

# Blueye

EN

Installation, use and maintenance manual

24-03-2022



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## THANK YOU

Thank you for choosing our product.

It is the result of many years' experience and careful design and has been built with first-class quality materials and advanced technologies.

Declaration or certificate of conformity also guarantees that the equipment meets the requirements of the European Machinery Safety Directive.

The quality level is constantly monitored, and therefore our products are synonymous with Safety, Quality and Reliability.

Changes considered necessary for product improvement may be made to the stated data at any time without any obligation to give prior notice.

Thank you again



Read this manual carefully before installing, testing or starting this unit.

Give this manual and all complementary documentation to the operator of the system who will be responsible for keeping them so they are always available if needed.



The images and drawings contained herein are examples only.

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# 1 INTRODUCTION

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## 1.1 Safety precautions

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During installation and operation of the instrument, the following instructions must be followed:

- The instrument must be installed by a qualified and authorized person
- Strictly follow the connection diagrams during installation
- The instrument should be installed in a panel so as to ensure that, after it has been positioned, the terminals cannot be reached
- The panel must be wired in compliance with IEC standards
- Do not power the instrument if parts of it are damaged
- Swegon Operations s.r.l. accepts no responsibility for malfunctioning, breakages, accidents or anything else that may be caused by not knowing or failing to apply the instructions given
- Swegon Operations s.r.l. reserves the right to work on the product without being obliged to promptly update the user manuals

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## 1.2 General Description

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- Blueye is an innovative solution studied to meet requirements for remote control and remote management of a wide variety of technical installations in a continuous and automated manner.
- It consists of a peripheral electronic board able to detect data through RS485 serial communication ports and Ethernet on ModBus RTU / Modbus TCP protocol, and transmit them through a 2G/3G modem or the xDSL network to the relevant servers.
- Here, they are stored, processed and made available to authorized users, through the use of a normal web browser and a smartphone app.
- Blueye allows users to monitor and work on the operation of their sites without needing to set up their own control centre.
- The user only needs to connect to Internet, go to the website [www.blueboxcooling.com](http://www.blueboxcooling.com), in the Blueye section, and log in to work on the information transmitted in real time by the remote station as though s/he were on the spot. Access to the platform takes place on request to [cantarana.warranty@swegon.it](mailto:cantarana.warranty@swegon.it).
- The Blueye peripheral implements the Modbus Master protocol that interrogates the slaves (up to 5) with local polling time of up to 5 seconds. The peripheral analyses the data received and sends them to the server depending on a settable polling, or instantly when alarm conditions occur.

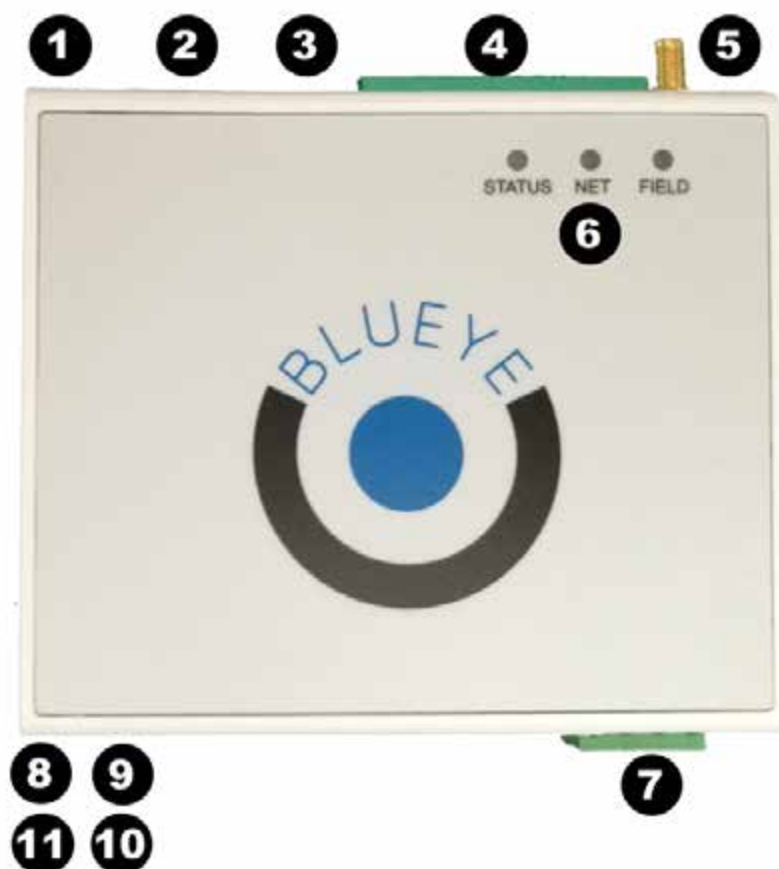
It is possible to:

- Configure (only authorized user) the registers for each individual slave peripheral
- View all the registers in real time
- View or extract log data, graphic trends and tables, and set the values of the registers
- Create standard configuration “templates”. (only authorized user) to be re-used later
- Access the diagnostics section to identify any communication problems

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## 2 CONNECTIONS

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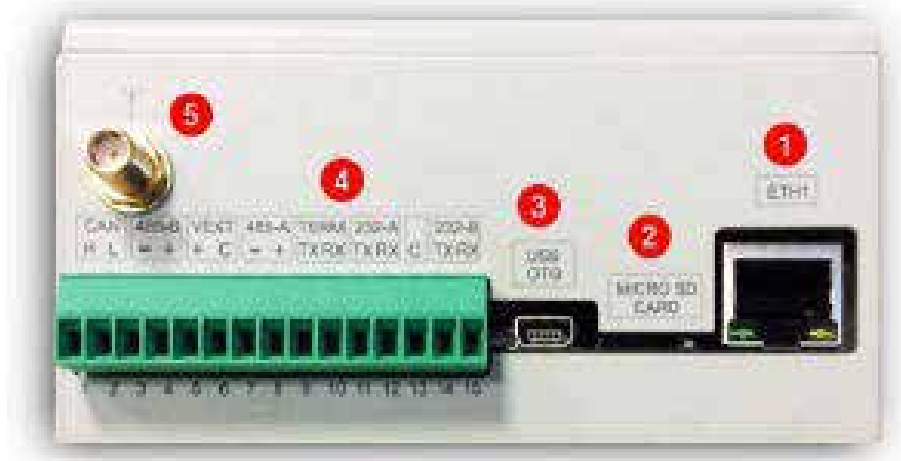


### 2.1 Description of the terminals

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1. ETH1 Ethernet port
2. Micro SD Card
3. Mini USB OTG Port
4. 15 pin serial connector
5. Modem antenna connector
6. Indicator LEDs
7. Digital input / Power supply
8. SIM Card
9. ETH0 Ethernet port
10. Type A USB port
11. Factory Reset button

## 2.2 Detail of connections



## 2.3 Description of the terminals

1. **Ethernet Port ETH:1** This is a 10/100 Ethernet port
2. **Micro SD Card:** This slot can house a micro SD card (for future developments)
3. **Mini USB OTG Port:** (for future developments)
4. **15 pin serial connector**
5. **SMA F modem antenna connector:** It is possible to connect a dual band GSM antenna

**N.B. Pin 6 is the common (GND)**

PIN	DESCRIPTION	PORT
1	Can H	CAN BUS
2	Can L	
3	-	RS 385-B
4	+	VEXT
5	+	
6	C	can be used to polarize the RS485 bus (as per diagram shown later)
7	-	RS 485-A
8	+	
9	TX	RS 232 SERVICE (diagnostics)
10	RX	
11	TX	RS 232-A
12	RX	COMMON (GND)
13	C	
14	TX	RS 232-B
15	RX	



## 2.4 Detail of connections of lower part



PIN	DESCRIPTION	PORT
1	non-polarized	POWER SUPPLY
2	non-polarized	12-24 AC/DC
3	-	DIGITAL INPUT
4	-	(opto-isolated input)

### 7. Digital Input / Power Supply:

8. **SIM Card** Slot for GSM SIM (Mini-SIM format)

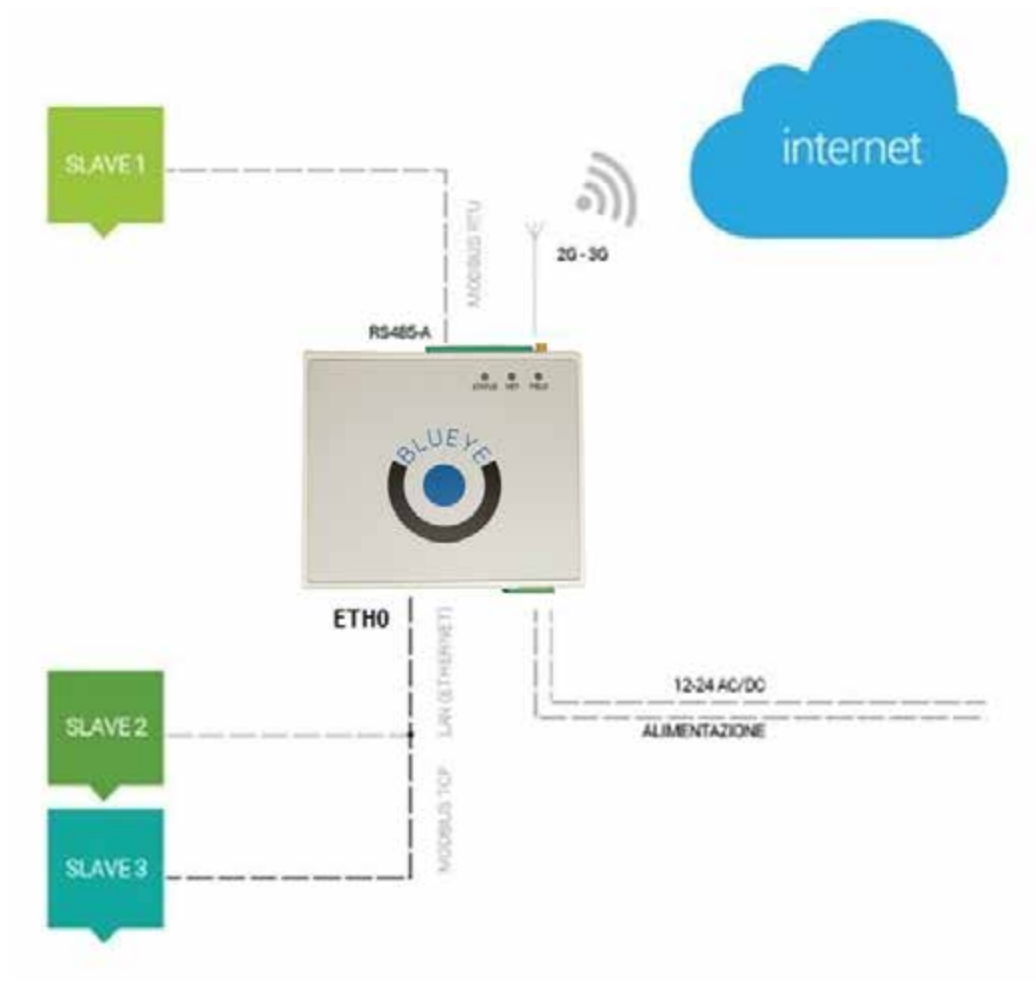
9. **ETH0 Ethernet port:** This is a 10/100 Ethernet port that can be used with WAN functions (for connection to the Internet) and/or LAN (to access local devices on IP network)

10. **Type A USB port:** Via this port, which implements the standard USB DEVICE, it will be possible to connect a peripheral to the Blueye device (e.g. USB memory stick, external disc, etc.)

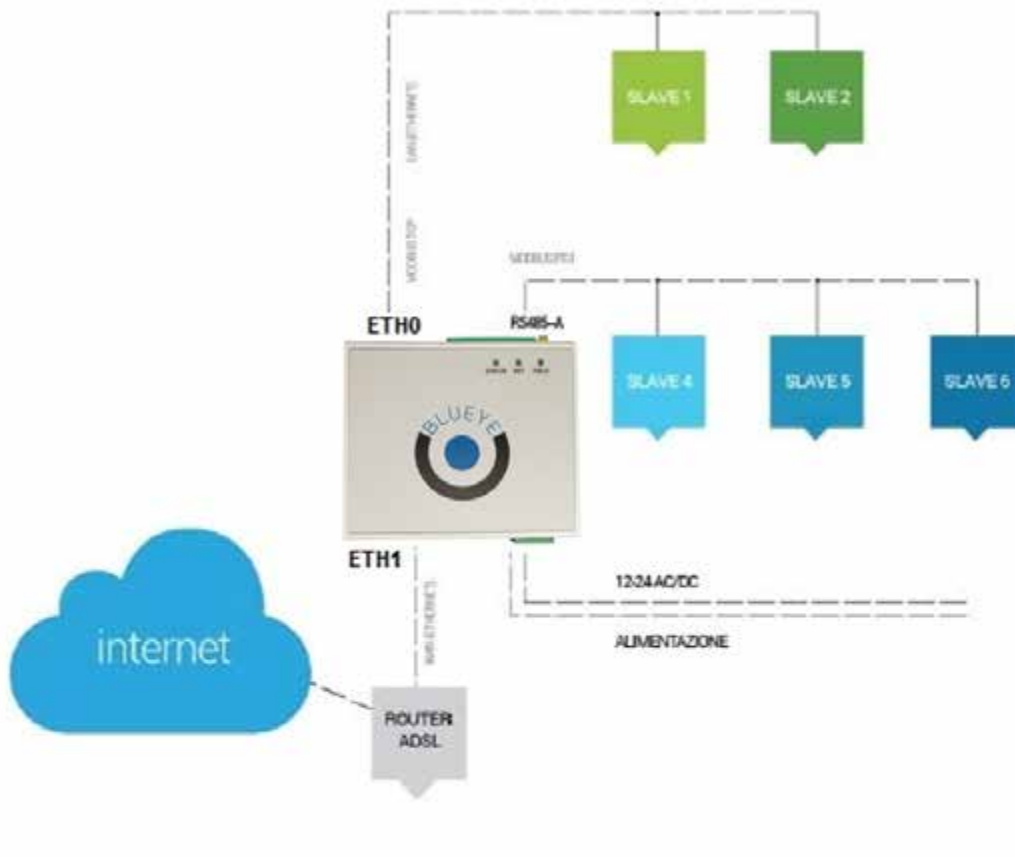
11. **Factory Reset button:** this button is used to start the “factory reset” procedure, as explained later.

### 3 TYPES OF CONNECTION

#### 3.1 Connection to the Internet through 2G/3G network



## 3.2 Connection to the Internet through ADSL



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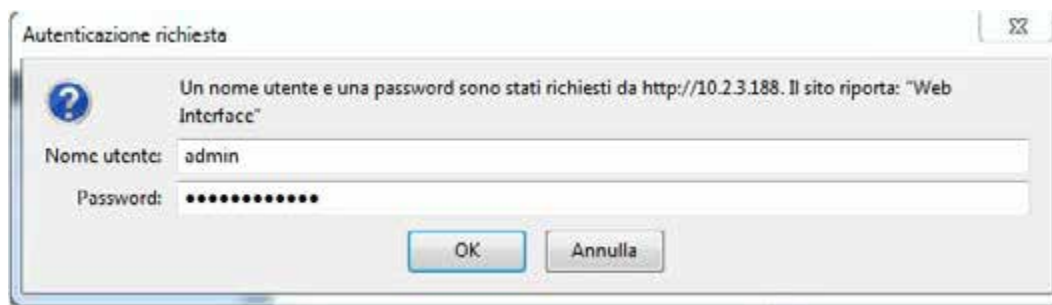
## 4 DEVICE ACCESS TO THE INTERNET

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### 4.3 Connection to the Internet through 3G or Ethernet

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To correctly configure the Blueeye device, it is necessary to access through a web page. Once the IP address of the Blueeye has been typed in (10.2.3.30 by default), the authentication password will be requested.



As default for these devices, we have:

username: **admin**

password: MAC address of the ETH0 Ethernet port without the colon, therefore: **9c53cd00990b**



The letters must all be lowercase.



For the type of connection (APN or Ethernet), follow the instructions in the previous chapters.

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# 5 CONNECTION TO THE OUTSIDE WORLD

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The Blueye device can communicate with the outside world in two distinct ways: The first requires installation of a SIM Card that will allow navigation on the Internet, whereas the second requires connection, through special connection cable, of the device to an Internet access point provided by the existing IT infrastructure.

## 5.1 First Switch On

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Consult the “Connections” chapter and then power the device.

If the device is not initially configured, the 3 LEDs will flash simultaneously to indicate that the device is waiting to be configured via web page.

This configuration can also be obtained by restoring the factory settings (factory reset).

## 5.2 Connection to the Internet through SIM Card

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To be fully operative, the Blueye device must first be correctly configured. The SIM Card must have certain features, otherwise it will not be possible to access the Internet.

### 5.2.1 Features of the SIM Card

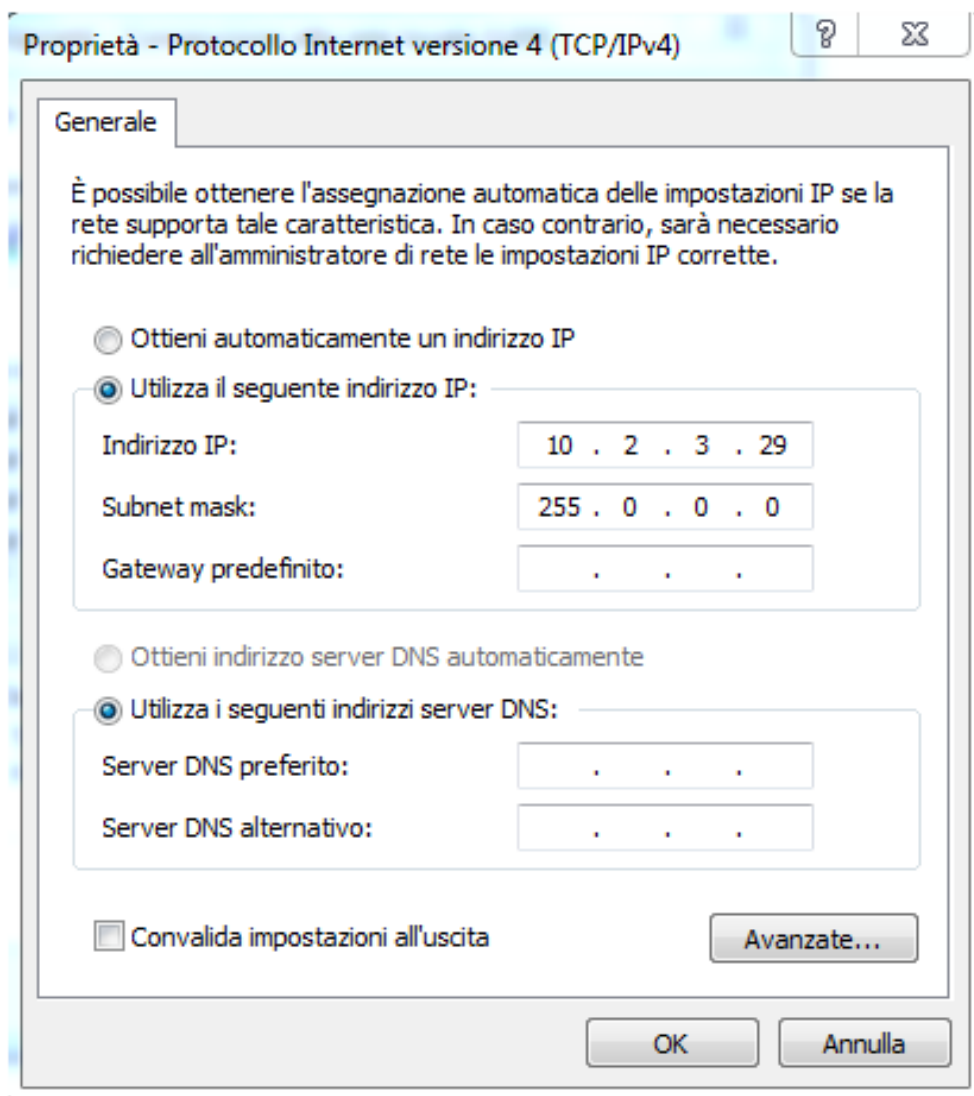
- The SIM Card must be enabled for the packet data service (2G/3G)
- The SIM must have the PIN code disabled. If it does not, insert the SIM on a GSM mobile phone and unlock the PIN so that it will no longer be requested.
- The SIM Card must be able to receive international SMSs (for configuration and status)
- The SIM Card must be FLAT rate and not rechargeable
- The telephone service provider's APN must be known
- Possible username and password for access to the APN network

## 5.2.2 First Configuration

To configure the Blueye device connection parameters, proceed as follows:

Connect the eth0 port of the device to a computer through a direct Ethernet cable (patch UTP5).

On the computer, set a static IP address IPv4 in class 10.2.3.x (example 10.2.3.29) and a subnet mask of 255.0.0.0.



Follow the instructions given in the "Device access to the Internet" chapter to carry out the authentication procedure (login).  
Open a web browser at the following address: <http://10.2.3.30>  
Click on "Configuration", and the following page will be displayed.

### "Configuration" page

The screenshot shows a web interface titled "Configuration". It is divided into four sections: "LAN eth0", "LAN eth1", "GPRS/3G", and "WAN".

- LAN eth0:** Has radio buttons for "DHCP" (unchecked) and "STATIC" (checked). Below are input fields for "IP address" (10.2.3.30), "Subnet mask" (255.255.255.0), and "Default gateway" (ppp0).
- LAN eth1:** Has input fields for "IP address" and "Subnet mask", both currently empty.
- GPRS/3G:** Has input fields for "APN" (internet.it), "User", and "Password", all currently empty.
- WAN:** Has a dropdown menu for "Wan interface" (Gprs/3G), and input fields for "Rilheva server host" (engine2.xeo4.it) and "Rilheva server port" (8081).

At the bottom left of the form are "Save" and "Reset" buttons.

Enter information regarding the telephone service provider in the "GPRS/3G" field.  
You will have to configure the APN parameter (according to the chosen telephone service provider) and, if necessary, the username and password (leave blank if not used).

Enter the method with which to connect on "WAN", in this case:

A close-up of the "Wan interface:" dropdown menu. The selected option is "Gprs/3G".

If connection with the device to be interrogated takes place through RS-485 network, leave the LAN eth1 field blank. If connection with the device to be interrogated takes place through TCP/IP, then configure the eth1 field correctly as well. In this case, you will have to enter an IP address of the same class and with the same netmask as the device to be connected. Once you have finished making the configuration settings, click on "Save", and then press "Reboot" in the main menu.

You can check the settings made are correct through the “Status” page.

### Status page

This gives some important information regarding the Blueye device configurations of its main features: for example, the unique IMEI number for each device.

A setting example is given below.

Status	
<b>General Info:</b>	
IMEI:	359193039941406
MAC Address eth0:	9c:53:cd:00:90:fb
GSM Signal:	7/10
Firmware Version:	5.6.16 - 1.4.12
Kernel Version:	Linux 2.6.31-rc9
Local Time:	Fri Jan 22 08:06:02 UTC 2016
Avg CPU Load:	16%
<b>WAN Network:</b>	
Connection Mode:	GPRS
IP:	2.43.22.130
Subnet Mask:	255.255.255.255
Gateway:	192.168.111.111
DNS Primary:	10.133.13.210
DNS Secondary:	83.224.65.106
<b>LAN Network:</b>	
IP:	10.2.3.87
Subnet Mask:	255.255.255.0

### Error page

Diagnostics	
Rilheva WebServer 1.0.3	
<b>General info:</b>	
Rilheva Tx/Rx Payload Bytes:	161
ppp0 Status:	OK
eth0 Tx/Rx Bytes:	329437
eth1 Tx/Rx Bytes:	0
ppp0 Tx/Rx Bytes:	3208



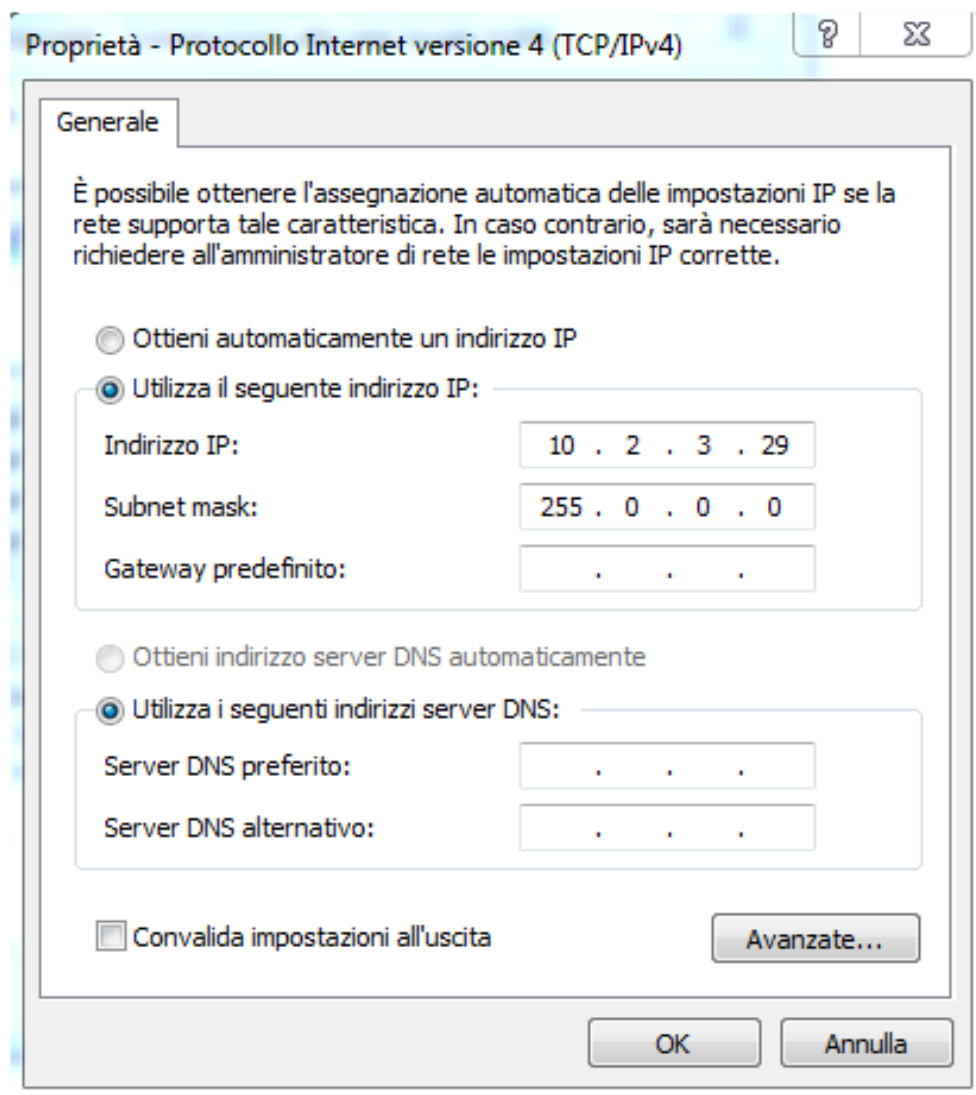
## 5.3 Connection to the Internet through existing network

If the Blueye device is connected to the Internet through an existing networking infrastructure, then proceed as described below.

### 5.3.1 First Configuration

Connect the eth0 port of the device to a computer through a direct Ethernet cable (patch UTP5).

On the computer, set a static IP address IPv4 in class 10.2.3.x (example 10.2.3.29) and a subnet mask of 255.0.0.0.



Open a web browser at the following address: <http://10.2.3.30>  
Click on “Configuration”, and the following page will be displayed.

### “Configuration” page

The screenshot shows a web interface titled "Configuration". It is divided into four sections: "LAN eth0", "LAN eth1", "GPRS/3G", and "WAN".

- LAN eth0:** Includes radio buttons for "DHCP" (unselected) and "STATIC" (selected). Below are input fields for "IP address" (10.2.3.30), "Subnet mask" (255.255.255.0), and "Default gateway" (10.2.3.1).
- LAN eth1:** Includes input fields for "IP address" and "Subnet mask", both currently empty.
- GPRS/3G:** Includes input fields for "APN", "User", and "Password", all currently empty.
- WAN:** Includes a dropdown menu for "Wan interface" (set to "LAN Eth0"), and input fields for "Rilheva server host" (engine2.xec4.it) and "Rilheva server port" (8081).

At the bottom of the form are two buttons: "Save" and "Reset".

Enter information regarding the connection to the Web on the LAN eth0 port.  
Enter information regarding the connection to the device to be interrogated on the LAN eth1 port.  
Enter the method with which to connect to the Internet on “WAN”, in this case:

A close-up of the "Wan interface" dropdown menu. The text "Wan interface:" is on the left, and the dropdown box contains "LAN Eth0" with a downward arrow on the right.

If connection with the device to be interrogated takes place through RS-485 network, leave this field blank. Otherwise, enter an IP address of the same class and with the same netmask as the device to be connected.  
Once you have finished making the configuration settings, click on “Save”, and then press “Reboot” in the main menu.  
In the “Status” page, check the settings made.

## 5.4 Access to cloud

To connect to the server (cloudvpn.rilheva.it), the device uses port 1194 and the UDP protocol.

## 5.5 Connection to the Internet through VPN (Connect)

The "Connect" function allows you to access your units provided with the Blueeye device.

Each Blueeye device is configured with an IP class dedicated to your LAN, for example 172.16.222.0/24.

This means the router can address up to 253 devices in the IP 172.16.222.1 – 172.16.222.254 range.

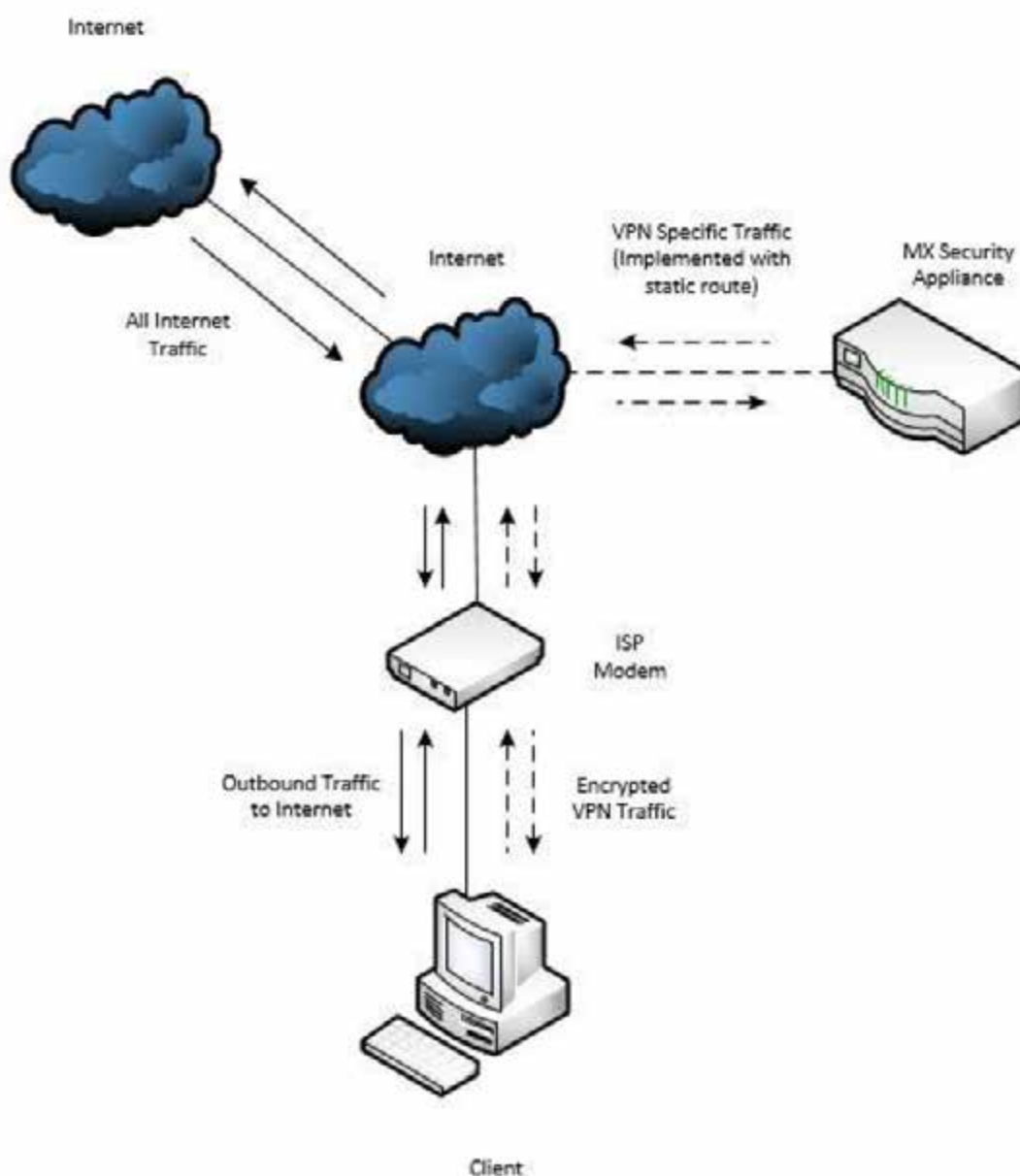
### 5.5.1 Client configuration

When the VPN access is issued, the account consisting of the following data will be communicated.

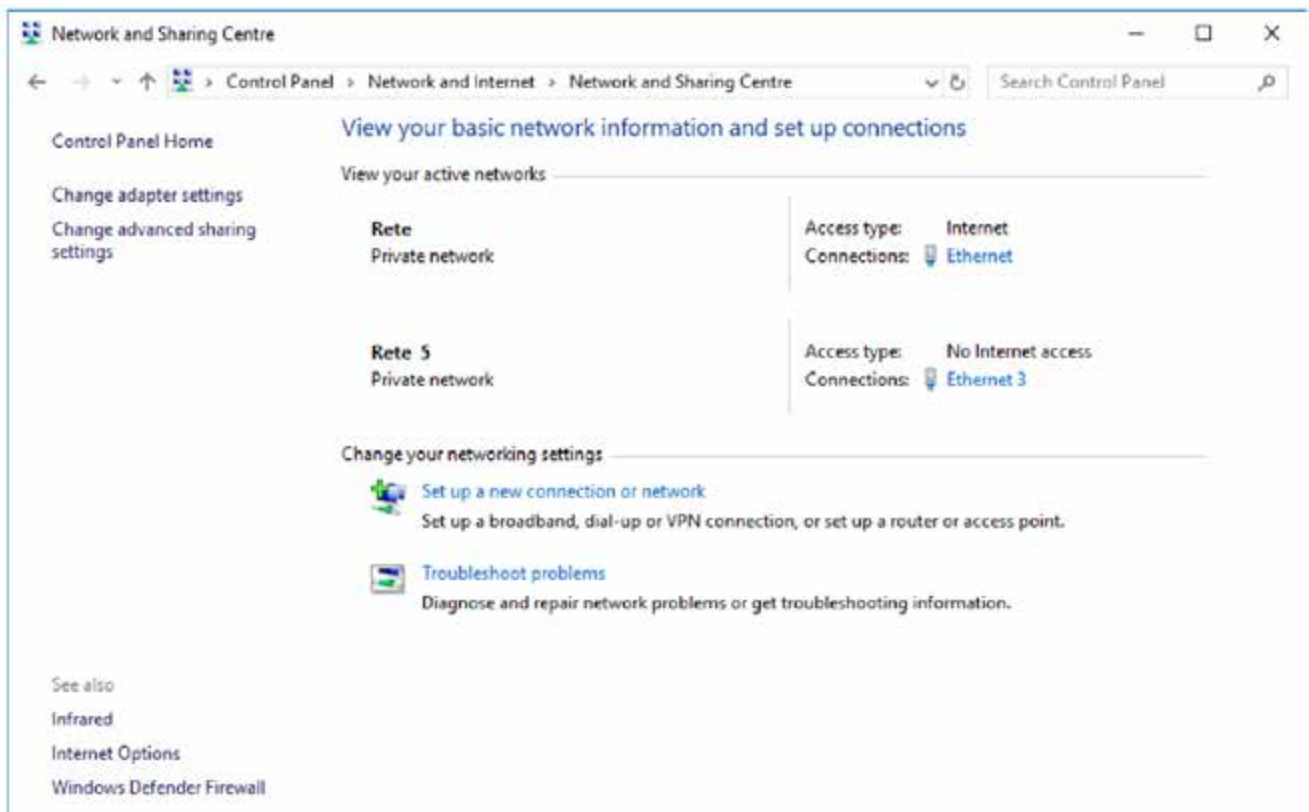
Example:

- host: **vpn.xeo4.it**
- user: **<user\_name>**
- password: **<user\_password>**

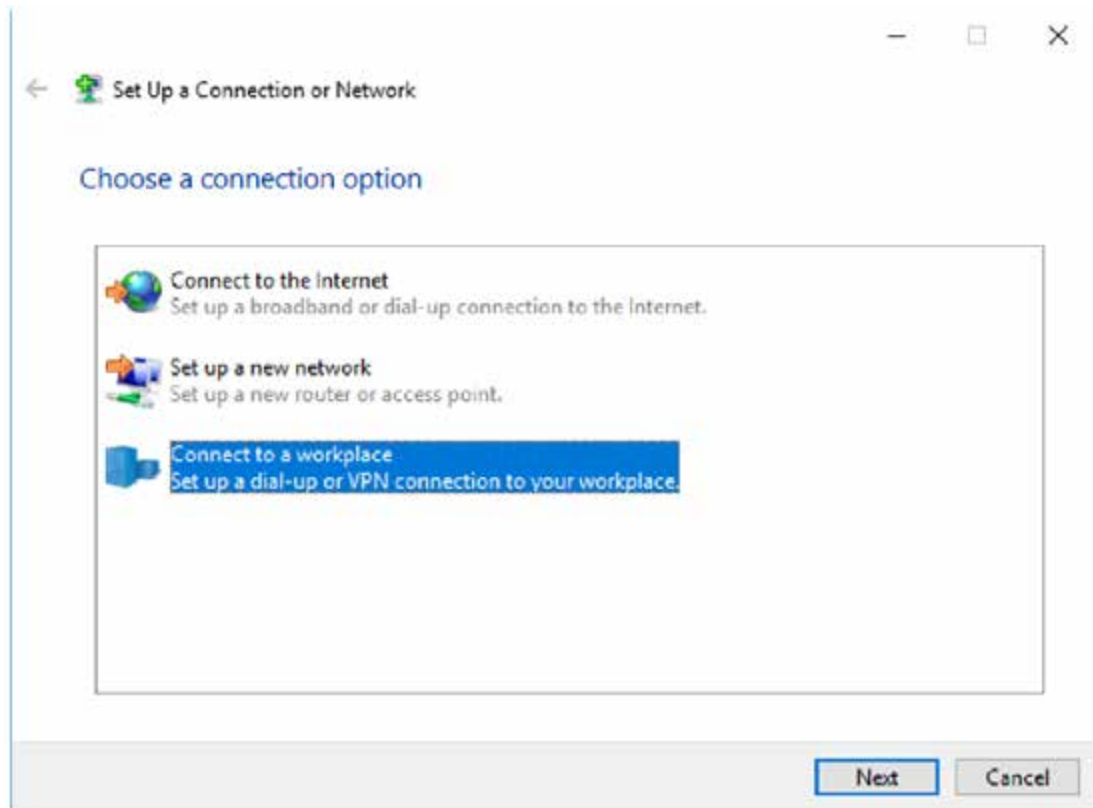
Instructions are given below on how to configure a VPN access on your personal computer, so that it will be possible to simultaneously use the normal connectivity to the Internet and the VPN tunnel only to access the remote devices wired on your Blueeye VPN.



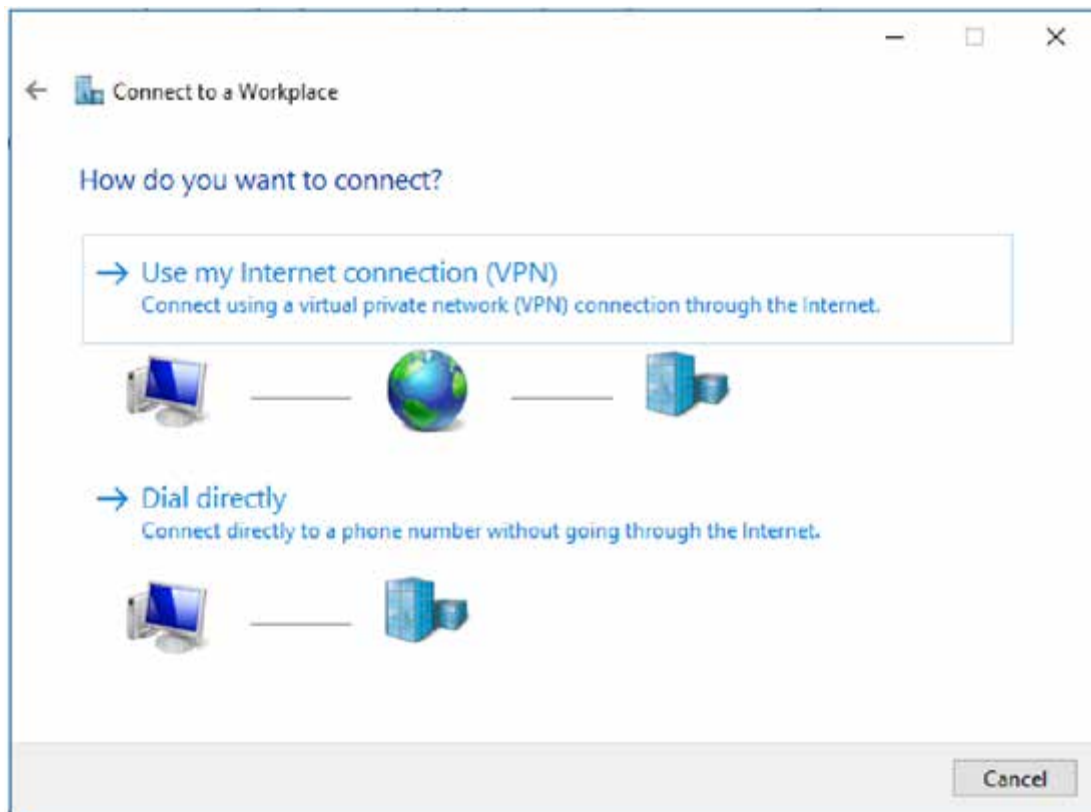
When you connect from a "Windows 7" or higher operating system, you must open the "Network connections and sharing centre" window by simply typing "connection centre" in the "Search programs and files" box of the "Start" button.



Click on "Set up a new connection or network".



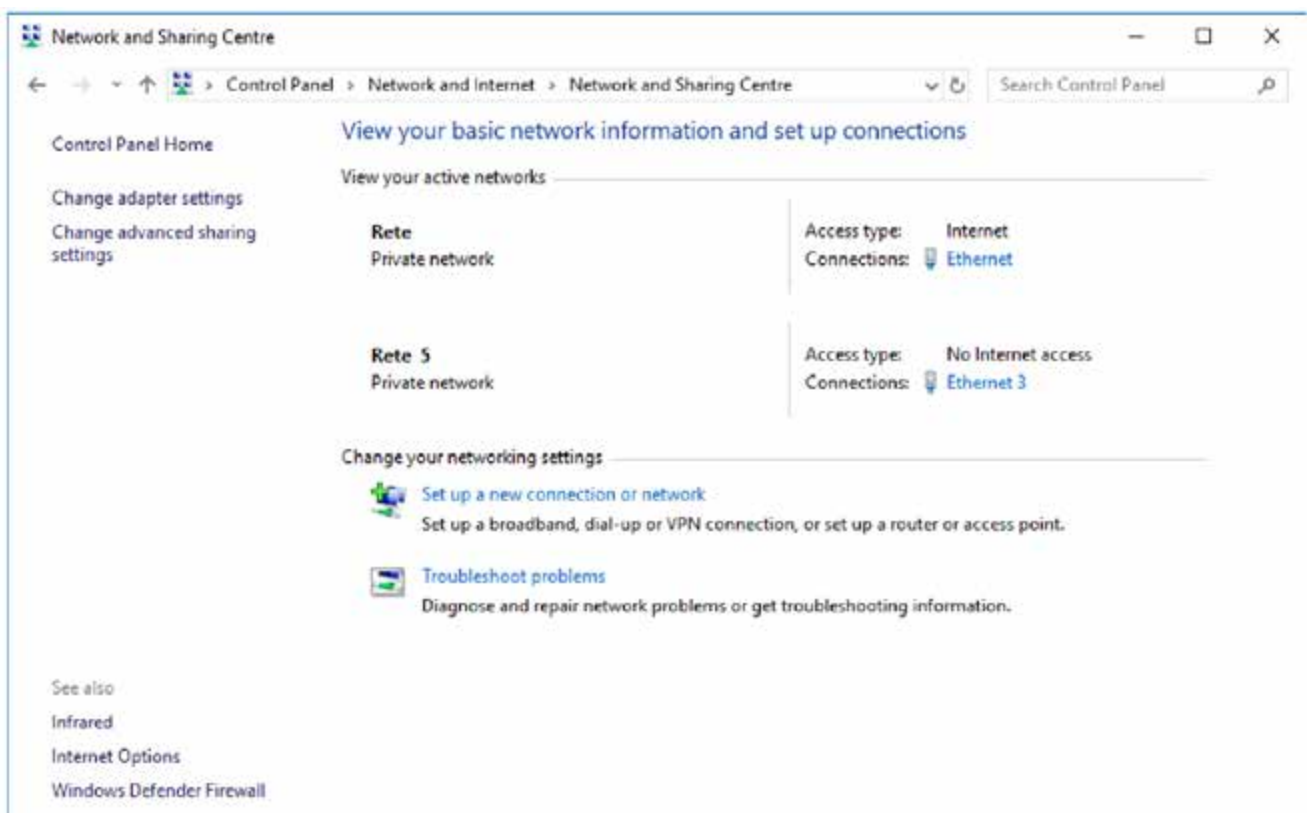
If asked "Do you want to use a connection that you already have?", select "No, create a new connection". Select the "Connection to a corporate network" item and press the "Next" button.



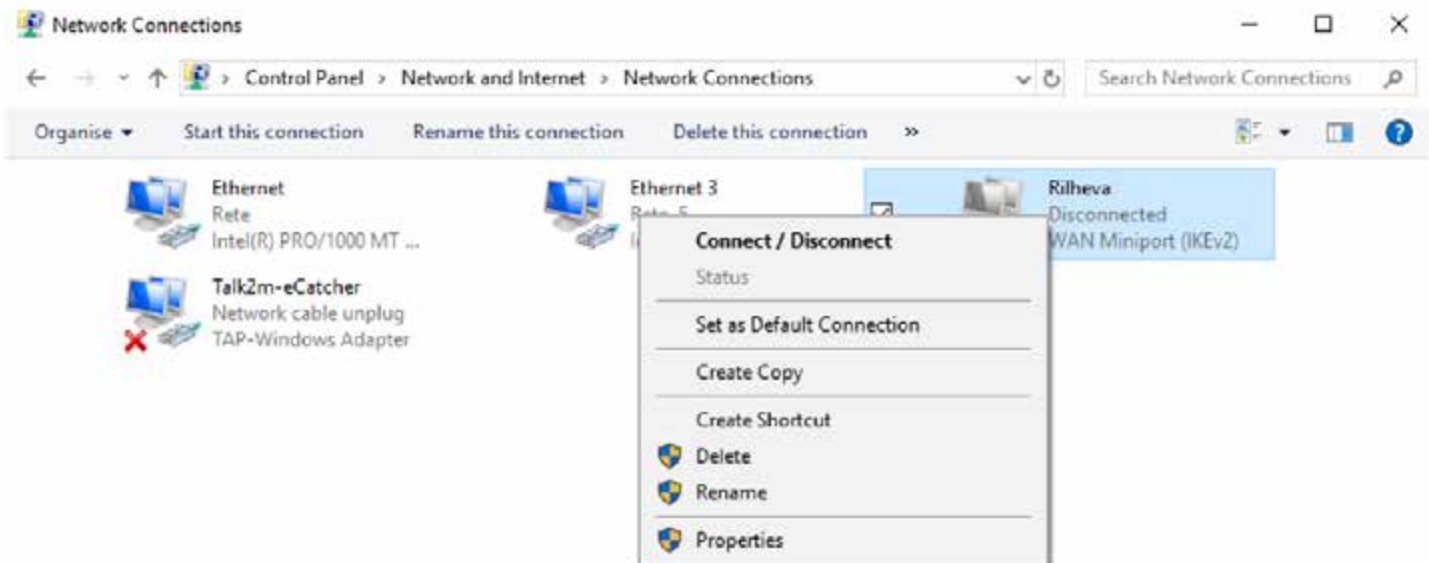
Select the "Use existing Internet connection (VPN)" item

Fill in the two fields by entering the above-mentioned "host" parameter as Internet address and "Blueye Cloud Connect VPN", or any other name you wish, as destination name.

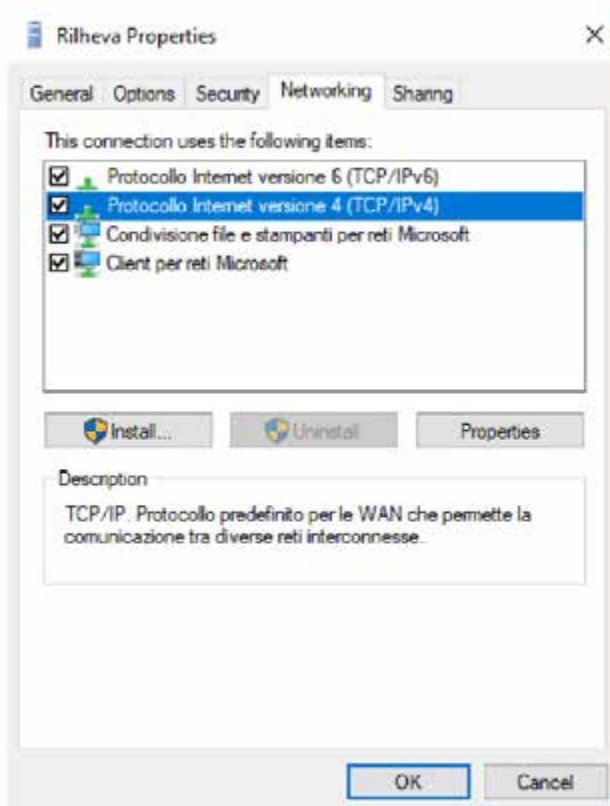
When you confirm with the "Create" button, the "Network connections and sharing centre" window will re-appear.



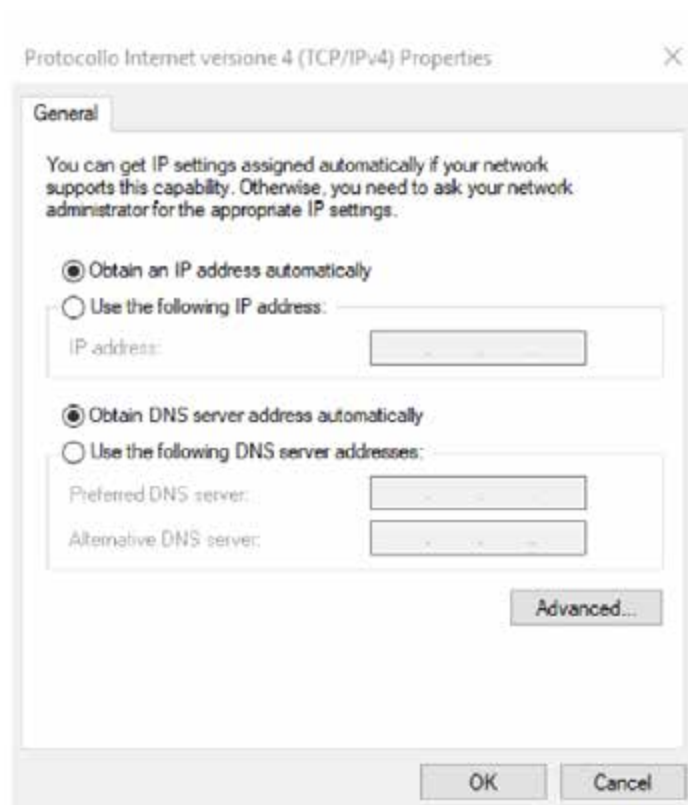
Click on "Change card settings".



Go to the VPN item you have just created and edit it by right clicking on "Properties".



Then select the "Network" section, select the "Internet protocol version 4" item and press the "Properties" button.



Press the "Advanced" button.



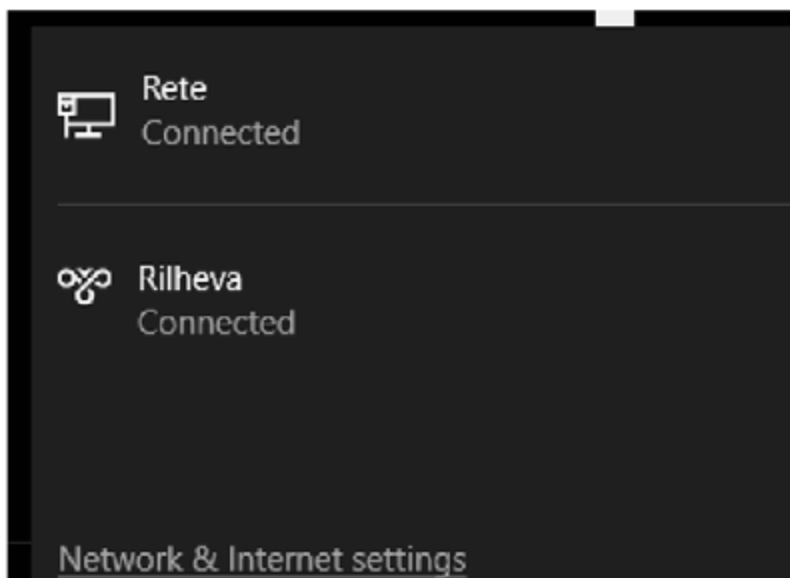
Untick the "Use default gateway on remote network" option.  
Now press OK to all the open windows to confirm your choice.

## 5.5.2 Configuration of routing to the devices to be controlled

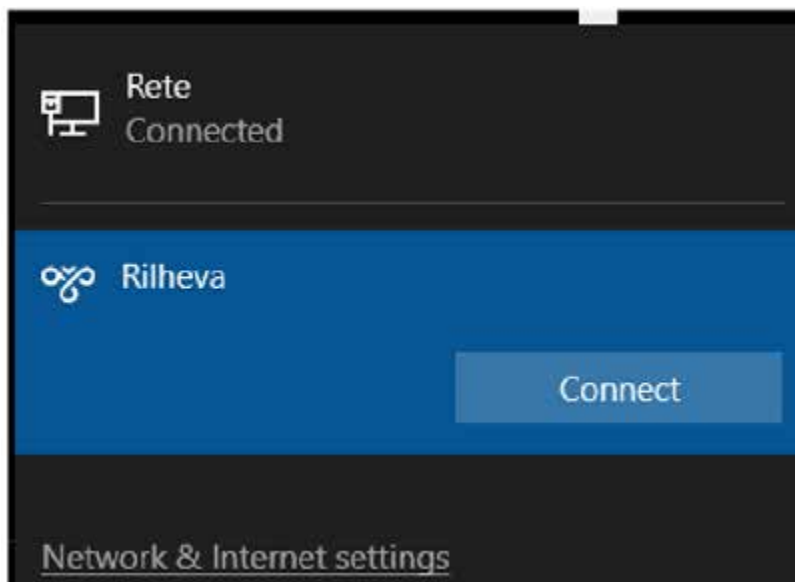


Before proceeding with the next step, the VPN connection that has just been configured must be activated.

Click the icon of the connection in the bar at bottom right,

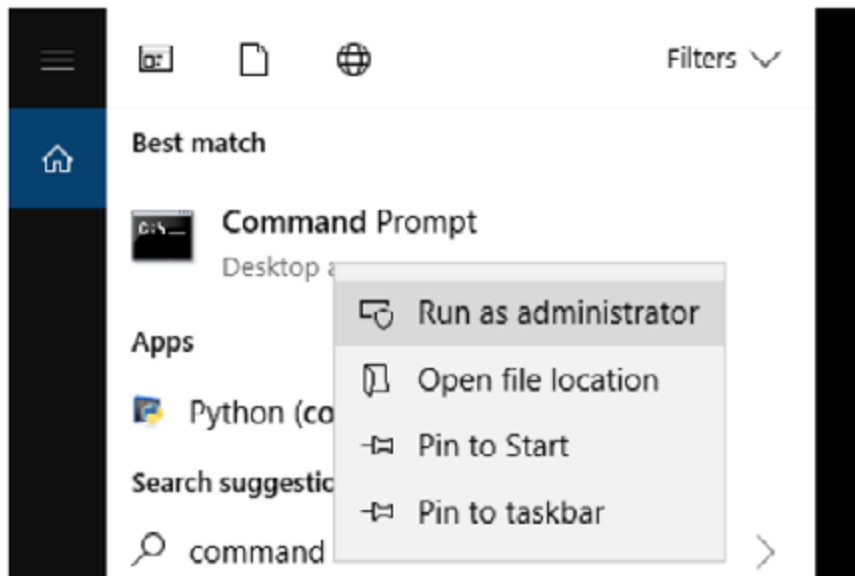


then click on the connection you have just created and then on "Connect".



Open "Command Prompt" as administrator. To do this, press on the "Windows" icon, and then type "cmd". Now right click on the "Command Prompt" item and select "Run as administrator".





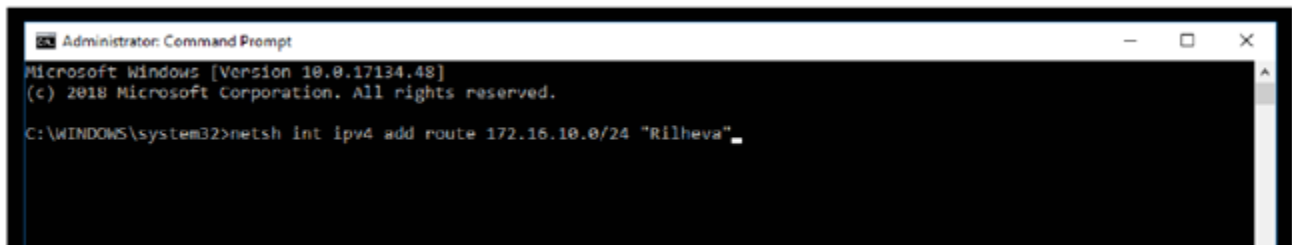
When prompted, type the following command and press "Enter":

**netsh int ipv4 add route <IP\_CLASS> "Blueye Cloud Connect VPN"**

where:

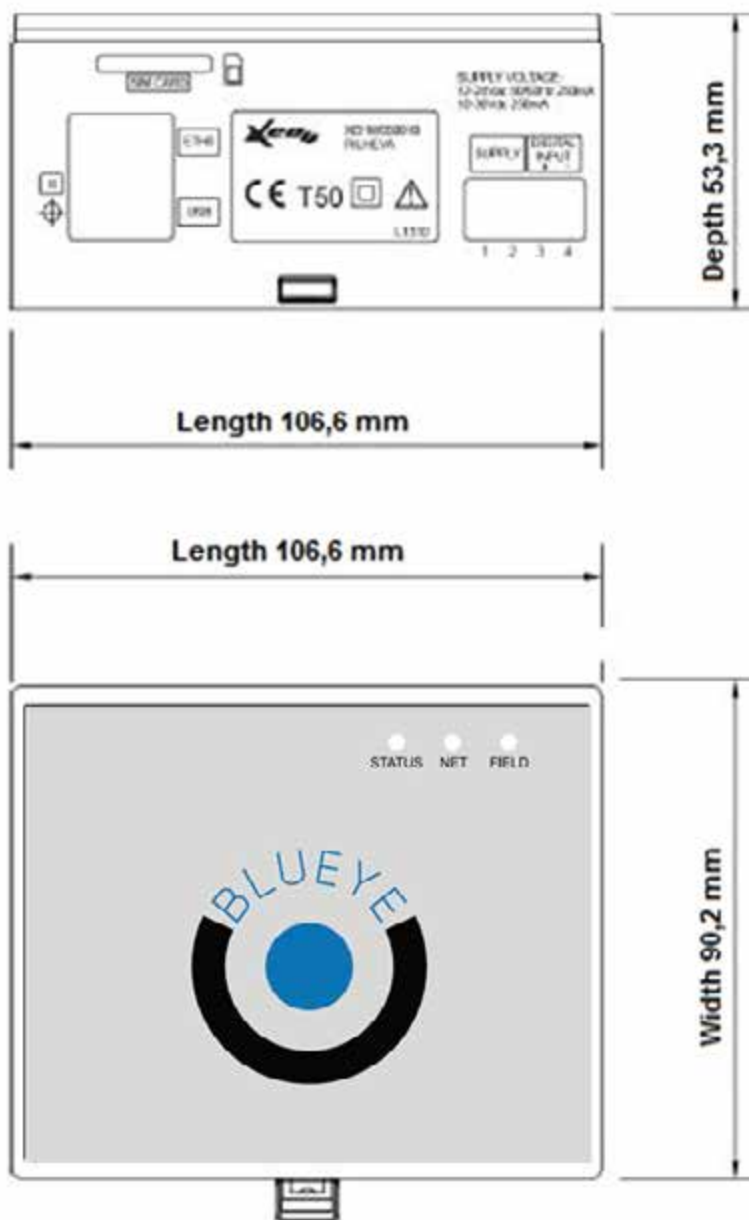
- <IP\_CLASS> is to be replaced with the class assigned to the router and/or to the devices you want to reach through the VPN connection. The class must be specified in CIDR format (172.16.222.0/24).
- Blueye Cloud Connect VPN is to be replaced with the "Destination Name" chosen when configuring the VPN.

If there are several Blueye devices, repeat the command and change only the destination class.



## 6 SYSTEM HARDWARE

### 6.1 Dimensions



## 6.2 Blueye technical specifications

Description	Specifications
Platform:	CPU ARM 9 i.Mx25 @ 400 MHz
Operating System:	Linux 2.6.31
RAM:	64MB DDR2-266
FLASH memory:	256MB NAND Flash
Power supply:	9-36Vdc (12-24Vac +/-10%)
Power consumption:	~5W (Max 150mA @ 24Vac)
Operating temperature:	-20°C / +60 °C
Signals:	1 device reset button 1 three-colour STATUS LED 1 red NET LED
Modem:	1 red FIELD LED mini PCI express GSM/GPRS quad band (version A)
Modem:	mini PCI express GSM/GPRS/UMTS HSUPA quad band (version B)
SIM CARD slot:	push-push type
Additional slot I:	mini PCI express for future expansions (wifi / zigbee / GPS)
Additional slot II:	proprietary connector for custom expansions
Antennas:	SMA external (MODEM 2G/3G + optional WLAN/GPS)
Container:	plastic on DIN guide (6 modules)
On-board communication ports:	4 serial (2 x 3-wire RS232 on terminals, 2 x 2-wire RS485 (+ GND and Vdc for polarization of 485)) 1 serial RS232 (console) 2 Ethernet 10/100 full duplex (port with 2 integrated LEDs) 1 USB OTG 1 USB DEVICE 1 slot for push-push micro SD 1 CAN bus
Control systems:	Watchdog hardware
Firmware reprogramming:	Can be activated remotely (Over the air)
Real Time Clock (RTC):	External wakeup RTC - Synchronized by the server, with back-up battery
Power failure:	Power failure control through dedicated opto-isolated input (DI)
Sound signals:	Buzzer
I/O expandability:	through additional modules via Ethernet or Serial port

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## 7 INDICATOR LED OPERATION

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### 7.1 Normal operation

In normal operating conditions, the LEDs must have the following status:

**STATUS LED** > flashing green

**NET LED** > red on

**FIELD LED** > off with brief flashes during Modbus polling

### 7.2 Error signalling

**STATUS LED** steady orange

When the orange STATUS LED comes on steady, it means there is an irreversible hardware failure. Contact the technical support department.

**STATUS LED** green/red flashing alternately

In this case, the device interrogates the slave peripherals via Modbus, but some read errors persist.

**FIELD LED** steady red

When the FIELD LED comes on steady, it means the Blueye device is not communicating with the field devices through Modbus protocol.

**NET LED** fast flashing (about 10 times per second) Indicates that a hardware failure of the modem persists. Contact the technical support department.

**NET LED** slow flashing (about twice per second) - Indicates a problem with the SIM. Check that the SIM card is active, correctly inserted and with PIN disabled.

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## 7.3 Factory Reset (Restoration of factory settings)

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Restoring the factory default settings will cancel all the settings present in the Blueye.



The factory default settings should be restored only with the Manufacturer's permission.



Disconnect the connections present at ports eth0 and eth1 from the Blueye.

To restore the factory settings (factory reset):

1. Power the device by keeping the little button [R] pressed down with a pointed object.
2. Wait for the three LEDs to flash sequentially (about 20 seconds).



If the device is already on, the reset will not work. It must be switched off and then on again.

With this operation, any configured IP addresses, APNs and all settings regarding communication with the SIM Card are erased.

Now, wait for about another 5 seconds until the sequence stops and then release the button. The device restarts and shows the three LEDs flashing simultaneously (first configuration).

On restoring the factory default settings, the default IP address of port eth0 is re-installed.

The default IP address depends on the IMEI code.

The IMEI code is shown on the right side of the Blueye container.



If the IMEI code starts with 86107502, the address is 192.168.44.1

If the IMEI code starts with 35919303, the address is 192.168.1.1



To reconfigure the parameters, connect port eth0 of the device to a computer and carry out the operations indicated in the "First Configuration" chapters according to the type of connection used.

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## 8 MODBUS FUNCTIONALITY

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### 8.1 Serial port (Modbus RTU)

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The physical communication line complies with EIA-RS485 specifications in half-duplex mode (2-wire)

The MODBUS RTU (Remote Terminal Unit) code protocol is used

The transmission speed can be selected from the following baud rates:

1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 28800 bps, 38400 bps, 56000 bps, 57600 bps, 115200 bps

The RTU byte consists of 11 bits:

- 1 start bit
- 8 data bits
- 1 parity bit (NONE, ODD, EVEN)
- 1 or 2 stop bits (2-bits if parity is NONE)

### 8.2 Ethernet port (Modbus TCP)

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It is possible to connect Modbus TCP peripherals to the eth1 Ethernet port.

The network configuration (device IP and subnet) should be done beforehand using the integrated web server.

### 8.3 Format of data

Datum format	Modbus form	Data for register	Type	Sign	Range	Size bit
F1	Single register LSB side	2	Entire	unsigned	0-255	8
F2	Single register MSB side	2	Entire	unsigned	0-255	8
F3	Single register	1	Entire	unsigned	0-65535	16
F4	Single register	1	Entire	signed	-32768 +32767	16
F5	HI-LO pair of registers	1	Entire	unsigned	0- 4294967295	32
F6	HI-LO pair of registers	1	Entire	signed	-2147483648 +2147483647	32
F7	Pair of registers	1	Floating	signed	See IEEE 754	32
F8	Bit-based single register	16	Bit	-	0-1	16
F9	LO-HI pair of registers	1	Entire	unsigned	0- 4294967295	32
F10	LO-HI pair of registers	1	Entire	signed	-2147483648 -2147483648	32

### 8.4 Types of data managed by the protocol

Label	Type	On	Examples of use
Discrete input	1-bit	Read Only	Digital inputs
Coils	1-bit	Read & Write	Digital outputs
Input registers	16-bit	Read Only	Measurements
Holding registers	16-bit	Read & Write	Operating parameters

### 8.5 Addressing of data

All types of data (registers or coils) addressed by the MODBUS protocol are related to 0, and therefore the first datum of each type has address 0.

Each type of data is characterized by a prefix in the address:

Label	Prefix
Coils	1xxxx
Discretes Input	2xxxx
Input registers	3xxxx
Holding registers	4xxxx

The datum address to be entered in the Modbus frame is obtained by removing the prefix and subtracting 1 from the datum address. (SCADA convention)

## 8.6 Function Code

The functions implemented in Blueeye are the following:

Label	Type	On	Examples of use
1-bit	0x01	Read Coils	reads 1 or more consecutive bits starting from a specified address (the coils are outputs)
	0x02	Read Discrete Inputs	reads external input bits (which cannot be outputs)
	0x05	Write single coils	writes a TRUE or FALSE bit
	0x0f	Force Multiple coils	writes 1 or more TRUE or FALSE bits
16-bit	0x03	Read Holding Registers	reads 1 or more consecutive HOLDING registers starting from a specified address
	0x04	Read Input Registers	reads 1 or more consecutive registers starting from a specified address
	0x06	Write Single Register (holding)	Writes a HOLDING register
	0x10	Write Multiple Registers (Holding)	Writes 1 or more HOLDING registers
	0x07	Read Exception Status	For quick reading of a byte that contains data on instrument diagnostics "exception status output"
	0x08	Diagnostics	Diagnostic functions for the RS-485 network
	0x11	Slave ID report	To receive information on the type and status of a slave.

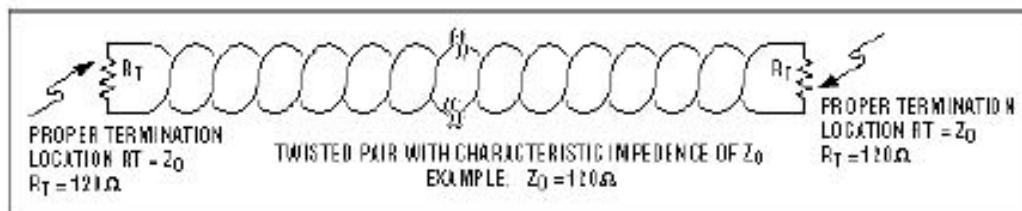


## 8.7 Guidelines for connection of peripherals on RS-485

### 8.7.1 Standard RS-485

The standard RS-485 is based on a balanced signal system. This means that the two electrical signals are ideally the opposite of each other, compared to earth.

The transmission line must consist of a twisted pair cable, which is especially immune to electromagnetic interference.



### 8.7.2 Transmission cable

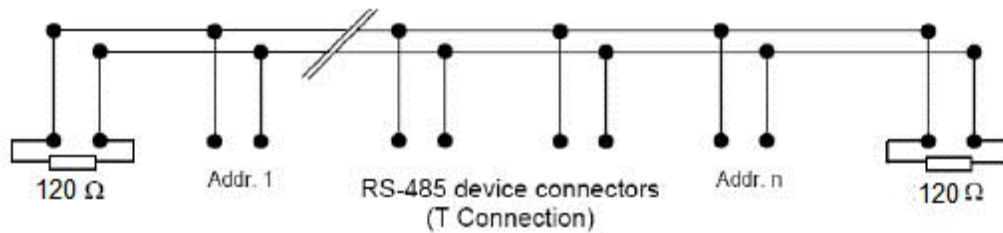
Always use a cable with a suitable degree of shielding to prevent interference risks, especially where there are power signals (e.g. motors, inverters, relays).

In general, the RS-485 transmission cable should be shielded and conform to the following specifications:

- Cable capacitance  $\leq 300 \text{ pF/m}$
- Line impedance  $100 \Omega \pm 15 \Omega$
- Line resistance  $140 \Omega/\text{km}$  or  $225 \Omega$
- Cable type: twisted pair

### 8.7.3 Network connection

- As far as possible, limit the RS-485 network to a single main line (one segment)
- Limit the total length of the main line to a maximum of 500 m
- Consider 500m as maximum for a baud rate at 2400
- Consider 50m as maximum for a baud rate at 19200
- Do not connect more than 31 devices to the same RS-485 segment.
- Disconnect any line termination resistor on all the Slaves that make up the network.
- For networks having a limited length (up to 30 m), it is not necessary to use any termination resistor.
- But for longer networks, it may be necessary to terminate the RS-485 line in the following way:
- Position a 120 ohm resistor at the end of the line (after the last Slave device or on the Slave itself). For connection of additional resistors, consult the manual of each device. In some of these devices, it may be possible for the resistors to be inserted directly from the device itself.

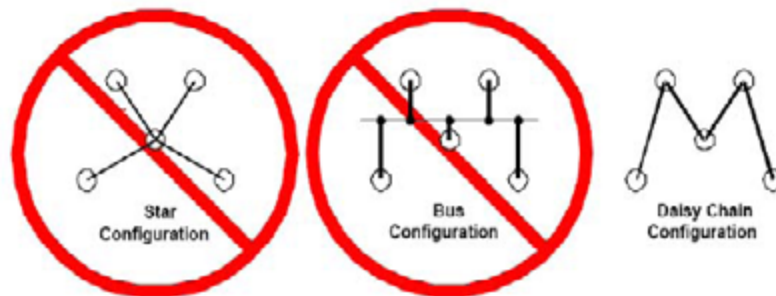


## 8.7.4 Configurations to avoid

RS-485 networks use a so-called daisy chain configuration.

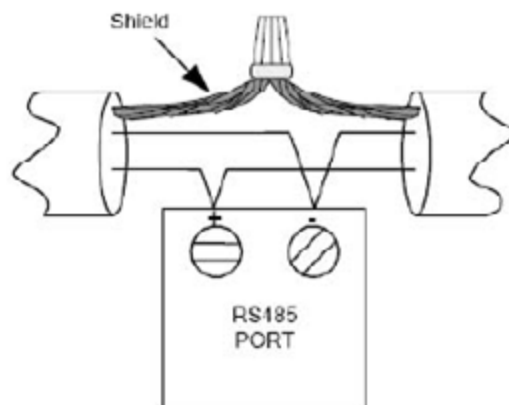
This means there is only one main line (cable) and all the peripherals are directly connected along the path of this line.

When other types of connection are used (e.g. centre-star, T branches), operation of the network cannot be guaranteed, especially where there are electromagnetic interference, considerably long networks and a high number of nodes.



## 8.7.5 Earthing

Make sure all the network peripherals use exactly the same earthing, especially when more than one power supply unit is used to power the peripherals. The braiding of the RS485 line should be connected to earth only at one end of the line.



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## 8.7.6 RS-485 bus polarization

For correct operation of an RS-485 network, the electrical signals must be correctly polarized.

When all the SLAVE Modbus peripherals are in reception status and the MASTER peripheral (namely Blueeye) is not interrogating, the RS-485 bus is in a high impedance state. In some cases, this can cause the bus to pick up electromagnetic interference from the outside that can be interpreted as real signals by the listening receivers.

It is possible to check whether the RS-485 network is correctly polarized by measuring the voltage at the ends of the + and - terminals using a tester (with no data traffic on the bus) and verifying that the voltage is higher than 200mV.

If it is not, two polarization resistors can be connected:

- one between the + terminal (B) and the VEXT (+)
- one between the - terminal (A) and the VEXT (C)

To calculate the value of the Rb resistors to use, it should be borne in mind that they must maintain a value between A (-) and B (+) of 200mV when all the RS-485 devices are receiving.

A numeric example to explain how to find the value of Rb.

Suppose we have the following condition:

- Bus made up of 32 nodes with input impedance of 12K $\Omega$
- Two 120 $\Omega$  termination resistors present
- 5V power supply

The impedance consisting of the parallel of 2 termination resistors (120 $\Omega$ ) and 32 input resistors of the peripherals (12k $\Omega$ ), whose result is about 52 $\Omega$ , is called Zo;

the power supply for bus polarization (5V) is called E

the Rbs are calculated with the following formula:

$$R_b = ((E/0.2)-1)*Z_o/2$$

in this case, the value is about 620 ohms

This polarization network should be placed at only one point of the network, preferably near the Blueeye peripheral.

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## 9 FAQ

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### 9.1 Activation

After correctly configuring Blueye, send an email requesting device activation to the Swegon Operations customer service department (service.cantarana.@Swegon.it) with the following information:

IMEI code (adhesive label with 15-digit number)

Once you have obtained authorization, connect to the site:

<http://www.blueboxcooling.com> Blueye section

**For help to use the portal, refer to the online help of the portal itself.**

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## 10 REFERENCE STANDARDS

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Conformity with:

**“Directive 1999/5/EC of the European Parliament and of the Council, of 9 March 1999, on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity”**

is obtained following as reference the standards described below.

- Safety: **EN 60950-1 (2007) - LVD**
- Electromagnetic compatibility: **EN 301 489-1 (2011) - EMC**
- **EN 301 489-7 (2005) - EMC**
- Effective use of the spectrum: **3GPP TS 51010-1**

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# 11 WARRANTY

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All Swegon Operations s.r.l. products are covered by a guarantee of good operation for a period of 12 months from the date of delivery, excluding any damage arising from tampering, negligence, accidents, normal wear or any indirect damage from poor use.

Even though they are packaged, the goods must be handled with care and stored in a dry place, as indicated in the technical documents attached to the product.

Any complaint due to manufacturing or quality defects of the product must be reported in writing to Swegon Operations s.r.l. subject to demonstration that the product has been installed and/or stored correctly as indicated in the technical documents attached to the product.

Swegon Operations s.r.l. declines all liability if the products are used for purposes other than their intended use, as indicated in the catalogues and in the attached technical documents.

The products are manufactured professionally as regards safety and, if installed correctly by qualified personnel and used according to their intended use and subjected to preventive maintenance, they protect the safety of persons, animals and property.

Products that fall within the scope of Directive 73/23/EEC amended by 93/68/EEC (Low Voltage) and Directive 89/336/EEC amended by 92/31/EEC and by 93/68/EEC (Electromagnetic Compatibility) conform to the essential requirements contained in them.

Swegon Operations s.r.l. reserves the right, without being obliged to give prior notice, to make all the necessary changes that, at its final discretion, will allow the technical and functional specifications of the products and the relevant production logics to be improved.

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## 12 DISPOSAL

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With reference to the European waste management directive, we inform you of the following:

- The owner of electrical and electronic equipment (EEE) is obliged not to dispose of it as non-separated municipal waste, and must dispose of it via separate collection through public or private waste collection systems as required by local regulations.
- The owner can return EEE to the dealer at the end of its life when purchasing equivalent new equipment.

This EEE may contain hazardous substances, and improper or incorrect disposal of them may have adverse effects on human health and the environment.

Incorrect disposal of them also entails penalties as provided for by local regulations.

The symbol shown on the equipment, which indicates separate collection of EEE, is a crossed out wheelie bin accompanied by a solid horizontal bar and identifies that it was put on the market after 13 August 2005.





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