
WMBUS DATA FORMAT/ TECHNICAL INFORMATION

MBUS MASTER (LAN-WMBUS-MA)



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Verify correct device and version

This document applies to the device LAN-WMBUS-MA with protocol version 4. There are two ways of finding out the protocol version of the device; either by looking at the label on the device or by looking at the data packets sent out by the device. See chapters **Protocol version in data packets** and **Protocol version in label** below for more information.

Protocol version in data packets

If it is possible to check the information in the data packets sent out by the device, then the protocol version is included in the data field called *A-Field Protocol version*. For more information, see chapter

Meters found	Sound indication
0	5 seconds 1 time
1-16	1 time for 0,5 second for each found meter with 0,1 s silence.
17-500	32 short beeps 0,1 second long with 0,1 s silence.

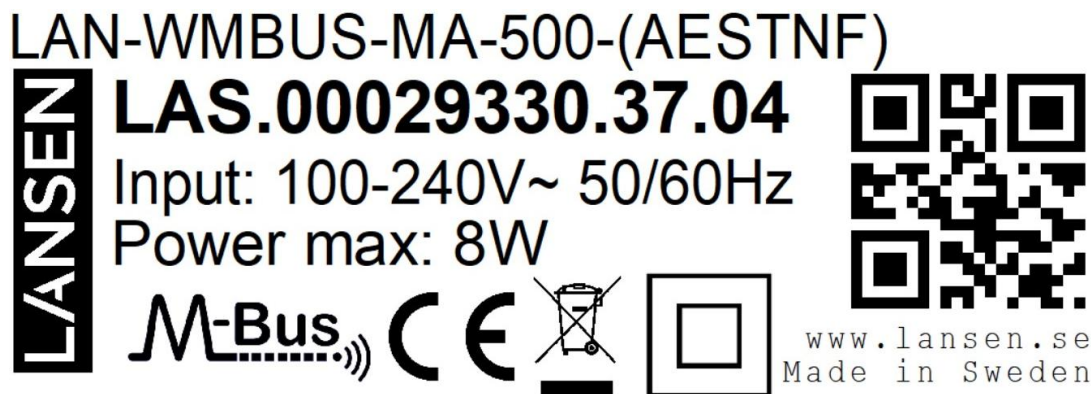
Table 3 above is the sound indication after search process is completed. .

WMBUS-format.

Protocol version in label

The protocol version can be found on the label. An example of a label is shown in the figure below and the relevant information is described by LAS.00029330.37.04, where

- **Manufacturer code:** LAS
- **Serial number:** 00029330
- **Device type:** 0x37
- **Protocol version:** 0x04
- **Configuration of the device:** AESTNF (see chapter **Possible configurations from order code**)



Installation

Please refer to our document [Quick_Installation_Guide_MA](#).

MBUS parameters

The MBUS master as default only supports 2400 baud with secondary addressing. Note that all ID-numbers (MAN.**ID**.VER.TYPE) on the bus must be unique.

Encryption

As default, all data is sent encrypted. The same encryption key is used for all meters connected to each specific MBUS master. If the wired MBUS data is already encrypted no further encryption will be performed by the MBUS master.

Sequence number

As standard, separate sequence number (transmission counter) is derived from each meter. The status packet, which is sent out by the MBUS master, uses a separate sequence counter.

Possible configurations from order code

The letters inside the parentheses at the end of the device name, LAN-WMBUS-MA-X-(AESTNFR), describes how the MBUS master has been configured during manufacture, as seen below.

X = Number of supported devices. Possible options are: 1, 4, 8, 16, 32, 64, 128, 256, 500.

A = **A**lternative addressing used (see chapter **Alt2: Alternative address handling**).

E = No **E**ncryption.

S = No **S**tatus message (packet from chapter **Status packet** is never sent).

T = Do not **T**ransmit empty packet if no response from meter (packet from chapter **No response from meter**).

N= Do not search for **N**ew meters every X hours.

F= Stop start sequence if no meter is **F**ound (constant beep until meter is found).

R = Increased **R**eadout speed, more often. This is the default setting. (see chapter **Transmission time by MBUS master**).

Standard configuration for LAN-WMBUS-MA-X

- Standard address handling used (see chapter **Alt1: Standard address handling**).
- Encryption on.
- Transmits status message (see chapter **Status packet**) every 5 minutes.
- Transmits empty packet (see chapter **No response from meter**) if no response from meter.
- Search for new meters every 48 hours if less than 32 meters are on the bus or every 7 days if 32 or meters are currently found on the bus.
- Continue start sequence even if no meter is found.
- Default readout speed

USB Power

During testing devices with a micro-USB connector can be powered using a 5V USB cable, for maximum 7 loads. For final installation 230V AC must be used as written on the label.

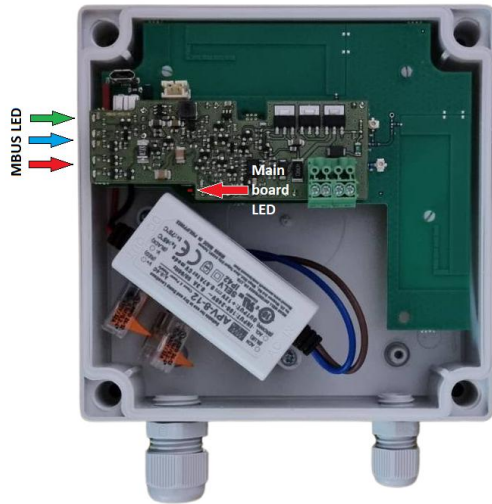
CAUTION! Do not connect USB and 230V AC at the same time. This may damage the USB host.



LED indications on the MBUS master

There are two locations with LEDS, as seen in the picture below. The red LED on the main board flashes according to:

- 1 time for about 0,25s for each meter found by the MBUS master.
- 3 times at 0.5Hz every 30 seconds if no meter is found by the MBUS master.



On the side of the device are five MBUS LEDs which indicate according to the table below.

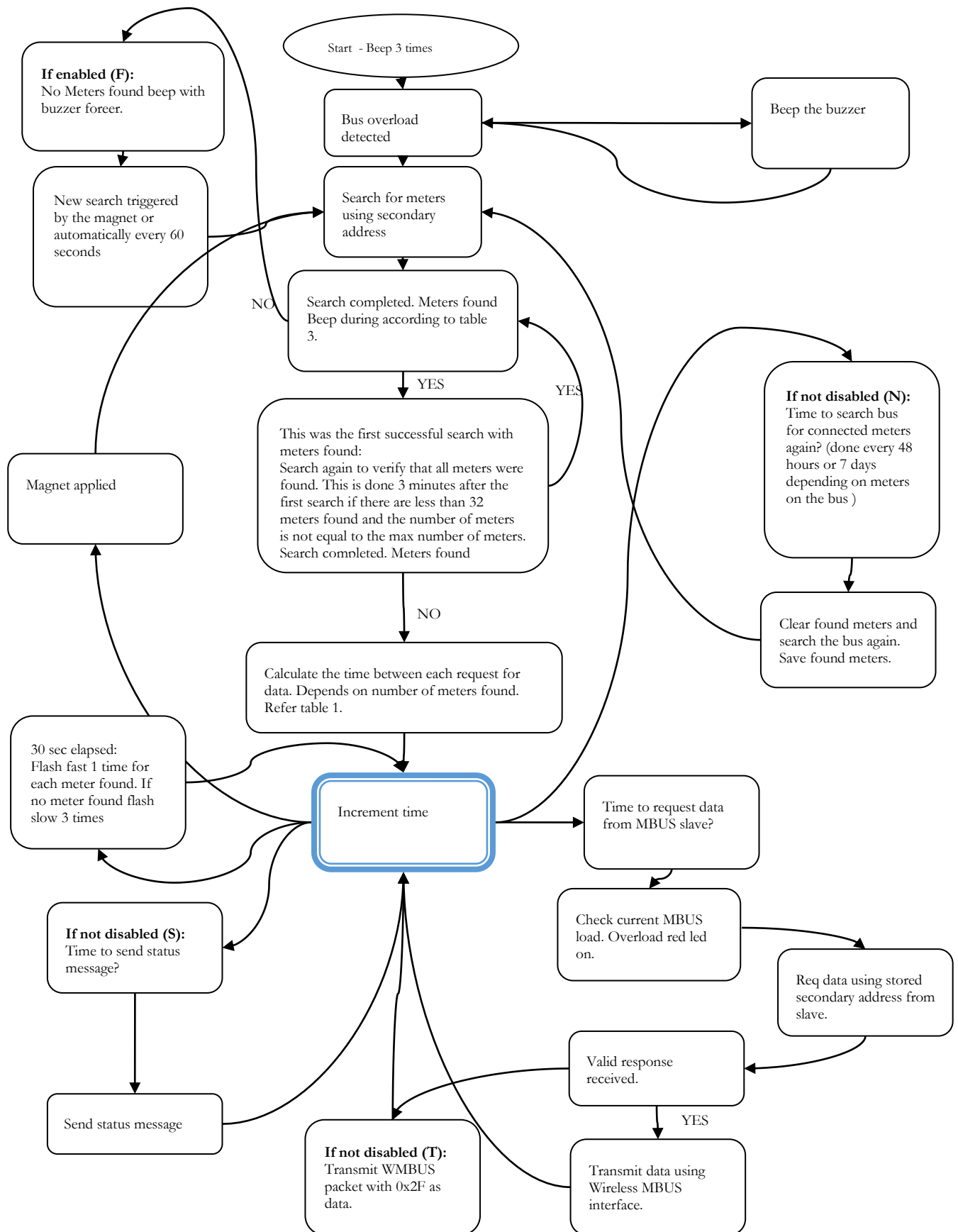
Name	Color	Condition	Indication
PWR	Green	Normal	On when power is applied to the device.
TX	Blue	Normal	Quick flash when serial data is transmitted from the MBUS master on the bus.
RX	Green	Normal	Quick flash when data is received from an MBUS slave OR if there was a fast change in the bus load.
A	Red	Alarm	On for minimum 5s or until overload condition has been resolved (Software overload detection).
B	Red	Alarm	On during overload condition (Hardware overload detected).

Transmission time by MBUS master

The MBUS master sends out wMBUS packets at fixed intervals, and the transmission interval depends on how many meters is found, as seen in the table below.

Meters found	Transmission interval (in minutes) until each specific meter is read and transmitted by the MBUS master	
	Reduced	Increased (Default)
251-500	120	120
101-250	90	90
51-100	60	60
17-50	30	30
9-16	15	10
5-8	15	5
1-4	15	3

MBUS master flow chart



Meters found	Sound indication
0	5 seconds 1 time
1-16	1 time for 0,5 second for each found meter with 0,1 s silence.
17-500	32 short beeps 0,1 second long with 0,1 s silence.

Table 3 above is the sound indication after search process is completed. .

WMBUS-format

The MBUS master can be ordered to use one of the alternatives below. The difference is how the link layer (LLA) and network layer (ALA) is used.

Alt1: Standard (see chapter Alt1: Standard address handling)

This version strictly follows *EN 13757 handling of radio converter*. The LLA address is in this case the address of the MBUS converter while the ALA address is the meter address.

Alt2: Alternative (see chapter Alt2: Alternative address handling)

This is the compatibility mode for receivers/gateways that cannot handle different addresses for LLA and ALA. In this case, the meter address is used both for ALA and LLA, thus making wired meters behave exactly as a wireless meter.

Alt1: Standard address handling

Example of readout from a Lansen wired temperature sensor with serial number 11223344. Note that the LLA address is the address of the MBUS master while the ALA address is the meter address with CI-field set to long header. This alternative fits less data in each packet compared to the alternative address handling (224 bytes instead of 240 bytes).

Art nr.	LAN-WMBUS-MA-X				
Version	4 (0x04)				
Information	Packet is sent every x seconds in T-mode. Depending on the number of connected meters.				
DR1	Temperature: Last measured value				
DR2	Humidity: Last measured value				
Byte No	Field Name	Content	Info	Byte data	
1	L-Field	Length			Link layer (LLA)
2	C-Field	SND-NR		0x44	
3	M-Field	Meter Manufacturer code	LAS	0x33	
4	M-Field	Meter Manufacturer code		0x30	
5	A-Field	Device serial number (LSB)	Example: 0001067	0x67	
6	A-Field	Device serial number		0x00	
7	A-Field	Device serial number		0x01	
8	A-Field	Device serial number (MSB)		0x00	
9	A-Field	Protocol version		0x01	
10	A-Field	Meter type	Radio converter unit	0x37	
11	CI-Field	Long header		0x72	Network layer (ALA)
12	Meter-ID	Connector meter serial number	Example: 11223344	0x44	
13	Meter-ID	Connector meter serial number		0x33	
14	Meter-ID	Connector meter serial number		0x22	
15	Meter-ID	Connector meter serial number		0x11	
16	Meter-Man	Meter manufacturer code	Example: LAS	0x33	
17	Meter-Man	Meter manufacturer code		0x30	
18	Meter-Ver	Meter version		0x01	
19	Meter-Med	Meter medium	Example: Room sensor	0x1B	
20	Access.No	Transmission counter		0x02	
21	Status	Device status (error/alarms)		0x00	
22	Configuration	Number of encrypted blocks	Example: 3	0x03	
23	Configuration	Encryption		No encryption: 0x00 Encryption mode 5: 0x05	
24	AES-Verify	Encryption Verification		0x2F	DATA blocks
25	AES-Verify	Encryption Verification		0x2F	
26	DR1	DIF	16-bit integer	0x02 = Value OK 0x32 = Value not OK	
27	DR1	VIF	External temperature 0.01°C	0x65	
28	DR1	Value (LSB)	Example: 0x0011	0x11	
29	DR1	Value (MSB)		0x00	
30	DR2	DIF	16-bit integer	0x02 = Value OK 0x32 = Value not OK	
31	DR2	VIFE	Extension table	0xFB	
32	DR2	VIFE	Relative humidity 0.1%RH	0x1A	
33	DR2	Value (LSB)	Example: 0x0102	0x02	
34	DR2	Value (MSB)		0x01	

Alt2: Alternative address handling

Example of readout from a Lansen wired temperature sensor with serial number 11223344. Note that the LLA address is a copy of the ALA address and that the CI-field is set to short header with this alternative. By using this alternative, more MBUS data can fit into each packet (maximum 240 bytes of data).

Art nr.	LAN-WMBUS-MA-X-A				
Version	Version from meter				
Information	Packet is sent every x seconds in T-mode. Depending on the number of connected meters.				
DR1	Temperature: Last measured value				
DR4	Humidity: Last measured value				
Byte No	Field Name	Content	Info	Byte data	
1	L-Field	Length			Link layer (LLA)
2	C-Field	SND-NR		0x44	
3	M-Field	Meter Manufacturer code	LAS	0x33	
4	M-Field	Meter Manufacturer code		0x30	
5	A-Field	Device serial number (LSB)	Example: 11223344	0x44	
6	A-Field	Device serial number		0x33	
7	A-Field	Device serial number		0x22	
8	A-Field	Device serial number (MSB)		0x11	
9	A-Field	Protocol version		0x01	
10	A-Field	Meter type		0x1B	
11	CI-Field	Short header	Example: 7	0x7A	Network layer (ALA)
12	Access no.	Transmission counter. From Meter		0x07	
13	Status	Device status (error/alarms) From Meter		0x00	
14	Configuration	Number of encrypted blocks	Example: 7	0x07	
15	Configuration	Encryption	Encryption mode 5	0x05	
16	AES-Verify	Encryption Verification		0x2F	DATA blocks
17	AES-Verify	Encryption Verification		0x2F	
18	DR1	DIF	16-bit integer	0x02 = Value OK 0x32 = Value not OK	
19	DR1	VIF	External temperature 0.01°C	0x65	
20	DR1	Value (LSB)	Example: 0x0011	0x11	
21	DR1	Value (MSB)		0x00	
22	DR4	DIF	16-bit integer	0x02 = Value OK 0x32 = Value not OK	
23	DR4	VIF	Extension table	0xFB	
24	DR4	VIFE	Relative humidity 0.1%RH	0x1A	
25	DR4	Value (LSB)	Example: 0x0102	0x02	
26	DR4	Value (MSB)		0x01	

No response from meter

This packet is sent out if a meter which has previously been found does not respond anymore. Note that the LLA-address in this packet contains the meter address. This packet is transmitted so that the receiver/gateway can detect that the data, thus also the meter, is lost.

For this packet, the Status-byte in the network layer is set to 3 and the data block is filled with filler bytes (0x2F). Note that the sequence number for meters that do not respond is always set to a random number for this packet.

Art nr.	LAN-WMBUS-MA-X			
Version	4 (0x04)			
Information	Packet is sent every x seconds in T-mode. Depending on the number of connected meters.			
Field name	Content	Info	Byte data	
L-Field	Length			
C-Field	SND-NR		0x44	
Information according to Alt1: Standard address handling or Alt2: Alternative address handling .				Link layer (LLA) + Network layer (ALA)
AES-Verify	Encryption Verification		0x2F	DATA blocks
AES-Verify	Encryption Verification		0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	
Filler bytes			0x2F	

Status packet

Additional to the converted Wired MBUS packet, the MBUS master also transmits its status every 5 minutes. This packet contains important diagnostic information, and this packet is always sent non-encrypted.

Art nr.		LAN-WMBUS-MA-X			
Version		4 (0x4)			
Information		Packet is sent every 5 minutes in T-mode.			
DR1		Used bus loads mA.			
DR2		Bus status Overload detected.			
DR3		Overloads detected last 24 hours.			
DR4		Max supported meters. The number of logical meters that this version of MBUS master support			
DR5		Meters found by the MBUS master on the bus.			
DR6		Number of meters that have not responded on the last request. (TBI)			
DR7		Power to the device 12V for ACDC version.			
DR8		Time until new bus scan will happen in minutes.			
DR9		SW Version Other software version.			
Byte No	Field Name	Content	Info	Byte data	
1	L-Field	Length			Link layer (LLA)
2	C-Field	SND-NR		0x44	
3	M-Field	Meter Manufacturer code	LAS	0x33	
4	M-Field	Meter Manufacturer code		0x30	
5	A-Field	Device serial number (LSB)	Example: 11223344	0x44	
6	A-Field	Device serial number		0x33	
7	A-Field	Device serial number		0x22	
8	A-Field	Device serial number (MSB)		0x11	
9	A-Field	Protocol version		0x04	
10	A-Field	Meter type		0x37	
11	CI-Field	Short header		0x7A	Network layer (ALA)
12	Access no.	Transmission counter		0x07	
13	Status	Device status		0x00	
14	Configuration	Number of encrypted blocks		0x01	
15	Configuration	Encryption	Encryption mode 5	0x05	DATA blocks
16	AES-Verify	Encryption Verification		0x2F	
17	AES-Verify	Encryption Verification		0x2F	
18	DR1	DIF	16-bit integer	0x02	
19	DR1	VIF	Extension table	0xFD	
20	DR1	VIFE	Current on the BUS (0.1) mA	0x58	
21	DR1	Value (LSB)	Example: 0x0011	0x11	
22	DR1	Value (MSB)		0x00	
23	DR2	DIF	8-bit integer	0x01	
24	DR2	VIF	Extension table	0xFD	
25	DR2	VIFE	Extension table	0x97	
26	DR2	VIFE	Error codes	0x1D	
27	DR2	Value		0x00 = OK 0x08 BUS overload	
28	DR3	DIF	16-bit integer + Subunit 2	0x82	
29	DR3	DIFE		0x80	
30	DR3	DIFE		0x40	
31	DR3	VIFE	Dimensionless	0x3A	
32	DR3	Value (LSB)		0x00	
33	DR3	Value (MSB)		0x00	
34	DR	DIF	16-bit integer + Storage 1	0x42	
35	DR4	VIF	Extension table	0xFD	
36	DR4	VIFE	Dimensionless	0x3A	
37	DR4	Value (LSB)		0x00	
38	DR4	Value		0x00	
39	DR5	DIF	16-bit integer	0x02	
40	DR5	VIF	Extension table	0xFD	
41	DR5	VIFE	Dimensionless	0x3A	
42	DR5	Value (LSB)		0x00	
43	DR5	Value (MSB)		0x00	
44	DR6	DIF	16-bit integer + Subunit 1	0x82	
45	DR6	DIFE		0x40	
46	DR6	VIFE	Dimensionless	0x3A	
47	DR6	Value (LSB)		0x00	
48	DR6	Value (MSB)		0x00	
49	DR7	DIF	16-bit integer	0x02	
50	DR7	DIFE	Extension table	0xFD	
51	DR7	VIF	Voltage (mV)	0x46	
52	DR7	Value (LSB)		0x00	
53	DR7	Value (MSB)		0x00	

54	DR8	DIF	16-bit integer + Subunit 3	0x82	
55	DR8	DIFE		0xC0	
56	DR8	DIFE		0x40	
57	DR8	VIFE	Dimensionless	0x3A	
58	DR8	Value (LSB)		0x00	
59	DR8	Value (MSB)		0x00	
60	DR9	DIF	16-bit integer	0x02	
61	DR9	VIF	Extension table	0xFD	
62	DR9	VIFE	Version	0x0F	
63	DR9	Value (LSB)		0x00	
64	DR9	Value (MSB)		0x00	

Revision history

Updated (date)	Revision	Updated by	Comments
2021-09-24	4.6	Martin Hallberg	Corrected the behavior the MBUS master do not sound the buzzer when directly when a meter is found. The buzzer is only sound after the search is completed. Added in the flow chart that the Mbus master beeps 3 times at startup.
2022-01-12	4.7	Martin Hallberg	Type fix only the DR6 was duplicated in the text.
2026-08-19	4.8	Samuel Holst	Added USB warning. Increased readout speed is now default.