4G Transparent Communication Module

Enertrek_C30 Seires

User Manual

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1 Product Information and Application

1.1 Product Overview

The EnerTrek_C30 module is a 4G communication module designed for the networking and communication of RS485 Modbus RTU devices. For downlink communication, the module connects to Modbus RTU devices via RS485; for uplink communication, it connects to platforms or servers via the 4G network. This enables remote reading, remote control, data monitoring, and networking for on-site equipment.

By default, this module supports the Modbus RTU transparent transmission mode, allowing it to forward Modbus commands issued by the platform or upper computer (host PC) to the on-site devices, and upload the device responses back to the platform.

1.2 Product Positioning

Type	Positioning	Description
Transparent Module	Data Forwarding Channel	Primarily responsible for data forwarding between the network side and the RS485 side; it does not actively parse business data.
Data Acquisition Gateway	Edge Data Acquisition Device	Capable of actively polling downlink devices, parsing the data, and uploading it to the platform.
EnerTrek_C30 Positioning	Primarily Transparent Transmission, Extensible for Data Acquisition	Used for Modbus RTU transparent transmission by default; polling and data acquisition capabilities can be extended in the future based on platform requirements.

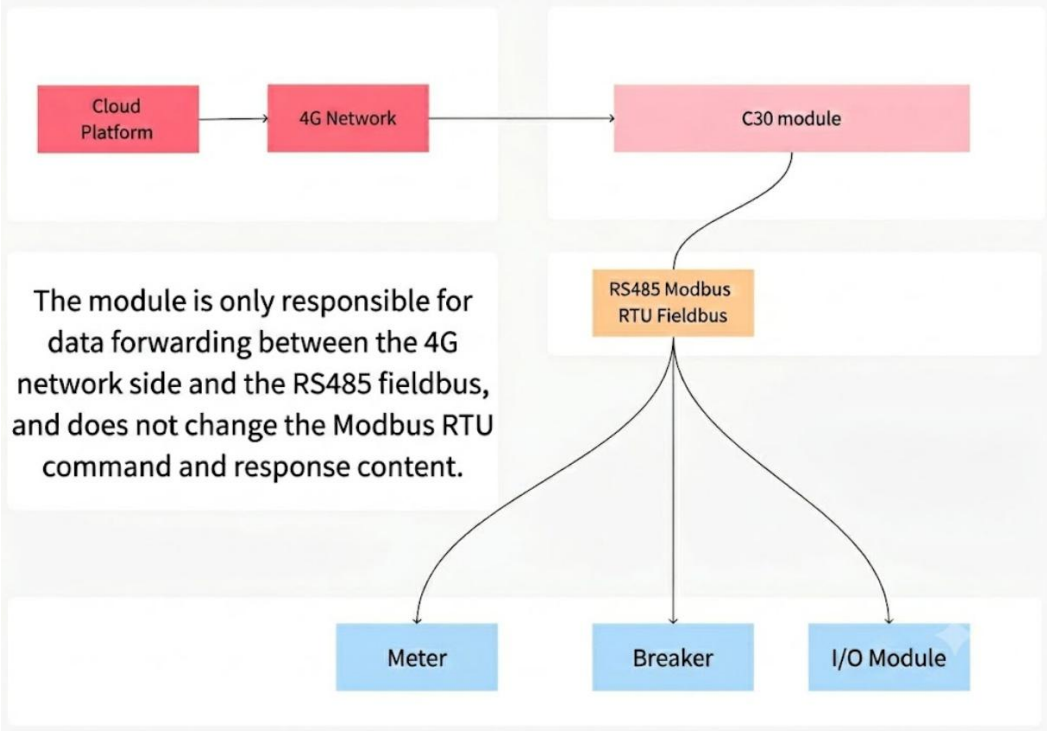
1.3 Typical Applications

Application Scenario	Description
Smart Power Distribution System	Connects to RS485 devices such as smart meters, circuit breakers, and IO modules.
Energy Monitoring System	Uploads data including voltage, current, power, energy consumption, and alarm status.

Industrial Automation	Remotely reads data from on-site devices such as PLCs, instruments, and controllers.
Building Power Distribution Monitoring	Achieves centralized data acquisition and platform management for multiple devices.
Outdoor Device Networking	Applicable for on-site environments with 4G network coverage but no wired network or Wi-Fi available.
Remote Operation & Maintenance (O&M)	Remotely issues Modbus read or control commands through the platform.

2 System Architecture

2.1 System Architecture Diagram



2.2 Communication Logic

Link Direction	Communication Path	Description
Uplink	RS485 Device → EnerTrek_C30 → 4G → Platform	Uploads device response data, status data, or acquired data.
Downlink	Platform → 4G → EnerTrek_C30	Issues Modbus read, configuration, or control

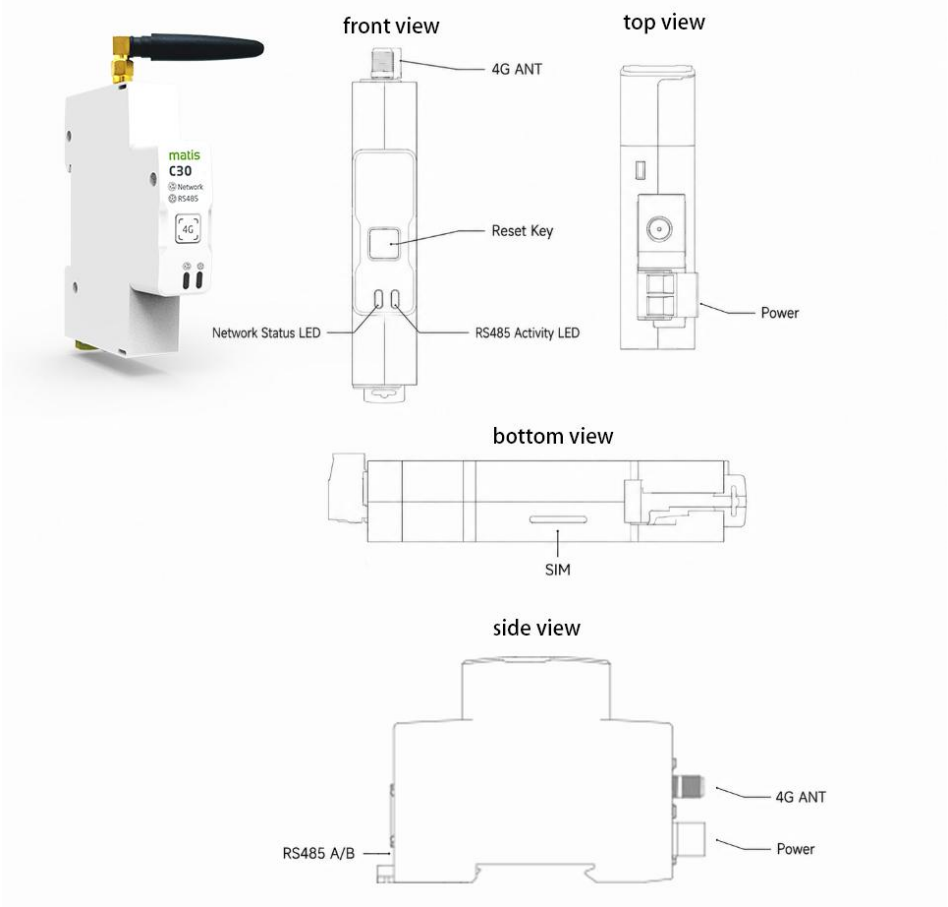
	→ RS485 Device	commands.
Local Configuration	PC Configuration Tool → RS485/Serial Port → EnerTrek_C30	Configures APN, server settings, MQTT Topics, serial port parameters, etc.

2.3 Device Role

Interface / Side	Role	Description
4G / Platform Side	MQTT Client / Communication Terminal	Connects to servers or cloud platforms to complete registration, online status activation, and data transmission/reception.
RS485 Side	Modbus RTU Master or Transparent Channel	Connects downlink to Modbus RTU slave devices.
Downlink Devices	Modbus RTU Slave	Smart meters, circuit breakers, I/O modules, sensors, controllers, etc.

3 Product Ports

3.1 Product Port Diagram



3.2 Port Description

Interface Name	Type	Function Description
Power	Wiring Terminal	Power supply input for the module
RS485 A/B	Wiring Terminal	Connects to Modbus RTU slave devices
SIM	Nano SIM Card Slot	Insert a 4G SIM card for network registration and data services
4G ANT	SMA / IPEX Antenna Interface	Connects to an external 4G antenna
Reset Key	Physical Button	Restores default RS485/UART communication parameters
Network Status LED	Status Indicator	Displays 4G network connection status
RS485 Activity LED	Status Indicator	Displays RS485 communication status
Product Label / QR Code	Label / Identifier	Used for identification of SN, IMEI, model number, and platform binding information.

4 Technical Parameters

Item	Parameter
Product Type	4G transparent communication module
Uplink Communication	4G
Downlink Interface	RS485
Downlink Protocol	Modbus RTU
SIM Card	Nano SIM card
Antenna Interface	External 4G antenna interface
Working Mode	Modbus RTU transparent passthrough; polling acquisition scales with software versions.
Default Serial Parameters	9600, 8, NONE, 1
Supported Baud Rates	1200 ~ 115200 bps
Sub-device Capacity	Supports up to 32 Modbus sub-devices
Configuration Method	Host PC configuration tool
OTA Upgrade	Supports remote upgrade
Operating Temperature	-10 ℃ ~ +55 ℃
Relative Humidity	5% to 95%, non-condensing
Installation Method	DIN rail mounting, subject to final mechanical structure confirmation.
Ingress Protection (IP)	IP20

5 Installation Requirements

5.1 DIN Rail Installation

1. Snap the Enertrek_C30 module onto the DIN rail and verify that the device is securely fixed.

2. Insert the Nano SIM card and install the 4G antenna.

3. Connect the power supply terminals and the RS485 A/B terminals.

4. Before powering on, verify the power supply specifications, RS485 polarity, and downlink device addresses.

5. After powering on, observe the Network Status and RS485 Activity LED indicators.

5.2 Wiring Requirements

Item	Requirement
Power Supply	Ensure the power supply is disconnected before wiring.
RS485 Polarity	Connect A to A and B to B. If communication fails, check whether the wiring is reversed.
Communication Cable	Shielded twisted pair (STP) cables are recommended. High-voltage (strong current) and low-voltage (weak current) cables must be routed separately.
Termination Resistor	For long-distance buses or poor communication quality, it is recommended to configure a 120Ω termination resistor at both ends of the bus.
SIM Card	Use a SIM card that supports 4G data services, and verify that the data plan, APN, and carrier network are functioning normally.
Antenna	The antenna should be securely connected. Avoid complete shielding by metal enclosures or cabinets.

6 Product Functions

6.1 LED Indicator

Indicator	Status	Behavior	Description
Network Status	Normal	Solid green	Registered to the 4G network; connection is normal.
	Registering	Flashing green slowly (approx. 1s)	Registering or continuously attempting to connect to the 4G network.
RS485 Activity	Communicating	Flashing green	Modbus RTU communication is in progress.
	No Communication	LED Off	No downlink device activity detected or device is offline.

6.2 Button Function

Operation Method	Function	Description
Press and hold for 10 seconds	Restores RS485/UART default communication parameters.	Does not restore network parameters such as SIM/APN, server address, MQTT Topic, etc.

Note: Pressing and holding for 10 seconds only restores the RS485/UART communication parameters. Network parameters—such as SIM/APN, server address, and MQTT Topic—will not be restored to defaults. To modify network parameters, they must be configured separately via the configuration tool, platform, or corresponding debugging methods.

6.3 Working Mode

6.3.1 Transparent Transmission Mode

As a data forwarding device, the module transmits Modbus RTU commands issued by the platform or host PC to field devices via RS485, and returns the device responses to the platform in their original format. This mode is applicable for remote meter reading, remote control, device commissioning, and status reading.

6.3.2 Polling Mode

The module can periodically read register data from downlink Modbus RTU devices according to a preset polling table, and perform protocol parsing based on the configured register mapping relationships.

The parsed data can be encapsulated into JSON format as required by the platform and uploaded for the periodic collection and display of data, including voltage, current, power, energy, temperature, switching status, and alarm status.

This mode is applicable to scenarios where the platform needs to directly obtain structured data rather than receiving raw Modbus messages.

Note: This function must be configured or customized in advance based on project requirements. Users must confirm the downlink device's Modbus protocol, register mapping relationships, field names, scaling factors, units, upload intervals, and JSON data formats with the manufacturer. The specific supported content is subject to the actual software version and the configuration files confirmed by both parties.

6.4 OTA Upgrade

The module supports remote OTA upgrades. During the upgrade process, the module will download the firmware, write the program, and automatically restart. Do not disconnect the power supply during the upgrade. The upgrade duration depends on the network quality and firmware size; it takes approximately 1 to 2 minutes to complete in a test environment.

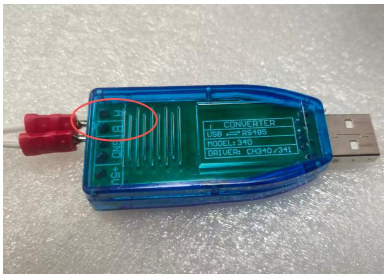
7 Parameter Configuration

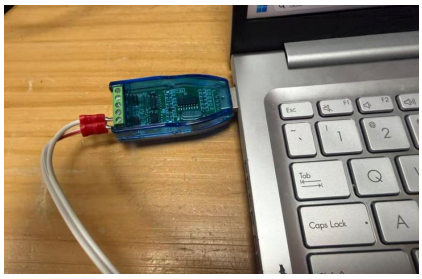
7.1 Configuration Methods

The configuration tool is designed for factory configuration, field debugging, and batch parameter configuration of the module. It enables users to read and modify settings, including server addresses, MQTT Topics, RS485 communication parameters, and sub-device parameters.

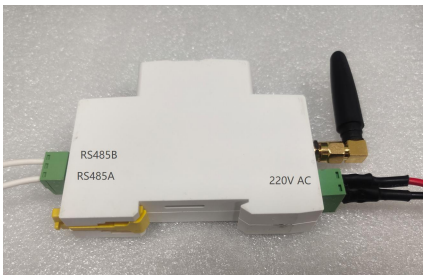
7.2 Configuration Tool Connection

1. Connect the computer to the Enertrek_C30 module using an RS485-to-USB converter.

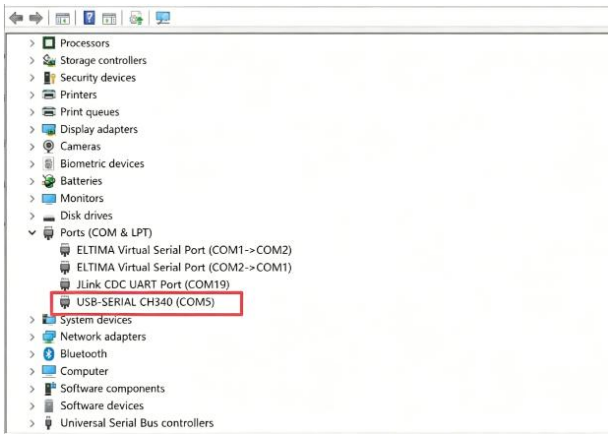




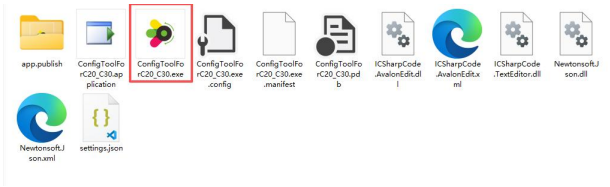
2. Connect the power supply to the Enertrek_C30 and verify that the device powers on normally.



3. Confirm the current serial port number on the computer.

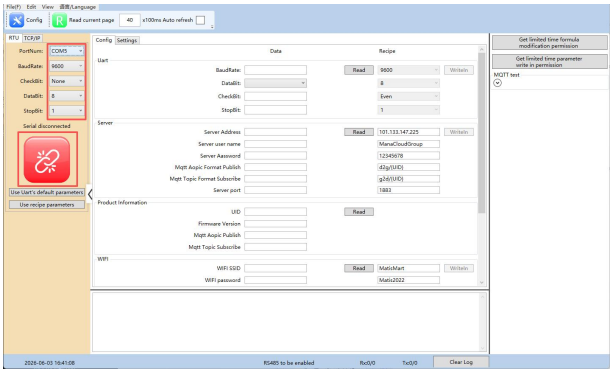


4. Extract and open the C20/Enertrek_C30 configuration tool.

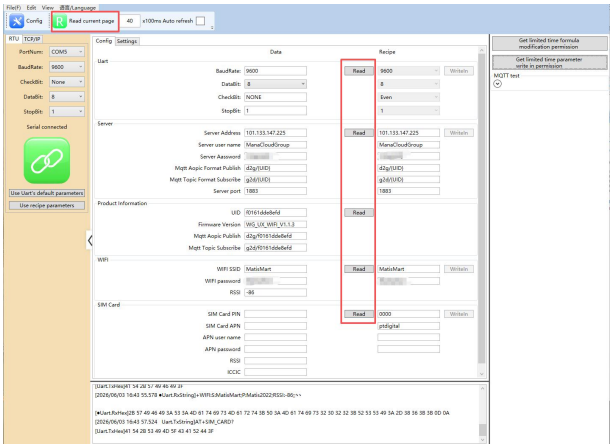


5. Select the language and log in.

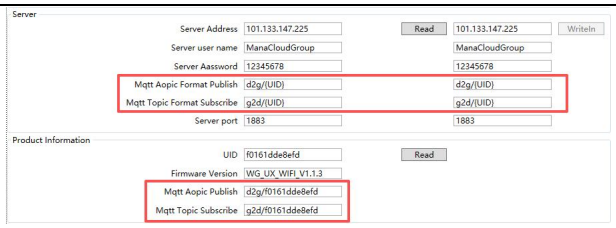
6. Select the RTU parameters and open the serial port.



7. Click "Read Current Page" or the corresponding read button to retrieve the device's current parameters.



8. If you need to modify the parameters, obtain the time-limited parameter write permission first, then modify the parameters and click "Writein".



7.3 4G / APN Configuration

Parameter	Description	Default / Attribute
PIN	SIM card PIN code	Default: 0000
APN	Carrier APN	The default value is "internet"; the actual value may vary depending on the carrier or IoT SIM card service provider.
APN_U	APN username	Default: Left blank
APN_P	APN password	Default: Left blank
RSSI / CSQ	4G signal strength	Read-only; used to evaluate field network quality.
ICCID	SIM card identification number	Read-only; used to confirm current SIM card information.

Standard IoT SIM cards can typically detect the APN automatically. If the SIM card fails to connect to the network automatically, you should verify the APN, username, and password with the network carrier, and configure them using the configuration tool or platform.

7.4 MQTT Server Configuration

Parameter	Description
Server IP / Domain	MQTT server address, which can be an IP address or a domain name.
UserName	MQTT username.
Password	MQTT password.
Publish Topic	Device publishing Topic, used for the module to upload data to the platform.
Subscribe Topic	Device subscription Topic, used for the platform to issue commands to the module.

7.5 MQTT Topic and UID Rule

MQTT Topics support both static topics and dynamic topics that include a UID. When a topic contains {UID}, the module will automatically replace {UID} with the device's unique identification number once it goes online. The 4G version typically uses the IMEI as the UID.

Configured Topic	Actual Topic Example
d2g/{UID}	d2g/867156067806820
g2d/{UID}	g2d/867156067806820
d2g/{UID}/123	d2g/867156067806820/123
d2g/123	d2g/123

7.6 RS485 / UART Parameter Configuration

Parameter	Default Value	Description
Baud Rate	9600	Can be configured according to the downlink device; the supported range is subject to the actual software version.
Data Bits	8	Defined by DataBits, excluding the parity bit.
Parity	NONE	Configure as None, Odd, or Even Parity according to the requirements of the device.
Stop Bits	1	Typically set to 1.
Protocol	Modbus RTU	Used for communication with downlink RS485 devices.
Device Role	RS485 Master / Transparent Channel	Executed according to transparent transmission or polling mode.

8 Operation Procedure

8.1 Install Device

1. Install the module onto a DIN rail or inside an equipment enclosure.
2. Insert a Nano SIM card.
3. Install the 4G antenna.
4. Connect the power supply.
5. Connect the RS485 A/B lines.
6. Verify whether the RS485 device address, baud rate, and parity match consistently.

8.2 Device Online

1. Power on the module.
2. The module automatically detects the SIM card.

3. The module automatically registers onto the 4G network.

4. During network registration, the Network Status green LED flashes slowly.

5. Once the network connection is successful, the Network Status green LED remains solid on.

6. The platform displays the device status as online.

8.3 Connect RS485 Devices

1. Set the Modbus address of the downlink device.

2. Verify the baud rate, data bits, parity, and stop bits.

3. Add the sub-device on the platform.

4. Send a read command to test the communication.

5. During RS485 communication, the RS485 Activity indicator flashes.

8.4 Start Transparent Transmission

1. The platform issues Modbus commands.

2. The Enertrek_C30 forwards the commands to field devices via RS485.

3. Downlink devices return response data.

4. The Enertrek_C30 uploads the response data to the platform through the 4G network.

9 Commissioning

9.1 Preparation

•Enertrek_C30 4G transparent Communication module.

•Available 4G SIM card and 4G antenna.

•RS485-to-USB converter.

•C20/Enertrek_C30 configuration tool.

•Modbus test device, meter or circuit breaker.

•Platform account, server parameters, or MQTT test tool.

9.2 Network Verification

•Verify whether the Network Status green LED remains solid on.

•Verify whether the RSSI / CSQ signal quality can be read normally.

•Check whether the platform displays the device status as online.

•Verify whether the server address, port, username, and password are correct.

9.3 RS485 Verification

•Verify whether the RS485 A/B lines are connected reversely.

•Check whether the downlink device addresses are duplicated.

•Verify whether the baud rate, data bits, parity, and stop bits match consistently.

•Check whether the RS485 Activity indicator flashes.

•Verify whether there is a response when executing the Modbus register read command.

9.4 Platform Communication Verification

•Verify whether the MQTT server address is accessible.

•Check whether the MQTT port, username, and password are correct.

•Verify whether the Publish Topic and Subscribe Topic are configured correctly.

•Check whether {UID} has been replaced with the actual device UID/IMEI.

•Verify whether the platform can successfully issue commands and receive device responses.

9.5 Device Information Verification

Information Item	Description
UID	Device unique identification number; the 4G version typically uses the IMEI.
FW	Firmware version number.
PUB	Device publishing topic.
SUB	Device subscription topic.
UART	Current RS485/UART communication parameters.

10 Document Revision History

Version	Date	Section	Revision Description	Reason for Revision	Prepared by	Reviewed by	Approved by	Remarks
V1.0	2026-06-17	Full Doc	Initial release.	New document creation.	Wynn Zhang			

Note:

1. The version number is recommended to follow formats such as V1.0, V1.1, V2.0, etc. Minor revisions should use sub-version numbers, while major structural or functional changes should use major version numbers.

2. The revision description should clearly state “what has been changed”, and the reason for revision should clearly state “why it was changed”.

3. Before a controlled document is released, the preparation, review, and approval process should be completed, and the revision history should be retained.