



Powering Business Worldwide

Installation instructions

Industrial Gateway Card for UPS

INDGW-M2

English

Eaton is a registered trademark of Eaton Corporation or its subsidiaries and affiliates. Phillips is a registered trademark of Phillips Screw Company.

National Electrical Code and NEC are registered trademarks of National Fire Protection Association, Inc.

Microsoft®, Windows®, and Windows Server® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

UNIX® is a registered trademark of The Open Group.

Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries.

VMware is a registered trademark or trademark of VMware, Inc. in the United States and/or other jurisdictions.

Google™ is a trademark of Google Inc.

All other trademarks are properties of their respective companies.

©Copyright 2019 Eaton Corporation. All rights reserved.

No part of this document may be reproduced in any way without the express written approval of Eaton Corporation.

1 Servicing the Network Management Module

1.1 Unpacking the Network module

The network module will include the following:

- Network module
- Quickstart
- USB AM to Micro USB/M/5P 5ft Cable
- RS-485 wiring terminal

i Packing materials must be disposed of in compliance with all local regulations concerning waste. Recycling symbols are printed on the packing materials to facilitate sorting.

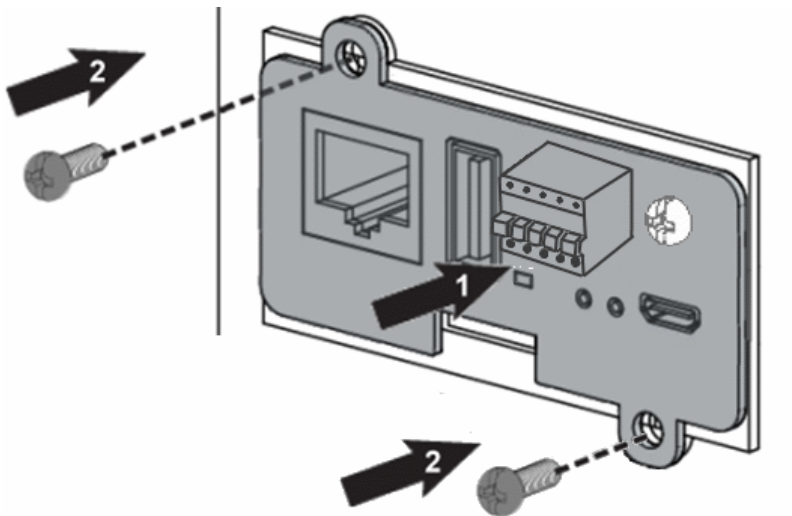
1.2 Installing the Network Module

1.2.1 Mounting the Network Module

i It is not necessary to power down the UPS before installing the Network Module. Required tools: No. 2 Phillips screwdriver.

The Network Module is hot-swappable. Inserting and/or extracting the Network Module from the communication slot of the product has no effect on the output.

1. Remove the two screws securing the option slot cover plate and store the plate for possible future use.



2. Install the Network Module along the alignment channels in the option slot. Secure the Network Module using the two screws you removed in step 1.
3. If the product is powered up, you can verify that the Network Module is seated properly and communicating with the product by checking that the Status ON LED flashes green after 2 minutes.

1.2.2 Wiring the RS-485 Modbus RTU terminal

The Modbus Network Module provides an easy path for integrating an Eaton UPS into an RS-485 Modbus network and also provides isolation of the communication between the UPS and the RS-485 Modbus network.

Use the terminal strip on the Modbus Network Module to wire into a two-wire network.

⚠ If the Modbus Network Module is the last device installed in the network chain or the length of the network cable is excessive, termination needs to be enabled.

For details on termination, see the ***Configuring the termination*** section.

A- Modbus Common/GND (0V pin on terminal block) connection

The Network Module is an isolated device, if all the other devices on the network are isolated, common/GND (0V pin on terminal block) should be connected between devices to limit common mode voltage.

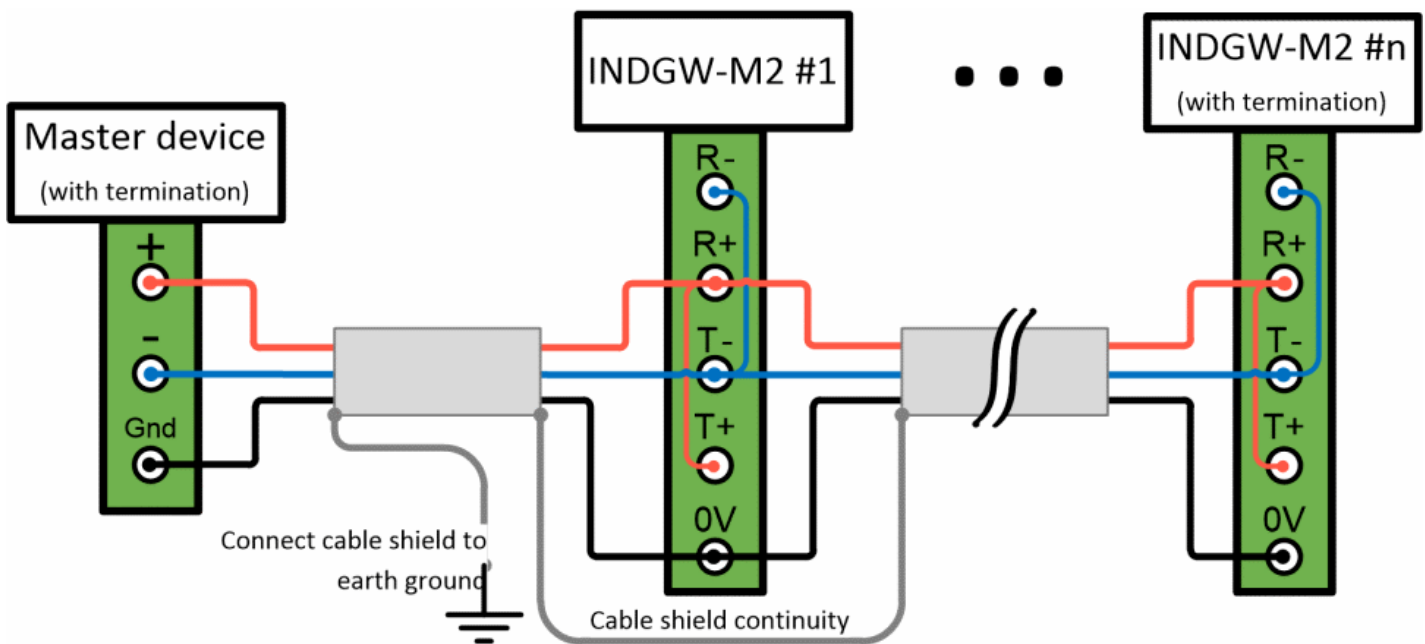
Common/GND (0V pin on terminal block) should not be connected to any other devices that is not isolated to avoid ground loops.

B- Cable shield connection (foiled or braised)

The cable shield should be continuous on the entire length of the bus and should be connected to ground (earth) at only one point to limit the flow of ground-loop currents in the shield caused by ground potential differences.

C- Two-wire networks

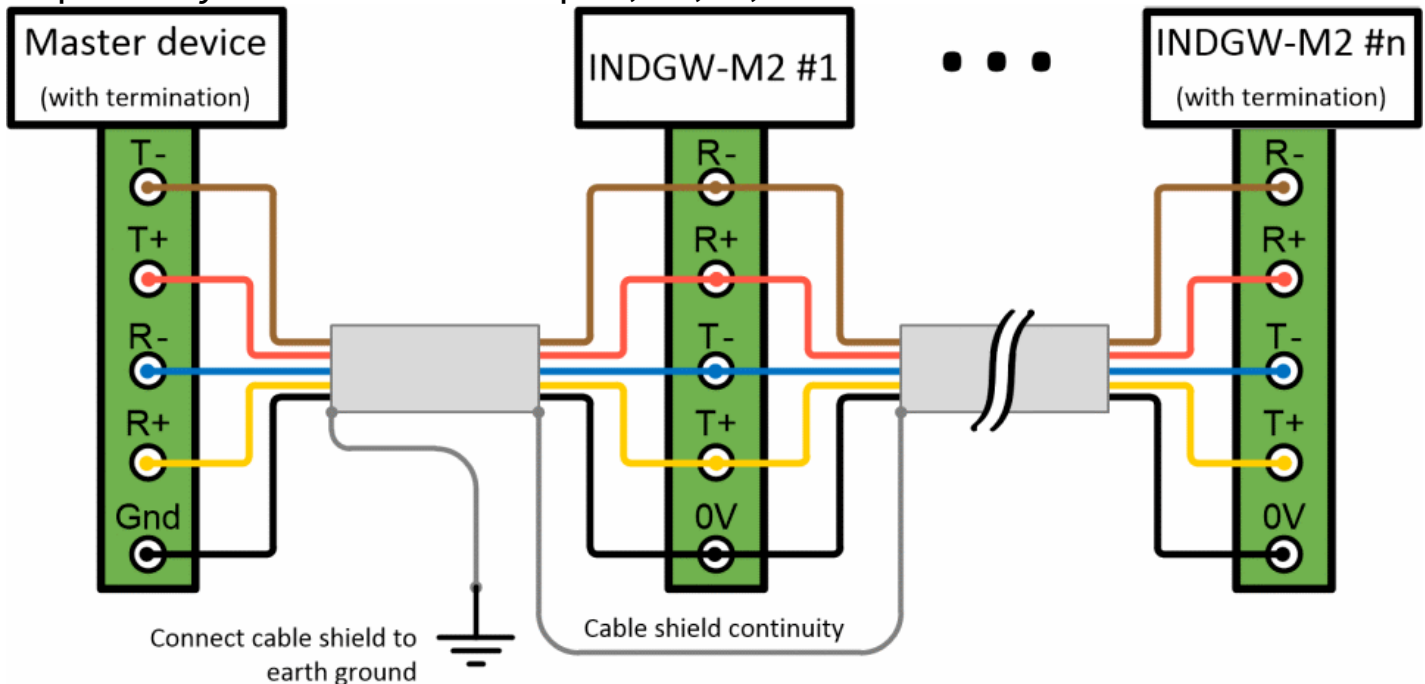
- Interconnect R- with T- and R+ with T+ on the Modbus Network Module terminal strip.
- Connect the RS-485 network signal + to the R+ or T+ on the Modbus Network Module terminal strip.
- Connect the RS-485 network signal – to the R- or T- on the Modbus Network Module terminal strip.



① Belden 3106A-22AWG or equivalent cabling (a 1.5 twisted-pair shielded 120Ω cable with ground) is recommended.

D- Four-wire networks

All four RS-485 network signals including T-, T+, R-, and R+ must be connected respectively to the terminal strip R-, R+, T-, T+.



① Belden 9843-24AWG or equivalent cabling (3 twisted-pair shielded 120Ω cable with ground) is recommended.

E- Configuring the termination

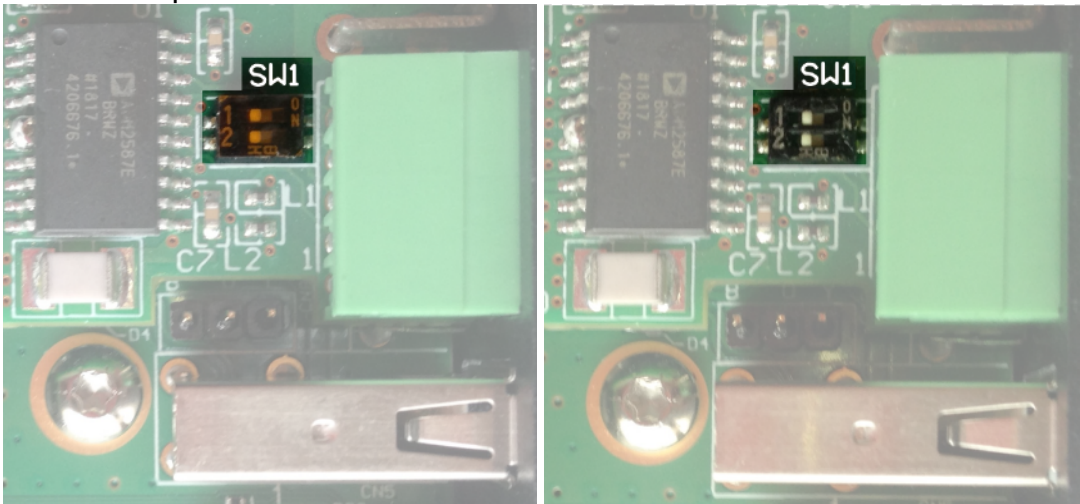
If the Modbus Card is the last device installed in the network chain or the length of the network cable is excessive, termination needs to be enabled.

Termination is used to match impedance of a node to the impedance of the transmission line being used. When impedance are mismatched, the transmitted signal is not completely absorbed by the load and a portion is reflected back into the transmission line.

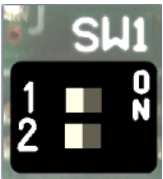
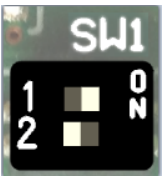
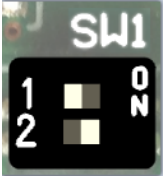
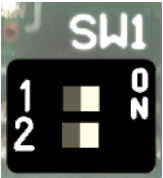
⚠ No more than two termination points should be used in the RS-485 network.

To enable the on-board termination resistor (120Ω) :

- 1. Locate the termination switch that is located on the top of the Modbus Network Module.
- 2. Peel off the protection :



- 3. Change the position of the termination switch according to your needs:

	Switch position
No termination (default)	
Termination for <u>two-wire</u> networks	One of the two position below can be used:  or 
Termination for <u>four-wire</u> networks	

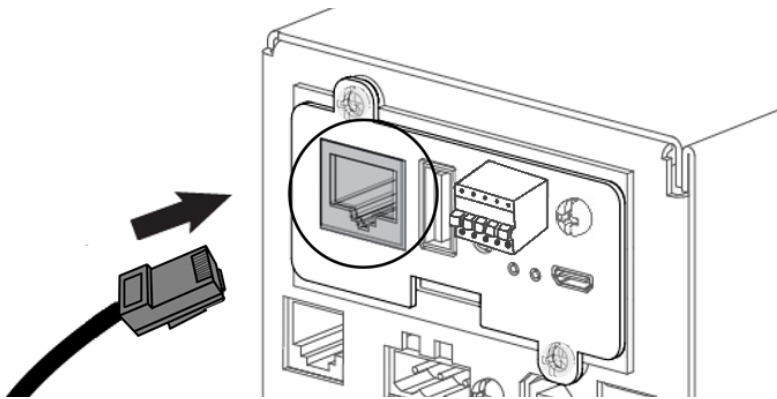
1.3 Accessing the Network Module

1.3.1 Accessing the web interface through Network

A- Connecting the network cable

⚠ Security settings in the Network Module may be in their default states. For maximum security, configure through a USB connection before connecting the network cable.

Connect a standard *gigabit compatible shielded ethernet cable (F/UTP or F/FTP)* between the network connector on the Network Module and a network jack.



B- Accessing the web interface


⚠ It is highly recommended that browser access to the Network Module is isolated from outside access using a firewall or isolated network.

1. On a network computer, launch a supported web browser. The browser window appears.
2. In the Address/Location field, enter: `https://xxx.xxx.xxx.xxx`, where `xxx.xxx.xxx.xxx` is the static IP address of the Network Module.
The log in screen appears.
3. Enter the user name in the User Name field. The default user name is **admin**.
4. Enter the password in the Password field. The default password is **admin**.
The password must be changed at first login.
5. Click **Sign In**. The Network Module web interface appears.

1.3.2 Finding and setting the IP address

A- Your network is equipped with a BOOTP/DHCP server (default)

1 Read from the device LCD

 Note: some older UPS may not be able to display the IP address even if they have an LCD. Please consult the UPS manual.

If your device has an LCD, from the LCD's menu, navigate to Identification>>>"COM card IPv4".

- Note the IP address of the card.
- Go to the section: Accessing the web interface through Network.

2 With web browser through the configuration port

For example, if your device does not have an LCD, the IP address can be discovered by accessing the web interface through RNDIS and browsing to Settings>Network.

- To access the web interface through RNDIS, see the [Accessing the web interface through RNDIS](#) section.
 - Navigate to Settings>>>Network>>>IPV4.
 - Read the IPv4 settings.

B- Your network is not equipped with a BOOTP/DHCP server

1 Define from the configuration port

The IP address can be defined by accessing the web interface through RNDIS.

To access web interface through RNDIS, see the [Accessing the web interface through RNDIS](#) section.

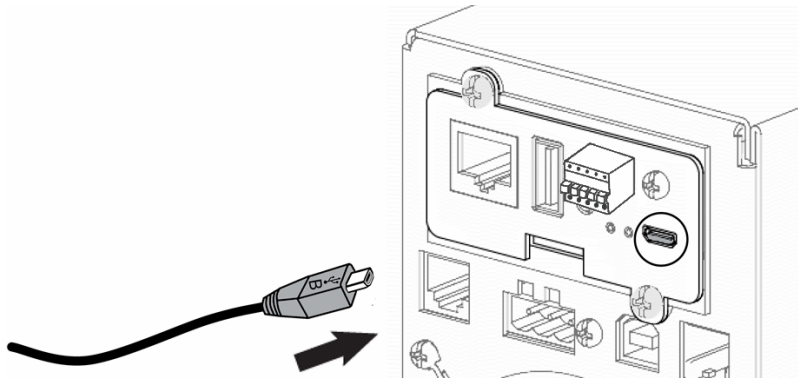
Define the IP settings:

- Navigate to Settings>>>Network>>>IPV4.
- Select Manual (Static IP).
- Input the following information: Address, Subnet Mask, Default Gateway
- Save the changes.

1.3.3 Accessing the web interface through RNDIS

A- Connecting the configuration cable

1. Connect the Micro-B to USB cable to a USB connector on the host computer.
2. Connect the cable to the Settings connector on the Network Module.



This connection is used to access and configure the Network Module network settings locally through a RNDIS (Ethernet over USB interface).

B- Web interface access through RNDIS

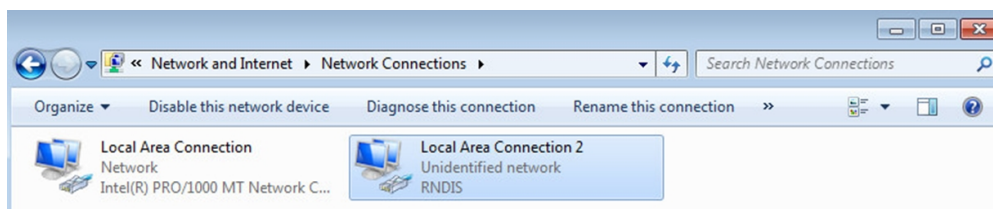
1 Configuring the RNDIS

Automatic configuration

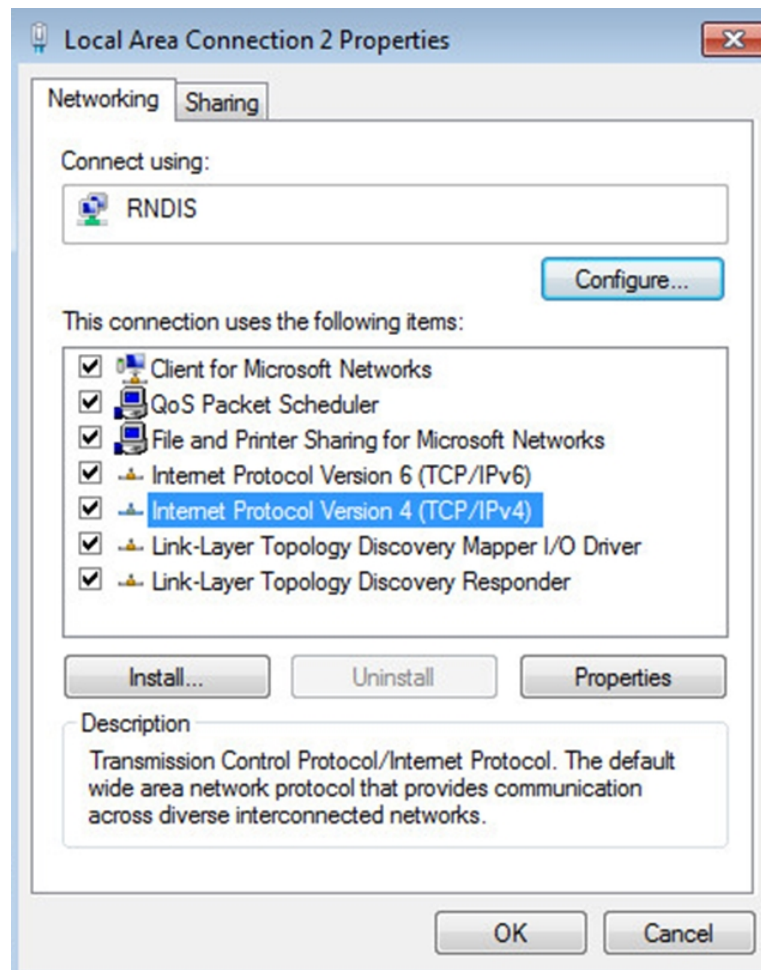
- ① RNDIS driver is used to emulate a network connection from USB. After the card is connected to the PC, **Windows**® OS will automatically search for the RNDIS driver. On some computers, the OS can find the RNDIS driver then configuration is completed and you can go to Accessing the web interface. On some others it may fail then proceed to manual configuration.

Manual configuration

1. In case **Windows**® OS fails to find driver automatically, go to the Windows control panel>Network and sharing center>Local area connection



2. Right click on the RNDIS local area connection and select Properties.
3. Select Internet Protocol Version 4 (TCP/IPv4) and press the Properties button.



4. Then enter the configuration as below and validate (IP = 169.254.0.150 and mask = 255.255.255.0), click OK, then click on Close.

2 Accessing the web interface

1. Be sure that the UPS is powered on.
2. On the host computer, download the RNDIS_Serial.zip file from the website www.powerquality.eaton.com/Support/ and extract it.

For more information, navigate to Accessing to the latest Network Module firmware/driver section.

3. Launch setProxy.bat to add 169.254.* in proxy's exceptions list, if needed.

For manual configuration, navigate to Modifying the Proxy exception list section in the full documentation.

4. Launch a supported browser, the browser window appears.
5. In the Address/Location field, enter: **https://169.254.0.1**, the static IP address of the Network Module for RNDIS. The log in screen appears.
6. Enter the user name in the User Name field. The default user name is **admin**.
7. Enter the password in the Password field. The default password is **admin**.
8. Click **Sign In**. The Network Module local web interface appears.

1.3.4 Accessing the card through serial terminal emulation

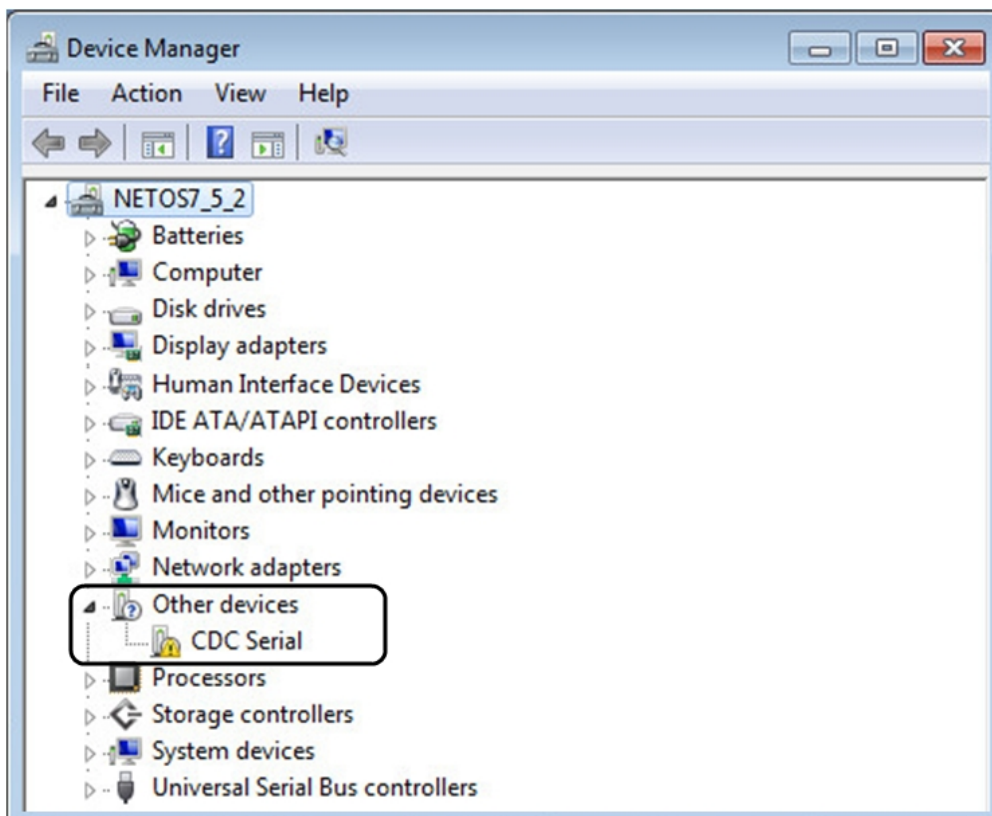
A- Connecting the configuration cable

1. Connect the Micro-B to USB cable to a USB connector on the host computer.
2. Connect the cable to the Settings connector on the Network Module. This connection is used to access and configure the Network Module network settings locally through Serial (Serial over USB interface).

B- Manual configuration of the serial connection

① Serial driver is used to emulate a serial connection from USB. After the card is connected to the PC, manual configuration of the driver is needed for **Windows**® OS to discover the serial connection.

1. On the host computer, download the RNDIS_Serial.zip file from the website www.powerquality.eaton.com/Support/ and extract it.
2. Plug the USB cable and go to **Windows**® Device Manager.
3. Check the CDC Serial in the list, if it is with a yellow exclamation mark implying that driver has not been installed follow the steps 4-5-6-7 otherwise configuration is OK.



4. Right click on it and select Update Driver Software. When prompted to choose how to search for device driver software, choose Browse my computer

for driver software. Select Let me pick from a list of device drivers on my computer.

5. Select the folder where you have previously downloaded the driver file Click on Next.

6. A warning window will come up because the driver is not signed. Select Install this driver software anyway


7. The installation is successful when the COM port number is displayed for the Gadget Serial device in the **Windows**® Device Manager.


C- Accessing the card through Serial

CLI can be accessed through:

- SSH
- Serial terminal emulation.

It is intended mainly for automated configuration of the network and time settings of the network card. It can also be used for troubleshooting and remote reboot/reset of the network interface in case the web user interface is not accessible.

 Changing network parameters may cause the card to become unavailable remotely. If this happens it can only be reconfigured locally through USB.

 You can see this list of available commands by typing in the CLI: **?**
You can see the help by typing in the CLI: **help**

For more details, refer to CLI section in the Network Module User Guide on the Eaton website.

1.4 Configuring Modbus TCP and RTU


1.4.1 Configuring the communication parameters

- Access the web interface through Network or RNDIS
- Navigate to Settings>>>Modbus and set the communication parameters to the desired settings.

	Default setting	Possible parameters
Modbus RTU	Enable — disabled Baud rate (bps) — 19200 Parity — Even Stop bits – 1	Enable — disable/enable Baud rate (bps) — 1200/2400/4800/9600/19200/38400/57600/1152 00 Parity — None/Even/Odd Stop bits – 1/2
Modbus TCP	Enable — disabled Port — 502	Enable — disable/enable Port — x-xxx
Mapping configuration	No mapping	Name – 128 characters maximum Map – Eaton ModbusMS compatible Transport – RTU/TCP Device ID – from 1 to 247 Access – None/Read only/Read/Write Illegal read behaviour – Return exception/ Return zeros

1.4.2 Available maps

- Access the web interface through Network or RNDIS
- Navigate to Settings>>>Modbus and press the **Supported MAPs** button to download the MAPs.

 File is generated in real time and will take into account the UPS capabilities and values at the time of the generation.
Table in the downloaded file will show all possible registers, only the one showing Available equal to True will be supported by your system.

A- Mapping table content

- address (hex): register address in hexadecimal
- address (1-base): register address in 1-base format
- Type: Register/Discrete
- Size in bytes
- Number of modbus registers
- Writable: True/False

- Representation: Int16/Uint16/String/Boolean/...
- Name
- Description
- Unit (Kelvin, A, V, W, VA, %, Hz, min, ...)
- Status to 0: status when the discrete equal 0
- Status to 1: status when the discrete equal 1
- Available: True/False – Shows if the register is available on current UPS
- Value: Shows current value of the register on current UPS

1.4.3 Modbus communication monitoring tool









- Access the CLI through SSH or the Serial terminal emulation
- Get available commands by typing ? in the CLI

CLI commands can be used to retrieve Modbus communication statistics, for more information, see the UPS Network Module User Guide.

1.5 Configuring the Network Module settings

Use Eaton UPSNetwork Module web interface to configure the UPS Network Module.

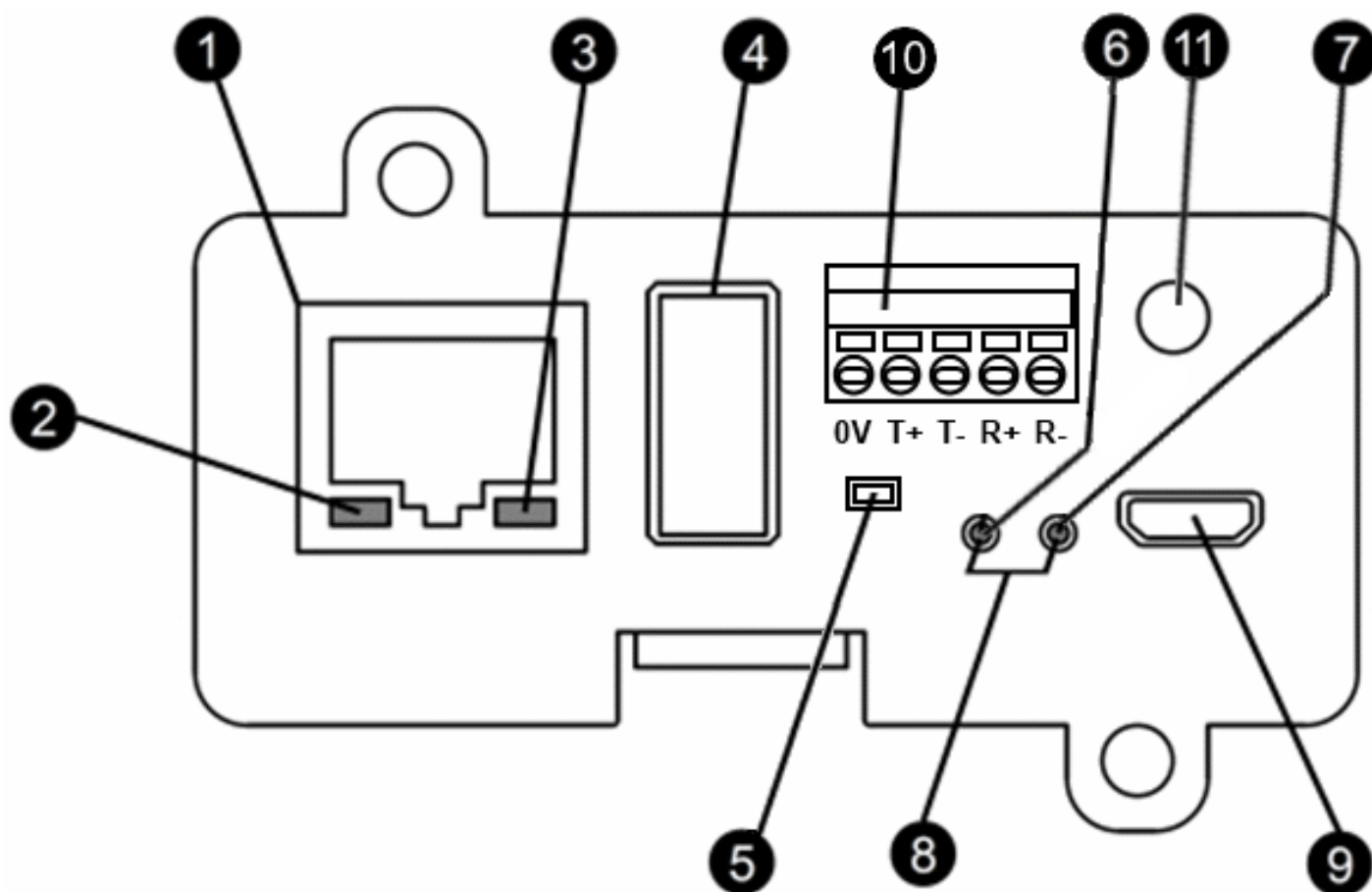
Main web interface menus are described below:


	Home page with overview of the UPS/Module status (Synoptic with measures, Active alarms, Meters, Outlet status,...).
	Module settings (Date&Time, Users, Network, Protocols, Certificates, Email, My Preferences, ...).
	List of Alarms with date, time and description.
	Power quality meters and measure logs.
	Entire UPS Control, Battery test, Outlets control.
	Scheduled Shutdown, Agents list, Agent Settings, Power Outage Policy.
	Sensors (only displayed when sensors have been discovered in card administration)
	Card administration (Firmware upgrade, reboot, save and restore, sensor commissioning,...)

For more information, see the UPS Network Module User Guide on the Eaton website.

2 Information

2.1 Front panel connectors and LED indicators



Nbr	Name	Description
1	Network connector	Ethernet port
2	Network speed LED	Flashing green sequences: <ul style="list-style-type: none"> • 1 flash — Port operating at 10Mbps • 2 flashes — Port operating at 100Mbps • 3 flashes — Port operating at 1Gbps
3	Network link/activity LED	<ul style="list-style-type: none"> • Off — UPS Network Module is not connected to the network. • Solid yellow — UPS Network Module is connected to the network, but no activity detected. • Flashing yellow — UPS Network Module is connected to the network and sending or receiving data.
4	AUX connector	For Network Module accessories only.
		 <i>Do not use for general power supply or USB charger.</i>
5	Restart button	Ball point pen or equivalent will be needed to restart: <ul style="list-style-type: none"> • Short press (<6s) — Safe software restart (firmware safely shutdown before restart). • Long press (>9s) — Forced hardware restart.
6	ON LED	Flashing green — Network Module is operating normally.
7	Warning LED	Solid red — Network Module is in error state.
8	Boot LEDs	Solid green and flashing red — Network Module is starting boot sequence.
9	Settings/UPS data connector	Configuration port. Access to Network Module's web interface through RNDIS (Emulated Network port). Access to the Network Module console through Serial (Emulated Serial port).
10	Modbus connector	Detachable terminal block with push-in connections: 0V / T+ / T- / R+ / R-
11	Shield	Depending on the cabling this location may be used as a shield reference.

2.2 Specifications/Technical characteristics

Physical characteristics	
Dimensions (wxdxh)	132 x 66 x 42 mm 5.2 x 2.6 x 1.65 in
Weight	70 g 0.15 lb
RoHS	100% compatible
Storage	
Storage temperature	-25°C to 70°C (14°F to 158°F)
Ambient conditions	
Operating temperature	0°C to 70°C (32°F to 158°F)
Relative humidity	5%-95%, noncondensing
Module performance	
Module input power	5V-12V ±5% 1A
AUX output power	5V ±5% 200mA
Date/Time backup	CR1220 battery coin cell The RTC is able to keep the date and the time when Network Module is OFF
Functions	
Languages	English, French, Italian, German, Spanish, Japanese
Alarms/Log	Email, SNMP trap, web interface / Log on events
Network	Gigabit ETHERNET, 10/100/1000Mb/s, auto negotiation, HTTP 1.1, SNMP V1, SNMP V3, NTP, SMTP, DHCP
Security	Restricted to TLS 1.2
Supported MIBs	<i>xUPS MIB / Standard IETF UPS MIB (RFC 1628) / Sensor MIB</i>
Browsers	Internet Explorer, Google Chrome, Firefox, Safari
Settings (default values)	
IP network	DHCP enabled NTP server: pool.ntp.org
Port	443 (https), 22 (ssh), 161 (snmp), 162 (snmp trap), 25 (smtp), 8883 (mqttps), 123 (ntp), 5353 (mdns-sd), 80 (http), 514 (syslog)
Web interface access control	User name: admin Password: admin
Settings/UPS data connector	USB RNDIS Apipa compatible IP address: 169.254.0.1 Subnet mask: 255.255.0.0