

1 About This Manual

1.1 Validity

This manual mainly includes safety precautions, mechanical installation, electrical connection, debugging, WEB interface usage, maintenance, troubleshooting, etc. of Solinteg Energy Management Device (Hereinafter referred to as “RML-1000”). Please read this manual carefully before using RML-1000.

The purchased products, services or functions are subject to the terms and clauses specified by Solinteg Power Co., Ltd. All or part of the products, services or functions described in this manual may not be within the scope of purchase. This manual serves as user guide, and all statements, information or recommendations hereof do not constitute any expressed or implied warranties.

1.2 Target Group

This manual is applicable to the technicians responsible for installation, operation and maintenance of RML-1000. The user must have the following qualifications:

① The user must possess certain electrical, cable and mechanical knowledge; and be familiar with on-grid photovoltaic power generation systRML-1000 and relevant working principles.

② The user must be professionally trained for the installation and debugging of electrical equipment.

③ The user must be familiar with national/regional electrical standards and regulations of the host country.

④ The user must be familiar with the contents of this manual.

Installation, maintenance and troubleshooting can only be performed by those who meet

1.3 Symbol Explanations

This manual contains important safety and operating instructions which should be accurately understood and followed during installation and maintenance of the device. To use this manual in the most accurate manner, please pay attention to the following symbol explanations.

DANGER	It indicates a high level of hazards which, if not avoided, will result in death or serious injury.

WARNING	Indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.
ATTENTION	It indicates a high level of hazards which, if not avoided, will result in death or serious injury.
NOTE	The supplementary explanation of important information in the text, which helps users use the device in an efficient way. “Note” is not a safety warning, and has nothing to do with personal injury, and device or environmental damage.

1.4 Version Record

RML-1000-UM-EN-V01
April 15, 2024
Initial release

2 Safety Instruction

2.1 Statement

Please read this manual before transportation, storage, installation, operation, use and maintenance of the device. Follow the instructions in the manual strictly, and adhere to the signs on the device, as well as all the safety instructions outlined in the manual.

① Damages caused by improper transportation.

② Damages caused by incorrect storage, installation or use.

③ Damages caused by installation and use of equipment by non-professionals or untrained personnel.

④ Damages caused by failure to comply with the instructions and safety warnings in this document.

⑤ Damages of running in an environment that does not meet the requirements stated in this document.

⑥ Damages caused by operation beyond the parameters specified in applicable technical specifications.

⑦ Damages caused by unauthorized disassembly, alteration of products or modification of software codes.

⑧ Damages caused by abnormal natural environment (force majeure, such as lightning, earthquake, fire, storm, etc.).

⑨ Any damages caused by the process of installation and operation which don't follow the local standards and regulations.

⑩ Products beyond the warranty period.

2.2 Personnel Safety

① Installation personnel must have received relevant training or have electrical-related qualification certificates.

② It is strictly prohibited to wear watches, bracelets, bangles, rings, necklaces, or other conductive objects during installation and operation to avoid electric shock or burns.

③ Cut off the power supply before installation. Sparks or arcs generated from electrified operations during cable disassembly and installation may cause fires or personal injuries.

④ During installation and operation, installation personnel must wear personal protective equipment.

⑤ Please keep children away from RML-1000.

2.3 Electrical safety

① Please operate the device in strict accordance with this manual.
② Perform electrical connections in strict accordance with local regulations.
③ Cut off the power supply before installation. Live operation is prohibited.
④ Ground the device before installation. Remove the ground lead last when disassembling the device.
⑤ Please select the cable specifications according to the requirements in the manual.
⑥ Please connect the cables firmly, and tighten the terminal screws when installing the device.
⑦ Have the damaged cables replaced by professionals to avoid risks.

3 Product Introduction

RML-1000 is an energy management device specially designed for the inverter industry. It achieves efficient use and management of energy by integrating inverters, battery hybrid systRML-1000 and other devices onto a single platform. RML-1000 can help users maximize energy utilization, reduce energy costs, and improve energy reliability and sustainability through data collection, analysis and optimization.

3.1 Version

RML-1000 is available in standard version and 4G version.
Version comparison:

	Standard version	4G version
Wi-Fi networking	✓	
LAN networking	✓	✓
4G networking	✗	✓
		✓

4G version is subdivided into EU version, AU version and CN version based on countries or regions. The following table shows the countries and regions where the 4G version is applicable.

4G version	Applicable Countries or Regions
EU	Europe, Middle East (including Israel), and Southeast Asia (excluding Japan and Republic of Korea)
AU	Australia and South America (including Mexico)
CN	China and India (2G only)

NOTE

The applicable countries or regions listed above are for reference only, which are subject to the frequency bands of local carriers.

3.2 Function

① Multi-inverter parallel operation

The RML-1000 can simultaneously connect multiple on-grid inverters, hybrid inverters and smart meters, thereby achieving centralized data management and optimal energy scheduling of photovoltaic hybrid system.

② Active power control

RML-1000 can implement an anti-backflow function by connecting with smart meter to meet the requirements of power output limitation for photovoltaic system in some countries/regions.

In Australia, RML-1000 can connect with DRED (Demand Response Enabling Device) to control system power.

In Germany or other regions of Europe, RML-1000 can connect with RCR (Ripple Control Receiver) to control system power.

③ Emergency stop function

RML-1000 can connect with emergency stop switch.

④ Multiple networking methods

RML-1000 supports LAN, Wi-Fi and 4G networking.

⑤ Multi-protocol compatibility

RML-1000 is compatible to Modbus RTU protocol, and supports connection with multiple types of devices.

⑥ Digital quantity and analog quantity

RML-1000 supports 9 channels of digital signal inputs, 3 channels of digital signal outputs, 4 channels of analog signal inputs and 4 channels of analog quantity signal inputs.

⑦ WEB interface configuration

It supports local WEB interface configuration, enabling device management, parameter setting, data management, local upgrade and other functions.

⑧ Local firmware upgrading

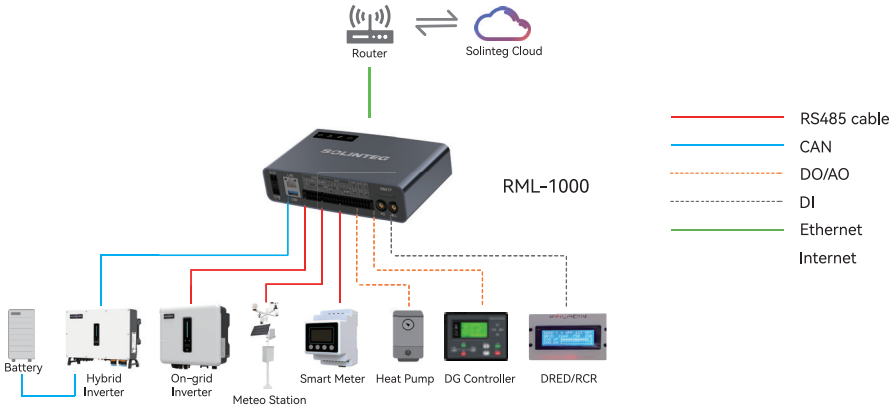
It supports local firmware upgrading through USB port.

⑨ Compatibility with TF card (Trans-flash card)

It supports max 128GB TF card.

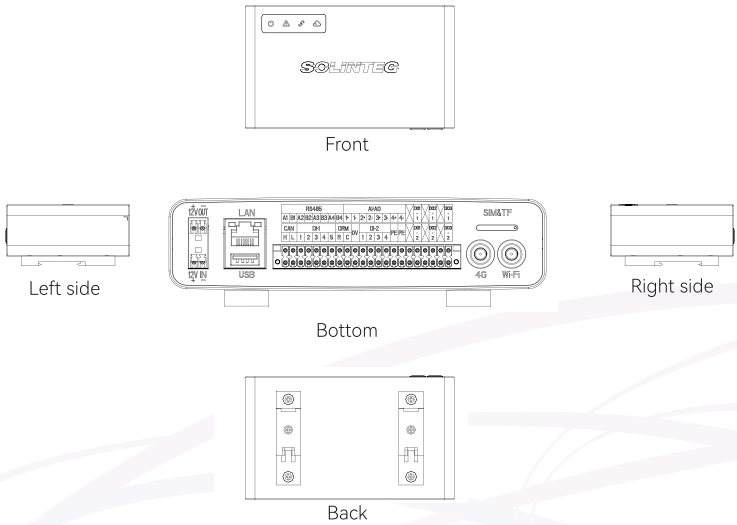
3.3 Application Scenarios

The typical application scenarios of RML-1000 are as follows (using LAN networking as an example). The connected devices include on-grid inverter, hybrid inverter, smart meter, meteorological monitoring device, DI Ctrl device, intelligent load (such as heat pump) and diesel generator.

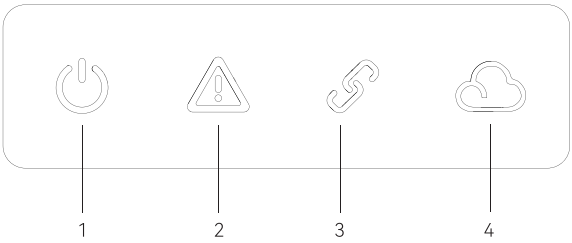


3.4 Appearance

The appearance of RML-1000 is as follows.



3.5 Indicators



The status and description of RML-1000 indicators are as follows.

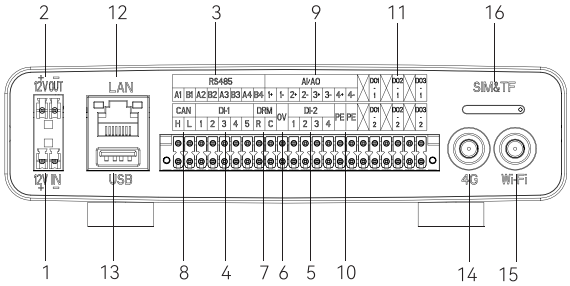
Item	Indicator	Status		Description
1	Power indicator	Off		No power supply
		Green	On	Normal operation
			Slow flash (at an interval of 500ms)	Wi-Fi reset in progress
2	Warning indicator	Red	Off	No warning information with device
			Slow flash (at an interval of 500ms)	Warning information with device
3	Communication indicator	Green	On	Normal communication of devices connected
			Slow flash (at an interval of 500ms)	Communication failure of devices connected
4	Cloud platform indicator	Green	Fast flash (at an interval of 200ms)	Initial status
			Slow flash (at an interval of 500ms)	Device is connected to router but not to server
			On	Device is connected to router and server

The status and description of power adapter indicators are as follows

Item	Indicator	Status	Description
1	DC OK	Green steady-on	Normal operation

3.6 Terminal Definition

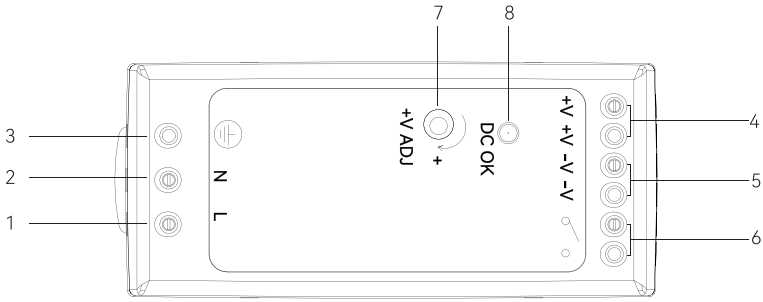
RML-1000 Terminal



No	Port	Mark	Description
1	12V IN+/-	/	12V DC input
2	12V OUT+/-	/	12V DC output (12V/1A) Can be turned on or off
3	RS485	A1	RS485 communication A1B1/ A2B2/A3B3 can be connected with Solinteg on-grid inverter
		B1	
		A2	
		B2	
		A3	
		B3	
		A4	RS485 communication A4B4 is connected with smart meter and other devices It has a built-in 120Ω matching resistor, which can be enabled or disabled through WEB interface.
		B4	
4	DI 1	1	Digital input
		2	
		3	
		4	
		5	
5	DI 2	1	
		2	
		3	
		4	

No	Port	Mark	Description
6	0V	/	Digital input common port
7	DRM	C	Reference points for DRED device connection (built-in 15KΩ resistor turned off by default) Reference points for RCR device connection Reference points for emergency stop device connection
		R	Reference points for DRED device connection
8	CAN	H	CAN communication Communicate with Solinteg hybird inverter
		L	
9	AI/AO	1+	0~10V analog input/output 4~20mA analog input/output
		1-	
		2+	
		2-	
		3+	
		3-	
		4+	
		4-	
10	PE	/	Grounding terminal
11	DO 1	1	Normally-open dry contact signal output
		2	
	DO 2	1	Normally-open dry contact signal output
		2	
	DO 3	1	Normally-close dry contact signal output
		2	
12	LAN	/	Ethernet interface WEB interface configuration connection port
13	USB	/	USB 2.0 interface RML-1000 local upgrading firmware
14	4G	/	4G antenna, only available in 4G version
15	Wi-Fi	/	Wi-Fi antenna
16	SIM&TF	/	SIM card slot and TF card slot Support nano SIM card Support max 128GB TF card

Adapter Terminal



No	Port	Description
1	L	Single-phase AC Phase L
2	N	Single-phase AC Phase N
3	PE	Ground lead
4	+V	12V DC output+
5	-V	12V DC output-
6		Reserved
7	+V ADJ	DC output voltage calibration
8	DC OK	Indicator

3.7 Product Symbols

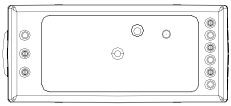
Symbol	Description
	To prevent potential impacts of hazardous substances in electrical and electronic devices on the environment and human health, end users should understand the meaning of these symbols. Discarded electrical and electronic devices are not allowed to be disposed of as unsorted municipal wastes, and must be collected separately.
CE	CE mark. RML-1000 complies with relevant EU directives.

4 Unpacking and Storage

4.1 Packing List

A

B



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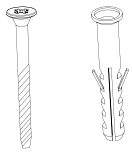

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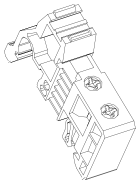

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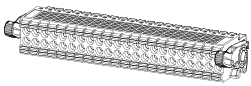

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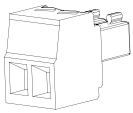

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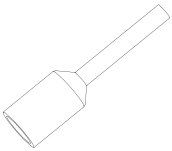

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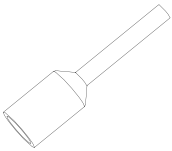

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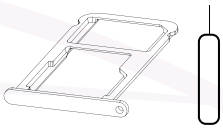
K



L

User Manual

Item	Name		Description	Note
A	RML-1000	1	/	/
B	Power adapter	1	Input: 100~240VAC, 1.1A, 50/60Hz Output: 12V/3.33Aut:100 ~240VAC,1.1A,50/60Hz Output:12V/3.33A	RML-1000 DC power supply
C	Plastic expansion tube	3	M4*40	Installation rail
D	C45 rail	1	250*35mm	/
E	Matching fixtures	4	Terminal Fixture E-UK 2	Fixing RML-1000 and power adapter
F	Connector	1	44pin	Communication and Control Cable Connection
G	Connector	2	2pin	12V power input/output cable connection
H	Pin terminal (yellow)	10	1mm^2 or 18AWG	Used for power cable crimping
I	Pin terminal (blue)	44	0.75mm^2 or 20AWG	Used for communication and control cable crimping
J	Wi-Fi antenna/4G antenna	1	/	4G antenna is only available for 4G version,not for standard version. The longer one is the 4G antenna .
K	SIM card tray/SIM eject pin	1	/	/
L	User guide	1	/	/

4.2 Precautions for Storage

① Store RML-1000 in its original outer box.
② Do not expose it to outdoor environment or rain during storage.
③ Storage temperature: -45~85℃ , storage humidity: ≤ 90%.
④ Please do not place heavy objects on the RML-1000.

5 Mechanical Installation

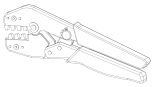
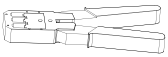
5.1 Preparation Before Installation

① Check the accessories against the packing list before installation, as specified in the section “Packing List”.

② Please refer to the section “Installation Conditions” to select suitable installation environment and site.

③ Please refer to the section “Installation Tools” for the use of special installation tools and personal protective equipment for installation.

5.2 Installation Tools

Name	Symbol	Name	Symbol	Name	Symbol
Electric drill		Crimping tool		Marker	
Manual screwdriver		RJ45 jack crimping plier		Cable ties	
Wire stripper		Ruler		Cut-resistant gloves	

5.3 Installation Conditions

① The IP rating of RML-1000 is IP20, please install indoors.

② The operating temperature of RML-1000 is -30~75℃ , and the operating humidity is 90%, please install in suitable environment.

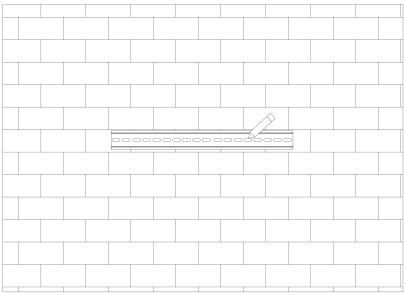
③ The installation should be carried out away from areas with flammable and explosive atmosphere and chemical corrosion materials.

④ Please install RML-1000 horizontally.

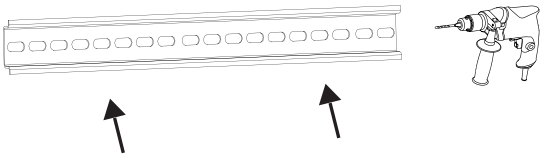
⑤ RML-1000 can be installed on the wall, in the distribution cabinet or in the container.

5.4 Installation of RML-1000

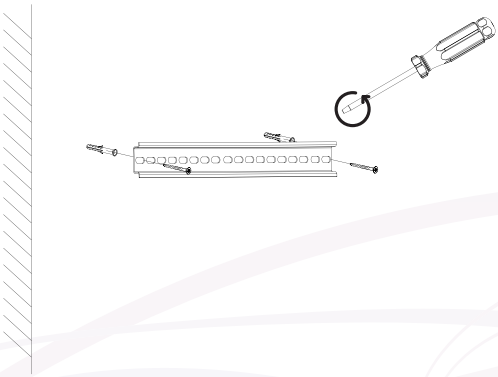
① Place the guide rail horizontally on the installation surface, and mark the locations for drilling holes with a marker.



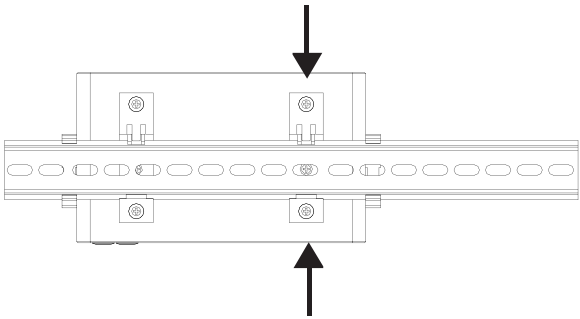
② Drill holes at the marked locations with an electric drill.



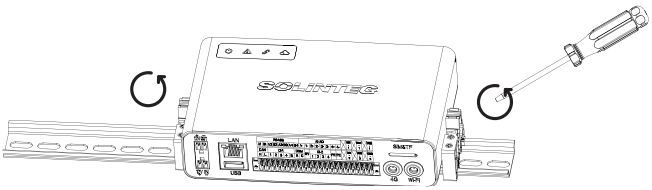
③ Insert the plastic expansion tube into the hole through the guide rail. Use a manual screwdriver to tighten the screws to secure the guide rail.



④ Secure RML-1000 onto the guide rail using the clip on its back.

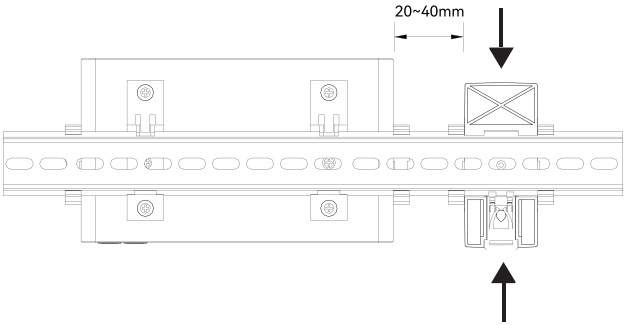


⑤ Fix the matching fixtures on both sides of RML-1000 tightly using a screwdriver to complete the installation.

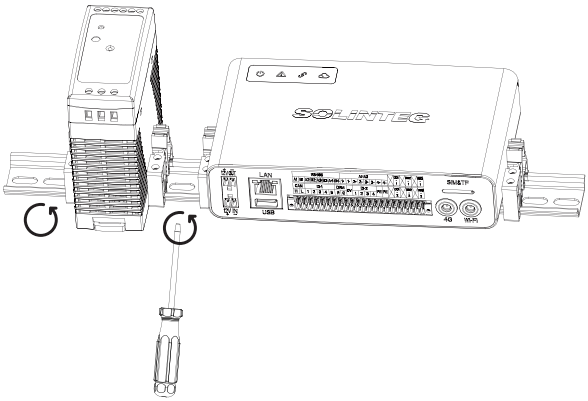


5.5 Installation of Power Adapter

① Fix the power adapter onto the guide rail using the clip on its back. It is recommended to install the power adapter on the left side of RML-1000, and keep a distance of 20~40mm to RML-1000.



② Fix the matching fixtures on both sides of the power adapter tightly using a screwdriver to complete the installation.



6 Electrical Connection

6.1 Safety Precautions

DANGER

① Be aware of high voltage when connecting with RML-1000! Please disconnect the power supply before connecting cables.
② Please do not touch the DC power terminal and AC power terminal of the power adapter when the RML-1000 is turned on.

WARNING

① Be aware of the residual voltage at the terminal of RML-1000 and power adapter when the power is disconnected. Please wait for 30 seconds before operation.
② Follow the requirements for cable connection as specified in this manual. Wrong wiring may result in damage to the device or personal injury.
③ Short-circuit of cable is not allowed. Short-circuit of cables can damage the device.
④ Please do not connect power supply to the communication terminal of RML-1000, otherwise, the device may be damaged.

NOTE

① All cables should be intact and well insulated with appropriate size and securely connected.
② Please use pin terminals in the accessory kit of RML-1000 for cable crimping in case of soft cable connection.
③ Insert the 44-pin connector terminal all the way into RML-1000 to lock the clip automatically.
④ The cables required for electrical connection are not supplied with the product. Cables must be prepared based on the above information.

6.2 Grounding

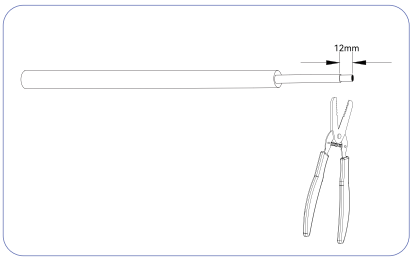
6.2.1 Cable Preparation

Cables required for RML-1000 grounding are as follows:

No.	Type	Applicable Cable Specifications
1	RML-1000 ground lead	0.20mm² ~0.75mm² or 24~20AWG (with pin terminal) 0.20mm² ~1mm² or 28~16AWG (without pin terminal)

6.2.2 Wiring Procedure

① Wire stripping: Use wire stripper to strip the cables.
② Terminal crimping: Insert the stripped cable into the pin terminal, and use crimping plier to crimp it.
③ Connection: Insert the cable into the PE end of the 44-pin connector terminal, and lock it.
④ Insert connector to RML-1000. Ground the other end.



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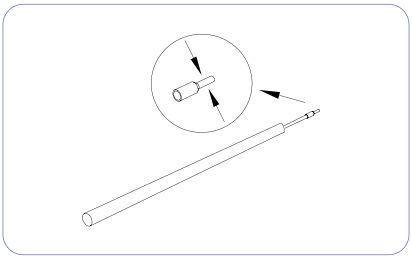

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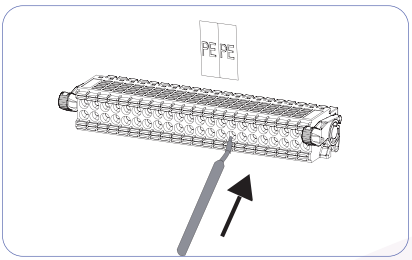

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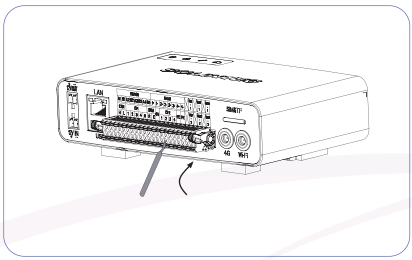


④

NOTE

Please ground RML-1000. Reliable grounding can reduce the risk of lightning strikes, and improve the electromagnetic interference

6.3 Power Cable Connection

6.3.1 Cable Preparation

No.	Type	Applicable Cable Specifications
1	RML-1000 12V DC output cable	0.41mm² ~1mm² or 21~18AWG (with pin terminal) 0.20mm²~1mm² or 28~16AWG (without pin terminal)
2	RML-1000 12V DC input cable	0.52mm² ~1mm² or 20~18AWG (with pin terminal) 0.2mm² ~1mm² or 28~16AWG (without pin terminal)
3	Power adapter 220V AC input cable	0.20mm² ~1mm² or 24~16AWG
4	Power adapter ground lead	0.20mm² ~1mm² or 24~16AWG

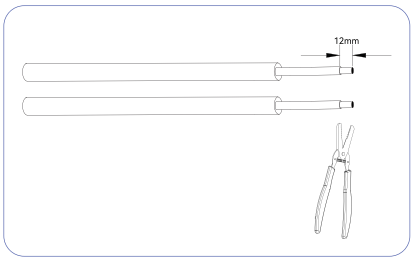
6.3.2 Wiring Procedure

① Wire stripping: Use wire stripper to strip the cables.

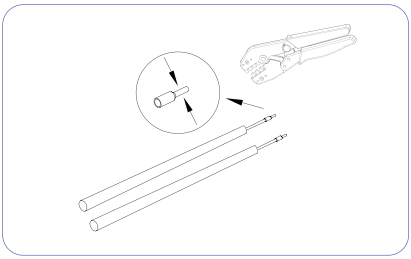
② Terminal crimping: Insert the stripped cable into the pin terminal, and use crimping plier to crimp it.

③ Connection: Insert the cable into the corresponding port, and use a screwdriver to tighten the screw to lock it. Connect cables as shown below.

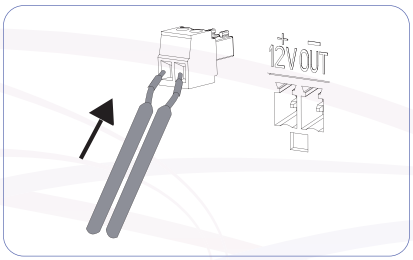
④ Insert the connector all the way into RML-1000.



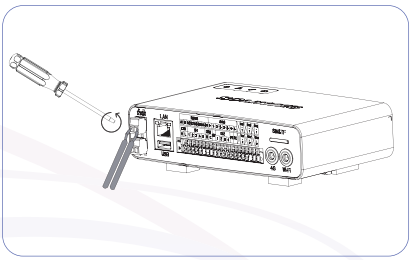
①



②



③



④

DANGER

Please disconnect the power before connecting the power cables to prevent electric shock.

NOTE

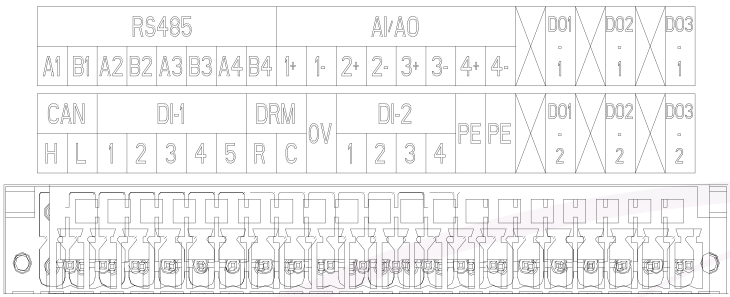
The power adapter must be connected with an AC circuit breaker. AC circuit breakers are not supplied with RML-1000, and user should prepare them according to actual conditions.

6.4 Communication and Control Cable Connection

6.4.1 Cable Preparation

No.	Type	Applicable Cable Specifications
1	RS 485 communication cable	Twisted pair 0.20mm² ~0.75mm² or 24~20AWG (with pin terminal) 0.20mm² ~1mm² or 28~16AWG (without pin terminal)
2	CAN communication cable	
3	DI signal cable	0.20mm² ~0.75mm² or 24~20AWG 0.20mm² ~1mm² or 28~16AWG (without pin terminal)
4	DO signal cable	
5	AI/AO signal cable	

6.4.2 Definition of RML-1000 communication terminal



Please refer to the section “Terminal Definition” for details.

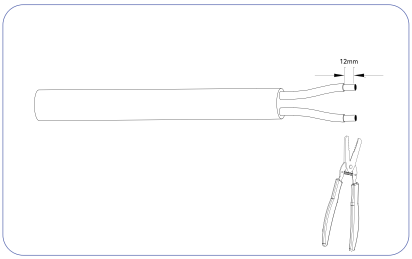
6.4.3 Wiring Procedure

① Wire stripping: Use wire stripper to strip the required cables. **(RS485 is taken as an example).**

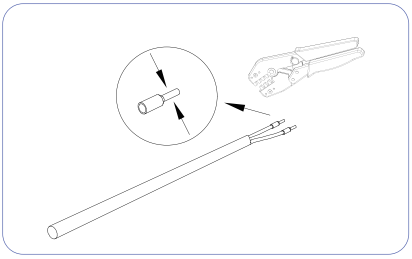
② Terminal crimping: Insert the stripped cable into the pin terminal, and use crimping plier to crimp it.

③ Connection: Insert the crimped cable all the way into the corresponding terminal of the 44-pin communication terminal to lock it automatically.

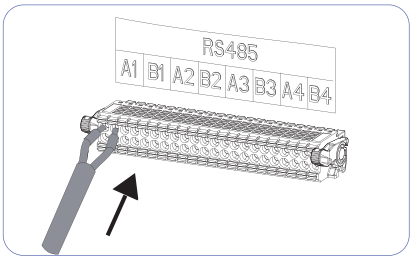
④ Connect all cables to the 44-pin communication terminal, and then insert them all the way into RML-1000 to lock automatically.



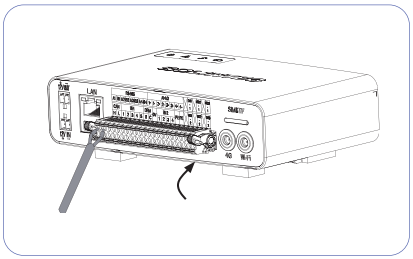
①



②



③



④

NOTE

Please use pin terminals in the accessory kit of RML-1000 for cable crimping in case of soft cable connection.

NOTE

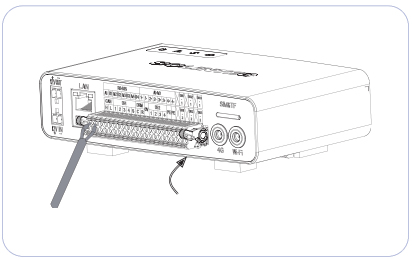
Perform the same operation for the connection of communication cable on the RML-1000 side. The specific connection with external devices depends on the condition.

◎ 6.4.4 Disassembly

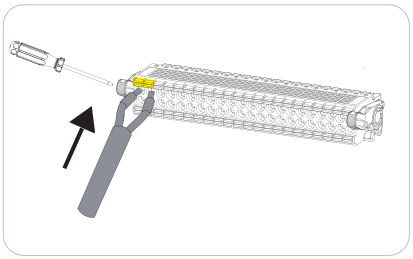
① Disconnect all power supplies first.

② Push down the handles on both sides of the 44-pin connector at the same time, the connector will eject automatically.

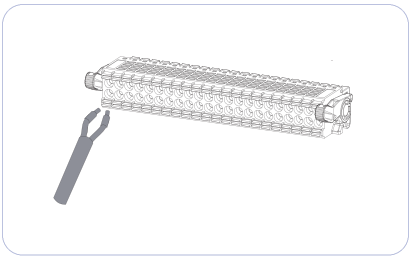
③ Use slotted screwdriver to push the corresponding contact near the signal cable, then the signal cable can be pulled out (RS485 communication cable is taken as an example).



①



②



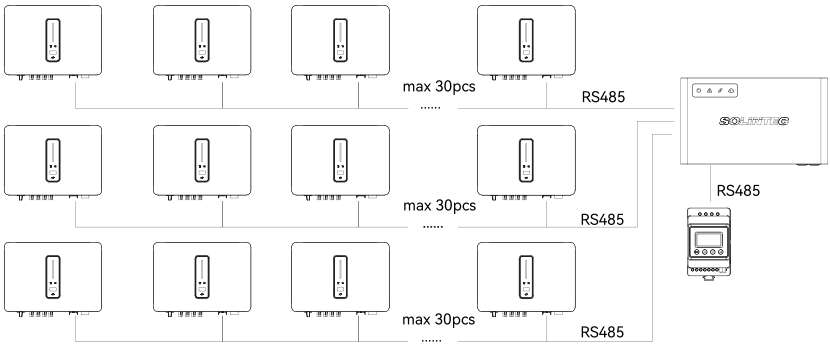
③

ATTENTION	Disconnect all power supplies before disassembling connectors.

6.5 Communication Connection Scenario

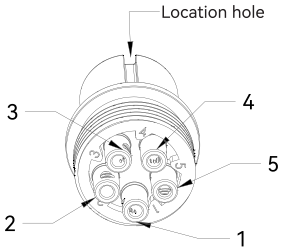
6.5.1 Connect with on-grid inverter through RS485

RML-1000 can be connected with Solinteg on-grid inverter through RS485 port.



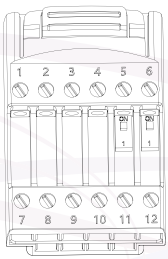
OGS-1.5-3.3K, OGS-3-6K and OGT-5-25K on-grid inverter RS485 wiring terminal

Basic version



COM2 port number	Definition
1	RS485-A1
2	RS485-B1
3	RS485-A1
4	RS485-B1

Extended version



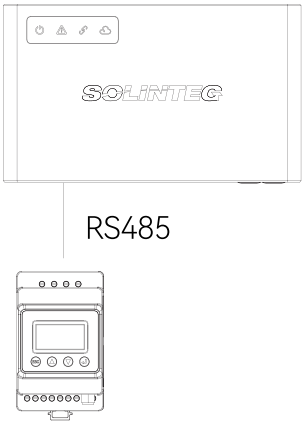
COM2 port number	Definition
9	RS485-A1
10	RS485-B1
11	RS485-A1
12	RS485-B1

ATTENTION	Inverter connected with RML-1000 can no longer be connected with communication module (4G/LAN/Wi-Fi/DuoCOM), otherwise, the data displayed on cloud monitor will not be correct.

NOTE	① RS485 A1B1/A2B2/A3B3 can be connected with Solinteg on-grid inverter, with up to 30 devices per channel. ② On-grid inverters in different power ranges can be connected with each channel of RS485, while single-phase and three-phase on-grid inverters are not allowed to be connected at the same time. ③ The transmission range of the communication signal of RS485 is up to 1,200m, but depending on the application environment at site, it may be less than 1200m. ④ When RS485 port is connected with Solinteg inverter, it can identify and allocate Modbus address automatically. ⑤ Each channel of RS485 port has a built-in matching resistor of 120Ω. It can be enabled through WEB interface, please refer to the section of “8.7.3 RS485”. ⑥ Baud rate, communication protocol and validation method of all devices on each RS485 link should be consistent with the RS485 communication parameters of corresponding COM port of RML-1000. ⑦ For more information on the devices matching through RS485 port, please contact Solinteg Customer Service.

6.5.2 Connect with smart meter RMM through RS485

RML-1000 can be connected with smart meter RMM through RS485 port



Smart meter RMM RS485 wiring terminal

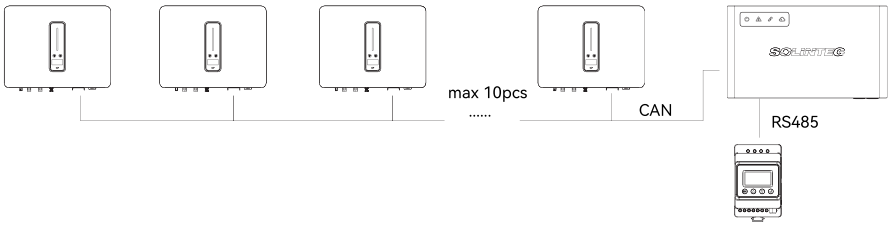
Port number	Definition
A	RS485-A1
B	RS485-B1

NOTE

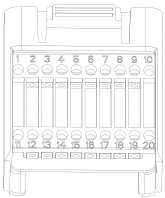
RS485 A4B4 is used to connect with Solinteg smart meter RMM.

6.5.3 Connect with hybrid inverter through CAN

RML-1000 can be connected with Solinteg hybrid inverter through CAN port



MHS-3-8K, MHT-4-20K and MHT-25-50K hybrid inverter CAN wiring terminal



COM2 port number	Definition
17	CANL_P
18	CANH_P

ATTENTION

Inverter connected with RML-1000 can no longer be connected with communication module (4G/LAN/Wi-Fi/DuoCOM), otherwise, the data displayed on cloud monitor will not be correct.

NOTE

CAN is used to connect with Solinteg hybrid inverter, and up to 10 devices can be connected to each channel.

MHT-4-20K and MHT-25-50K three-phase hybrid devices are allowed to be connected to one channel.

MHS series and MHT series hybrid devices are not allowed to be connected to one channel.

It's recommended that the transmission distance of CAN communication signal shall not be more than 100m.

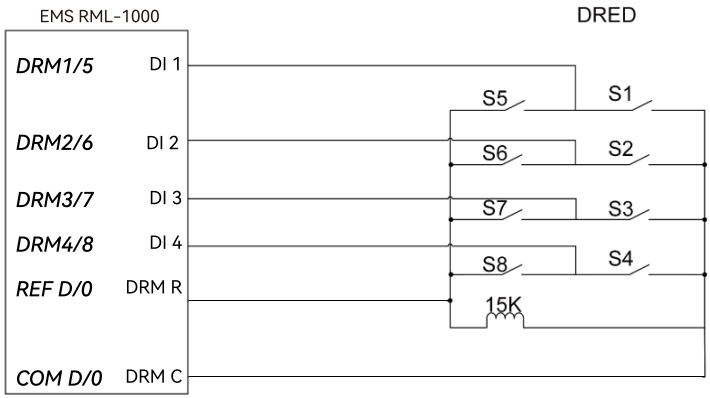
6.5.4 Connect with DRED and RCR through DI

Connection with DRED device

According to Australian standards and regulations, photovoltaic hybrid system should have a port to connect DRED (Demand Response Enable Devices).

The DI port of RML-1000 can be used to connect with DRED. When DRED device is connected with RML-1000, the energy control of the entire photovoltaic hybrid system can be realized. Solinteg does not provide DRED device.

Schematic diagram of DRED connection



DRM(Demand Response Management)

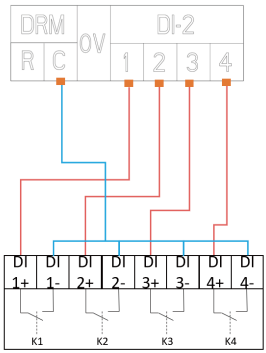
Mode	Function
DRM 0	Operate the disconnection device
DRM 1	Do not consume power
DRM 2	Do not consume at more than 50% of rated power
DRM 3	Do not consume at more than 75% of rated power and source reactive power if capable
DRM 4	Increase power consumption (subject to constraints from other active DRMs)
DRM 5	Do not generate power
DRM 6	Do not generate at more than 50% of rated power
DRM 7	Do not generate at more than 75% of rated power and sink reactive power if capable.
DRM 8	Increase power generation (subject to constraints from other active DRMs
Priority	DRM1 > DRM2 > DRM3 > DRM4
	DRM5 > DRM6 > DRM7 > DRM8

NOTE

The power limits under different DRM modes can be configured through WEB interface.
Please refer to “8.6.1 Active Power” for parameter setting of DRM control.

Connection with RCR device

According to the requirements of Germany and other regions in Europe, the photovoltaic hybrid system should have a port to connect RCR (Ripple Control Receiver) devices.
The DI port of RML-1000 can be used to connect with RCR. When RCR device is connected with RML-1000, the energy control of the entire photovoltaic hybrid system can be realized.



Schematic diagram of RCR connection

RCR operation mode as shown in table below:

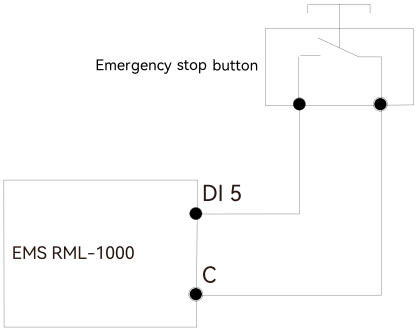
Switch mode (External RCR device)	Feed-in output power (in % of the Rated AC output power)
K1 turn on	100%
K2 turn on	60%
K3 turn on	30%
K4 turn on	0%
RCR priority: K1<K2<K3<K4	

NOTE

The power limits by different switches can be configured through WEB interface.
Please refer to “8.6.1 Active Power” for parameter setting of RCR control.

6.5.5 Connect with emergency stop devices through DI

RML-1000 can be connected with emergency stop devices through DI port. All inverters connected with RML-1000 will stop AC output when the emergency stop is activated.



Schematic diagram of emergency stop connection (5, C)

NOTE

The emergency stop switch can be configured as normally-on or normally-off switch through WEB interface

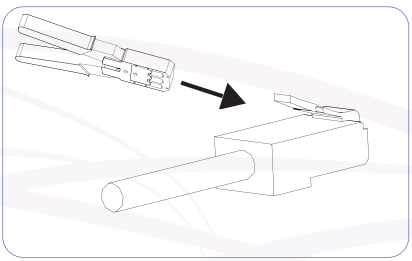
6.6 LAN Communication Cable Connection

Cable Preparation

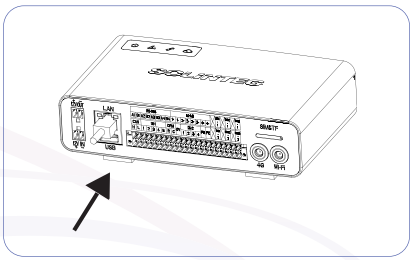
No.	Type	Recommended cable specifications
1	Network cable	Recommended to use Cat 5e or higher-grade network cable with shielded RJ45 connector.

① Use RJ45 registered jack crimping plier for network cable crimping, the line sequence is shown in the diagram below.

② Insert the crimped network cable into LAN port.



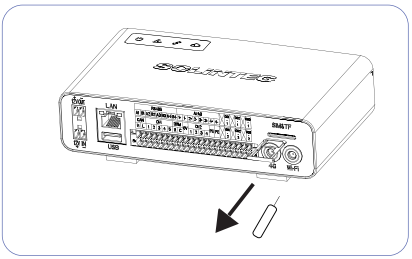
①



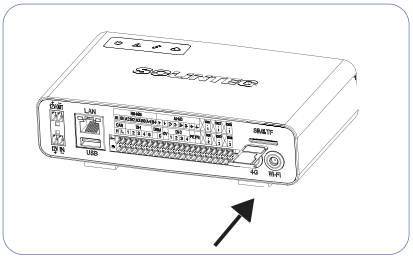
②

6.7 Inserting SIM Card and TF Card

① Use a SIM eject pin to remove the card holder.
② Place a SIM card and a TF card into the card holder in correct orientation, and put back the card holder.

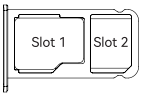


①



②

NOTE



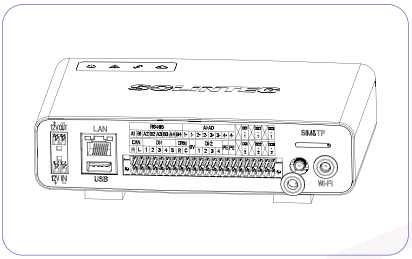
Slot 1 is for TF card
Slot 2 is for nano SIM card

NOTE

Please turn off the power first before inserting and unplugging the SIM card or TF card.

6.8 Wi-Fi Antenna and 4G Antenna Connection

① Remove the plastic cover from the antenna port.
② Screw the antenna onto the port.



①

②

NOTE

The longer one is the 4G antenna, please note the difference.

7 Commissioning

Pre-power-on check

① RML-1000 and power adapter are tightly mounted.
② All cables are reliably connected.
③ All cables are connected in accordance with the manual.
④ Power cable polarities are connected correctly.
⑤ Devices are grounded correctly.

Start up

① Close the AC circuit breaker switch of power adapter to start up RML-1000.
② RML-1000 signal indicator: all indicators are on, indicating normal startup.

8 WEB interface

NOTE

① The WEB interface in this manual is for reference only. Please refer to the actual display.
② The configuration of WEB interface has to be performed by professionals to avoid setting errors which may lead to economic losses, failure of the system to satisfy local regulations, or harm to the device.

8.1 Preparation and Login

8.1.1 Device requirements

① A PC with Ethernet port.
② Compatible with Windows 7 and above.
③ Recommended browsers: Microsoft Edge, Google, and Firefox.

8.1.2 Operating steps

① Connect RML-1000 with PC using a network cable
② Configure the IP addresses of PC and RML-1000 in the same network segment.

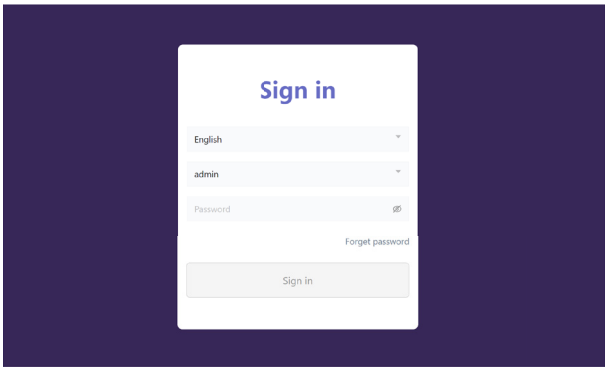
Port	IP setting	RML-1000 default value	Example of PC setting
LAN	IP address	18.18.18.18	18.18.18.11
	Subnet mask	255.255.255.0	255.255.255.0
	Default gateway	18.18.18.1	18.18.18.1

③ Enter the IP address 18.18.18.18 of RML-1000 in the browser address bar to log in to the WEB interface.

8.1.3 Login

Set the language on the login interface.

Username is “admin”, enter the password,and click [Sign in] to log in.



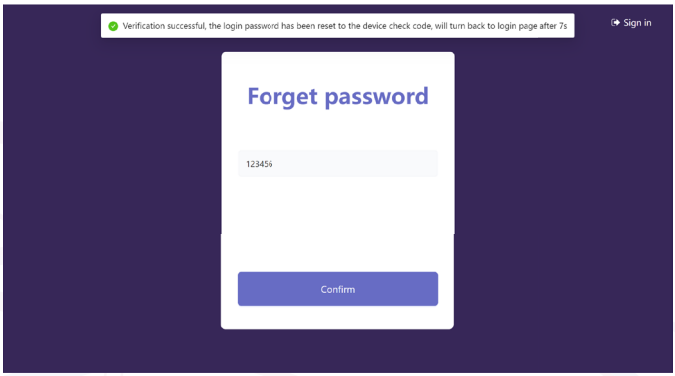
NOTE

The initial password is the check code of the RML-1000 device.

8.1.4 Forgot password

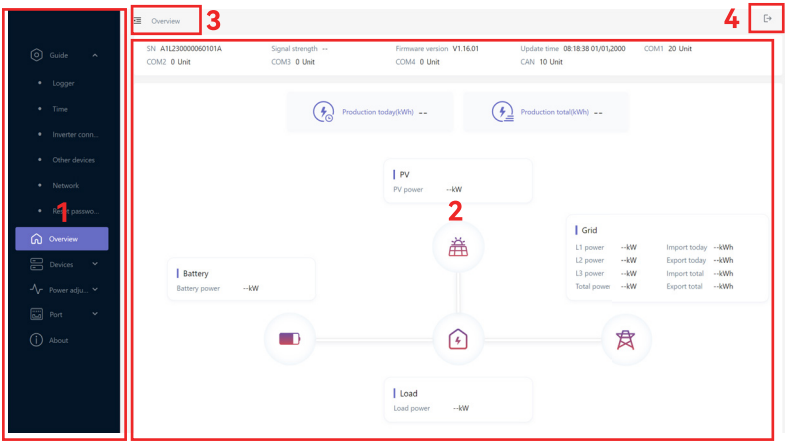
If forget the login password, click the **[Forget password]** button to enter the following interface.

Enter the RML-1000 check code, enter it correctly, click the **[Confirm]** button, and the WEB interface will pop up “Verification successful, the login password has been reset to the device check code, wil turn back to login page after 7s”. The login password will be restored to the RML-1000 check code and returned to the login interface.



8.2 WEB Interface Layout

The layout of WEB interface is as follows



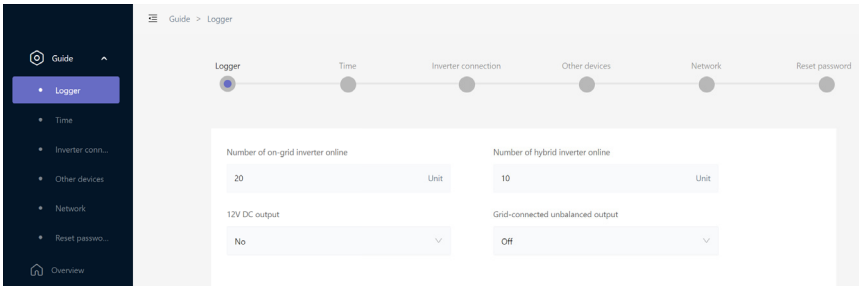
No.	Name	Description
1	Navigation menu	Main function menu of WEB interface
2	Function display interface	Configuration interface under the current function
3	Menu name/return to previous menu	Current menu title/return to previous menu
4	Logout	/

8.3 Guide

When configuring RML-1000 for the first time or reconfiguring RML-1000, it is recommended to follow the guide.

8.3.1 Logger

Enter the number of inverters connected, and 12V DC output switch.



No.	Parameter	Description	Remark
1	Number of on-grid inverter online	Enter the number of all on-grid inverters connected to the RS485 A1B1/ A2B2/A3B3 ports.	Range: 0~90 units.
2	Number of hybrid inverter online	Enter the number of all hybrid inverters connected with CAN_H&L ports	Range: 0~10 units.
3	12V DC output	Enable/Disable 12V/ 1A DC output	/
4	Grid-connected unbalanced output	System AC side three phase unbalanced output	/

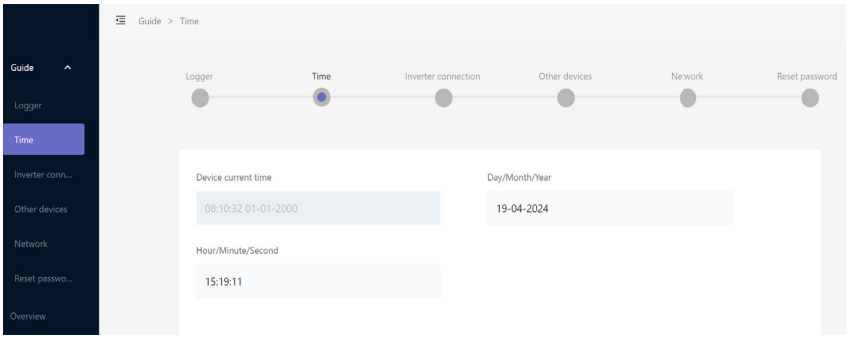
NOTE

The parameters set here are consistent with those set in "8.3.1 Logger". If the entered number of online devices is inconsistent with the actual number, it will not affect the operation.

Click **[Set]** to complete parameter setting;
Click **[Refresh]** to refresh parameters;
Click **[Next]** to enter the next step of setting.

8.3.2 Time

RML-1000 time calibration. Calibrate time when using RML-1000 for the first time.



Item	Status	Description
1	Device current time	The current time on RML-1000 clock.
2	Day/Month/Year	Select the calibration reference time. Current time of PC can be read.
3	Hour/Minute/Second	Select the calibration reference date. Current date of PC can be read

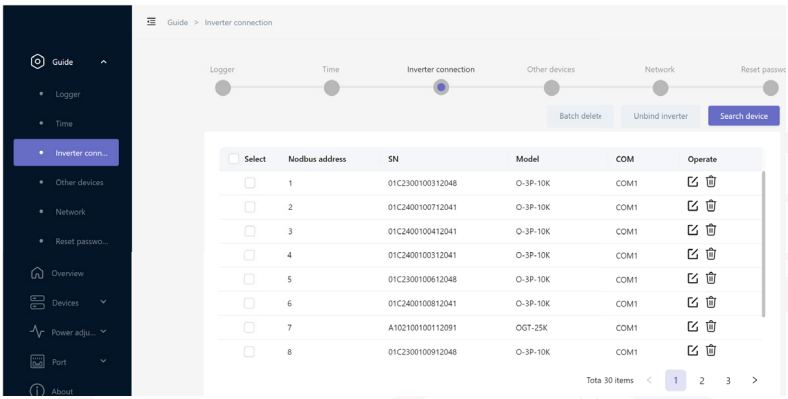
Click **[Set]** to complete parameter setting;

Click **[Refresh]** to refresh parameters;

Click **[Next]** to enter the next step of setting.

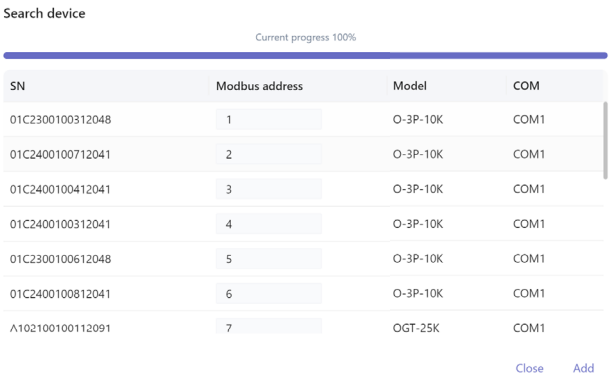
8.3.3 Inverter connection

To search, edit, and delete on-grid inverters and hybrid inverters.



No.	Parameter	Description	Remark
1	SN	Serial number of the connected inverter	/
2	Modbus address	Modbus address of connected inverter	COM1 range [1,30] COM2 range [31,60] COM3 range [61,90] CAN range [121,130]
3	COM	Inverter connection port	COM1 corresponds to RS485 A1B1 COM2 corresponds to RS485 A2B2 COM3 corresponds to RS485 A3B3 CAN corresponds to CAN_H&L
4	Model	Model of connected inverters	/

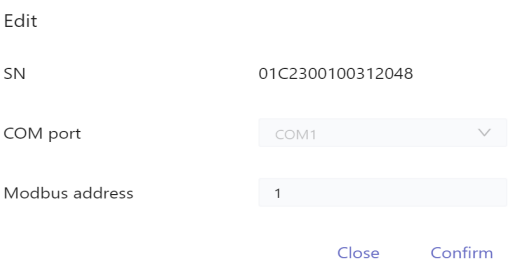
Click **[Search device]** to search the connected inverters



When Solinteg inverters are connected, Modbus address will be automatically assigned, and individual inverter settings are not required.

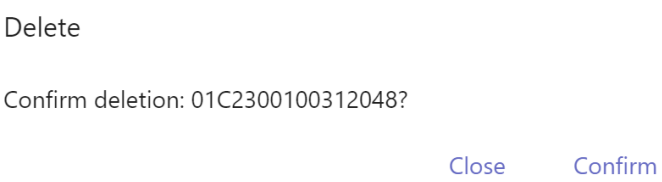
When the progress bar reaches 100%, click **[Add]** to complete parameter setting;

Click [ ] to edit inverter.

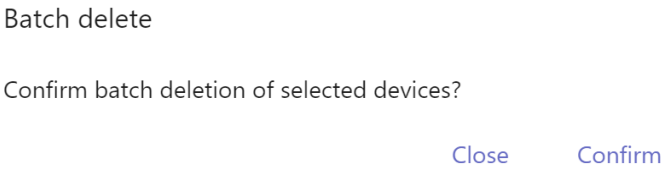


Click **[Confirm]** to complete editing.

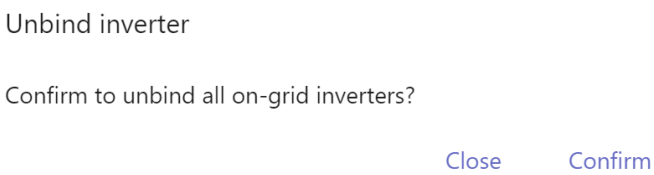
Click [ ]to pop up a dialog box, and then click **[Confirm]** to delete the selected device.



Click **[Select]** to select multiple devices, and click **[Batch Deletion]** to pop up a dialog box, and then click **[Confirm]** to delete multiple selected devices.



Click **[Unbind inverter]** button to unbind all connected grid-connected inverters from RML-



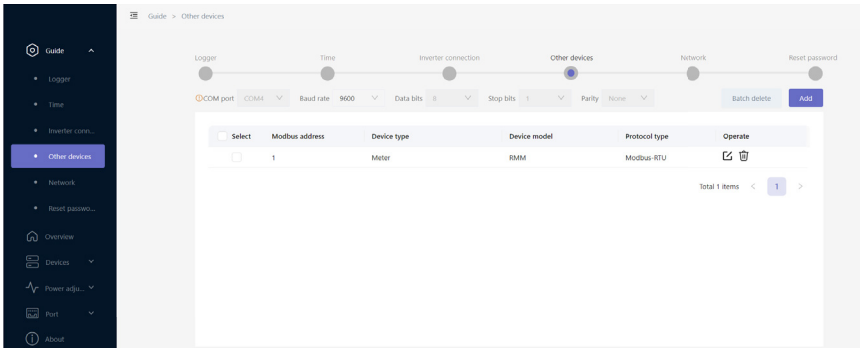
Click **[Confirm]** to unbind inverters.

NOTE	Solinteg hybrid inverters cannot be edited or deleted. RML-1000 does not exchange data with the deleted inverters whose power generation data is not reflected in the WEB interface and the cloud. To add the device again, please click **[Search Device]** and **[Add]**

Click **[Refresh]** to refresh parameters;
Click **[Next]** to enter the next step of setting.

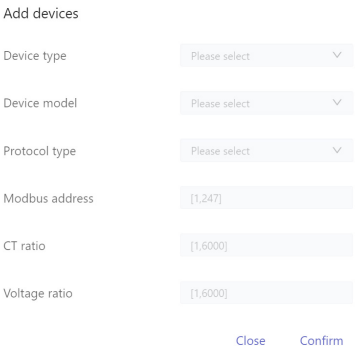
8.3.4 Other devices

To add, edit, and delete other devices, such as electric meters, third-party inverters, and environmental sensors.



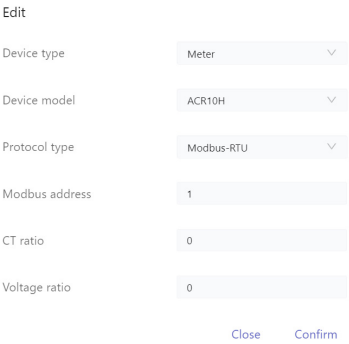
No.	Parameter	Description	Remark
1	Modbus address	Modbus address of other connected devices	Range 1~247
2	Protocol type	Protocol compatible with other connected devices	Modbus RTU is supported currently
3	COM port	Other devices connected with COM4 port	COM4 corresponds to RS485 A4B4
4	Baud rate	Baud rate of COM4 communication port	Two baud rates of 9600 and 115200
5	Data bit	Baud rate of COM4 communication port	/
6	Stop bits	A stop bit has to be sent after each data byte transmission. The value of stop bit is 1	/
7	Parity	None	/
8	CT ratio	CT ratio of connected electric meter.	For the connected Solinteg RMM electric meter, CT ratio is the default value and cannot be edited.
9	Voltage ratio	Voltage ratio of the connected voltage transformer.	For the connected Solinteg RMM electric meter, no voltage ratio parameter is present and cannot be edited.

Click **[Add]** to add other connected devices and set parameters.



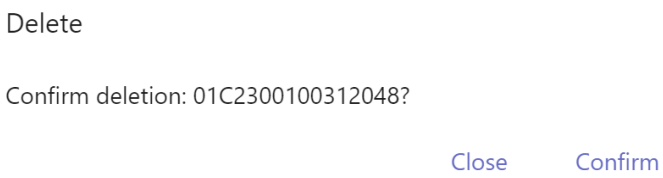
Click **[Confirm]** to complete adding.

Click [ ] to edit other connected devices.

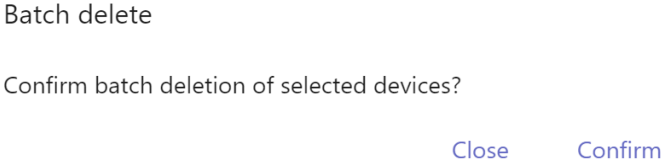


Click **[Confirm]** to complete editing.

Click [ ]to pop up a dialog box, and then click[Confirm] to delete the selected device.



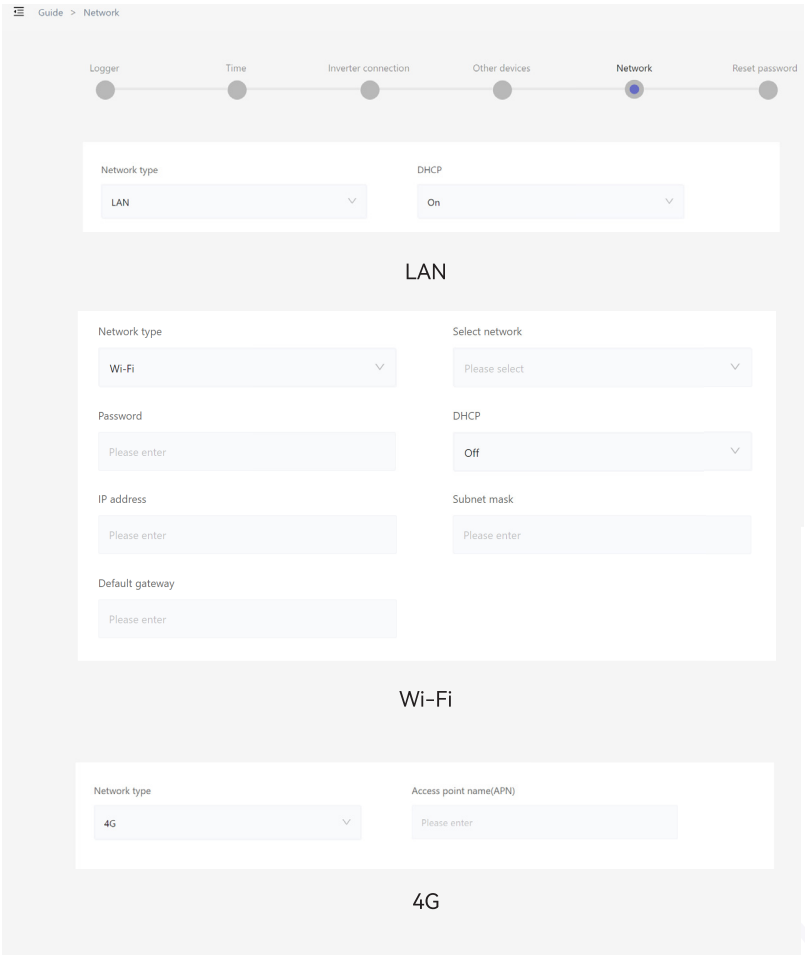
Click **[Select]** to select multiple devices, and click **[Batch Deletion]** to pop up a dialog box, and then click **[Confirm]** to delete multiple selected devices.



Click **[Refresh]** to refresh parameters;
Click **[Next]** to enter the next step of setting.

8.3.5 Network

Set RML-1000 networking mode, and edit related parameters.



No.	Parameter	Description
1	Network type	Three networking modes: Wi-Fi/LAN/4G
2	Select network	Wi-Fi name
3	Password	Wi-Fi password
4	DHCP	Enable/disable DHCP
5	IP address	When DHCP is OFF, set the IP address of the RML-1000 to be on the same network segment as the router
6	Subnet mask	
7	Default gateway	
8	Access Point Name (APN)	4G carrier access point name

Click **[Set]** to complete parameter setting.

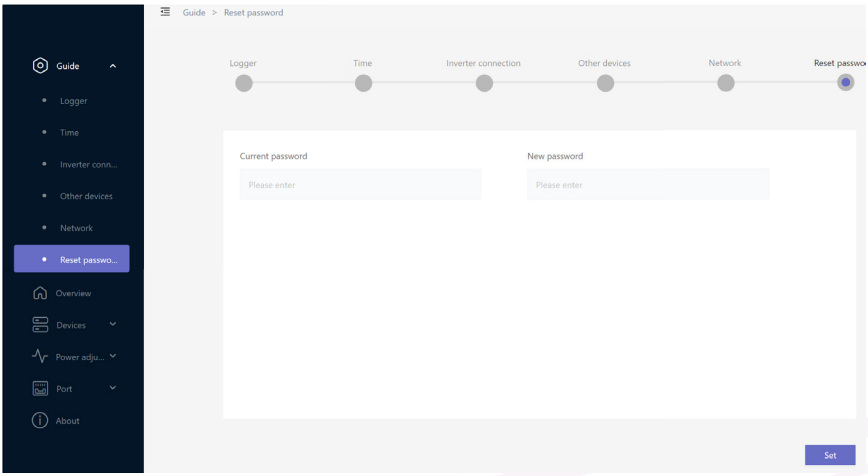
Click **[Refresh]** to refresh parameters.

Click **[Reset]** to restore default settings.

Click **[Next]** to enter the next step of setting.

8.3.6 Reset password

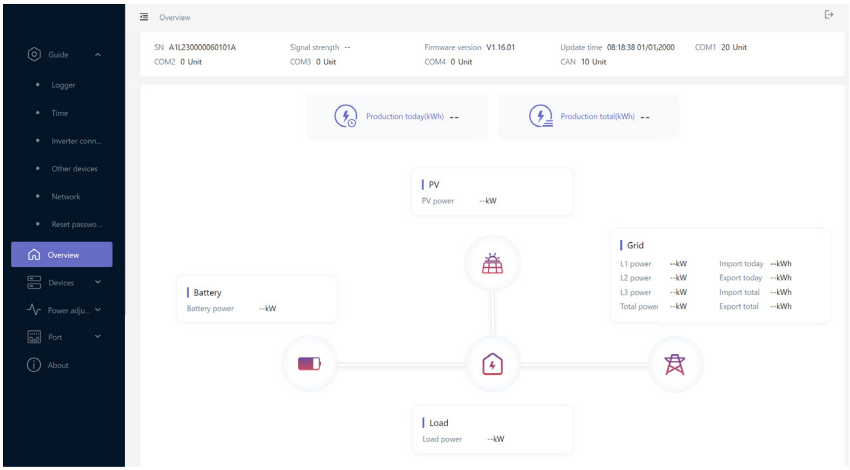
Reset the WEB interface login password.



Enter current password, enter new password, and click **[Set]** to complete password reset.

8.4 Overview

This interface displays the overall information of the photovoltaic hybrid system centered around the RML-1000, including power generation, PV power, battery power, load power, grid power, and purchased and sold power.



NOTE

The direction of flow in the overview diagram reflects the direction of energy flow.

Parameters in information bar

No.	Parameter	Description	Remark
1	SN	RML-1000 SN code	/
2	Signal strength	Wi-Fi/4G/LAN signal strength	For LAN communication, the signal strength is 100
3	Firmware version	RML-1000 firmware version number	/
4	Update time	Time at which the current parameters were obtained	/
5	COM1/COM2/COM3/ COM4/CAN	Quantity of devices connected with each port	/

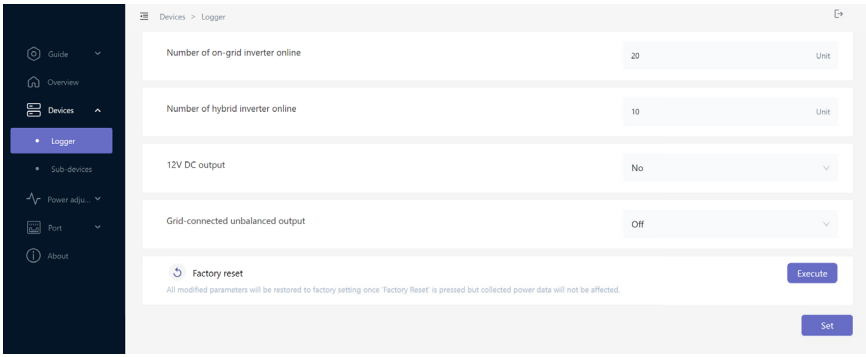
Parameters in system diagram

No.	Parameter	Description	Remark
1	Production today (kWh)	The cumulative power generation on PV side for the current day	/
2	Production total (kWh)	Cumulative power generation from photovoltaic system on PV side since installation	/
3	PV power (kW)	Current power on PV side	/
4	Battery power (kW)	Current power of battery connected to the hybrid inverter	Positive value indicates battery charging Negative value indicates battery discharging
5	Load power (kW)	Current power of the load	/
6	L1 power(kW)	Current power detected by Phase L1 electric meter	Positive value indicates power fed into the grid Negative value indicates power consumption from the grid
7	L2 power(kW)	Current power detected by Phase L2 electric meter	
8	L3 power (kW)	Current power detected by Phase L3 electric meter	
9	Total power (kW)	The total current power of Phase L1, L2, and L3	
10	Import today(kWh)	Power bought from the grid by photovoltaic system the same day	/
11	Export today(kWh)	Power sold to the grid by photovoltaic system the same day	/
12	Import total (kWh)	Cumulative power bought from the grid by photovoltaic system	/
13	Export total (kWh)	Cumulative power sold to the grid by photovoltaic system	/

8.5 Device

8.5.1 Logger

To set the number of inverters connected with RML-1000, turn on 12V DC output, and restore factory setting.



No.	Parameter	Description	Remark
1	Number of on-grid inverter online	Enter the number of all on-grid inverters connected to the RS485 A1B1/ A2B2/A3B3 ports.	Range: 0~90 units.
2	Number of hybrid inverter online	Enter the number of all hybrid inverters connected with CAN_H&L port	Range: 0~10 units.
3	12V output activation	Enable/Disable 12V/ 1A DC output	/
4	Grid-connected un-balanced output	System AC side three phase unbalanced output	/

NOTE

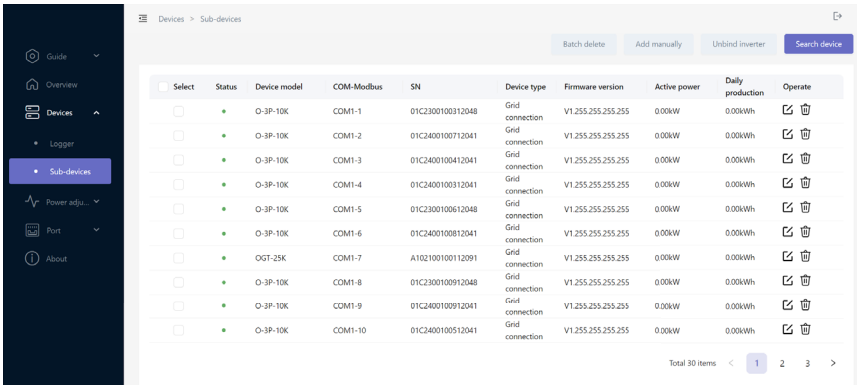
The parameters set here are consistent with those set in "8.3.1 Logger".

In the part of Restore Factory Settings, click **[Execute]** to restore the RML-1000 to factory settings. The set parameters will be restored to factory settings.

Click **[Set]** to complete parameter setting.

8.5.2 Sub-devices

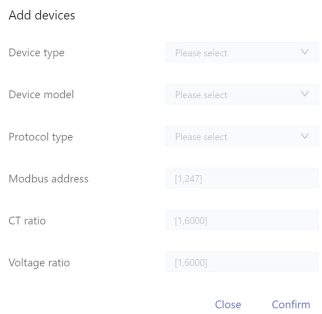
To display information of sub-devices connected with RML-1000, and edit parameters.



No.	Parameter	Description
1	COM-Modbus	COM port of connected device and Modbus address
2	Firmware version	Firmware version of connected device (inverter and electric meter)
3	Active power (kW)	Current AC output active power of inverter
4	Daily power generation (kWh)	The cumulative daily power generation on PV side of inverter

NOTE

① The parameters set **[Batch delete]** , **[Unbind inverter]** , **[Search device]** here are consistent with those set in "8.3.3 Inverter connection" and "8.3.4 Other devices".
② Solinteg hybrid inverter cannot be edited or deleted.



Click **[Add manually]** button to add device.
Click **[Confirm]** to complete setting.

8.6 Power adjustment

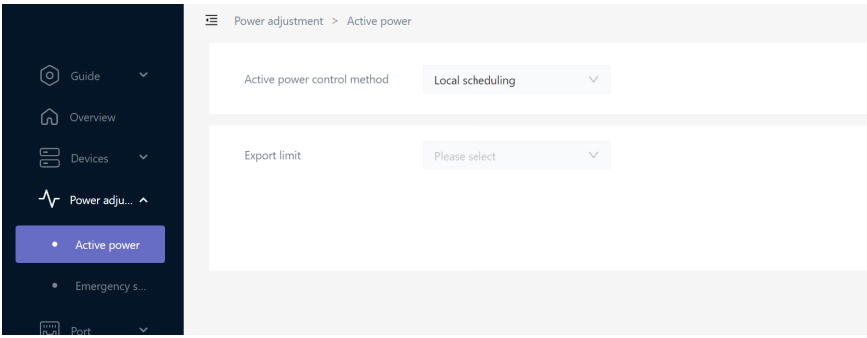
8.6.1 Active power

To dispatch the active power of photovoltaic hybrid system with RML-1000 as the data collection center.

There are three active power control modes: Local scheduling, DRM control, and RCR control.

Local scheduling

The Local scheduling of active power of RML-1000 is achieved by limiting the active power fed into grid by photovoltaic hybrid system through connected electric meters and current transformers (CTs).

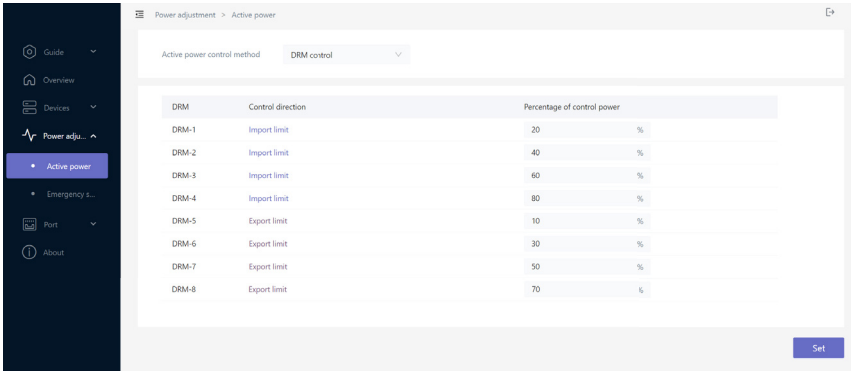


No.	Parameter	Description
1	Export limit	On/off
2	Feed in grid (kW)	Maximum power fed into grid from system

Click **[Set]** to complete setting.

DRM control

The DRM control of active power of RML-1000 is achieved by limiting the active power consumed and fed into grid by photovoltaic hybrid system through the connected DRED

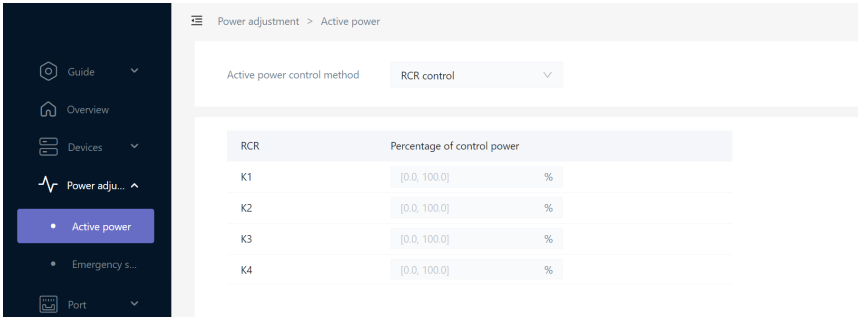


No.	Parameter	Description	Remark
1	DRM-1	Limit of grid power consumed by system under DRM Mode 1	The control power percentage setting value must satisfy: DRM-4>DRM-3>DRM-2>DRM-1
2	DRM-2	Limit of grid power consumed by system under DRM Mode 2	
3	DRM-3	Limit of grid power consumed by system under DRM Mode 3	
4	DRM-4	Limit of grid power consumed by system under DRM Mode 4	
5	DRM-5	Limit of grid power fed by system under DRM Mode 5	The control power percentage setting value must satisfy: DRM-8>DRM-7>DRM-6>DRM-5
6	DRM-6	Limit of grid power fed by system under DRM Mode 6	
7	DRM-7	Limit of grid power fed by system under DRM Mode 7	
8	DRM-8	Limit of grid power fed by system under DRM Mode 8	
9	Control direction	Import limit: Limit of grid power consumed Export limit: Limit of grid power fed	/
10	Control power percentage	%Total rated power of inverters connected with RML-1000 (including on-grid inverters and hybrid inverters)	/

Click **[Set]** to complete setting.

RCR control

The RCR control of active power of RML-1000 is achieved by limiting the active power fed into grid by photovoltaic hybrid system through the connected RCR device.

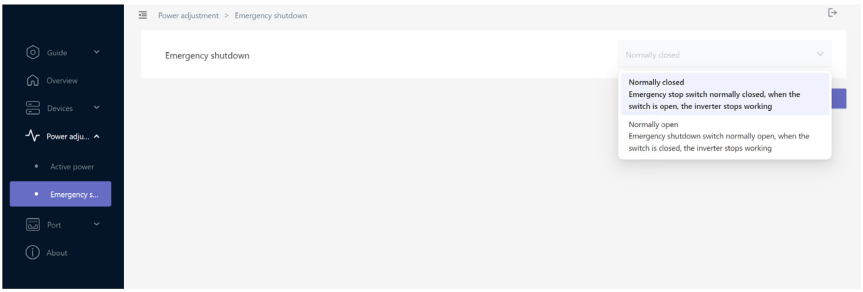


No.	Parameter	Description	Remark
1	K1	Limit of grid power fed by photovoltaic system by K1 switch	The control power percentage setting value must satisfy: K4>K3>K2>k1
2	K2	Limit of grid power fed by photovoltaic system by K2 switch	
3	K3	Limit of grid power fed by photovoltaic system by K3 switch	
4	K4	Limit of grid power fed by photovoltaic system by K4 switch	
5	Control power percentage	%Total rated power of inverters connected with RML-1000 (including on-grid inverters and hybrid inverters)	/

Click **[Set]** to complete setting.

8.6.2 Emergency stop

RML-1000 can be connected with an emergency stop switch. When the emergency stop is activated, inverters will stop AC side output and remain in waiting status.



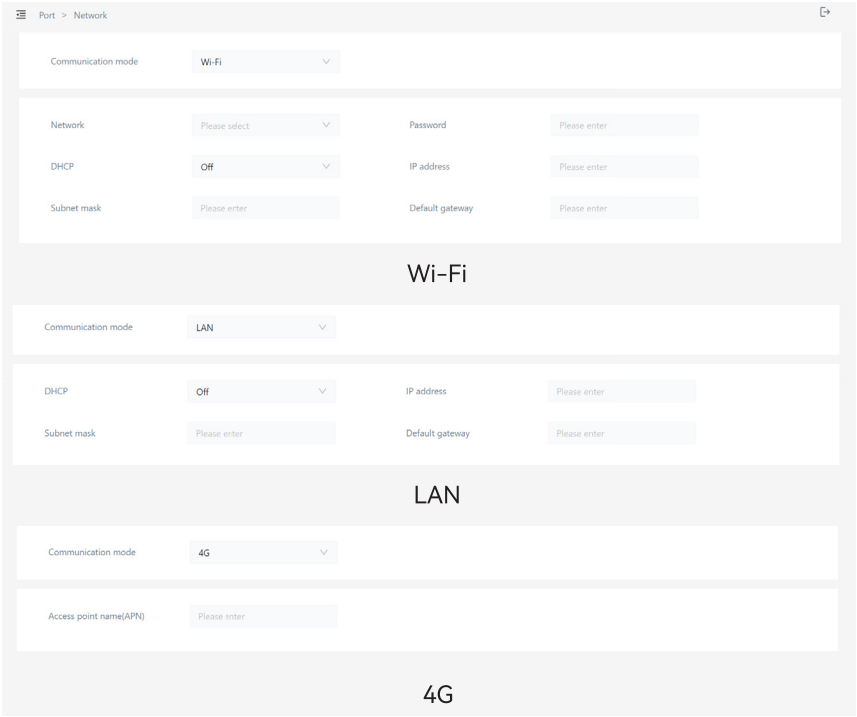
No.	Parameter	Description	Remark
1	Emergency shutdown	Normally Open	Emergency shutdown switch normally open, when theswitch is closed, the inverter stops working.
		Normally Closed	Emergency stop switch normally closed, when theswitch is open, the inverter stops working.

Click **[Set]** to complete setting.

8.7 Port

8.7.1 Network

To set RML-1000 networking mode (Wi-Fi/LAN/4G), and edit related parameters.



No.	Parameter	Description
1	Network type	Three networking modes: Wi-Fi/LAN/4G
2	Select network	Wi-Fi name
3	Password	Wi-Fi password
4	DHCP	Enable/disable DHCP
5	IP address	When DHCP is OFF, set the IP address of the RML-1000 to be on the same network segment as the router
6	Subnet mask	
7	Default gateway	
8	Access Point Name (APN)	4G carrier access point name

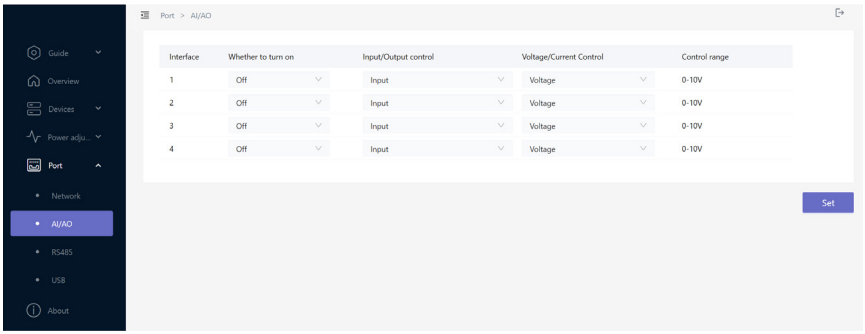
Click **[Reset]** to restore default settings.

Click **[Set]** to complete setting.

8.7.2 AI/AO

RML-1000 analog input/output port configuration.

Each AI/AO port can be turned on/off, and the input/output control value is voltage/current. The voltage range is 0-10V and the current range is 4-20mA.



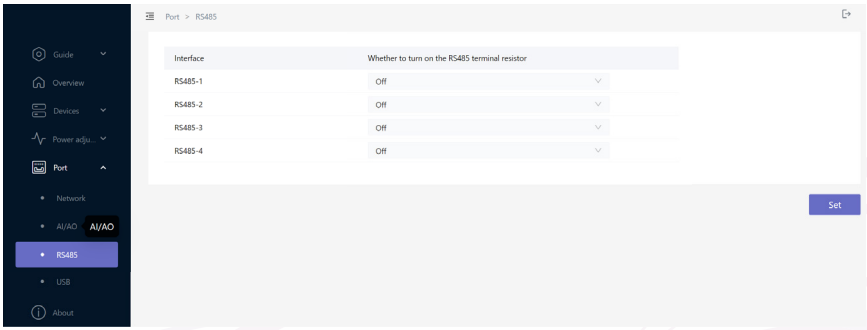
Click **[Set]** to complete setting.

8.7.3 RS485

Configuration of RS485 communication matching resistor.

The built-in 120Ω matching resistor can be turned on/off for each RS485 port.

When the communication distance of RS485 is long, or the communication is unstable, RS485 matching resistor of the corresponding serial port can be enabled to improve communication quality.



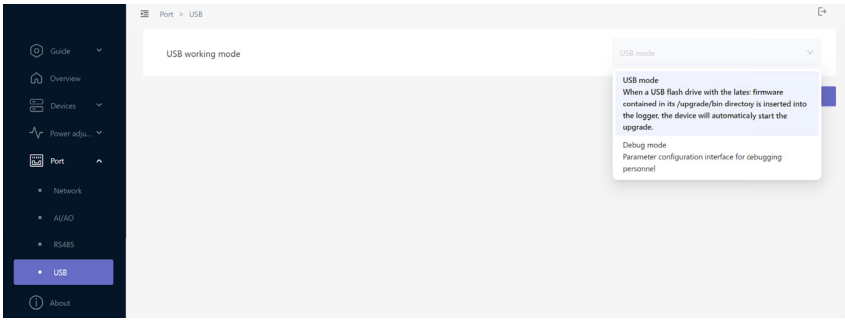
Click **[Set]** to complete setting.

8.7.4 USB

USB port has two operating modes.

USB mode:When a USB flash drive with the lastest firm ware contained in its/upgrade/bin directory is inserted into the logger, the device will automatically start the upgrade.

Debug mode: Parameter configuration interface for debugging personnel.



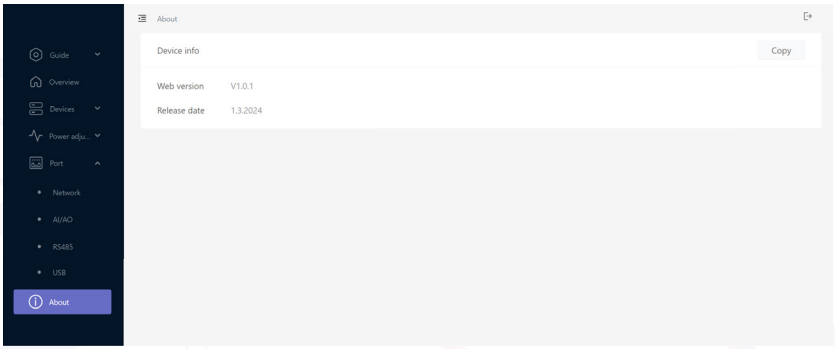
Click **[Set]** to complete setting.

After selecting USB mode, save the firmware (bin file) to the root directory of the USB flash drive. Insert the USB flash drive into the USB port, and RML-1000 will automatically upgrade the firmware.The upgrade time is less than a minute. Once the upgrade is complete, the RML-1000 will restart.

ATTENTION	Do not change the bin file name, otherwise the firmware upgrade will be affected.

8.8 About

This interface displays the webpage version and release date.



9 Operation & Maintenance

9.1 Cloud monitoring

Cloud monitoring web link:www.solinteg-cloud.com

Cloud monitoring Download QR Code

9.2 Maintenance

① Regularly check for any electromagnetic interference devices around RML-1000 to ensure it avoids electromagnetic interference.

② Regularly check the cables connected with RML-1000 to ensure reliable connection.

③ Regularly check the ground lead of RML-1000 to ensure reliable connection.

10 Troubleshooting

Common faults and solutions

Fault	Cause Analysis	Recommended Solutions
RML-1000 cannot be powered on	1.DC power cable loosely connected. 2.AC power cable loosely connected. 3.Faulty power adapter	1.Disconnect all power supplies. 2.Check whether the power cables are securely connected. 3.Replace the power adapter. 4.Contact Solinteg after-sales service.
WEB interface cannot be opened	1. Wrong WEB interface IP address entered. 2. IP addresses of PC and RML-1000 are not in the same network segment.	1. Confirm that the IP address entered is 18.18.18.18 2. Set the IP addresses of PC and RML-1000 in the same network segment. 3. Contact Solinteg after-sales service. Contact Solinteg after-sales service.
No device found on WEB interface	1.Communication cable loosely connected. 2.Wrong wiring between RML-1000 and inverter or electric meter communication terminal.	1. Check whether the cable connected with RS485 or CAN port is secured. 2. Refer to the RML-1000, inverter, and electric meter manuals for terminal definitions, and check the wiring.
4G communication error	1.SIM card is not inserted into the slot correctly. 2.4G antenna is not tightened or damaged. 3.APN input error. 4.Insufficient SIM card data.	1. Insert or replace SIM card. 2. Tighten or replace the 4G antenna. 3. Confirm that APN input is correct. 4. Please contact SIM card carrier or Solinteg after-sales service.

11 FAQ

Q: Can Wi-Fi, LAN and 4G be used simultaneously?
A: Users can use one service only. When current networking fails, it won't automatically switch to another.

Q: Do hybrid and on-grid inverters connected to RML-1000 need to be connected with a communication module?
A: No additional communication modules (4G/LAN/Wi-Fi/DuoCOM) need to be added.

Q: What devices are compatible with RML-1000 RS485 port? How many devices can be connected at the maximum?
A: RS485 A1B1/ A2B2/A3B3 support the connection with Solinteg on-grid inverters. A4B4 currently only supports the connection with Solinteg RMM smart electric meters

Q: How far is the communication distance of RML-1000 RS485 port at the maximum? What is the function of RS485 matching resistor?
A: 1,200m. When the communication distance of RS485 is long, or the communication is unstable, RS485 matching resistor can be enabled to improve communication quality.

Q: What devices are compatible with RML-1000 CAN port? How many devices can be connected at the maximum?
A: Solinteg hybrid inverters. Up to 10 inverters can be connected.

Q: How far is the communication distance of RML-1000 CAN port at the maximum?
A: 100m.

Q: Is there communication between the on-grid inverters and the hybrid inverters connected with RML-1000?
A: RML-1000, as the host, collects signals from slaves and sends command to the slaves. The connected slave devices (inverters) do not communicate with each other.

Q: Do inverters connected with RML-1000 need to be connected with a separate electric meter?
A: No.

Q: Do both PE ports of RML-1000 need to be grounded?
A: Only one of them needs to be grounded.

Q: Can RCR devices and DRED devices be connected to RML-1000 at the same time?
A: No.

Q: How does the inverter operate when there is a communication anomaly with RML-1000?
A: With CommsWatchDog function enabled, the inverters stop AC output, and remain in waiting mode; if this function is disabled, the inverters remain in the current status.

Q: How is active power control executed if RML-1000 is not connected to a meter or if there is a communication anomaly with the meter?
A: In local scheduling mode, the maximum output power on the system AC side is equal to the power of feed in grid on the WEB interface;
In DRM mode, the maximum output/input power on system AC side is equal to the power set on the WEB interface;
In RCR mode, the maximum output/input power on system AC side is equal to the power set on the WEB interface.

12 Parameter Specifications

Model	RML-1000
Communication	
Max. number of devices	90
Communication ports	
RS485 interface	4, 3 for PV inverter parallel, 1 for other device
CAN interface	1 for Hybrid inverter parallel
Ethernet	1×RJ45, 10/100 Mbps (Adaptive)
Digital input	9, support DRM/RCR
Digital output	3, 230VAC 1A / 30VDC 1A
Analog input / output	4, support 4 ~ 20 mA or 0 ~ 10 VDC
USB	USB2.0*1
Extended Storage	TF Card, 128GB
WLAN	
WLAN	802.11 b/g/n/ac, HT20/40/80MHz, 2.4GHz
4G (Only 4G version)	
CN version	LTE FDD: B1/B3/B5/B8; LTE TDD: B34/B38/B39/B40/B41; GSM: B3/B8
EU version	LTE FDD: B1/B3/B5/B7/B8/B20/B28; LTE TDD: B38/B40/B41; GSM: B2/B3/B5/B8
AU version	LTE FDD: B1/B2/B3/B4/B5/B7/B8/B28/B66; LTE TDD: B38/B40/B41; GSM: B2/B3/B5/B8
Power Supply	
DC input	12 VDC, 1.7A(Peak)
DC output	12 VDC, 1 A
Average power consumption	<6 W
General Data	
Dimensions	170mm*100mm*42mm
Weight	550g
Mounting type	3.5 mm guide rail
Operating temperature	-30~+75℃
Operating humidity	0%-90% relative humidity, no condensation
Storage temperature	-40~+85℃
Storage humidity	< 40%
Elevation	≤4000 m
Protection degree	IP20
Warranty	2 years

Model	MDR-40-12(Power Adapter)
Output	
DC output voltage	12V
DC output current range	0~3.33A
Rated output power	40W
Input	
AC input voltage range	85~264VAC
AC input frequency range	47~63Hz
AC input frequency range	1.1A/115VAC，0.7A/230VAC
Leakage current	＜ 1mA/240VAC
Protection	
Over Voltage Protection	15.6~18V. Protection mode: Shut down output voltage, resume after reboot
Environment	
Operation temperature	-20~+70℃
Operation humidity	20~90% RH, no condensation
Storage conditions	-40~+85℃ ,10~95%RH
General	
Dimensions	40*90*100mm（W*H*D）
Weight	0.3kg

13 Contact Information

Should you have any question about this product, please contact us.

We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Date of the device
- Fault code/name
- Brief description of the problem

China (HQ)

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