METRALINE | ENERGY

M-Bus Interface of Energy Meters U28X

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1 Revision History

This document is in first initial Revision 1

2 M-Bus protocol for Energy Meters

This document describes the M-Bus protocol implemented inside GOSSEN METRAWATT Energy Meters with M-Bus On-Board, with optional MID certification.
The on-board slave M-Bus over twisted pairs communication system is compliant with the European standards EN 13757-2 (physical and link layer) and EN 13757-3 (application layer). It has the following hardware features:

- SELV circuit (4 kV of isolation between main supply and measuring circuits and M-Bus circuit)
- 1 unit load (1 UL): the maximum mark state current required is 1.5 mA

The following Baud Rates are available: 300, 600, 1200, 2400, 4800 and 9600. The device is shipped from the factory with Baud Rate = 2400.
Parity=Even and Number of Stop Bit=1 are fixed parameters, according to the standard.
When shipped from the factory, the Primary address of the device is = 0. On the field, it is possible to assign a Primary address between 1 and 250. Once written, it can't be restored to 0.

The rest of information in this section is intended for users with an advanced understanding of M-Bus protocol, their communications network and their power system.

The meter supports the M-Bus protocol as follows:

- Mode 1 communications (least significant bit first).
- Telegram formats:
  - Single character
  - Short frame
  - Long frame
- Function codes (C-field bits 3-0):
  - SND_NKE: Initiates of communications between the master and slave.
  - SND_UD: The master sends user data to the slave.
  - REQ_UD2: The master requests Class 2 user data from the slave.
  - RSP_UD: The slave sends requested data to the master.
- The Secondary addressing is fully managed in accordance with the M-Bus standard; when shipped from the factory, the device has an unique Secondary Address. The Secondary Addressing is particularly useful for the Wildcard Searching Procedure used by a Master to search for the installed devices.
- The Broadcast Telegrams are also managed according to the M-Bus standard.

2.1 General data

Addressing:

An unambiguous address must be given to connect an M-Bus communication slave to the M-Bus network.

Both types of addressing are managed: Primary addressing and Secondary addressing.
The Primary addressing is very simple: inside the M-Bus Telegram from the Master, the Primary Address corresponding with the addressed slave must be inserted.
When a slave device is manufactured and shipped from the factory, it has a default Primary Address = 0, as stated by the M-Bus standard.
After the device selling, it is possible to change its Primary Address in the range from 1 to 250; once modified from 0 to "non 0" it is no longer possible to restore its value to 0.
When Primary addressing is used in a plant, one must take care to assign different Primary addresses to the Slaves connected on the Bus.
There are some further addresses, beyond 250, that have different scopes, as reported in the following summary:

Decimal	Hexadecimal	Description
0…250	(0x00…0xFA)	Valid Standard Primary Address
251, 252	(0xFB, 0xFC)	Reserved for future use
253	(0xFD)	Used to address the slave previously selected by means of Secondary Address (see Secondary addressing description)
254	(0xFE)	Broadcast Address: all installed slaves accept the request and send the corresponding answer
255	(0xFF)	Broadcast Address: all installed slaves accept the request, but they don't answer (useful, for example, to change the Baud Rate to all the installed slaves).

The Secondary addressing is very different. All the slaves have a unique Secondary Address, ranging from 00000000 to 99999999.
Refer to M-Bus standard documentation for Secondary Addressing description, very useful also for automatic detection of slaves installed in a plant.
See paragraph "Select M-Bus Slave using Secondary Address (SND_UD)" for Secondary Address using

Baud rate:

The baud rate can be set during operation on the M-Bus and can be selected between 300, 600, 1200, 2400, 4800 or 9600 Baud.

Reading data:

Reading data parameterization can be chosen on the M-Bus (pay attention to groups).

2.2 Read-out data that can be parameterized

Data name	Type of data	Unit	Resolution	Number of Bytes
Identification of Parameter Set	INT6	-	S0,S1,S2,S3,S4,S5	9
Active Energy Import Total	INT4	kWh	0.1 kWh	6
Reactive Energy Import Total	INT4	kvarh	0.1 kWh	8
Active Energy Import Phase L1 Tarif 1	INT4	kWh	0.1 kWh	9
Active Energy Import Phase L2 Tarif 1	INT4	kWh	0.1 kWh	9
Active Energy Import Phase L3 Tarif 1	INT4	kWh	0.1 kWh	9
Active Energy Import Total Tarif 1	INT4	kWh	0.1 kWh	7
Active Energy Import Phase L1 Tarif 2	INT4	kWh	0.1 kWh	9
Active Energy Import Phase L2 Tarif 2	INT4	kWh	0.1 kWh	9
Active Energy Import Phase L3 Tarif 2	INT4	kWh	0.1 kWh	9
Active Energy Import Total Tarif 2	INT4	kWh	0.1 kWh	7
Active Energy Export Phase L1 Tarif 1	INT4	kWh (-)	0.1 kWh	9
Active Energy Export Phase L2 Tarif 1	INT4	kWh (-)	0.1 kWh	9
Active Energy Export Phase L3 Tarif 1	INT4	kWh (-)	0.1 kWh	9
Active Energy Export Total Tarif 1	INT4	kWh (-)	0.1 kWh	7
Active Energy Export Phase L1 Tarif 2	INT4	kWh (-)	0.1 kWh	9
Active Energy Export Phase L2 Tarif 2	INT4	kWh (-)	0.1 kWh	9
Active Energy Export Phase L3 Tarif 2	INT4	kWh (-)	0.1 kWh	9
Active Energy Export Total Tarif 2	INT4	kWh (-)	0.1 kWh	7
Reactive Energy Import Phase L1 Tarif 1	INT4	kvarh	0.1 kvarh	10
Reactive Energy Import Phase L2 Tarif 1	INT4	kvarh	0.1 kvarh	10
Reactive Energy Import Phase L3 Tarif 1	INT4	kvarh	0.1 kvarh	10
Reactive Energy Import Total Tarif 1	INT4	kvarh	0.1 kvarh	8
Reactive Energy Import Phase L1 Tarif 2	INT4	kvarh	0.1 kvarh	10
Reactive Energy Import Phase L2 Tarif 2	INT4	kvarh	0.1 kvarh	10
Reactive Energy Import Phase L3 Tarif 2	INT4	kvarh	0.1 kvarh	10
Reactive Energy Import Total Tarif 2	INT4	kvarh	0.1 kvarh	8
Reactive Energy Export Phase L1 Tarif 1	INT4	kvarh (-)	0.1 kvarh	10

Reactive Energy Export Phase L2 Tarif 1	INT4	kvarh (-)	0.1 kvarh	10
Reactive Energy Export Phase L3 Tarif 1	INT4	kvarh (-)	0.1 kvarh	10
Reactive Energy Export Total Tarif 1	INT4	kvarh (-)	0.1 kvarh	8
Reactive Energy Export Phase L1 Tarif 2	INT4	kvarh (-)	0.1 kvarh	10
Reactive Energy Export Phase L2 Tarif 2	INT4	kvarh (-)	0.1 kvarh	10
Reactive Energy Export Phase L3 Tarif 2	INT4	kvarh (-)	0.1 kvarh	10
Reactive Energy Export Total Tarif 2	INT4	kvarh (-)	0.1 kvarh	8
Active Power Phase L1	INT4	W (+,-)	0.001 kW	8
Active Power Phase L2	INT4	W (+,-)	0.001 kW	8
Active Power Phase L3	INT4	W (+,-)	0.001 kW	8
Active Power Total	INT4	W (+,-)	0.001 kW	6
Reactive Power Phase L1	INT4	var (+,-)	0.001 kvar	10
Reactive Power Phase L2	INT4	var (+,-)	0.001 kvar	10
Reactive Power Phase L3	INT4	var (+,-)	0.001 kvar	10
Reactive Power Total	INT4	var (+,-)	0.001 kvar	8
Tariff presently operating	INT1		Tariff 1 or Tariff 2	4
Status Byte 4 (Range Overflow Alarms)	INT1	-	-	4
Apparent Power Phase L1	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Phase L2	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Phase L3	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Total	INT4	VA (+,-)	0.001 kVA	8
Voltage Phase L1	INT2	V	0.1 V	7
Voltage Phase L2	INT2	V	0.1 V	7
Voltage Phase L3	INT2	V	0.1 V	7
Voltage Total -> only single phase meter	INT2	V	0.1 V	(5)
Current Phase L1	INT3	mA (+,-)	0.001 A	8
Current Phase L2	INT3	mA (+,-)	0.001 A	8
Current Phase L3	INT3	mA (+,-)	0.001 A	8
Current Total	INT3	mA (+,-)	0.001 A	6
Power factor Phase L1	INT1	Fo x 0.1	0.01	6
Power factor Phase L2	INT1	Fo x 0.1	0.01	6
Power factor Phase L3	INT1	Fo x 0.1	0.01	6
Power factor Total	INT1	Fo x 0.1	0.01	4
Netfrequency	INT2	Hz x 0.1	0.1 Hz	5
Model	CHAR8		8 characters	12

*** Warning:** It's possible to Read-out in one Telegram a maximum of 234 Bytes.

2.3 Read-out data parameterization

2.3.1 Structure of Parameter Set for Read-out Data possible

The Parameter Set identification is a INT6 type (6 Bytes)

⇨ S0S1S2S3S4S5 <=

S0 = Parameterset 0 Read-out Data: value: 00 – 7F
S1 = Parameterset 1 Read-out Data: value: 00 – FF
S2 = Parameterset 2 Read-out Data: value: 00 – FF
S3 = Parameterset 3 Read-out Data: value: 00 – FF
S4 = Parameterset 4 Read-out Data: value: 00 – FF
S5 = Parameterset 5 Read-out Data: value: 00 – FF

S0 = Parameterset 0

xxxx xxx1b: Parameterset Identification
xxxx xx1xb: Byte 4 State (Overflow Range Alarms)
xxxx x1xxb: Parameterset 1
-> Instead of imported active energy
-> Imported reactive energy
xxxx 1xxxb: Parameterset 2
-> Instead of exported active energy
-> Imported reactive energy
xxx1 xxxxb: Parameterset 2
-> Instead of exported active energy
-> Exported reactive energy
xx1x xxxxb: Parameterset 3
-> Instead of active and reactive power
-> Imported reactive energy
x1xx xxxxb: Parameterset 3
-> Instead of active and reactive power
-> Exported reactive energy
1xxx xxxxb: Parameterset 3
-> Instead of reactive power
-> Apparent Power

S1 = Parameterset 1

xxxx xxx1b: Imported active or reactive energy phase L1 Tariff 1
xxxx xx1xb: Imported active or reactive energy phase L2 Tariff 1
xxxx x1xxb: Imported active or reactive energy phase L3 Tariff 1
xxxx 1xxxb: Total imported active or reactive energy Tariff 1
xxx1 xxxxb: Imported active or reactive energy phase L1 Tariff 2
xx1x xxxxb: Imported active or reactive energy phase L2 Tariff 2
x1xx xxxxb: Imported active or reactive energy phase L3 Tariff 2
1xxx xxxxb: Total imported active or reactive energy Tariff 2

S2 = Parameterset 2

xxxx xxx1b: Exported active or reactive energy phase L1 Tariff 1
or Imported active or reactive energy phase L1 Tariff 1
xxxx xx1xb: Exported active or reactive energy phase L2 Tariff 1
or Imported active or reactive energy phase L2 Tariff 1
xxxx x1xxb: Exported active or reactive energy phase L3 Tariff 1
or Imported active or reactive energy phase L3 Tariff 1
xxxx 1xxxb: Total exported active or reactive energy Tariff 1
or Total imported active or reactive energy Tariff 1
xxx1 xxxxb: Exported active or reactive energy phase L1 Tariff 2
or Imported active or reactive energy phase L1 Tariff 2
xx1x xxxxb: Exported active or reactive energy phase L2 Tariff 2
or Imported active or reactive energy phase L2 Tariff 2
x1xx xxxxb: Exported active or reactive energy phase L3 Tariff 2
or Imported active or reactive energy phase L3 Tariff 2
1xxx xxxxb: Total exported active or reactive energy Tariff 2
or Total imported active or reactive energy Tariff 2

S3 = Parameterset 3

xxxx xxx1b: Active power phase L1
or Imported or exported reactive energy phase L1 Tariff 1
xxxx xx1xb: Active power phase L2
or Imported or exported reactive energy phase L2 Tariff 1
xxxx x1xxb: Active power phase L3
or Imported or exported reactive energy phase L3 Tariff 1
xxxx 1xxxb: Total active power
or Total imported or exported reactive energy Tariff 1
xxx1 xxxxb: Reactive or Apparent power phase L1
or Imported or exported reactive energy phase L1 Tariff 2
xx1x xxxxb: Reactive or Apparent power phase L2
or Imported or exported reactive energy phase L2 Tariff 2
x1xx xxxxb: Reactive or Apparent power phase L3
or Imported or exported reactive energy phase L3 Tariff 2
1xxx xxxxb: Total Reactive or Apparent power
or Total imported or exported reactive energy Tariff 2

S4 = Parameterset4

xxxx xxx1b: Voltage Phase L1
-> In single phase meter, this is the Voltage Value
xxxx xx1xb: Voltage Phase L2
xxxx x1xxb: Voltage Phase L3
xxxx 1xxxb: Active Energy Import Total
xxx1 xxxxb: Reactive Energy ImportTotal
xx1x xxxxb: Reserve
x1xx xxxxb: Netfrequency
1xxx xxxxb: Tariff presently operating

S5 = Parameterset5
xxxx xxx1b: Current Phase L1
xxxx xx1xb: Current Phase L2
xxxx x1xxb: Current Phase L3
xxxx 1xxxb: Total Current
xxx1 xxxxb: Power factor Phase L1
xx1x xxxxb: Power factor Phase L2
x1xx xxxxb: Power factor Phase L3
1xxx xxxxb: Total power factor

Example:

Parameter Set Identification (INT6 Typ) = **82 3A 0F 77 07 88,** three-phase meter

S0 = 82 => 1000 0010b : Status Byte 4 (Overflow Range Alarms)
+ Parameterset 3
-> Instead of Reactive Power
-> all Apparent Power

S1 = 3A => 0011 1010b : Imported active energy phase L2 Tariff 1
+ Imported active energy phase L3 Tariff 1
+ Total imported active energy Tariff 1
+ Imported active energy phase L1 Tariff 2
+ Imported active energy phase L2 Tariff 2

S2 = 0F => 0000 1111b : Exported active energy phase L1 Tariff 1
+ Exported active energy phase L2 Tariff 1
+ Exported active energy phase L3 Tariff 1
+ Total exported active energy Tariff 1

S3 = 77 => 0111 0111b : Active Power Phase L1
+ Active Power Phase L2
+ Active Power Phase L3
+ Apparent Power Phase L1
+ Apparent Power Phase L2
+ Apparent Power Phase L3

S4 = 07 => 0000 0111b : Voltage Phase L1
+ Voltage Phase L2
+ Voltage Phase L3

S5 = 88 => 1000 1000b : Total Current
+ Total Power Factor

2.3.2 Default Parameter Set

These are set by the factory.

This Parameter Set is also loading with the Telegram „Set Parameter Set to Default Read- Out Data“.

Three-Phase Default Parameter Set Identification (INT6 Typ) = 09 FF 88 FF 9F 07

S0 = 09 => 0000 1001b : Parameterset Identification
+ Parameterset 2
Instead of exported active energy ->Imported reactive energy
➔ S0 Total = 9 byte

S1 = FF => 1111 1111b : Active - Energy Import Phase L1 Tariff 1
+ Active - Energy Import Phase L2 Tariff 1
+ Active - Energy Import Phase L3 Tariff 1
+ Active - Energy Import Total Tariff 1
+ Active - Energy Import Phase L1 Tariff 2
+ Active - Energy Import Phase L2 Tariff 2
+ Active - Energy Import Phase L3 Tariff f2
+ Active - Energy Import Total Tariff 2
➔ S1 Total = 68 Byte

S2 = 88 => 1000 1000b : Total imported reactive energy Tariff 1
+ Total imported reactive energy Tariff 2
➔ S2 Total = 16 Byte

S3 = FF => 1111 1111b : Active - Power Phase L1
+ Active - Power Phase L2
+ Active - Power Phase L3
+ Active - Power Total
+ Reactive - Power Phase L1
+ Reactive - Power Phase L2
+ Reactive - Power Phase L3
+ Reactive - Power Total
➔ S3 Total = 68 Byte

S4 = 9F => 1001 1111b : Voltage Phase L1
+ Voltage Phase L2
+ Voltage Phase L2
+ Active Energy Import Total
+ Reactive Energy Import Total
+ Tariff presently operating
➔ S4 Total = 39 Byte

S5 = 07 => 0000 0111b : Current Phase L1
+ Current Phase L2
+ Current Phase L3
➔ S5 Total = 24 Byte

Total: Three-phase energy meter = 224 Byte.

Single-Phase Default Parameter Set Identification (INT6 Typ) = 0B 88 88 88 99 08

S0 = 0B => 0000 1011b : Parameterset Identification
+ Byte 4 State
+ Parameterset 2
Instead of exported active energy ->Imported reactive energy
➔ S0 Total = 13 byte

S1 = 88 => 1000 1000b : + Active - Energy Import Total Tariff 1
+ Active - Energy Import Total Tariff 2
➔ S1 Total = 14 Byte

S2 = 88 => 1000 1000b : Total imported reactive energy Tariff 1
+ Total imported reactive energy Tariff 2
➔ S2 Total = 16 Byte

S3 = 88 => 1000 1000b : + Active - Power Total
+ Reactive - Power Total
➔ S3 Total = 14 Byte

S4 = 99 => 1001 1001b : Voltage Total
+ Active Energy Import Total
+ Reactive Energy Import Total
+ Tariff presently operating
➔ S4 Total = 23 Byte

S5 = 08 => 0000 1000b : Current Total
➔ S5 Total = 6 Byte

Total: Single-phase energy meter = 86 Byte.

3 Telegrams for Configuration of the M-Bus slave

3.1 Primary Address (A-Field)

Field A (address field) contains the Primary Address of the M-Bus slave and is used to identify that slave. Field A can have a value between 0 and 255.

3.1.1 Structure of Primary Address (A-Field)

A-Field (Hex)	Primary address	Description
00	0	Factory setting
01 – FA	1 - 250	Settable primary addresses
FB, FC	251, 252	Reserved for future use
FD	253	Used to send information to all devices previously selected by secondary addresses
FE	254	Used to send information to all devices connected to the M-Bus network (Broadcast telegram). All the devices respond with a reception confirmation or with their primary address.
FF	255	Used to send information to all devices connected to the M-Bus network (Broadcast telegram). The telegrams with this addressing do not receive replies.

3.2 Secondary Address (UD)

If “FD” is set in A-field, the identification of the M-Bus module occurs on Secondary Address (UD):

3.2.1 Structure of Secondary Address (UD)

Identification number	Producer	Version	Medium
xxxxxxxx	mm mm	xx	02

- Identification number: 8-digit serial number of M-Bus slave (secondary address)
  => 00000000 – 99999999
- Producer code: 2 Byte constant
- Version number: 1 Byte, firmware version
  => 01 - FF
- Medium: 1 Byte, constant = electricity
  => 02

3.2.2 Wildcard

The M-Bus slave reacts to the requests only if the constant parameters (manufacturer, version, medium) and the identification number coincide with those supplied.
"Wildcards" can be used in all 4 of these parameters.
The wildcard character is „F“.
Individual wildcards cannot be used for constant parameters.

Example:
M-Bus slave: Identification number = 12345678, producer = XX, version = 12, medium = 02

Ind. sec. (DU) : F2345678, FF FF, 12, 02 => the M-Bus slave reacts
Ind. sec. (DU): 1234FF78, FF FF, 12, 02 => the M-Bus slave reacts
Ind. sec. (DU): 12345678, FF FF, 12, 02 => the M-Bus slave reacts
Ind. sec. (DU): FFF4FFF, FF FF, FF, FF => the M-Bus slave reacts
Ind. sec. (DU): FFFFFFF, FF FF, FF, FF => All M-Bus slaves react on the network
Ind. sec. (DU): FFF5FFF, FF FF, FF, FF => The M-Bus slave does not react, invalid id. number
Ind. sec. (DU): FFFFFFF, FF 14, FF, FF => The M-Bus slave does not react, invalid producer
Ind. sec. (DU): FFFFFFF, FF FF, 1F, FF => The M-Bus slave does not react, invalid version

3.3 Reset M-Bus slave access counter (SND_UD)

This telegram resets the M-Bus slave access counter, which is set at “0”.

The M-Bus slave confirms correct reception by means of a reply composed of a single character (ACK = E5). If the telegram is not received properly, the M-Bus slave sends no confirmation.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long- Telegram
2	1	03	L- Field
3	1	03	L- Field Repetition
4	1	68	Start- Character Long- Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	50	CI- Field, Initialise M-Bus slave (Set to „0“)
8	1	xx	CS Checksum, summed up C-Field to CI- Field incl.
9	1	16	Stop Character

To set the access meter at “0” on all M-Bus slaves on the network simultaneously, use 255 as Primary Address in A field (Hex = FF). The M-Bus slaves will however not send an Acknowledgement.

3.4 Set baud rate (SND_UD)

This telegram sets the desired baud rate on the M-Bus slave.

The M-Bus slave confirms correct reception by means of a reply composed of a single character (ACK = E5). If the telegram is not received properly, the M-Bus slave sends no confirmation.

The confirmation reply (ACK) is sent by the M-Bus slave with the former baud rate. As soon as “ACK” is sent, the M-Bus slave changes to the new baud rate that was set.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	03	L- Field
3	1	03	L- Field Repetition
4	1	68	Start Character, Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	xx	CI- Field, Set new Baudrate B8 : Set Baudrate to 300 Baud B9 : Set Baudrate to 600 Baud BA : Set Baudrate to 1200 Baud BB : Set Baudrate to 2400 Baud -> Manufacturer's Mark BC : Set Baudrate to 4800 Baud BD : Set Baudrate to 9600 Baud
8	1	xx	CS Check Sum summed up by C Field, A Field and CI Field
9	1	16	Stop Character

To set the new baud rate on all M-Bus slaves on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus slaves will however not send an Acknowledgement.

3.5 *Set Parameter Set to Default Read-out Data (SND_UD)*

This Telegram sets the Parameter Set for the Read-out Data of the Default Parameter Set.

The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the Telegram has not been correctly received, the M- Bus slave will not send an Acknowledgement.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	04	L- Field
3	1	04	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data from M-Bus Modul
8	1	7F	DIF- Field, Set Default Parameterset
9	1	xx	CS Checksum, summed up by C-Field to DIF- Field incl.
10	1	16	Stop Character

To set the Default Parameter Set on all M-Bus slaves on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus slaves will however not send an Acknowledgement.

3.6 Set Parameter Set to any Read-out Data desired (SND_UD)

This Telegram sets the Parameter Set for Read-out Data of any value desired.
For the Structure of the Parameter Set for Read-out Data please see: „Structure of Parameter Set for Read-out Data possible“.

The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus slave will not send an Acknowledgement.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Charater Long Telegram
2	1	0C	L- Field
3	1	0C	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for M-Bus slave
8	1	06	DIF- Field, 48 Bit Integer- Daten (6 Byte)
9	1	FD	VIF- Field, Es folgt ein Standart VIFE
10	1	0B	VIFE- Field, Standard VIFE = Parameterset- Identification
11	1	„S0“	Parameter Set S1 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
12	1	„S1“	Parameterset S1 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
13	1	„S2“	Parameterset S2 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
14	1	„S3“	Parameterset S3 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
15	1	„S4“	Parameterset S4 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
16	1	„S5“	Parameterset S5 (00 - FF) Please see: „Structure of Parameter Set of Read-out Data possible“
17	1	xx	CS Checksum, summed up by C-Field to „S5“ incl.
18	1	16	Stop Character

To set the new Parameter Set on all M-Bus slaves on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus slaves will however not send an Acknowledgement.

3.7 Set Primary Address (SND_UD)

This Telegram sets a new Primary Address in the M-Bus slave.

The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus slave will not send an Acknowledgement.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	06	L- Field
3	1	06	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for M-Bus slave
8	1	01	DIF- Field, 8 Bit Integer - Data (1 Byte)
9	1	7A	VIF- Field, Set Primary Address
10	1	xx	New Primary Address:, Range: 00 – FA (0 – 250), Invalid: FB – FF (no action in meter)
11	1	xx	CS Checksum, summed up aus C-Field from C Field to Primary Address incl.
12	1	16	Stop Character

3.8 Set Secondary Address (SND_UD)

This Telegram sets a new Secondary Address in the M-Bus slave.
The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus slave will not send an Acknowledgement.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	09	L- Field
3	1	09	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Address for M-Bus slave
8	1	0C	DIF- Field, 8 digits BCD, 4 Byte
9	1	79	VIF- Field, Set Secondary Address
10	1	xx	New Secondary Address digit 7 and 8, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 78
11	1	xx	New Secondary Address digit 5 and 6, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 56
12	1	xx	New Secondary Address digit 3 and 4, Range 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 34
13	1	xx	New Secondary Address digit 1 and 2, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 12
14	1	xx	CS Checksum, summed up from C Field up to Sec. Address incl.
15	1	16	Stop Character

3.9 Set Secondary Address and Manufacturer's Mark (SND_UD)

This Telegram sets a new Secondary Address and a new Manufacturer's Mark.

The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus slave will not send an Acknowledgement.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0D	L- Field
3	1	0D	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for M-Bus slave
8	1	07	DIF- Field, 64 Bit Integer, 8 Byte
9	1	79	VIF- Field, Set Secondary Address and Manufacturer's Mark
10	1	xx	New Secondary Address digits 7 and 8, Range: 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 78
11	1	xx	New Secondary Address digits 5 and 6, Range: 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 56
12	1	xx	New Secondary Address digits 3 and 4, Range: 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 34
13	1	xx	New Secondary Address digits 1 and 2, Range: 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 12
14	1	xx	New Manufacturer's Mark Byte 2, Range: 00 – FF Example: Manufacturer = 14 73 (ECS) -> Byte- Value = 73
15	1	xx	New Manufacturer's Mark Byte 1, Range: 00 – FF Example: Manufacturer = 14 73 (ECS) -> Byte- Value = 14
16	1	xx	Version; This Parameter cannot be changed => Setting: Any Value 00 – FF
17	1	xx	Medium; This Parameter is fixed to 02 and cannot be changed. => Setting: Any Value 00 - FF.
18	1	xx	CS Checksum, summed up from C Field to Medium inclusive
19	1	16	Stop Character

To set the new Secondary Address and the new Manufacturer's Mark on all M-Bus slaves on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus slaves will however not send an Acknowledgement.

3.10 Reset Active Energy Tariff 1 + 2 and Reactive Energy Tariff 1 + 2 (SND_UD)

This Telegram enables to either Re-setting the Active Energy Tariff 1 + 2 in the M-Bus slave and/or to Re-setting the Reactive Energy Tariff 1 + 2 (Set to “0”).

The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus slave will not send an Acknowledgement.

Caution: ***This function is inhibited in MID certified devices.***

3.10.1 Reset Active and Reactive Energy

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	07	L- Field
3	1	07	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for M-Bus slave
8	1	01	DIF- Field, 8 Bit Integer (1 Byte)
9	1	FF	VIF- Field, An Manufacturer-spec.VIFE follows
10	1	13	VIFE- Field, Manufacturer-spec.VIFE = Energy Reset
11	1	xx	Coding off Active and Reactive Energy Reset: 00h: No Reset Active and Reactive Energy (Binary: 0000 0000) 01h: Reset Active Energy (Binary: 0000 0001) 10h: Reset Reactive Energy (Binary: 0001 0000) 11h: Reset Reset Active and Reactive Energy (Binary: 0001 0001)
12	1	xx	CS Checksum, summed up from C-Field to Coding
13	1	16	Stop Character

In order to Reset to all M-Bus slaves on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus slaves will however not send an Acknowledgement.

3.11 Select M-Bus Slave using Secondary Address (SND_UD)

This Telegram selects M-Bus slave.

The M-Bus slave confirms the correct receipt by Single Character Acknowledgement (ACK = E5) and switch into Selection Mode.
If the telegram has not been correctly received the M-Bus slave will not send an Acknowledgement.

In Selection Mode the M-Bus slave is ready to transmit the entire Read-out Data after receiving the Telegram „Transmit Read-out Data“ (Short Telegram REQ_UD2 with A- Field on FD).
In Selection Mode the M-Bus slave accepts also all telegrams with Primary Address on FD (A-Field on FD)

During selection individual positions of the secondary addresses can be occupied with wildcards (Fh). Such a wildcard means that this position will not be taken account of during selection, and that the selection will be limited to specific positions, in order to address complete groups of slaves (Multicasting). In the identification number each individual digit can be wildcarded by a wildcard nibble Fh while the fields for manufacturer, version and medium can be wildcarded by a wildcard byte FFh.
The state of the selection remains unchanged until the slave is deselected with a selection command with non-matching secondary addresses, or a ‘Initialisation of M-Bus device(SND_NKE)’ telegram to address 253.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0B	L- Field
3	1	0B	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Address
7	1	52	CI- Field, Selection of M-Bus slave
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	xx	CS Checksum, summed up from C-Field to Secondary Address
17	1	16	Stop Character

4 Transmit Read-out Data (REQ_UD2)

The M-Bus slave receives this Short Telegram and transmits the parametrized Read-out Data.

The M-Bus slave confirms correct receipt by transmitting of the Read-out Data. If the Short Telegram has not been received correctly, no Data will be transmitted by the M-Bus slave.

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	7B	C- Field, Transmit Read-out Data
3	1	xx	A- Field, Primary Address 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Used to send information to all devices previously selected by secondary addresses FE : All M-Bus slave in the System transmit the Read-out Data FF : No action by M-Bus slave
4	1	xx	CS Checksum, summed up by C-Field and A- Field
5	1	16	Stop Character

4.1.1 Telegram of Read-out Data by M-Bus slave (RSP_UD)

- ***Bytes No. 8 – 19 are the firm Data Record Header for every M-Bus slave.***

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	xx	L- Field, corresponding to number of Read-out Data parametrised
3	1	xx	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	08	C- Field, Transmit Data of M-Bus slave
6	1	xx	A- Field, Primary Address (00 – FA = 0 – 250)
7	1	72	CI- Field, Read-out Data of M-Bus slave
8 - 11	4	xxxxxxxx	***8-digit Serial Number of M-Bus slave (Sec. Address)***
12 + 13	2	xx xx	***Manufacturer's Mark***
14	1	xx	***Version Number of M-Bus slave Firmware (00 – FF)***
15	1	02	***Medium Electricity***
16	1	xx	***Meter called upon, at each call on M-Bus slave + 1 (00 – FF -> 00)***
17	1	xx	***Shows the M-Bus slave Status. Please see „Structure of Error Flags Data Transmission from Meter to M-Bus slave" and „Structure of Error Flags in M-Bus slave"***
18 + 19	2	00 00	***Signature. For M-Bus slave always on „0000"***
20 - YY	0 - EA	xx….xx	***Read-out Data parametrised. Please see:" Structure of Telegram of Read-out Data possible"***
YY + 1	1	0D	DIF of Model Code
YY + 2	1	FC	VIF of Model Code
YY + 3	1	0C	VIFE of Model Code
YY + 4	1	08	Length of Model Code
YY + 5 … YY + 12	8	xxxxxxxx	Model Code = 8 characters
YY + 13	1	xx	CS Check Sum, summed up from C Field to End of „Read-out Data parametrised"
YY + 14	1	16	Stop Character

- ***Bytes No. 20 – YY are the Read-out Data defined in the Parameter Set.***

4.1.2 Structure of Telegram for Read-out Data possible

The M-Bus slave transmits Read-out Data to the Master depending on the Parameter Set.
A summary of the options is shown under „Structure of Parameterset for Read-out Data possible“.

4.1.2.1 Parameterset Identification

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	06	DIF, 48 Bit Integer, 6 Byte
2	1	FD	VIF, followed by a Standart VIFE
3	1	0B	Parameterset Identification
4	1	„S0“	Parameterset S0 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
5	1	„S1“	Parameterset S1 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
6	1	„S2“	Parameterset S2 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
7	1	„S3“	Parameterset S3 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
8	1	„S4“	Parameterset S4 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
9	1	„S5“	Parameterset S5 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“

4.1.2.2 Active Energy Import Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	04	DIF, 32 Bit Integer, 4 Byte
2	1	05	VIF, Active Energy Total
3- 6	4	xxxxxxxx	Active Energy Import Total

4.1.2.3 Reactive Energy Import Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	80	DIFE, Followed by a further DIFE
3	1	40	DIFE, Reactive Register
4	1	05	VIF, Reactive Energy Total
5 - 8	4	xxxxxxxx	Reactive Energy Import Total

4.1.2.4 Active Energy Import Phase L1, L2 and L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	10	DIFE, Tariff 1
3	1	85	VIF, Active Energy, Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6 - 9	4	xxxxxxxx	Active Energy Import Phase L1, L2 or L3

4.1.2.5 Active Energy Import Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	10	DIFE, Tariff 1
3	1	05	VIF, Active Energy
4 - 7	4	xxxxxxxx	Active Energy Import Total Tariff 1

4.1.2.6 Active Energy Import Phase L1 , L2 and L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	20	DIFE, Tariff 2
3	1	85	VIF, Active Energy, Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6 - 9	4	xxxxxxxx	Active Energy Import Phase L1, L2 or L3

4.1.2.7 Active Energy Import Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	20	DIFE, Tariff 2
3	1	05	VIF, Active Energy
4 - 7	4	xxxxxxxx	Active Energy Import Total Tariff 2

4.1.2.8 Active Energy Export Phase L1, L2 and L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	10	DIFE, Tariff 1
3	1	85	VIF, Active Energy, Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6 - 9	4	xxxxxxxx	Active Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

4.1.2.9 Active Energy Export Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	10	DIFE, Tariff 1
3	1	05	VIF, Active Energy
4 - 7	4	xxxxxxxx	Active Energy Export Total -> IntegerValue = Negative

4.1.2.10 Active Energy Export Phase L1, L2 and L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	20	DIFE, Tariff 2

3	1	85	VIF, Active Energy, Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6 - 9	4	xxxxxxxx	Active Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

4.1.2.11 Active Energy Export Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	20	DIFE, Tariff 2
3	1	05	VIF, Active Energy
4 - 7	4	xxxxxxxx	Active Energy Export Total -> IntegerValue = Negative

4.1.2.12 Reactive Energy Import Phase L1, L2 and L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	85	VIF, Reactive Energy; Followed by a further VIFE
5	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
6	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
7 - 10	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 or L3

4.1.2.13 Reactive Energy Import Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	90	DIFE, Total Tariff 1; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	05	VIF, Reactive Energy
5 - 8	4	xxxxxxxx	Reactive Energy Import Total

4.1.2.14 Reactive Energy Import Phase L1, L2 and L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	A0	DIFE, Tariff 2 ; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	85	VIF, Reactive Energy; Followed by a further VIFE
5	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
6	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
7 - 10	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 or L3

4.1.2.15 Reactive Energy Import Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	A0	DIFE, Total Tariff 2; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	05	VIF, Reactive Energy
5 - 8	4	xxxxxxxx	Reactive Energy Import Total

4.1.2.16 Reactive Energy Export Phase L1, L2 and L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	85	VIF, Reactive Energy; Followed by a further VIFE
5	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
6	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
7 - 10	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

4.1.2.17 Reactive Energy Export Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	90	DIFE, Total Tariff 1; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	05	VIF, Reactive Energy
5 - 8	4	xxxxxxxx	Reactive Energy Export Total -> IntegerValue = Negative

4.1.2.18 Reactive Energy Export Phase L1, L2 and L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	A0	DIFE, Tariff 2 ; Followed by a further DIFE
3		40	DIFE, Reactive Value
4	1	85	VIF, Reactive Energy; Followed by a further VIFE
5	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
6	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
7 - 10	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

4.1.2.19 Reactive Energy Export Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	A0	DIFE, Total Tariff 2; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	05	VIF, Reactive Energy
5 - 8	4	xxxxxxxx	Reactive Energy Export Total -> IntegerValue = Negative

4.1.2.20 Active Power Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	04	DIF, 32 Bit Integer, 4 Byte
2	1	AB	VIF, Active Power; Followed by a further VIFE
3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
4	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
5 - 8	4	xxxxxxxx	Active Power Phase L1, L2 or L3

4.1.2.21 Active Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	04	DIF, 32 Bit Integer, 4 Byte
2	1	2B	VIF, Active Power
3- 6	4	xxxxxxxx	Active Power Total

4.1.2.22 Reactive Power Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	80	DIFE, Total; Followed by a further DIFE
3	1	40	DIFE, Reactive Value
4	1	AB	VIF, Reactive Power; Followed by a further VIFE
5	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
6	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
7 - 10	4	xxxxxxxx	Reactive Power Phase L1, L2 or L3

4.1.2.23 Reactive Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	80	DIFE, Total; Followed by a further DIFE
3	1	40	DIFE, Reactive- Value

4	1	2B	VIF, Reactive Power
5 - 8	4	xxxxxxxx	Reactive Power Total

4.1.2.24 Apparent Power Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	C0	DIFE, Total; Followed by a further DIFE
3	1	40	DIFE, Apparent Value
4	1	AB	VIF, Apparent Power; Followed by a further VIFE
5	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
6	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
7 - 10	4	xxxxxxxx	Apparent Power Phase L1, L2 or L3

4.1.2.25 Apparent Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
2	1	C0	DIFE, Total; Followed by a further DIFE
3	1	40	DIFE, Apparent Value
4	1	2B	VIF, Apparent Power
5 - 8	4	xxxxxxxx	Apparent Power Total

4.1.2.26 Voltage Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	02	DIF, 16 Bit Integer, 2 Byte
2	1	FD	VIF, Followed by a VIFE
3	1	C8	VIFE = Voltage; Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6 - 7	2	xxxx	Voltage Phase L1, L2 or L3

4.1.2.27 Voltage Total single Phase Meter

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	02	DIF, 16 Bit Integer, 2 Byte
2	1	FD	VIF, Followed by a VIFE
3	1	48	VIFE = Voltage
4 - 5	2	xxxx	Voltage Total

4.1.2.28 Current Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	03	DIF, 23 Bit Integer, 3 Byte
2	1	FD	VIF, Followed by a VIFE
3	1	D9	VIFE = Current; Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6 - 8	3	xxxxxx	Current Phase L1, L2 or L3

4.1.2.29 Current Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	03	DIF, 23 Bit Integer, 3 Byte
2	1	FD	VIF, Followed by a VIFE
3	1	59	VIFE = Current Total
4 - 6	3	xxxxxx	Current Total

4.1.2.30 Power factor Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	01	DIF, 8 Bit Integer, 1 Byte
2	1	FF	VIF, Followed by an Manufacturer-spec.VIFE
3	1	E1	Manufacturer-spec.VIFE = Power factor; Followed by a further VIFE
4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
6	1	xx	Power factor Phase L1, L2 or L3

4.1.2.31 Power factor Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	01	DIF, 8 Bit Integer, 1 Byte
2	1	FF	VIF, Followed by an Manufacturer-spec.VIFE
3	1	61	Manufacturer-spec.VIFE = Power factor
4	1	xx	Power factor Total

4.1.2.32 Netfrequency

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	02	DIF, 16 Bit Integer, 2 Byte
2	1	FF	VIF, Followed by an Manufacturer-spec.VIFE
3	1	52	Manufacturer-spec.VIFE = Netfrequency
4 - 5	2	xxxx	Netfrequency

4.1.2.33 Status Byte 4 (Range Overflow)

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	01	DIF, 8 Bit Integer, 1 Byte
2	1	FD	VIF, Followed by a VIFE
3	1	17	VIFE = Status (Error) Flags
4	1	xx	Status Byte 4 (Range Overflow)

4.1.2.34 Tariff presently operating

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	01	DIF, 8 Bit Integer, 1 Byte
2	1	FF	VIF, Followed by an Manufacturer-spec.VIFE
3	1	13	Manufacturer-spec.VIFE = Tariff presently operating
4	1	0x	Tariff presently operating 01 : Tariff 1 02 : Tariff 2

4.1.2.35 Model

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	0D	DIF, 8 Bit Integer, 1 Byte
2	1	FD	VIF, Followed by a VIFE
3	1	0C	VIFE = Model
4	1	08	Length of data
5 - 12	8	“cccccccc“	Model Code = 8 characters

The M-Bus slave always transmits the Model data to the Master, regardless of the Parameter Set.

5 Telegram of Error Flags (REQ_UD1)

The Error Flags are transmitted by the M-Bus slave within 35 – 75 ms from receipt of the Short Telegram „Transmit Error Flags“.

Remark: The Error Flag and the **M-Bus slave Status** on the Read-out Data Header are identical.

The M-Bus slave confirms correct receipt by Transmit the Error Flags.
If there aren't Error Flags set, the M-Bus slave confirms correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram was not correctly received the M-Bus slave will not send an Acknowledgement.

5.1 Transmit Error Flags of M-Bus slave

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	7A	C- Field. Transmit Error Flags
3	1	xx	A Field, Primary Address 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Used to send information to all devices previously selected by secondary addresses FE : All M-Bus slave in the System send the Error Flags FF : No action by M-Bus slave
4	1	xx	CS Checksum, summed up from C-Field and A- Field
5	1	16	Stop Character

5.2 Telegram of Error Flags (RSP_UD)

The Error Flags are transmitted by the M-Bus slave within 35 – 75 ms from receipt of the Short Telegram „Transmit Error Flags of M-Bus slave“.

Remark: If there aren't Error Flags set, the M-Bus slave confirms correct receipt by Single Character Acknowledgement (ACK = E5).

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	04	L- Field
3	1	04	L- Field Repetition
4	1	68	Start Character Repetition
5	1	08	C- Field. Transmit Data from M-Bus slave
6	1	xx	A- Field, Primary Address (00 – FA = 0 – 250)
7	1	71	CI- Field, Error Flags of M-Bus slave
8	1	xx	Error Flags, Please see „Structure of Error Flags Data Transmission from Meter to M-Bus slave“ and „Structure of Error Flags in M-Bus slave“
9	1	xx	CS Checksum, summed up from C-Field to Error Flags inclusive
10	1	16	Stop Character

5.3 Structure of Error Flags slave

The M-Bus slave automatically carries out every second a number of internal tests, and, in the event of an Error, sets the corresponding Flag.

Error Flag (Binary)	Error Flag (Hex Value)	Description
xxxx 0000	x0	No Error set. => No Error in M-Bus slave
xxxx 0001	x1	Error on Micro or Hardware fault.
xxxx 0010	x2	Overflow of internal Stack.
xxxx 0100	x4	Error on internal RAM (Memory Cell fault, etc..).
xxxx 1000	x8	Error on internal FLASH Memory.
xxxx 0011	x3	Error on Micro or Hardware fault and Overflow of internal Stack.
xxxx 0101	x5	Error on Micro or Hardware fault and Error on internal RAM.
xxxx 0110	x6	Overflow of internal Stack and Error on internal RAM.
xxxx 0111	x7	Error on Micro or Hardware fault and Overflow of internal Stack and Error on internal RAM.
xxxx 1001	x9	Error on Micro or Hardware fault and Error on internal FLASH Memory.
xxxx 1010	xA	Overflow of internal Stack and Error on internal FLASH Memory.
xxxx 1011	xB	Error on Micro or Hardware fault Overflow of internal Stack and Error on internal FLASH Memory.
xxxx 1100	xC	Error on internal RAM and Error on internal FLASH Memory.
xxxx 1101	xD	Error on Micro or Hardware fault and Error on internal RAM and Error on internal FLASH Memory.
xxxx 1110	xE	Overflow of internal Stack and Error on internal RAM and Error on internal FLASH Memory.
xxxx 1111	xF	Error on Micro or Hardware fault and Overflow of internal Stack and Error on internal RAM and Error on internal FLASH Memory.

6 Initialisation of M-Bus slave (SND_UD2)

This Short Telegram re-initialises the M-Bus slave.

The M-Bus slave confirms correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram was not correctly received the M-Bus slave will not send an Acknowledgement.

6.1.1 Initialisation of M-Bus slave

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	40	C- Field. REQ-UD2
3	1	xx	A Field, Primary Address 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Used to send information to all devices previously selected by secondary addresses FE : All M-Bus slave in the System send the ACK FF : No action by M-Bus slave
4	1	xx	CS Checksum, summed up from C-Field and A- Field
5	1	16	Stop Character

By sending to a „selected“ slave an Initialization Message with Primary address = FD, the slave is deselected.

7 Support and Contact

Please contact us at
+49 911 8602-0
Monday – Thursday: 08:00 Uhr – 16:00 Uhr
Friday: 08:00 Uhr – 14:00 Uhr
support.industrie@gossenmetrawatt.com

Please contact GMC-I Service GmbH for repairs, replacement parts and calibration:
+49 911 817718-0
service@gossenmetrawatt.com
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