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USER GUIDE

W-Modbus COMPACT

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W-Modbus Compact

W-Modbus Compact Manual

Comprehensive guide for W-Modbus Compact

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Introduction

This manual provides technical guidance for the installation, configuration and operation of the W-Modbus communication device. Designed to serve as a direct replacement for traditional cabling, this device enables W-Modbus communication over a wireless link.

The W-Modbus device maintains compatibility with standard Modbus and is intended for use in industrial automation, building management systems and other applications where Modbus is required. By eliminating the need for physical cabling, installation time and maintenance complexity are reduced while preserving the reliability and performance of a cabled counterpart.

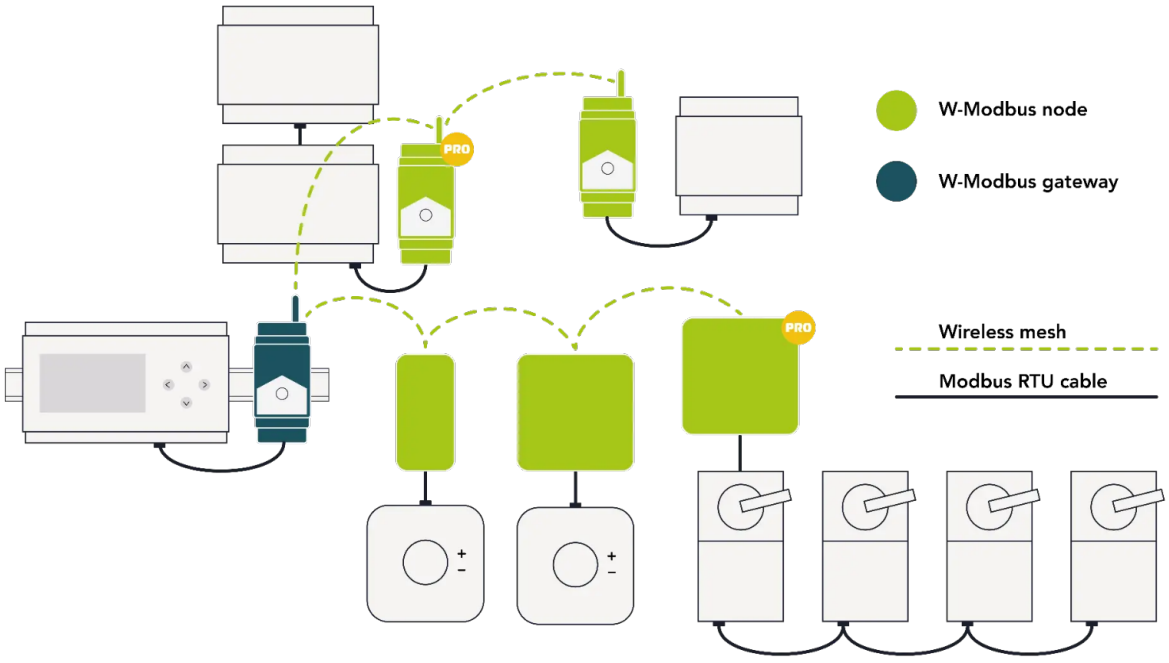
This manual outlines the device's features, technical specifications, setup procedures, and troubleshooting steps to ensure proper setup or integration into an existing W-Modbus network.

Product Overview

W-Modbus simplifies Modbus installations by replacing the control cable with a wireless connection. This significantly alleviates the downsides of running control cables, such as daisy-chaining, installation planning and troubleshooting.

W-Modbus is built on LumenRadio's MiraOS, which runs the MiraMesh network stack.

A W-Modbus unit can be configured either as a Gateway that is connected to a Modbus Client, or as a mesh node that is connected to one or more Modbus Servers. A W-Modbus network can consist of up to 100 mesh nodes.



Installed networks are not limited to an initial configuration and can be expanded or reduced as necessary. Additionally, problems with wireless connectivity (for example, increased radio noise in the area) can be remedied by repeater installation.

Glossary of Terms

Term	Definition
RTU	Remote Terminal Unit. In the context of LumenRadio's products, it refers to the Modbus RTU protocol.
MS/TP	Multidrop Serial/Token Passing. In the context of LumenRadio's products, it refers to the BACnet MS/TP protocol.
W-Modbus	LumenRadio's implementation of Wireless Modbus RTU.
W-BACnet	LumenRadio's implementation of Wireless BACnet MS/TP.
Gateway (Root Node)	The central gateway/master/root device of a W-Modbus network.
Node (Mesh Node)	Mesh Nodes, or Nodes, serve as subsidiary devices of a W-Modbus network.
MiraMesh	The underlying wireless mesh networking technology which is responsible for delivering W-Modbus data wirelessly.
MiraOS	The operating system which W-Modbus is built on top of.
Wireless Repeater	Any W-Modbus device that relays data packets between other devices in the mesh network. Note that every W-Modbus device functions as a repeater automatically, even if no Modbus device is connected to it.
Commissioning Network	A temporary W-Modbus network consisting of a Gateway in commissioning mode and one or more Mesh Nodes in commissioning mode, used for onboarding new devices.
Secure Network	A W-Modbus network that has transitioned from Commissioning Mode to Secure Mode, enabling long-term communication of application traffic using unique network credentials for each network.
Gateway Commissioning Mode	The mode in which the gateway device is advertising its existence using known network credentials such that mesh nodes in commissioning mode can join.
Gateway Secure Mode	The mode in which the gateway is advertising its existence using network credentials unique to the gateway.

Term	Definition
Mesh Commissioning Mode	The mode in which a mesh node is using known network credentials such that the node can find a gateway that is in commissioning mode.
Mesh Secure Mode	The mode in which a mesh node has been commissioned by a gateway and is using secure and unique network credentials to transmit data wirelessly.
Baudrate	The number of bits per second when transmitting data over a serial connection such as RS485. Common baud rates for W-Modbus include 9600, 19200, 38400, and 76800.
Stop Bits	Stop bits mark the end of an RS485 data frame.
Parity	An error-detection mechanism used in serial communication. A parity bit is appended to each data frame to verify data integrity. Note that parity is not configurable in BACnet MS/TP.
RS485	A physical layer standard for serial communication. RS485 defines the electrical characteristics of the wired bus on which protocols like Modbus RTU and BACnet MS/TP operate. LumenRadio's W-Modbus/W-BACnet devices connect to RS485 buses.
Wall Mount (form factor)	A wall-mounted W-Modbus device. Can be used as either a Gateway or Mesh Node.
Wall Mount PRO (form factor)	Identical to the base model of the Wall Mount, but supports up to 4 connected local devices when in any of the Mesh Modes.
DIN rail (form factor)	A DIN rail-mounted W-Modbus device designed for installation in electrical cabinets. Can be used as either a Gateway or Mesh Node.
DIN rail PRO (form factor)	Identical to the base model DIN rail, but supports 4 connected local devices when in any of the mesh modes.
Compact (form factor)	The smallest W-Modbus form factor, designed to be used only as a Mesh Node. It is configured via a single button and does not have DIP switches or three-pole switches.
Radio Module (or just Module)	A hardware component consisting of a CPU with an integrated radio chip, on which MiraOS and the W-Modbus firmware run.
W-Modbus module (form factor)	Every W-Modbus product contains an nRF52840 MCU

Term	Definition
	running the W-Modbus firmware. This combination of hardware and firmware — referred to as the module — is also available as a standalone component, allowing OEM customers to integrate W-Modbus directly into their own products.
MWA-N2 module	This is one of the radio modules on which W-Modbus can run. The MWA-N2 module has support for an external antenna, but lacks an internal antenna. The MWA-N2 module is used on the Wall Mount and Compact form factors.
MWA-N3 module	This is one of the radio modules on which W-Modbus can run. The MWA-N3 module has a built-in internal antenna, but has an external antenna port as well. The MWA-N3 module is used on the DIN rail form factor.
DFU over BLE	A Device Firmware Update (DFU) over Bluetooth Low Energy (BLE) is a method of upgrading the firmware running on a W-Modbus wirelessly. Such an update can be performed from a phone running the W-Modbus app.
FOTA update	A Firmware Over The Air (FOTA) update is a method of distributing new firmware over the mesh network to all nodes in a secure W-Modbus network, without requiring physical access to each device.
PDR (Packet Delivery Ratio)	The percentage of packets that are successfully delivered to their destination. A PDR of 95% means that 95 out of 100 packets are successfully delivered, while 5 packets are lost or corrupted during transmission.

Safety Information

- Disconnect Power Before Installation: Always turn off the power supply before wiring or servicing the device. Never work on live circuits.
- Verify the Power Source: Confirm that the power source matches the product's power specification.
- Check Polarity for DC Power: When using 12/ 24 VDC, verify correct polarity. Incorrect polarity may damage the device, the power supply or other devices connected to the same power source.
- Use Appropriate Wiring: Choose cables with the correct gauge and insulation suitable for the installation environment.
- Prevent Short Circuits: Ensure no bare conductors are exposed and all wiring is secured to avoid accidental contact.
- Include Overcurrent Protection: Use properly rated fuses or circuit breakers to protect both wiring and the device.
- Follow Local Electrical Regulations: All installation work must comply with applicable electrical codes and safety standards.
- ESD Measures: Wear proper ESD protection and ensure all equipment is correctly grounded to prevent unnecessary damage during installation.
- Qualified Personnel Only: Installation and servicing should only be performed by trained and authorized technicians.

Warnings and Precautions

WARNING

Warnings and Precautions

- Read these instructions and safety instructions carefully before using the product.
- Never submerge the product in water or any other liquid.
- Do not install the product in wet environments, or environments where relative humidity exceeds 95%.
- Do not install or use the product if it is visibly damaged.
- Do not attempt to modify the product. Any such modification will void the product warranty.
- The product should not be used for safety-critical tasks (e.g., medical devices).

WARNING

ELECTRICAL SAFETY

Only qualified electricians or service personnel trained by LumenRadio may perform installations and/or modification to an existing electrical installation.
Always follow local/national rules when performing this type of electrical installation.
When connecting a 24V isolation transformer, this must be done in accordance with IEC 61558-1.

WARNING

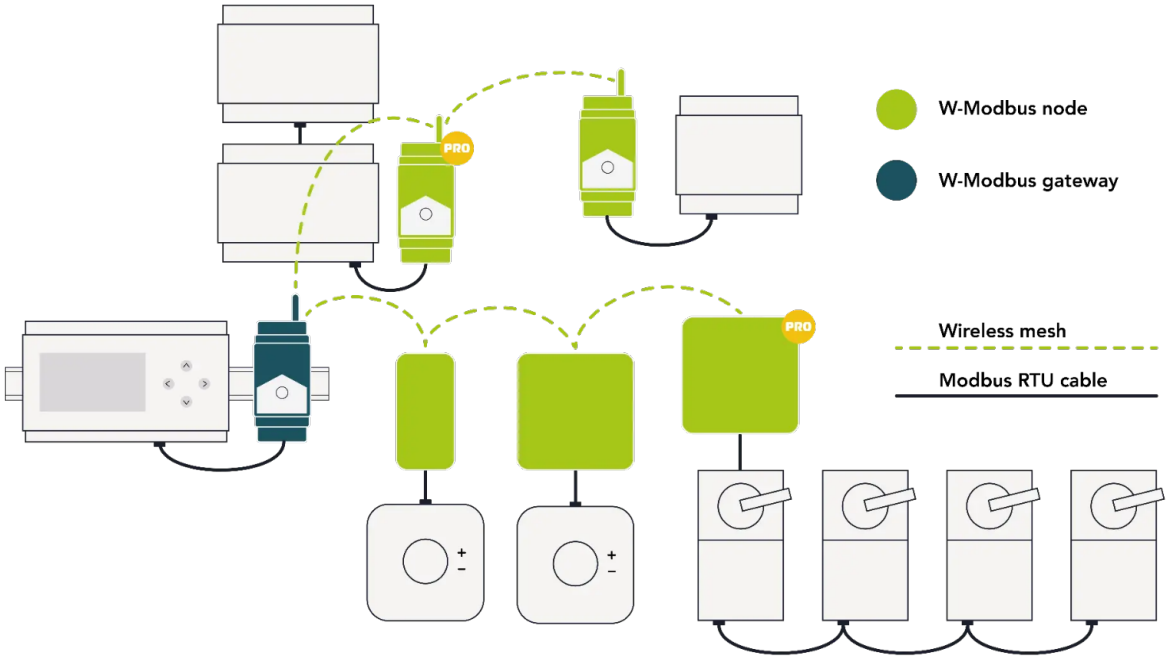
POWER AND RS485 CIRCUIT CAUTION

W-Modbus uses a half-wave rectified circuit. It should not share a VAC transformer with a device using full-wave rectified circuit.
The same VAC transformer can be used for W-Modbus and other device(s) only under the following conditions:

1. The other device(s) are half-wave rectified.
2. All power connections must have the same polarity. The ”+” terminal of W-Modbus must not be connected to the ”–” terminal of another device.

System Description

This section describes the W-Modbus system and its components, as well as the supported Modbus protocols and their features. It also includes an overview of the wireless communication technology used by W-Modbus.



W-Modbus Mesh Network

The W-Modbus Gateway is the central gateway/master/root device of a W-Modbus network. All wireless unicast (device-to-device) messages sent by mesh nodes must pass through this device before being forwarded to the destination mesh node.

The Modbus Client/Master must be connected to the W-Modbus Gateway of the network in order to be able to query devices connected to Slave/Mesh nodes.

Mesh Nodes, or Nodes, serve as subsidiary devices of a W-Modbus network. When sending data over the network, all unicast messages will be routed through the Gateway.

MiraMesh is the underlying wireless mesh networking technology which is responsible for delivering W-Modbus data wirelessly. MiraMesh is also responsible for dynamically changing the hopping path of data packets between nodes.

Once a mesh node joins the gateway, the gateway will send secure credentials that will be used once the network is switched to Secure Mode.

All network traffic is encrypted using AES-128 encryption, and the network credentials are unique to each gateway. This means that even if two W-Modbus networks are in close proximity to each other, they will not interfere with each other as they will be using different network credentials and encryption keys.

Commissioning Network

A W-Modbus network is comprised of one Commissioning Gateway and up to 100 Commissioning Mesh Nodes. Nodes in Commissioning Mode will advertise with pre-determined network credentials, meaning they can hear the Gateway advertising its existence, allowing mesh nodes to form a network.

Secure Network

Once a Commissioning Network is switched to Secure Mode, all connected nodes will reboot synchronously, and the secure network credentials unique to the gateway will be used. A secure network is comprised of one gateway, and one or more mesh nodes, all of which have been commissioned/secured, and are thus using network credentials and encryption keys unique to the gateway of that network.

Config Distribution

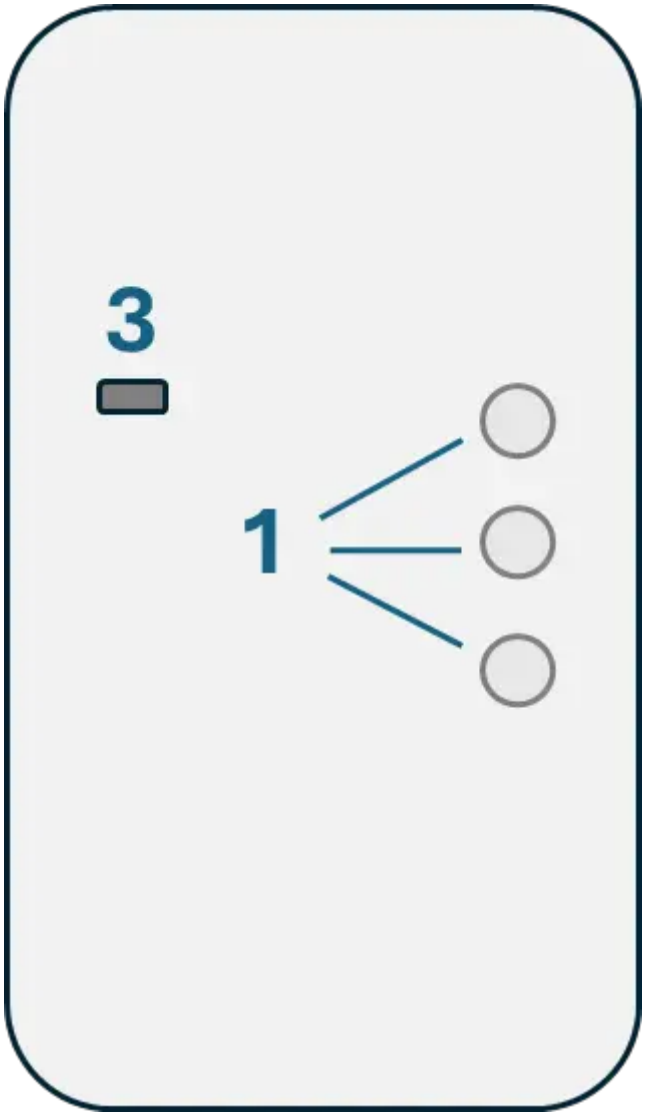
The gateway can distribute its bus settings (baud rate, etc) to the rest of the nodes in the network.

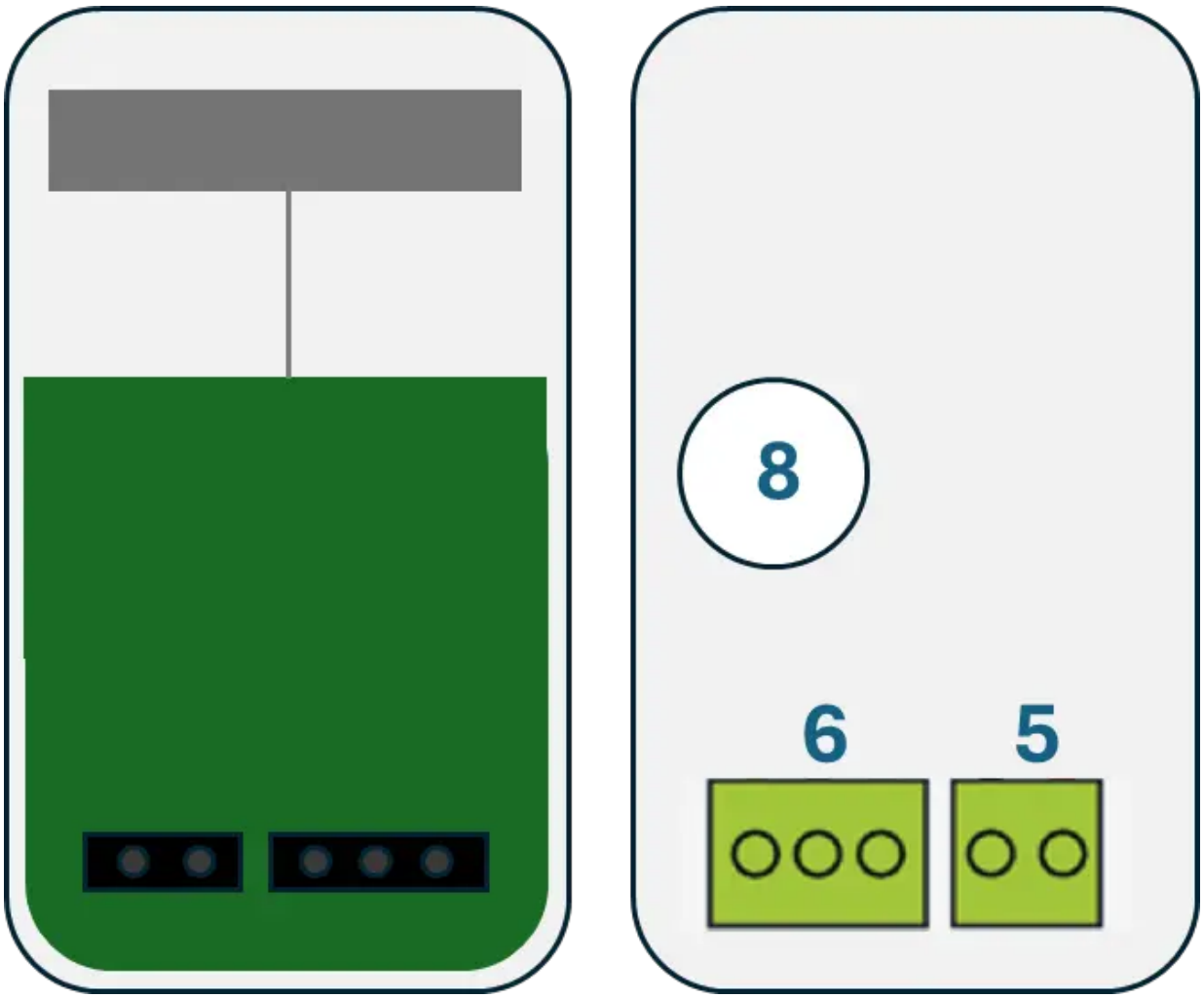
Firmware-Over-The-Air (FOTA)

Starting with firmware version 3.0.0, W-Modbus supports Firmware-Over-The-Air (FOTA) updates. FOTA allows the gateway to distribute new firmware to all nodes in a secure W-Modbus network without any user interaction. This means that when a new firmware version is released, the gateway can automatically update all nodes in the network to the latest firmware version without the need for a technician to manually update each node.

Update the gateway to the latest firmware version, and the gateway will take care of updating all nodes in the network.

Device Overview





#	Component	More information
1	LEDs	LED Status Indicators
2	N/A	
3	Push button	Button Functionality
4	N/A	
5	Power connector	Wiring Diagram
6	RS485 Bus connector	Wiring Diagram
7	N/A	
8	Knockout for cable entry	

Specifications

Physical Specifications	
Dimensions (W x H x D)	48 x 85 x 22 mm
Weight	55 g
Ingress protection class	IP40

Physical Specifications	
Antenna	Internal
Bus Specifications	
---	---
Maximum number of devices on bus (Node)	1
End-Of-Line Terminal Resistor	YES, 120Ω
Electrical Specifications	
---	---
Input voltage (AC)	24VAC ±10%
Input voltage (DC)	12–24VDC ±10%
Maximum power consumption	2.5W
Average power consumption	0.5W
Conductor cross section (stranded)	0.2–1.5mm²
Conductor cross section (solid)	0.2–1.5mm²
AWG	24–16
24V throughput power	N/A
Maximum RF output power	100 mW
Frequency range	2402–2480 MHz
Environmental Conditions	
---	---
Ambient operating temperature	-20°C to +55°C / -4°F to 131°F
Ambient storage temperature	-30°C to +80°C / -22°F to 176°F
Relative humidity	10–95% non-condensing

LED Status Indicators

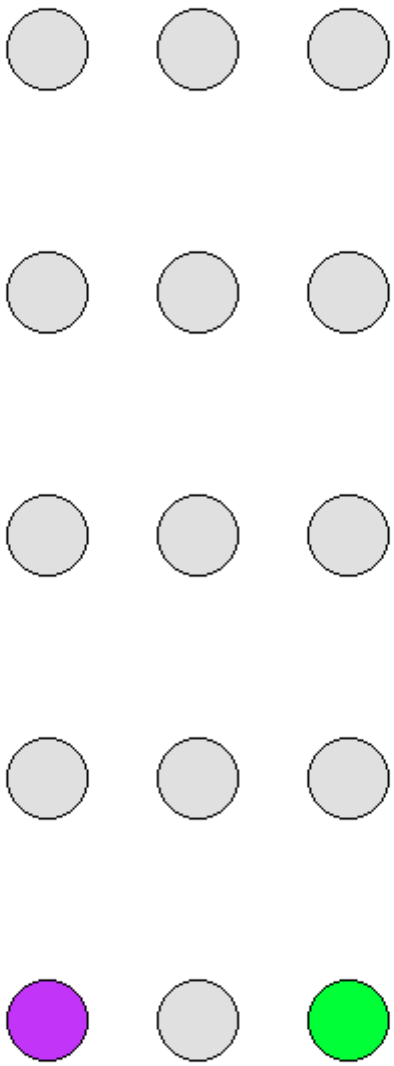
The LEDs will display different patterns depending on the current state of the device.
This section describes the possible patterns and their meanings.

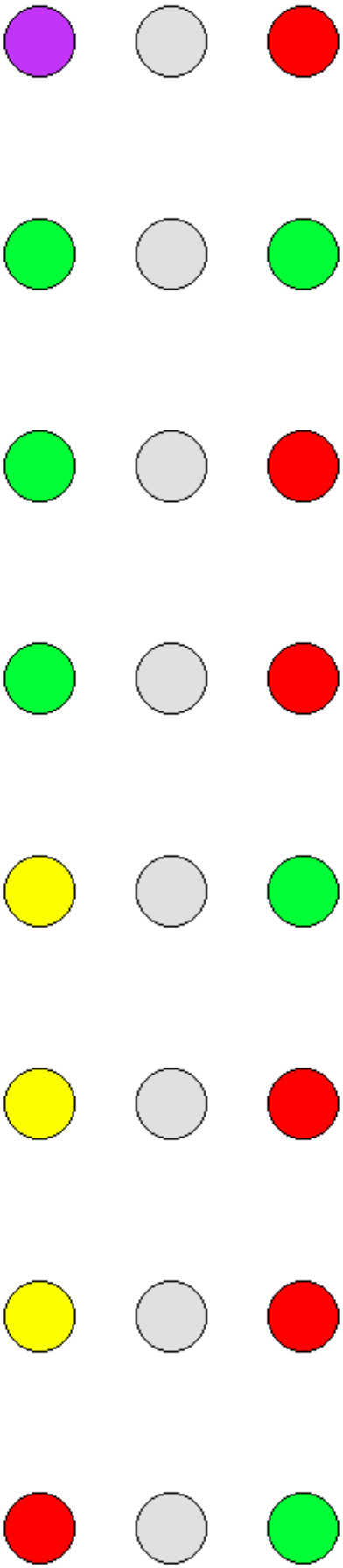
LED patterns shown in response to a button command are not included here; refer to Button Functionality.

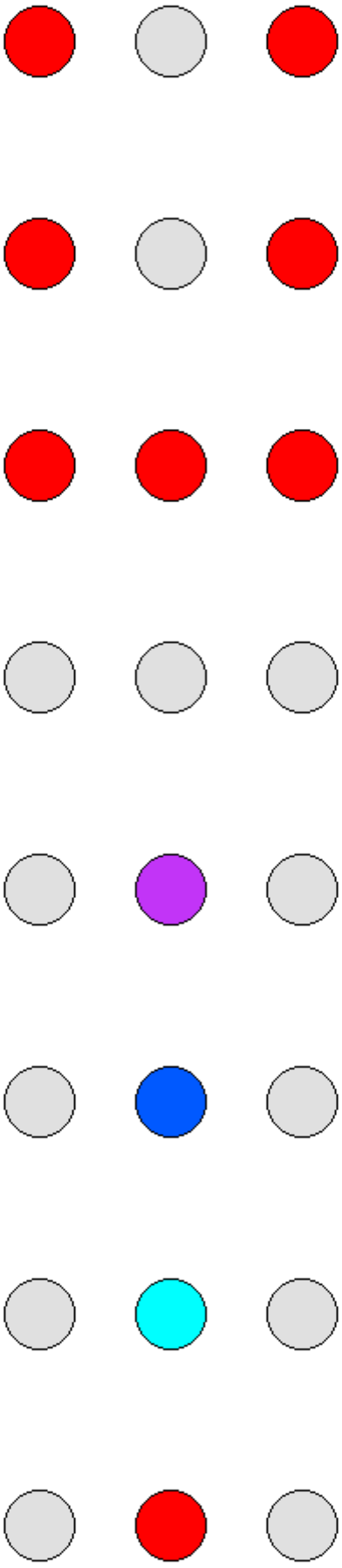
The LEDs will turn off after 30 minutes. They can be set to always on; refer to Button Functionality.

> NOTE
>
> If there is an error status on the RS485 LED, the LEDs will not turn off and will remain on until the error is resolved.

LED Overview







Button Functionality

There are four ways to interact with the device using the button:

- Single press
- Double press
- Triple press
- Hold and release

Single Press

If LEDs are not already permanently on (see Held button behavior below), this action extends the time during which the LEDs will stay active by 30 minutes.

Double Press

Rescans Modbus devices

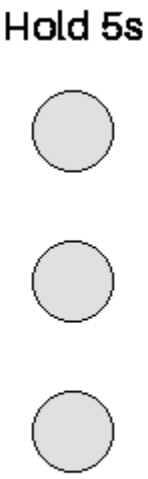
The third LED from the top will start to blink faster when scanning is running, refer to LED Status Indicators.

Triple Press

Makes the device connectable by the mobile app for 3 minutes.
The middle LED will flash blue two times to confirm. See Mobile App section.

Held button behavior

Some actions are performed by holding the button and releasing when a specified color is seen on the middle LED. Refer to the animation and the list below.



- Hold for 5s to turn LEDs to always on, release when magenta is shown
- Hold for 10s to uncommission, release when blue is shown.

- Hold for 15s to show firmware version on the LEDs. Release when cyan is shown.
- Hold for 20s to enter Firmware Update mode, release when red is shown.

Mobile App

W-Modbus



[Image: Download W-Modbus on App Store]

Features

- Updating W-Modbus firmware
- Network diagnosis
- Showing W-Modbus device information

Requirements

- Your mobile device has Bluetooth enabled.
- The target device is powered on and within Bluetooth range.
- Your mobile device has an internet connection so that the latest firmware can be automatically downloaded.

> WARNING
>
> During the time the app is connected to the W-Modbus device, the device will have 33% lower bandwidth available for network traffic.

Device Connection

Switch the W-Modbus device into Bluetooth mode by triple-pressing the button. When the device successfully enters Bluetooth mode, the middle LED will flash blue. The device will remain in Bluetooth mode for a period of 3 minutes.

Launch the W-Modbus Application

Open the application on your mobile device. The app will automatically scan for a device.

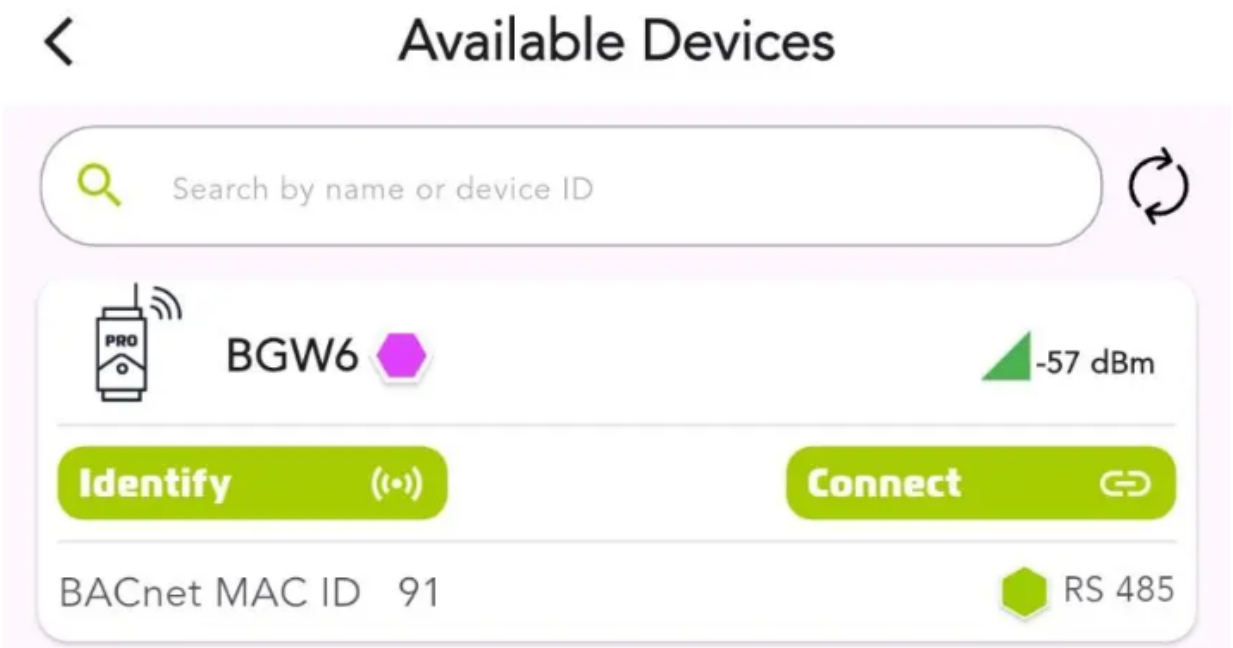
> NOTE
>
> The W-Modbus app only finds W-Modbus devices. Ensure you are using the correct app, as the W-Modbus and W-BACnet apps are separate applications.

When a device is found, the Available Devices screen is shown.





Set your device to
app mode


Available Devices
Search by name or device ID
PRO
BGW6
-57 dBm
Identify
Connect
BACnet MAC ID 91
RS 485

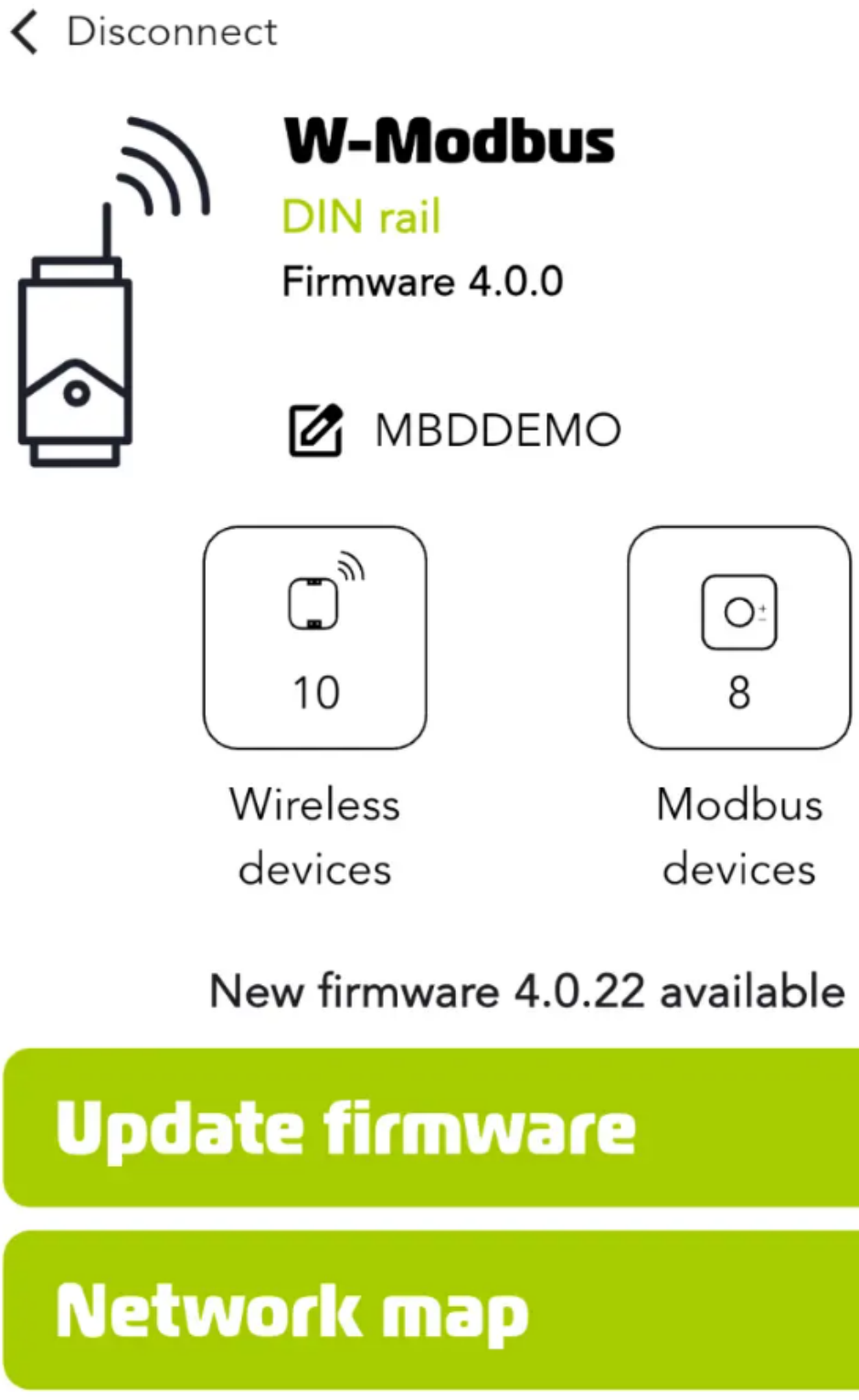
Here you can select the device you wish to connect to. You can also press Identify to confirm the correct device, which will blink all LEDs white as confirmation.

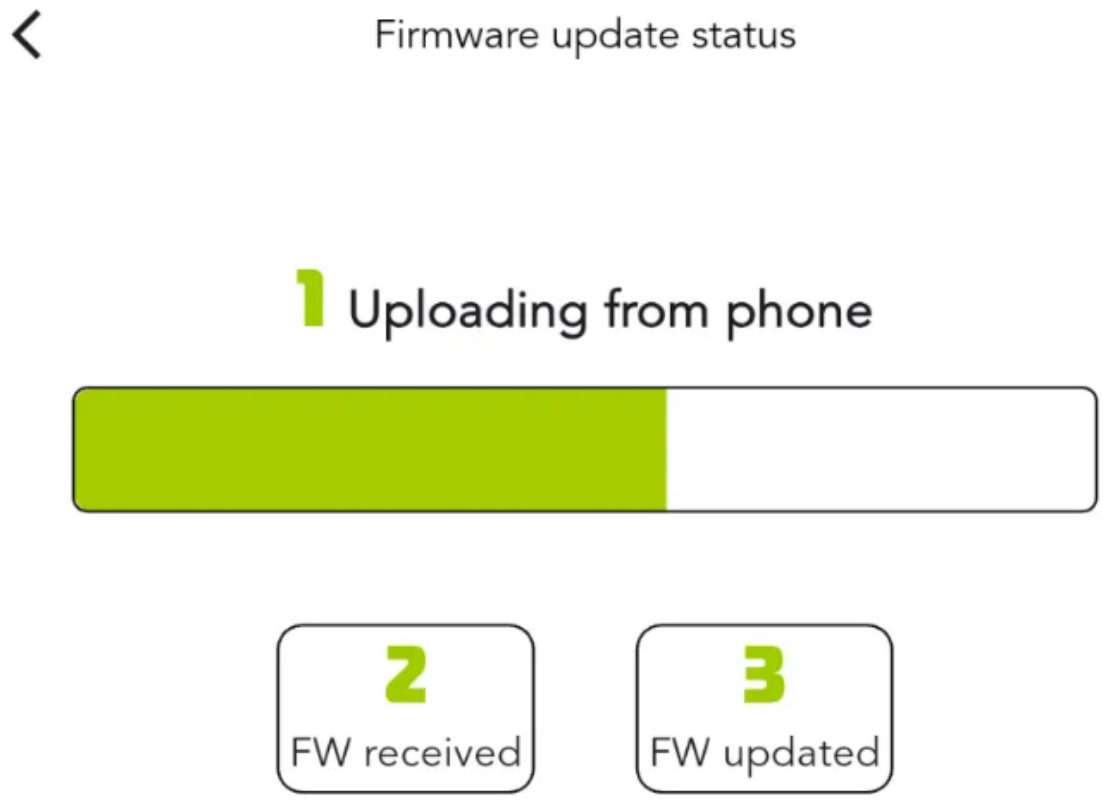
If no device is found, repeat step 1 and follow the instructions on the app to repeat the scan.

Firmware update in app

Start update

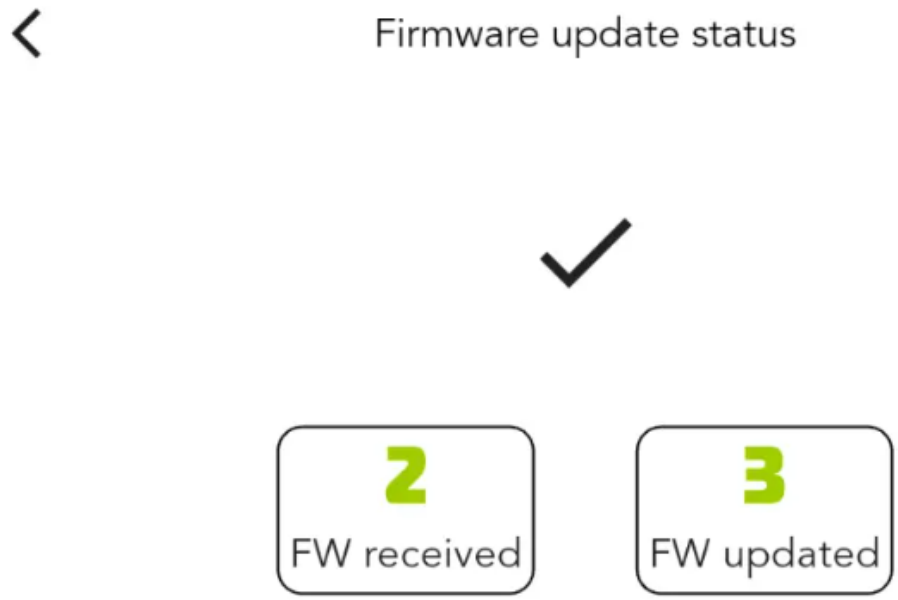
If there is a firmware update available for the connected device, the application will provide an onscreen option to start the update. The app will display the progress in real time.


Disconnect
W-Modbus
DIN rail
Firmware 4.0.0
MBDDEMO
10
Wireless devices
8
Modbus devices
New firmware 4.0.22 available
Update firmware
Network map


Firmware update status
1 Uploading from phone
2
FW received
3
FW updated

Complete update

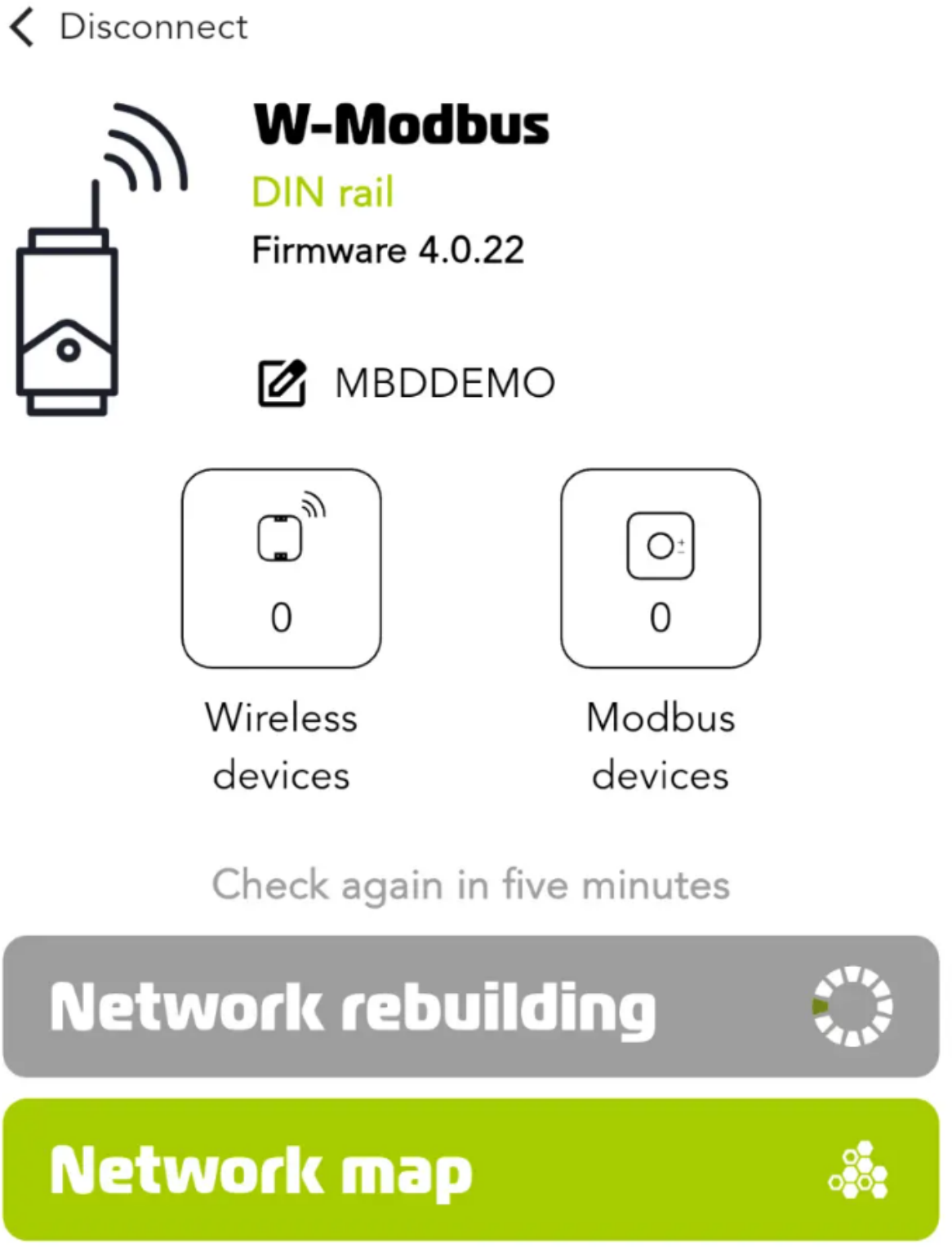
If an update was performed on a gateway device the update will automatically propagate to all nodes in the network. Typically this propagation takes 30 minutes to 2 hours, but can take longer depending on the size of the network.



Firmware upload done!

Gateway is updated. Soon the firmware will be distributed to all nodes.

The next steps will continue in a few minutes and may take up to 2 hours


Disconnect
W-Modbus
DIN rail
Firmware 4.0.22
MBDDEMO
0
Wireless devices
0
Modbus devices
Check again in five minutes
Network rebuilding
Network map

Switching Update Channel

If updating to beta firmware, you need to switch the update channel.
When the app is starting, tap the LumenRadio logo 8 times and select Beta mode.


lumenradio
Firmware mode options
Select beta mode if you are a beta tester and want to test the next release. Developer mode is only for developers and should not be used on production sites.
Production mode
Beta mode
Developer mode

Beta Mode will be shown in red in the top right corner.

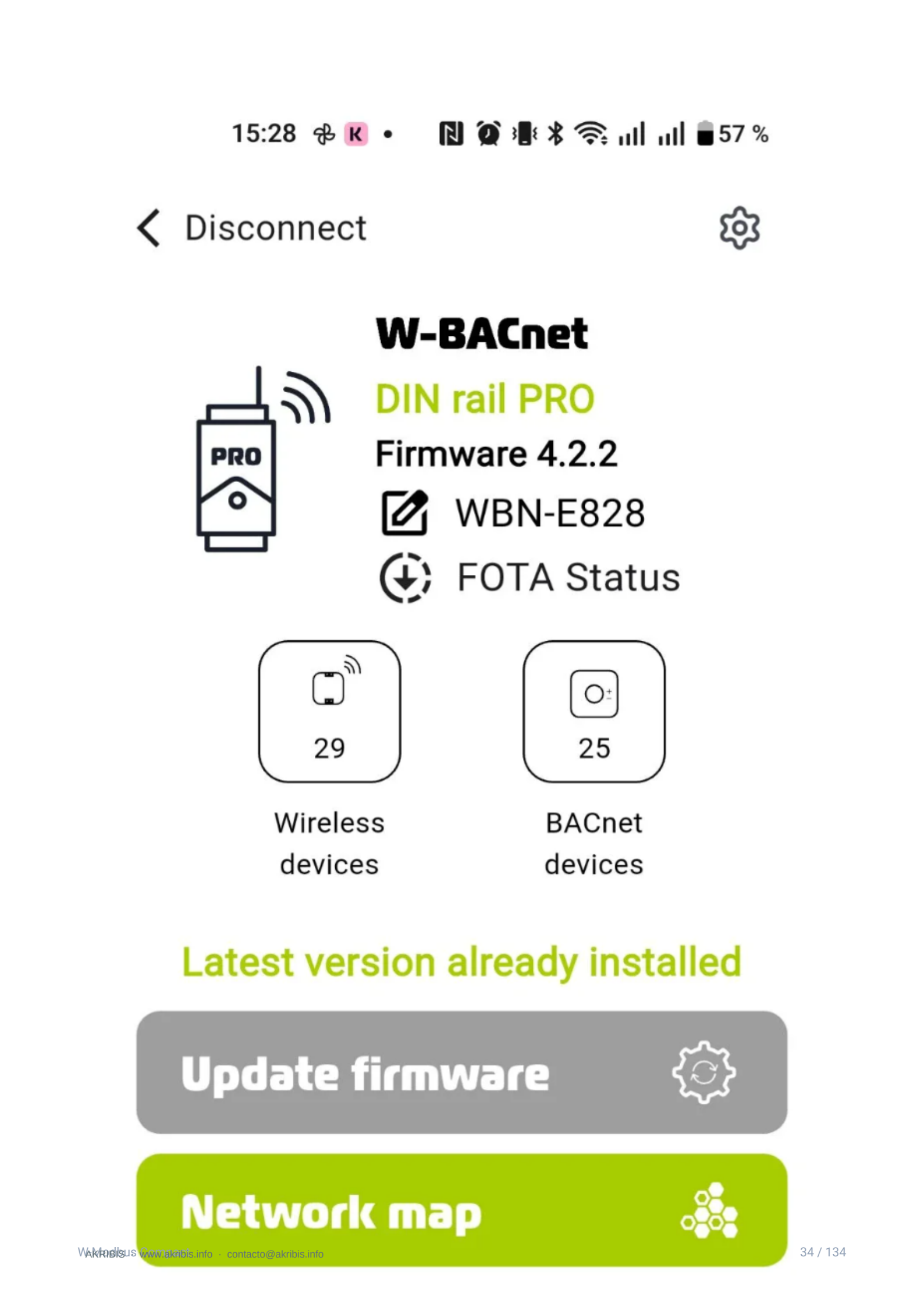
FOTA status

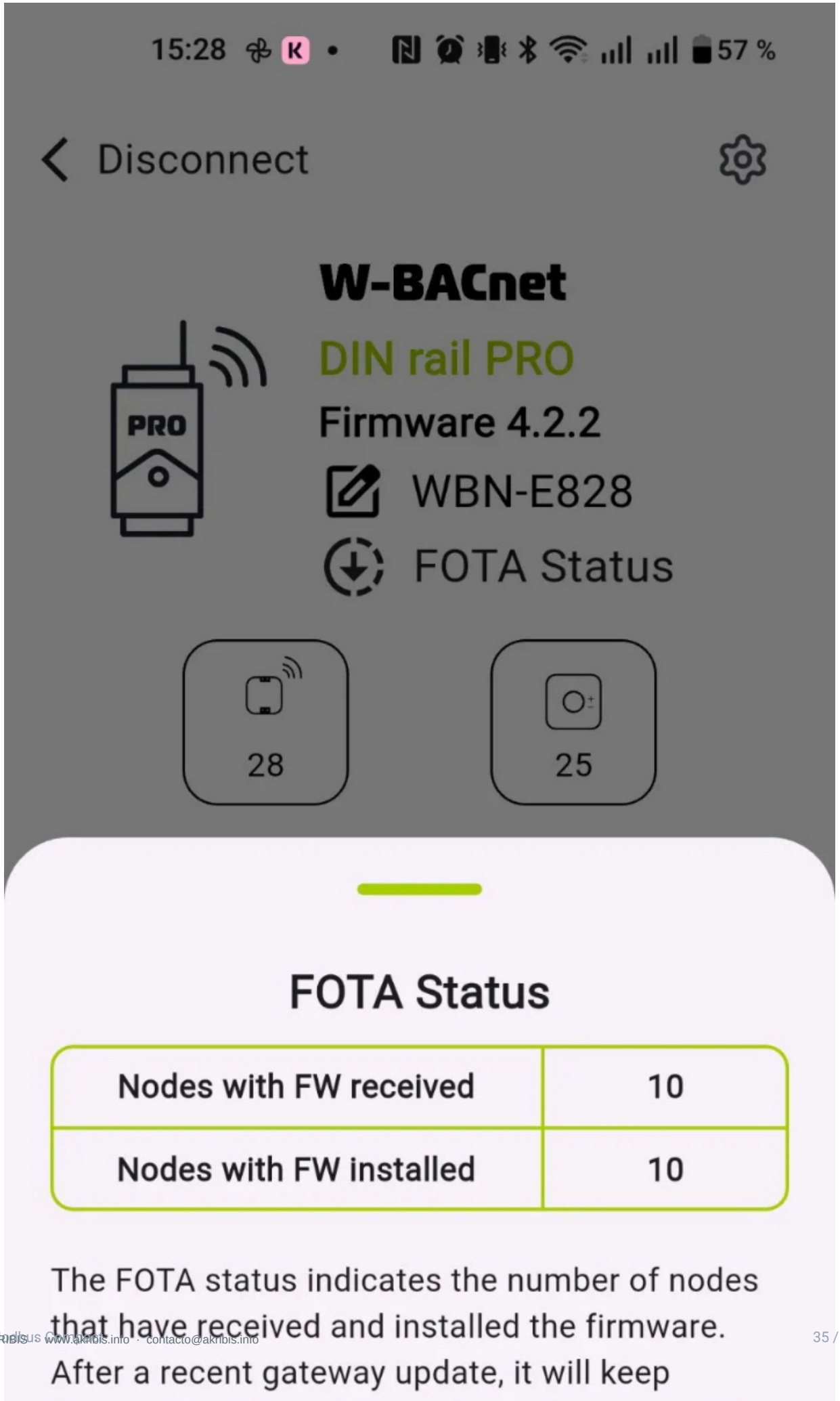
The FOTA Status button on the app home screen can be used to monitor and manage Firmware Over-the-Air (FOTA) updates. Once the firmware is updated on the gateway (GW), the gateway automatically propagates the new firmware to all connected nodes.

Selecting the FOTA Status button displays:

- The number of nodes that have successfully received the firmware.
- The number of nodes that have successfully installed the firmware.

The firmware update process runs in the background and may take up to 2 hours, depending on the number of connected nodes and the network quality. During this time, users can continue using the application normally while the update progresses.

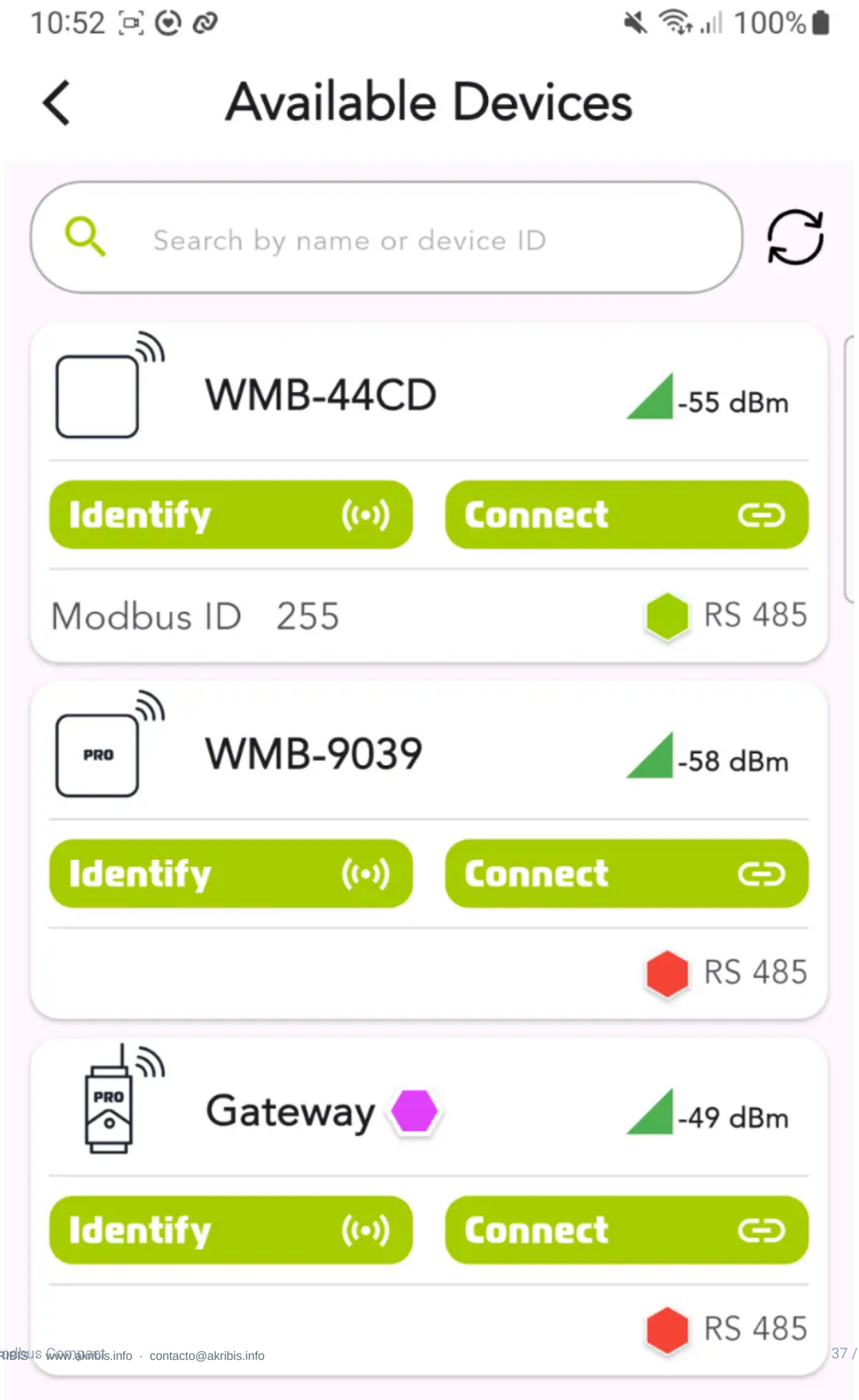

15:28
57 %
Disconnect
W-BACnet
DIN rail PRO
Firmware 4.2.2
WBN-E828
FOTA Status
29
Wireless devices
25
BACnet devices
Latest version already installed
Update firmware
Network map

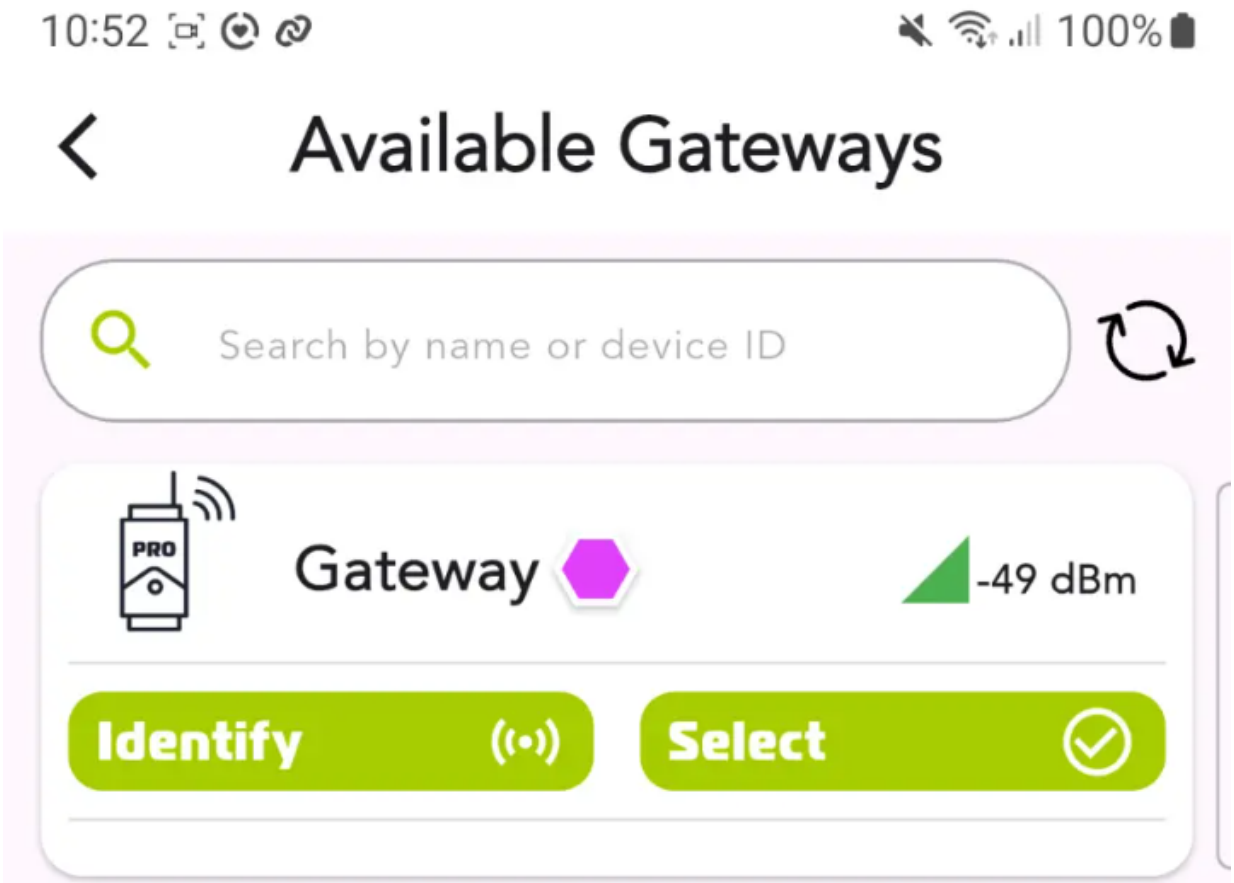

15:28
57 %
Disconnect
W-BACnet
DIN rail PRO
Firmware 4.2.2
WBN-E828
FOTA Status
28
25
FOTA Status
Nodes with FW received
10
Nodes with FW installed
10
The FOTA status indicates the number of nodes
that have received and installed the firmware.
After a recent gateway update, it will keep

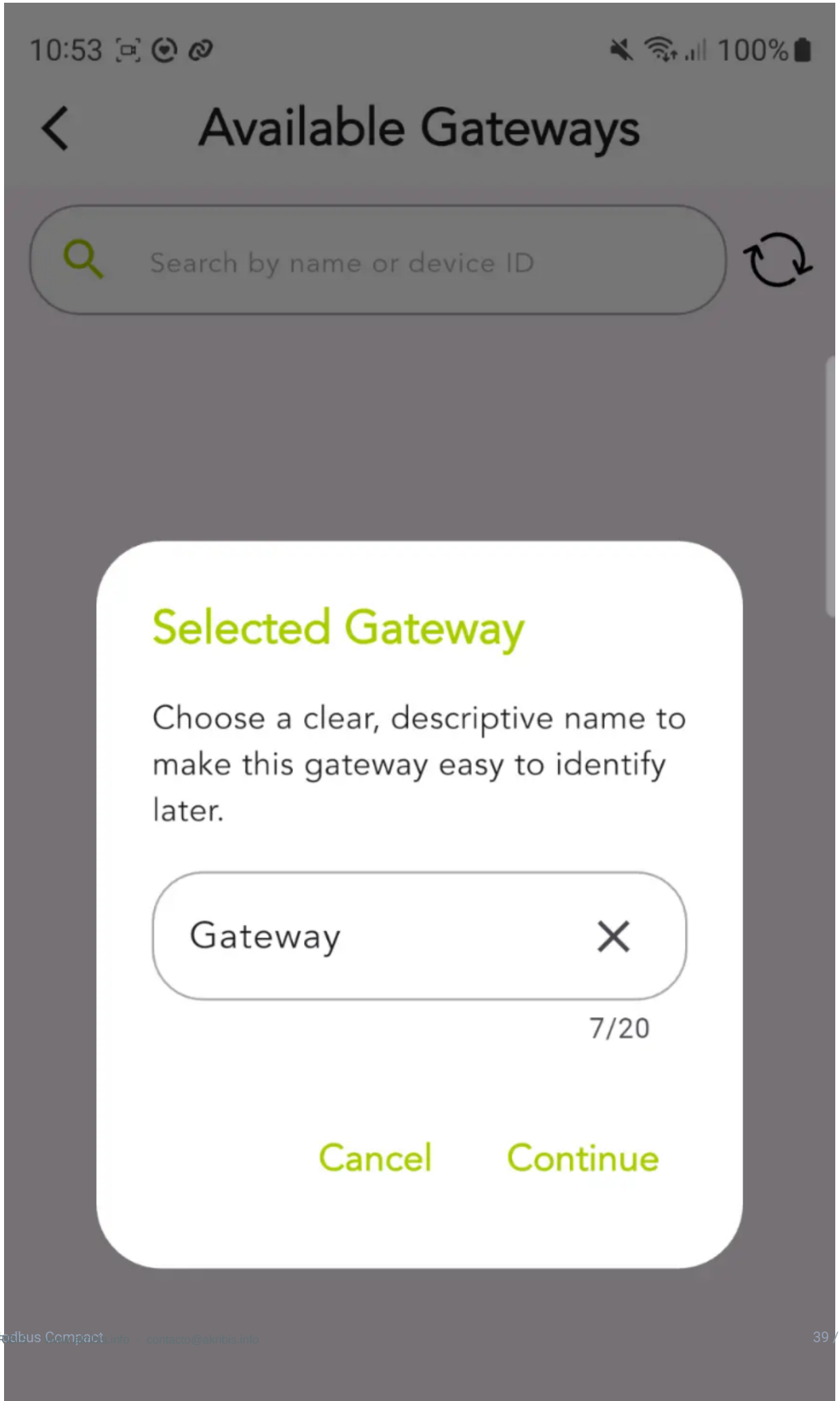
Commissioning

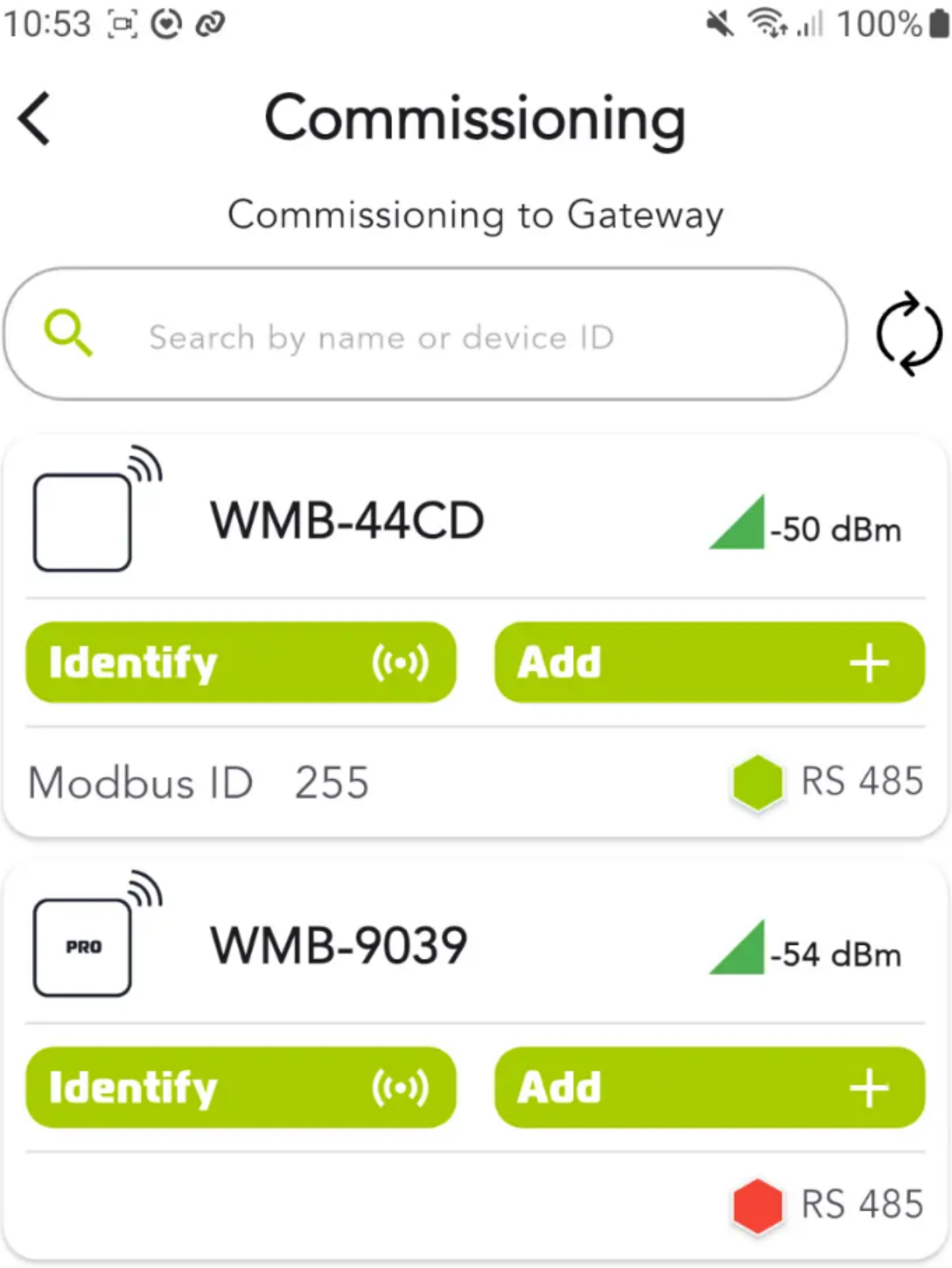
The commissioning process allows you to add W-Modbus nodes to a gateway's network using the mobile app. Follow the steps below to commission your devices.

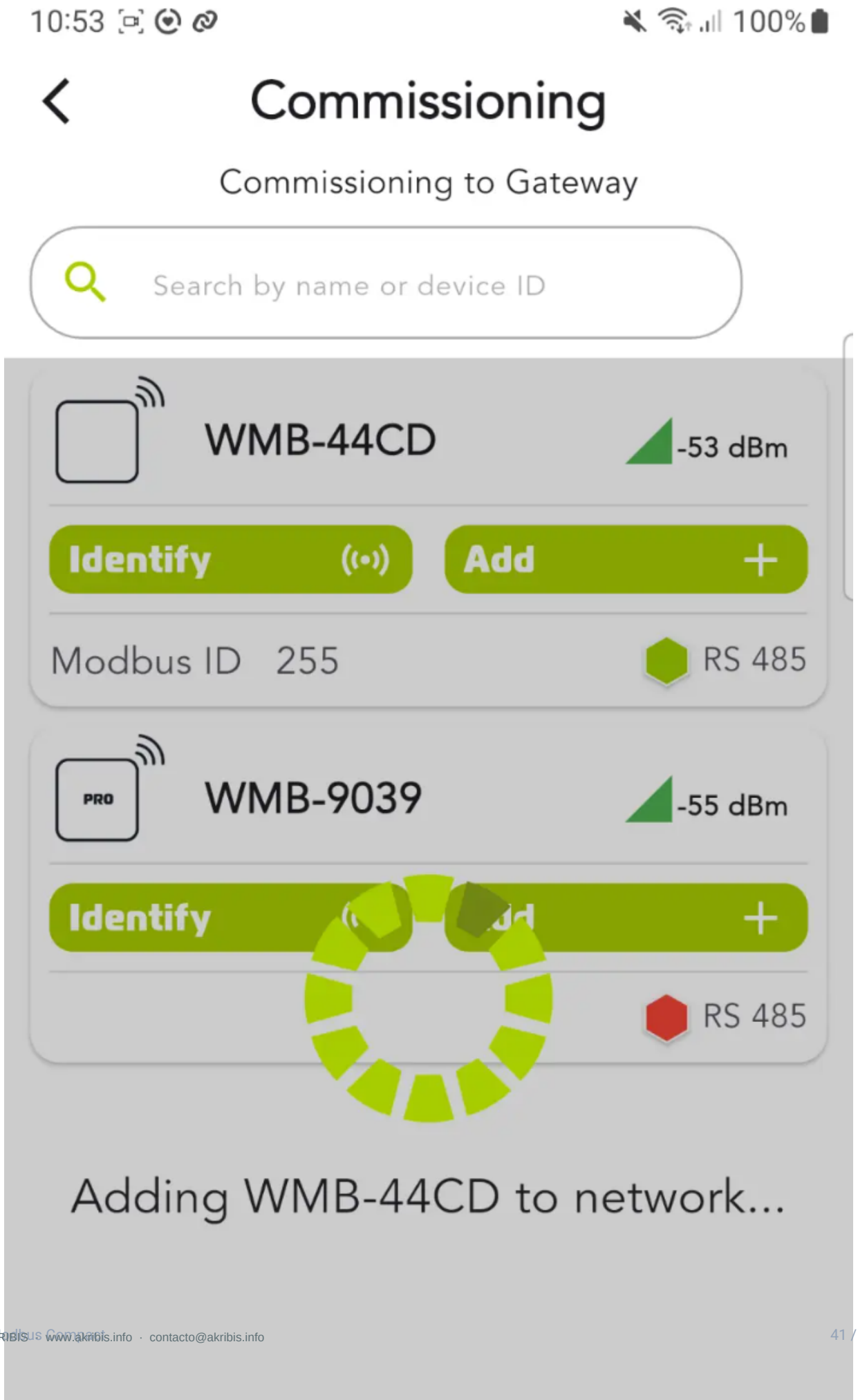
The gateway should be in secure mode before commissioning devices to it using the mobile app. Put the gateway in secure mode using the three-pole-switch.


10:52
100%
Available Devices
Search by name or device ID
WMB-44CD
-55 dBm
Identify
Connect
Modbus ID 255
RS 485
PRO
WMB-9039
-58 dBm
Identify
Connect
RS 485
PRO
Gateway
-49 dBm
Identify
Connect
RS 485


10:52
100%
Available Gateways
Search by name or device ID
PRO
Gateway
-49 dBm
Identify
Select


10:53
100%
Available Gateways
Search by name or device ID
Selected Gateway
Choose a clear, descriptive name to make this gateway easy to identify later.
Gateway
7/20
Cancel
Continue


10:53
100%
Commissioning
Commissioning to Gateway
Search by name or device ID
WMB-44CD
-50 dBm
Identify
Add
Modbus ID 255
RS 485
PRO
WMB-9039
-54 dBm
Identify
Add
RS 485


10:53
100%
Commissioning
Commissioning to Gateway
Search by name or device ID
WMB-44CD
-53 dBm
Identify
Add
Modbus ID 255
RS 485
PRO
WMB-9039
-55 dBm
Identify
RS 485
Adding WMB-44CD to network...

Saved Gateways

Gateways that have been previously connected are automatically saved so you don’t need to establish a new gateway connection each time you commission additional devices. If needed, saved gateways can be removed from the list of available gateways shown in Step 3.

Removing Commissioned Devices

To remove a commissioned device from a gateway’s network, follow Steps 1-5. When you reach Step 5place the device into Bluetooth commissioning mode. It will appear in the list of advertising devices (use the search function if needed) with an available Remove option. Once removed, the device will automatically decommission itself from the current network and return to Bluetooth advertising mode.

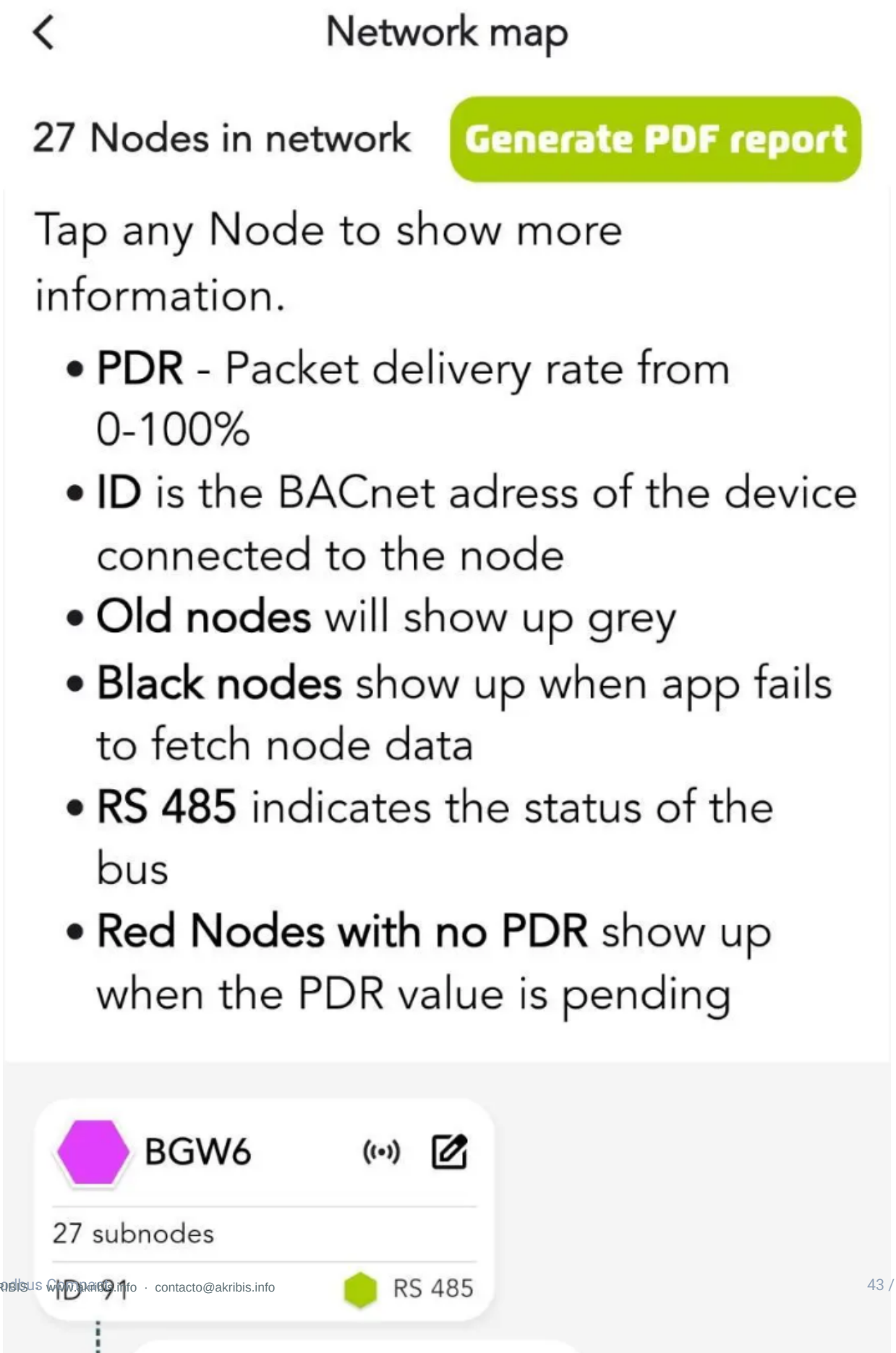
Nodes can also be decommissioned using the push button on the device.

Network Map

The network map provides a visual representation of all W-Modbus devices connected to a gateway. This feature enables the viewing of device connections to assist with understanding their relationships within the network.

Network Map Overview

The network map is presented as a hierarchical tree structure where parent devices appear at the top level with child devices indented beneath them to illustrate a direct connection. Sibling devices — those sharing the same parent — are displayed at the same indentation level. An example of a network map is displayed below.


Network map
27 Nodes in network
Generate PDF report
Tap any Node to show more information.
• PDR - Packet delivery rate from 0-100%
• ID is the BACnet adress of the device connected to the node
• Old nodes will show up grey
• Black nodes show up when app fails to fetch node data
• RS 485 indicates the status of the bus
• Red Nodes with no PDR show up when the PDR value is pending
BGW6
27 subnodes
ID 91
RS 485

In the picture above, the gateway is titled "BGW6" and has 27 mesh nodes as children.
The children are named "WBN-ED52", "WBN-A842" and so on. Both WBN-ED52 and WBN-A842 are directly connected to the gateway, making them siblings in the network map. WBN-A842 has one mesh node as a child.

PDR

The hexagon to the immediate left of a node's
name displays a number which indicates the packet delivery rate (PDR) from the gateway to that node.

In the picture above, WBN-ED52 has a PDR of 95% while WBN-A842 has a PDR of 91%.

The color of the hexagon is determined by the PDR, with green indicating a strong connection (PDR >= 99%), amber indicating a moderate connection (PDR >= 94% and < 99%), and red indicating a weak connection (PDR < 94%).

RS485 Status and Address

The RS485 hexagon at the bottom right of the node indicates that
the node has a connected device on the local bus.
In the picture, all the nodes have a connected device
as indicated by the green RS485 hexagon. The hexagon's color will be red for
a node with no connected device.
The ID displayed at the bottom left of the node is the Modbus address of the devices connected on the local bus. In the picture, the gateway has a device with address 91, while the node WBN-ED52 has two local devices connected, with address 72 and 97.

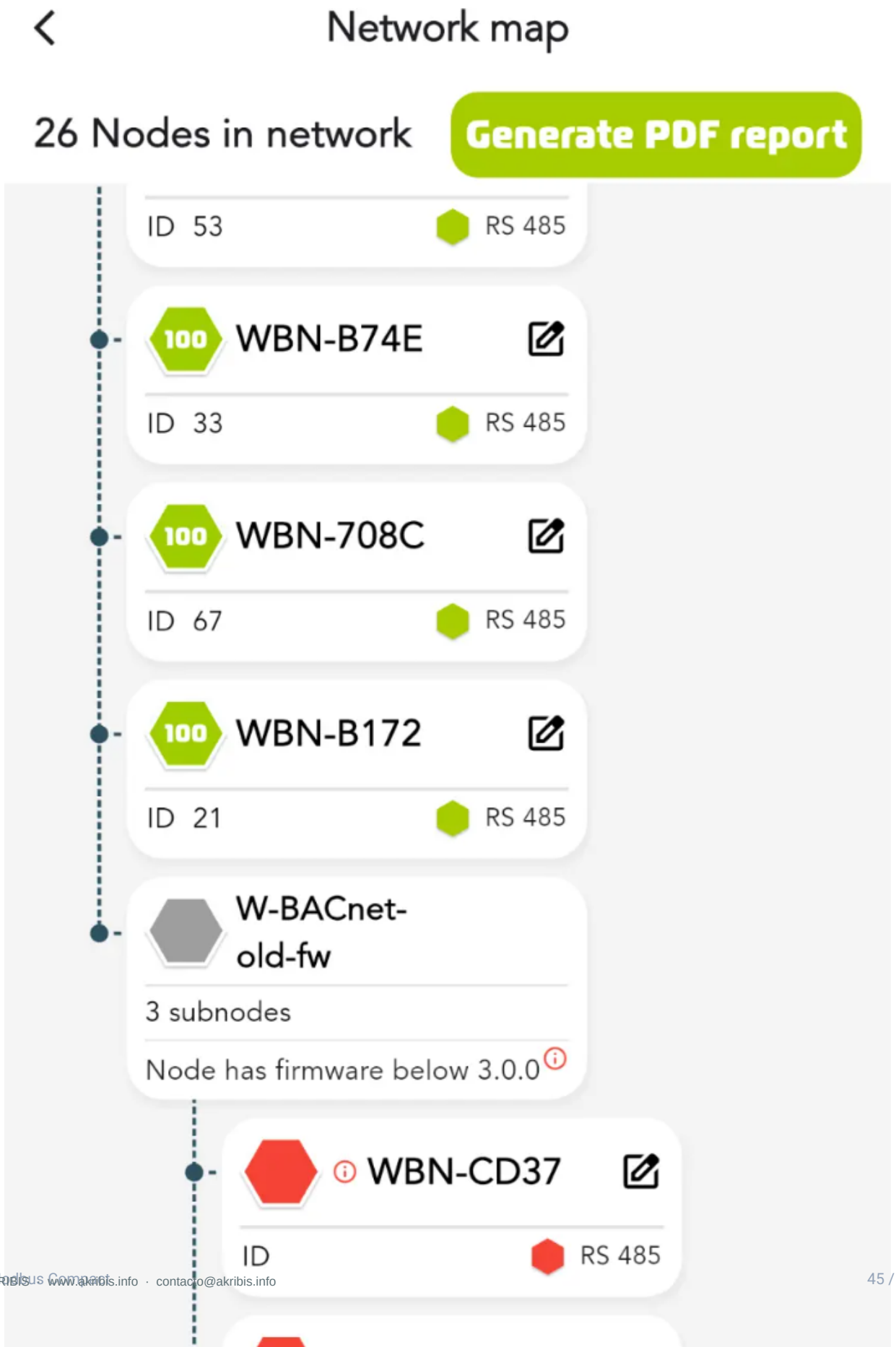
> NOTE
>
> For W-Modbus, the gateway will not have an RS485 hexagon as the gateway acts as the Modbus client and does not have a server address.

Identify and rename buttons

The buttons to the right of the device name are used for renaming the device and identifying.

- The Identify button will cause the device to blink all LEDs white as confirmation. When you have identified the device, press the button to make the blinking stop.
- The Rename button will rename a node. See below for more details on renaming devices.

Missing PDR values


Network map
26 Nodes in network
Generate PDF report
ID 53
RS 485
100
WBN-B74E
ID 33
RS 485
100
WBN-708C
ID 67
RS 485
100
WBN-B172
ID 21
RS 485
W-BACnet-old-fw
3 subnodes
Node has firmware below 3.0.0
WBN-CD37
ID
RS 485

In this picture, some of the nodes ("WBN-CD37", "WBN-D493" and "WBN-ED52") have yet to calculate a PDR and send to the gateway.
One node has firmware older than 3.0.0, which only displays limited information in the network map.

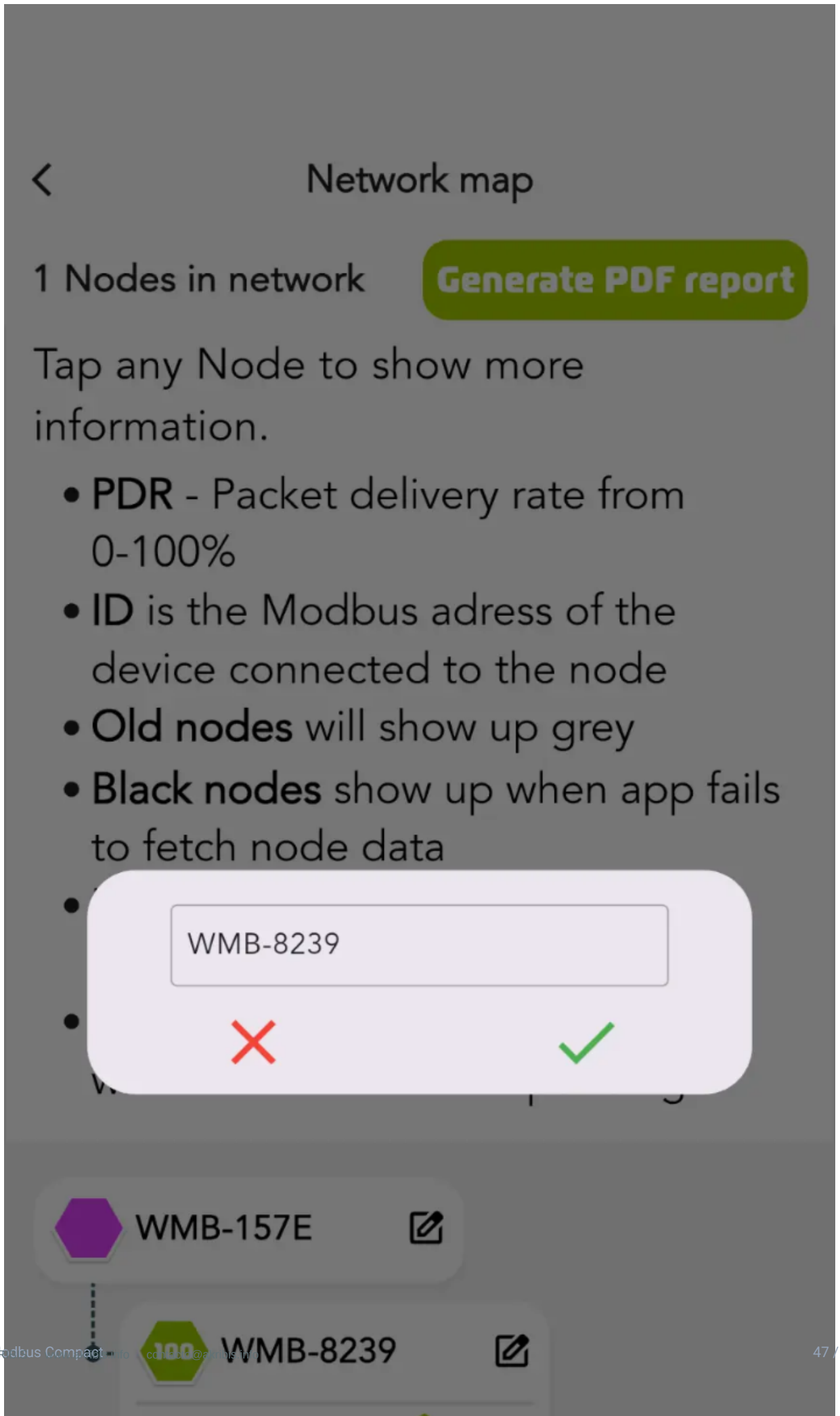
Renaming a Gateway/Node

Follow these steps to rename a node within the network map:

Connect to a gateway

Connect to the app and open the network map as described above.

Tap on (rename icon) to open the rename dialog.


Network map
1 Nodes in network
Generate PDF report
Tap any Node to show more information.
• PDR - Packet delivery rate from 0-100%
• ID is the Modbus adress of the device connected to the node
• Old nodes will show up grey
• Black nodes show up when app fails to fetch node data
WMB-8239
WMB-157E
WMB-8239

Enter a new name

The name must match the following criteria:

- The name must be in ASCII characters only.
- The maximum length of the name is 8 characters.

Confirm or cancel

- Tap the checkmark to save the new name.
- Tap the red (X) to cancel the renaming process.

PDF Report Generation

The application allows for the generation of PDF reports of the network map.

Requirements

Before generating a PDF report, ensure:

- The mobile device has sufficient storage to save the generated report.
- Optionally, a compatible PDF viewer is installed for viewing reports after generation.

Report Generation Process

Connect to the app and open the network map as described above.

Select the Generate PDF report option.

Project reference

Project reference

Installer company name

Installer company name

Installer name

Installer name

Alternative reference

Alternative reference

Comment

Comment

Table sorting order

Network routing

Customize Report Content:
The report's content can be customized by adding optional details such as the company and installer name.

The report will include a timestamp of when the report was generated.

Generate & Save the Report

- Tap Generate PDF Report to create the PDF document.
- The application will compile the network map and relevant data into a structured report.
- Save the file to your mobile device or share it.

Gateway Replacement

Gateway Replacement allows an existing installation to be restored by replacing a damaged or unavailable gateway with a new device. The replacement gateway takes over the previous installation using recovery information from the original network.

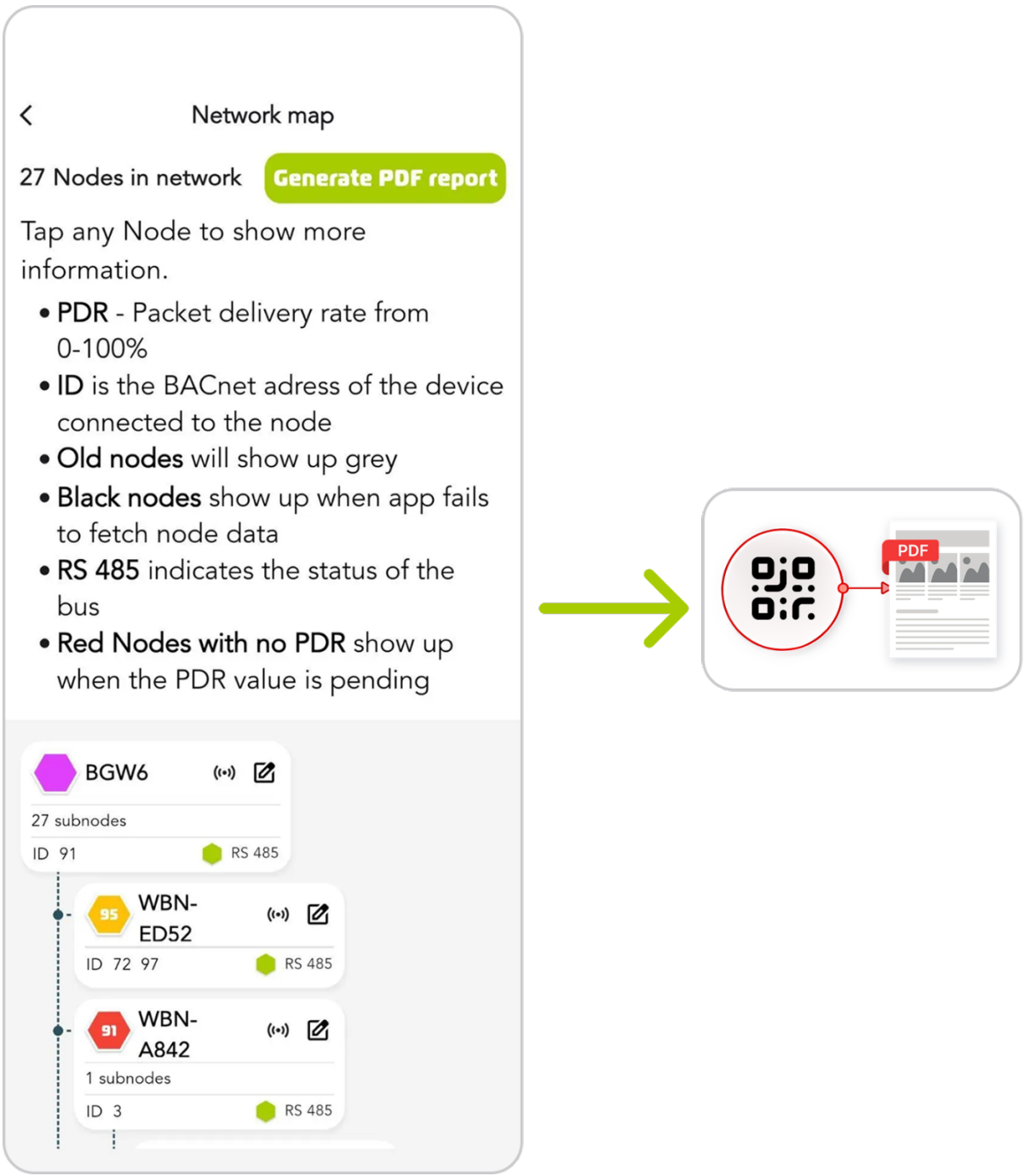
IMPORTANT - REQUIRED before replacement
A Network Map PDF must be generated and saved before Gateway replacement is required. The recovery information contained in the Network Map is needed to restore on existing installation.
Without previously saved recovery information, gateway recovery cannot be possible.

For information on how to create and save a Network map, see the Network Map section.

Recovery Information







When to use Gateway Replacement

Gateway Replacement should only be used when an existing gateway must be replaced. Typical scenarios include:

- Gateway failure
- Damaged hardware
- Gateway no longer accessible

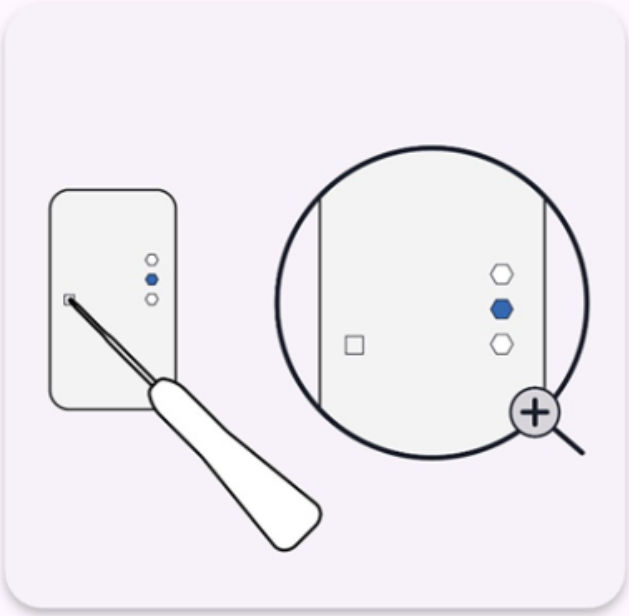
Do not use Gateway Replacement for new installations. For new setups, use the standard commissioning process.

Access routes

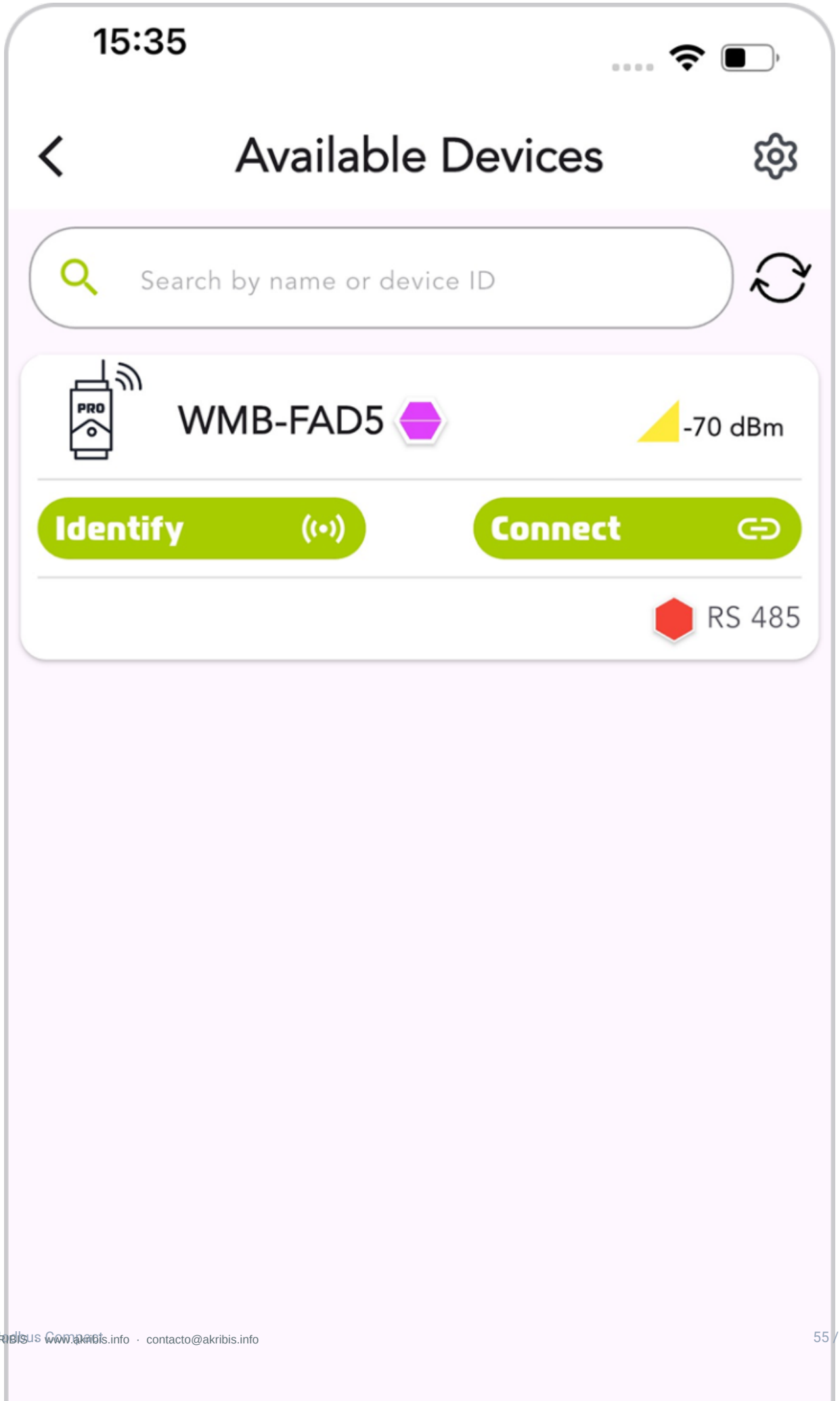
From the start screen or the Available Devices screen, tap the Settings icon. Select Gateway Replacement to begin the recovery process.

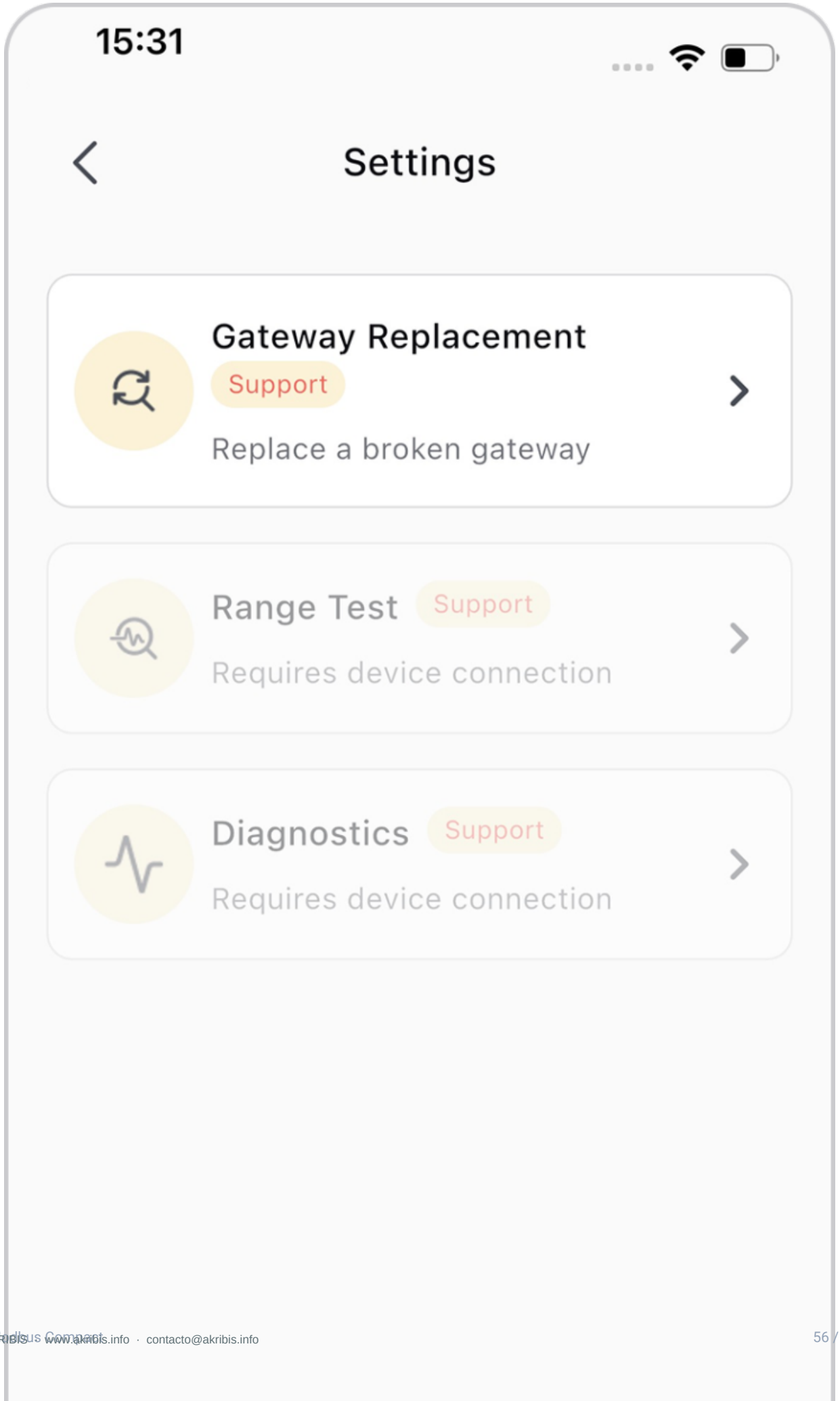
15:35

lumenradio



Set your device to app mode by pushing the button 3 times.


15:35
Available Devices
Search by name or device ID
PRO
WMB-FAD5
-70 dBm
Identify
Connect
RS 485


15:31
Settings
Gateway Replacement
Support
Replace a broken gateway
Range Test
Support
Requires device connection
Diagnostics
Support
Requires device connection



Step 1: Confirm Gateway Replacement

9:41

Replace Broken Gateway

Agreement Confirmation

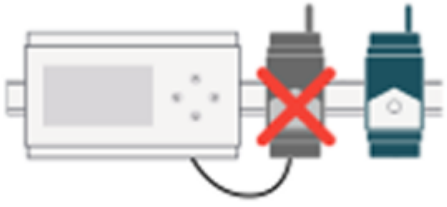
1 of 4 steps

Critical: Do Not Ignore!

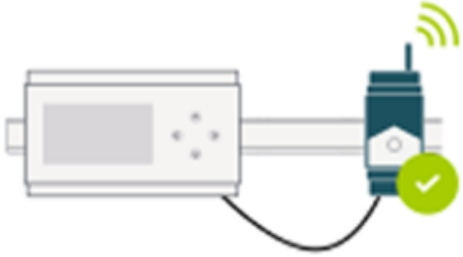
Using the old gateway can cause network instability.

- The old gateway must be permanently powered off and must not be used again.
- Power on the new gateway.

Turn off the Old Gateway



Use the New Gateway



9:41

Replace Broken Gateway

Agreement Confirmation

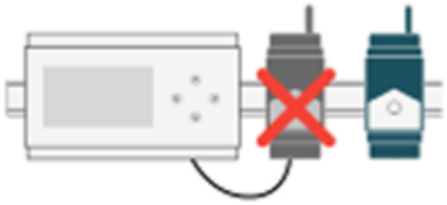
1 of 4 steps

Critical: Do Not Ignore!

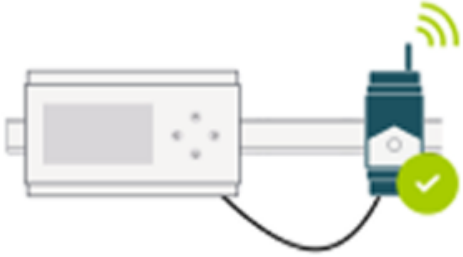
Using the old gateway can cause network instability.

- The old gateway must be permanently powered off and must not be used again.
- Power on the new gateway.

Turn off the Old Gateway

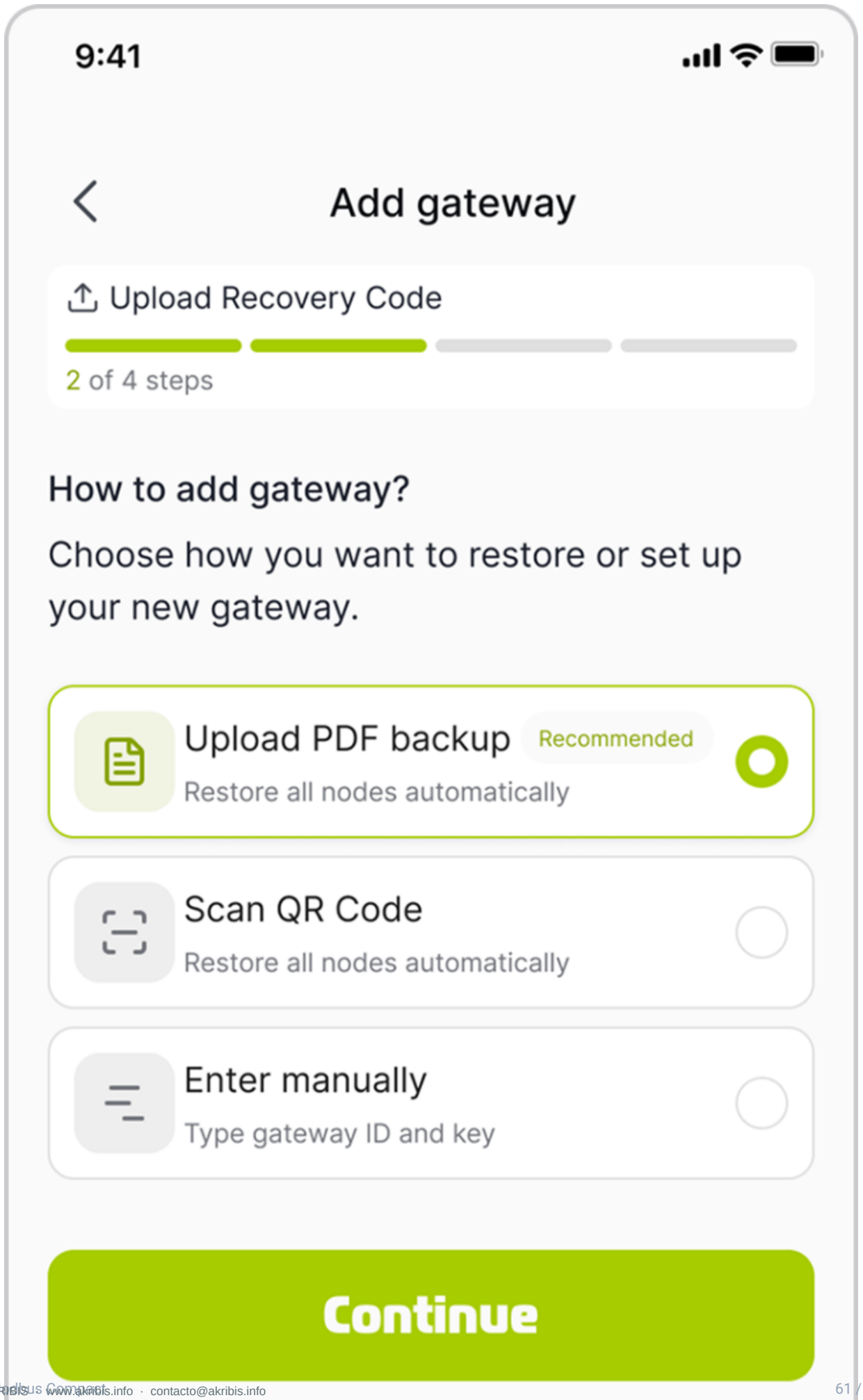


Use the New Gateway



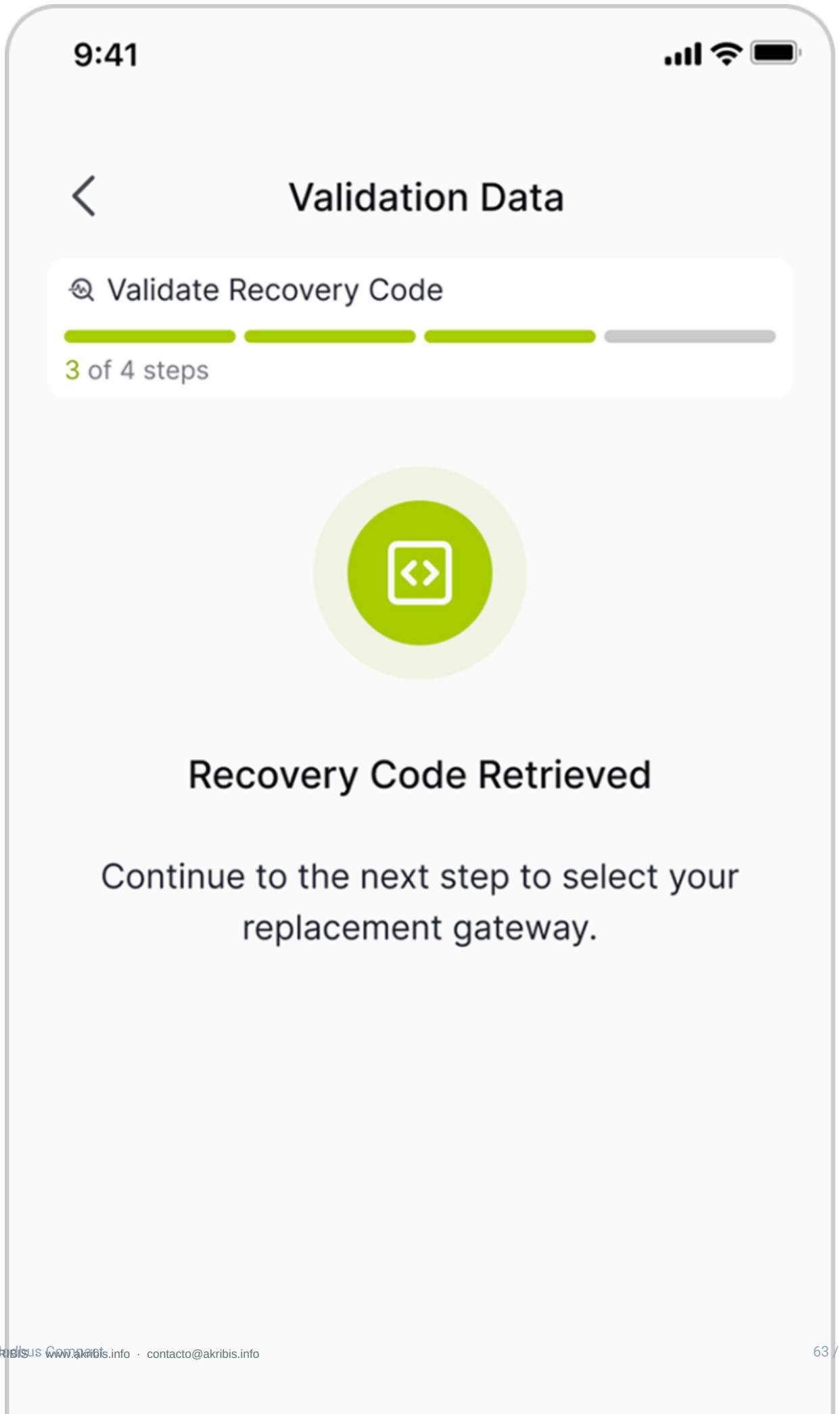


Step 2: Select Recovery Method


9:41
Add gateway
Upload Recovery Code
2 of 4 steps
How to add gateway?
Choose how you want to restore or set up your new gateway.
Upload PDF backup
Recommended
Restore all nodes automatically
Scan QR Code
Restore all nodes automatically
Enter manually
Type gateway ID and key
Continue



IMPORTANT - REQUIRED before replacement
A Network Map PDF must be generated and saved before Gateway replacement is required. Recovery information must be available before starting Gateway replacement.
Without previously saved recovery information, gateway recovery cannot be possible.


9:41
Validation Data
Validate Recovery Code
3 of 4 steps
Recovery Code Retrieved
Continue to the next step to select your replacement gateway.





9:41

lumenradio

Activate your device....

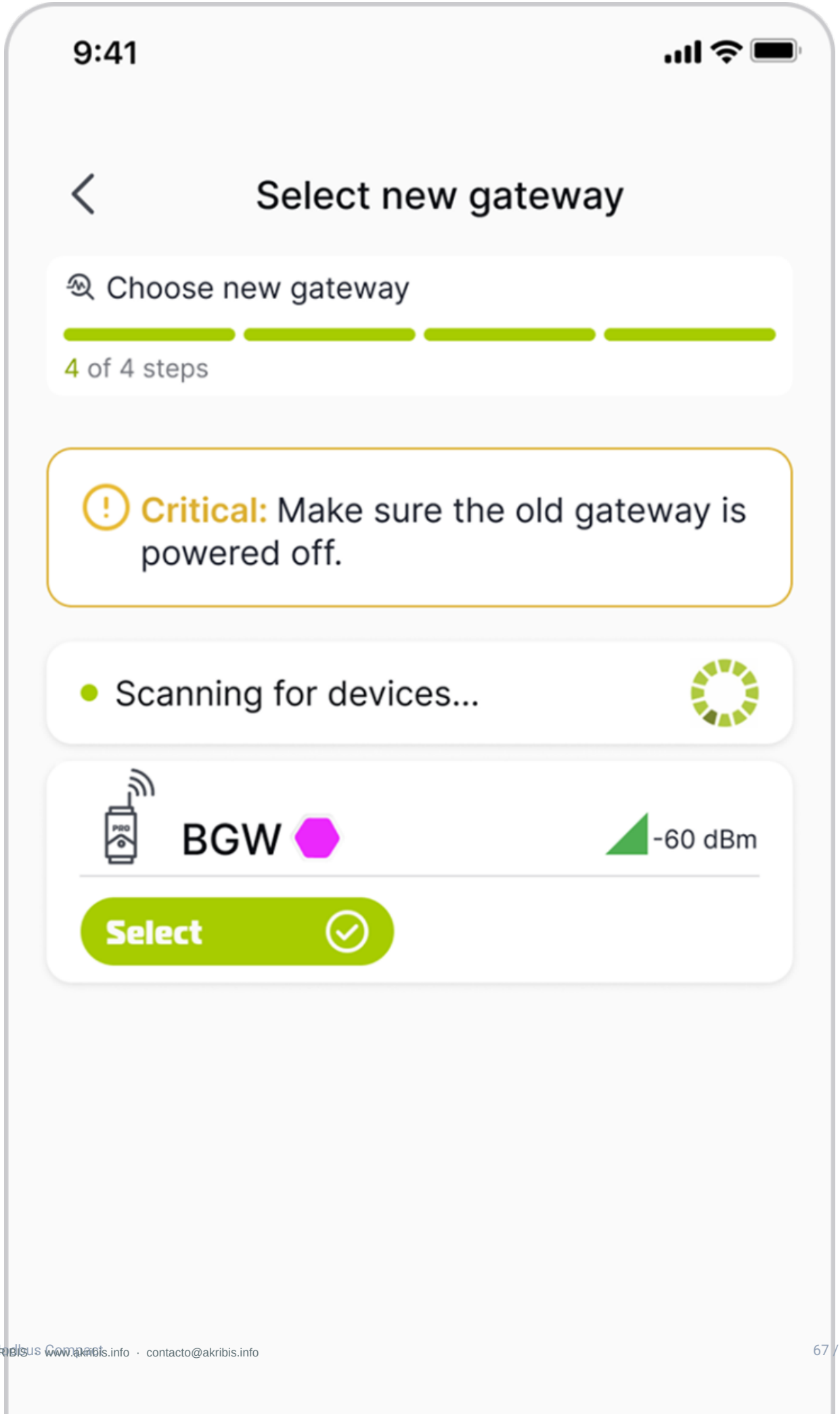


Set your device to app mode by pushing the button 3 times

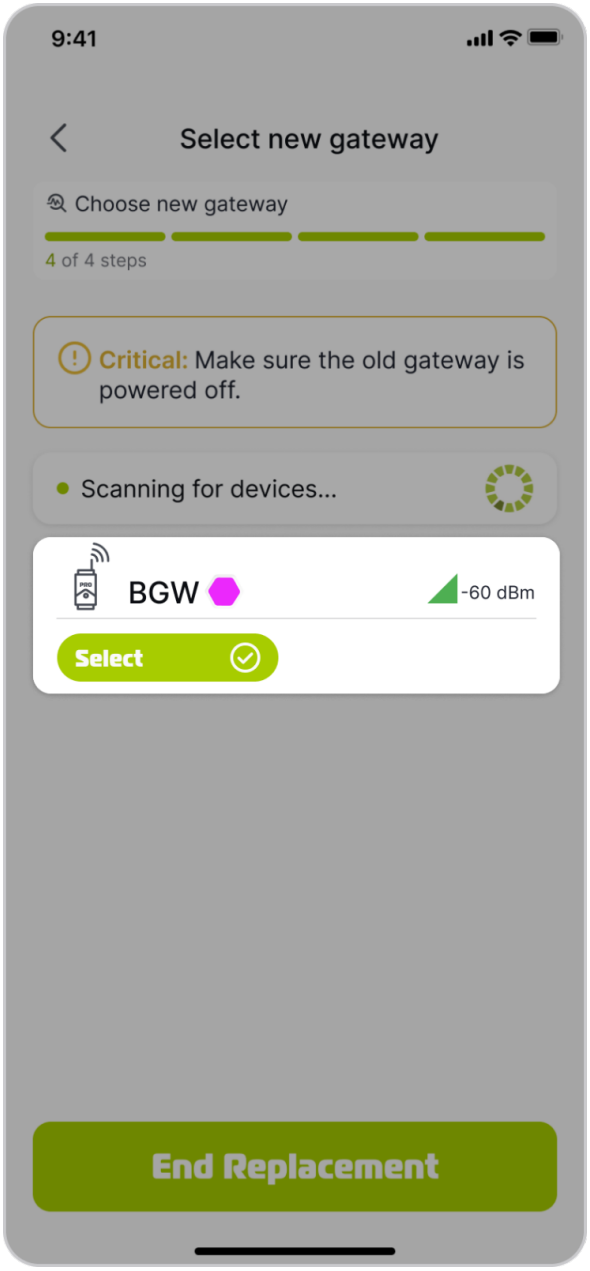
Look for the indicator

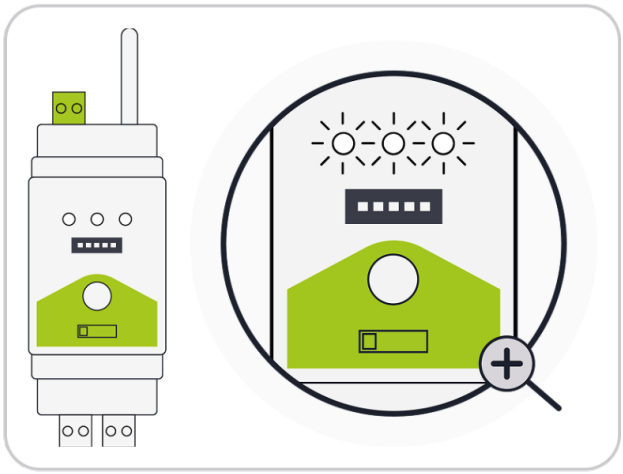
The LED will start blinking blue when the



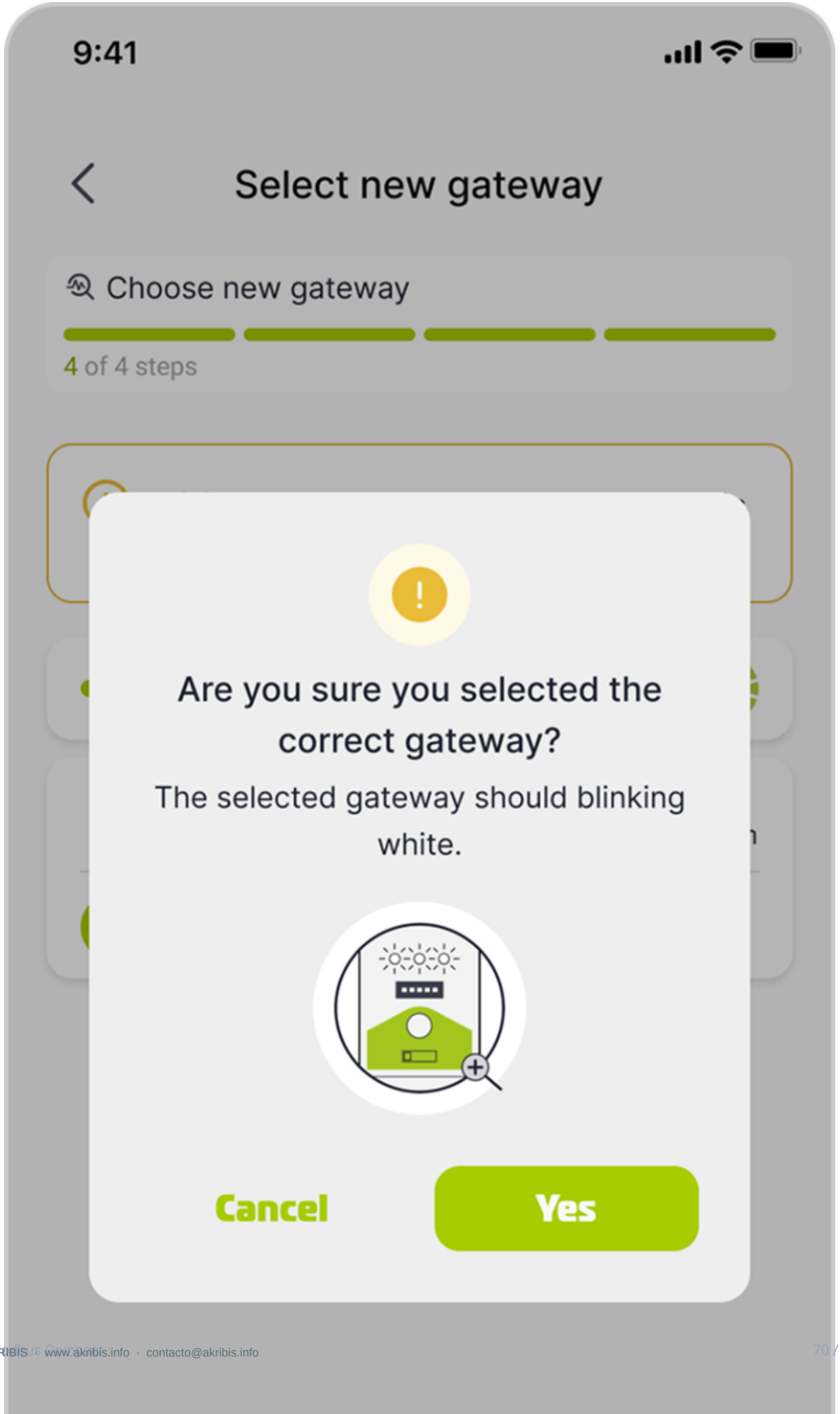

9:41
Select new gateway
Choose new gateway
4 of 4 steps
Critical: Make sure the old gateway is powered off.
Scanning for devices...
BGW
-60 dBm
Select

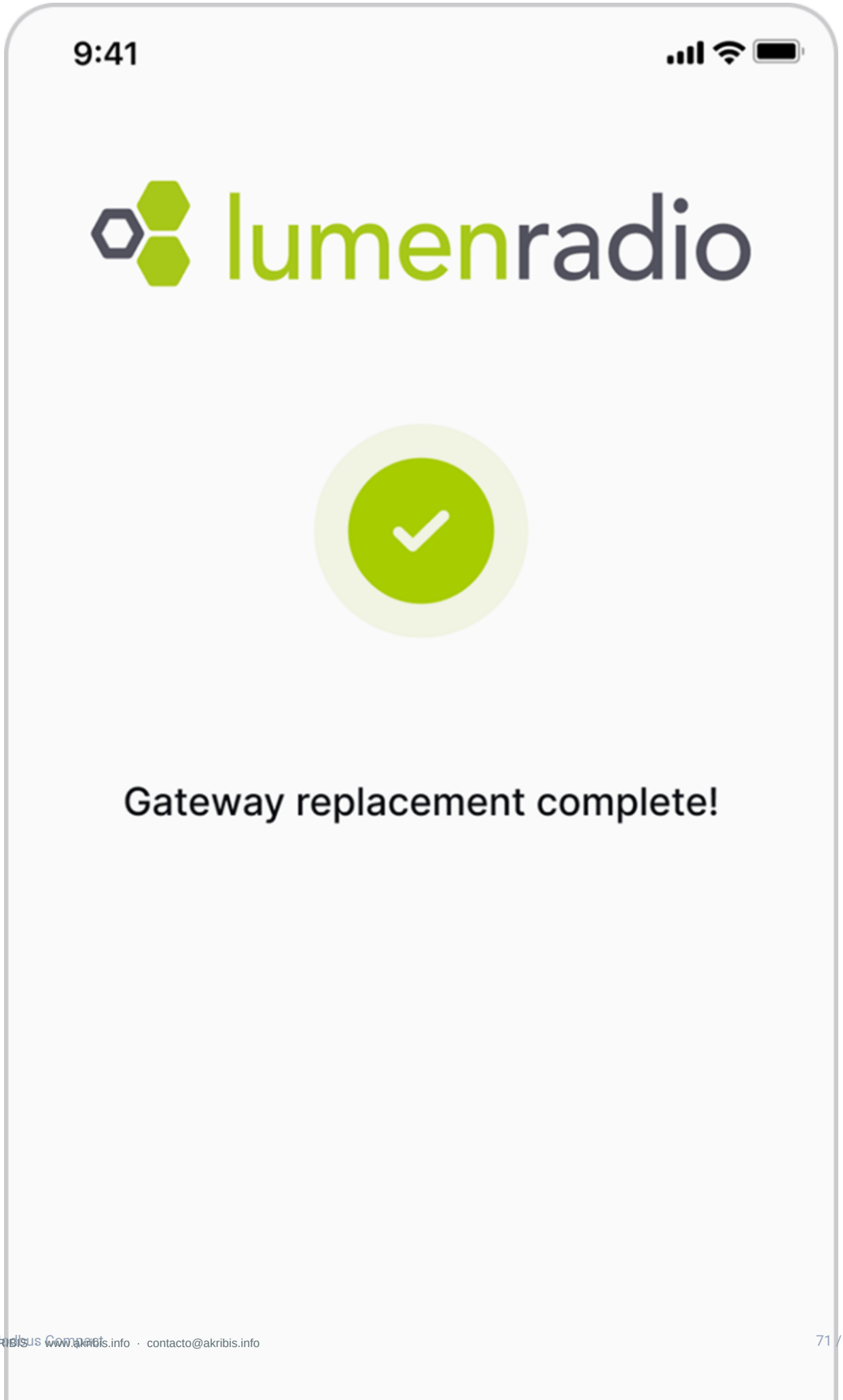






Step 7: Replacement Complete


9:41
Select new gateway
Choose new gateway
4 of 4 steps
Are you sure you selected the correct gateway?
The selected gateway should blinking white.
Cancel
Yes


9:41
lumenradio
Gateway replacement complete!



Mobile App Troubleshooting

If firmware update via the app fails or an error occurs:

- Ensure the device is within range and connected.
- If issues persist, restart the app and target W-Modbus device and try again.

Range Test Mode

Starting with firmware version 4.2.1, there is a range test mode that can be enabled on W-Modbus devices using the mobile app. This mode allows you to test the wireless range and signal strength of your W-Modbus devices.

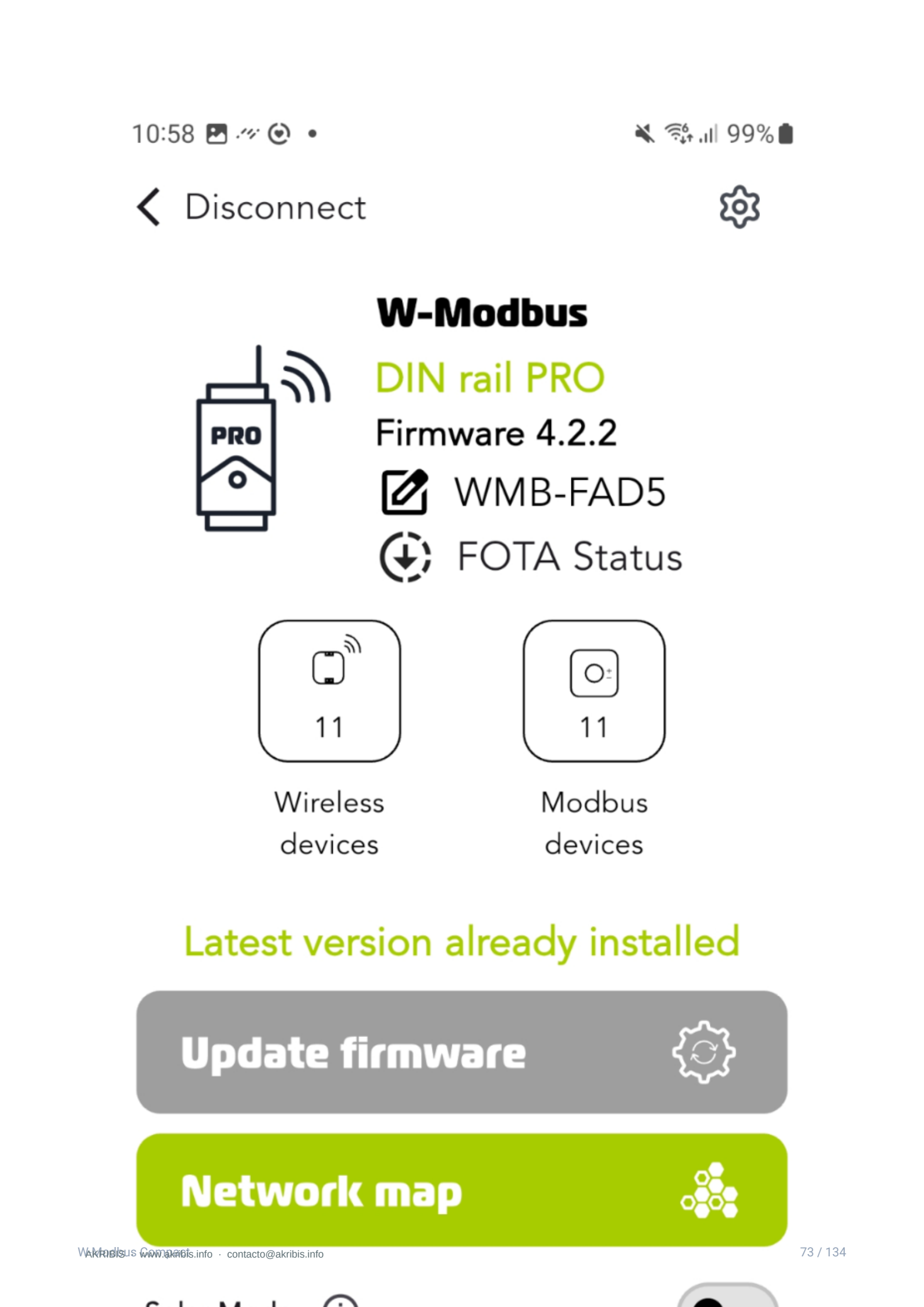
This test is intended to validate the range of a specific point-to-point connection. It can also be used to validate range for a full mesh system.
Note that all application traffic (BACnet or Modbus) will be blocked during the test.

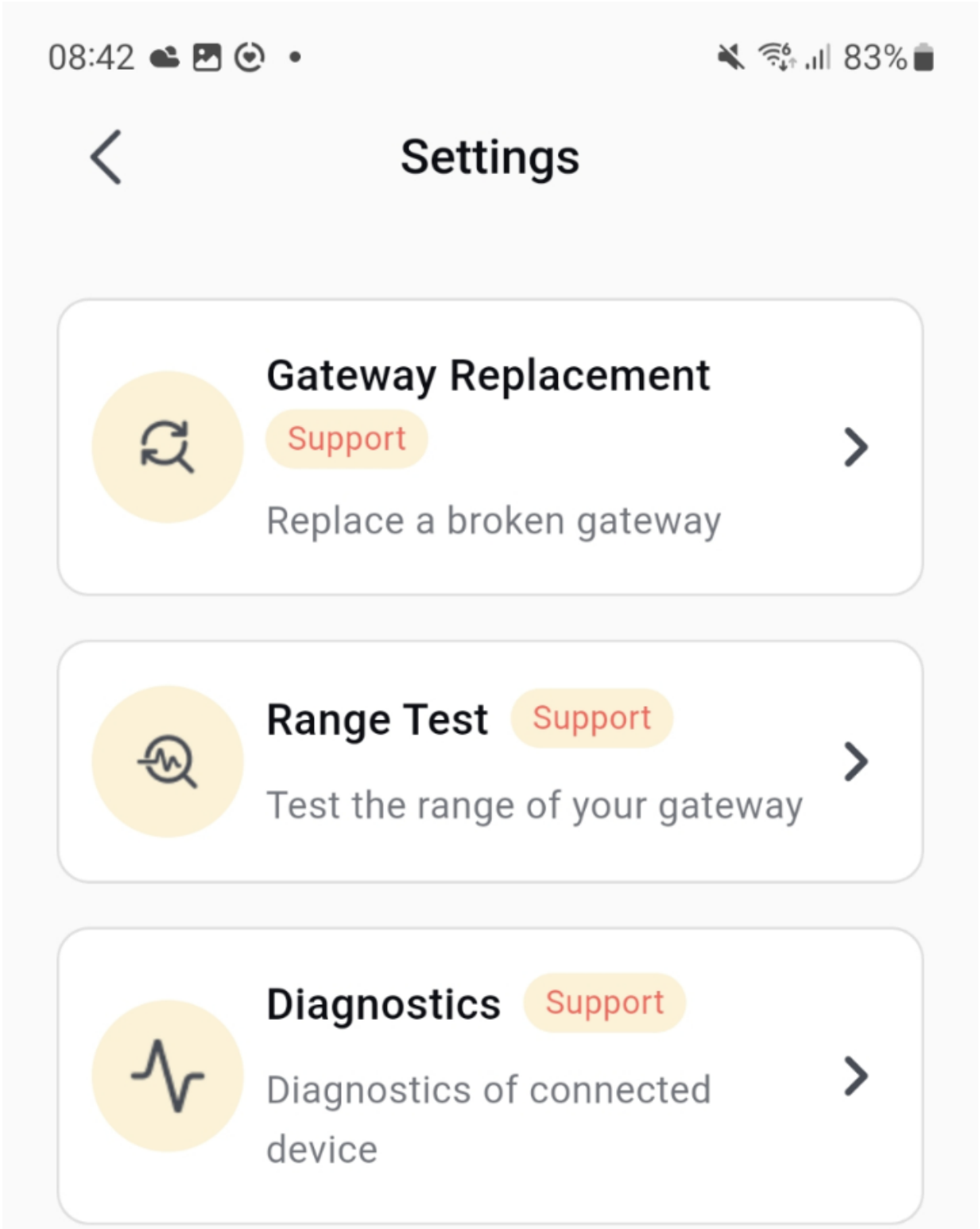
Activating Range Test Mode

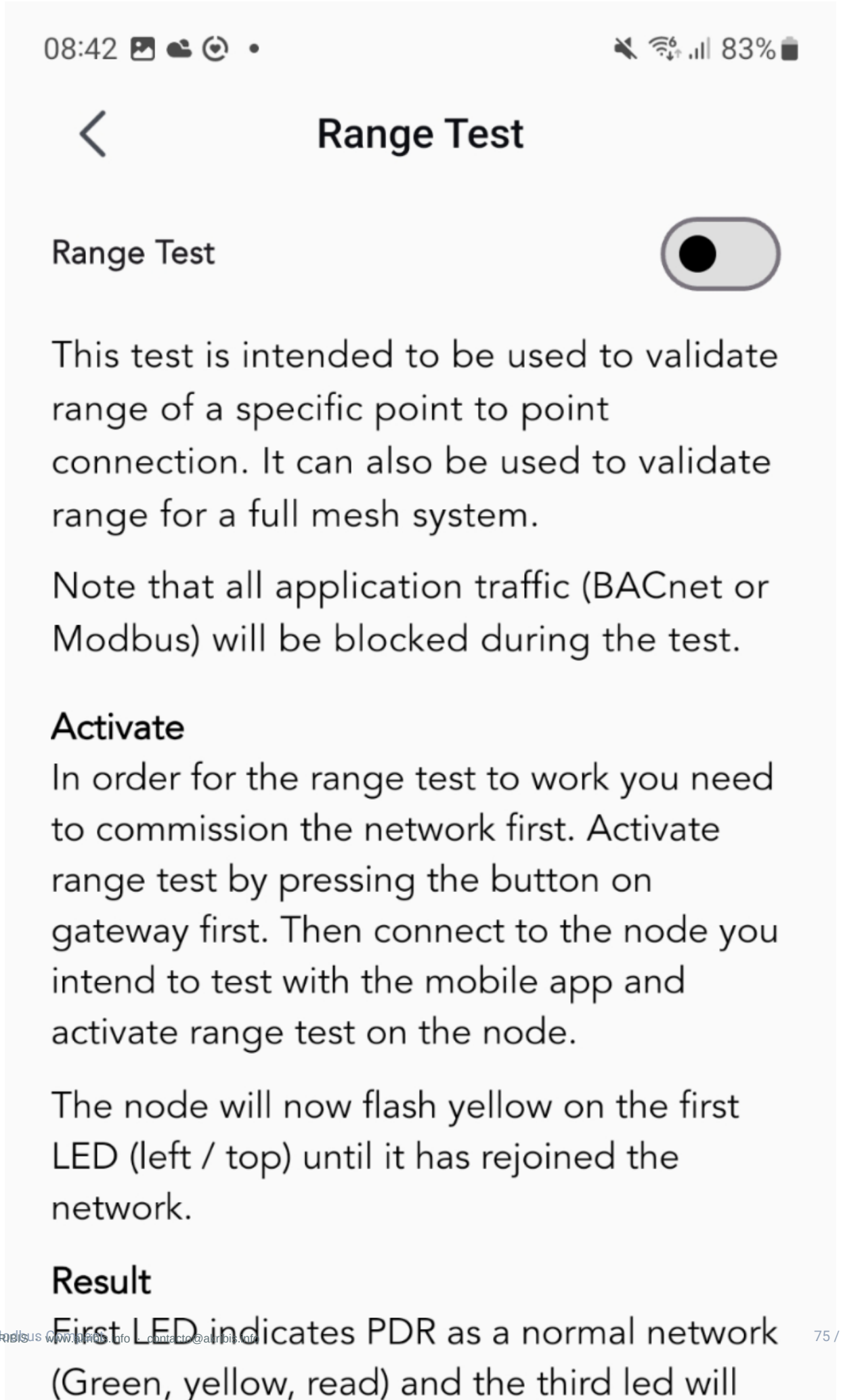
In order for the range test to work, you need to commission the network first.

1. Connect to the gateway using the mobile app.
2. Tap the settings icon to the top right of the screen.
3. Tap on the Range Test option.
4. Tap the Range Test toggle switch.

This will put the gateway in range test mode.


10:58
99%
Disconnect
W-Modbus
DIN rail PRO
Firmware 4.2.2
WMB-FAD5
FOTA Status
11
Wireless devices
11
Modbus devices
Latest version already installed
Update firmware
Network map


08:42
83%
Settings
Gateway Replacement
Support
Replace a broken gateway
Range Test
Support
Test the range of your gateway
Diagnostics
Support
Diagnostics of connected device


08:42
83%
Range Test
Range Test
This test is intended to be used to validate range of a specific point to point connection. It can also be used to validate range for a full mesh system.
Note that all application traffic (BACnet or Modbus) will be blocked during the test.
Activate
In order for the range test to work you need to commission the network first. Activate range test by pressing the button on gateway first. Then connect to the node you intend to test with the mobile app and activate range test on the node.
The node will now flash yellow on the first LED (left / top) until it has rejoined the network.
Result
First LED indicates PDR as a normal network (Green, yellow, read) and the third led will

Then connect to the node you intend to test with the mobile app and activate range test on the node following the steps above but for step 1, connect to the desired node instead of the gateway.

The devices will restart, and the node will flash yellow on the first LED (left / top) until it has rejoined the network.
A white LED on the third LED on the gateway will indicate that the gateway is in range test mode.

Once connection is established, the first LED will indicate the Packet Delivery Ratio (PDR) as in a normal network (green, yellow, red) and the third LED will indicate latency (green, yellow, red). The middle LED will indicate when a test packet is being sent.

Interpreting the results

- A green PDR LED and a green latency LED indicate a good connection.
- A yellow PDR LED and/or a yellow latency LED indicates a fair connection that may be sufficient for a production environment, but could potentially cause issues in more demanding applications.
- A red PDR LED and/or a red latency LED indicate a weak connection.

Restoring from Range Test Mode

Activate Bluetooth on the test devices and deactivate range test. Do not forget that the gateway also needs to be restored.

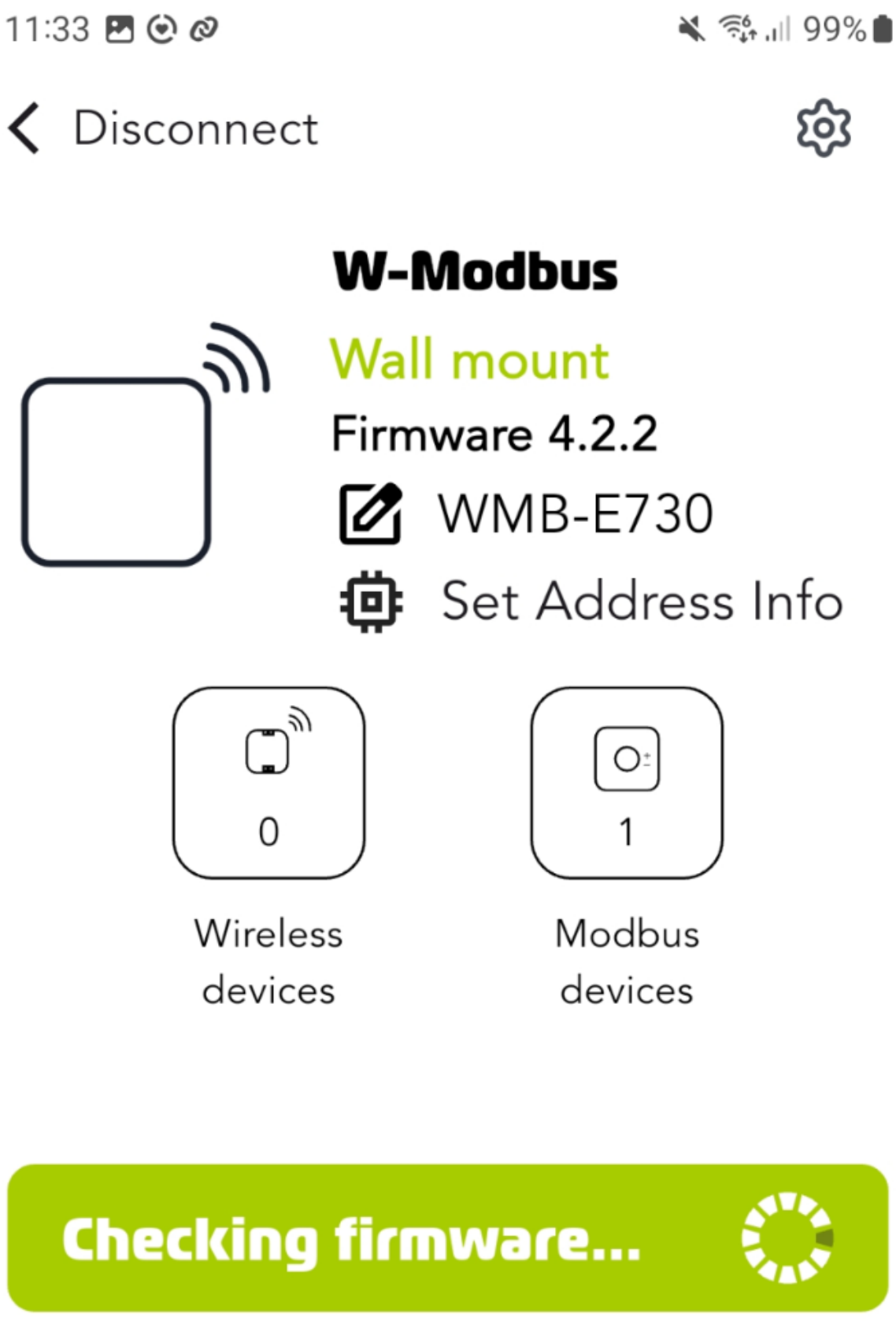
Setting Modbus Addresses

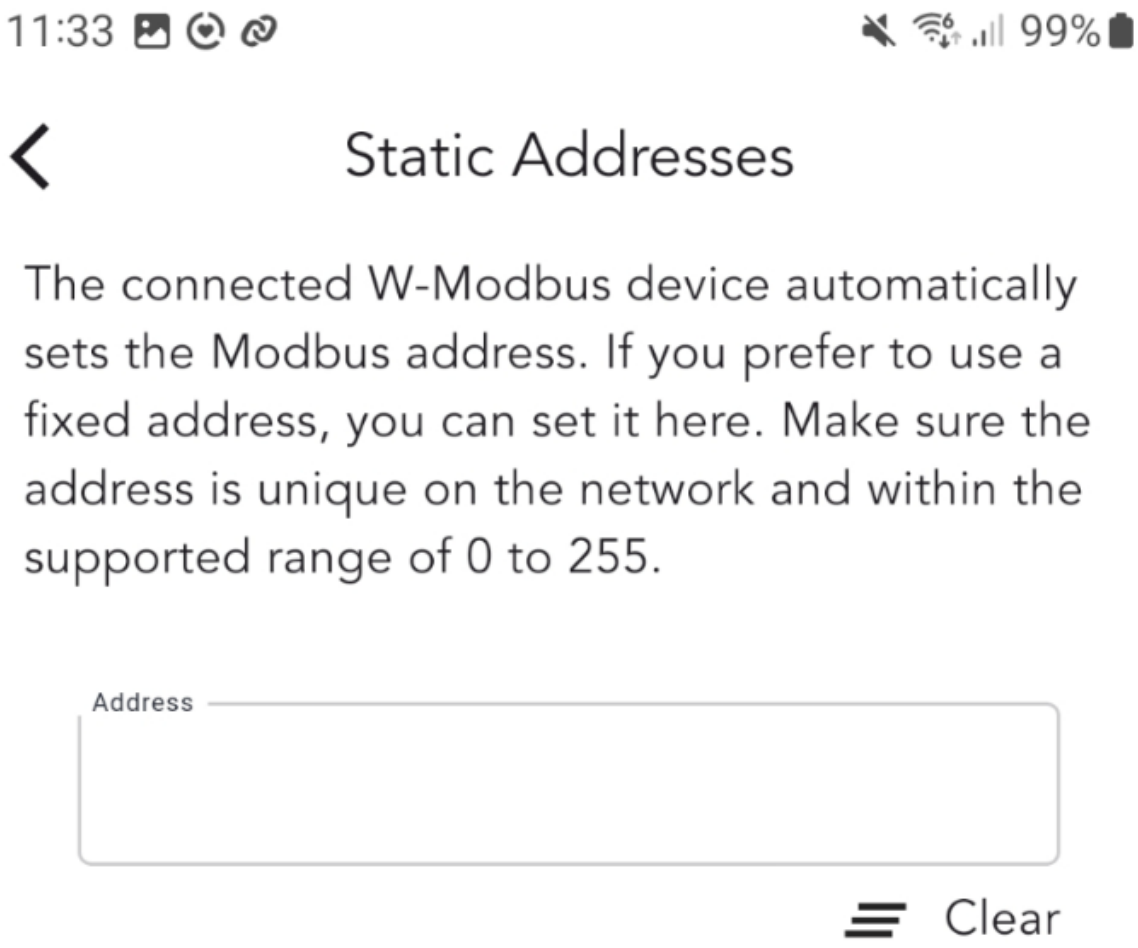
Modbus device addresses are assigned automatically, however, the mobile app has the option of setting the address of connected Modbus devices.

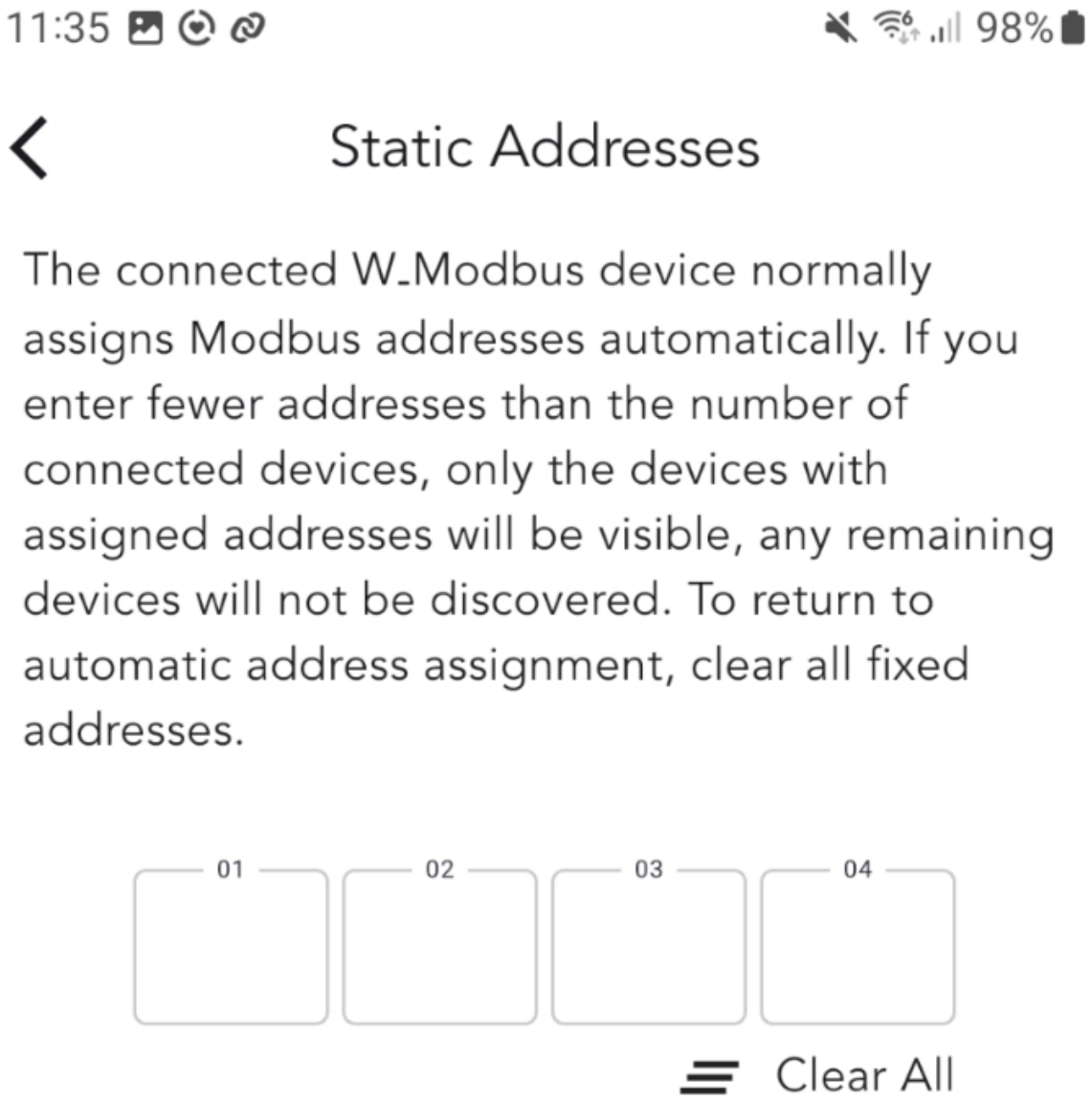
> WARNING
>
> If you have a W-Modbus PRO product you will have the option to set up to 4 device addresses. If fewer addresses are provided than the number of connected devices, only the devices with assigned addresses will be visible. Any remaining devices will not be discovered. To return to automatic address assignment, clear all specified addresses.

Assigning a Modbus Address

1. Connect to the device using the mobile app.
2. Tap the Set Address Info option.
3. Enter the address for the device(s).
4. Tap Update Address(es).


11:33
99%
Disconnect
W-Modbus
Wall mount
Firmware 4.2.2
WMB-E730
Set Address Info
0
1
Wireless devices
Modbus devices
Checking firmware...


11:33
99%
Static Addresses
The connected W-Modbus device automatically sets the Modbus address. If you prefer to use a fixed address, you can set it here. Make sure the address is unique on the network and within the supported range of 0 to 255.
Address
Clear


11:35
98%
Static Addresses
The connected W-Modbus device normally assigns Modbus addresses automatically. If you enter fewer addresses than the number of connected devices, only the devices with assigned addresses will be visible, any remaining devices will not be discovered. To return to automatic address assignment, clear all fixed addresses.
01
02
03
04
Clear All

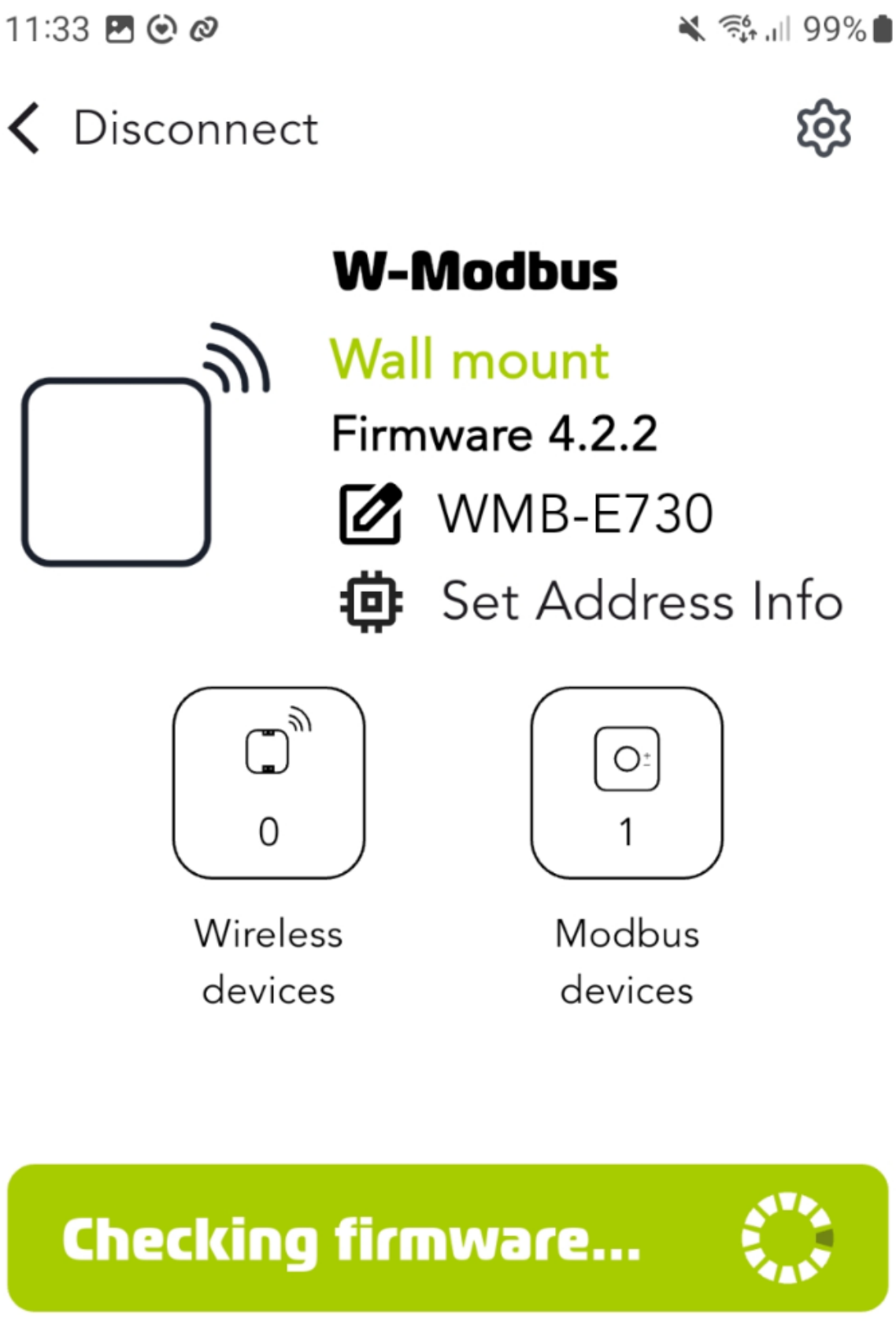
Device Diagnostics

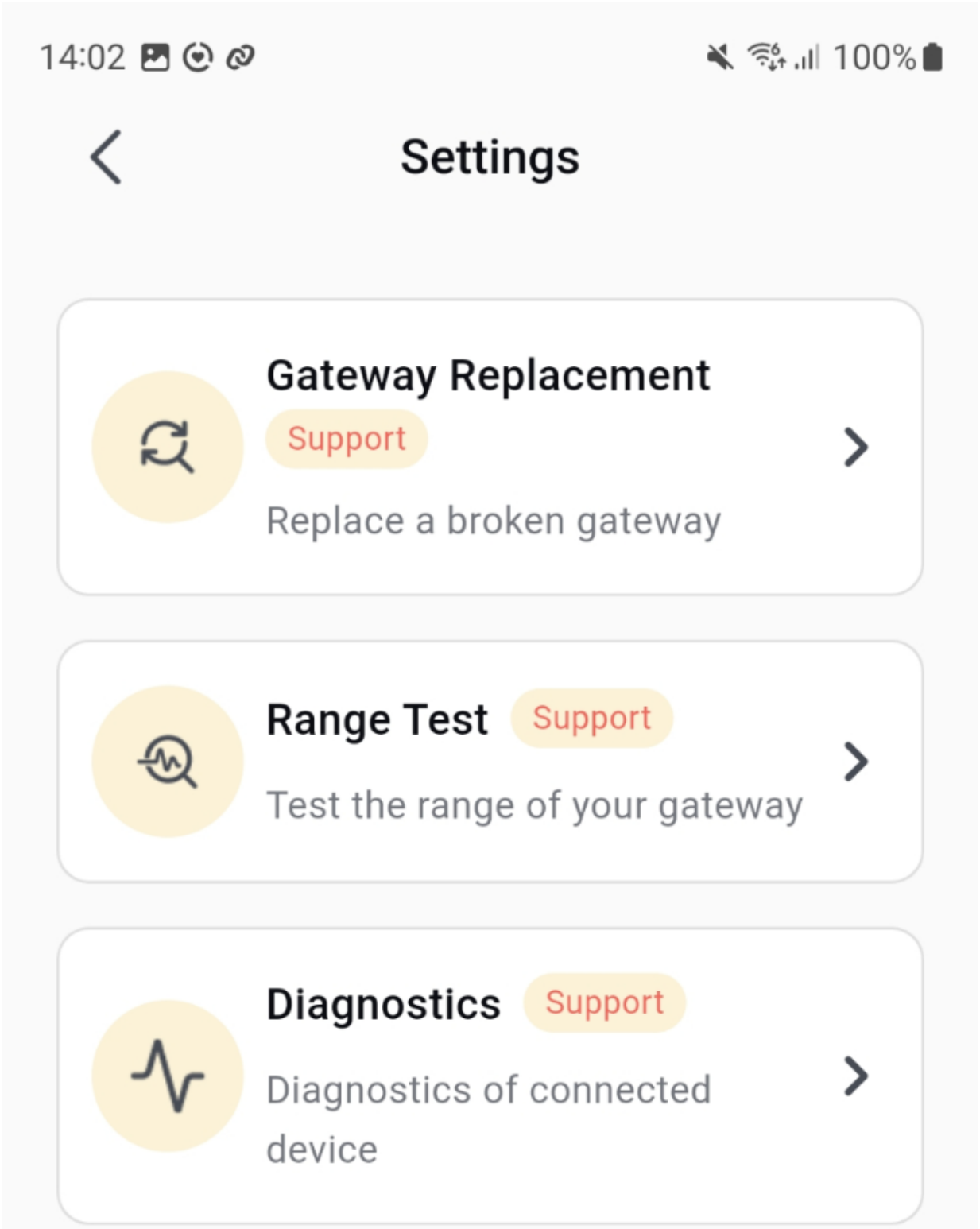
For support and troubleshooting, the mobile app has the ability to retrieve diagnostic information from a currently connected device.

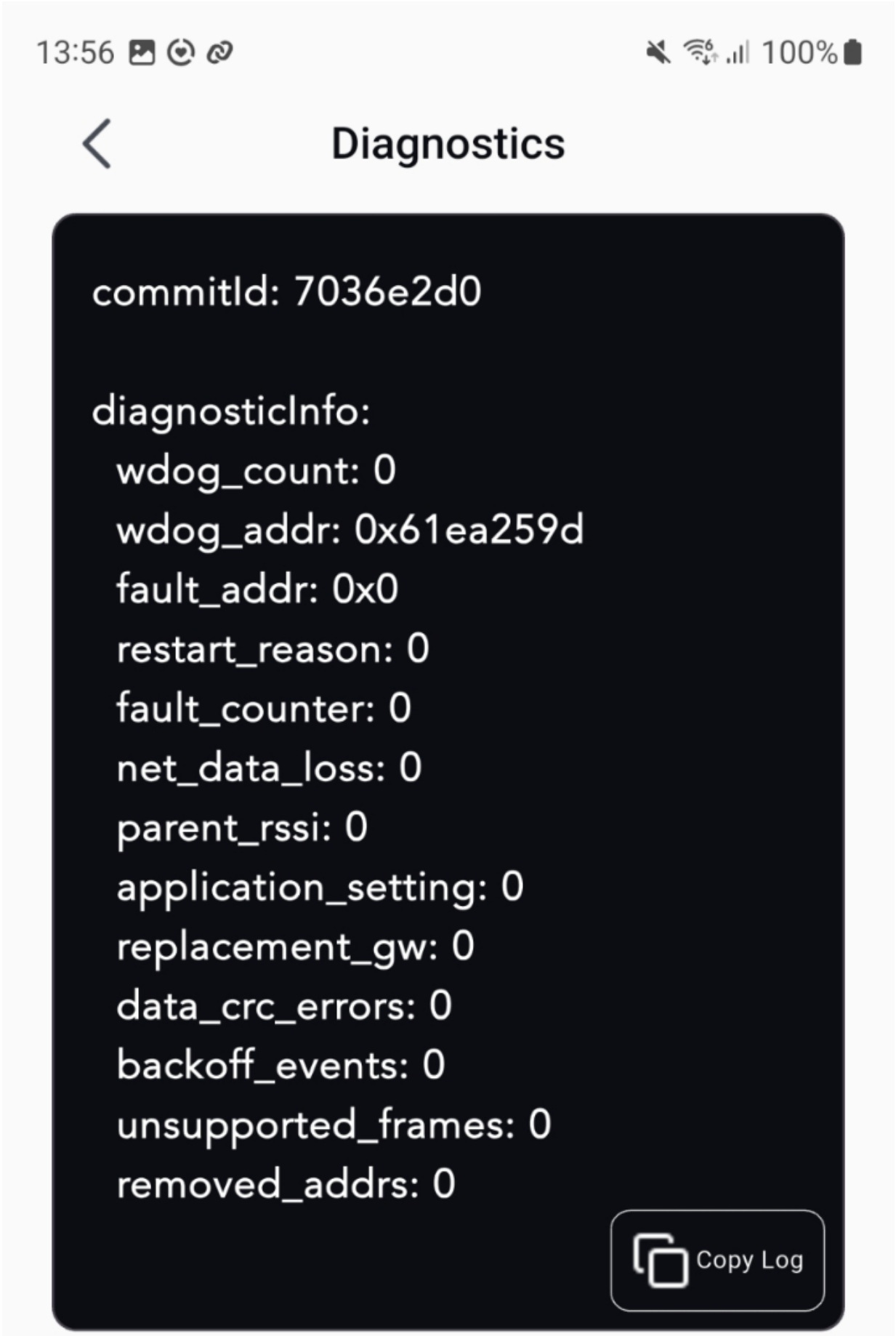
How to retrieve diagnostics

To access this feature, follow the steps below:

1. Connect to the device using the mobile app.
2. Tap the settings icon to the top right of the screen.
3. Tap the Diagnostics option.
4. Tap the Get Diagnostics button.


11:33
99%
Disconnect
W-Modbus
Wall mount
Firmware 4.2.2
WMB-E730
Set Address Info
0
Wireless devices
1
Modbus devices
Checking firmware...


14:02
100%
Settings
Gateway Replacement
Support
Replace a broken gateway
Range Test
Support
Test the range of your gateway
Diagnostics
Support
Diagnostics of connected device


13:56
100%
Diagnostics
commitId: 7036e2d0
diagnosticInfo:
wdog_count: 0
wdog_addr: 0x61ea259d
fault_addr: 0x0
restart_reason: 0
fault_counter: 0
net_data_loss: 0
parent_rssi: 0
application_setting: 0
replacement_gw: 0
data_crc_errors: 0
backoff_events: 0
unsupported_frames: 0
removed_addrs: 0
Copy Log

Radio planning

This section provides guidelines for planning the radio communication aspects of a W-Modbus network. It covers topics such as wireless design considerations, installation and placement of wireless devices and external antennas, and factors to consider for larger projects.

Wireless design considerations

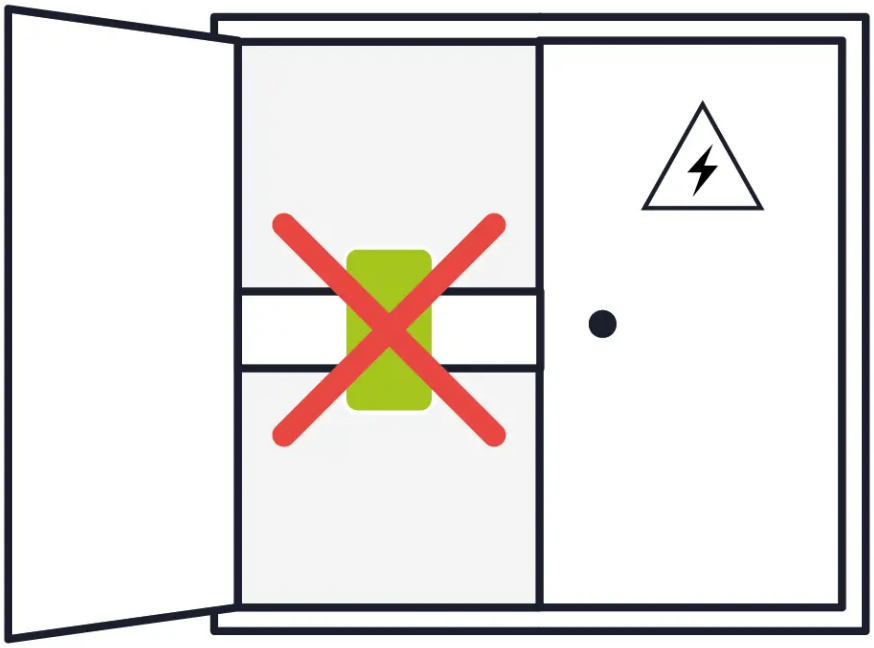
W-Modbus is designed to be simple to use without the need for extensive planning. However, it is still recommended to consider the placement of your gateway and node units before installation. It is also a good idea to bring an additional W-Modbus device to use as a repeater, in case any nodes experience communication issues in the network.

WARNING

In many cases wired W-Modbus devices are placed in metal enclosures. This will effectively block the wireless signal. In these cases, an external antenna should be used and placed on the outside of the metal enclosure.

NOTE

Note that only the DIN Rail supports external antennas, and it is not recommended to use a Compact or Wall Mount product inside a metal enclosure.

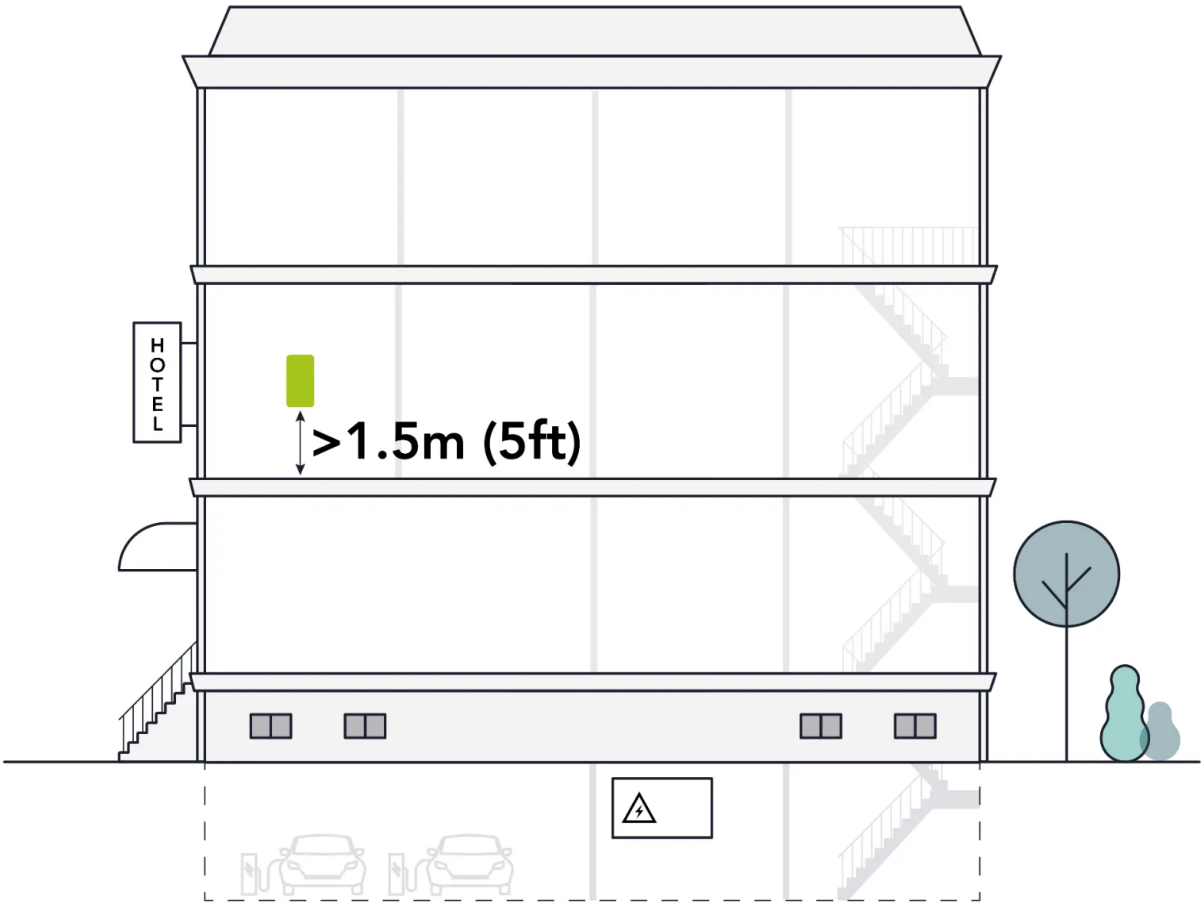


Do **not** place product inside **metal enclosure**

Installation and Placement of Wireless Devices and External Antennas

A consistent, high-quality wireless network is essential for maintaining a stable Modbus system. Follow the guidelines below to optimize performance.

- Clearance: Maintain at least 3/4 of an inch of unobstructed space around the antenna — avoid contact with cables or other objects that could disrupt the radiation pattern and reduce range.
- Height: Install devices or external antennas at least 1.5 m (5 ft) above floor level.



- Cable and connector handling: Ensure all connectors and cables are properly secured. Antenna cables are sensitive; avoid excessive bending or tight loops both during installation and in final placement.
- Metal Interference: Do not install inside a metal enclosure or where the device is surrounded by metal objects.
- Moisture & Snow: Water significantly attenuates wireless signals. For outdoor installations, use antennas that cannot be covered by snow buildup — see Outdoor Antenna Guidelines for details.

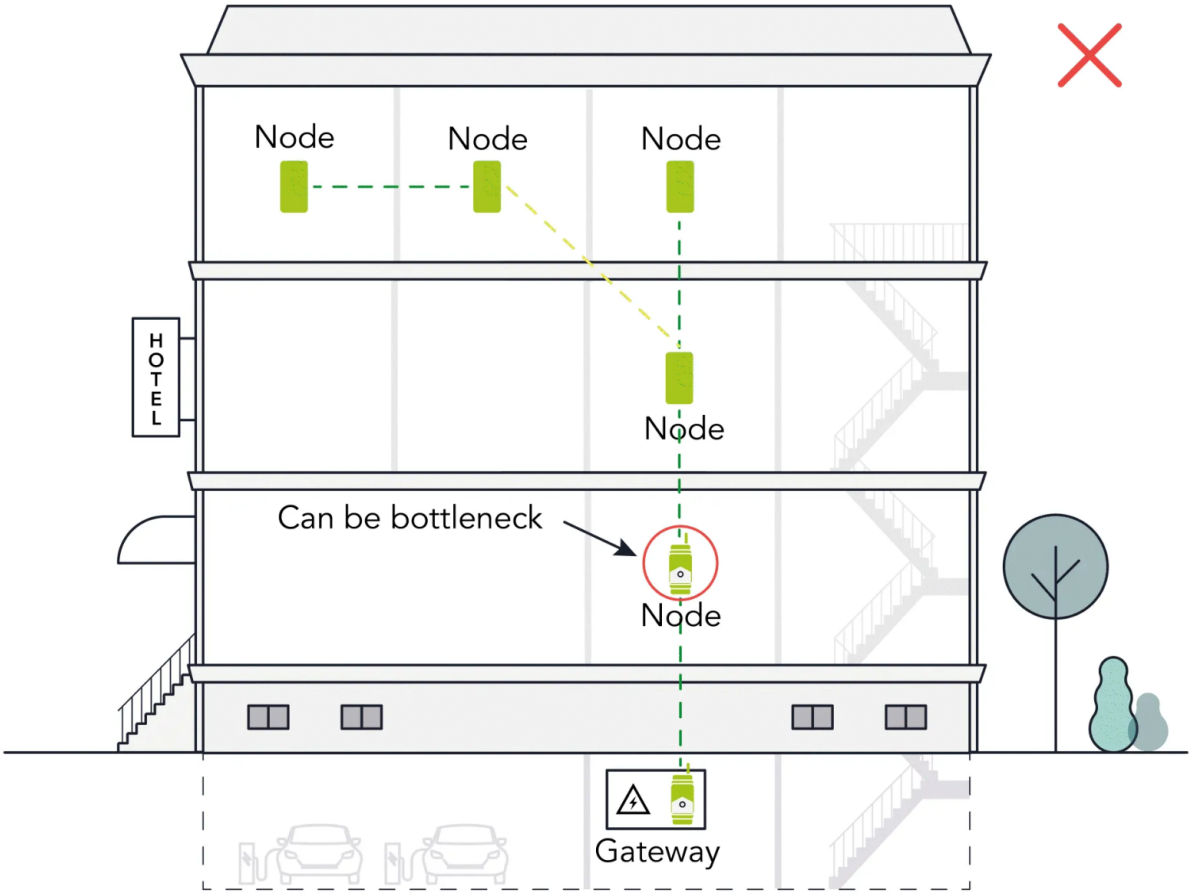
For larger projects it is worth considering a couple of factors.

- If you have more than 25 Modbus devices that require a fast response rate, consider splitting the network into two or more networks. You can follow this set-up guide for each network.
- If you have longer distances outdoors or many walls or floors to penetrate, you need to estimate the range. For this purpose, our wireless range calculator can be used.

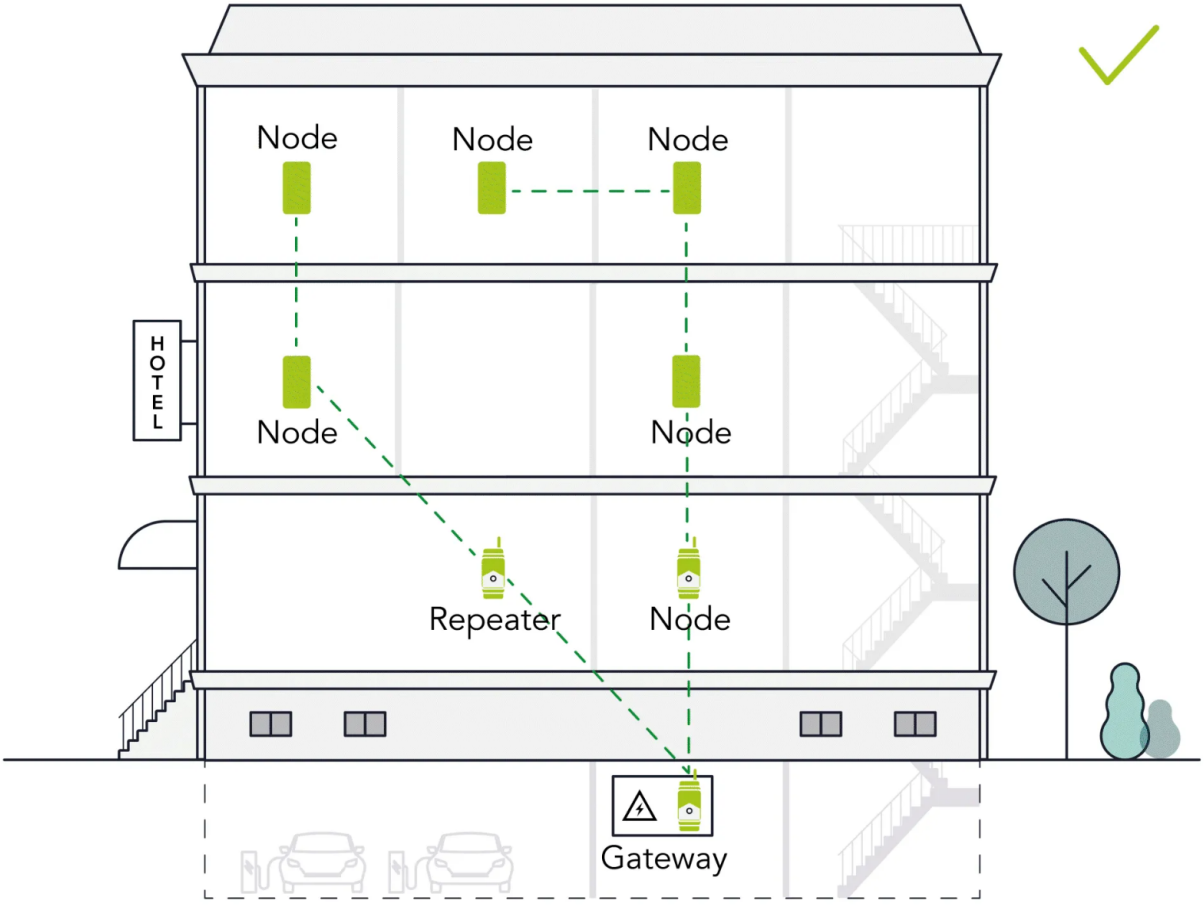
Installation Guidelines

Example Installations

When installing larger W-Modbus networks, physical network planning is important. Try to avoid bottleneck nodes and consider placing repeaters if the signal seems to travel a long distance or through difficult obstacles.



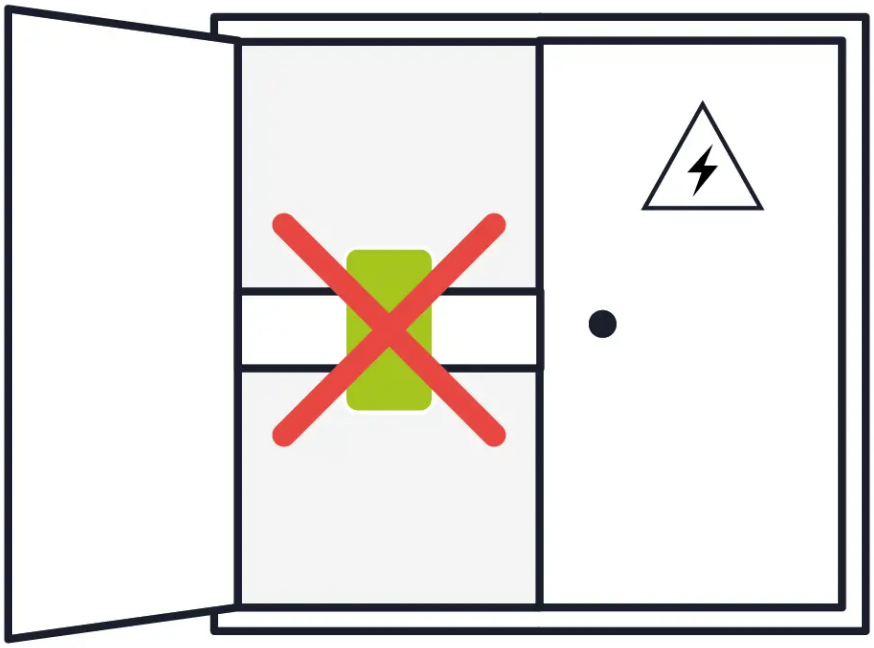
 A bad installation does not have alternate mesh pathways



 A good installation has good node density to allow for multiple mesh pathways

Electrical Cabinets

> **WARNING**
>
> Do not place the Compact device inside a metal electric cabinet.



Do **not** place product inside **metal enclosure**

Indoor Installations

For indoor installations, any of the available form factors may be used. Refer to the Wireless design considerations and Radiation pattern sections to determine which product best fits your specific application and performance requirements.

Outdoor Installations

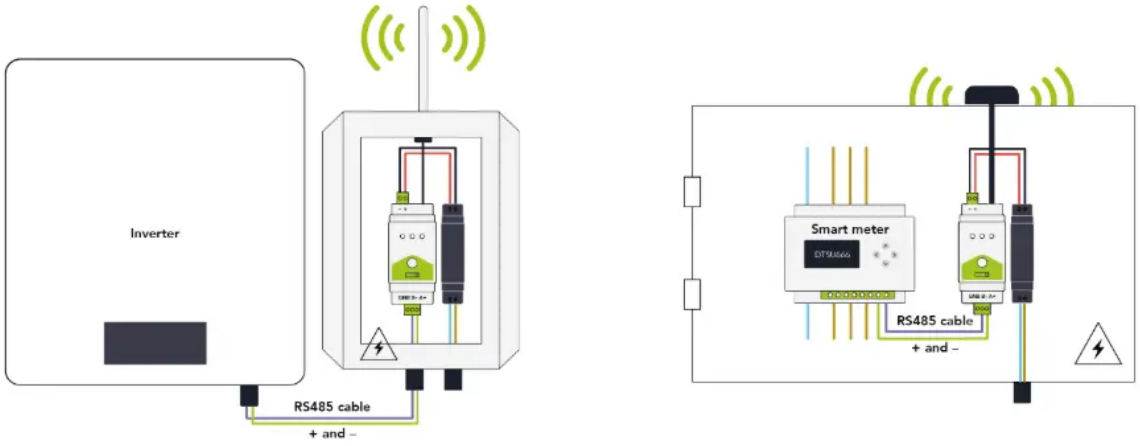
Place your device inside a suitably rated IP enclosure to protect it from dust, moisture, and other environmental conditions. If you are using a metal enclosure, ensure that the antenna is mounted outside the casing to prevent signal loss caused by metal shielding. In such metal-case installations, a DIN rail version of the device should be used to ensure proper mounting, grounding, and overall system reliability.

Refer to the Wireless design considerations and Radiation pattern sections to determine which product best fits your specific application and performance requirements.

Solar Installations

> **WARNING**
>
> The Gateway should always be installed at the inverter, while the Node is connected at the smart meter.

If needed, additional nodes can be placed between the Gateway and the Node to act as repeaters, boosting signal strength and improving overall wireless network performance.

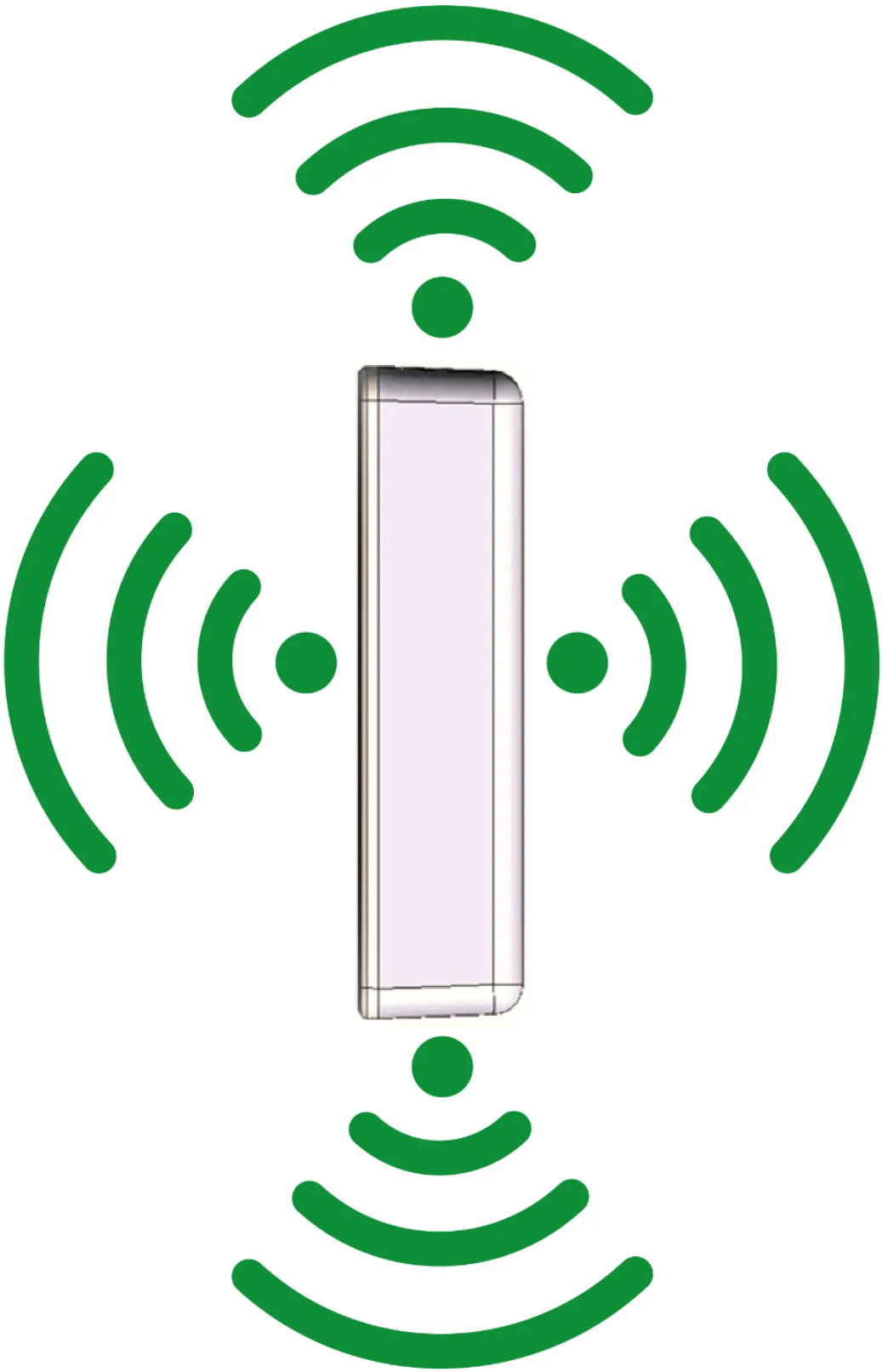


The gateway should be put in solar mode to optimize the wireless performance in this type of installation.

Radiation pattern

Compact


lumenradio



Wall mount


lumenradio



DIN rail


12-24 VDC
24 VAC
lumenradio
MODE
NET
TX
RX
RS485
DATA
ON
1 2 3 4 5
GATEWAY
COMM.
NODE
GND
B-
A+

DIN rail accessories











Antenna alignment

The alignment of the antennas is important to get the best possible performance. Please see the following instruction video:

Antenna Range estimates

The table below shows the expected range between different antenna combinations when installed as indicated by the symbols. Values are based on outdoor installations with clear line of sight and no obstructions. Refer to

Radio Planning for guidance on antenna placement and orientation.

Antenna Type	SKU	Estimated Range
DIN rail in metal enclosure	840-2120	-- 50ft/15m --
DIN rail outdoor kit	800-2324	------ 1500ft/450m ------
1.8 dBi Outdoor White N-Type Male Antenna Kit	800-2325	------ 1500ft/450m ------
3.5 dBi Outdoor White N-Type Male Antenna + Cable	104-1040	------ 1650ft/500m ------
5 dBi Puck Antenna (IP65)	104-1033	--- 350ft/100m ---
6 dBi Long-Range Directional Antenna + Cable	104-1004	-------- 2000ft/600m --------

Gateway & Node selection

Gateway Selection

Choose either a DIN rail or a Wall mount W-Modbus device to be the Gateway for your wireless network. You should have only one Gateway per network. The Modbus client that is responsible for polling different values from different sensors and controllers, is always connected at the W-Modbus Gateway.

Node selection

Any W-Modbus device — Compact, DIN Rail, DIN Rail Pro, Wall Mount, or Wall Mount Pro — can serve as a node in the network. Nodes without a Modbus device connected function as repeaters, helping to extend radio coverage and improve overall wireless network health.

Setup Guide

This section provides a step-by-step guide for setting up a W-Modbus network. It covers the initial configuration of W-Modbus devices, connecting to Modbus Clients and Servers, and troubleshooting common issues during the setup process.

Pre-installation Requirements

Prerequisites

- Ensure power is disconnected before installation
- Verify Modbus network requirements. Refer to Application Guide.
- Check environmental conditions. Refer to Wireless design considerations.

Safety Considerations

- Always disconnect power before installation
- Follow local electrical codes
- Use appropriate PPE during installation

Cabling requirements

RS485 networks use shielded, twisted-pair cable with impedance
between 100 and 130 ohms. Foil or braided shielding is acceptable.

The Compact has a built-in 120Ω EOL (End-of-Line) resistor, which can not be disabled.

Compact Specific Requirements

- Minimal space requirements
- Ensure proper ventilation
- Consider cable bend radius

> WARNING
>
> ## POWER AND RS485 CIRCUIT CAUTION
>
> W-Modbus uses a half-wave rectified circuit. It should not share a VAC transformer with a device using full-wave rectified circuit.
> The same VAC transformer can be used for W-Modbus and other device(s) only under the following conditions:
>
> 1. The other device(s) are half-wave rectified.
> 2. All power connections must have the same polarity. The ”+” terminal of W-Modbus must not be connected to the ”–” terminal of another device.

Physical Setup

1. Confirm that the W-Modbus unit has no visible damage.

2. Mount the unit

The enclosure is wall mounted and fits onto a junction box.
Start with mounting the backplate of the enclosure.

3. Connect the power supply and the Modbus device to the W-Modbus unit

Use the rear and/or side knockouts for cable entry.

4. Ensure that the W-Modbus unit and its wiring are securely mounted, and that the LEDs turn on.

5. Secure the front case to the mounted back plate.

6. Set the baud rate on the Gateway

W-Modbus end-user products ship by default with baud rate 9600, no parity and 1 stop bit. This can be changed using the dip switches on the product.

The Compact will always get the baud rate from the gateway.

In other words, the system is baud rate independent as long as you use Wall mounts and DIN rails as nodes in your system.
You can mix baud rates in the system if you desire.

Physical commissioning installation video guide

Physical Commissioning Method (Step-by-Step)

Before proceeding, complete the Physical Setup steps.

1. Set up the gateway in the system for commissioning

- Use the dip switches on the Wall mount or Din Rail unit you wish to use as the gateway to set it to Gateway Commissioning Mode.
- Allow all the commissioning mesh nodes join this commissioning Gateway.

2. Install the nodes

- All devices are shipped in mesh-commissioning mode and are ready to join a new network.
- Nodes that are prepared for commissioning display a sweeping blue LED pattern.
- In case the device isn't in commissioning mode (i.e., you do not see the sweeping blue LEDs), press the button for 10 seconds.

- The center LED will turn blue, indicating the device has been uncommissioned; it will then show the sweeping blue LED sequence and be ready to join a new network.
- Place the gateway (GW) into commissioning mode and wait for the nodes to receive the secure network credentials required for permanent installations.
- Once a node successfully receives these credentials, all its LEDs will blink green.
- After this, the system is ready to transition to secure network mode.
- When the gateway is switched to secure mode, each node will blink yellow on all LEDs and then reboot to rejoin the gateway under secure operation.

3. At the gateway, switch the network to Secure Mode

- Once you have made sure all your nodes are in the network you can validate in your W-Modbus controller that you see all your W-Modbus devices.
- If you are missing any then you can validate the installation in the mobile app.
- Once all W-Modbus devices are available for you in the W-Modbus controller then flip the 3 state dip switch to secure mode.
- The network will now reboot.
- The network will reform, which will take up to 15 min.
- Wait at least 5 minutes before checking the mobile app to see the network reforming progress.
- If, after following the steps, all devices are not appearing in the network, see troubleshooting guide.

Mounting instructions

The enclosure is wall mounted and fits onto a junction box. Start with mounting the backplate of the enclosure.

Mobile App Commissioning Installation Guide

Mobile App Commissioning Method (Step-by-Step)

Before proceeding, complete the Physical Setup steps.

1. Set up the gateway for your system in secure mode

Use the dip switches on the Wall mount or Din Rail unit you wish to use as the gateway to set it to Gateway Secure Mode.

2. Select the Gateway to join

- Download the latest version of the W-Modbus app.
- Put the gateway device into BLE advertising mode by pressing the button 3 times.
- Open the app and tap the Commission button — all available gateways will be listed.
- Use the Identify button to confirm the correct gateway device which gives confirmation by blinking all LEDs white.
- Select your gateway and rename it to something meaningful that references the installation site.
- The app will display a list of mesh nodes available to join the selected gateway's network.
- To exit the commissioning process at any time, press the End Commission button in the bottom of the

screen.

3. Nodes identification

- All devices are shipped in mesh commissioning mode and will display a sweeping blue LED pattern, indicating they are ready to join a new network.
- If a device is not in commissioning mode (i.e., no sweeping blue LEDs), press and hold the button for 10 seconds until the center LED turns blue, then release. The device has now been uncommissioned and will display the sweeping blue LED pattern, ready to join a new network.
- In the W-Modbus app commissioning screen, use the Identify button in the app to confirm the correct node — the device will blink all LEDs white as confirmation.

4. Sect the Nodes to add to the Gateway

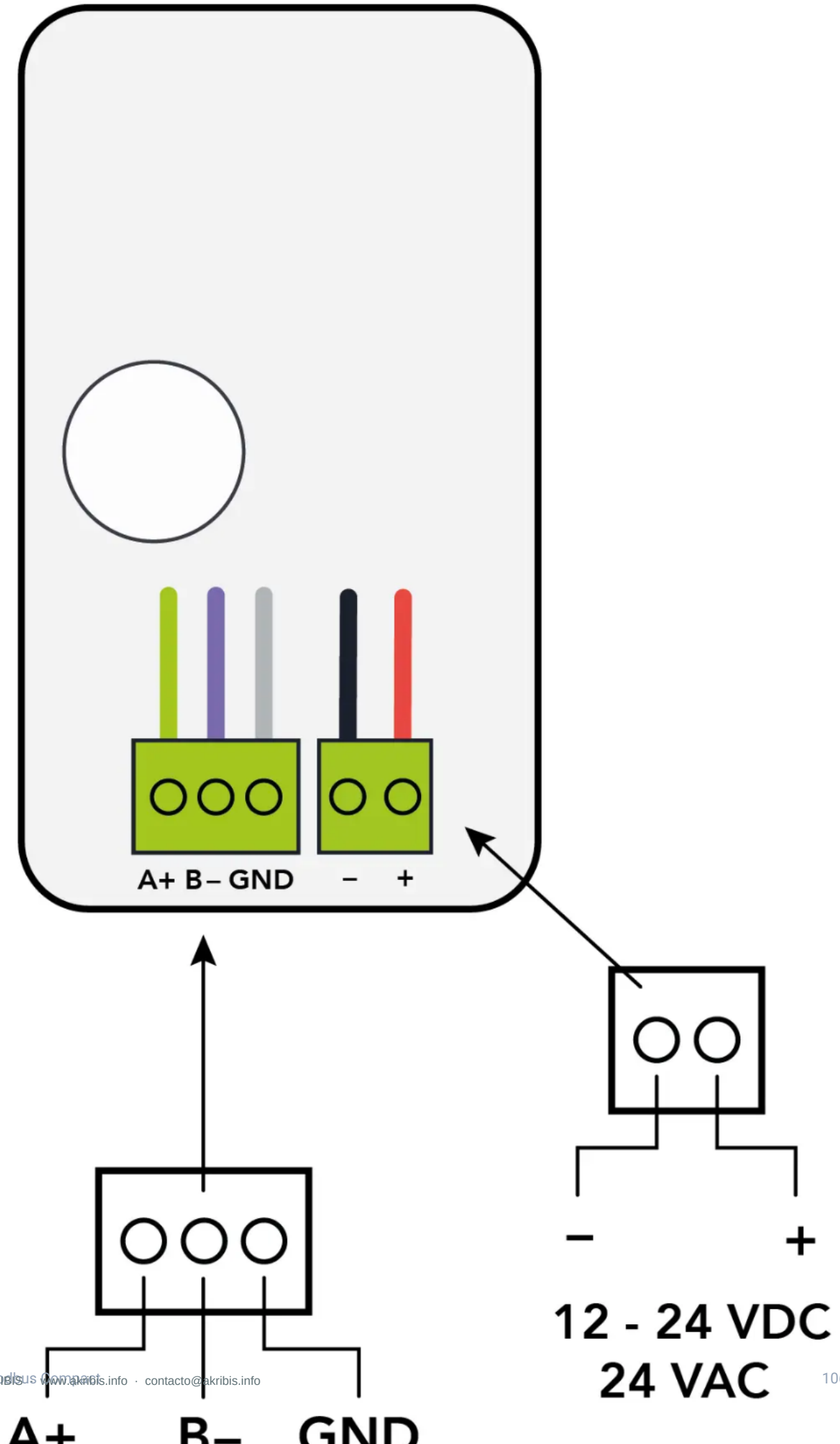
- In the W-Modbus app commissioning screen, tap the Add button to add the node to the gateway selected in the previous step.
- Once added, the device tile disappears from the commissioning screen.
- The node will reboot and the top LED will flash yellow, then change to a solid color indicating connection strength to its parent: red (weak), yellow (moderate), or green (strong).
- Ideally, all nodes should show a solid green or yellow top LED. If you see red, consider adding repeaters, using external antennas, or repositioning the device to improve signal strength.
- Repeat this process for all nodes intended for this gateway.
- To exit the commissioning process at any time, press the End Commission button at the bottom of the screen.

5. Verify your installation

- Put the gateway device into BLE advertising mode by pressing the button 3 times.
- Open the app and connect to the correct gateway from the list of available devices.
- The device home screen will display the total number of wireless devices in the network — verify that this matches your expected count.
- Tap the Network map button to view all connected mesh devices and their Modbus devices connected on the RS-485 port.

Wiring

Wiring Diagram


A+ B– GND
– +
– +
12 - 24 VDC
24 VAC
A+
B–
GND

The Compact has a built-in 120Ω EOL (End-of-Line) resistor, which can not be disabled.

Application Guide

This section includes guidelines for selecting the appropriate W-Modbus product for specific applications and use cases. It also provides information on how to optimize the performance of W-Modbus devices in various environments and scenarios.

Best practice settings

These are best practice settings for Modbus RTU communication when using W-Modbus products.

- Minimum 1 second time-out on replies.
- Minimum 3 retries per request
- (PDR) above 95 % on all nodes. See Mobile App section.
- If your device is fast-polling, see section Solar applications
- See Solar Installations guide on how to wire LumenRadio devices with solar inverters.

A consistent, high-quality wireless network is key for a stable Modbus RTU network. Refer to Wireless design considerations for more information.

Response latency

In a Modbus system, it is important to be able to ask questions and
receive answers within a certain time frame.
When a Modbus Client asks a question, there is often a pre-configured waiting time ("timeout").
In many Modbus systems, this is configurable.
W-Modbus often has a delay of 50-80 ms but responses can take up to 500 ms depending on the amount of data, the
baud rate of the device and if repeaters are used.

Server Scanning

W-Modbus nodes start scanning Modbus addresses by polling on the
current baudrate, parity and stop bit from address 1 up to 255.
This is done by requesting holding registry 0 from a specific address.
Scanning has a 300 ms timeout, meaning each device has 300ms to respond.

Thus, if your device has address number 255 it will take 1 min and 17 seconds for the W-Modbus node to find it.
The third LED blinks faster when scanning is running. Refer to LED Status Indicators.
Once a device is found, the third LED (RS485) will go from red to green.

The scan can be restarted using the button, see Button Functionality.

Solar applications

It has been found that some solar inverters have set their response wait time to 100 ms or less, which means the system does not have time to respond before the next question is asked.

For solar inverters with a very fast poll rate, LumenRadio offers a Solar Mode which can be used to improve compatibility. Solar Mode is a special mode of operation for W-Modbus products that is designed to work with solar inverters that have a very fast poll rate.

How to switch to Solar mode

Solar mode can be enabled from the W-Modbus app.

> WARNING
>
> The FW version should be >= 4.2.0 and you need to update to the latest version of the app to use Solar mode.

Connect to the gateway of your wireless Modbus network using the W-Modbus app. Once connected, toggle the Solar Mode switch from the app's home screen. The gateway will then restart, and all nodes will need to rejoin the network, resulting in a brief temporary downtime.

Disconnect

W-Modbus



DIN rail PRO

Firmware 4.2.0

Max GW

FOTA Status

2

Wireless devices

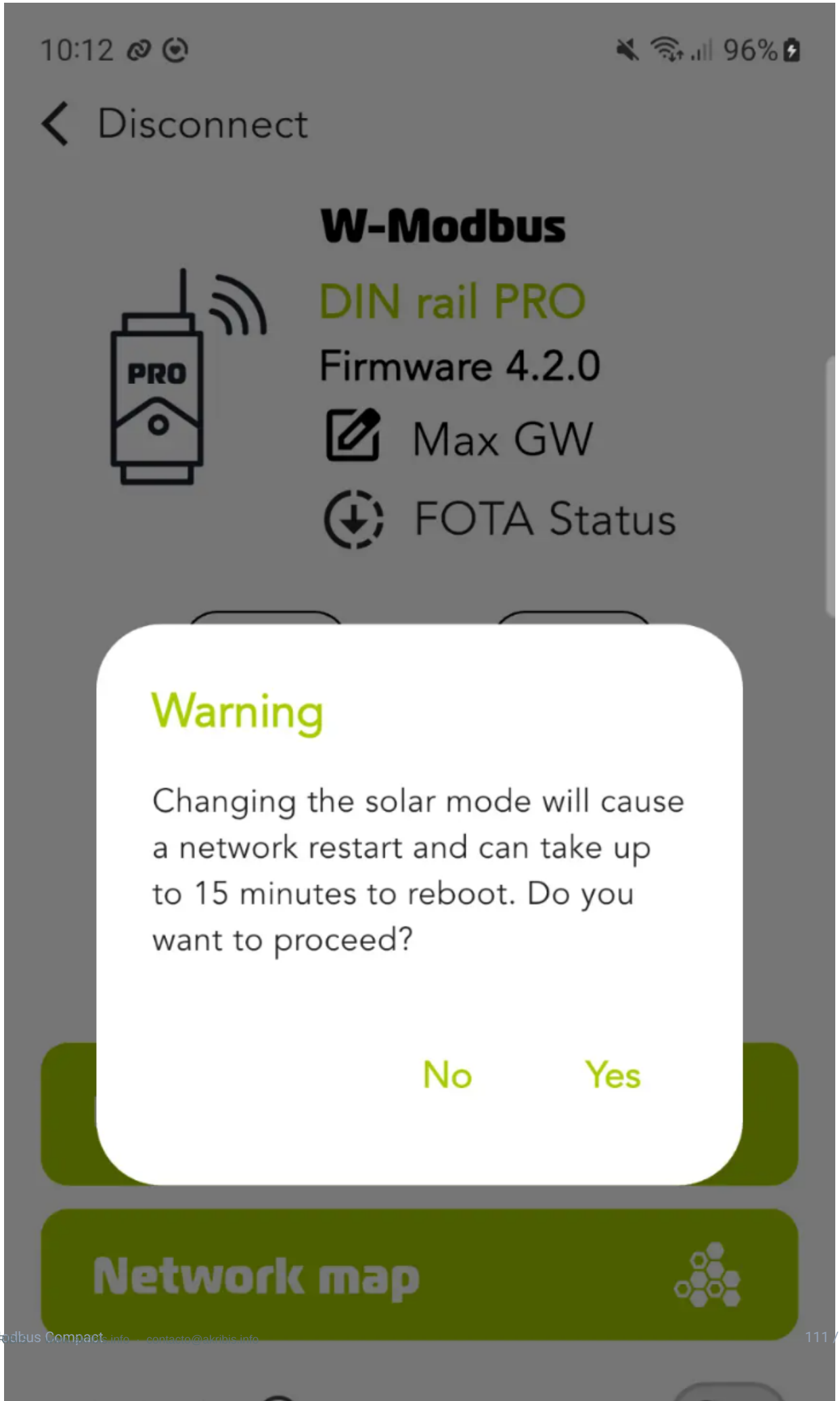
0

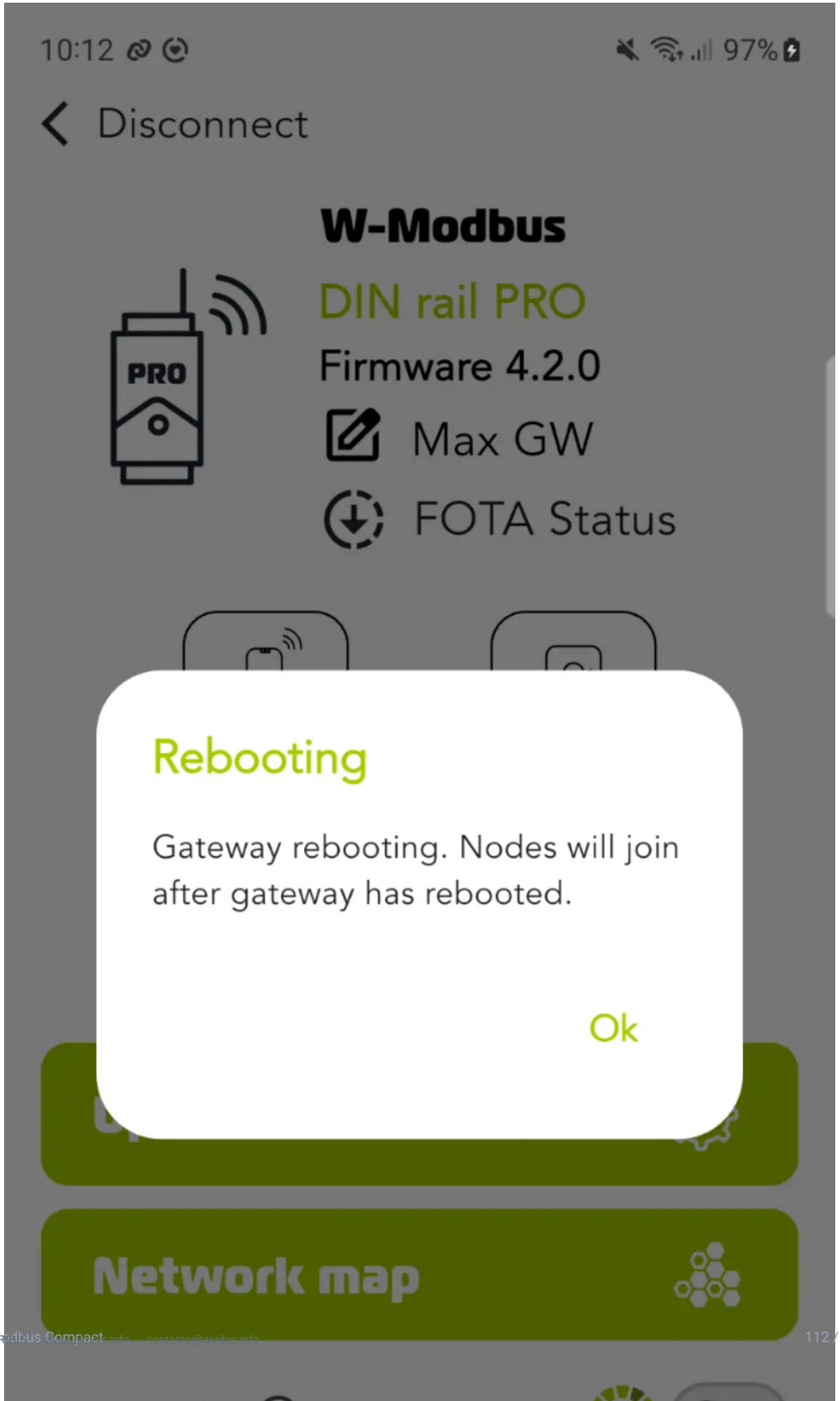
Modbus devices

New firmware 4.1.1 available

Update firmware

Network map


10:12
96%
Disconnect
W-Modbus
DIN rail PRO
Firmware 4.2.0
Max GW
FOTA Status
Warning
Changing the solar mode will cause a network restart and can take up to 15 minutes to reboot. Do you want to proceed?
No
Yes
Network map


10:12
97%
Disconnect
W-Modbus
DIN rail PRO
Firmware 4.2.0
Max GW
FOTA Status
Rebooting
Gateway rebooting. Nodes will join after gateway has rebooted.
Ok
Network map

10:22 100%

Disconnect

W-Modbus



DIN rail PRO

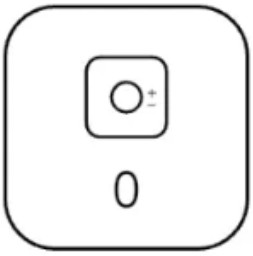
Firmware 4.2.0

Max GW

FOTA Status



Wireless devices



Modbus devices

New firmware 4.1.1 available

Update firmware

Network map

Compatibility Notice

Using W-Modbus Solar mode, there have been good results with many inverter & smart meter pairs that have a very fast poll rate. However, LumenRadio can not guarantee functionality due to rapid firmware updates from Solar inverter companies.

It is therefore recommended, if possible, to disable automatic updates on the inverter and smart meter, and update their firmware only if needed.
There have been cases where inverter and smart meter firmware updates increase polling rate further, breaking compatibility.

We maintain a list of tested inverter and smart meter combinations, please see the Solar Inverter and Smart Meter Compatibility List section below for more information.

If you do decide to test with other combinations than the ones found on our compatibility list or find current working systems no longer working, please raise a support ticket.

Solar Inverter and Smart Meter Compatibility List

LumenRadio maintains a list of tested solar inverter and smart meter combinations that have been found to work with W-Modbus Solar mode. This list is updated as we test new combinations.

Inverter brand	Inverter	Smart meter	Comment
Fronius	Symo GEN24 10.0 Plus	Fronius Smart Meter 63A-3	Works with all versions of LumenRadio firmware
Growatt	MOD 3-10KTL3-XH	CHINT TPM-C (DTSU666)	Works as of LumenRadio firmware 2.2.3+
Growatt	MOD10KTL3-XH (BP)	CHINT DTSU666-20	Works with Solar Mode
Huawei	SUN2000-10KTL	CHINT DTSU666-H	Works with Solar Mode
Huawei	SUN2000-10KTL-M1	CHINT DTSU666-H	Works with Solar Mode
Kostal	PLENTICORE BI10.0/26 G2	Smart Energy Meter G2	Works with Solar Mode
SAJ	H2-10K-T2	CHINT DTSU666	SAJ have adapted firmware in Sweden to support LumenRadio
Sigenergy	SigenStor EC 10.0 kW TP	Sigen Sensor TP-CT120-DH (Eastron SDM630MODBUS)	Works with Solar Mode
Solinteg	MHT-50K-100	Solinteg RMM-MA	Works with Solar Mode
Solis	S6-EH3P15K-H	Eastron SDM630MODBUS	Works with Solar Mode
Sungrow	SG5.0/6.0/7.0/8.0/10/12RT	CHINT DTSU666-20	Works with Solar Mode
Sungrow	SH15T	CHINT DTSU666	Works with Solar Mode
Sungrow	SH6.ORT-V112	CHINT DTSU666-20	Works with Solar Mode

There are some inverter and smart meter pairs where issues have been reported which we have not yet tested

with Solar Mode:

Inverter brand	Inverter	Smart meter	Comment
SolaX	X3-Hybrid G4.2	CHINT DTSU666	Not tested with Solar Mode yet. Please contact LumenRadio if you have tested beta version with SolaX.
Fox ESS	H3	CHINT DTSU666	Not tested with Solar Mode yet. Please contact LumenRadio if you have tested beta version with Fox ESS.

Troubleshooting / FAQ

This section contains common troubleshooting steps and frequently asked questions.

Physical

None of the LEDs are blinking when powered on.

- Check if the supply voltage is within the specification. The voltage should be 12-24V DC or 24VAC and at least 0.5A current input.
- If the supplied input voltage is DC, check that the polarity is connected correctly.
- Check if the unit is in bootloader mode. Open nRF Connect app and check if the device shows up under 'scanner' tab with 'DFU' filter. If device shows up, follow the steps in Update Procedures. If not, try power cycling the unit and check again.
- If the issue persists, contact your distributor and raise a support ticket.

No RS-485 device detected

Red status LED or no status LED indicates that no RS-485 device is detected. Check the following:

- Verify polarity of RS485 connectors.
- Check RS485 bus settings (baud rate, parity, stop bits)
- Ensure the Modbus master is connected to the W-Modbus Gateway, and that the slaves are connected to the W-Modbus nodes. The Modbus master is responsible for polling different values from different sensors and controllers, and it is always connected at the W-Modbus Gateway.
- If this is a solar installation, ensure the inverter is installed at the Gateway and the smart meter is installed at the Node. The gateway should be put in solar mode to optimize the wireless performance in this type of installation.
- Verify that the Modbus device is working as expected

Can the end-of-line terminal resistor be disabled?

No, it can not be disabled. The typical usage of the product is that the product is end of line.

Wireless

Nodes are not connecting to gateway

- Check if the nodes are in commissioning mode. If not, put them in commissioning mode and try again.
- Check if the gateway is in commissioning mode. If not, put it in commissioning mode and try again.
- Check if the gateway or nodes are in range test mode. If so, exit range test mode and try again.
- Check if the nodes are within range of the gateway. If not, move them closer to the gateway and try again. See radio planning for more information on range and placement of the gateway and nodes.

When I put the gateway back into commissioning mode, some nodes stay in secure mode.

- This is because the nodes didn't find the gateway in time for the gateway to tell them to switch back into commissioning mode.
- Put the gateway back into secure mode for 10 minutes, to allow for all the nodes to join the GW.
- Then switch the GW back to commissioning mode.
- Alternatively, each node can be manually put back into commissioning mode, refer to button functionality section for instructions on how to do this.

Modbus Specific

Where should the node and the GW be connected in case of solar installations?

Solar Installations

Firmware Updates

This section describes the firmware update process for W-Modbus devices.

The latest firmware version for W-Modbus devices is 4.2.3.

Starting with firmware version 3.0.0, it is enough to update the gateway to the latest firmware version, and the gateway will take care of updating all nodes in the network using Firmware-Over-The-Air (FOTA).

> NOTE
>
> On firmware 3.0.0 and above, the gateway will override your firmware update if you update only at the nodes, so it is recommended to update the gateway first. If you have updated the nodes before updating the gateway, simply update the gateway and the FOTA process will take care of the rest.

Checking Current Version

Via Mobile app

See Mobile App section

Via LED lights

When the button is held for 15 seconds and then released as described in Button Functionality, the LEDs will show the current
firmware version.

The version number is split into Major.Minor.Patch. As an example, firmware version 3.3.2 has the Major version 3, Minor version 3 and Patch version 2.

The version is shown on the LEDs by blinking the topmost LED in yellow one time for each increment of the Major version, the second LED one time for each increment of the Minor version and the third LED one time for each increment of the Patch version.

For 3.3.2, the top LED will blink 3 times, the second LED will blink 3 times and the bottom LED will blink 2 times.

Update Procedures

via Mobile app

See Mobile App section

nRF Connect

> WARNING
>
> Updating via the Mobile App is recommended, nRF Connect should only be used as a fallback if you are updating devices that have a firmware below 3.1.1, where the mobile app is not supported.

This method of updating the LumenRadio firmware requires you to first download the latest firmware from LumenRadio's website.
If you are updating your devices from version 2.2.3 or below to version 3.0.0 or above, you will need to repeat this step for all devices in the network. If you are updating from version 3.0.0 or above to the latest version, you will only need to do this step once at the gateway.

Video Guide

iOS

- Download and store the new firmware to your phone. Save it in any location.
- Download the app nRF Connect for Mobile from App Store.
- Open the mobile app and activate Bluetooth on the phone.
- On the LumenRadio device: Enter bootloader mode for the unit by pressing and holding down the push button for 20 seconds. When the mid LED turns red then release the button.
- In the nRF Connect app: Scan and connect to the unit. Press Scan in the top left corner of the app, and press Connect on the W-Modbus-DFU or W-Xbus-DFU or DFU-W-Xbus-1XYZ unit in the list. If the device does not show up in the list of found devices, redo step 3 and make sure you are not using any filters.
- Select firmware to upload: Press the DFU symbol in the top right corner of the app. Press Open Document Picker and then select the firmware you downloaded to your phone in step 1. Note that in the example below we use the W-Modbus software. The procedure looks the same for W-BACnet but the file name is W-BACnet-version.zip.
- Wait for transfer to complete
- Wait until the transfer is 100% and you get the status Application has been sent successfully from the app. Press Disconnect in the top right corner and wait for the unit to restart. The update is now complete!

Android

- Download and store the new firmware to your phone. Save it in any location.
- Download the app nRF Connect for Mobile from Google Play store.
- Open the mobile app and activate Bluetooth on the phone.
- On the LumenRadio device: Enter bootloader mode for the unit by pressing and holding down the push button for 20 seconds. When the mid LED turns red then release the button.
- In the nRF Connect app: Scan and connect to the unit. Press Scan in the top left corner of the app, and press Connect on the W-Modbus-DFU or W-Xbus-DFU or DFU-W-Xbus-1XYZ unit in the list. If the device does not show up in the list of found devices, redo step 3 and make sure you are not using any filters.
- Select firmware to upload: Press the DFU symbol in the top right corner of the app. Select the file type Distribution packet (zip), press OK and then select the firmware you downloaded to your phone in step 1. The file transfer will start when you press OK in the file browser.
- Wait for transfer to complete: Wait until the transfer is 100% and you get the status Application has been sent successfully from the app. Press Disconnect in the top right corner and wait for the unit to restart. The update is now complete!

Release Notes

4.2.2

Released on 2026-05-28.

Added

- Added firmware support for replacement of broken gateway through the mobile app.

Fixed

- Fixed a bug that caused the boot time of the device to increase.
- Fixed an issue that could cause communication to get stuck in solar mode.
- Fixed a bug that caused app mode to briefly be 0 when read through SPI/UART before rebooting after decommissioning

Known issues

- While the W-BACnet/W-Modbus mobile app is connected to a W-BACnet/W-Modbus device, the device bandwidth is temporarily reduced by 33%.
- Downgrading the firmware to a version below 3.0.0 will factory reset the device.

4.2.1

Released on 2026-03-16.

Added

- Firmware support for commissioning W-BACnet and W-Modbus networks via the mobile app.
- Firmware support for device identification in the mobile app.
- Firmware support for switching to Solar mode for W-Modbus in the mobile app.
- Added SPI/UART register and SPI interrupt for checking if a device was pinged by the mobile app.

Changed

- LEDs are turned on by default for commissioning GW.
- LEDs will no longer turn off after 30 minutes if there is any issue indication on the status LED.
- Nodes in commissioning mode (except OEM modules) will now always advertise on BLE.

Fixed

- Improved RS485 driver to prevent issues in edge cases.
- Fixed a bug with specific controllers which could cause the RS485 status LED to be green, even though the received data was invalid.

Known issues

- While the W-BACnet/W-Modbus mobile app is connected to a W-BACnet/W-Modbus device, the device bandwidth is temporarily reduced by 33%.
- Downgrading the firmware to a version below 3.0.0 will factory reset the device.

4.2.0

Internal release.

4.1.1

Released on 2025-12-16.

Fixed

- W-BACnet: Fixed issue where padded frames were not being handled correctly, causing communication issues with some devices.
- W-Modbus: Fixed intermittent issue with certain read requests in solar configurations.
- Intermittent issue with devices causing an extra reboot during startup fixed.

Known issues

- When manually uncommissioning a device through the push button, the device will restart several times, which increases boot time slightly.
- W-BACnet: when upgrading from any FW version less than 4.0.0, to this version or above, there may be service disruption only during the time in which the FW is being propagated to the rest of the nodes in a network.
- When running W-BACnet version 4.1.0, padded frames are not handled correctly, which may cause communication issues with some devices. This is fixed in version 4.1.1.
- While the W-BACnet/W-Modbus mobile app is connected to a W-BACnet/W-Modbus device, the device bandwidth is temporarily reduced by 33%.
- Downgrading the firmware to a version below 3.0.0 will factory reset the device.

4.1.0

Released on 2025-11-07.

Added

- W-BACnet: Improved network stability and performance on large networks / during high network load.
- W-Modbus: GW's RS485 LED blinks green when there is valid RS485 traffic, red when there is invalid traffic and remains off when there is no traffic.

Changed

- W-BACnet: Reduced the amount of Poll For Master frames sent on the local bus.
- W-BACnet: Autobaud will now keep running until a device is found.
- W-Modbus: Improved compatibility with Solar inverters / Smart Meters.

- W-Modbus: Blink the RS485 RX LED only when valid traffic is received by the GW.

Fixed

- Fixed intermittent RS485 framing issues on baudrates >= 76800.
- Fixed bug where stop bit and parity setting was not correctly applied on boot in some cases.
- Fixed bug where mobile app could still connect to device after the 3 minute timer had expired.
- W-Modbus: Fixed bug which could cause unnecessary device scanning in some cases.

Known issues

- W-BACnet: when upgrading from any FW version less than 4.0.0, to this version or above, there may be service disruption only during the time in which the FW is being propagated to the rest of the nodes in a network.
- While the W-BACnet/W-Modbus mobile app is connected to a W-BACnet/W-Modbus device, the device bandwidth is temporarily reduced by 33%.
- Downgrading the firmware to a version below 3.0.0 will factory reset the device.

4.0.0

Released on 2025-08-07.

Added

- W-BACnet: Improved performance when transmitting large amounts of data.
- Wall Mount & DIN rail: In case of any operating system crash, all three LED's will become solid red after booting up again. This state can be cleared with a push of the button, after which the LED behavior will return to normal.
- Added support for the Compact form factor.

Changed

- PDR of any node in the network map now takes into account the PDR of each parent all the way to the gateway. This better represents end-to-end PDR.

Fixed

- Updates to gateways via the W-BACnet/W-Modbus App propagate throughout networks without having to restart the gateway.

Known issues

- W-BACnet: when upgrading from any FW version less than 4.0.0, to this version or above, there may be service disruption only during the time in which the FW is being propagated to the rest of the nodes in a network.
- While the W-BACnet/W-Modbus mobile app is connected to a W-BACnet/W-Modbus device, the device bandwidth is temporarily reduced by 33%.
- Downgrading the firmware to a version below 3.0.0 will factory reset the device.

3.3.2

Released on 2025-04-25.

Added

- W-BACnet: Autobaud can now be enabled by switching on dip switch no. 4 (previously used for stop bits). The W-BACnet device, after booting, will "lurk" on the MS/TP bus until the baudrate of a connected BACnet device is identified. If the baudrate cannot be identified within 90 seconds, legacy behavior will be resumed. Baudrates in the order that they are tested by autobaud are: 76800, 38400, 19200, 9600, 57600, 115200.
- OEM modules: Ability to switch between BACnet and Modbus via SPI and/or UART management interface.
- OEM modules: Ability to read and write device name through SPI and/or UART management interface.

Fixed

- When OEM module nodes are decommissioned by a connected gateway, the commissioning bit is now correctly cleared.
- Improved network recovery time significantly after updating the gateway.

Known issues

- After updating a Gateway through the W-BACnet/W-Modbus App, the upgrade may not propagate to devices in the network unless the gateway is restarted. Fixed in 4.0.0.

3.3.1

Internal release, no changes to firmware.

3.3.0

Released on 2024-12-05.

Added

- The BLE status, whether the device is advertising or not, can be read through SPI/UART interfaces on the OEM module.
- The firmware version can be seen on the network map with the next mobile app version (coming soon).

Changed

- BLE advertisements now run for 3 minutes, with an interval of 417.5 ms.
- The network map now works in commissioning mode as well.
- Stop bit and parity are no longer configurable for the W-BACnet products.

- GW always advertises for 1 minute after DFU update.

Fixed

- The OEM documentation is updated.
- Miscellaneous bug fixes.
- SPI is now reset if SPI master device is reset.
- RS-485 frame spacing is now more consistent.

Known issues

- Pro form factor logos are wrong in the app.

3.2.7

Released on 2024-10-01.

Added

- Rewrite I-Am, I-Have, and I-Am-Router-To-Network from broadcast to unicast to reduce the risk of broadcast storms, for W-BACnet products.

Fixed

- Intermittent RS-485 bus communication issues fixed for W-BACnet products.

Known Issues

- Pro form factor logos are wrong in the app.

3.2.5

Released on 2024-05-24.

Fixed

- Consecutive responses to modbus polls by client fixed.

3.2.4

Released on 2024-05-17.

Fixed

- Intermittent mesh network loop issues fixed.
- Rare wireless communication issues fixed.

Known Issues

- Two consecutive Modbus responses can be put on the bus.

3.2.3

Released on 2024-04-30.

Fixed

- Frequent changes in RS-485 bus parameters bug fixed.

3.2.0

Released on 2024-02-14.

Added

- UART interface added as an alternative to SPI, can be used to control the oem modules.
- A new app mode, APP_MODE_IDLE, has been added for the OEM modules, pausing any networking activity when in effect.

Changed

- BLE version has been downgraded from 5 to 4 (see below concerning the App)

Fixed

- All Apple iOS 17 devices are now able to use the W-Modbus app with W-Modbus devices on version 3.2.0 or later.

3.1.1

Released on 2023-12-18.

Changed

- W-Modbus module documentation has been revised.

Known Issues

- The W-Modbus app can only set device names with 8 characters of length or less on the home screen. Network map devices can have names up to 19 characters.

3.1.0

Released on 2023-11-28.

Added

- SPI command added for rescanning Modbus addresses, for the oem modules.

- SPI command added for BLE advertising, for the oem modules.

Fixed

- Documentation for Modbus SPI button rescanning is fixed.

3.0.0

Released on 2023-10-27.

Added

- DFU FOTA added, allowing firmware upgrades of an entire network by just upgrading the gateway.

Changed

- Restricted Modbus addresses 248 through 255 will now also be scanned for compatibility with the solar industry products.

Fixed

- Issue with detection of consecutive addresses on the Pro units fixed.
- SPI NOP command no longer causes subsequent commands to time out on the oem module.

2.2.3

Released on 2023-08-23.

Fixed

- Compatibility added for W-Modbus devices to work with solar inverters.

2.2.1

Released on 2023-04-27.

Added

- Wall Mount and DIN rail LEDs can be turned on/off permanently by 5s button press.
- Wall Mount and DIN rail LEDs can now indicate firmware version by 15s button press.
- Pressing the button on the GW can turn on the LEDs on all wireless devices (Wall Mounts and DIN rails) in the network.

Changed

- RS-485 reliability significantly improved.
- LED colors behavior is updated.
- Mode and network status is now combined and shown at the top LED.
- GW's top LED is now magenta.

- For mesh nodes, the network status LED indicates the connection quality: red for poor, yellow for fair, and green for good.
- For mesh nodes, the network status LED blinking yellow signifies searching for a network to join.
- RS-485 bus activity is shown on the middle LED, with blue/ green blinking for TX/ RX.

2.2.0

- Released on 2023-03-24.

Added

- W-BACnet and W-Modbus DIN rail products released.

2.1.1

Released on 2022-09-20.

Changed

- Start token passing on the gateway when an MSTP device is connected to one of the nodes in the network.

2.1.0

Released on 2022-06-01.

Added

- W-BACnet OEM Module released.

2.0.1

Released on 2022-05-05.

Fixed

- W-Modbus Pro shows when at least one modbus RTU server device address has been found.
- W-Modbus Pro units will always find the lowest four RTU server device addresses present if more than four devices are on the same bus.

2.0.0

Released on 2022-04-25.

Added

- W-BACnet Wall Mount product released.

1.2.0

Released on 2022-04-14.

Added

- W-Modbus and W-Modbus Pro OEM Module products released.
- Rescanning modbus RTU addresses can be triggered by pushing button twice.
- OEM module's app mode defaults to Mesh node from None.

Fixed

- Missing address 247 while scanning for W-Modbus fixed.

1.1.2

Released on 2021-09-27.

Changed

- RS-485 reliability improved.

Fixed

- DIP switch bug fixed.

1.1.0

Released on 2021-06-29.

Added

- SPI interface added for controlling the oem module.
- New LED behavior: All LEDs will flash yellow when a node is scheduled to restart.

1.0.2

Released on 2021-06-01.

Fixed

- Uncommissioning triggered by a short push on the push button is fixed.

1.0.0

Released on 2021-04-09.

Added

- W-Modbus Wall Mount product released.

Warranty and Support

This section provides information about the warranty and support options available for W-Modbus products. It includes details on the warranty coverage, how to obtain support, and contact information for customer service.

Warranty Terms

The length of the warranty is a negotiation question between distributor and LumenRadio. Each distributor has a different term.
The warranty term is typically between 1-5 years from day of shipment, but you will need to check with your distributor to find out what applies to you.

The warranty or service agreement will be deemed void if:

1. The product is repaired, modified, or changed, unless such repair, modification or change has been approved by LumenRadio AB; or
2. The serial number on the product has been made illegible or is missing.

Return and complaint policy

The customer is required to examine the goods as soon as possible upon receipt. If there is reason to believe that a product defect may result in damage, a written complaint must be made immediately. LumenRadio's liability shall pertain solely to defects that the customer asserts in writing within 15 days after the defect is discovered or should have been discovered, and no later than within the period stated in the agreement with LumenRadio from the invoice date.

When to Contact Support

If you have followed the steps in the troubleshooting guide and you're still seeing issues, feel free to contact our Customer Support.

Create a support request by clicking the "Create Support Ticket" att the bottom left of this page.

What to include in support request

In order to get help as fast as possible, please include as much information about your case as possible, including

- The symptoms you are seeing
- Pictures of the installation and wiring
- A small video of the LEDs of the malfunctioning unit(s)
- A network map from the mobile app
- The type of power supply you are using to power the W-Modbus unit (AC or DC)
- The make and model of the Modbus devices you are using

- Serial bus settings (baudrate, parity, stopbits)
- Information about wireless conditions, distance between nodes and any obstructions.
- If any external antenna is used.

Press the "Create Support Ticket" in the bottom of the navigation to create a support request.

{{#NOTE}}The more information you can provide, the faster we can help you.{{/NOTE}}

RMA claims

You can find the warranty terms for LumenRadio products in the Warranty and Support section.
If you have a claim that you believe is covered by the warranty, please submit an RMA claim via our {{action:open-rma:support system}}.

The RMA ticket must contain the serial number of the products,
a clear description of the observed fault, and details of how the
device has been installed.

Regulatory Compliance

CE

This product complies with the Essential Requirements of RED (Radio Equipment Directive) of the European Union (2014/53/EU). This product meets the requirements of relevant conformance standards. A detailed Declaration of Conformity is available upon request from the manufacturer.

EU Declaration of Conformity

UKCA

This product complies with the relevant statutory requirements in the United Kingdom. This product meets the requirements of relevant conformance standards. A detailed Declaration of Conformity is available for market surveillance upon request from the manufacturer.

FCC

FCC IDENTIFIERS: XRSTIMOMWAN301, XRSTIMOMWAN201

FCC Information to User

This product does not contain any user serviceable components and is to be used with approved antennas only. Any product changes or modifications will invalidate all applicable regulatory certifications and approvals.

FCC Guidelines for Human Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Declaration of Conformity

We LumenRadio AB, Johan Willins gata 8, SE-416 64 Gothenburg, Sweden, declare under our sole responsibility that this product complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and

- This device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency Interference Warnings & Instructions

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following methods:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an electrical outlet on a circuit different from that which the radio receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

Modifications made to the product, unless expressly approved by LumenRadio AB, could void the user's right to operate the equipment.

Industry Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. Le resent appareil numerique nemet pas de bruits radiolectriques depassant les limites applicables aux appareils numeriques de la classe B prescrites dans le Reglement sur le broullage radioelectrique edicte par le ministere des Communications du Canada.

ISED Certification

MIC (Japan)

MIC Certification

KC (South Korea)

KC Certification

2.4GHz radio in other countries

- China
- India
- Australia - Importer responsibility (ConserveIT)
- South Africa - Importer responsibility (Name of partner)
- Malaysia
- Vietnam