Communication Module M-Bus Protocol - 261261

Technical description

Revision 2.3
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Table of Contents

1 M-Bus module

Description of M-Bus module and different variants of the model.
The alternating current single and three-phase static meter can be provided with an M-Bus communication module.

The M-Bus communication module (inside of a special DIN single-module housing) is mounted next to the meter. Make sure that the IR modules of the meter and communication module face each other.

1.1 M-Bus module

- M-Bus module conforming to EN1434
- Wired by YCYM or J.Y(St)Y 2 x 2 x 0.8 mm strand double-pole cables.
- 2 screwed-on terminals on M-Bus module.
- Data baud rate can be selected between 300 and 9600 Baud.
- The Parameterization of the module can be configured via M-Bus. The parameters are stored permanently in the M-Bus module.
- If power is cut, all data will be saved in the M-Bus module (uP FLASH).
- Data transmission conforming to IEC 870-5
  - Asynchronous serial transmission (Start - Stop): half-duplex.
  - Data baud rate can be selected among 300, 600, 1200, 2400, 4800 and 9600 Baud.
  - Character size: 11 Bit per character (1 start bit, 8 data bit, 1 even bit and 1 stop bit).
  - Bit sequence: The character is transmitted starting from the least significant bit.
  - Character controlled by even bit.
  - Data block controlled by checksum.
- Current consumption of M-Bus module < 2.6 mA. Equal to two standard loads.

1.2 General data

Addressing:

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

The M-Bus module has two types of addressing: one with secondary address and one with primary address.

The secondary address has 8 digits (00000000-99999999) and can be chosen freely while operating on the M-Bus.

The primary address can be chosen between 0 and 250 while operating on the M-Bus.

Both the primary and secondary address can only appear once in the M-Bus system.

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).

1.3 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 oder 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 cos φ Phase L1	INT1	Fo x 0.1	0.01	6
Power factor cos φ Phase L2	INT1	Fo x 0.1	0.01	6
Power factor cos φ Phase L3	INT1	Fo x 0.1	0.01	6
Power factor cos φ Total	INT1	Fo x 0.1	0.01	4
Netfrequency	INT2	Hz x 0.1	0.1 Hz	5
				Total: 503*

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

1.4 Read-out data parameterization

1.4.1 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 -> By single phase meter is this the Voltage Total
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 cos phi Phase L1
xx1x xxxxb	:	Power factor cos phi Phase L2
x1xx xxxxb	:	Power factor cos phi Phase L3
1xxx xxxxb	:	Total power factor cos phi

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 (cos Phi)

1.4.2 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“.

Default Parameter Set Identification (INT6 Typ) = 0B FF 88 FF 9F 0F

S0 = 0B => 0000 1011b : Parameterset Identification
+ Status Byte 4 (Range Overflow Alarms)
+ Parameterset 2
Instead of exported active energy ->Imported reactive energy
➔ S0 Total = 13 byte

S1 = FF => 1111 1111b : Active - Energy Import Phase L1 Tariff 1 -> Not if single Phase
+ Active - Energy Import Phase L2 Tariff 1 -> Not if single Phase
+ Active - Energy Import Phase L3 Tariff 1 -> Not if single Phase
+ Active - Energy Import Total Tariff 1
+ Active - Energy Import Phase L1 Tariff 2 -> Not if single Phase
+ Active - Energy Import Phase L2 Tariff 2 -> Not if single Phase
+ Active - Energy Import Phase L3 Tariff f2 -> Not if single Phase
+ Active - Energy Import Total Tariff 2
➔ S1 Total 3 Phase Energy meter = 68 Byte
➔ S1 Total 1 Phase Energy meter = 14 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 -> Not if single Phase
+ Active - Power Phase L2 -> Not if single Phase
+ Active - Power Phase L3 -> Not if single Phase
+ Active - Power Total
+ Reactive - Power Phase L1 -> Not if single Phase
+ Reactive - Power Phase L2 -> Not if single Phase
+ Reactive - Power Phase L3 -> Not if single Phase
+ Reactive - Power Total
➔ S3 Total 3 Phase Energy meter = 68 Byte
➔ S3 Total 1 Phase Energy meter = 14 Byte

S4 = 9F => 1001 1111b : Voltage Phase L1 -> Not if single Phase
or Voltage Total -> Only if 3 Phase
+ Voltage Phase L2 -> Not if single Phase
+ Voltage Phase L2 -> Not if single Phase
+ Active Energy Import Total
+ Reactive Energy Import Total
+ Tariff presently operating
➔ S4 Total 3 Phase Energy meter = 39 Byte
➔ S4 Total 1 Phase Energy meter = 23 Byte

S5 = 0F => 0000 1111b : Current Phase L1 -> Not if single Phase
+ Current Phase L2 -> Not if single Phase
+ Current Phase L3 -> Not if single Phase
+ Current Total
➔ S5 Total 3 Phase Energy meter = 30 Byte
➔ S5 Total 1 Phase Energy meter = 6 Byte

Total: 3 phase energy meter = 224 Byte and single phase energy meter = 86 Byte.

2 Telegrams for Parameterization and Read-out Data of M-Bus module

Description of all telegrams that can be used via M-Bus

2.1 Primary Address (A-Field)

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

2.1.1 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 for processes with 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.

2.2 Secondary Address (UD)

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

2.2.1 Structure of Secondary Address (UD)

Identification number	Producer	Version	Medium
xxxxxxxx	mm mm	xx	02

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

2.2.2 Wildcard

The M-Bus module 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 module: Identification number = 12345678, producer = XX, version = 12, medium = 02

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

2.3 Reset M-Bus module access counter (SND_UD)

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

The M-Bus module 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 module sends no confirmation.

2.3.1 Reset M-Bus module access counter using Primary Address

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 module (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 modules on the network simultaneously, use 255 as Primary Address in A field (Hex = FF). The M-Bus modules will however not send an Acknowledgement.

2.3.2 Reset M-Bus module access counter using Secondary Address

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 to FD = Sekundary Address
7	1	50	CI- Field, Initialise M-Bus module (Set module called to „0“)
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	xx	CS Checksum, summed up by C-Field to UD incl.
17	1	16	Stop Character

2.4 Set baud rate (SND_UD)

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

The M-Bus module 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 module sends no confirmation.

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

2.4.1 Set baud rate using Primary Address

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

2.4.2 Set baud rate using Secondary Address

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	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 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	xx	CS Check Sum, summed up by C Field, A Field, CI Field and UD.

17	1	16	Stop Character

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

2.5.1 Set Parameter Set to all Read-out Data possible using Primary Address

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

2.5.2 Set Parameter Set to all Read-out Data possible using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character 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	FD	A- Field, Primary Address to FD = Secondary Address
7	1	51	CI- Field, New Data for M-Bus module
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	7F	DIF- Field, Set Default Parameterset
17	1	xx	CS Checksum, summed up by C-Field to DIF- Field incl.
18	1	16	Stop Character

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

2.6.1 Set Parameter Set for any Read-out Data desired using Primary Address

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 module
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 modules on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus modules will however not send an Acknowledgement.

2.6.2 Set Parameter Set for any Read-out Data desired using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	14	L- Field
3	1	14	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	51	CI- Field, New Data for M-Bus module
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	06	DIF- Field, 48 Bit Integer Data (6 Byte)
17	1	FD	VIF- Field, A Standard VIFE follows
18	1	0B	VIFE- Field, Standard VIFE = Parameterset Identification
19	1	„S0“	Parameterset S0 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
20	1	„S1“	Parameter Set S1 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
21	1	„S2“	Parameterset S2 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
22	1	„S3“	Parameterset S3 (00 – 0F), Please see: „Structure of Parameter Set of Read-out Data possible“
23	1	„S4“	Parameterset S4 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
24	1	„S5“	Parameterset S5 (00 - FF) Please see: „Structure of Parameter Set of Read-out Data possible“
25	1	xx	CS Checksum, summed up from C-Field to „S5“ incl.
26	1	16	Stop Character

2.7 Set Primary Address (SND_UD)

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

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

2.7.1 Set Primary Address using Primary Address

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 module
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

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

2.7.2 Set Primary Address using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0E	L- Field
3	1	0E	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	51	CI- Field, New Data for M-Bus module
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	01	DIF- Field, 8 Bit Integer- Data (1 Byte)
17	1	7A	VIF- Field, Set Primary Address
18	1	xx	New Primary Address, Range :00 – FA (0 – 250), Invalid: FB – FF (no action in meter)
19	1	xx	CS Checksum, summed up from C Field to Primary Address incl.
20	1	16	Stop Character

2.8 Set Secondary Address (SND_UD)

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

2.8.1 Set Secondary Address using Primary Address

Byte Nr.	Size (Byte)	Value (Hex)	Beschreibung
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 module
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

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

2.8.2 Set Secondary Address using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Beschreibung
1	1	68	Start Character Long Telegram
2	1	11	L- Field
3	1	11	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	51	CI- Field, New Data for M-Bus module
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	0C	DIF- Field, 8 digits BCD, 4 Byte
17	1	79	VIF- Field, Set Secondary Address
18	1	xx	New Secondary Address digits 7 and 8, Range: 00 - 99 Beispiel: Sec. Address = 12345678 -> Byte Value = 78
19	1	xx	New Secondary Address digits 5 and 6, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 56
20	1	xx	New Secondary Address digits 3 and 4, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 34
21	1	xx	New Secondary Address digits 1 and 2, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 12
22	1	xx	CS Checksum, summed up from C Field to Sec. Address incl.
23	1	16	Stop Character

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

2.9.1 Set Secondary Address and Manufacturer's Mark using Primary Address

Byte Nr.	Size (Byte)	Value (Hex)	Beschreibung
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 module
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 modules on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus modules will however not send an Acknowledgement.

2.9.2 Set Secondary Address and Manufacturer's Mark using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	15	L- Field
3	1	15	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	51	CI- Field, New Data for M-Bus module
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	07	DIF- Field, 64 Bit Integer, 8 Byte
17	1	79	VIF- Field, Set Secondary Address and Manufacturer's Mark
18	1	xx	New Secondary Address digits 7 and 8, Range: 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 78
19	1	xx	New Secondary Address digits 5 and 6, Range: 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 56
20	1	xx	New Secondary Address digits 3 and 4, : Range 00 – 99 Example: Sec. Address = 12345678 -> B Range Byte Value = 34
21	1	xx	New Secondary Address digits 1 and 2, : 00 – 99 Example: Sec. Address = 12345678 -> Byte Value = 12
22	1	xx	New Manufacturer's Mark Byte 2, Range: 00 – FF Example: Manufacturer = 14 73 (ECS) -> Byte- Value = 73
23	1	xx	New Manufacturer's Mark Byte 1, Range: 00 – FF Example: Manufacturer = 14 73(ECS) => Byte Value = 14
24	1	xx	Version; This Parameter cannot be changed. => Setting: Any Value 00 – FF
25	1	xx	Medium; This Parameter is fixed to 02 and cannot be changed. => Setting: Any Value 00 – FF
26	1	xx	CS Checksum, summed up from C Field to Medium incl.
27	1	16	Stop Character

2.10 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 module and/or to Re-setting the Reactive Energy Tariff 1 + 2 (Set to “0”).

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

Caution: ***This function is blocked in Electricity Meters with official certification (Metas or PTB Approval).***

2.10.1 Reset Active and Reactive Energy using Primary Address

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 module
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 modules on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus modules will however not send an Acknowledgement.

To make sure that all M-Bus module in the System have Set the Active and / or Reactive Energy to „0“, this Telegram can be repeated every few seconds (normally about 30 seconds).

2.10.2 Reset Active and Reactive Energy using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0F	L- Field
3	1	0F	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	51	CI- Field, New Data for M-Bus module
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	01	DIF- Field, 8 Bit Integer (1 Byte)
17	1	FF	VIF- Field, An Manufacturer-spec.VIFE follows
18	1	13	VIFE- Field, Manufacturer-spec.VIFE = Energy Reset
19	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)
20	1	xx	CS Checksum, summed up from C-Field to Coding
21	1	16	Stop Character

2.11 Select M-Bus Module using Secondary Address (SND_UD)

This Telegram selects M-Bus module.

The M-Bus module 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 module will not send an Acknowledgement.

In Selection Mode the M-Bus module 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 module accepts also all telegrams with Primary Address on FD (A-Field on FD)

The M-Bus module switch back to Normal Mode by receiving an invalid telegram or by receiving the telegram “ Initialisation of M-Bus module”

2.11.1 Select M-Bus Module using Secondary Address

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 module
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	xx	CS Checksum, summed up from C-Field to Sekundary Address
17	1	16	Stop Character

2.12 Transmit Read-out Data (REQ_UD2)

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

The M-Bus module 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 module.

The Read-out Data are sent within 35 – 75 ms from receipt of the Short Telegram by the M-Bus module.

2.12.1 Transmit Read-out Data

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 : Transmission using Secondary Address FE : All M-Bus module in the System transmit the Read-out Data FF : No action by M-Bus module
4	1	xx	CS Checksum, summed up by C-Field and A- Field
5	1	16	Stop Character

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 module
6	1	xx	A- Field, Primary Address (00 – FA = 0 – 250)
7	1	72	CI- Field, Read-out Data of M-Bus module
8 - 11	4	xxxxxxxx	***8-digit Serial Number of M-Bus module (Sec. Address)***
12 + 13	2	xx xx	***Manufacturer's Mark***
14	1	xx	***Version Number of M-Bus module Firmware (00 – FF)***
15	1	02	***Medium Electricity***
16	1	xx	***Meter called upon, at each call on M-Bus module + 1 (00 – FF -> 00)***
17	1	xx	***Shows the M-Bus module Status. Please see „Structure of Error Flags Data Transmission from Meter to M-Bus module" and „Structure of Error Flags in M-Bus module"***
18 + 19	2	00 00	***Signature. For M-Bus module 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	xx	CS Check Sum, summed up from C Field to End of „Read-out Data parametrised"
YY + 2	1	16	Stop Character

2.12.2 Telegram of Read-out Data by M-Bus module (RSP_UD)

- ***Bytes No. 8 – 19 are the firm Data Record Header for every M-Bus module.***
- ***Bytes No. 20 – YY are the Read-out Data defined in the Parameter Set.***

2.12.3 Structure of Telegram for Read-out Data possible

The M-Bus module 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“.

2.12.3.1 Parameterset Identification

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

2.12.3.2 Active Energy Import Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integer, 4 Byte
YY + 1	1	05	VIF, Active Energy Total
YY + 2 - YY + 5	4	xxxxxxxx	Active Energy Import Total

2.12.3.3 Reactive Energy Import Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	80	DIFE, Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Register
YY + 3	1	05	VIF, Reactive Energy Total
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Import Total

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	85	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 4	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Import Phase L1, L2 or L3

2.12.3.5 Active Energy Import Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	05	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Import Total Tariff 1

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	85	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 4	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Import Phase L1, L2 or L3

2.12.3.7 Active Energy Import Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	05	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Import Total Tariff 2

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	85	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 4	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

2.12.3.9 Active Energy Export Total Tariff 1

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

- YY + 6			-> IntegerValue = Negative

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	85	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 4	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

2.12.3.11 Active Energy Export Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	05	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Export Total -> IntegerValue = Negative

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	85	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 or L3

2.12.3.13 Reactive Energy Import Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Total Tariff 1; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	05	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Import Total

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Tariff 2 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	85	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 or L3

2.12.3.15 Reactive Energy Import Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Total Tariff 2; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	05	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Import Total

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	85	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

2.12.3.17 Reactive Energy Export Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Total Tariff 1; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	05	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Export Total -> IntegerValue = Negative

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Tariff 2 ; Followed by a further DIFE
YY + 2		40	DIFE, Reactive Value
YY + 3	1	85	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

2.12.3.19 Reactive Energy Export Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Total Tariff 2; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	05	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Export Total -> IntegerValue = Negative

2.12.3.20 Active Power Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integer, 4 Byte
YY + 1	1	AB	VIF, Active Power; Followed by a further VIFE
YY + 2	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 3	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 4 - YY + 7	4	xxxxxxxx	Active Power Phase L1, L2 or L3

2.12.3.21 Active Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integer, 4 Byte
YY + 1	1	2B	VIF, Active Power
YY + 2 - YY + 5	4	xxxxxxxx	Active Power Total

2.12.3.22 Reactive Power Phase L1, L2 and L3

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

- YY + 9			

2.12.3.23 Reactive Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	80	DIFE, Total; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive- Value
YY + 3	1	2B	VIF, Reactive Power
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Power Total

2.12.3.24 Apparent Power Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	C0	DIFE, Total; Followed by a further DIFE
YY + 2	1	40	DIFE, Apparent Value
YY + 3	1	AB	VIF, Apparent Power; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Apparent Power Phase L1, L2 or L3

2.12.3.25 Apparent Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	C0	DIFE, Total; Followed by a further DIFE
YY + 2	1	40	DIFE, Apparent Value
YY + 3	1	2B	VIF, Apparent Power
YY + 4 - YY + 7	4	xxxxxxxx	Apparent Power Total

2.12.3.26 Voltage Phase L1, L2 and L3

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

2.12.3.27 Voltage Total single Phase Meter

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

2.12.3.28 Current Phase L1, L2 and L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 23 Bit Integer, 3 Byte
YY + 1	1	FD	VIF, Followed by a VIFE
YY + 2	1	D9	VIFE = Current; Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 4	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 7	3	xxxxxx	Current Phase L1, L2 or L3

2.12.3.29 Current Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 23 Bit Integer, 3 Byte
YY + 1	1	FD	VIF, Followed by a VIFE
YY + 2	1	59	VIFE = Current Total
YY + 3 - YY + 5	3	xxxxxx	Current Total

2.12.3.30 Power factor cos phi Phase L1, L2 and L3

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

2.12.3.31 Power factor cos phi Total

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

2.12.3.32 Netfrequency

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

2.12.3.33 Staus Byte 4 (Range Overflow)

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

2.12.3.34 Tariff presently operating

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF, Followed by an Manufacturer-spec.VIFE
YY + 2	1	13	Manufacturer-spec.VIFE = Tariff presently operating
YY + 3	1	0x	Tariff presently operating 00 : no connection to the Meter 01 : Tariff 1 02 : Tariff 2

2.13 Telegram of Error Flags (REQ_UD1)

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

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

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

2.13.1 Transmit Error Flags of M-Bus module

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 : Transmission using Secondary Address FE : All M-Bus module in the System send the Error Flags FF : No action by M-Bus module
4	1	xx	CS Checksum, summed up from C-Field and A- Field
5	1	16	Stop Character

2.13.2 Telegram of Error Flags (RSP_UD)

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

Remark: If there aren't Error Flags set, the M-Bus module 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 module
6	1	xx	A- Field, Primary Address (00 – FA = 0 – 250)
7	1	71	CI- Field, Error Flags of M-Bus module
8	1	xx	Error Flags, Please see „Structure of Error Flags Data Transmission from Meter to M-Bus module“ and „Structure of Error Flags in M-Bus module“
9	1	xx	CS Checksum, summed up from C-Field to Error Flags inclusive
10	1	16	Stop Character

2.13.3 Structure of Error Flags Data Transmission from Meter to M-Bus module

The latest Data are transmitted every 4 seconds from the Meter to the M-Bus module.

The Data Transmission from the Meter to the M-Bus module only works if the Meter is connected at least on one phase to the voltage system and the M-Bus module is connectet to the M-Bus Data Line.

If the Voltage fails on the M-Bus the following Data are stored in an intermediary memory of an EEPROM:

- Active or Reactive Energy Import Phase L1, L2, L3 and Total, Tariff 1 and Tariff 2.
- Active or Reactive Energy Export Phase L1, L2, L3 and Total, Tariff 1 and Tariff 2.
- Parameter Set of Read-out Data possible
- Primary and Secondary Addresses for M-Bus Communication
- Baud Rate for M-Bus Communication

Error Flag (Binär)	Error Flag (Hex Value)	Description
0000 xxxx	0x	No Error has been set. => All instantaneous Data can be called via the M-Bus module.
0001 xxxx	1x	The last Data Transmission from the Meter to the M-Bus module was faulty. The Meter is not connected to voltage or is faulty. => Only the Data of the last successful Data Transmission can be called via M-Bus module.
0011 xxxx	3x	After putting the M-Bus module into operation no successful Data Transmission from the Meter to the M-Bus module has beeneffected. => The first Data Transmission is not yet completed (below 2 -6 sec.). => The Meter is not connected to system Voltage or is faulty. The M-Bus Data are not up-to-date. The Data are on „0“ or they correspond to the last Voltage failure.

2.13.4 Structure of Error Flags M-Bus module

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

Error Flag (Binär)	Error Flag (Hex Value)	Description
xxxx 0000	x0	No Error set. => No Error in M-Bus module
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.

2.14 Initialisation of M-Bus module (SND_UD2)

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

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

2.14.1 Initialisation of M-Bus module

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 : Transmission using Secondary Address FE : All M-Bus module in the System send the ACK FF : No action by M-Bus module
4	1	xx	CS Checksum, summed up from C-Field and A- Field
5	1	16	Stop Character

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