# Wireless M-BUS B4 Gateway documentation
# LTE-M1 / GPRS and Ethernet GW

*using optional*

*LansenConfigurator 1.6.2.0*

# Introduction

- This device from Lansen is a lightweight gateway that is made for receiving wM-Bus data and transmitting the data using LTE M1/GPRS or Ethernet, depending on variant, to an MQTT server.
- The data received is timestamped and once connection to the MQTT service is active the data is transmitted to the specified MQTT server.
- To maintain full data integrity, the data is NOT decrypted in the gateway and no encryption keys are stored in the gateway.
- Packets are sent with Quality of Service (QoS) set to 0, i.e., the MQTT server should not reply to messages. TCP/IP is handling transmission, ACK, and quality of service automatically.
- The gateway can be configured over the wM-Bus interface using, for example, a Lansen USB-dongle (LAN-WMBUS-D1/D2-TC), a wM-Bus compatible transceiver, or via the MQTT interface.
- The gateway can run either on mains power or battery.
- The gateway support in-field upgrade of the firmware. The upgrade can be requested by the MQTT or wM-Bus interface.
- Configuration of a gateway can be protected using a unique AES128 encryption key which is preprogrammed into the gateway during production.

# MQTT traffic

This document describes how to interpret data packages from a gateway which support Message Queueing Telemetry Transport (MQTT).

**Note: The number 01234567 below is an example of a serial number for a gateway.**

Data is posted from the gateway on topic **LAS/W/D/01234567**.

Configuration to the gateway is posted on topic **LAS/W/C/01234567**.

Response of configuration from the gateway is posted on topic **LAS/W/R/01234567**.

Gateway ready to accept configuration data is posted on topic **LAS/W/I/01234567**.

Packets are sent with Quality of Service (QoS) set to 0, i.e., the MQTT server should not reply to messages. TCP/IP is handling transmission, ACK, and QoS, automatically.

If the connection is lost, data is stored on the gateway in its flash memory. This is also the case for battery driven devices.

If the connection is lost during a transmission the gateway will resend the not yet delivered telegram to the server once the connection is active again.

Below is an example packet as sent from the gateway where wM-Bus data is in blue, the MQTT header is in red, and the received WMBUS packet is in yellow.

30 A0 01 00 10 4C 41 53 2F 57 2F 44 2F 30 30 30 34 36 31 35 33 68 88 88 68 08 FD 72 97 42 04 00 33 30 0B 32 58 00 00 00 0C 78 53 61 04 00 06 6D 58 84 95 DE 26 5B 01 FD 71 A3 8C 40 78 97 42 04 00 81 40 FD F1 94 74 00 0D FD 3B 55 54 44 33 30 97 42 04 00 0B 32 7A C4 00 00 40 2F 2F 04 FD 3A D3 C4 00 00 82 40 FD 3A 1E 01 02 FD 0F 95 00 81 80 40 FD 3A 00 84 C0 40 FD 3A A6 99 00 00 42 FD 3A 19 00 82 01 FD 3A 87 05 C1 01 FD 3A 7F 82 02 FD 3A E0 01 06 6D 1A 04 95 DE 26 00 02 FD 46 0B 0D B2 16

## Packet sent by gateway with wM-Bus container

The data is packed into a wM-Bus container data record which is represented by the table below.

Example packet complete MQTT packet:

| Information | |
|---|---|
| DR1 | Represents the time when package was received |
| DR2 | Represents the signal strength for the reception of the received package |
| DR3 | If packet was from a repeater the repeater serial number is written here, otherwise this value is 0xFFFFFFFF |
| DR4 | RSSI value that the repeater received the packet.<br>Relative RSSI 0-100, 0 is the best and 100 is the worst. 0xFF means the value is not used. |
| DR5 | Wireless M-Bus data received. |

| Byte No. | Field Name | Content | Info | Byte data (example) | Layer |
|---|---|---|---|---|---|
| 1 | Start | Start-byte | | 0x68 | Data Link |
| 2 | L-Field | Telegram length | If packet is longer than 255 then both L-fields should be added, otherwise the L-fields are the same. | 0x45 | |
| 3 | L-field | Telegram length | | 0x45 | |
| 4 | Start | Start-byte | | 0x68 | |
| 5 | C-Field | ACC-DMD | | 0x08 | |
| 6 | A-Field | Primary addressing | 0xFD = Use secondary addressing | 0xFD | |
| 7 | CI-Field | Long header (0x72) | | 0x72 | Transport |
| 8 | ID-Field | Identification number (LSB) | **Example:** 33221100 | 0x00 | |
| 9 | ID-Field | Identification number | | 0x11 | |
| 10 | ID-Field | Identification number | | 0x22 | |
| 11 | ID-Field | Identification number (MSB) | | 0x33 | |
| 12 | Manufacturer | Manufacturer code (LSB) | LAS | 0x33 | |
| 13 | Manufacturer | Manufacturer code (MSB) | | 0x30 | |
| 14 | Version | Version | | 0x07 | |
| 15 | Type | Device type | | 0x1B | |
| 16 | Acc. | Access number | | 0x01 | |
| 17 | Status | Errors and alerts | | 0x00 | |
| 18 | Config. | Configuration field | **Example:** Encryption off | 0x00 | |
| 19 | Config. | Configuration field | | 0x00 | |
| 20 | ID-Field | DIF | 8-digit BCD | 0x0C | Application |
| 21 | ID-Field | VIF | Fabrication number | 0x78 | |
| 22 | ID-Field | Gateway serial number (LSB) | **Example:** 00000008 | 0x08 | |
| 23 | ID-Field | Gateway serial number | | 0x00 | |
| 24 | ID-Field | Gateway serial number | | 0x00 | |
| 25 | ID-Field | Gateway serial number (MSB) | | 0x00 | |
| 26 | DR1 | DIF | 48-bit integer | 0x06 | |
| 27 | DR1 | VIF | Time Type I format | 0x6D | |
| 28 | DR1 | Received time (LSB) | **Example:** 2000-01-01 00:01:02 | 0x02 | |
| 29 | DR1 | Received time | | 0x01 | |
| 30 | DR1 | Received time | | 0xC0 | |
| 31 | DR1 | Received time | | 0x01 | |
| 32 | DR1 | Received time | | 0x01 | |
| 33 | DR1 | Received time (MSB) | | 0x00 | |
| 34 | DR2 | DIF | 8-bit integer | 0x01 | |
| 35 | DR2 | VIF | Extension | 0xFD | |
| 36 | DR2 | VIF | RSSI | 0x71 | |

| | | | | | |
|---|---|---|---|---|---|
| 37 | DR2 | Value | **Example:** 118 | 0x76 | |
| 38 | DR3 | DIF | 8 digit BCD | 0x8C | Application |
| 39 | DR3 | DIFE | Subunit 1 | 0x40 | |
| 40 | DR3 | VIF | Fabrication number | 0x78 | |
| 41 | DR3 | Repeater serial number (LSB) | **Example:** 00000009 | 0x09 | |
| 42 | DR3 | Repeater serial number | | 0x00 | |
| 43 | DR3 | Repeater serial number | | 0x00 | |
| 44 | DR3 | Repeater serial number (MSB) | | 0x00 | |
| 45 | DR4 | DIF | 8-bit integer | 0x81 | |
| 46 | DR4 | DIFE | Subunit 1 | 0x40 | |
| 47 | DR4 | VIF | Extension | 0xFD | |
| 48 | DR4 | VIFE | RSSI | 0xF1 | |
| 49 | DR4 | VIFE | Relative deviation | 0x94 | |
| 50 | DR4 | VIFE | Multiplier (0.01) | 0x74 | |
| 51 | DR4 | Value | RSSI of repeater (0-100%)<br>**Note:** 0xFF = Not used<br><br>**Example:** 70 | 0x46 | |
| 52 | DR5 | DIF | Variable length | 0x0D | |
| 53 | DR5 | VIF | Extension | 0xFD | |
| 54 | DR5 | VIFE | Data container for wireless M-Bus protocol | 0x3B | |
| 55 | DR5 | LVAR | **Example:** 50 | 0x32 | |
| 56 | DR5 | Telegram content starting with the L-field in the contained wireless MBUS packet | | 0x8C | |
| 57 | … | | … | | |
| 58 | DR5 | Last byte of the telegram | 0x06 | | |
| 59 | Checksum | | | 0x | Data Link |
| 60 | Stop-byte | | | 0x16 | |

# Sending configuration packets to a gateway

This chapter describes how to send configuration packets to a gateway. The packet is always sent to the topic LAS/W/C/12345678 where 12345678 is the serial number of the gateway.

**Note:** Alternative 1 needs to be used if a gateway has been enabled to only accept encrypted configuration packets.

## Alternative 1: M-BUS header for encrypted and non-encrypted configuration packets

The following header is supported by the gateway and can be used for sending both AES128 encrypted and non-encrypted configuration packets.

The serial number in bytes 12-15 must be the serial number of the gateway that should be configured, i.e., the same serial number that is in the MQTT configuration header.

The access number, byte 20, should be incremented by 1 for each packet sent to the gateway for optimal security. However, it will still work even if the same access number is always used.

**Note:** After the header, the configuration data is added – The configuration data is also referred to as ENAPI Data. Refer to the document **Bridge_ENAPI_Commands_B4** for detailed instruction about each ENAPI command. Configuration of the gateway is sent in the same way both on the MQTT as with the dongle. An NDA is required to receive the commands and the structure.

| Byte No. | Field Name | Content | Info | Byte data (example) | Layer |
|---|---|---|---|---|---|
| 1 | L-Field | Length of data | | | Data Link |
| 2 | C-Field | SND-UD2 | | 0x43 | |
| 3 | M-Field | Meter Manufacturer Code | LAS | 0x33 | |
| 4 | M-Field | Meter Manufacturer Code | | 0x68 | |
| 5 | A-Field | Serial number BCD (LSB) | **Example:** 0A0A0A0A | 0x0A | |
| 6 | A-Field | Serial number BCD | | 0x0A | |
| 7 | A-Field | Serial number BCD | | 0x0A | |
| 8 | A-Field | Serial number BCD (MSB) | | 0x0A | |
| 9 | A-Field | Version | **Example:** 00 | 0x00 | |
| 10 | A-Field | Device type | **Example**: 00 | 0x00 | |
| 11 | CI-Field | Long network header | | 0x5B | Transport |
| 12 | Ident Nr. | Gateway serial number BCD (LSB) | **Example:** 12345678 | 0x78 | |
| 13 | Ident Nr. | Gateway serial number BCD | | 0x56 | |
| 14 | Ident Nr. | Gateway serial number BCD | | 0x34 | |
| 15 | Ident Nr. | Gateway serial number BCD (MSB) | | 0x12 | |
| 16 | Manufacturer | Manufacturer code (LSB) | LAS | 0x33 | |
| 17 | Manufacturer | Manufacturer code (MSB) | | 0x30 | |
| 18 | Version | Version (Ignored by gateway) | This can be set to any value | 0xFF | |
| 19 | Device type | Device type (Ignored by gateway) | This can be set to any value | 0xFF | |
| 20 | Access number. | Access Number to gateway | | 0x75 | |
| 21 | Status | Errors and alerts | | 0x00 | |
| 22 | Config. | Configuration field | **Example:** Encryption off | 0x00 | |
| 23 | Config. | Configuration field | | 0x00 | |
| 24 | AES-verify | Encryption verification | | 0x2F | |
| 25 | AES-verify | Encryption verification | | 0x2F | |

### Alternative 2: M-BUS header only for non-encrypted configuration data.

This format is easier, compared to the previous alternative, but only supports non-encrypted configuration data. The Access number, byte 12, should be incremented by 1 for each packet sent to the gateway for best security. However, it will still work even if the same access number is always used.

**Note:** After the header, the configuration data is added – The configuration data is also referred to as ENAPI Data. Refer to the document **Bridge_ENAPI_Commands_B4** for detailed instruction about each ENAPI command. Configuration of the gateway is sent in the same way both on the MQTT as with the dongle. An NDA is required to receive the commands and the structure.

| Byte No | Field Name | Content | Info | Byte data (example) | Layer |
|---|---|---|---|---|---|
| 1 | L-Field | Length of data | | | Data Link |
| 2 | C-Field | SND-NR | | 0x44 | |
| 3 | M-Field | Meter Manufacturer Code | LAS | 0x33 | |
| 4 | M-Field | Meter Manufacturer Code | | 0x30 | |
| 5 | A-Field | Serial number BCD (LSB) | **Example:** 0A0A0A0A | 0x0A | |
| 6 | A-Field | Serial number BCD | | 0x0A | |
| 7 | A-Field | Serial number BCD | | 0x0A | |
| 8 | A-Field | Serial number BCD (MSB) | | 0x0A | |
| 9 | A-Field | Version | | 0x00 | |
| 10 | A-Field | Device type | | 0x00 | |
| 11 | CI-Field | Short network header | | 0x7A | Transport |
| 12 | Access no. | Access Number | 0xA1 | | |
| 13 | Status | Errors and alerts | | 0x00 | |
| 14 | Configuration | | **Example:** Encryption off | 0x00 | |
| 15 | Configuration | | | 0x00 | |
| 16 | AES-verify | Encryption verification | | 0x2F | |
| 17 | AES-verify | Encryption verification | | 0x2F | |

## The response from the gateway

The packet is always sent to the topic LAS/W/R/12345678 where 12345678 is the serial number of the gateway.

**Note:** After the header, the configuration data is added – The configuration data is also referred to as ENAPI Data. Refer to the document **Bridge_ENAPI_Commands_B4** for detailed instruction about each ENAPI command.

| Byte No | Field Name | Content | | Byte data | |
|---|---|---|---|---|---|
| 1 | L-Field | Length of data | | 0x | Data Link |
| 2 | C-Field | RSP-UD | | 0x08 | |
| 3 | M-Field | Meter Manufacturer code (LAS) | | 0x33 | |
| 4 | M-Field | Meter Manufacturer code (LAS) | | 0x30 | |
| 5 | A-Field | Serial NO LSB (BCD) | | 0x78 | |
| 6 | A-Field | Serial NO (BCD) | | 0x56 | |
| 7 | A-Field | Serial NO (BCD) | | 0x34 | |
| 8 | A-Field | Serial NO MSB (BCD) of GW | | 0x12 | |
| 9 | A-Field | Version | | 0x0A | |
| 10 | A-Field | Device type | | 0x31 | |
| 11 | CI-Field | Short transport header | | 0x7A | Transport |
| 12 | Access No. | Access number of gateway | | 0x75 | |
| 13 | Status | Meter state (Low battery) | **Example**: Low battery | 0x04 | |
| 14 | Config Field | | | 0x00 | |
| 15 | Config Field | | | 0x00 | |
| 16 | AES-Verify | Encryption verification | | 0x2F | |
| 17 | AES-Verify | Encryption verification | | 0x2F | |

## Status packet

A status packet contains information and settings about the gateway and the packet is sent at regular intervals.

In other words, a status packet is sent:

- Every 12 hours over the MQTT interface.
- On every new connection to the MQTT server.
- Every minute over the wM-Bus interface (default in C mode, frame format A).

| Note: Information in DR1 – DR11 below are the same as for the repeater. | |
|---|---|
| DR1 | Total number of packets transmitted over MQTT since power up |
| DR2 | Used routing slots (maximum 2000) used (whitelist devices). |
| DR3 | Software version of gateway |
| DR4 | Is the bridge listening now? (1=Yes, 0=NO) |
| DR5 | Seconds to mode change (Listen→Sleep or Sleep→Listen). Maximum 32767 seconds |
| DR6 | Value on parameter "*Listen timer*" |
| DR7 | Value on parameter "*Pause timer*" (0=The gateway will always listen) |
| DR8 | Shows which weekday(s) the gateway is listening. See **Table 1** for more information |
| DR9 | Value on parameter "*Start time*", shown as minutes after midnight (-1=Not used) |
| DR10 | Current time |
| DR11 | Current battery level. Battery level is always 3600 for battery version and 5000 for mains version |
| DR12 | IMEI number |
| DR13 | ICCID number of SIM-card number |
| DR14 | RSSI in the LTE M1 network (connection between the gateway and the base station) |
| DR15 | Hardware model |
| DR16 | Hardware version |
| DR17 | On time (days) since powerup |
| DR18 | Number of seconds for which the modem has been active |
| DR19 | Number of seconds for which the wM-Bus radio has been in listen mode |
| DR20 | Shows which weekday(s) the gateway will upload data. See **Table 1** for more information<br>**Note:** Has no function if parameter *MQTT Always Online* is enabled. |
| DR21 | The time for which the modem will upload stored data, shown as minutes after midnight (-1=Not used)<br>**Note:** Has no function if parameter *MQTT Always Online* is enabled. |
| DR22 | The interval for which the modem will upload data. Maximum 1440 minutes (24 hours).<br>Can be combined with days to upload data (see DR20). |
| DR23 | Number of NTP server connection retries since last successful NTP connection. |

| Byte No. | Field Name | Content | Info | Byte data (example) | Layer |
|---|---|---|---|---|---|
| 1 | Start | Start-byte | | 0x68 | Data Link |
| 2 | L-Field | Telegram length | If packet is longer than 255 then both L-fields should be added, otherwise the L-fields are the same. | 0x45 | |
| 3 | L-field | Telegram length | | 0x45 | |
| 4 | Start | Start-byte | | 0x68 | |
| 5 | C-Field | SND_NR | | 0x44 | |
| 6 | A-Field | Primary addressing | 0xFD = Use secondary addressing | 0xFD | |
| 7 | CI-Field | Long header (0x72) | | 0x72 | Transport |
| 8 | ID-Field | Identification number (LSB) | **Example:** 33221100 | 0x00 | |
| 9 | ID-Field | Identification number | | 0x11 | |
| 10 | ID-Field | Identification number | | 0x22 | |
| 11 | ID-Field | Identification number (MSB) | | 0x33 | |
| 12 | Manufacturer | Manufacturer code (LSB) | LAS | 0x33 | |
| 13 | Manufacturer | Manufacturer code (MSB) | | 0x30 | |
| 14 | Version | Version | | 0x07 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15 | Type | Device type | | 0x1B | | |
| 16 | Acc. | Access number | | 0x01 | | |
| 17 | Status | Errors and alerts | **Example**: Low battery | 0x04 | | |
| 18 | Config. | Configuration field | **Example:** Encryption off | 0x00 | | |
| 19 | Config. | Configuration field | | 0x00 | | |
| 20 | ID-Field | DIF | 8-digit BCD | 0x0C | | Application |
| 21 | ID-Field | VIF | Fabrication number | 0x78 | | |
| 22 | ID-Field | Gateway serial number (LSB) | **Example:** 00000008 | 0x08 | | |
| 23 | ID-Field | Gateway serial number | | 0x00 | | |
| 24 | ID-Field | Gateway serial number | | 0x00 | | |
| 25 | ID-Field | Gateway serial number (MSB) | | 0x00 | | |
| 26 | DR1 | DIF | 32-bit integer | 0x04 | Number of total packets transmitted over MQTT since power up | |
| 27 | DR1 | VIF | Extension table | 0xFD | | |
| 28 | DR1 | VIFE | Dimensionless | 0x3A | | |
| 29 | DR1 | Value (LSB) | **Example:** 65793 (0x010101) | 0x01 | | |
| 31 | DR1 | Value | | 0x01 | | |
| 32 | DR1 | Value | | 0x01 | | |
| 33 | DR1 | Value (MSB) | | 0x00 | | |
| 34 | DR2 | DIF | 16-bit integer + Extension | 0x82 | Used routing slots | |
| 35 | DR2 | DIFE | Subunit 1 | 0x40 | | |
| 36 | DR2 | VIF | Extension table | 0xFD | | |
| 37 | DR2 | VIFE | Dimensionless | 0x3A | | |
| 38 | DR2 | Value (LSB) | **Example:** 521 (0x0209) | 0x09 | | |
| 39 | DR2 | Value (MSB) | | 0x02 | | |
| 40 | DR3 | DIF | 16-bit integer | 0x02 | Software version of gateway | |
| 41 | DR3 | VIF | Extension table | 0xFD | | |
| 42 | DR3 | VIFE | Version | 0x0F | | |
| 43 | DR3 | Value (LSB) | **Example:** 120 (0x0078) | 0x78 | | |
| 44 | DR3 | Value (MSB) | | 0x00 | | |
| 45 | DR4 | DIF | 8-bit integer + Extension | 0x81 | Is the bridge listening now? (1=Yes, 0=NO) | |
| 46 | DR4 | DIFE | Subunit 2 | 0x80 | | |
| 47 | DR4 | DIFE | Subunit 2 | 0x40 | | |
| 48 | DR4 | VIF | Extension table | 0xFD | | |
| 49 | DR4 | VIFE | Dimensionless | 0x3A | | |
| 50 | DR4 | Value | **Example:** Yes (0x01) | 0x01 | | |
| 51 | DR5 | DIF | 32-bit integer + Extension | 0x84 | Seconds to mode change | |
| 52 | DR5 | DIFE | Subunit 3 | 0xC0 | | |
| 53 | DR5 | DIFE | Subunit 3 | 0x40 | | |
| 54 | DR5 | VIF | Extension table | 0xFD | | |
| 55 | DR5 | VIFE | Dimensionless | 0x3A | | |
| 56 | DR5 | Value (LSB) | **Example:** 5803 (0x000016AB) | 0xAB | | |
| 57 | DR5 | Value | | 0x16 | | |
| 58 | DR5 | Value | | 0x00 | | |
| 59 | DR5 | Value (MSB) | | 0x00 | | |
| 60 | DR6 | DIF | 16-bit integer + Storage 1 | 0x42 | Value on parameter "*Listen timer*" | |
| 61 | DR6 | VIF | Extension table | 0xFD | | |
| 62 | DR6 | VIFE | Dimensionless | 0x3A | | |
| 63 | DR6 | Value (LSB) | **Example:** 20 (0x0014) | 0x14 | | |
| 64 | DR6 | Value (MSB) | | 0x00 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 65 | DR7 | DIF | 16-bit integer + Extension | 0x82 | Value on parameter "*Pause timer*" | Application |
| 66 | DR7 | DIFE | Storage 2 | 0x01 | | |
| 67 | DR7 | VIF | Extension table | 0xFD | | |
| 68 | DR7 | VIFE | Dimensionless | 0x3A | | |
| 69 | DR7 | Value (LSB) | **Example:** 1420 (0x058C) | 0x8C | | |
| 70 | DR7 | Value (MSB) | | 0x05 | | |
| 71 | DR8 | DIF | 8-bit integer + Storage + Extension | 0xC1 | Which weekdays the gateway is listening | |
| 72 | DR8 | DIFE | Storage 3 | 0x01 | | |
| 73 | DR8 | VIF | Extension table | 0xFD | | |
| 74 | DR8 | VIFE | Dimensionless | 0x3A | | |
| 75 | DR8 | Value | **Example:** Mondays<br><br>**Note:** See **Table 1** for more info. | 0x02 | | |
| 76 | DR9 | DIF | 16-bit integer + Extension | 0x82 | Value on parameter "*Start time*", shown as minutes after midnight | |
| 77 | DR9 | DIFE | Storage 4 | 0x02 | | |
| 78 | DR9 | VIF | Extension table | 0xFD | | |
| 79 | DR9 | VIFE | Dimensionless | 0x3A | | |
| 80 | DR9 | Value (LSB) | **Example:** 10:01 (0x0259) | 0x59 | | |
| 81 | DR9 | Value (MSB) | | 0x02 | | |
| 82 | DR10 | DIF | 48-bit integer | 0x06 | Current time | |
| 83 | DR10 | VIF | Time Type I format | 0x6D | | |
| 84 | DR10 | Current Time | **Example**: 2001-0101 00:01:02 | 0x02 | | |
| 85 | DR10 | Current Time | | 0x01 | | |
| 86 | DR10 | Current Time | | 0xC0 | | |
| 87 | DR10 | Current Time | | 0x01 | | |
| 88 | DR10 | Current Time | | 0x01 | | |
| 89 | DR10 | Current Time | | 0x00 | | |
| 90 | DR11 | DIF | 16-bit integer | 0x02 | Current battery level | |
| 91 | DR11 | DIFE | Extension table | 0xFD | | |
| 92 | DR11 | VIF | Voltage (mV) | 0x46 | | |
| 93 | DR11 | Value (LSB) | **Example:** 3600 (0x0E10) | 0x10 | | |
| 94 | DR11 | Value (MSB) | | 0x0E | | |
| 95 | DR12 | DIF | Variable Length | 0xCD | IMEI number | |
| 96 | DR12 | DIFE | Storage 5 | 0x02 | | |
| 97 | DR12 | VIFE | Extension table | 0xFD | | |
| 98 | DR12 | VIF | Dimensionless | 0x3A | | |
| 99 | DR12 | LVAR | EMEI string length (15 bytes) | 0x0F | | |
| 100 | DR12 | EMEI Ascii string (LSB) | **Example:** 012345678901234 | 0x34 | | |
| 101 | DR12 | EMEI Ascii string | | 0x33 | | |
| 102 | DR12 | EMEI Ascii string | | 0x32 | | |
| 103 | DR12 | EMEI Ascii string | | 0x31 | | |
| 104 | DR12 | EMEI Ascii string | | 0x30 | | |
| 105 | DR12 | EMEI Ascii string | | 0x39 | | |
| 106 | DR12 | EMEI Ascii string | | 0x38 | | |
| 107 | DR12 | EMEI Ascii string | | 0x37 | | |
| 108 | DR12 | EMEI Ascii string | | 0x36 | | |
| 109 | DR12 | EMEI Ascii string | | 0x35 | | |
| 110 | DR12 | EMEI Ascii string | | 0x34 | | |
| 111 | DR12 | EMEI Ascii string | | 0x33 | | |
| 112 | DR12 | EMEI Ascii string | | 0x32 | | |
| 113 | DR12 | EMEI Ascii string | | 0x31 | | |
| 114 | DR12 | EMEI Ascii string (MSB) | | 0x30 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 115 | DR13 | DIF | Variable Length | 0x8D | ICCID number of SIM-card number | Application |
| 116 | DR13 | DIFE | Storage 6 | 0x03 | | |
| 117 | DR13 | VIF | Extension table | 0xFD | | |
| 118 | DR13 | VIFE | Dimensionless | 0x3A | | |
| 119 | DR13 | LVAR | ICCID string length (19-20 bytes) | 0x14 | | |
| 120 | DR13 | ICCID Ascii string (LSB) | **Example:** 01234567890123456789 | 0x39 | | |
| 121 | DR13 | ICCID Ascii string | | 0x38 | | |
| 122 | DR13 | ICCID Ascii string | | 0x37 | | |
| 123 | DR13 | ICCID Ascii string | | 0x36 | | |
| 124 | DR13 | ICCID Ascii string | | 0x35 | | |
| 125 | DR13 | ICCID Ascii string | | 0x34 | | |
| 126 | DR13 | ICCID Ascii string | | 0x33 | | |
| 127 | DR13 | ICCID Ascii string | | 0x32 | | |
| 128 | DR13 | ICCID Ascii string | | 0x31 | | |
| 129 | DR13 | ICCID Ascii string | | 0x30 | | |
| 130 | DR13 | ICCID Ascii string | | 0x39 | | |
| 131 | DR13 | ICCID Ascii string | | 0x38 | | |
| 132 | DR13 | ICCID Ascii string | | 0x37 | | |
| 133 | DR13 | ICCID Ascii string | | 0x36 | | |
| 134 | DR13 | ICCID Ascii string | | 0x35 | | |
| 135 | DR13 | ICCID Ascii string | | 0x34 | | |
| 136 | DR13 | ICCID Ascii string | | 0x33 | | |
| 137 | DR13 | ICCID Ascii string | | 0x32 | | |
| 138 | DR13 | ICCID Ascii string | | 0x31 | | |
| 139 | DR13 | ICCID Ascii string (MSB) | | 0x30 | | |
| 140 | DR14 | DIF | 8-bit integer | 0x01 | RSSI in the LTE M1 network | |
| 141 | DR14 | VIF | Extension table | 0xFD | | |
| 142 | DR14 | VIFE | RSSI | 0x71 | | |
| 143 | DR14 | Value | **Example:** -71<br><br>**Note:** Calculate this value as two's (2's) complement | 0xB9 | | |
| 144 | DR15 | DIF | 8-bit integer | 0x01 | Hardware model | |
| 145 | DR15 | VIF | Extension table | 0xFD | | |
| 146 | DR15 | VIFE | Model version | 0x0C | | |
| 147 | DR15 | Value | **Example:** 0x01 | 0x01 | | |
| 148 | DR16 | DIF | 8-bit integer | 0x01 | Hardware version | |
| 149 | DR16 | VIF | Extension table | 0xFD | | |
| 150 | DR16 | VIFE | Hardware version | 0x0D | | |
| 151 | DR16 | Value | **Example:** 0x01 | 0x01 | | |
| 152 | DR17 | DIF | 16-bit integer | 0x02 | On time (days) since powerup | |
| 153 | DR17 | VIF | On time days | 0x23 | | |
| 154 | DR17 | Value (LSB) | **Example:** 2051 | 0x03 | | |
| 155 | DR17 | Value (MSB) | | 0x08 | | |
| 156 | DR18 | DIF | 32-bit integer | 0x04 | Number of seconds for which the modem has been active | |
| 157 | DR18 | VIF | Operating time seconds | 0x24 | | |
| 158 | DR18 | Value (LSB) | **Example:** 9173511 seconds (0x008BFA07) | 0x07 | | |
| 159 | DR18 | Value | | 0xFA | | |
| 160 | DR18 | Value | | 0x8B | | |
| 161 | DR18 | Value (MSB) | | 0x00 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 162 | DR19 | DIF | 32-bit integer + Extension | 0x84 | Number of seconds for which the wM-Bus radio has been in listen mode | Application |
| 163 | DR19 | DIFE | Subunit 1 | 0x40 | | |
| 164 | DR19 | VIF | Operating time seconds | 0x24 | | |
| 165 | DR19 | Value (LSB) | **Example:** 9173511 seconds (0x008BFA07) | 0x07 | | |
| 166 | DR19 | Value | | 0xFA | | |
| 167 | DR19 | Value | | 0x8B | | |
| 168 | DR19 | Value (MSB) | | 0x00 | | |
| 169 | DR20 | DIF | 8-bit integer + Storage + Extension | 0xC1 | Shows which weekday(s) gateway will upload data | |
| 170 | DR20 | DIFE | Storage 7 | 0x03 | | |
| 171 | DR20 | VIF | Extension table | 0xFD | | |
| 172 | DR20 | VIFE | Dimensionless | 0x3A | | |
| 173 | DR20 | Value | **Example:** Monday + Wednesday<br><br>**Note:** Refer to **Table 1.** | 0x0A | | |
| 174 | DR21 | DIF | 16-bit integer + Extension | 0x82 | The time for which the modem will upload stored data, shown as minutes after midnight | |
| 175 | DR21 | DIFE | Storage 8 | 0x04 | | |
| 176 | DR21 | VIF | Extension table | 0xFD | | |
| 177 | DR21 | VIFE | Dimensionless | 0x3A | | |
| 178 | DR21 | Value (LSB) | **Example**: 00:30 | 0x1E | | |
| 179 | DR21 | Value (MSB) | | 0x00 | | |
| 180 | DR22 | DIF | 16-bit integer + Extension + storage | 0xC2 | The interval for which the modem will upload data | |
| 181 | DR22 | DIFE | Storage 9 | 0x04 | | |
| 182 | DR22 | VIF | Extension table | 0xFD | | |
| 183 | DR22 | VIFE | Dimensionless | 0x3A | | |
| 184 | DR22 | Value (LSB) | **Example:** 30 minutes | 0x1E | | |
| 185 | DR22 | Value (MSB) | | 0x00 | | |
| 186 | DR23 | DIF | 16-bit integer + Extension | 0x82 | Number of NTP server connection retries since last successful NTP connection | |
| 187 | DR23 | DIFE | Storage 5 | 0x05 | | |
| 188 | DR23 | VIF | Extension table | 0xFD | | |
| 189 | DR23 | VIFE | Dimensionless | 0x3A | | |
| 190 | DR23 | Value (LSB) | **Example:** 5 | 0x05 | | |
| 191 | DR23 | Value (MSB) | | 0x00 | | |

Table 1: Bit representation for days when gateway is listening

| Bit | Info |
|---|---|
| 0 (0x01) | Sunday |
| 1 (0x02) | Monday |
| 2 (0x04) | Tuesday |
| 3 (0x08) | Wednesday |
| 4 (0x10) | Thursday |
| 5 (0x20) | Friday |
| 6 (0x40) | Saturday |
| 7 (0x80) | NOT USED |

## Ready-for-conf packet

The *Ready-for-conf* packet is sent from the device every time upload of data from gateway is finished to MQTT. This indicates that the gateway is ready for configuration via MQTT.

The packet is always sent to the topic **LAS/W/I/12345678** where 12345678 is the serial number of the gateway.

| Byte No. | Field Name | Content | Info | Byte data (example) | Layer |
|---|---|---|---|---|---|
| 1 | Start | Start-byte | | 0x68 | Data Link |
| 2 | L-Field | Telegram length | If packet is longer than 255 then both L-fields should be added, otherwise the L-fields are the same. | 0x45 | |
| 3 | L-field | Telegram length | | 0x45 | |
| 4 | Start | Start-byte | | 0x68 | |
| 5 | C-Field | SND_NR | | 0x44 | |
| 6 | A-Field | Primary addressing | 0xFD = Use secondary addressing | 0xFD | |
| 7 | CI-Field | Long header (0x72) | | 0x72 | Transport |
| 8 | ID-Field | Identification number (LSB) | **Example:** 33221100 | 0x00 | |
| 9 | ID-Field | Identification number | | 0x11 | |
| 10 | ID-Field | Identification number | | 0x22 | |
| 11 | ID-Field | Identification number (MSB) | | 0x33 | |
| 12 | Manufacturer | Manufacturer code (LSB) | LAS | 0x33 | |
| 13 | Manufacturer | Manufacturer code (MSB) | | 0x30 | |
| 14 | Version | Version | | 0x07 | |
| 15 | Type | Device type | | 0x1B | |
| 16 | Acc. | Access number | | 0x01 | |
| 17 | Status | Errors and alerts | **Example**: Low battery | 0x04 | |
| 18 | Config. | Configuration field | **Example:** Encryption off | 0x00 | |
| 19 | Config. | Configuration field | | 0x00 | |

# Indications of a gateway

The device can use both visual indications (LED) and sound indications to show what is currently happening, e.g., how the startup sequence is going or if there are any errors after startup.

## Visual and sound indications during startup sequence of a gateway

Start by powering on the device. The following will occur during startup:

1 Buzzer beeps 10 times fast and the green LED flashes, both with the same speed.
When the beeping stops, the green LED turns off.

2 The blue LED turns on and is only on for about 60-90 seconds. During this time, the internal flash memory is cleared.

3 When the internal flash memory is cleared, the device beeps one time, the blue LED turns off and the green LED turns on. This indicates that the startup sequence is completed.

4 The device starts listening for incoming wM-Bus data. For each packet received, the blue LED flashes. During the first 3-4 minutes after the startup sequence is complete, the device accepts configuration data, for example, by using a Lansen configuration dongle (LAN-WMBUS-D1/D2-TC).

5 The modem tries to connect to the MQTT server using the settings in the device.
**Note:** It is important that all settings are entered correctly in step 4 for the device to be successful in this step.

## Visual indications in active mode (startup sequence completed)

After the startup sequence, see previous chapter, a gateway use LEDs to indicate different things, see tables below. There are LEDs both on the larger bottom card (carrier PCB) and the smaller top card (modem card PCB).

| LED color | Location | Behavior | Meaning |
|---|---|---|---|
| Green | Carrier PCB | Steady on | The device has power. |
| Blue | Carrier PCB | Quick flash | A packet was received by the wM-Bus radio. |
| Red | Carrier PCB | Steady on | The device has an active connection to the MQTT server. |
| | | | |
| Red | Modem card PCB | Flash every 3 seconds | The device is sending data. |
| Red | Modem card PCB | Flash every 800 ms (0.8 seconds) | Not registered to a network. |
| Red | Modem card PCB | Flash every 300 ms (0.3 seconds) | Registered to a network. |

**Note:** For battery version the LED indication will be turned off after 15 minutes to save power. Only a red LED flash every minute will indicate the device is operating. The indication will be active again for 15 minutes if waking the device using a magnet.

## Connection sequence to MQTT for uploading data (Battery Gateway)

This chapter describes the connection sequence for a battery-operated gateway.

**Note:** The setting '*Always connected to MQTT*' must not be set on a battery-operated gateway!

1 The modem is started and immediately searches for an LTE M1 network.

2 When an LTE-M1 network is found, the APN server is retrieved from the network and stored in a temporary memory.

3 The modem then connects to the NTP server as specified by the customer.
The default NTP server is pool.ntp.org unless it has been changed.

4 The modem then tries to connect to the MQTT server.

5 If the connection is successful, then the RED LED on the carrier card (bottom PCB) is turned on and the gateway starts uploading all stored meter data in its internal flash memory to the MQTT server.

6 When the upload is complete, the gateway register itself to receive configuration data from the MQTT server using address LAN/W/C/01234567, where 01234567 is the ID number of the gateway.

7 Once ready to receive configuration data, the gateway will listen to incoming MQTT configuration data by default for 30 seconds.
It is possible to extend this time by sending a command to the gateway. Refer to section **Connecting and working with Lansen Configurator (battery gateway)** to change configuration time.

8 Once the configuration time is up, the gateway turns off the modem completely and waits until it is time to upload data again.

## Connection sequence to MQTT for uploading data (Mains Gateway)

This chapter describes the connection sequence for a mains-operated gateway. In this example, the setting '*Always connected to MQTT*' is set to be active.

1 The modem is started and immediately searches for an LTE M1 network.

2 When an LTE-M1 network is found, the APN server is retrieved from the network and stored in a temporary memory. **Note**: For GPRS, the APN must be entered manually as a setting to the gateway.

3 The modem then connects to the NTP server as specified by the customer.
The default NTP server is pool.ntp.org unless it has been changed.

4 The modem then tries to connect to the MQTT server.

5 If the connection is successful, then the RED LED on the carrier card (bottom PCB) is turned on and the gateway starts uploading all stored meter data in its internal flash memory to the MQTT server.

6 When the upload is complete, the gateway registers itself to receive configuration data from the MQTT server using address LAN/W/C/01234567, where 01234567 is the ID number of the gateway.

7 Since the setting '*Always connected to MQTT*' is active, the gateway will keep the connection to the MQTT server active and transmit data immediately when it's picked up on the wM-Bus radio interface. The configuration interface will also be active all the time so that configuration can be made using the MQTT interface.

## Notes regarding SIM-card and PIN

The device supports either an eSIM or a full-size SIM-card. If eSIM is required then the SIM must be mounted during production, thus must be ordered in advance.

The SIM card must not have any PIN code, therefore the PIN must be inactivated.

For improved security, the SIM-card should be locked to the specific modem using the network provider webservice or similar.

There is usually also an option to lock the SIM-card to the first device it is powered up in.

## Notes regarding gateway antennas

Different variants of the device come with different setups of the antennas, where it uses either internal or external antennas on either the wM-Bus or MQTT interface. Typical device name is as below where X1 and X2 is present if the external antenna interface is used. If not present, then the internal antenna is used instead.

| LAN | - WMBUS | - B4 | - BE/M | - LR | - A1/A2 | - (X1) | - CATM1 | - (X2) |
|---|---|---|---|---|---|---|---|---|
| Manufacturer | Input | Device | BE: Battery<br>M: Mains | LR: Long Range | A1: IP40<br>A2: IP65 | Optional<br>External antenna for input (WMBUS) | Output | Optional<br>External antenna for output (CATM1) |

Additional information regarding antennas on the gateway:

- The gateway uses one broadband antenna to cover all LTE-M1 bands, either with internal or external antenna.
- If the internal input (wM-Bus) is used, then two internal antennas are used for maximum range in all directions. The wM-Bus radio listens using one antenna at a time and change antenna every 25-35 seconds.

## Power consumption

The device has four main power consumption modes with typical consumption as seen in the table below.

| Mode | Current consumption |
|---|---|
| Sleeping, only the time clock is running. | 20uA |
| Radio for wM-Bus active and receiving data. | 12 mA |
| Modem is active and transmitting data. | 150 mA |
| Modem is on idle, waiting for configuration data. | 24 mA |
| Battery leakage | 760 mAh |

**Note:** The status packet contains some information about how much time a device has spent in different modes. Note that all timers reset to 0 on power cycle.

1) Total on time since powerup.
2) Total active time for the radio (wM-BUS).
3) Total time the modem has been on.

# Battery lifetime (Battery Gateway)

Since the battery driven gateway has a large super capacitor to assist the battery, it is hard to measure the true battery voltage to determine the service life left on the device. One method to determine the lifetime to get an early warning is by using calculations based on how long the device has spent in the different modes as defined in chapter **Power consumption**.

**Note:** The total battery capacity of the battery is 38000 mAh.

**EXAMPLE**

The device has been running for 1 year and we want to know the remaining lifetime with the same usage as the first year. The settings and the total time in different modes of the device has been as follows:

Setting:

- Modem uploads data every day.
- Radio (wM-Bus) active 15 minutes/day.
- Total on time since powerup 365 days.
- Radio (wM-Bus) active 328500 seconds (15 minutes per day for 365 days).
- Modem active 21900 seconds (one minute per day for 365 days).

To get the power consumption for each mode, the equation below is used.

$$powerConsumption = timeInSeconds \cdot currentConsumption$$

Sleeping mode power consumption:

Total on time since powerup is 365 days. Convert this to seconds as below.

$$timeInSeconds = 365\ days \cdot 24\ h/day \cdot 60\ min/h \cdot 60\ min/s = 31\ 536\ 000 s$$

The current consumption, according to chapter **Power consumption**, when the device is sleeping is 20 uA. Inserting the time calculated above with the power consumption in the first equation gives:

$$totalPowerConsumption = 31\ 536\ 000\ s \cdot 20\ \mu A = 630\ 720\ 000\ \mu As = 630720\ mAs$$

Convert this value to mAh by dividing the result by 3600.

$$consumptionSleeping = \frac{630720\ mAs}{3600} = 175.2\ mAh$$

Radio (wM-Bus) active power consumption:

Total time is already in seconds so we can calculate the total power consumption immediately since the power consumption when a radio is active is 12 mA, according to chapter **Power consumption.**

$$totalPowerConsumption = 328500\ s \cdot 12\ mA = 3942000\ mAs$$

Convert this value to mAh by dividing the result by 3600.

$$consumptionRadio = \frac{3942000\ mAs}{3600} = 1095\ mAh$$

Modem active power consumption

Total time is already in seconds so we can calculate the total power consumption immediately since the power consumption when a radio is active is 160 mA, according to chapter **Power consumption.**

$$totalPowerConsumption = 21900\ \text{s} \cdot 160\ mA = \ 3\ 504\ 000\ mAs$$

Convert this value to mAh by dividing the result by 3600.

$$consumptionModem = \frac{3\ 504\ 000\ mAs}{3600} = 973.3\ mAh$$

Battery leakage:

The battery leakage is 760 mAh, according to chapter **Power consumption.**

Total consumption year 1:

$$totalPowerConsumption$$
$$= consumptionSleeping + consumptionRadio + consumptionModem + batteryLeakage$$
$$= 175\ +\ 1095\ +\ 973\ +\ 760\ =\ 3\ 003\ \text{mAh}$$

Therefore, the device has used 3003 mAh in one year. This means that the current available capacity left is:

$$availableCapacity = 38000\ mAh - 3003\ mAh = 34997\ mAh$$

To get expected lifetime left, we take the above calculation and divide by the *totalPowerConsumption* after a year.

$$expectedLifetime = availableCapacity/totalPowerConsumption = 34997\ mAh/3003mAh = 11.65\ years$$

# Using program Lansen Configurator for configuration of the gateway

The Lansen Configurator can be used to configure the gateway via the 868 MHz wM-Bus interface using a Lansen configuration dongle (LAN-WMBUS-D1/D2-TC) or directly via the MQTT server.

**Note**: To configure the device via the MQTT server, the device must first be connected to the MQTT server which requires all MQTT settings to be set correctly.

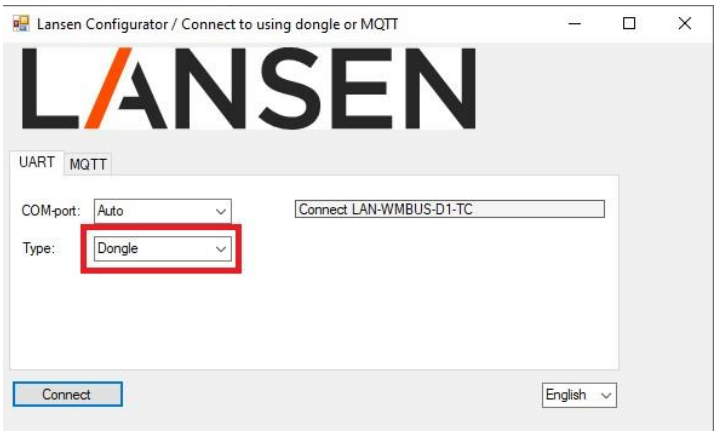
## Connect to the gateway over wM-Bus interface using a Lansen USB-dongle

To connect to the gateway using a Lansen configuration dongle (LAN-WMBUS-D1/D2-TC), perform the steps below.

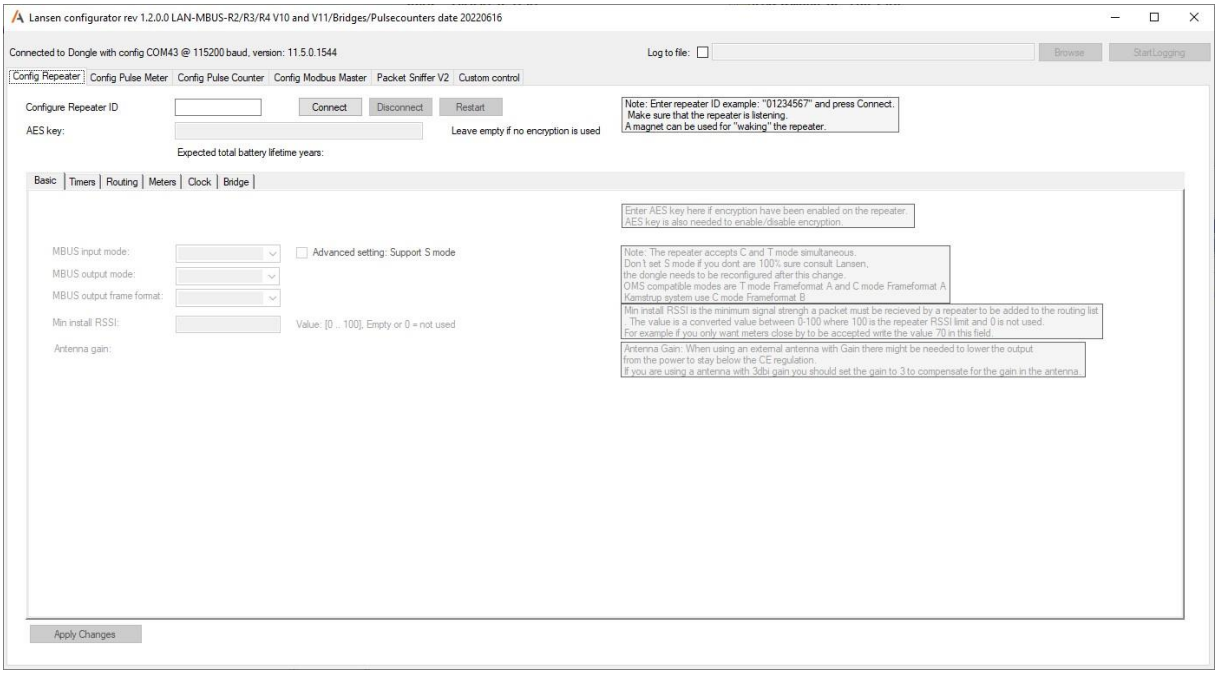
Select the Type 'Dongle' and click Connect.

If the program fails to connect to the dongle, try to select the com-port manually by changing the field from 'Auto' to the com-port of the dongle.

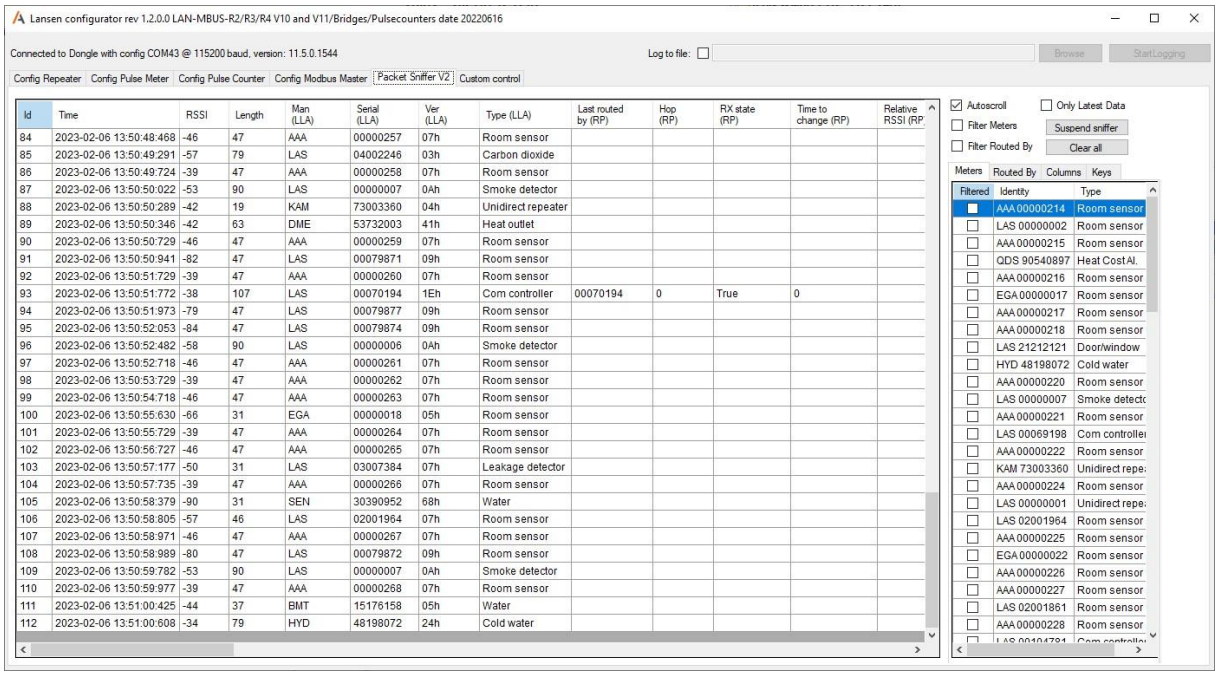
If the program still fails, it might be that the computer has failed to download the correct driver. In this case, visit our webpage (https://www.lansensystems.com/download/) and download the corresponding driver for the dongle you have.




The below window is shown once the connection to the dongle is successful.

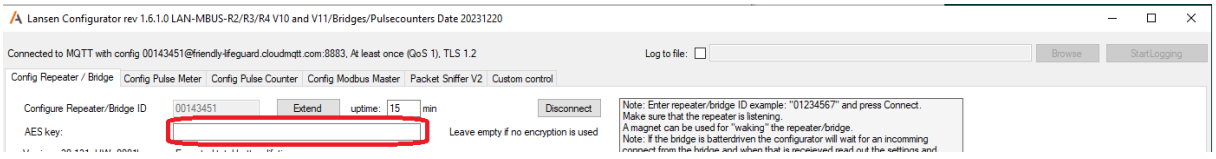


In the sniffer tab, Packet Sniffer V2, you can see all the devices in the area as picked up by the dongle.




- To configure a gateway, go to the tab called “Config Repeater” and enter the eight serial numbers, visible on the label on the gateway, either on the poke protection or on the front of the device.
- Click ‘Connect’. The program will start connecting to the gateway and read out all its data. The process takes 20-60 seconds.
- If the program is unable to connect, make sure that the gateway is not sleeping and that the gateway and dongle are at least 1 meter apart, so the radio signal isn’t too strong. If the gateway is sleeping, then you can wake the gateway using a magnet. Then click ‘Connect’ again.


If encryption is enabled on the gateway, then a valid AES-key must be entered in the field marked below to change settings. Note that it’s always possible to read out all settings without the AES-key except for MQTT settings that will only show the first letter of each setting.

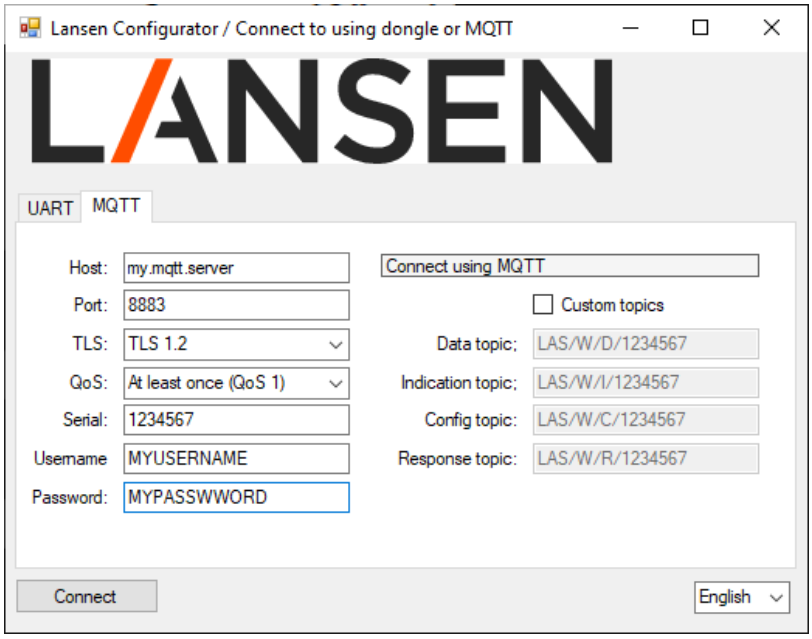


## Connect to the gateway over MQTT interface using Lansen Configurator

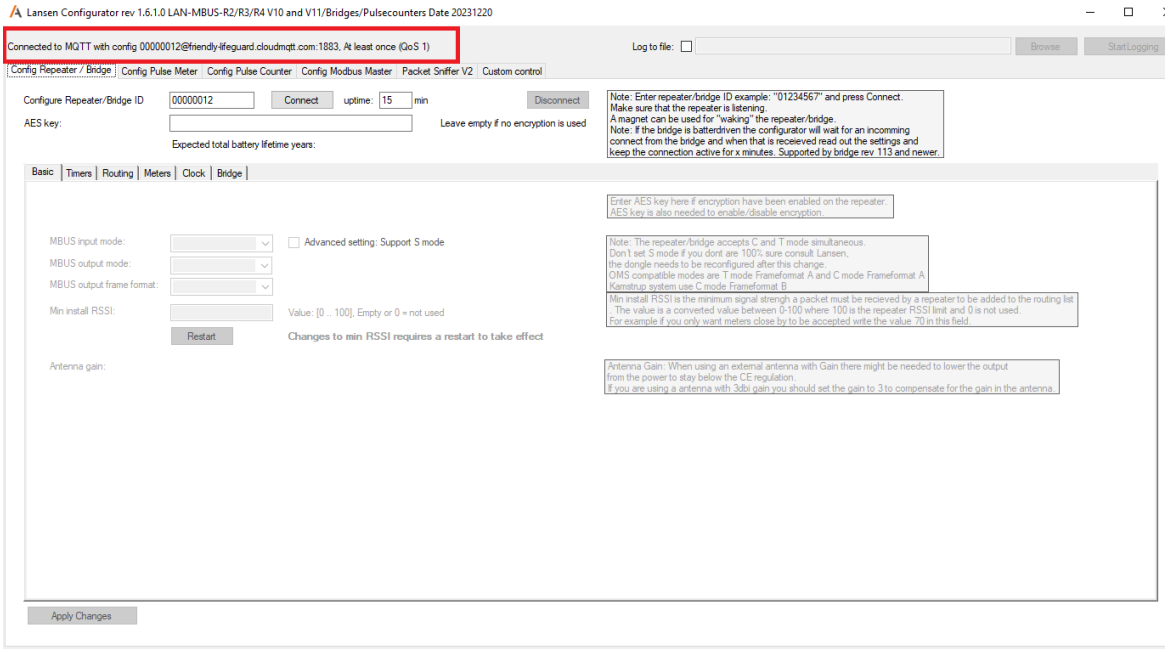
Start the Lansen Configurator and select the tab MQTT, as seen below, and enter the settings to the MQTT server to connect via the MQTT server. Example settings can be seen in the picture below.

**Host**: MQTT server address, for example, my.mqtt.server.
**Port**: Port number to MQTT server. Typical 8883 for non-encrypted connection.
**TLS**: Enter if TLS should be used in the connection between Lansen Configurator and the MQTT server.
**QoS**: Typically set to 'At least once (QoS 1)', depending on your MQTT server the value might need to be changed.
**Serial**: The serial number of the gateway, for example, 01234567.
**Username**: The username to connect to the MQTT server.
**Password**: The password to connect to the MQTT server.

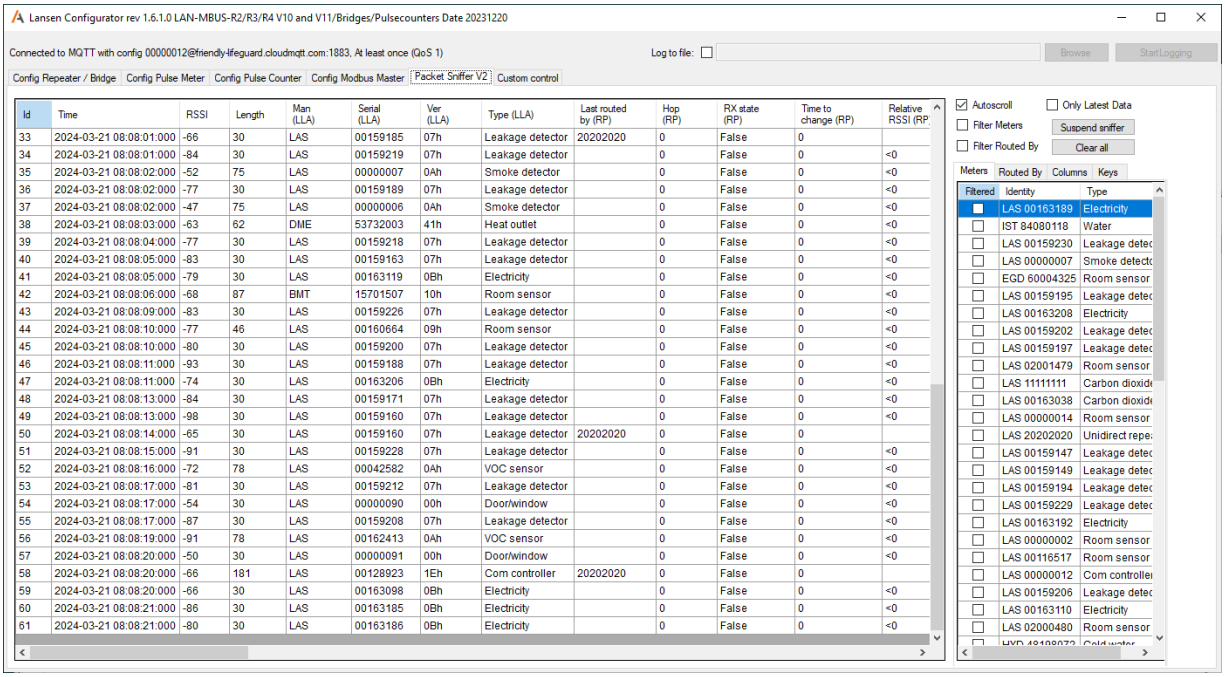
When everything is filled in, click 'Connect'.



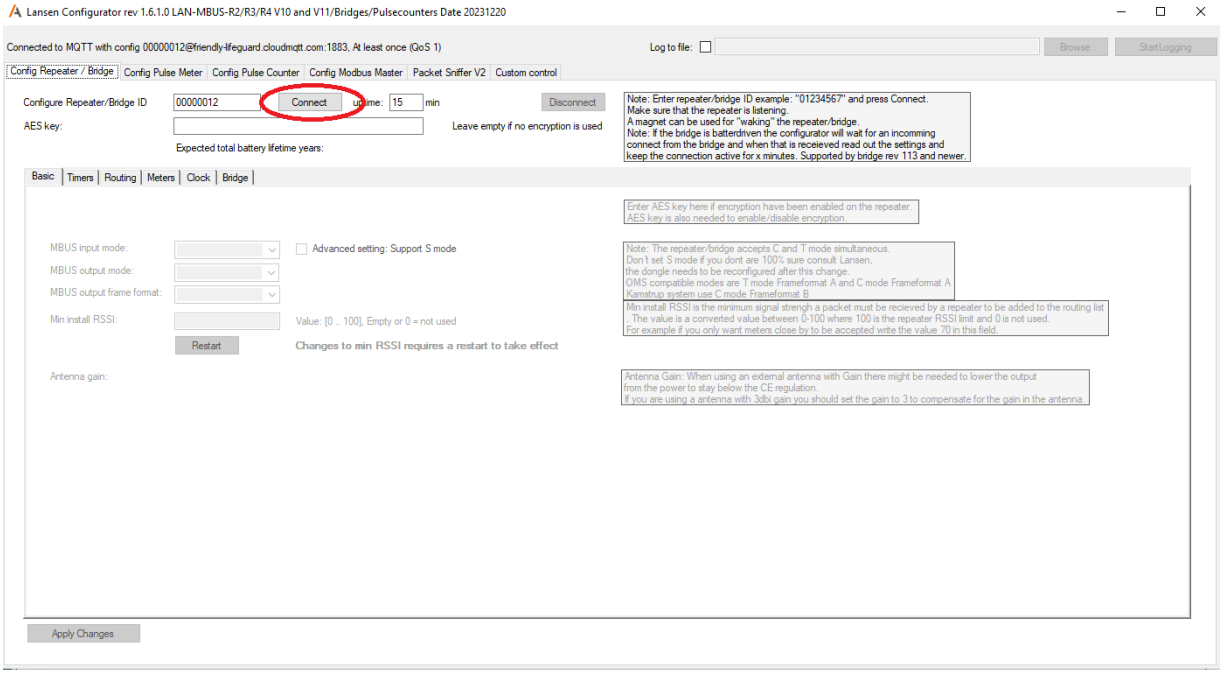

If everything works, then you are now connected to the MQTT server. In the example below, connection has been made to a gateway with serial number 0000012 to the MQTT server friendly-lifeguard.cloudmqtt.com.



In the sniffer tab, Packet Sniffer V2, one will see all data that are transmitted by the gateway over the MQTT interface.



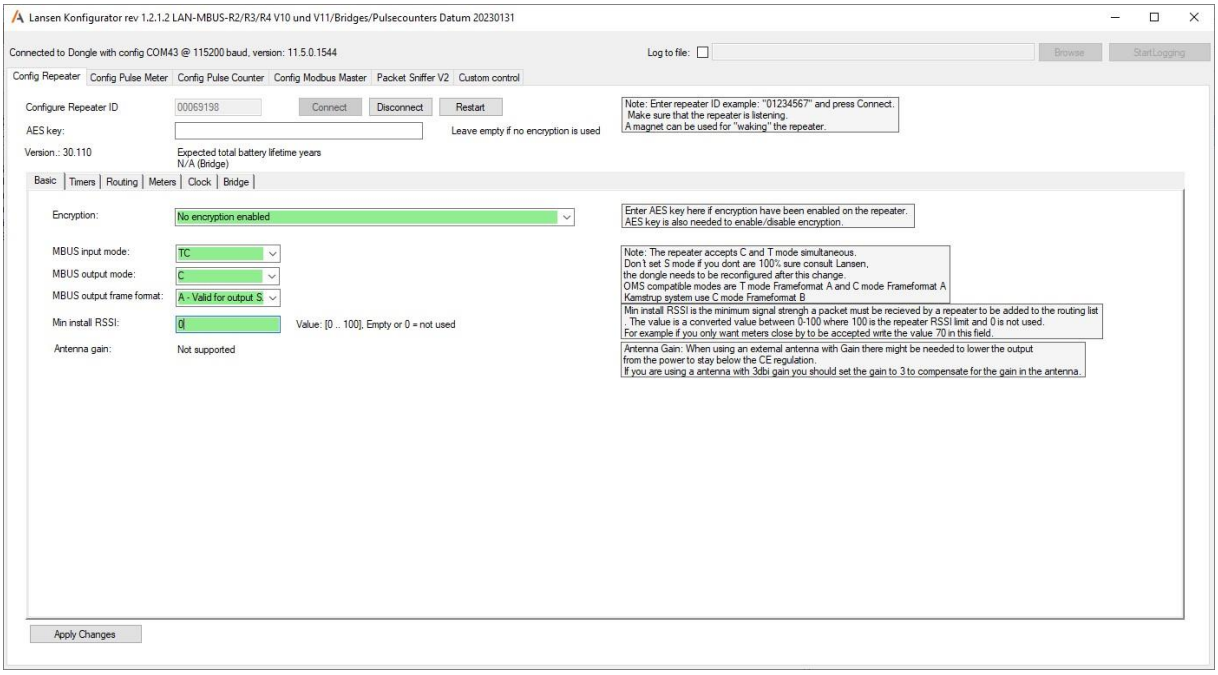

To change settings to the gateway one must first connect to the gateway. This is done by clicking ‘Connect’ and then all settings will be retrieved from the gateway and displayed in the program.



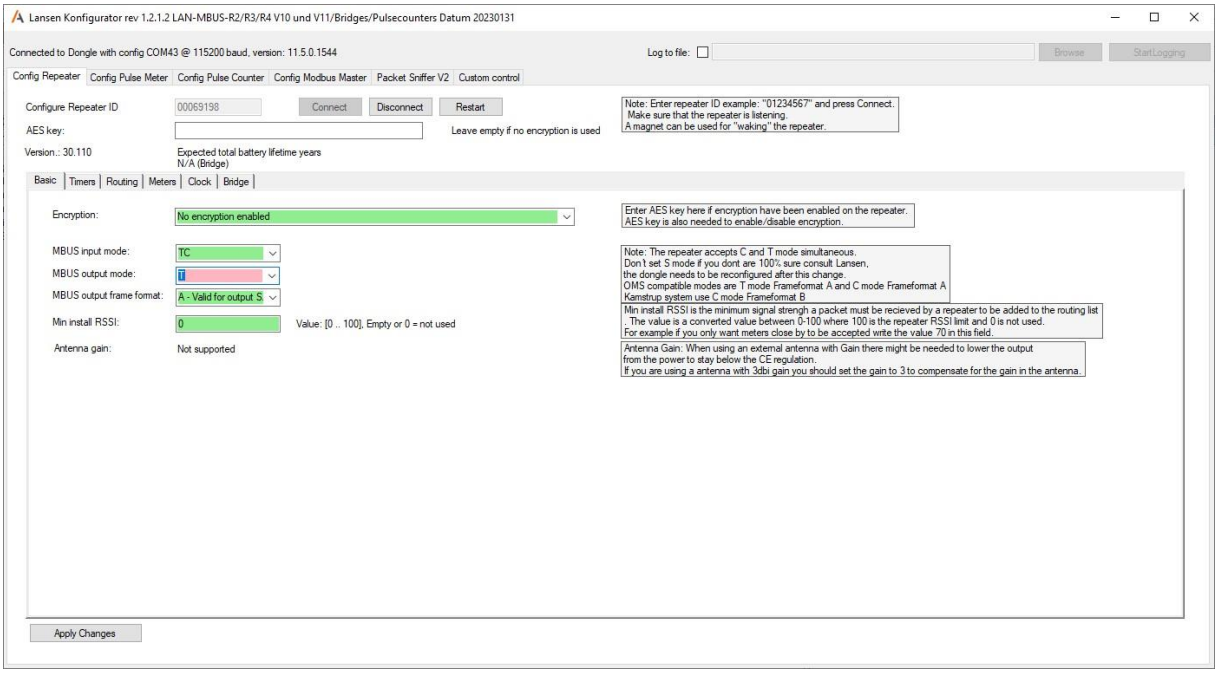
## Configuration settings for a gateway

This chapter is the same regardless if the connection has been made using the wM-Bus interface (see chapter **Connect to the gateway over wM-Bus interface using a Lansen** USB-dongle or the MQTT interface (see chapter **Connect to the gateway over MQTT interface** ).

Once connected to a gateway, the different settings can be seen in the different tabs called *Basic*, *Timers, Routing, Meters, Clock,* and *Bridge*.




When a setting is changed, it changes color from green to red. To send the setting to the bridge click *Apply Changes*. When a setting is successfully received by the gateway, it responds either with the new setting, if the setting was accepted, or the old setting, if the setting was not acceptable. The changed setting will then change back to green.



# Settings in the gateway

The following chapter will explain in detail what all the settings that are available mean. Note that all settings in the following chapter are supported by the Ethernet and LTE GW.

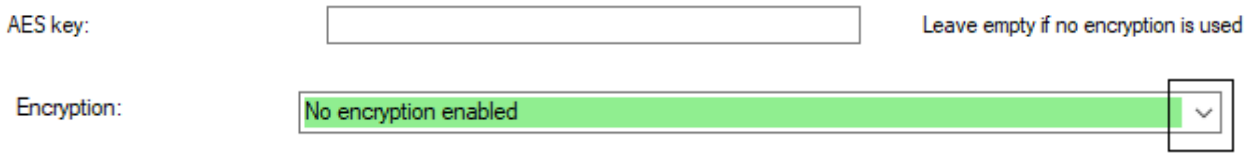
## Basic-tab

This tab contains the so called “basic” parameters of the gateway.

### AES key

Note: This option does not affect the encryption of incoming packets from sensors/meters.

This parameter is used to enable/disable the encryption options for a gateway. By default, the gateway is configured to not use encryption. This encryption is NOT used for encrypting incoming data packets from sensors/meters, it is only used for packets sent to the gateway for configuration from for example the LAN-WMBUS-D1/D2-TC configuration device.
Note: The AES key is not needed when configuring the device using an active MQTT connection.

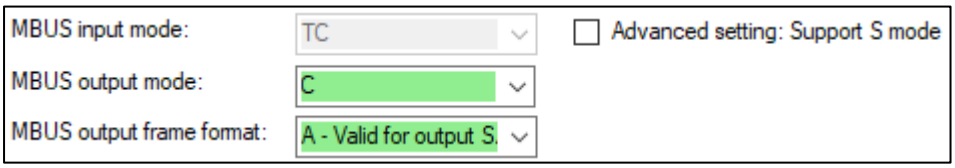



The different encryption options can be seen by clicking on the arrow marked by a box in the picture above. There are four options available, see table below. To change from one option to another, the correct AES key must be written in the field *AES key*.

| **Option** | **Meaning** |
|---|---|
| No encryption enabled | Encryption is not enabled (default).<br>When this option is enabled, the user does not need to write a key in the field *AES key* to change the other parameters for the GW. |
| Enabled for configuration | Encryption is enabled.<br>When this option is enabled, the field *AES key* must contain the correct key for the GW to apply any parameter changes. |
| Enabled: OMS time sync | This option enables the OMS time sync.<br>This option needs to be enabled if time synchronization should only be allowed if the time synchronization packet is sent encrypted. This packet is sent from the gateway using the OMS time synchronization format. |
| Enabled: OMS time sync and configuration | This option combines the two options above, i.e., *Enabled for configuration* and *Enabled: OMS time sync.* |

## MBUS mode

These settings are used to set the input and output communication format for the gateway.




By default, the gateway always accepts incoming data in C- and T-mode but the output mode can be changed to S-, C-, or T-mode with frame format A or B. Recommended use is:

- Input = TC
- Output = C
- Frame format = A

The gateway can listen for sensors in S-mode by first enabling “Advanced setting” and then setting the input mode to S-mode. Make sure all other configurations of the gateway are done before setting it to S-mode as it will not be able to configure it afterwards (if using the LAN-WMBUS-D1/D2 to configure the device).

Note: If input mode is set to S, it will not be possible to configure the gateway further until the USB-dongle has been configured to send in S-mode. Contact Lansen for more information on how to proceed with this.

Note: If input mode is set to S-mode, then the gateway will not receive with C- and T-mode.

## Min install RSSI

This parameter is used to ensure only meters with good signal strength is retransmitted by the gateway.


By using this parameter, one can control the minimum signal strength a meter must be received by the gateway to be added to the internal routing list of the gateway. This can be used in an environment where multiple gateways are deployed. By using this setting, only meters with a good connection to the gateway is handled, thus decreasing the risk for data collision in the air due to less retransmissions by fewer gateways.

Note**:** A gateway must be restarted after this parameter has changed, otherwise the internal routing list will not be changed. A restart can be performed by disconnecting and connecting the power/battery again or by clicking on *Restart* in Lansen Configurator.

## Antenna gain

This setting is used if a GW has a connected external antenna with a gain.


Having a large external antenna, especially with a gain, is advantageous since it allows a gateway to have a better reception. However, our gateways are built to send on the maximum allowed output power and using an antenna with gain causes the gateway to transmit with an output power greater than the legal limit.

To counteract this, set this setting to the specified gain on the external antenna and the gateway will lower its output power to match the gain, thus transmitting at the legal limit. This allows the gateway to use the full potential of the antenna when receiving while staying at the legal limit when transmitting.

**NOTE**: This parameter is only applicable to models which have external antenna on the w-MBus interface (ending with an -X on the label).

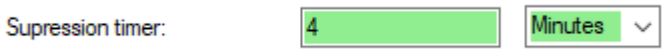
## Timers-tab

This tab contains parameters for the gateway which are timer-based, such as listen and pause timer. It is also possible to configure if the gateway should wake up on specific days, e.g., Mondays.

Note: The Ethernet gateway does not have all these settings since it is always on due to being mains powered.

### Suppression timer

This setting is used to reduce how often packets from each meter is stored by the gateway and the time can be set in either minutes or hours.




### Start time

This setting is used to control at what time and how often a gateway should start listening on selected weekdays.


Every time the gateway wakes up, it listens for data for the duration configured on the setting *Listen/pause timer* and then goes to sleep until it is time to wake up again.

To setup this properly, four options are available. From left to right in the picture above, they mean:

- **Checkbox**: Activate/deactivate this parameter
- **Time field**: Define which time (UTC) the gateway should start listening
- **Period interval**: How often the gateway should start listening
- **Active days**: The gateway will start listening for each checkbox marked

**Checkbox**
When this checkbox is marked, the parameter ***Start time*** is active. The gateway will start listening at the time, intervals, and days specified by the next options.

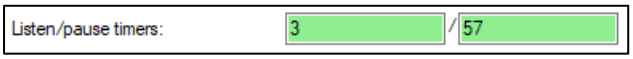
**Time field:**
The time set in this field indicates what time (UTC) each day the gateway will wake up and store packets. The time defined in this field must be equal or less than the chosen period interval. Furthermore, the gateway will be listening for the time defined in the parameter *Listen/pause timers*.

**Period interval:**
This option defines how often the gateway will start listening from the time set in the option *Time field*.

**Active days:**
This option controls which days the gateway is listening on. Simply mark the checkboxes for the days the gateway should be listening and uncheck the others.

### Listen/pause timers

This parameter sets how many minutes a gateway should listen for incoming wM-Bus packets and pause (not retransmit). The gateway alternates between these states.




The ratio between these two settings will affect the expected lifetime of the battery in the gateway and should be set according to the need for data from meters.

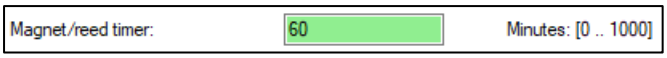
**Note:** For mains-operated gateway (LAN-WMBUS-B4-M), this parameter can be set to 1/0 (always listening).

**Note**: This parameter should be the same for all battery-operated repeaters/gateway in the same setup.

## Magnet reed timer

Note: This setting is not supported by the ethernet gateway.

This parameter sets how many minutes the gateway is in forced listening mode when a magnet has been used against it. This can be used, for example, when configuration of a gateway is needed or during installation.



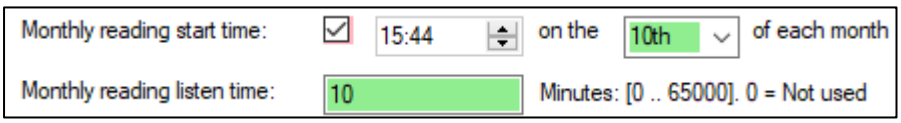

This mode is activated by using a permanent magnet to the left of the label, on the enclosure, for at least one second. This will cause the gateway to beep and wake up.

During the first minute after using a magnet, a gateway will only listen for configuration packets. This can be used if the gateway is being configured in an area with a lot of sensors. For the rest of the time defined by this parameter, the gateway will retransmit incoming packets as normal with the suppression timer. Once this timer is out, the gateway will go to sleep according to the pause time set on the parameter *Listen/pause timer*.

### *Monthly reading start time*

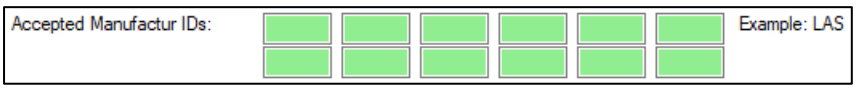
Note: This setting is not supported by the ethernet gateway.

This setting is a separate timer which is used to wake the gateway at a specific date and time once a month and is useful in systems where meter data is also needed at a specific date and time every month.




### *Accepted Manufacturer IDs*

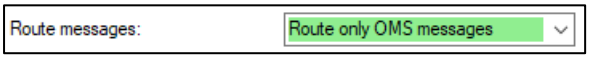
This parameter is used if the gateway should only store packets from meters with a specific manufacturer code. In other words, this is manufacturer code filtering. This is useful in areas where different companies and manufacturers are active. If all fields are empty, no filtering is done by the gateway and packets from all meters will be stored.




## Route messages

This parameter has two options:

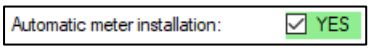
- Route only OMS messages: The gateway will only store OMS compatible packets
- Route all messages: The gateway stores both OMS and non-OMS compatible packets



## Meters-tab

The settings and options in this tab have to do with the internal routing list of a gateway. In this tab, meters can be viewed, added, and removed as explained in each chapter below.

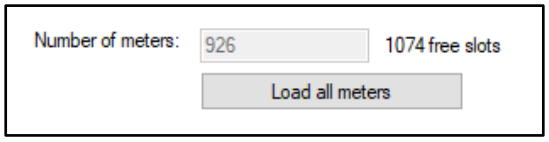
### Automatic meter installation




When this checkbox is marked, a gateway will automatically add received meters to its internal routing list of maximum 2000 unique meters. If it is not desired to add any more meters or to have full control of which meters are stored by a gateway, uncheck the checkbox.

NOTE: If this setting is disabled and no meters are stored in the internal routing list, then no meters will be stored by the gateway. In this case, meters must be added manually.

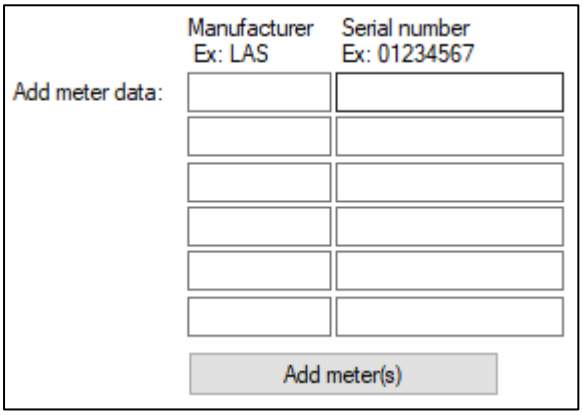
### Number of meters




The field displays how many meters there currently are in the internal routing list of the gateway. On the right-hand side of the field is the currently available number of slots shown. To view all the meters in the internal routing list, click on the button **Load all meters**. This will fill up the list on the right-hand side of the program.

### Add meter(s) manually to internal routing list

This is where a user can manually add a meter to the internal routing list of a gateway.




To add a meter to the internal routing list, fill in the manufacturer ID (left field) and the serial number (right field) and click on the button **Add meter(s)**. The meter(s) will then be added to the gateway.

**NOTE**: Adding meters manually can only be done if the parameter *Automatic meter installation* is disabled.

## Add meter(s) from file to internal routing list

Instead of adding a meter one by one, a user can instead import a csv-file with many meters.


To add a whole file, click on “Browse” and select the csv-file with the meters to be added to the gateway. Once a file has been selected, click “Import csv-file” to start uploading the meters in the file.

Note: The csv-file **MUST** on the first row start with the text **ManufacturerCode;IdentificationNumber** otherwise the file will not be uploaded to the gateway.

Note: Adding meters manually can only be done if the parameter *Automatic meter installation* is disabled.

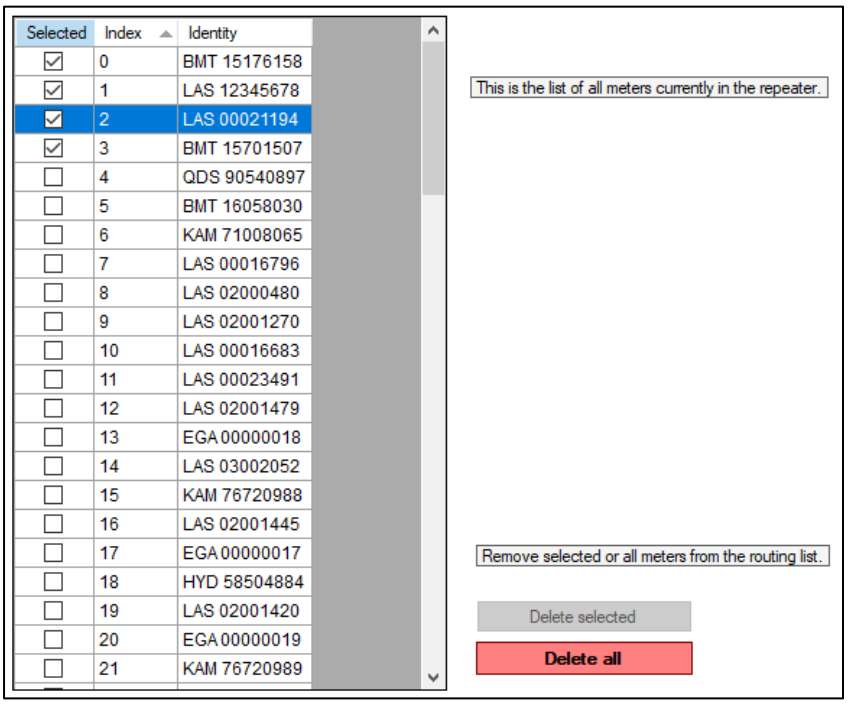
## Delete meter(s)

This is done if one, or several, meters should not be retransmitted by a gateway. To see this list, first click on ‘Load all meters’ to the left of the view below.

To remove all meters, click on the button **Delete all**. This is only possible if *Automatic meter installation* is enabled.

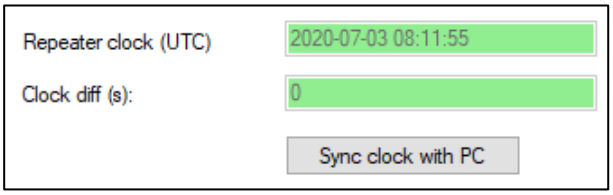
Use the button **Delete selected** if only selected meters should be deleted. Simply mark the meters in the list which are unwanted and click on the button **Delete selected** – the gateway will then remove the selected meters from its internal routing list.

Note: The button **Delete selected** is only enabled when the parameter *Automatic meter installation* is disabled.



## Clock-tab

This tab shows information about the internal clock of the gateway.




The upper field, *Repeater clock (UTC),* displays the internal clock of the gateway as UTC-time while the lower field, *Clock diff (s)*, shows how many seconds the internal clock of the gateway differs from the current clock on the PC.

The gateway keeps synchronization using the configured NTP server so no synchronization with PC is needed. To synchronize the gateway clock to the PC, simply click on the button **Sync clock with PC**.

**NOTE**: The time synchronization is performed each time the device connects to the internet or every 12 hours. The gateway LAN-WMBUS-B4 has a highly accurate onboard temperature compensated clock for minimum drift and the expected drift is less than 0.5 seconds/day.

## Bridge-tab

This tab contains settings on how the gateway should connect and communicate with MQTT. Some of these settings are only applicable for the LTE gateway while others are for the ethernet gateway.

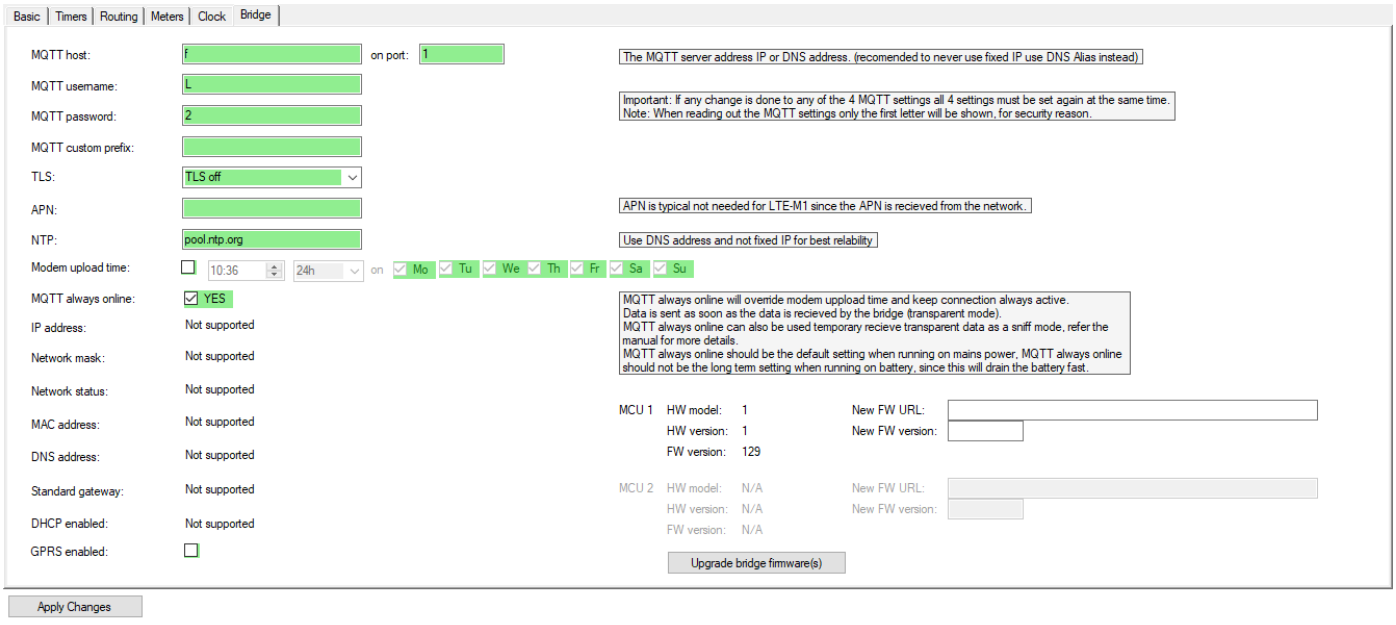
In this tab it is possible to configure the MQTT server addresses. The new setting will come into effect on the next connect to internet or by forcing a new connect to internet by doing a restart. To do a restart, click on the button **Restart** in the *Basic* tab.

**Note:** When connecting via the LAN-WMBUS-D1/D2-TC dongle and not entering an AES key only the first letter of the MQTT settings will be retrieved.

**Important:** Make sure that all settings are valid when changes are made on a device in a remote location. If the settings are incorrect then it will not be possible to do any more configurations using the MQTT interface.
Make sure that all 4 settings are set correctly, MQTT host, username, password and port since they are sent in the same configuration packet to the GW. Meaning if only 1 parameter is changed the 3 other parameters are also changed to the current value in the GUI.

### LTE gateway specific settings

These settings are only applicable for the LTE gateway and not for the ethernet gateway.



### *TLS*

It is possible to turn on communication using TLS for the gateway when communicating with the MQTT broker.

### APN

It is possible to enter a specific APN, if needed. This setting is always needed when the gateway is configured to use GPRS communication protocol. For LTE, the APN will be retrieved from the network if left empty in the configurator.

### NTP

It is possible to setup a specific NTP server if desirable.

### *Modem upload time*

This is the time that the modem will connect to the MQTT server and upload the stored data. If the setting *MQTT always online* is set to yes, this setting has no effect.

**Note**: Do not set the setting *Modem upload time* to the same value as the listen time under *Listen/pause timer*.

The best solution on a battery driven gateway is to first listen for incoming wM-Bus data then setup the gateway to upload the data later the same day.

Example:
Listen start time = 05:20
Listen time: 30 minutes
Modem Upload time: 06:00

### *MQTT always online*

This means that the gateway will always be connected to the MQTT server. If connection drops it will automatically try to connect again.

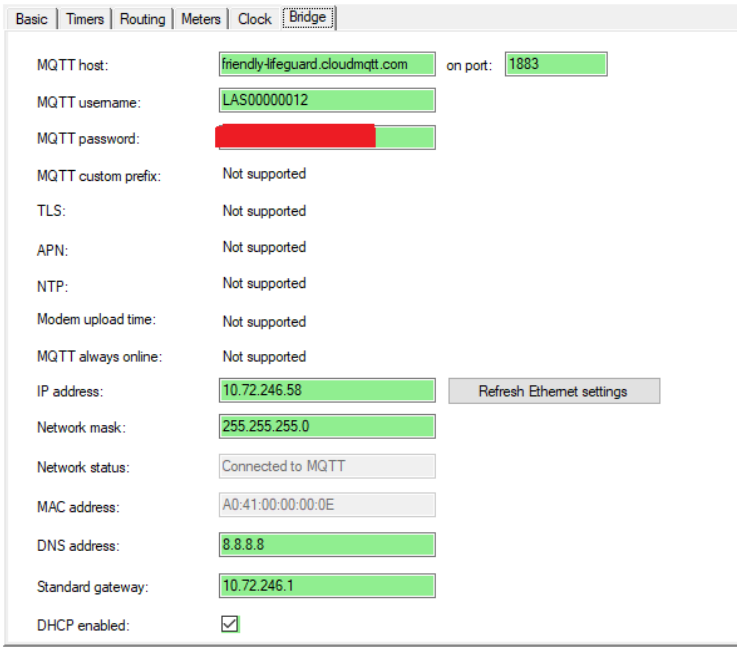
Note: NEVER use this option for battery driven gateways since this will drain power really fast.

### *GPRS enabled:*

It is possible to select if GPRS should be used instead of LTE-M1. Checkmark if GPRS should be used. GPRS will be activated on the next connection to the MQTT server. To force a reconnection, it is possible in the Basic tab to press a “restart” button to restart the complete GW.
**Note:** GPRS is not recommended when operating on battery.

## Ethernet gateway specific settings

These settings are only applicable for the ethernet gateway and not for the LTE gateway.




### *DHCP enabled:*

Turn on or off depending on if DHCP should be used. If DHCP is enabled on the gateway, then IP address and network mask are retrieved from the DHCP server. If DHCP is disabled on the gateway, then IP address and network mask must be manual entered.

### *IP address*

If DHCP is used the current IP address is shown.
If DHCP is not used (static IP) the address entered by the user is shown.

### *Network mask*

If DHCP is used the current Netmask address is shown.
If DHCP is not used (static IP) the Netmask address entered by the user is shown.

### *Standard gateway*

If DHCP is used the current standard gateway address is shown.
If DHCP is not used (static IP) the standard gateway address entered by the user is shown.

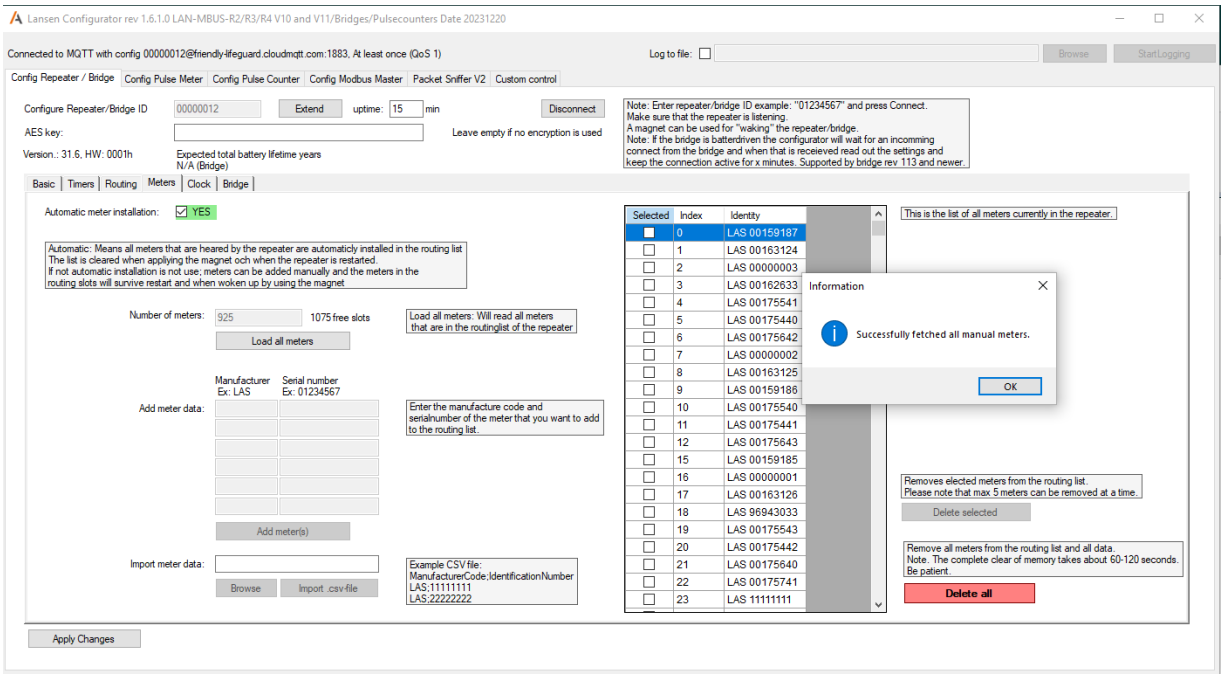
### *Mac address*

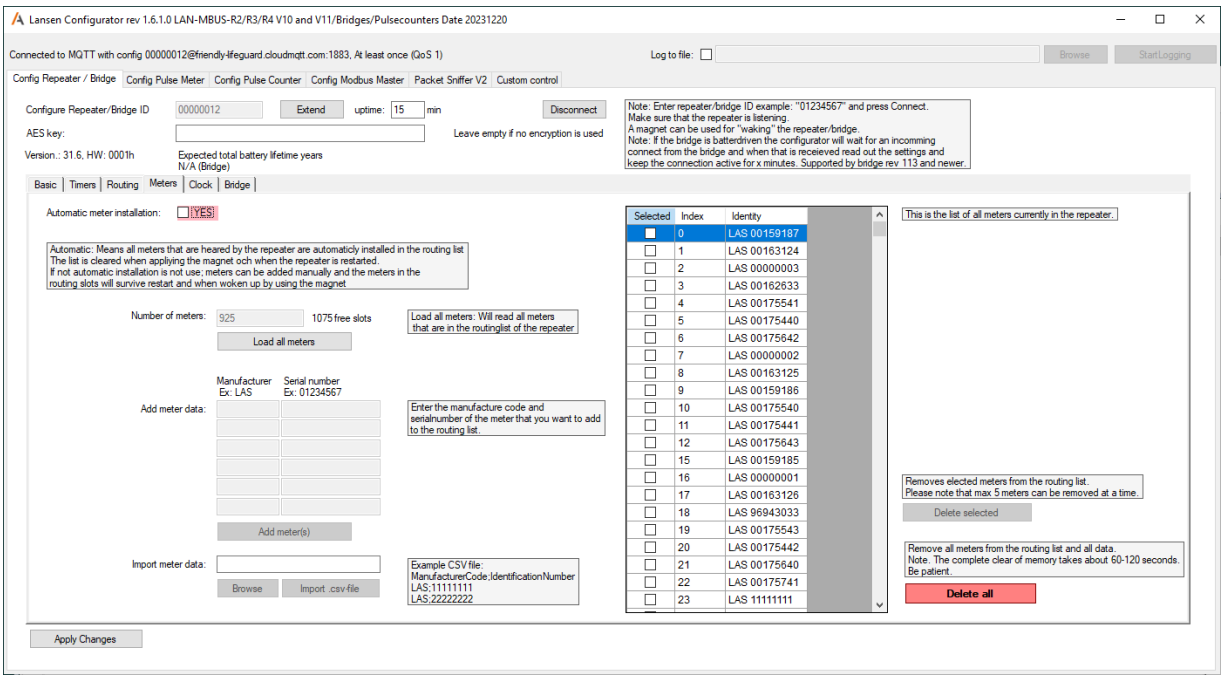
The unique MAC address is entered in production and cannot be changed.

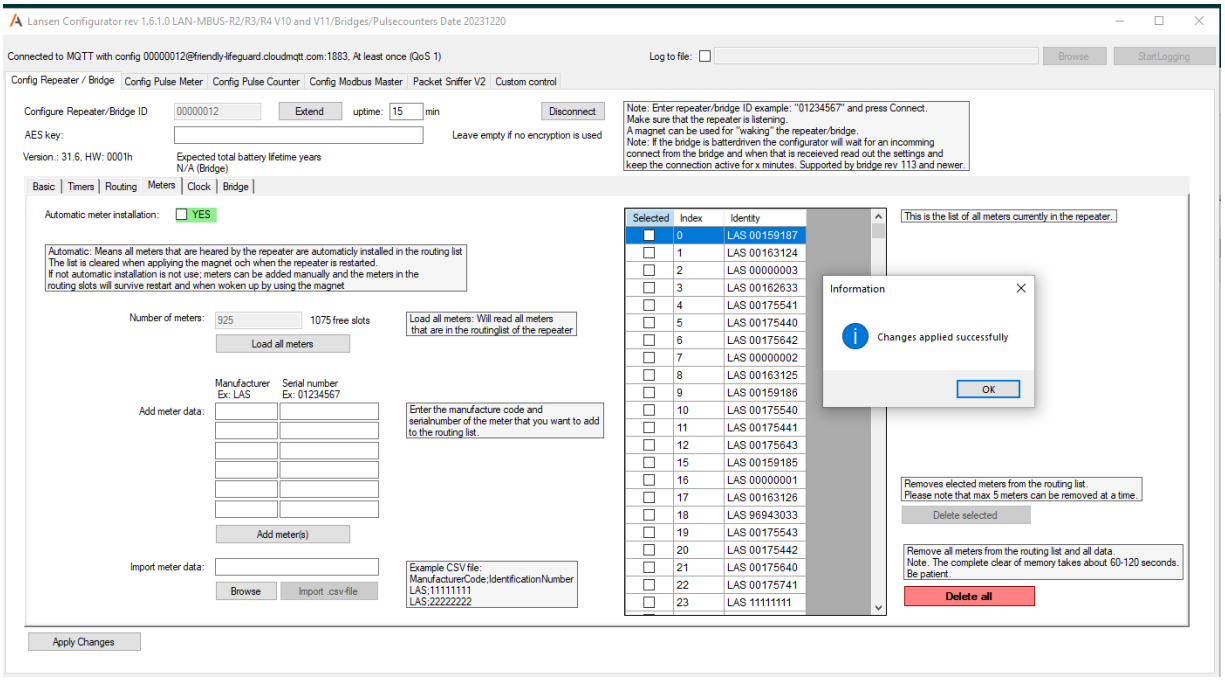
### *Network status*

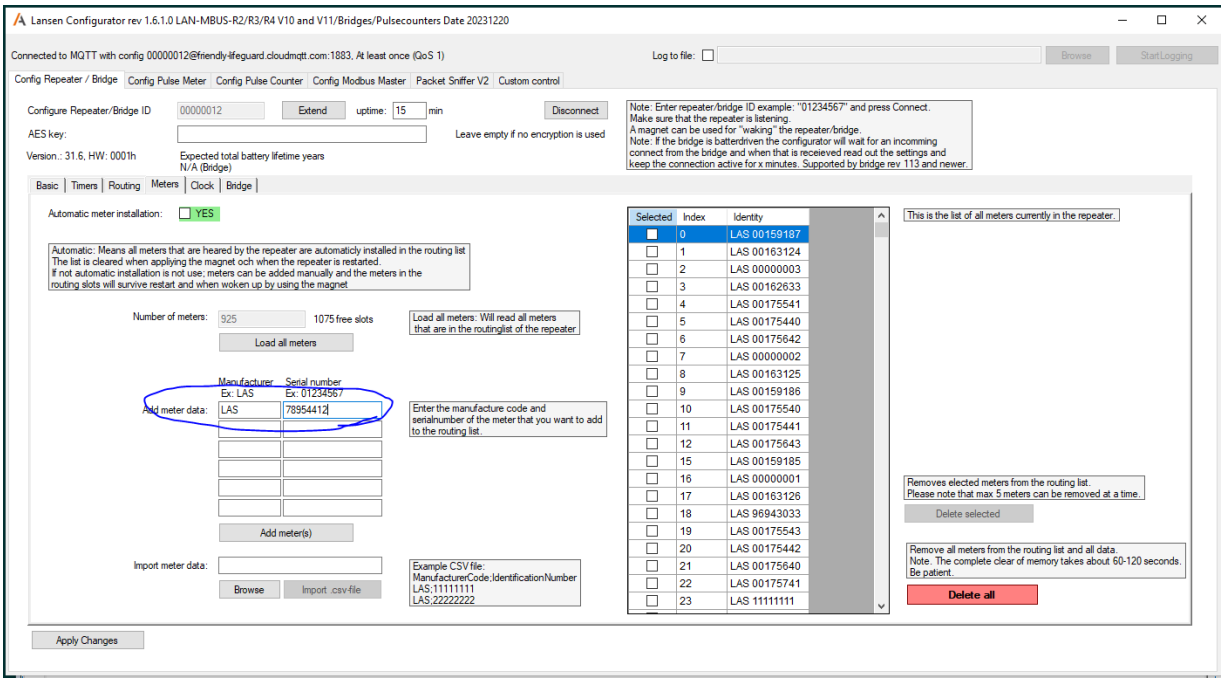
The current status of the network is shown in this window.

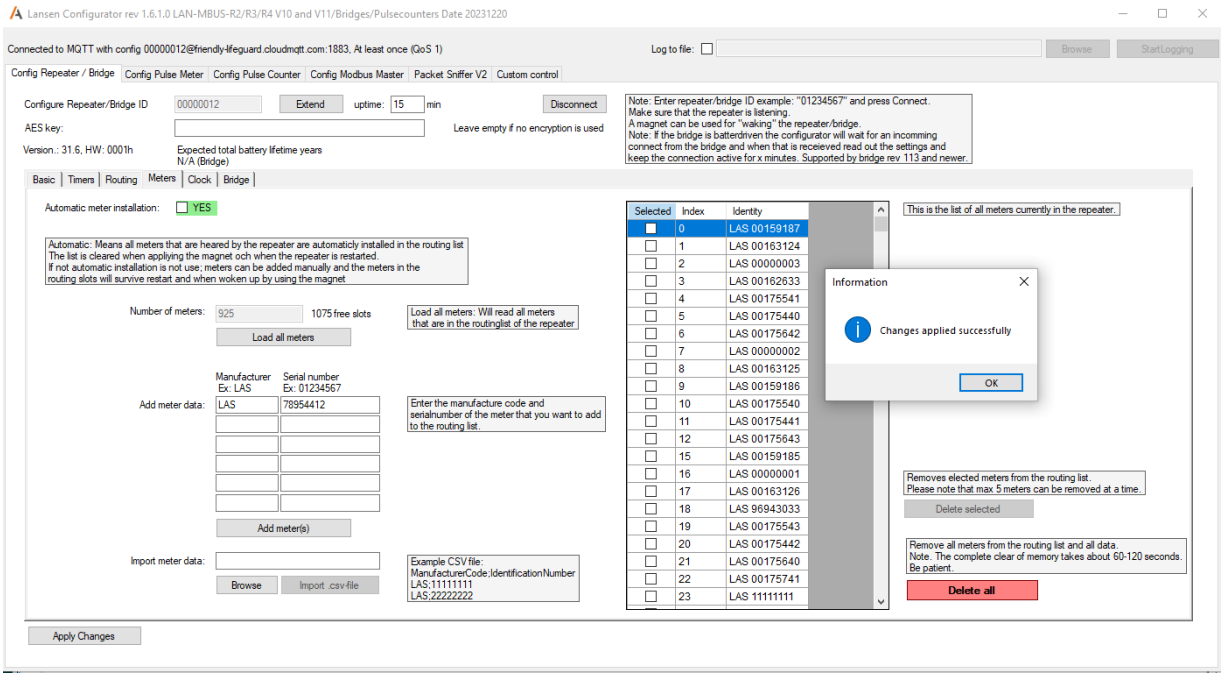
## Extra screenshots from the Meters tab with details

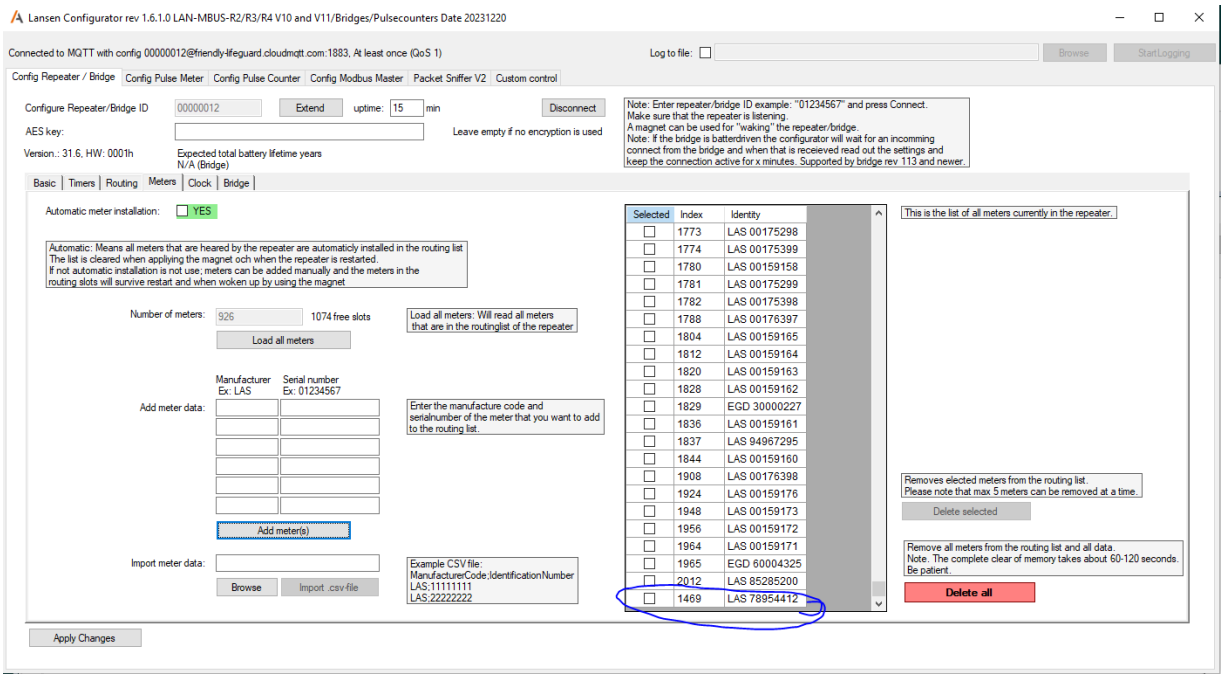



Lansen Configurator rev 1.6.1.0 LAN-MBUS-R2/R3/R4 V10 and V11/Bridges/Pulsecounters Date 20231220
Connected to MQTT with config 00000012@friendly-lifeguard.cloudmqtt.com:1883, At least once (QoS 1)
Log to file:
Browse
StartLogging
Config Repeater / Bridge
Config Pulse Meter
Config Pulse Counter
Config Modbus Master
Packet Sniffer V2
Custom control
Configure Repeater/Bridge ID
00000012
Extend
uptime:
15
min
Disconnect
AES key:
Leave empty if no encryption is used
Version.: 31.6, HW: 0001h
Expected total battery lifetime years
N/A (Bridge)
Note: Enter repeater/bridge ID example: "01234567" and press Connect.
Make sure that the repeater is listening.
A magnet can be used for "waking" the repeater/bridge.
Note: If the bridge is batterdriven the configurator will wait for an incomming connect from the bridge and when that is receieved read out the settings and keep the connection active for x minutes. Supported by bridge rev 113 and newer.
Basic
Timers
Routing
Meters
Clock
Bridge
Automatic meter installation:
YES
Automatic: Means all meters that are heared by the repeater are automaticly installed in the routing list
The list is cleared when applying the magnet och when the repeater is restarted.
If not automatic installation is not use; meters can be added manually and the meters in the routing slots will survive restart and when woken up by using the magnet
Number of meters:
925
1075 free slots
Load all meters
Load all meters: Will read all meters that are in the routinglist of the repeater
Manufacturer
Ex: LAS
Serial number
Ex: 01234567
Add meter data:
Enter the manufacture code and serialnumber of the meter that you want to add to the routing list.
Add meter(s)
Import meter data:
Browse
Import .csv-file
Example CSV file:
ManufacturerCode;IdentificationNumber
LAS;11111111
LAS;22222222
Apply Changes
Selected
Index
Identity
0 LAS 00159187
1 LAS 00163124
2 LAS 00000003
3 LAS 00162633
4 LAS 00175541
5 LAS 00175440
6 LAS 00175642
7 LAS 00000002
8 LAS 00163125
9 LAS 00159186
10 LAS 00175540
11 LAS 00175441
12 LAS 00175643
15 LAS 00159185
16 LAS 00000001
17 LAS 00163126
18 LAS 96943033
19 LAS 00175543
20 LAS 00175442
21 LAS 00175640
22 LAS 00175741
23 LAS 11111111
This is the list of all meters currently in the repeater.
Information
Changes applied successfully
OK
Removes elected meters from the routing list.
Please note that max 5 meters can be removed at a time.
Delete selected
Remove all meters from the routing list and all data.
Note. The complete clear of memory takes about 60-120 seconds.
Be patient.
Delete all


Lansen Configurator rev 1.6.1.0 LAN-MBUS-R2/R3/R4 V10 and V11/Bridges/Pulsecounters Date 20231220
Connected to MQTT with config 00000012@friendly-lifeguard.cloudmqtt.com:1883, At least once (QoS 1)
Log to file:
Browse
StartLogging
Config Repeater / Bridge
Config Pulse Meter
Config Pulse Counter
Config Modbus Master
Packet Sniffer V2
Custom control
Configure Repeater/Bridge ID
00000012
Extend
uptime:
15
min
Disconnect
AES key:
Leave empty if no encryption is used
Version.: 31.6, HW: 0001h
Expected total battery lifetime years
N/A (Bridge)
Note: Enter repeater/bridge ID example: "01234567" and press Connect.
Make sure that the repeater is listening.
A magnet can be used for "waking" the repeater/bridge.
Note: If the bridge is batterdriven the configurator will wait for an incomming connect from the bridge and when that is receieved read out the settings and keep the connection active for x minutes. Supported by bridge rev 113 and newer.
Basic
Timers
Routing
Meters
Clock
Bridge
Automatic meter installation:
YES
Automatic: Means all meters that are heared by the repeater are automaticly installed in the routing list
The list is cleared when applying the magnet och when the repeater is restarted.
If not automatic installation is not use; meters can be added manually and the meters in the routing slots will survive restart and when woken up by using the magnet
Number of meters:
925
1075 free slots
Load all meters
Load all meters: Will read all meters that are in the routinglist of the repeater
Manufacturer
Ex: LAS
Serial number
Ex: 01234567
Add meter data:
LAS
78954412
Enter the manufacture code and serialnumber of the meter that you want to add to the routing list.
Add meter(s)
Import meter data:
Browse
Import .csv-file
Example CSV file:
ManufacturerCode;IdentificationNumber
LAS;11111111
LAS;22222222
Apply Changes
Selected
Index
Identity
0 LAS 00159187
1 LAS 00163124
2 LAS 00000003
3 LAS 00162633
4 LAS 00175541
5 LAS 00175440
6 LAS 00175642
7 LAS 00000002
8 LAS 00163125
9 LAS 00159186
10 LAS 00175540
11 LAS 00175441
12 LAS 00175643
15 LAS 00159185
16 LAS 00000001
17 LAS 00163126
18 LAS 96943033
19 LAS 00175543
20 LAS 00175442
21 LAS 00175640
22 LAS 00175741
23 LAS 11111111
This is the list of all meters currently in the repeater.
Removes elected meters from the routing list.
Please note that max 5 meters can be removed at a time.
Delete selected
Remove all meters from the routing list and all data.
Note. The complete clear of memory takes about 60-120 seconds.
Be patient.
Delete all


Lansen Configurator rev 1.6.1.0 LAN-MBUS-R2/R3/R4 V10 and V11/Bridges/Pulsecounters Date 20231220
Connected to MQTT with config 00000012@friendly-lifeguard.cloudmqtt.com:1883, At least once (QoS 1)
Log to file:
Browse
StartLogging
Config Repeater / Bridge
Config Pulse Meter
Config Pulse Counter
Config Modbus Master
Packet Sniffer V2
Custom control
Configure Repeater/Bridge ID
00000012
Extend
uptime:
15
min
Disconnect
AES key:
Leave empty if no encryption is used
Version.: 31.6, HW: 0001h
Expected total battery lifetime years
N/A (Bridge)
Note: Enter repeater/bridge ID example: "01234567" and press Connect.
Make sure that the repeater is listening.
A magnet can be used for "waking" the repeater/bridge.
Note: If the bridge is batterdriven the configurator will wait for an incomming connect from the bridge and when that is receieved read out the settings and keep the connection active for x minutes. Supported by bridge rev 113 and newer.
Basic
Timers
Routing
Meters
Clock
Bridge
Automatic meter installation:
YES
Automatic: Means all meters that are heared by the repeater are automaticly installed in the routing list
The list is cleared when applying the magnet och when the repeater is restarted.
If not automatic installation is not use; meters can be added manually and the meters in the routing slots will survive restart and when woken up by using the magnet
Number of meters:
925
1075 free slots
Load all meters
Load all meters: Will read all meters that are in the routinglist of the repeater
Manufacturer Ex: LAS
Serial number Ex: 01234567
Add meter data:
LAS
78954412
Add meter(s)
Enter the manufacture code and serialnumber of the meter that you want to add to the routing list.
Import meter data:
Browse
Import .csv-file
Example CSV file:
ManufacturerCode;IdentificationNumber
LAS;11111111
LAS;22222222
Selected
Index
Identity
0 LAS 00159187
1 LAS 00163124
2 LAS 00000003
3 LAS 00162633
4 LAS 00175541
5 LAS 00175440
6 LAS 00175642
7 LAS 00000002
8 LAS 00163125
9 LAS 00159186
10 LAS 00175540
11 LAS 00175441
12 LAS 00175643
15 LAS 00159185
16 LAS 00000001
17 LAS 00163126
18 LAS 96943033
19 LAS 00175543
20 LAS 00175442
21 LAS 00175640
22 LAS 00175741
23 LAS 11111111
This is the list of all meters currently in the repeater.
Information
Changes applied successfully
OK
Removes elected meters from the routing list.
Please note that max 5 meters can be removed at a time.
Delete selected
Remove all meters from the routing list and all data.
Note. The complete clear of memory takes about 60-120 seconds.
Be patient.
Delete all
Apply Changes


Lansen Configurator rev 1.6.1.0 LAN-MBUS-R2/R3/R4 V10 and V11/Bridges/Pulsecounters Date 20231220
Connected to MQTT with config 00000012@friendly-lifeguard.cloudmqtt.com:1883, At least once (QoS 1)
Log to file:
Browse
StartLogging
Config Repeater / Bridge
Config Pulse Meter
Config Pulse Counter
Config Modbus Master
Packet Sniffer V2
Custom control
Configure Repeater/Bridge ID
00000012
Extend
uptime:
15
min
Disconnect
AES key:
Leave empty if no encryption is used
Version.: 31.6, HW: 0001h
Expected total battery lifetime years
N/A (Bridge)
Note: Enter repeater/bridge ID example: "01234567" and press Connect.
Make sure that the repeater is listening.
A magnet can be used for "waking" the repeater/bridge.
Note: If the bridge is batterdriven the configurator will wait for an incomming connect from the bridge and when that is receieved read out the settings and keep the connection active for x minutes. Supported by bridge rev 113 and newer.
Basic
Timers
Routing
Meters
Clock
Bridge
Automatic meter installation:
YES
Automatic: Means all meters that are heared by the repeater are automaticly installed in the routing list
The list is cleared when applying the magnet och when the repeater is restarted.
If not automatic installation is not use; meters can be added manually and the meters in the routing slots will survive restart and when woken up by using the magnet
Number of meters:
926
1074 free slots
Load all meters
Load all meters: Will read all meters that are in the routinglist of the repeater
Manufacturer Ex: LAS
Serial number Ex: 01234567
Add meter data:
Add meter(s)
Enter the manufacture code and serialnumber of the meter that you want to add to the routing list.
Import meter data:
Browse
Import .csv-file
Example CSV file:
ManufacturerCode;IdentificationNumber
LAS;11111111
LAS;22222222
Selected
Index
Identity
1773 LAS 00175298
1774 LAS 00175399
1780 LAS 00159158
1781 LAS 00175299
1782 LAS 00175398
1788 LAS 00176397
1804 LAS 00159165
1812 LAS 00159164
1820 LAS 00159163
1828 LAS 00159162
1829 EGD 30000227
1836 LAS 00159161
1837 LAS 94967295
1844 LAS 00159160
1908 LAS 00176398
1924 LAS 00159176
1948 LAS 00159173
1956 LAS 00159172
1964 LAS 00159171
1965 EGD 60004325
2012 LAS 85285200
1469 LAS 78954412
This is the list of all meters currently in the repeater.
Removes elected meters from the routing list.
Please note that max 5 meters can be removed at a time.
Delete selected
Remove all meters from the routing list and all data.
Note. The complete clear of memory takes about 60-120 seconds.
Be patient.
Delete all
Apply Changes

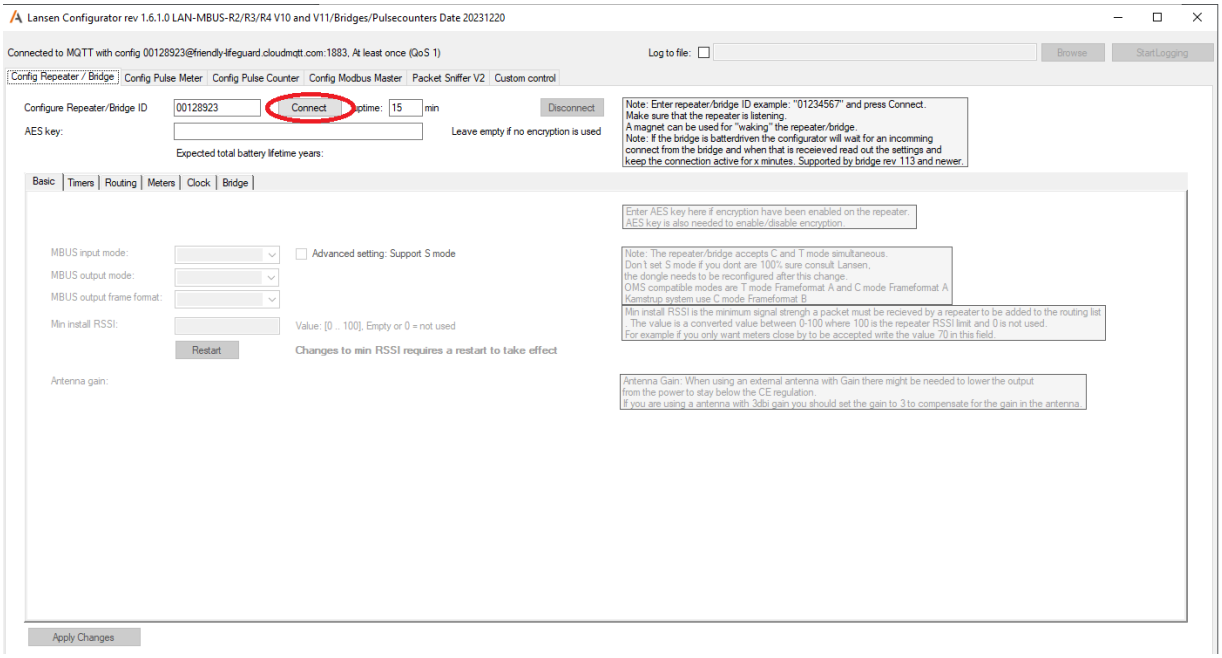
# Connecting and working with Lansen Configurator (Battery Gateway)

A battery-operated gateway is not always online (sleeping) to save battery. This must be considered when using Lansen Configurator, since trying to connect to a gateway may not happen right away like it would with a mains-powered gateway.

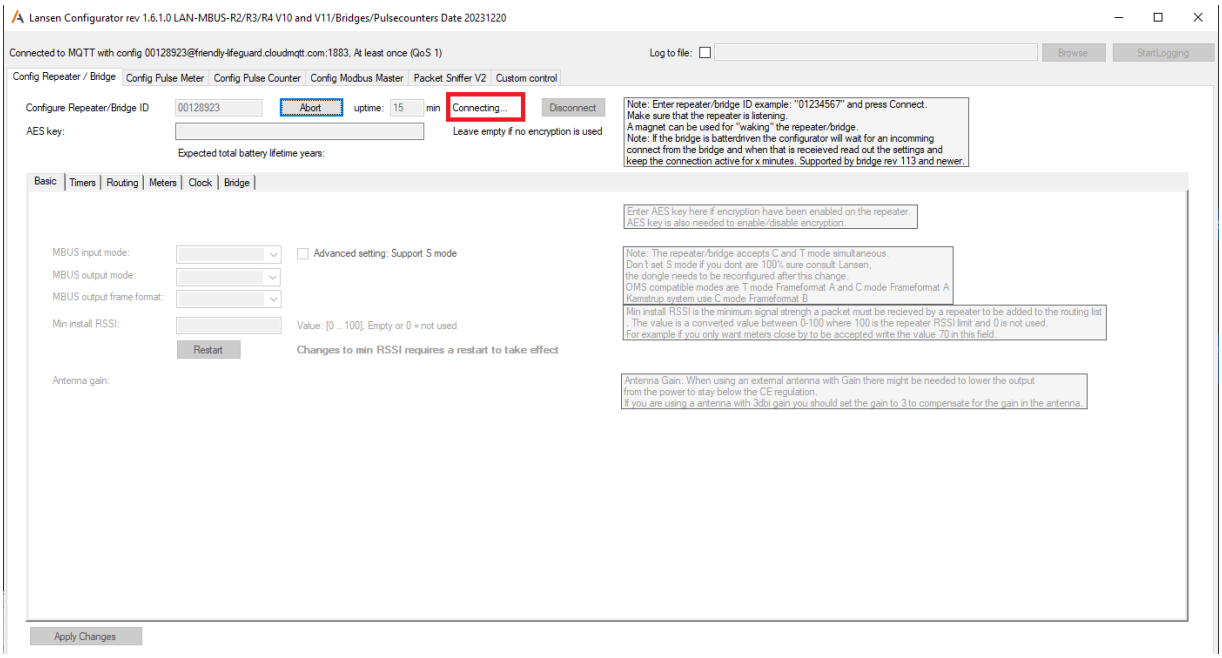
When the button *Connect* is clicked, marked by red circle below, the program Lansen Configurator will try to connect with the specified gateway and continuously checks if the gateway connects to the MQTT server. Once the gateway is connected to the MQTT server, the Configurator will automatically retrieve all settings from the gateway and force the gateway to be online the number of minutes as set in the field *Uptime*.

The following images shows the process in detail.

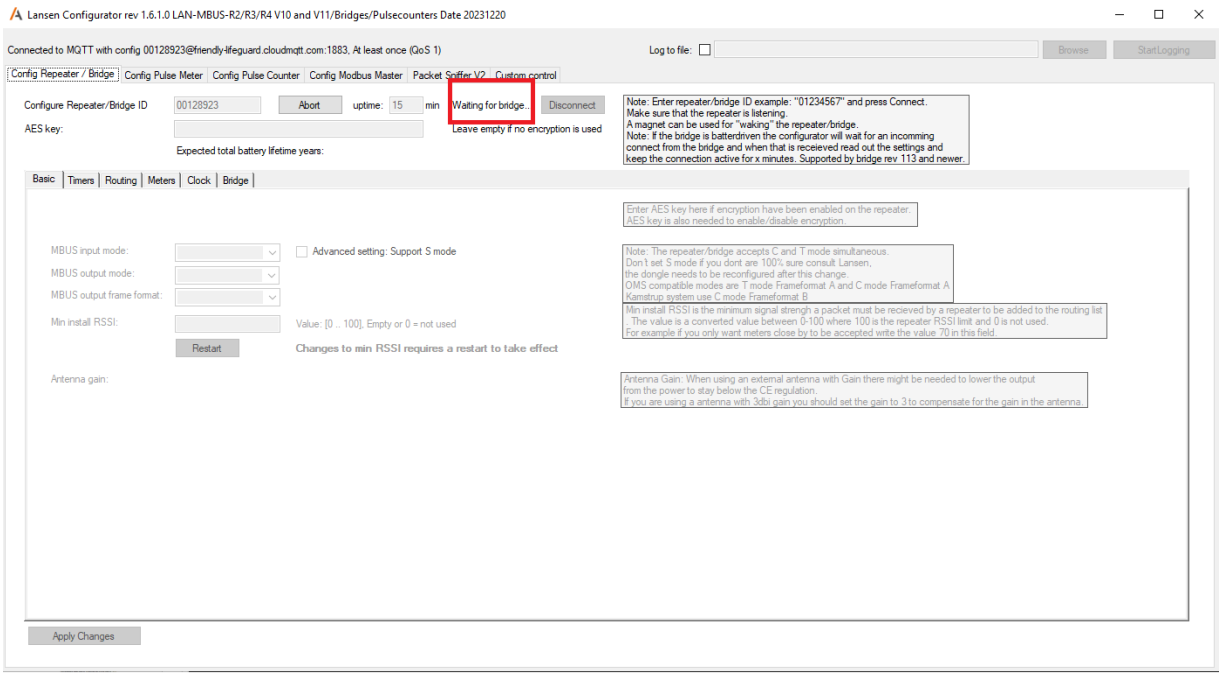
Enter a value for *Uptime*, e.g., 15 minutes, and click *Connect* to retrieve information from the gateway once the gateway is connected to the MQTT server.



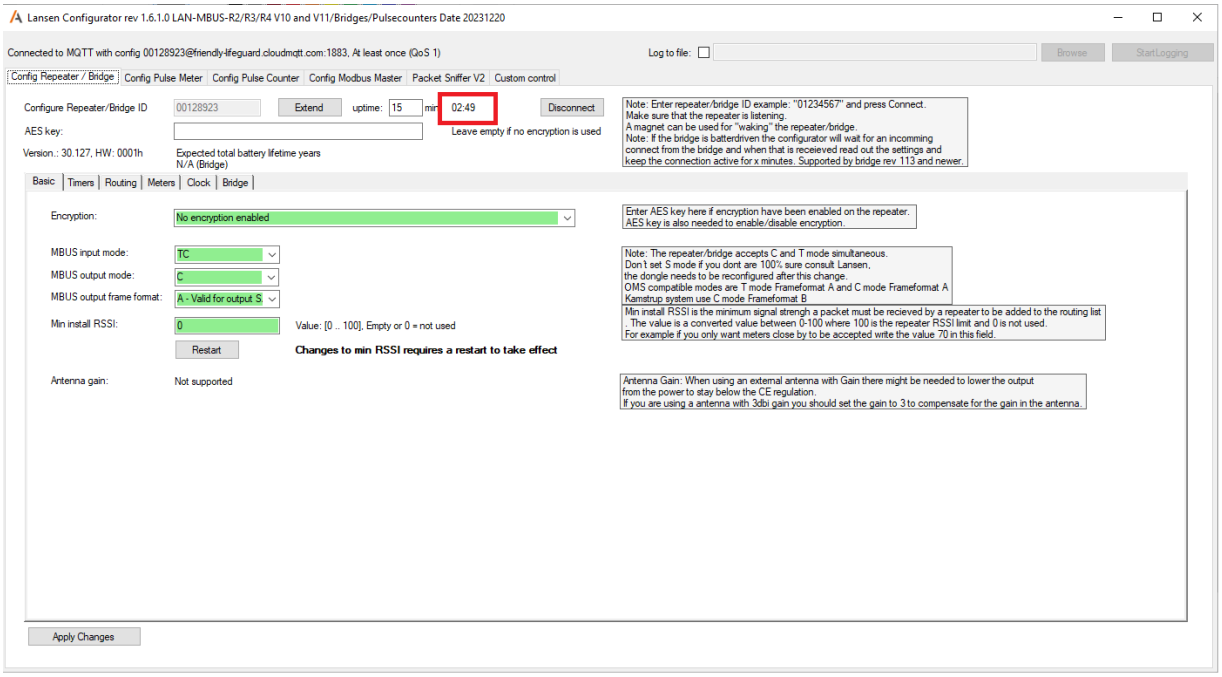

Lansen Configurator tries to connect to the gateway



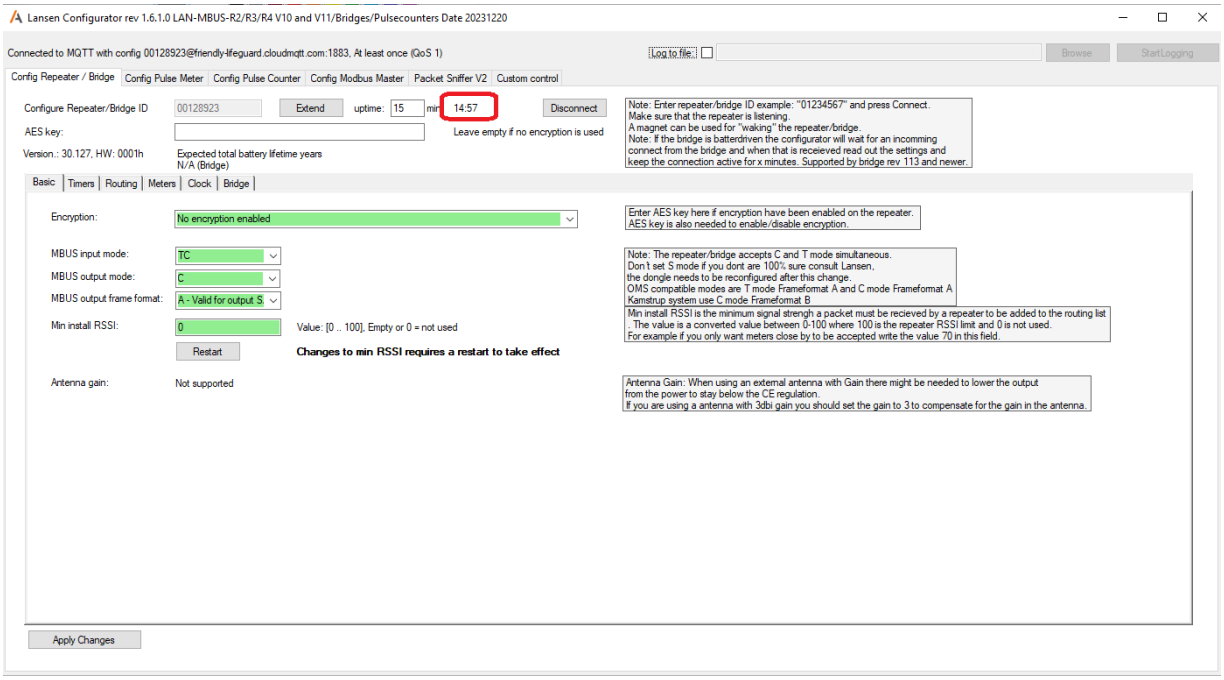
The gateway was offline so the program waits for a connection from the gateway.



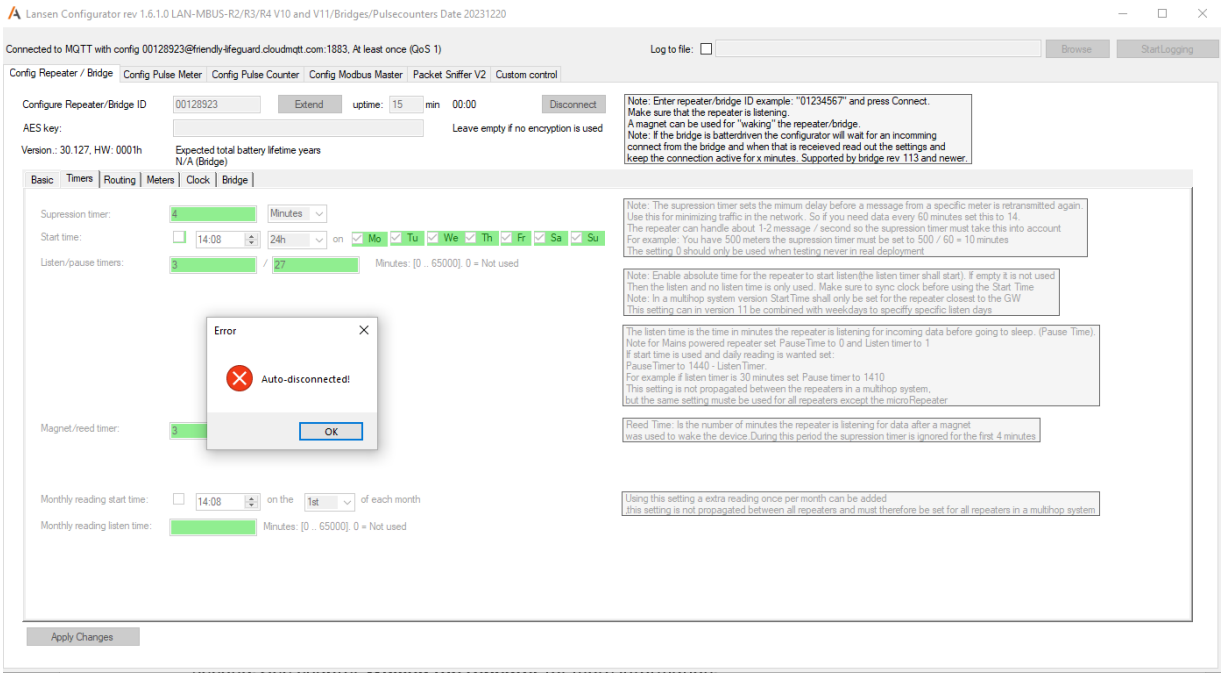

Once the gateway is connected to the MQTT server and connection is established by Lansen Configurator, the countdown of the uptime will start. The counter shows the time left before the gateway shuts down the connection with the MQTT server.



It is possible to extend the uptime by clicking ‘Extend’.




The gateway closes the connection when the timer reaches 00:00 or when the button *Disconnect* is clicked.



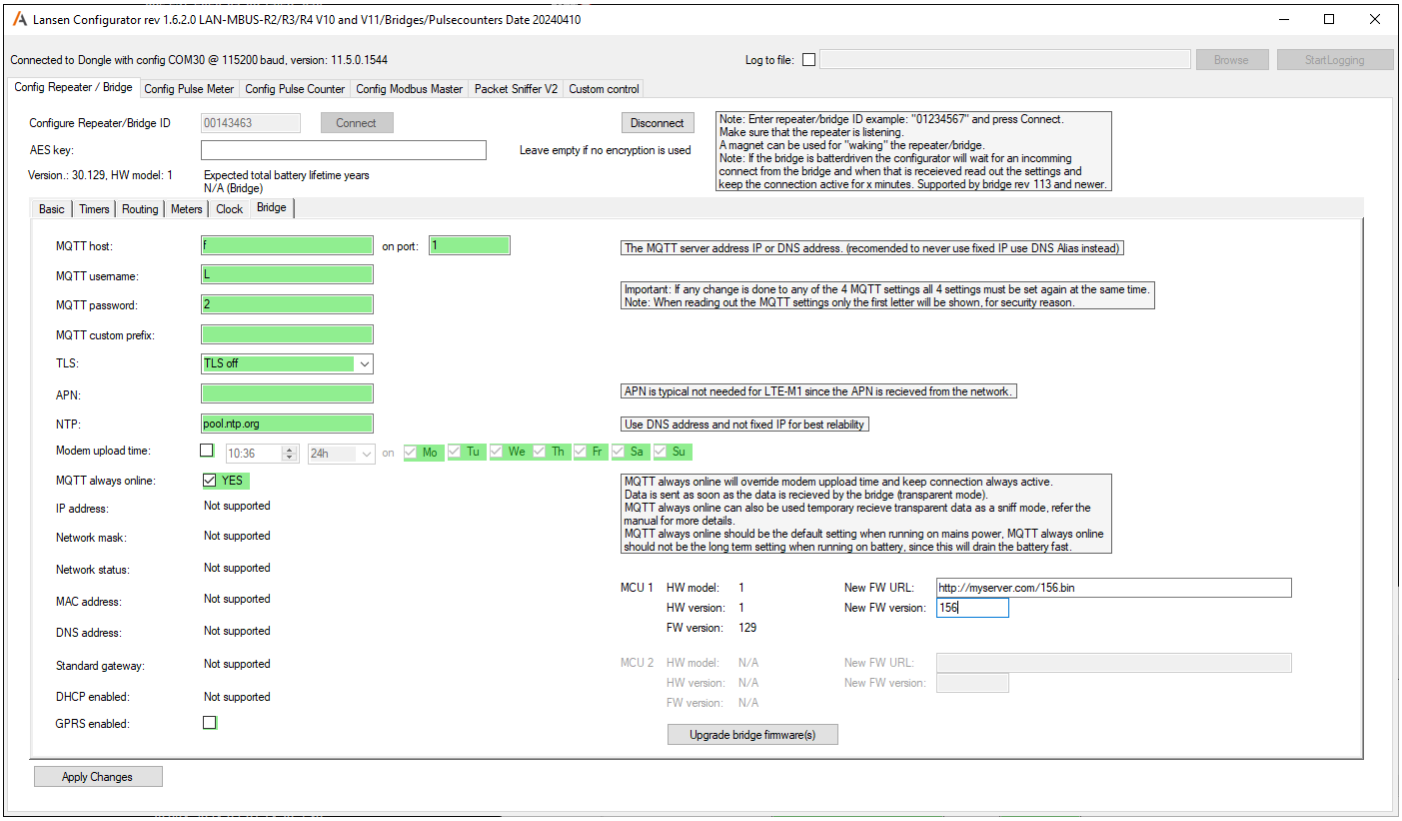
# Upgrade firmware

To upgrade the firmware, a specific command must be sent to the gateway via MQTT or the LAN-WMBUS-D1/D2-TC configuration dongle.

## LTE gateway

Below is an example setting.

- In the field called *Firmware URL*, enter the HTTP-server where the firmware is located.
- In Firmware version, enter the firmware version.
- Click *Upgrade bridge firmware* - The upgrade usually takes less than 1 minute.




## Ethernet Gateway

The ethernet gateway contains two firmwares which typically must be upgraded at the same time.
In that case both the firmware for MCU 1 and MCU 2 be entered at the same time.
Contact us for details.