

RFM-C3 WMBUS Concentrator

User manual v1.5



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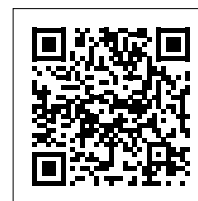


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1. Introduction

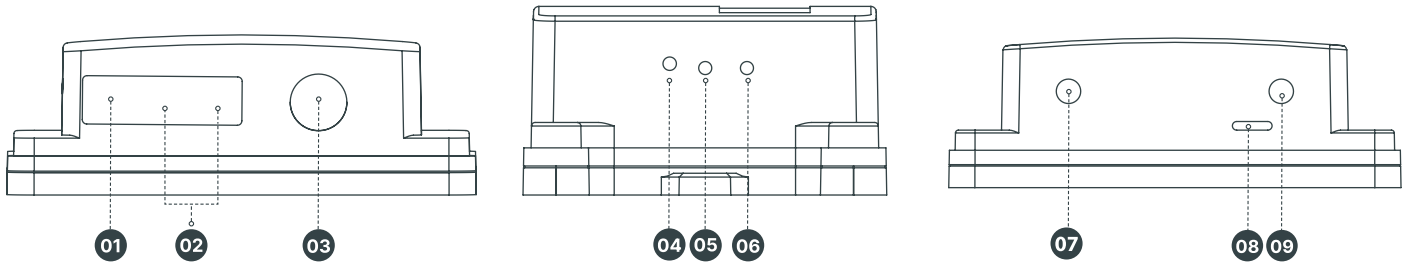
The RFM-C3 is a gateway/data concentrator that collects data sent from Wireless M-Bus devices and transmits them via GPRS signal or via Ethernet/LAN/Wi-Fi network. It can also be used in conjunction with the mod.MB-MASTER in order to remotely send the data detected from the wired MBUS modules. The consumption data and the information sent by the compatible devices, are collected by the RFM-C3 concentrator and sent via E-mail SMTP or using FTP/SFTP server connection by using the GPRS network or, alternatively, an Internet connection via Ethernet/LAN/Wi-Fi network. The E-mail contains the file of the acquired telegrams in txt and csv format and it is forwarded up to a maximum of five recipients, with hourly, daily, weekly, monthly frequency depending on the configuration set.

1.1 Package content

- > RFM-C3
- > Power supply +5VDC Output
- > SMA antenna
- > GPRS antenna
- > "Quick User Guide" Instruction sheet
- > Antenna Extension (bracket included)

1.2 Interfaces

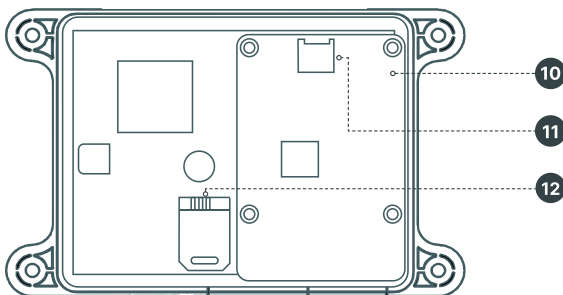
Here below we describe the interfaces and connectors available:



Interface index

- | | | |
|---|---------------------------|--|
| 1. Ethernet interface
RJ-45 | 4. Built in Button | 7. GPRS antenna SMA connector (included) |
| 2. USB Port | 5. Red status LED | 8. MICRO SD CARD |
| 3. Power supply connector
Input: +5VDC | 6. Green power supply LED | 9. wM-Bus antenna SMA connector (included) |

Internal board



Component index

- 10. Main board
- 11. MICRO SD Card holder
- ⚠ Attention: Never remove this card
- 12. SIM Data support

1.3 Installation

- > Install **RFM-C3** in a safe and protected area, away from possible radio shielding that might affect the reception quality.
- > May not be operated on sites exposed to direct sunshine or in the nearby of heat sources.
- > It is designed for indoor use only. Never expose it to rain, running water, condensation moisture, humidity, etc.
- > May not be exposed to aggressive gases, acid vapors, solvents and similar chemicals.
- > The configuration of the device is performed by using a PC connected with a LAN cable (RJ-45 connector) on the Ethernet port of the **RFM-C3** concentrator.

⚠ Caution: Make sure that you are equipped with all necessary technical means, particularly a GPRS supporting SIM card with PIN request disable or a PIN identical with that set in the RFM-C3 configuration

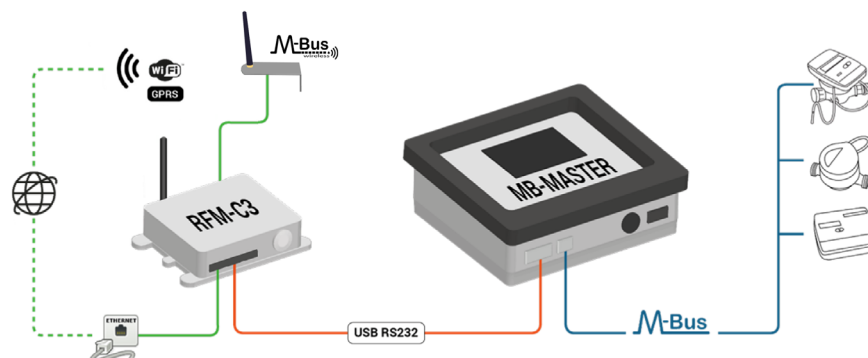
1.4 Mounting

External antenna connection

Screw the **GSM** antenna and the antenna extension into the corresponding **SMA** connector referred to as wM-Bus(see chapter 4).

⚠ Caution: Tighten the antennas gently with your hand; never use a tool!

Connection to MB-MASTER



Connect the RS232-USB serial converter supplied with the MB-MASTER to one of the USB ports of the RFM-C3 concentrator (see picture below and page 4).

ⓘ Note: The choice of the USB port is not crucial. It is possible to use one of your choice.

Power supply

RFM-C3 is +5VDC power supplied. Connect the output cable of the power supply:

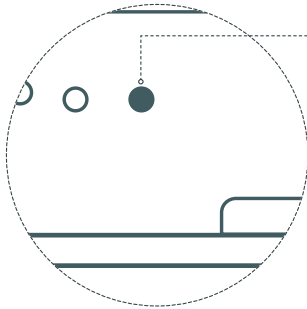
- > The two wires cable must be passed through the dedicated rubber gasket.
- > The two wires must be connected to the dedicated terminals inside the box, paying attention to the correct polarity, **+5V** and **ground**.

⚠ Warning: Do not connect power supply before connecting an antenna to RFM-C3 to avoid the WMBUS module damage. Do not connect any in compliant power supply to avoid potential irreversible damages.

2. Function and use

📄 Note: In this chapter, we provide the functions of the **RFM-C3** and how to use it.

2.1 Device start-up



To start the device up, it is sufficient to give power supply. After few moments, the red LED will turn on for one minute or so (**startup phase**). Do not remove power supply during this procedure. During the first startup, it is recommended to reset all the parameters (**see chapter 3.2**)

📄 Nota: Power supply green LED is flashing

2.2 Notification LED and multi-function button

🔧 Attention: Follow the next steps with accuracy

> Re-configuration and configuration e-mail sending: press the button for 1 second and then release it. The led will blink once and then stay on during configuration sending.

🔧 Warning: It is important not to press the button again up to the moment when the concentrator has completed this operation and the led will turn off.

> **Spegnimento:** Press the button for more than 3 seconds (and less than 8 seconds) and then release it in order to switch the concentrator off. This should be done EVERY TIME you need to unplug the concentrator. The led will blink 4 times and after 30 seconds, it will be safe to unplug the AC cord.

> To **reboot** the device, it is sufficient to proceed with the shutdown (**see above**), then disconnect and re-connect the power supply.

> **Paramteres reset:** press the button for more than 10 seconds and then release it to reset configuration parameters and delete all packet data received. The led will blink twice and twice again after a second.

📄 Note: as the device is in **stand-by** (so, as the device is on but no WMBUS packet is received and/or GPRS transmission is sent), the LED will blink every 10 seconds.

2.3 Wireless MBUS interface

The default mode of the RFM-C3 is the "**listen all**". The device will save the telegrams received in a buffer file in the internal memory, up to a maximum of 1000 telegrams. The concentrator overwrites the obsolete telegrams with newer telegrams received from the WMBUS devices, so the buffer file will always contain the most updated reading for each module. The **WMBUS module 867MHz / 868MHz / 921Mhz**, OMS compatible, works in **T1 mode**. It supports the data encryption. For safety reasons, the acquired messages are not decrypted, but they are stored as they were received. For the eventual decryption, it will be necessary to use the reading software.

3. Configuration and commissioning

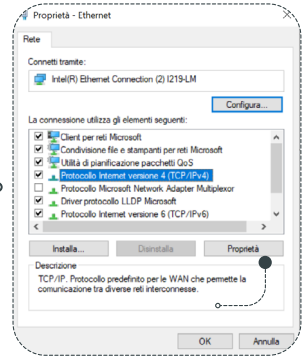
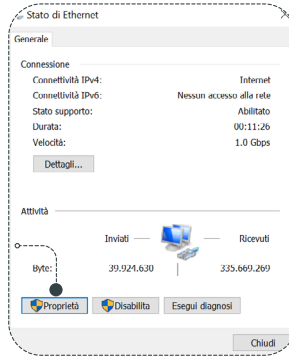
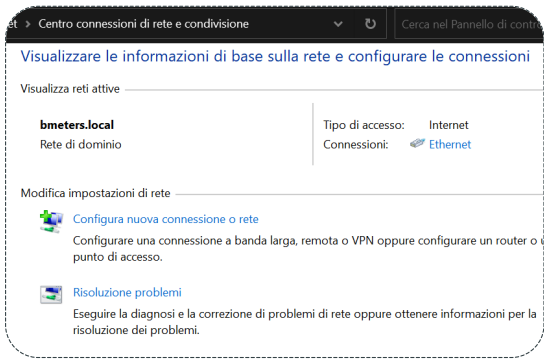
📄 Note: In this section we describe the RFM-C3 configuration. In order to proceed with the device configuration, connect the concentrator to the laptop by using an **RJ-45** cable.

3.1 Configuration from WEB browser

The device can be easily configured by using the default WEB application. Anyway, it is necessary to predispose the laptop for the communication via LAN cable. To do so, follow the next instructions.

3.1.1 Configuration preparation

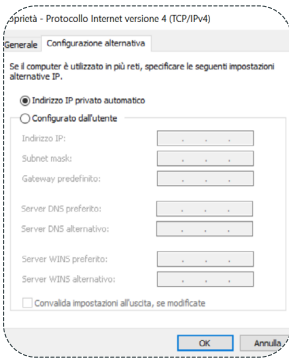
Before proceeding with the configuration of the device, access the Control Panel of the laptop to predispose the laptop for the communication via LAN cable. It will be sufficient to follow this procedure the first time only. This will allow to automatically recognize the setting every time the LAN cable is connected to the concentrator.



Follow the next directory: **Control Panel → Network and Internet → Network and sharing center → Change adapter settings.**
On this window, right click on the **“Local Network connection (LAN)”**, then select **“Properties”** from the drop-down menu.

A new window will appear: select **“alternative configuration”**.

Set the option button on **“User configured”** and set:
> **IP Address: 192.168.1.2**
> **Subnet Mask: 255.255.255.0**
Finally press **OK** to confirm the modifications.



Then press the button **Close**.

Now, the setting will be also maintained the next configuration via LAN cable, without influencing the general **TCP/IPv4** settings of the laptop.

Note: If you have any problems after completing all the steps, please contact support

3.1.2 Access to the application

Note: To access the application, open a new window on a browser (Microsoft Edge, Google Chrome, Mozilla Firefox etc.) and type the IP address 192.168.1.99 on the URL bar and press the button **“Enter”** on your keyboard.



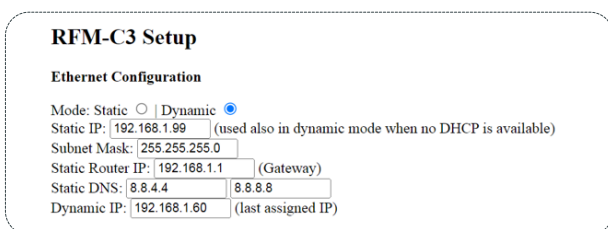
Info: A login page will be shown. To access the configuration page, enter the following login information:
User ID: admin
Password: bmmeters

3.1.3 Configuration page use

Note: The WEB browser configuration page allows to set all the configuration parameters of the device. Here below you can find the description of all the fields of the configuration page.

Ethernet configuration

This section allows to configure the parameters of the internet connection via LAN cable:

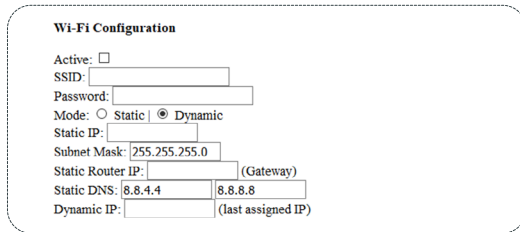


Ethernet settings:

- > **Mode:** It allows to set the IP assignment mode. Select Static if you want to assign a fixed IP address or Dynamic if you want the router to set all the net parameters automatically.
 - > **Static IP:** this field allows to set the address assigned to the concentrator. In Dynamic mode, if the concentrator is not connected to a router it will maintain the Static IP address.
 - > **Subnet Mask:** this field allows to set the subnet mask.
 - > **Static Router IP:** it allows to set the gateway address (router).
 - > **Static DNS:** this field allows to set the DNS (primary and secondary). The default ones are 8.8.4.4 and 8.8.8.8.
 - > **Dynamic IP:** this shows the last IP address the concentrator has been assigned to.
- Note:** to obtain a dynamic IP, it could take up to 2 minutes after the configuration is completed.

Wi-Fi configuration

This section allows to configure the parameters of the Wi-Fi internet connection:

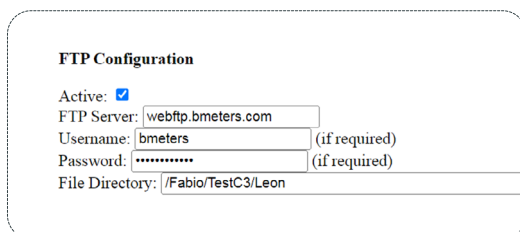


Wi-Fi settings

- > **Active:** tick this checkbox to enable Wi-Fi connection
 - > **SSID:** in this field it is necessary to enter the name of the Wi-Fi network (make sure to check capital letters and eventual spaces/symbols/numbers).
 - > **Password:** in this field it is necessary to enter the password of the Wi-Fi network (WPA2).
 - > **Mode:** It allows to set the functioning mode. Select Static if you want to assign a fixed IP address or Dynamic if you want the router to set all the net parameters automatically.
 - > **Static IP:** this field allows to set the address assigned to the concentrator (if set in Static mode).
 - > **Subnet Mask:** this field allows to set the subnet mask.
 - > **Static Router IP:** it allows to set the gateway address (router).
 - > **Static DNS:** this field allows to set the DNS (primary and secondary). The default ones are 8.8.4.4 and 8.8.8.8.
 - > **Dynamic IP:** this shows the last IP address that has been assigned.
- Note:** to obtain a dynamic IP, it could take up to 2 minutes after the configuration is completed.

FTP configuration

This section allows to set the parameters of the FTP server where the report file will be sent:

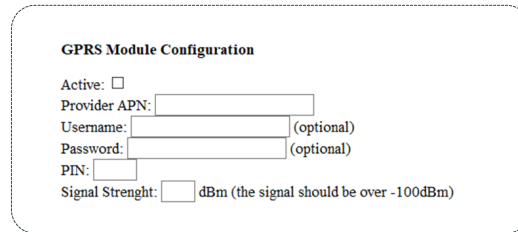


FTP settings

- > **Active:** tick this checkbox to enable GPRS connection
- > **FTP Server:** enter here the FTP server IP address (e.g.: ftp://webftp.bmeters.com)
- > **Username:** enter the Username of the FTP server account
- > **Password:** enter the Password of the FTP server account
- > **File Directory:** Default directory for file transfer (e.g.: /user/RFM-C3_readings)
- > **Type and port:** selectable SFTP/FTP and port number

GPRS configuration

This section allows to configure the parameters of the GPRS internet connection:




GPRS settings

- > **Active:** tick this checkbox to enable GPRS connection
- > **Provider APN:** in this field it is necessary to enter the Access Point Name (APN) of the SIM card provider.
- > **Username:** enter the username of the APN (if required)
- > **Password:** enter the password of the APN (if required)
- > **PIN:** in this field it is necessary to enter the PIN of the SIM card (if protected by a PIN code)
- > **Signal Strength:** indication of the last GPRS signal level (read every time an e-mail is sent).

Sender E-mail configuration

This section allows to set the parameters of the SMTP server that will send the report and configuration mail:



Sender E-mail settings

- > **Active:** tick this checkbox to enable E-mail.
- > **Email Subject:** here you can enter the subject for the E-mail that will be sent.
- > **Destination E-mail Address:** in this field it is possible to enter the recipient addresses of the report E-mail. It is possible to add up to five different addresses (it is sufficient to separate them with a comma “ , ”).
- > **Sender E-mail Address:** in this field it is necessary to enter the E-Mail address from which the report and configuration mail will be sent (it can be any address, but it’s advised to use one from the same domain name to avoid being recognized as spam).
- > **Use Default E-mail configuration*:** a default SMTP server is already provided. In case you need to use your own E-mail account unselect this box and fill the fields below.
- > **SMTP Server*:** type here the SMTP server address.
- > **Port*:** in this field you can type the port of the SMTP server.
- > **Security:** select the correct security protocol (TLS/SSL/None)
- > **User*:** type the SMTP E-Mail account username.
- > **Password*:** type the SMTP E-Mail account password.

Note: using of the default SMTP server (Use Default E-mail configuration: enabled) will only allow the pkfile.txt sending (therefore not of the csv file) containing the telegrams received from both wireless and wired MBUS devices. In addition, data sending with hourly frequency will not be available (maximum configurable frequency: 1 data transmission per day). To enable the data transmission of the .csv file containing the reading reports and the hourly frequency option, you will need to use your own SMTP server. Moreover, the .csv file can contain the information decoded from OMS compatible telegrams.

Sending Data

This section allows to configure the parameters of the sending of the report E-mail/files:

Sending Data

Send Through: E-mail | FTP | E-mail and FTP

Days of Month: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | ALL

Send Hour: :00 | Send every hour: **(MUST set your own SMTP server configuration)**

Sending Data settings

- > **Send Through:** Is it possible to select the mode the data will be sent, E-mail or FTP or both mail.
- > **Days of Month:** it is possible to select the days in which the report will be sent by ticking one or more checkboxes. To send everyday just select ALL.
- > **Send Hour:** This allows to set the hour of report sending.
- > **Send every hour:** by ticking this option, the hourly report data sending will be enabled.

Note: To enable the data transmission of the .csv file containing the reading reports and the hourly frequency option, you will need to use your own SMTP server. Moreover, the .csv file can contain the information decoded from OMS compatible telegrams.

Device configuration

This section allows to set the device basic parameters:

Device Configuration

Device ID:

Configuration E-mail Address: (if different from the destination address - use semicolon ";" to separate multiple addresses)

When the button is pressed the packets file and the configuration parameters will be sent to these addresses

Current Date (dd, mm, yyyy) / Time: 15-06-2023 / 22:28:21 Europe/Amsterdam (follows the Time Zone only after re-initialization)

Continent: (submit continent first)

City: (then submit city)

- > **Device ID:** in this field you can indicate a reference code of the concentrator (will be shown in the E-Mail subject).
- > **Configuration E-mail Address:** in this field you can enter an E-mail address where the configuration mails will be sent (if you leave this field blank the destination address will be used)
- > **Current Date / Time:** time and date of the device will be automatically updated as the device connects to the internet.
- > **Continent:** Select the continent where the device will be installed.
- > **City:** select the reference city for the Time Zone selection.
- > **Receiving Frequency:** 868/867/921 MHz

Vr: P4 10.05 868

Last email sent: 09/06/2023 10:30:38
Last FTP sent: 09/06/2023 10:36:03

This window shows the current firmware version of the concentrator, the last email sending and the last FTP sending. The button **"Send mail/ftp"** forces the sending of the configuration file (same function as the physical button).

Reading options configuration

In this section it is possible to set the reading options:

Reading Options

Read Always: **(Avoid reading while no module is transmitting!!!)**

Days of Week: Mon | Tue | Wed | Thu | Fri | Sat | Sun

Start Reading Hour: :00

Stop Reading Hour: :00

Number of wMbus Devices Installed: 1-9 | 10-199 | 200+

Erase Old Packets: never | only once | every Monday | every 1° of the month

Reading options settings

- > **Read always:** if this is selected the concentrator will read all the time.
- > **Days of Week:** select the reading day/s by ticking one or more checkboxes.
- > **Start Reading Hour:** the hour of reading start.
- > **Stop Reading Hour:** the hour of reading end
- > **Number of wMbus Devices Installed:** Select the number of devices installed on field.
- > **Erase old packets:** it allows to delete the data packets stored.

The following options are available:

- >> **Never:** by ticking this option, the packets will never be deleted (they will be overwritten anyway as per normal operation).
- >> **Only once:** by ticking this option, the packets will be deleted only when the device is configured.
- >> **Every Monday:** by ticking this option the packets will be deleted at 00:00 on every Monday.
- >> **Every 1 °of the month:** by checking this option, the packages will be deleted at 00:00 on the first day of every month.

CSV configuration

In this section it is possible to configure the options regarding the data report sending in a csv file. This file contains the reading data already decrypted and orderd for an easier and quicker consult (for OMS compatible devices only):

CSV Configuration

Send raw file:

Send also .csv files: **(MUST set your own SMTP server configuration)**

- WaterMeter HeatMeter HeatCostAllocator HumidityTemperatureSensor Other
- Single File File with fewer information but that contains all type of meters inside
- M-BUS File csv with M-BUS wired devices
- Export File language:

AES Global key 1

AES Global key 2

AES Global key 3

Individual AES keys:

CSV settings

> **Send raw file:** by selecting this checkbox, the raw file (pkfile) containing the "raw" telegrams of the wired and wireless MBUS modules will be sent.

Send also .csv files: by selecting this check, in addition to the raw file sending, the csv files data sending will be enabled.

Nota: To enable this feature, you will need to use your own SMTP server (Email and Email+FTP sending option only; FTP sender only won't require it).

> **WaterMeter / HeatMeter / HeatCostAllocator / HumidityTemperatureSensor / Other:** Here you can select the type of Wireless MBUS devices that will be received. The concentrator will create and send a different csv file for each of these categories, containing the data of the relative device types.

> **Single File:** by selecting this option, the transmission of a single csv file will be enabled for all Wireless MBUS devices received. Unlike the previous category, this file contains less details, but will group all devices into one file only.

> **M-BUS:** selecting this option enables the transmission of a csv file containing the reading data of the wired MBUS modules of the network of the MB-MASTER connected to the concentrator.

> **Export file language:** Here you can select the language of the csv file sent. (Italian / English).

> **AES Global key 1-2-3:** if the Wireless MBUS devices are encrypted with a global key, it will be necessary to indicate the global AES key set so that the concentrator can decrypt the data and report them in the csv file. It is possible to indicate up to three keys: the concentrator will attempt to decrypt with all three of them.

> **Individual AES keys:** in case the Wireless MBUS devices are encrypted with an individual key, it will be necessary to upload the file (.keys) of the individual AES keys so that the concentrator can decrypt the data and report them in the csv file.

It is necessary to upload a single file containing the keys of all devices to be decrypted. Attempting to load multiple files in sequence is not allowed, as the concentrator will overwrite the files from time to time.

Configuration submit (SUBMIT button)

As all the configuration data has been entered, press the button Submit in order to confirm the configuration and to send the configuration parameters to the concentrator. After few seconds the LED will turn on (parameters saving phase). Within one minute the configuration saving process will be completer and the LED will turn off.

MBUS Wired Setup

In this section it is possible to configure the options regarding MBUS network controlled by the MB-MASTER connected to the concentrator:

M-BUS WIRED SETUP


These values will be used by RFM-C3 to scan M-BUS wired devices and get the readings.
To save the values click on "Scan Devices" and complete a scan.

Retries: Timeout(s): Primary Address Search from: to:

Secondary Address Search: MSB LSB

Write one or more device serials with the character "," between each serial to search for specific devices.
NB: Instead of the full device number, you can write only some of the initial numbers.

MBUS Wired settings

- > **Retries:** Here you can set the number of retries for the MBUS scan.
- > **Timeout(s):** Here you can select the response timeout value for the MBUS scan. It is recommended to keep at least 2,0 seconds.
- > **Primary address search:** by ticking the checkbox, the search by primary address is enabled. Unticking the checkbox will make the concentrator search by secondary address.
- > **From [] to []:** here you can indicate the range of primary addresses to be searched during the MBUS scan.
- > **Scan Devices:** it allows you to start scanning the MBUS network. The scanning will be done by primary address if the primary address search checkbox is ticked, or by secondary address if the primary address search checkbox is unticked.
During the scanning operation, the following icon  will appear and at the end of the procedure will be signaled by a notification window of the browser in use
- > **Secondary address search MSB/LSB:** allows you to set the desired order of the bits for the search by secondary address.
If you opt for the search by secondary ID without indicating the specific addresses to be queried (in the table below), you will need to indicate one of the two boxes.
- > **Table of secondary addresses to search:** if you prefer to search for specific secondary addresses, it will be possible to indicate them in the text table by reporting the various serial numbers separated by a comma [,], as shown in the example above.
- > **Detected Device List:** the devices detected during the MBUS scan will be listed at the end of the web page.

Note: for a better performance and ease of use, it is advisable to set the MBUS network up by using the MB-MASTER + BMBUS software. As soon as all the devices in the network are given a primary address and are completely set up, you can proceed with the primary address search and configuration with the RFM-C3 web page. This will speed up the commissioning process.

3.2 Device test

During the commission process it is appropriate to test the WMBUS telegram reception and the correct mail sending. These two tasks can be easily done after the configuration by pressing the button on the PCB for one second. This will send an E-mail that contains all the configuration data and the reading file data in attachment. It is recommended to locate the installation point desired. Then, leave the device acquire the reading for at least 10/15 minutes and finally press the button. Once the mail is received, it will be possible to verify the telegrams received by reading the buffer file.

- > In the event the mail isn't received, check the configuration parameter again and check the correct connection to the data network.
- > In the event not all the telegrams of the devices installed in the area are received, it is necessary to find another installation point and then repeat the test again.

As the device test is successfully concluded, disconnect the LAN cable (or connect it to the router/LAN socket when Ethernet transmission are used) and close the device lid again

4. Accessories

In questa sezione è possibile prendere visione degli accessori disponibili

4.1 Antenna extension

For greater reception in difficult environments, an extension for the WMBus antenna has been added. The installation of this extension must be carried out trying to extend the cable length to the maximum (1 meter). The bracket included with the extension can be installed on a pole (metal clamp not included).

Note: if the pole is made of metal, it is strongly recommended to use a rubber insulator between the pole and the bracket to avoid interference.

Extension connection

1. Turn off the RFM-C3 concentrator if already installed.
2. Unscrew the antenna from the SMA-wM-Bus connector of the concentrator (if already installed) and in its place install the extension on the side opposite the bracket.
3. Screw the antenna to the SMA base screwed to the bracket.
4. Power on the RFM-C3 concentrator.

Pole mounting

5. Check that the diameter of the cable tie is sufficient to securely lock the bracket onto the pole.
6. Insulate the part of the pole where the clamp and bracket will be positioned with insulating material (e.g. rubber).
7. Close the band around the pole and the bracket, taking care to keep it inside the two slots of the bracket.
8. Tighten the clamp by screwing it until the bracket is securely fixed.

