Wireless M-BUS Gateway5 configuration manual for LTE-M1 or CAT1/4G

using optional

LansenConfigurator 1.8.0.0

Introduction

- This device from Lansen is a lightweight gateway that is made for receiving wM-Bus data and transmit the data using LTE M1 or CAT1/4G, 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 dataflow through the gateway is NOT decrypted. No encryption keys for the dataflow are stored in the gateway, however, the configuration of the gateway can be protected using a unique AES128 encryption key which is preprogrammed into the gateway during production. This ONLY protects the configuration data.
- Packets are sent with Quality of Service (QoS) set to 0, i.e., the MQTT server should not reply on 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), through a USB-C cable, 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.

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 should be posted on topic **LAS/W/C/01234567**.

Response of configuration from the gateway are 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 on message. TCP/IP is handling transmission, ACK, and QoS, automatically.

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

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

Below is an example packet as sent from the gateway where wM-Bus data is in blue and the MQTT header is in red. The received WMBUS packet 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 Note: Interpret the value using two's complement.
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. 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%) **Note:** 0xFF = Not used **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. 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 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 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 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	

Short Status packet

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

A short status packet contains information and settings about the gateway and the packet is sent at regular intervals.
In other words, a short status packet is sent:

- Every 12 hours over the MQTT interface.
- On every new connection to the MQTT server.

Note: Information in DR1 – DR8 below are the same as for the repeater.	
DR1	Software version of gateway
DR2	Revision of the gateway modem
DR3	Hardware model
DR4	Hardware version
DR5	Current battery level. Battery level is always 3600 for battery version and 5000 for mains version
DR6	Number of seconds for which the modem has been active
DR7	Timestamp for last change done on the gateway configuration
DR8	Timestamp for last change done on the gateway meter list

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	DR1	DIF	16-bit integer	0x02	Version of the gateway
21	DR1	VIF	Extension table	0xFD	
22	DR1	VIFE	Version	0x0F	
23	DR1	Value (LSB)	**Example:** 120 (0x0078)	0x78	
24	DR1	Value (MSB)		0x00	
25	DR2	DIF	Variable Length	0xCD	Revision of the Modem
26	DR2	DIFE	Storage 11	0x05	
27	DR2	VIF	Extension table	0xFD	
28	DR2	VIFE	Dimensionless	0x3A	
29	DR2	LVAR	Modem revision string length (10-35 bytes)	0x11	
30	DR2	Revision Ascii string (LSB)		0x32	

31	DR2	Revision Ascii string		0x33	
32	DR2	Revision Ascii string		0x37	
33	DR2	Revision Ascii string		0x34	
34	DR2	Revision Ascii string		0x42	
35	DR2	Revision Ascii string		0x30	
36	DR2	Revision Ascii string		0x31	
37	DR2	Revision Ascii string	**Example:** 2374B01SIM767XM5A	0x53	
38	DR2	Revision Ascii string		0x49	
39	DR2	Revision Ascii string		0x4D	
40	DR2	Revision Ascii string		0x37	
41	DR2	Revision Ascii string		0x36	
42	DR2	Revision Ascii string		0x37	
43	DR2	Revision Ascii string		0x58	
44	DR2	Revision Ascii string		0x4D	
45	DR2	Revision Ascii string		0x35	
46	DR2	Revision Ascii string MSB		0x41	
47	DR3	DIF	8-bit integer	0x01	Hardware model
48	DR3	VIF	Extension table	0xFD	
49	DR3	VIFE	Model version	0x0C	
50	DR3	Value	**Example:** 0x01	0x01	
51	DR4	DIF	8-bit integer	0x01	Hardware version
52	DR4	VIF	Extension table	0xFD	
53	DR4	VIFE	Hardware version	0x0D	
54	DR4	Value	**Example:** 0x01	0x01	
55	DR5	DIF	16-bit integer	0x02	Current battery level
56	DR5	DIFE	Extension table	0xFD	
57	DR5	VIF	Voltage (mV)	0x46	
58	DR5	Value (LSB)	**Example:** 3600 (0x0E10)	0x10	
59	DR5	Value (MSB)		0x0E	
60	DR6	DIF	32-bit integer	0x04	Number of seconds for which the modem has been active
61	DR6	VIF	Operating time seconds	0x24	
62	DR6	Value (LSB)	**Example:** 9173511 seconds	0x07	
63	DR6	Value		0xFA	
64	DR6	Value		0x8B	
65	DR6	Value (MSB)		0x00	
66	DR7	DIF	32-bit integer		Timestamp for configuration
67	DR7	VIF	Timestamps in seconds for last change of the configuration		
68	DR7	Value (LSB)	**Example:** 1737368574 seconds		
69	DR7	Value			
70	DR7	Value			
71	DR7	Value (MSB)			
72	DR8	DIF	32-bit integer		
73	DR8	VIF	Timestamps in seconds for last change of the meter list		
74	DR8	Value (LSB)	**Example:** 1737368575 seconds		
75	DR8	Value			
76	DR8	Value			
77	DR8	Value (MSB)			

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 – DR24 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 **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) **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). Can be combined with days to upload data (see DR20).
DR23	Number of NTP server connection retries since last successful NTP connection.
DR24	Modem revision

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 **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 **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 **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 10	0x05		
188	DR23	VIF	Extension table	0xFD		
189	DR23	VIFE	Dimensionless	0x3A		
190	DR23	Value (LSB)	**Example:** 5	0x05		
191	DR23	Value (MSB)		0x00		
192	DR24	DIF	Variable Length	0xCD	Revision of the modem	
193	DR24	DIFE	Storage 11	0x05		
194	DR24	VIF	Extension table	0xFD		
195	DR24	VIFE	Dimensionless	0x3A		
196	DR24	LVAR	Modem revision string length (10-35 bytes)	0x11		
197	DR24	Revision Ascii string (LSB)	**Example:** 2374B01SIM767XM5A	0x32		
198	DR24	Revision Ascii string		0x33		
199	DR24	Revision Ascii string		0x37		
200	DR24	Revision Ascii string		0x34		
201	DR24	Revision Ascii string		0x42		
202	DR24	Revision Ascii string		0x30		
203	DR24	Revision Ascii string		0x31		
204	DR24	Revision Ascii string		0x53		
205	DR24	Revision Ascii string		0x49		
206	DR24	Revision Ascii string		0x4D		
207	DR24	Revision Ascii string		0x37		
208	DR24	Revision Ascii string		0x36		
209	DR24	Revision Ascii string		0x37		
210	DR24	Revision Ascii string		0x58		

211	DR24	Revision Ascii string	0x4D			
212	DR24	Revision Ascii string	0x35			
213	DR24	Revision Ascii string MSB	0x41			

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 The LED strip (all 4 LED's) will light up, accompanied by a beep.

2 When the internal flash memory is cleared, the device beeps a second time, the IP-COM LED turns off and the wM-Bus LED will start flashing, indicating it is listening for incoming wM-Bus data. This also indicates that the startup sequence is completed. 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).

3 1-2 minutes after the starting sequence is finished the modem tries to connect to the MQTT server using the settings in the device, this is indicated by the IP-COM LED beginning to blink.

Visual Indications

A gateway use LEDs to indicate different things, see table below.

LED Strip (red circle)			
POWER	Green	Steady on Blinking 2 times/second	The device has power. Low battery
POWER INFO wM-Bus IP-COM	Green Red Red Red	All steady on	Startup sequence active.
INFO	Red	Steady on	wM-Bus radio on/listen for radio packets.
wM-Bus	Red	Quick flash	New packet received by the wM-Bus radio.
IP-COM	Red	Steady on Blinking	Active connection to the MQTT server. Modem active but not connected to the MQTT Server.
Cellular network LED (red arrow)			
Red	Flash every 300 ms (0.3 s)		The device is sending data.
Red	Steady on/Off + Flash every 300 ms (0.3 s) in intervals.		Not registered to a network, rebooting, attempting to connect to a network.

Note: For battery version the LED indication will be turned off after 30 minutes to save power. The indication will be active again for 30 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 Modem is started and immediately searches for an LTE M1 or CAT1/4G network, this can be seen on the IP-COM LED which will start to flash.

2 When an LTE-M1 or CAT1/4G 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 connection is successful, then the red IP-COM LED will turn on fully, the NET LED starts blinking every 0.3s 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's possible to extend this time by sending a command to the gateway. Refer to the section **Connecting and working with Lansen Configurator (Battery Gateway)** to change configuration time.

8 Once 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 Modem is started and immediately searches for an LTE M1 or CAT1/4G network, this can be seen on the IP-COM LED which will start to flash.

2 When an LTE-M1 or CAT1/4G 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 connection is successful, then the red IP-COM LED will turn on fully, the gateway starts uploading all stored meter data in its internal flash memory to the MQTT server and you can see the NET LED blinking every 0.3s.

6 When 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 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 is 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 support nano SIM-cards and eSIM. 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, thus 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	- GW5	- BE/M	- LR	- A1/A2	- (X1)	- CATM1 CAT1/4G	- (X2)
Manufacturer	Input	Device	BE: Battery M: Mains	LR: Long Range	A1: IP40 A2: IP65	Optional External antenna for input (WMBUS)	Output	Optional External antenna for output (CATM1)

Additional information regarding antennas on the gateway:

- The gateway uses one broadband antenna to cover all LTE-M1 or CAT1/4G 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 direction. 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 a typical consumption as seen in the table below.

Mode	Current consumption
Sleeping, only the time clock is running.	20 uA
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 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 minutes 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.

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

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 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 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 given as 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 currently 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 with a Lansen configuration dongle (LAN-WMBUS-D1/D2-TC), directly via the MQTT server, or using a USB-C wire directly inserted into the gateway.

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.

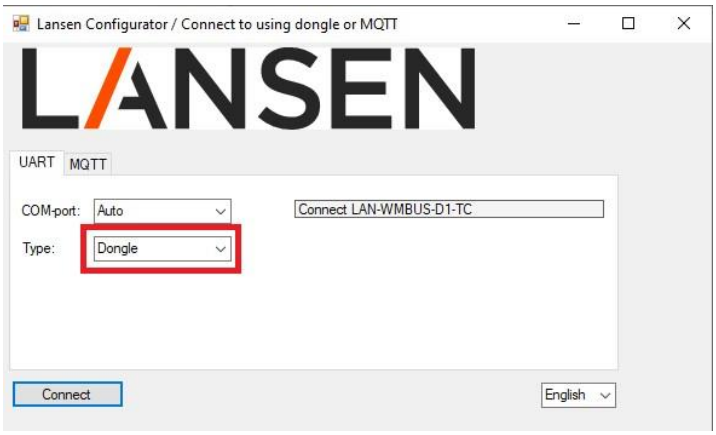
Connect to the gateway over wM-Bus interface using Lansen USB-dongle

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

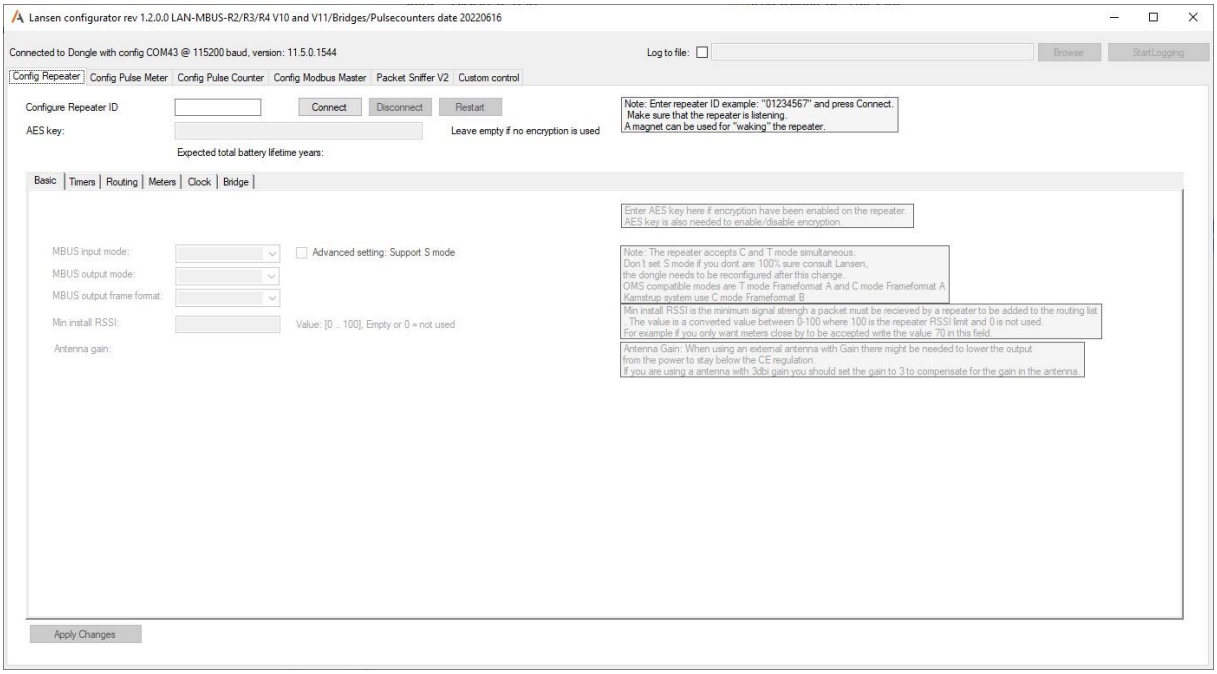
Select the Type ‘Dongle’ and click Connect.

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.

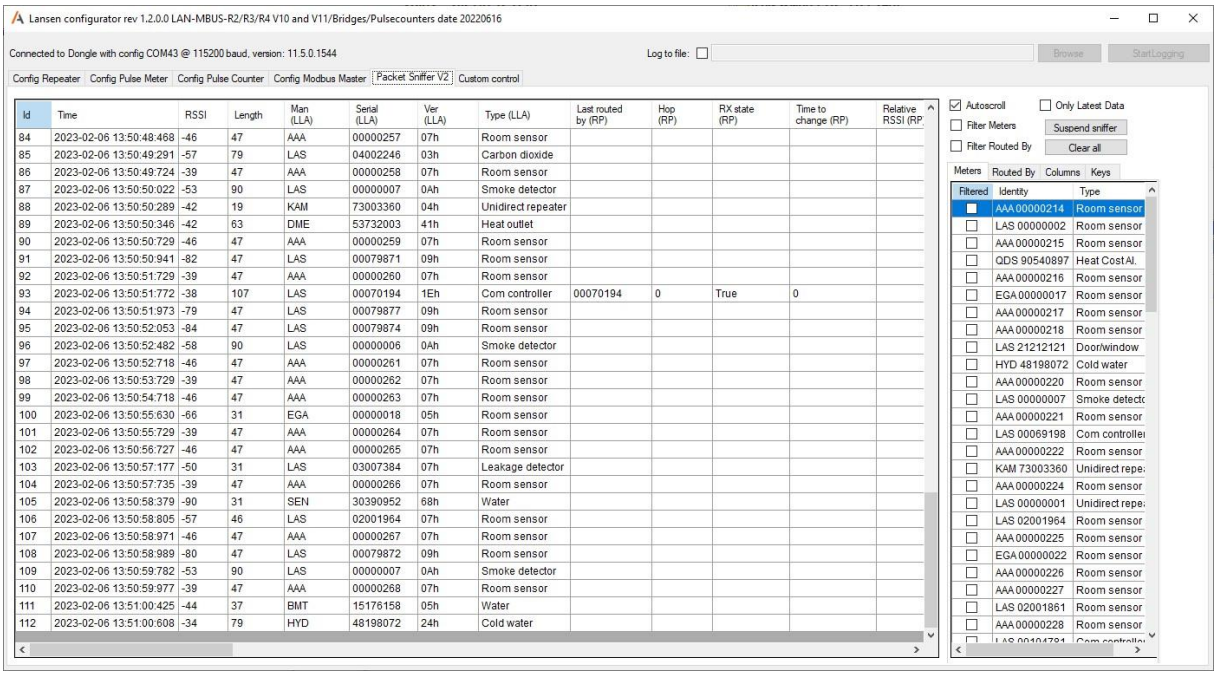
If the program still fails, it might be that the computer has failed to download the correct driver. In this case, visit our webpage (http://www.lansen.io/download/) and download the corresponding driver for the dongle you have.



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

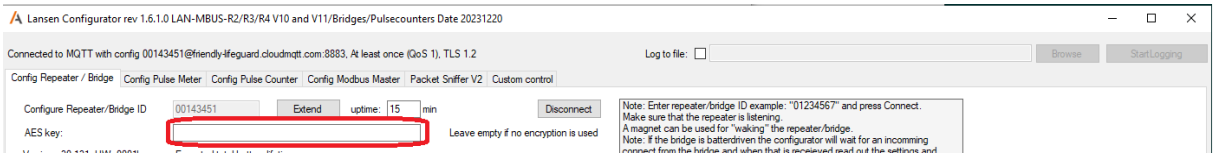


In the sniffer tab, Packet Sniffer V2, you can see all the device in the area as picked up by the dongle.



- To configure a gateway, go to the tab called “Config Repeater / Bridge” and enter the eight serial numbers, visible on the label of 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 is not too strong. If the gateway is sleeping, then you can wake the gateway using a magnet to the left of the front label. Then click ‘Connect’ again.

If encryption is enabled on the gateway, then a valid AES-key must be entered in the field marked below, when connecting, to change settings. Note that it is 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.

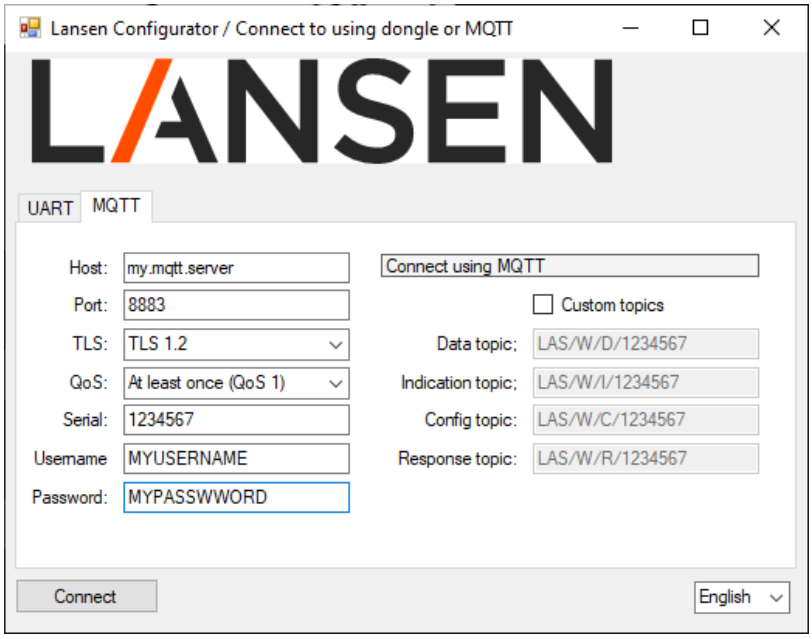


Connect to the gateway over MQTT interface using Lansen Configurator

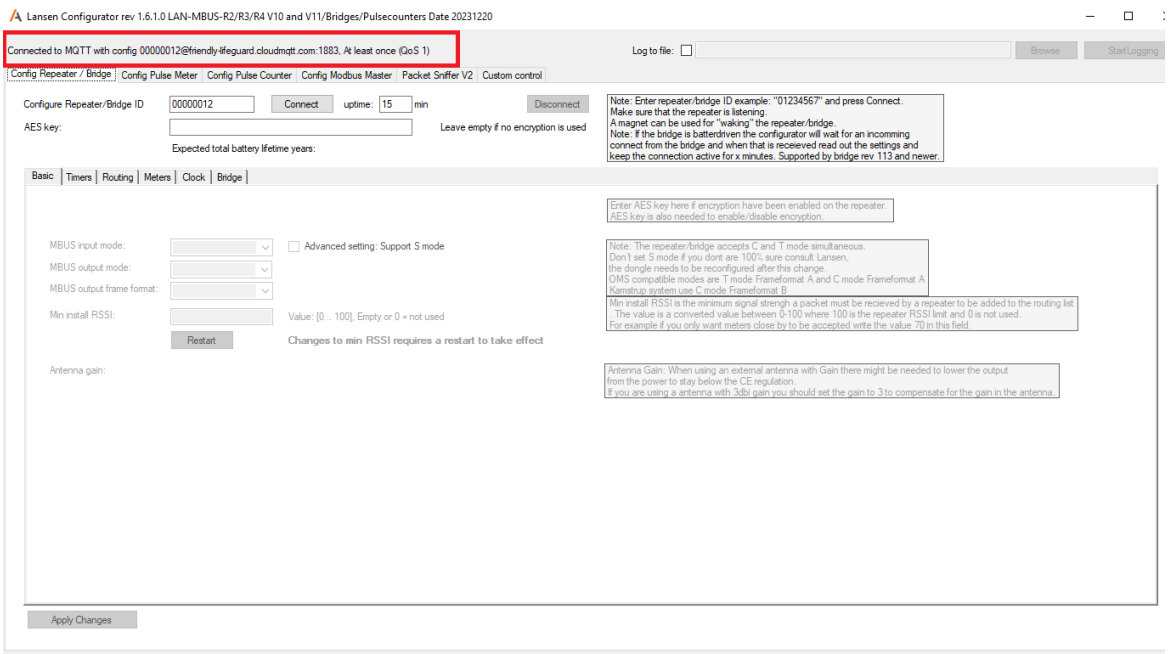
Start the Lansen Configurator and select the tab MQTT, as seen below, and enter the settings to the MQTT server to connect via the MQTT server. Example settings can be seen in the picture below.

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.

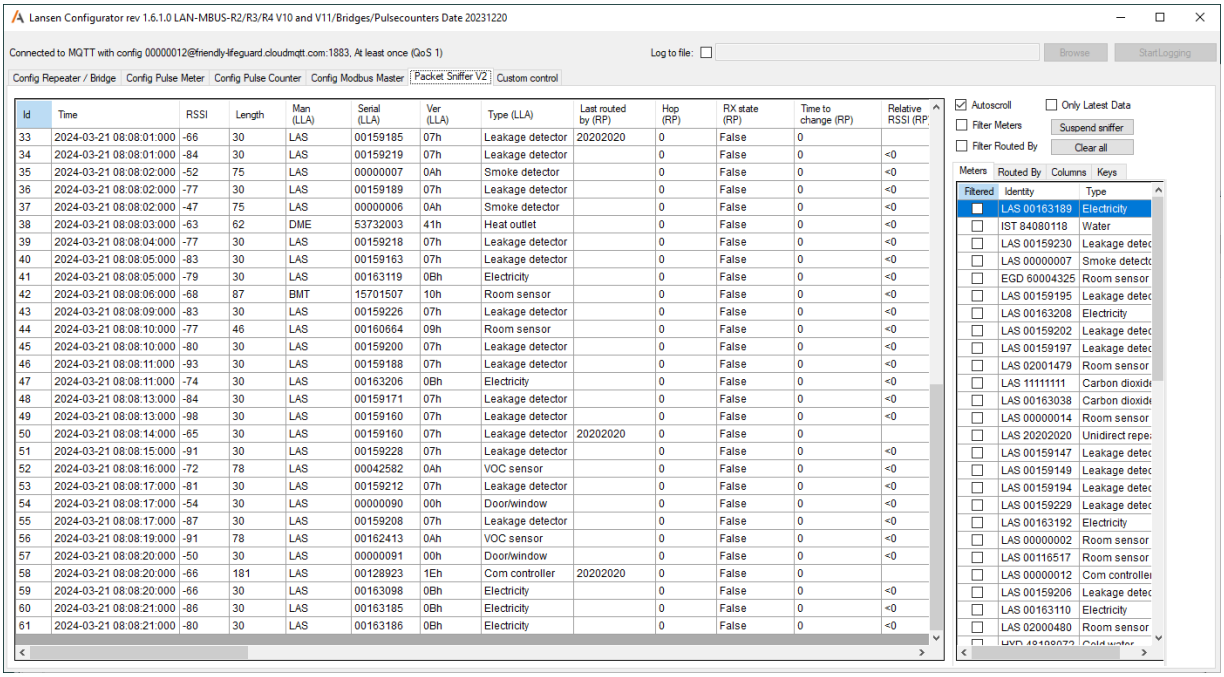
When everything is filled in, click 'Connect'.



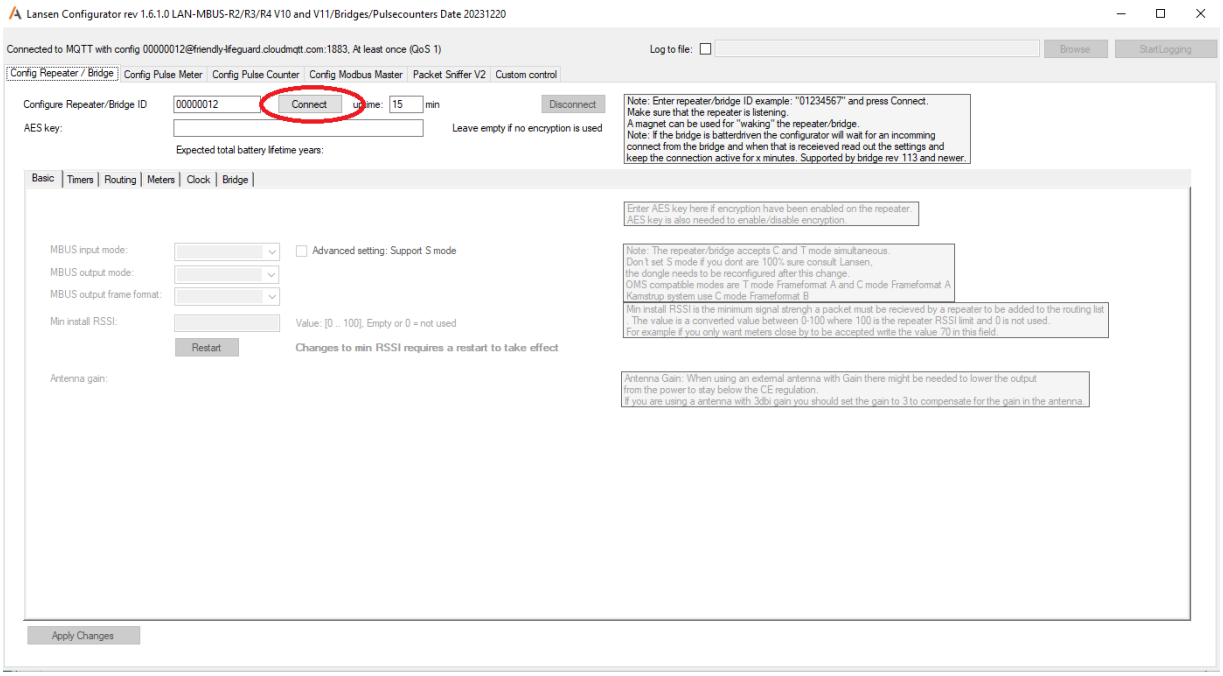
If everything works, then you are now connected to the MQTT server. In the example below, connection has been made with serial number 0000012 to the MQTT server friendly-lifeguard.cloudmqtt.com.



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



To change the 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.

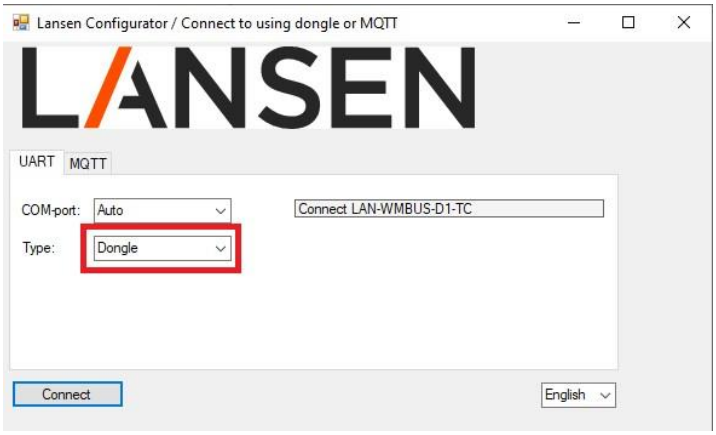


Connect to the gateway using a USB to USB-C cable (wired)

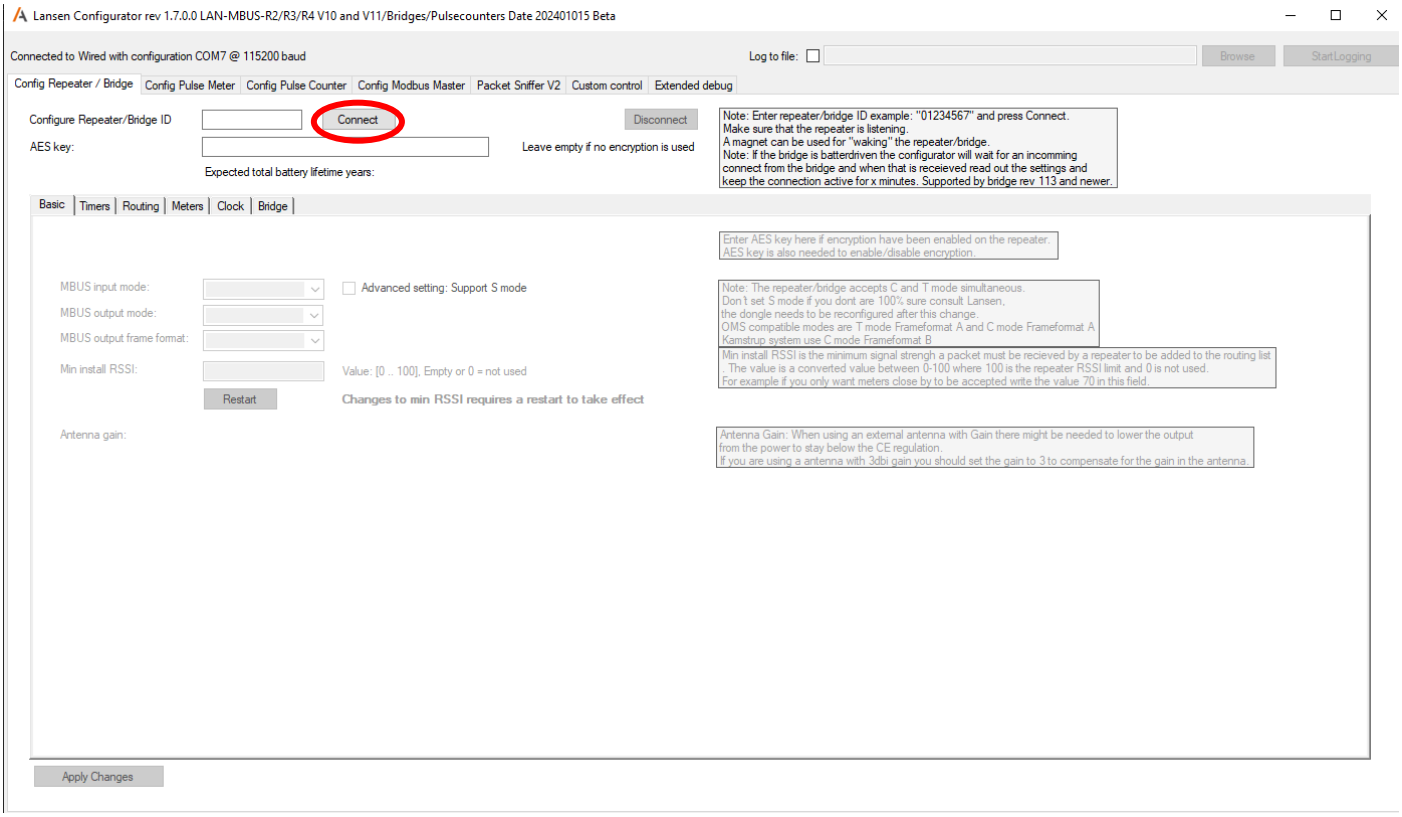
IMPORTANT: When using a wired cable, the cable itself will supply the gateway with power.

To connect to the gateway using a USB to USB-C cable, perform the steps below.
Select the dropdown menu where it says “Dongle” and change the setting to “Wired Connection”.

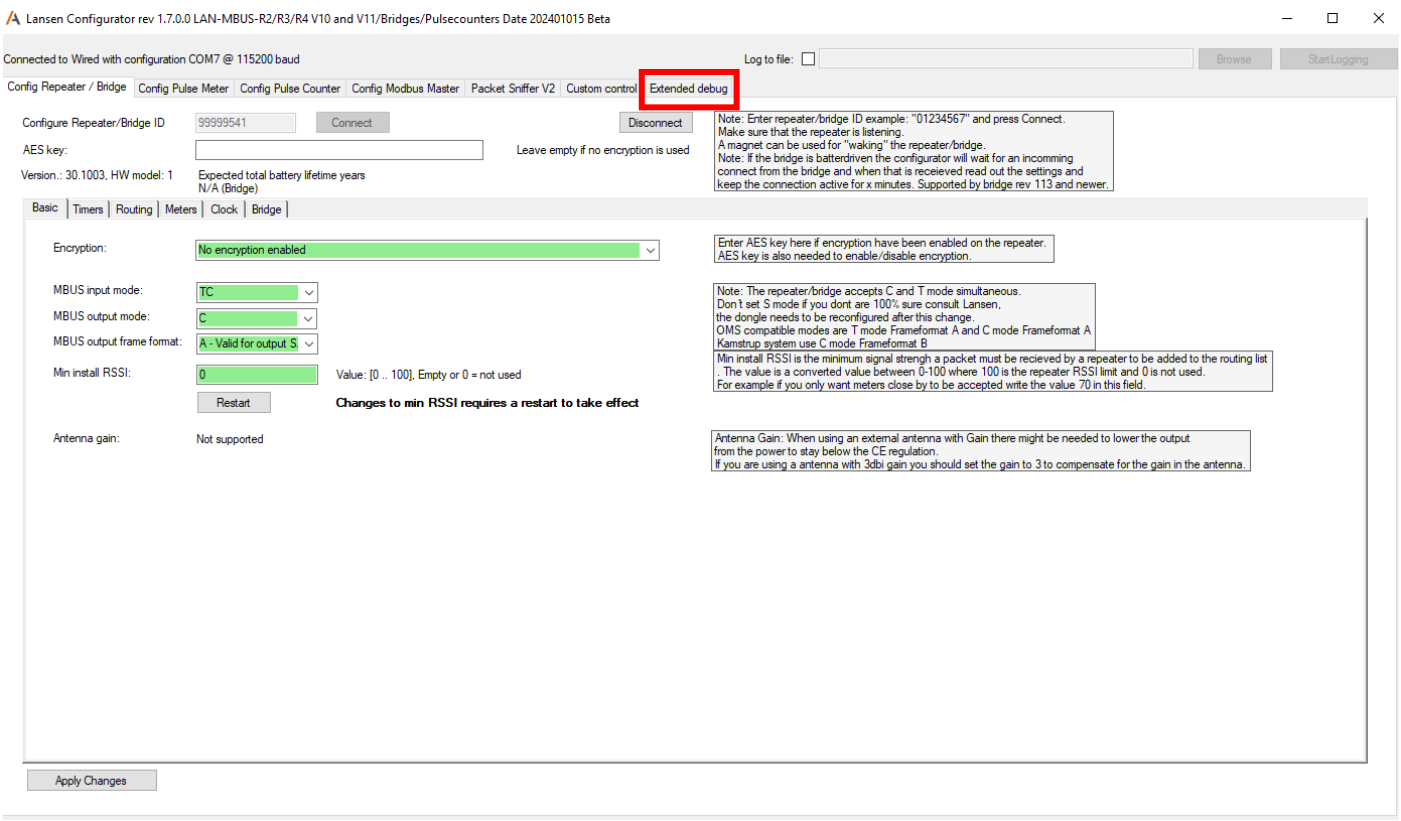
If the program fails to connect to the device, try to select the com-port manually by changing the field from ‘Auto’ to the com-port of the wire. Also make sure that the startup sequence is finished before connecting by wire.



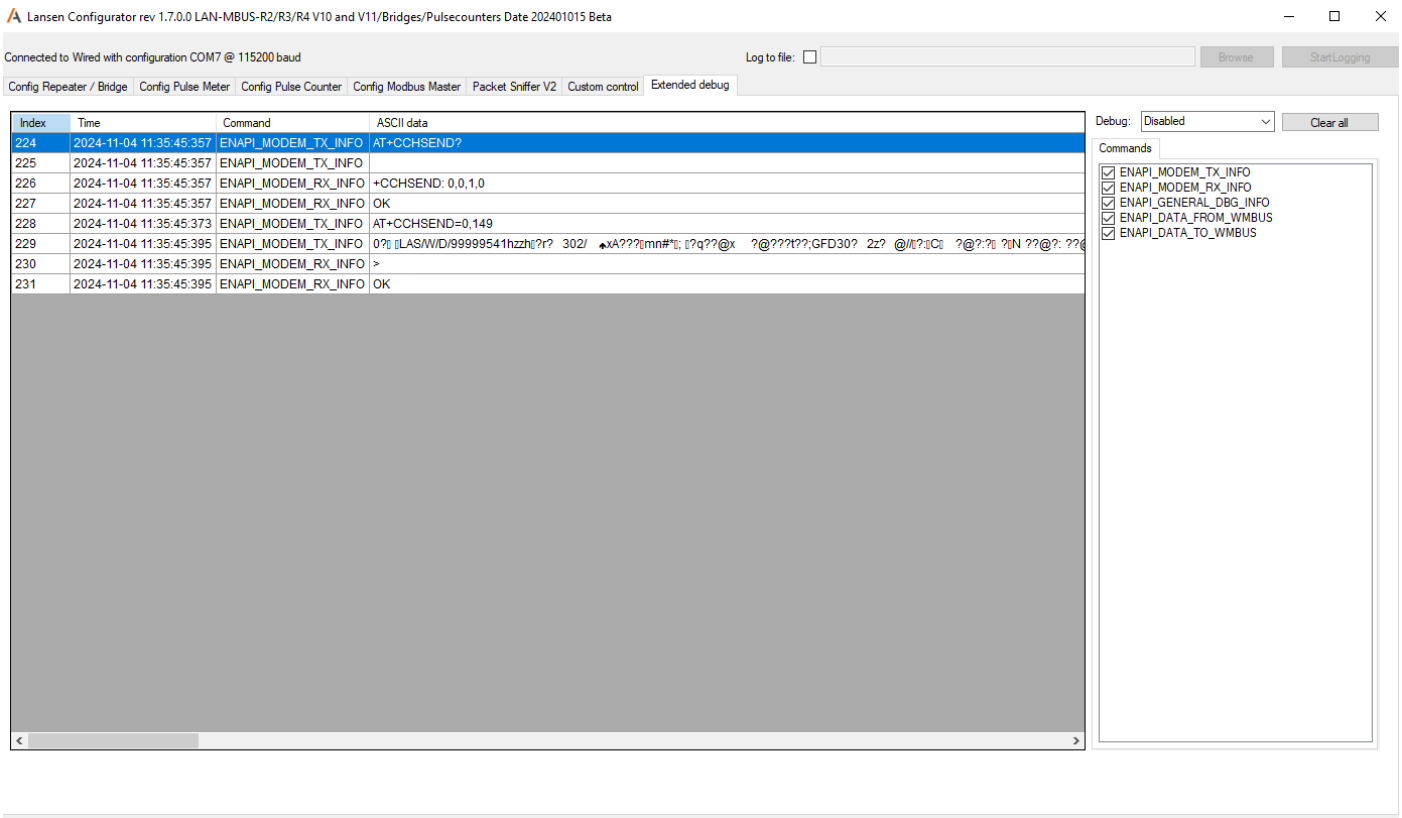
To change the settings to the gateway one must first connect to the gateway. This is done by putting in the serial number which can be found on the poke protection or the front label on the device, then clicking ‘Connect’. Once you have connected to the device you can change all the settings and parameters. The packet sniffer will not be operating when connected through wire.



When connected through wire you can now also go into a new feature called the “Extended Debug”.



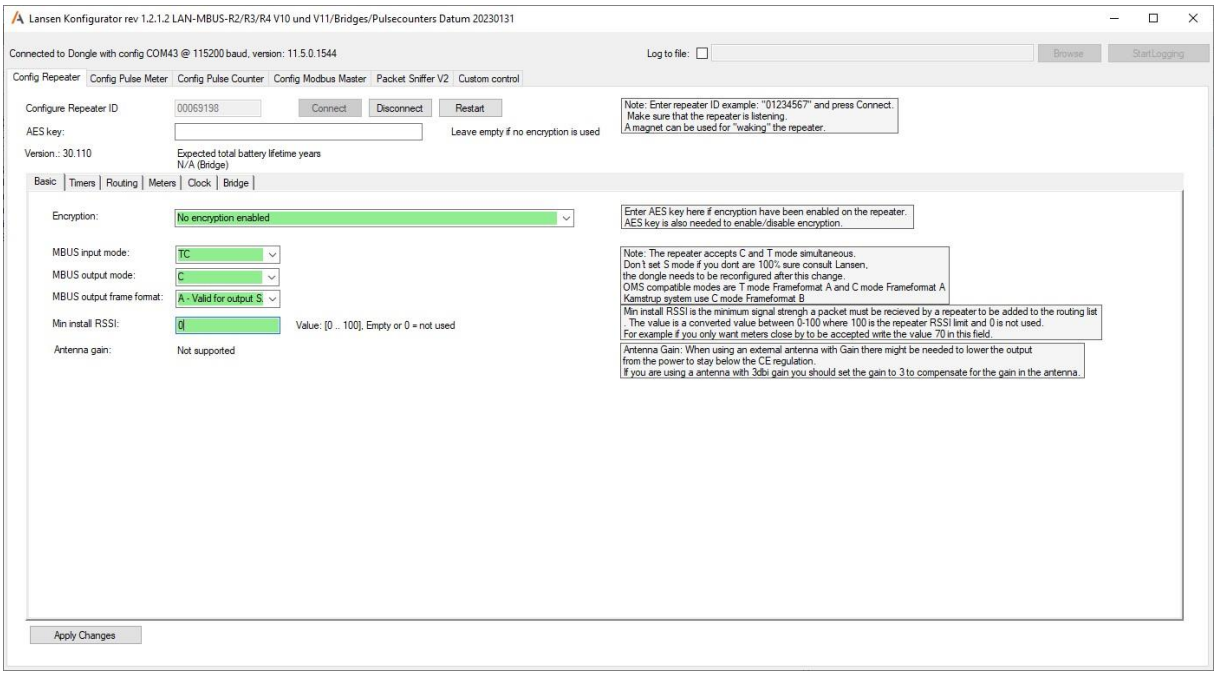
This area of the configurator allows you to see the AT commands to further debug and see what is going on with the gateway if needed, simply select “Enabled” in the top right corner and it will start as long as the MQTT is active on the gateway. Make sure to disable the extended debugger when you are done looking at the AT commands.



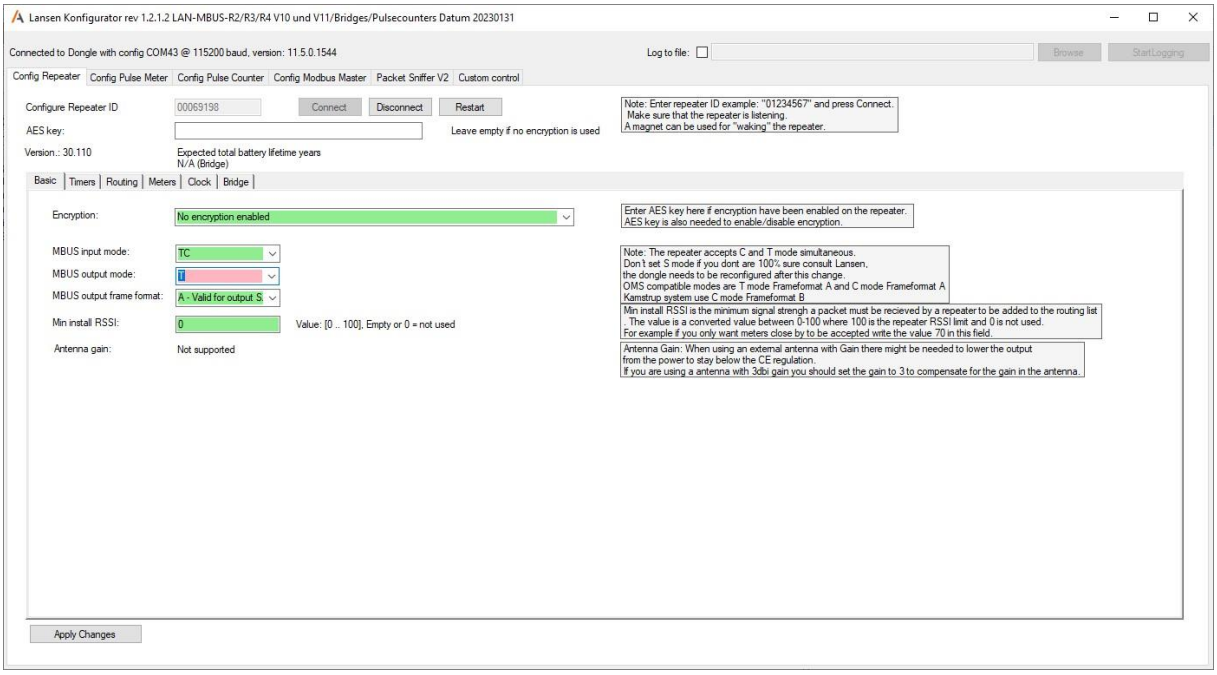
Configuration settings for a gateway

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 Lansen USB-dongle**, the wired connection (see chapter **Connect to the gateway using a USB to USB-C cable (wired)**, 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 gateway, 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 are supported by the Gateway.

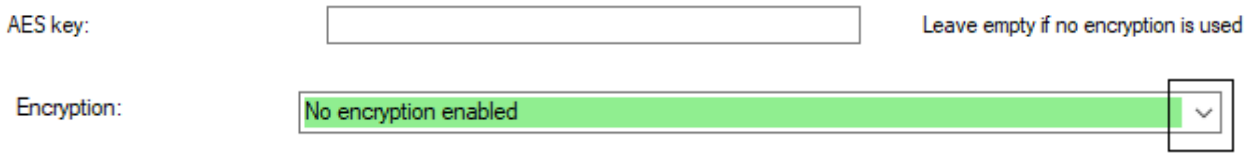
Basic-tab

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 a LAN-WMBUS-D1/D2-TC configuration device.
Note: The AES key is not needed when configuring the device using an active MQTT connection.

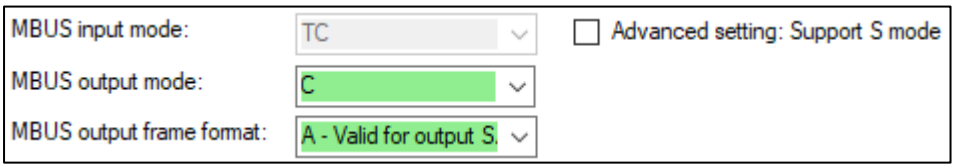


The different encryption options can be seen by clicking on the arrow marked by a box in the picture above. There are four options available, see table below. To change from one option to another, the correct AES key must be written in the field *AES key*.

Option	**Meaning**
No encryption enabled	Encryption is not enabled (default). 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. 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. 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 C- and T-mode data.

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 is 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 gateway 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.

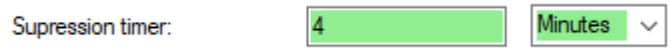
NOTE: This parameter is only applicable to models which have external antenna on the w-MBus interface (ending with an -X on the label).

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 wakeup on specific days, e.g., Mondays.

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.

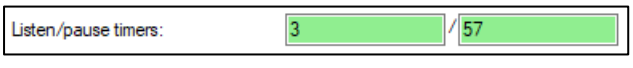
Time field:
The time set in this field indicates what time (UTC) each day the gateway will wake up and store packets. The time defined in this field must be equal or less than the chosen period interval. Furthermore, the gateway will be listening for the time defined in the parameter *Listen/pause timers*.

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.



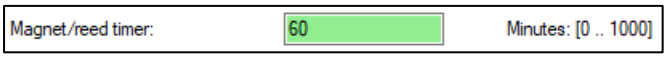
The ratio between these two settings will affect the expected lifetime of the battery in the gateway and should be set according to the need for data from meters.

Note: For mains-operated gateway (LAN-WMBUS-GW5-M), this parameter can be set to 1/0 (always listening).

Note: This parameter should be the same for all battery-operated repeaters and gateways in the same setup.

Magnet reed timer

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.

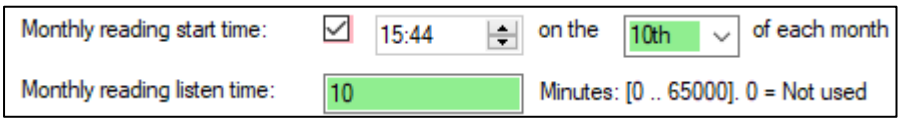


This mode is activated by using a permanent magnet to the left of the label, on the enclosure. This will cause the gateway to beep and wake up.

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*.

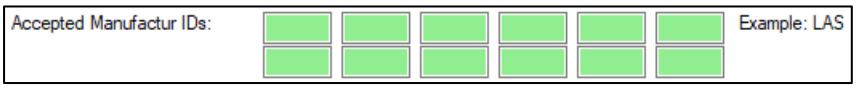
Monthly reading start time

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.



Accept Manufacturer ID

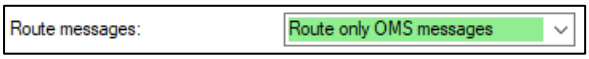
This parameter is used if the gateway should only store packets from meters with a specific manufacturer code. In other words, this is manufacturer code filtering. This is useful in areas where different companies and manufacturers are active. If all fields are empty, no filtering is done by the gateway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



Route messages

This parameter has two options:

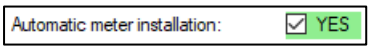
- Route only OMS messages: The gateway will only store OMS compatible packets
- Route all messages: The gateway stores both OMS and non-OMS compatible packets



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.

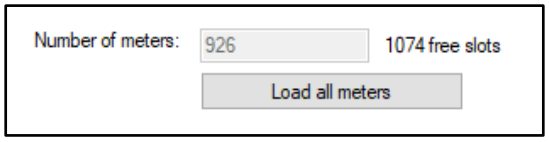
Automatic meter installation



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.

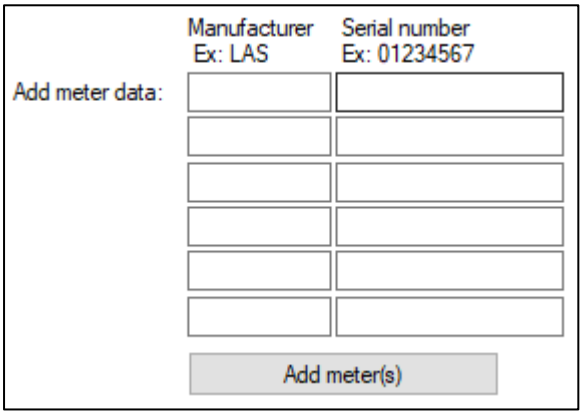
Number of meters



This 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 available. 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.

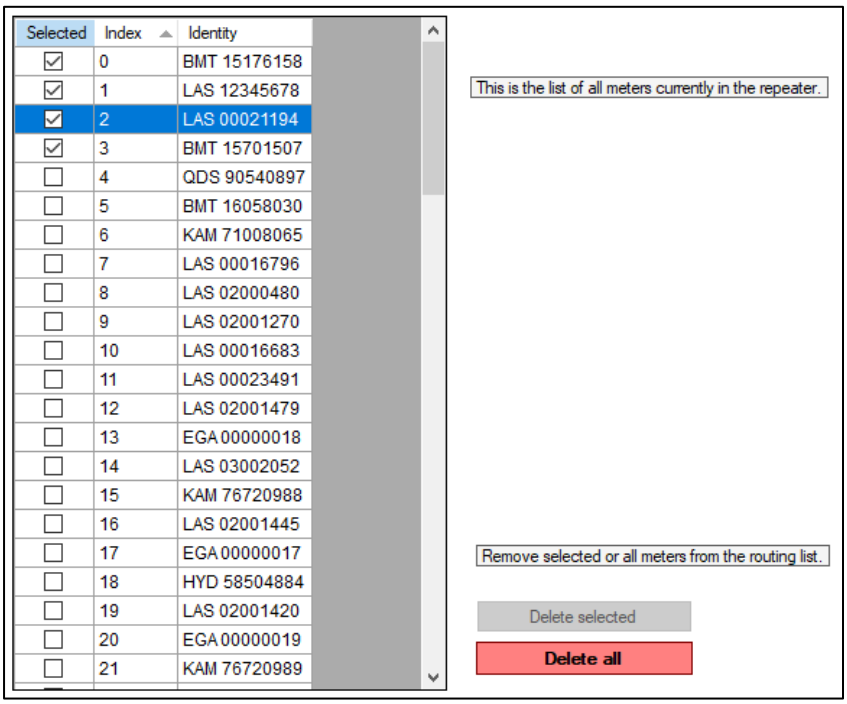
Delete meter(s)

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.

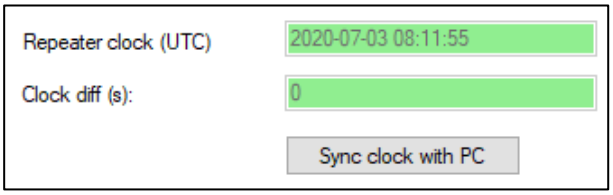
Use the button **Delete selected** if only selected meters should be deleted. Simply mark the meters in the list which are unwanted and click on the button **Delete selected** – the gateway will then remove the selected meters from its internal routing list.

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-GW5 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-M1 and CAT1/4G gateway while others are for the ethernet gateway (Example: B4-M-LR-A1-ETH).

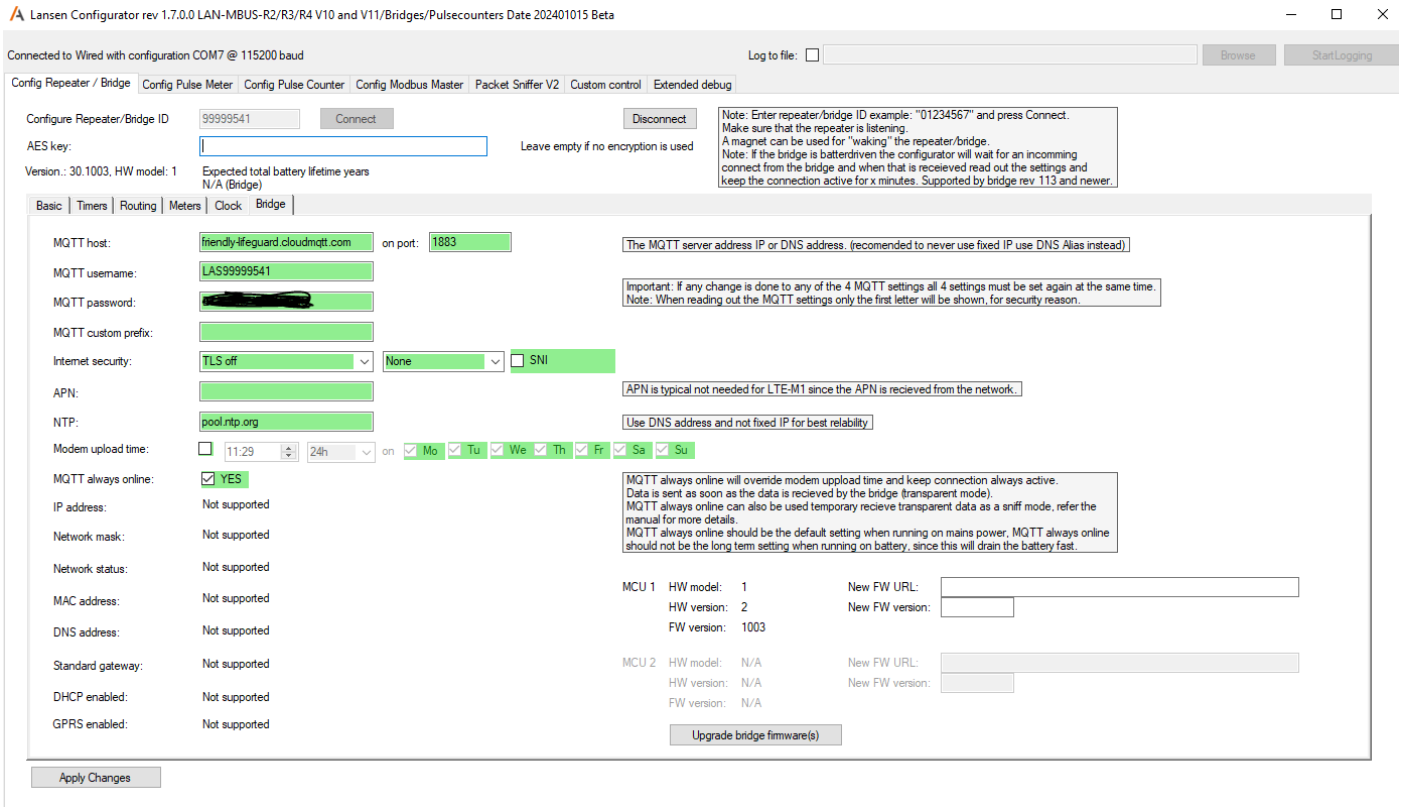
In this tab it is possible to configure the MQTT server addresses. The new setting will come into effect on the next connection to internet or by forcing a new connection to internet by doing a restart. To do a restart, click on the button **Restart** in the *Basic* tab.

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 gateway. Meaning if only 1 parameter is changed the 3 other parameters are also changed to the current value in the GUI.

LTE-M1 and CAT1/4G gateway specific settings

These settings are only applicable for the LTE-M1 and CAT1/4G gateway.



Internet Security

- It is possible to turn on communication using TLS for the gateway when communicating with the MQTT broker.
- Server and client authentication requires preloaded certificates.
- *SNI* checkbox: You can enable or disable the gateway to use SNI when contacting the MQTT broker.

APN

It's possible to enter a specific APN, if needed. For LTE, the APN will be retrieved from the network if left empty in the configurator.

NTP

It is possible to setup 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 battery driven gateway is to first listen for incoming wM-Bus data then setup the gateway to upload the data later the same day.

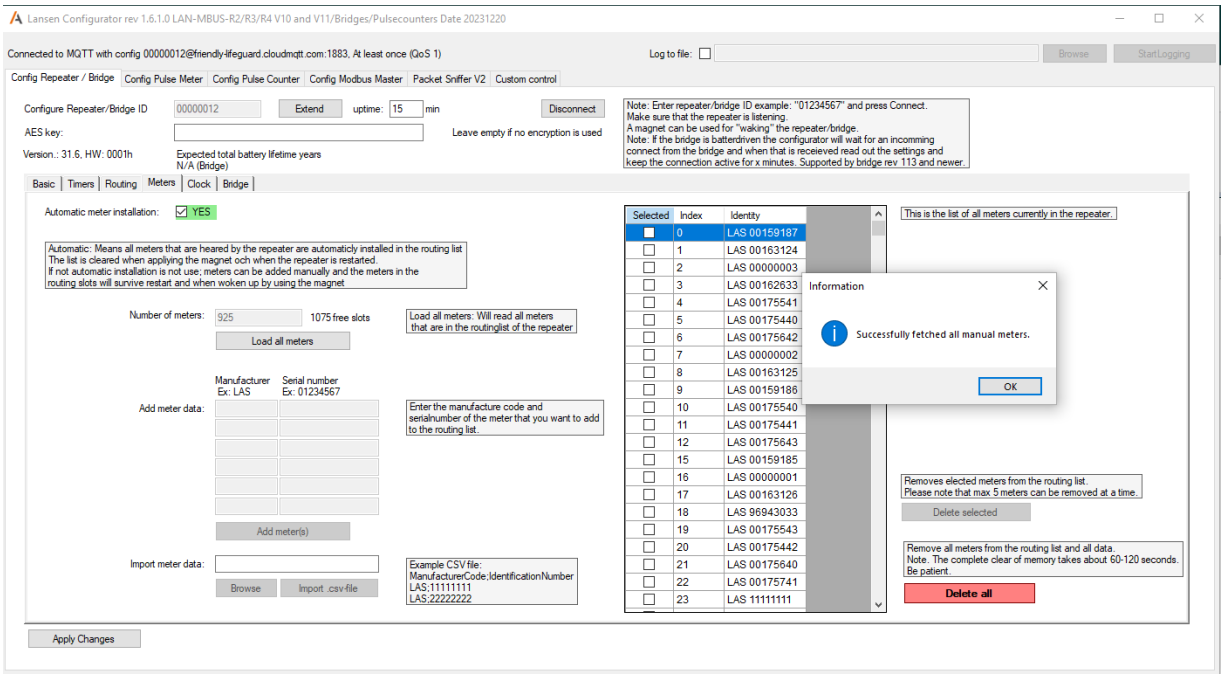
<u>Example:</u>
Listen start time = 05:20
Listen time: 30 minutes
Modem Upload time: 06:00

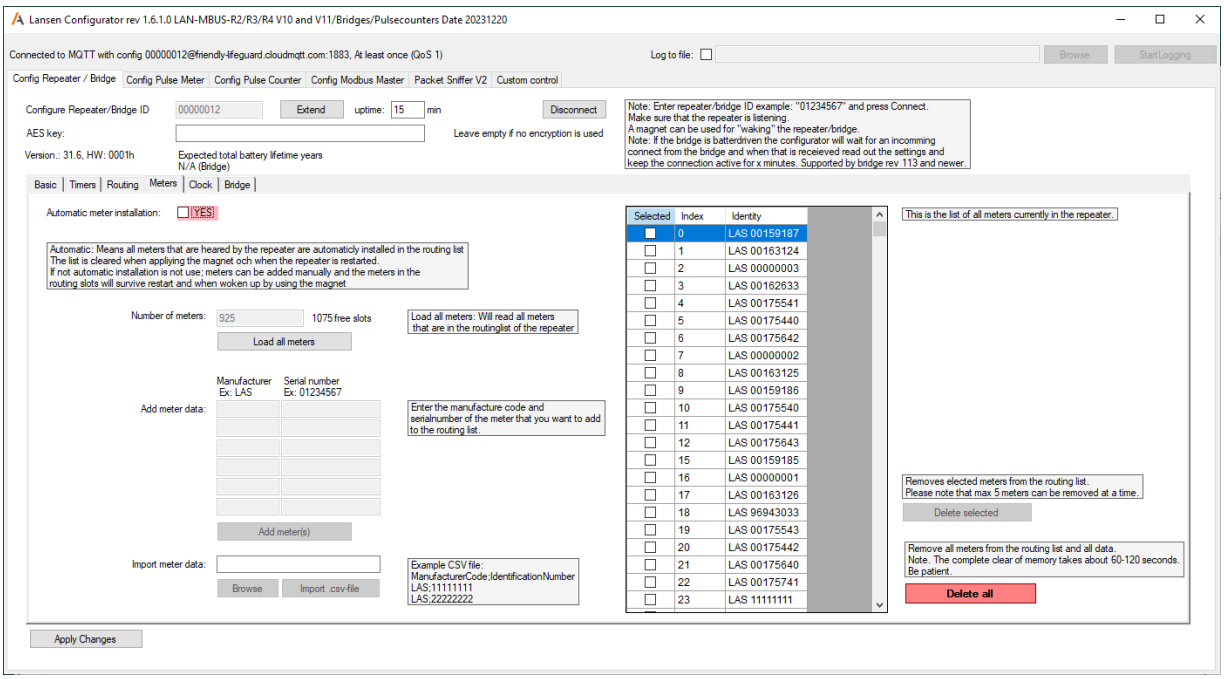
MQTT always online

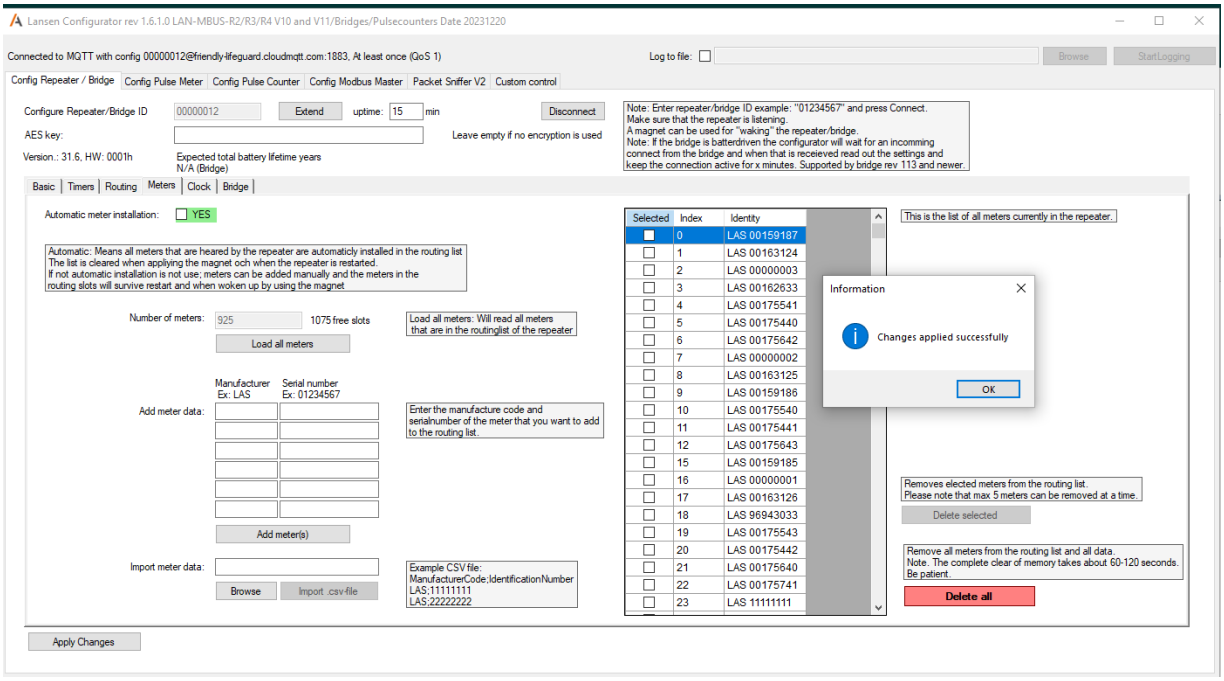
This means that the gateway will always be connected to the MQTT server. If connection drops it will automatically try to connect again.

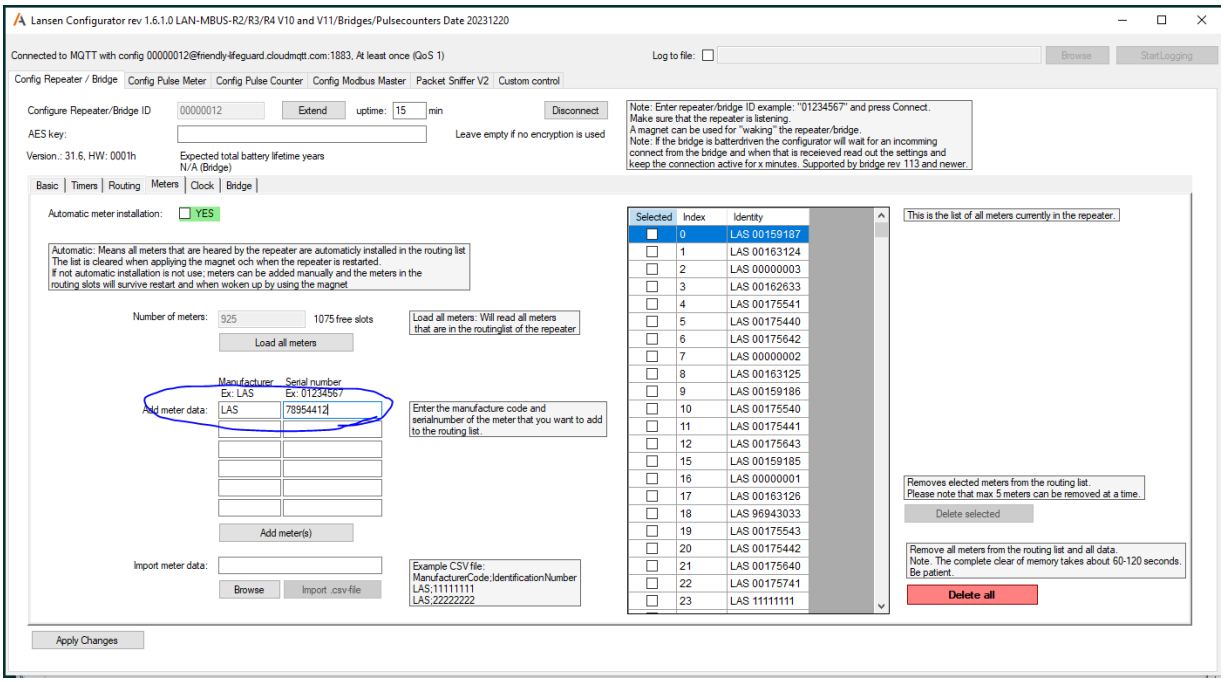
Note: NEVER use this option for battery driven gateways since this will drain power really fast.

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:
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
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.
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Number of meters:
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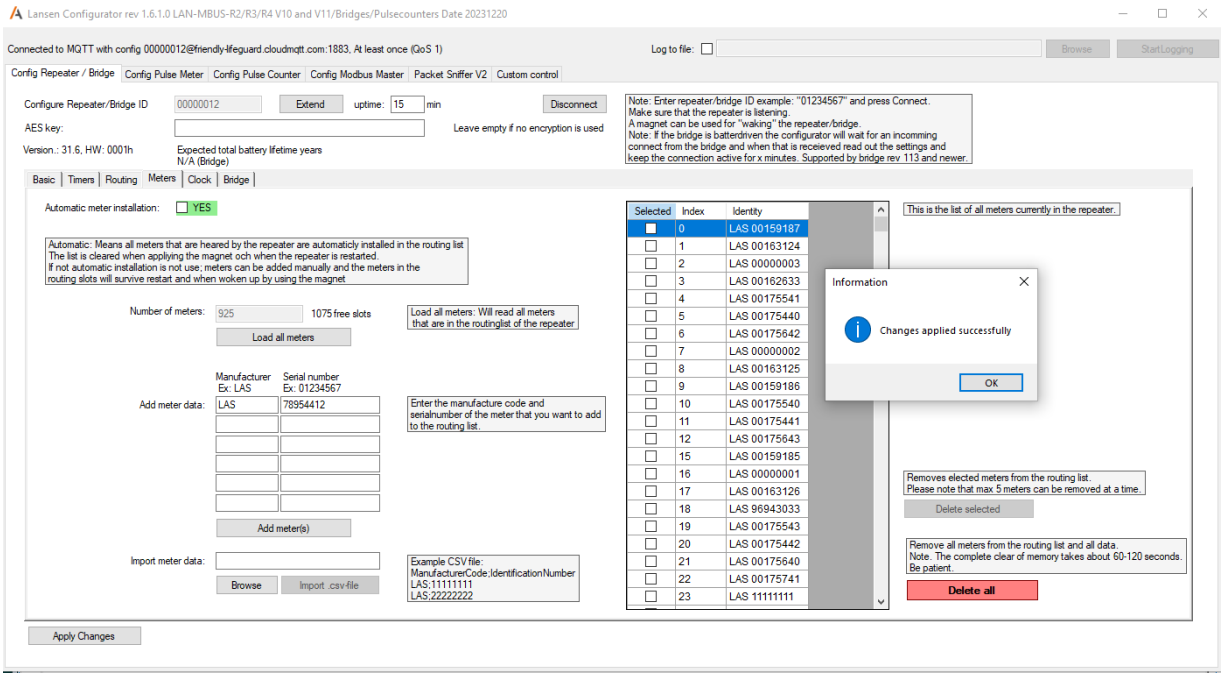
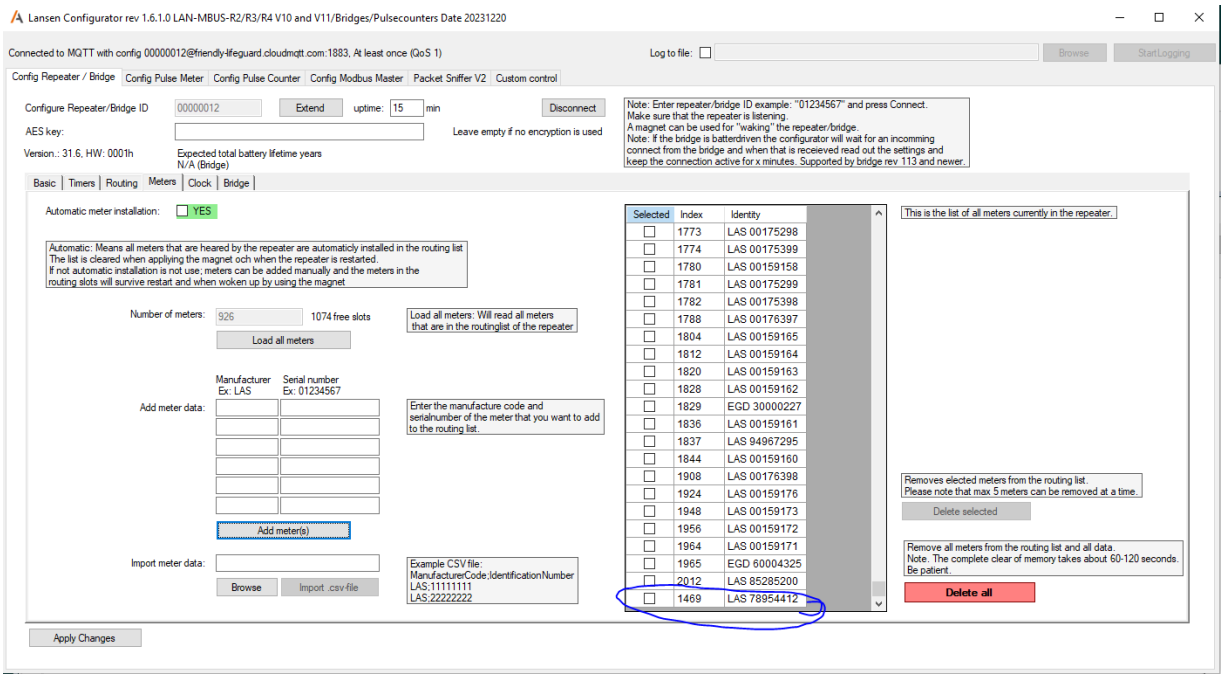
1075 free slots
Load all meters
Load all meters: Will read all meters that are in the routinglist of the repeater
Manufacturer
Ex: LAS
Serial number
Ex: 01234567
Add meter data:
LAS
78954412
Add meter(s)
Enter the manufacture code and serialnumber of the meter that you want to add to the routing list.
Import meter data:
Browse
Import .csv-file
Example CSV file:
ManufacturerCode;IdentificationNumber
LAS;11111111
LAS;22222222
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

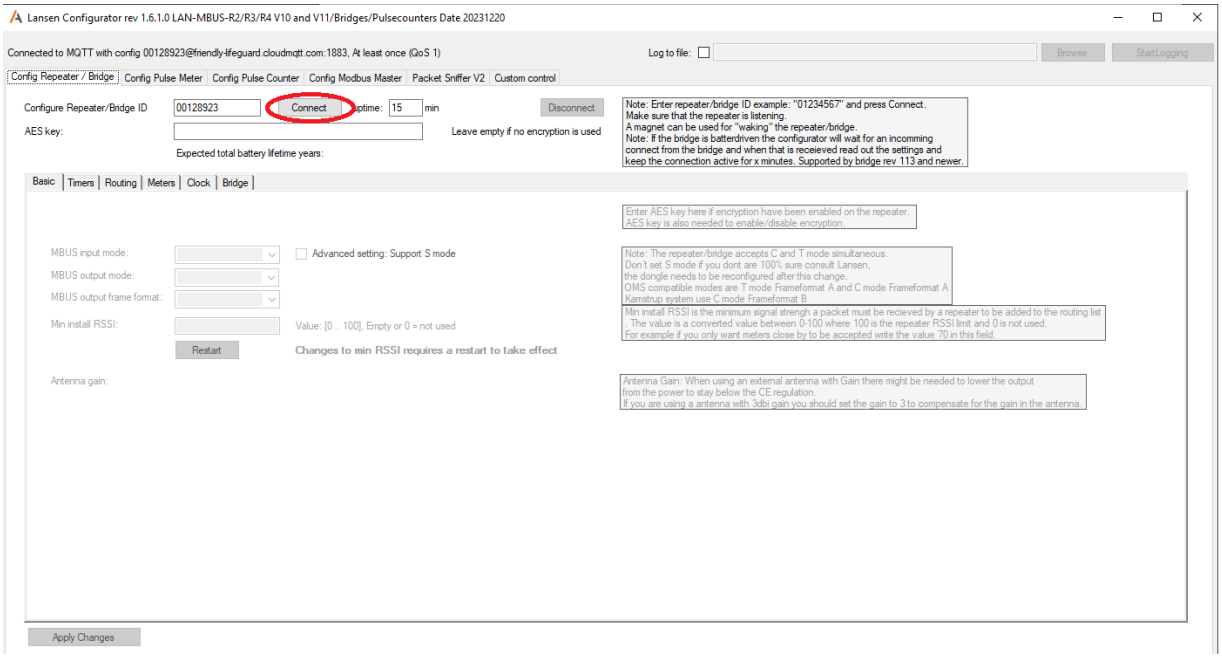

Lansen Configurator rev 1.6.1.0 LAN-MBUS-R2/R3/R4 V10 and V11/Bridges/Pulsecounters Date 20231220
Connected to MQTT with config 00000012@friendly-lifeguard.cloudmqtt.com:1883, At least once (QoS 1)
Log to file:
Browse
StartLogging
Config Repeater / Bridge
Config Pulse Meter
Config Pulse Counter
Config 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)

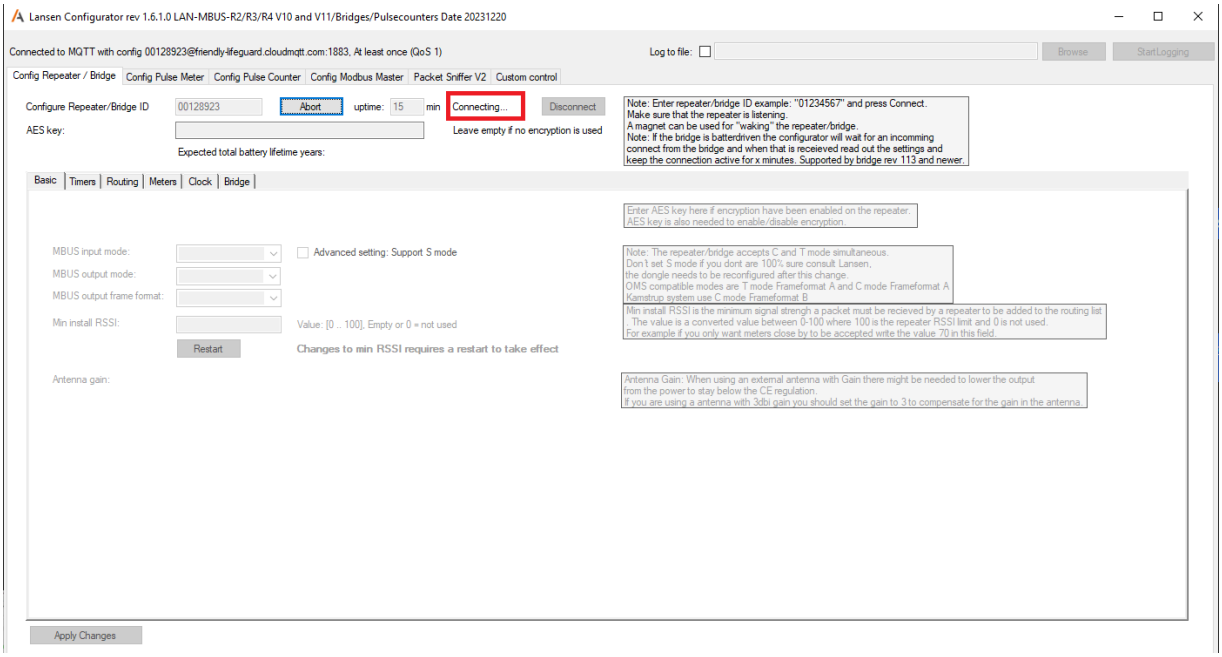
A battery driven gateway is not always online (sleeping), to save battery, and this must be taken into consideration when using Lansen Configurator when trying to connect to a gateway since the connection might not happen right away as it would with a main powered gateway.

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*. This setting is only available if connecting through MQTT.

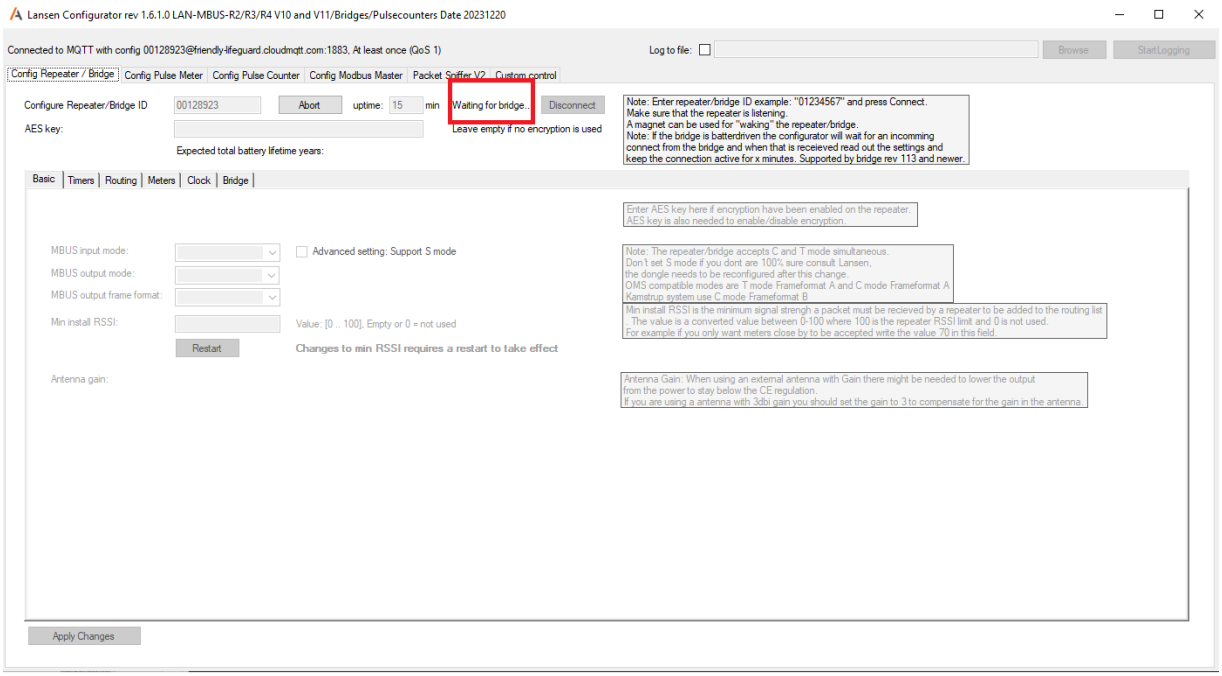
The following images shows the process in detail.
Enter a value for *Uptime*, e.g., 15 minutes, and click *Connect* to retrieve information from the gateway once the gateway is connected to the MQTT server.



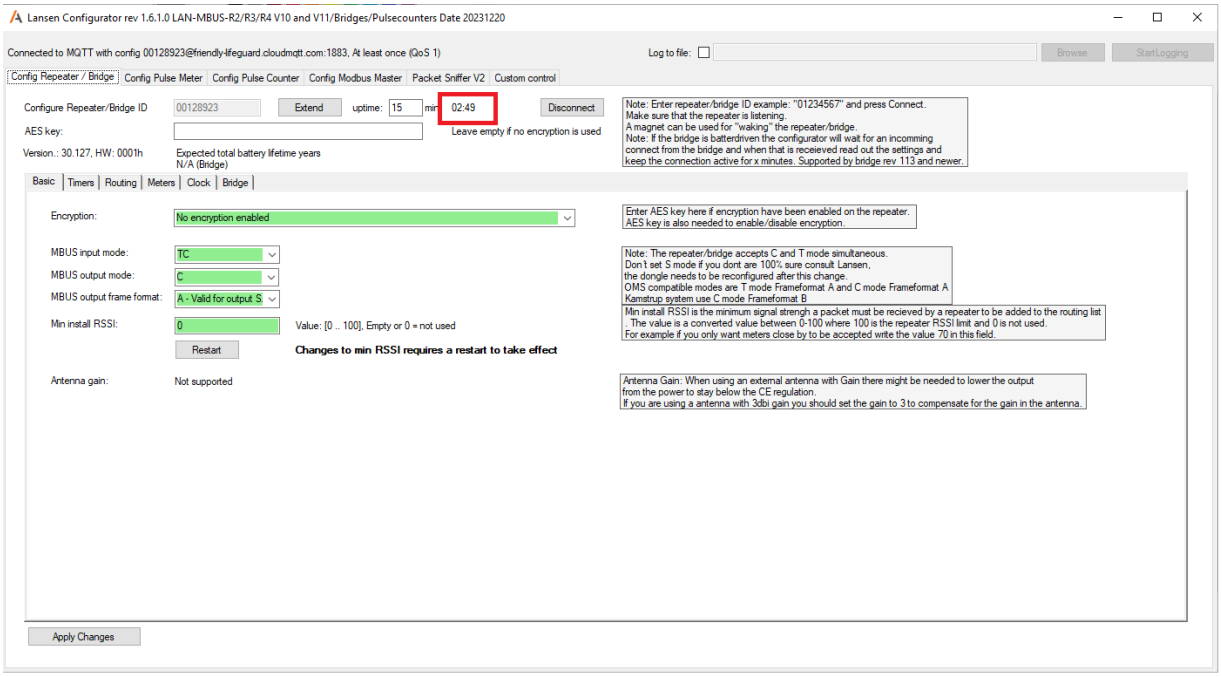
Lansen Configurator tries to connect to the gateway



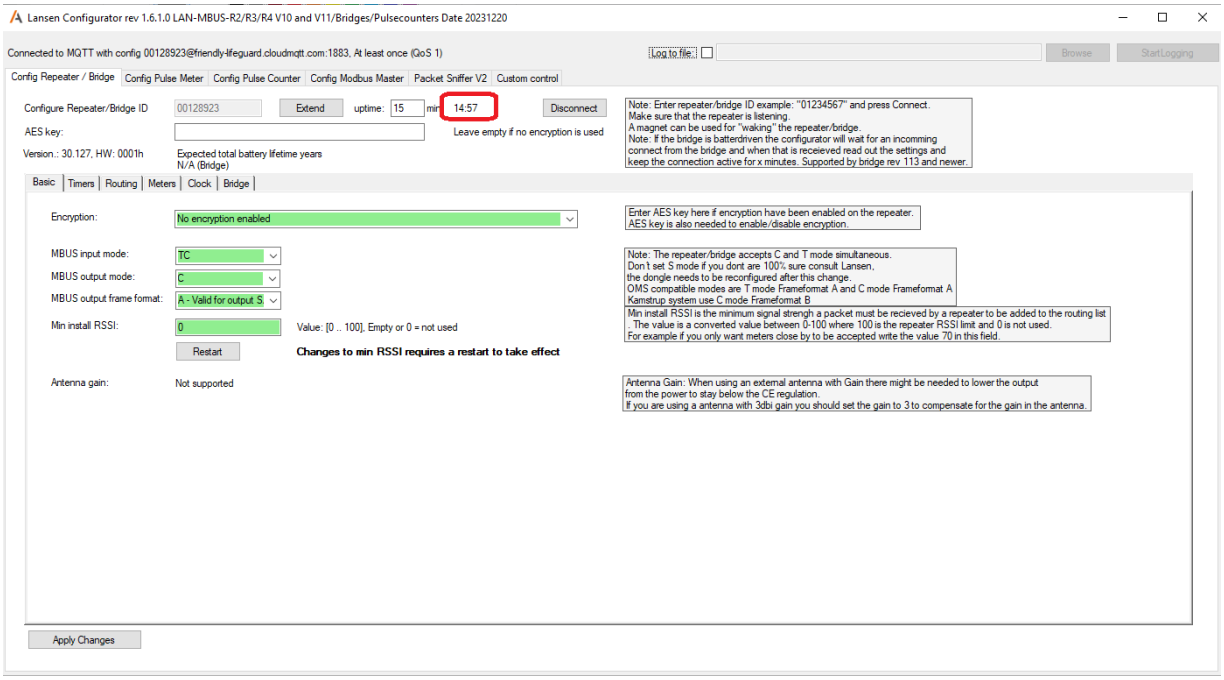
The gateway was offline so the program waits for a connection from the gateway.



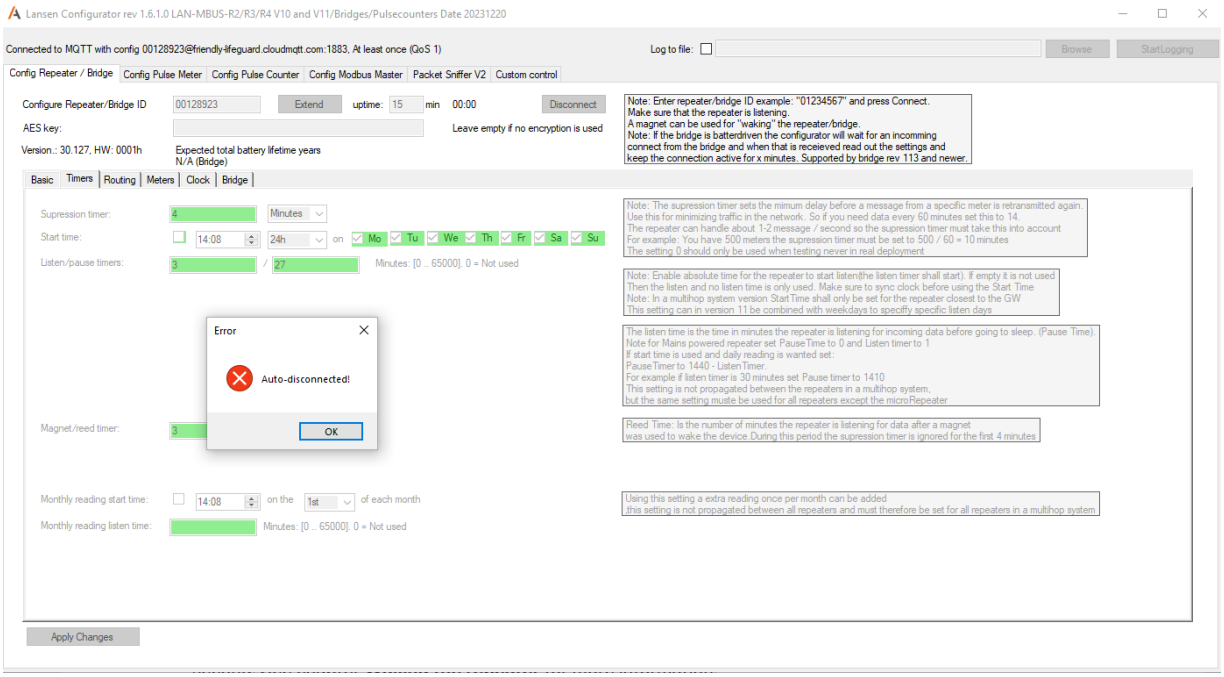
Once the gateway is connected to the MQTT server and connection is established by Lansen Configurator, the countdown of the uptime will start. The counter shows the time left before the gateway shuts down the connection with the MQTT server.



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, the LAN-WMBUS-D1/D2-TC configuration dongle, or by USB to USB-C wired cable.

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 typical takes less than 1 minute.