User Handbook EMU M-Bus Meters

Electronic Three-Phase Energy Meters EMU32.xx with M-Bus

Primary Address	**: 000**
Secondary Address	**: 00235641**
Baud Rate	**: 2400**
Parametrization	**: Customer-specific**

06.04.2006 Technical modifications reserved

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1 Short View on M-BUS

- **According to EN1434 Standard**

- **Many Fields of Application:**
  - Industry
  - Building Control Technique
  - Manufacturers of Consumption Meters
  - Public and Private Utilities

- **Wide Read-out Spectrum:**
  - for use in all media
  - Electricity Meters
  - Multi-Function Meters
  - Heat Meters
  - Water Meters
  - Gas Meters

- **Modest Extra Cost on Basic Metering:**
  - Every Meter with its own M-BUS
  - All Meters operate via the same System Components

- **Clear Communication System:**
  - simple, compatible, extendible
  - independent of Transmission Speed

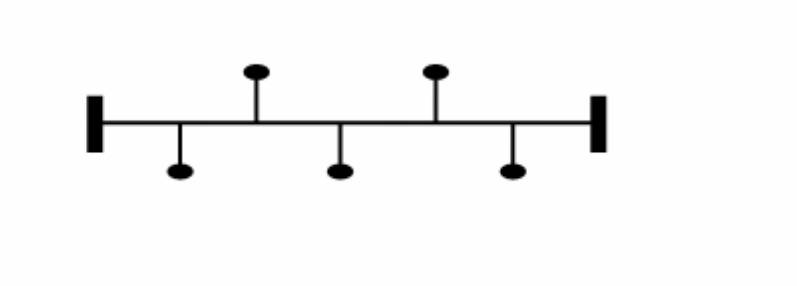
- **Simple Bustopology:**
  - Two-wire Circuit
  - Level Converters controlled by Master / Repeater(s)
  - Read-out Software

- **Simple Installation and easy Operation:**
  - Minimum Costs for Cabling and Installation
  - Network Structure as desired
  - Up to 250 Meters per Segment
  - Easily extendible by means of Repeaters
  - Network size as desired

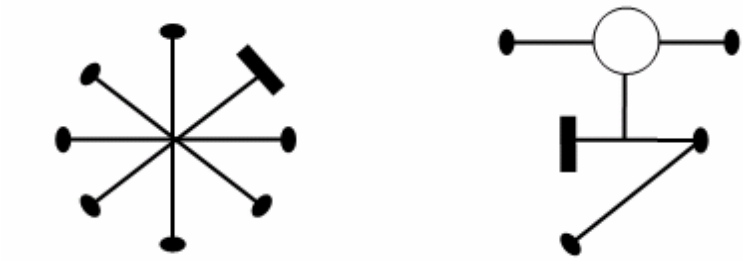
Please see additional information regarding the M-BUS under www.m-bus.com

2 Network Topologies

Bus-shaped Circuiting with Termination at both Ends



Free Circuiting with unilaterial Bus Termination



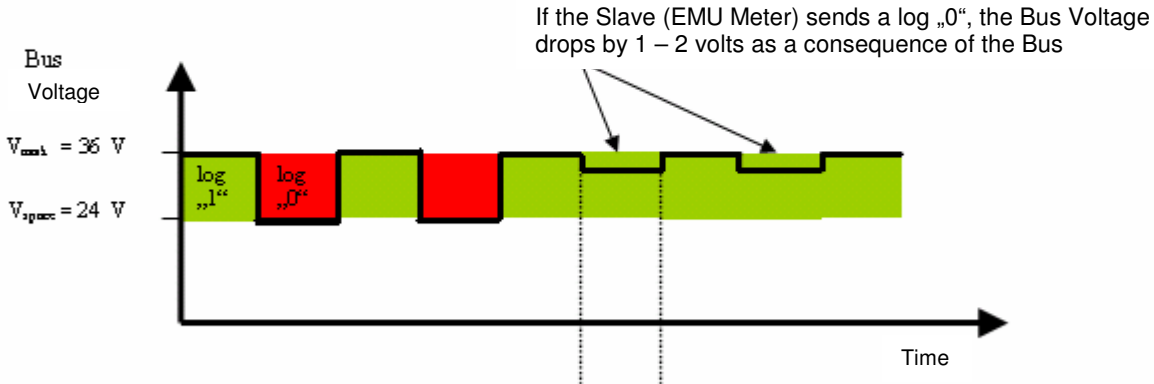
3 Technical Specification

3.1 Transmission from Master / Repeater to Slave and from Slave to Master / Repeater

Transmission from Master / Repeater to Slave (EMU Meter)

The Voltage Level Changes:

Log „1“ => V_{mark} = + 36 V
Log „0“ => V_{space} = + 24 V

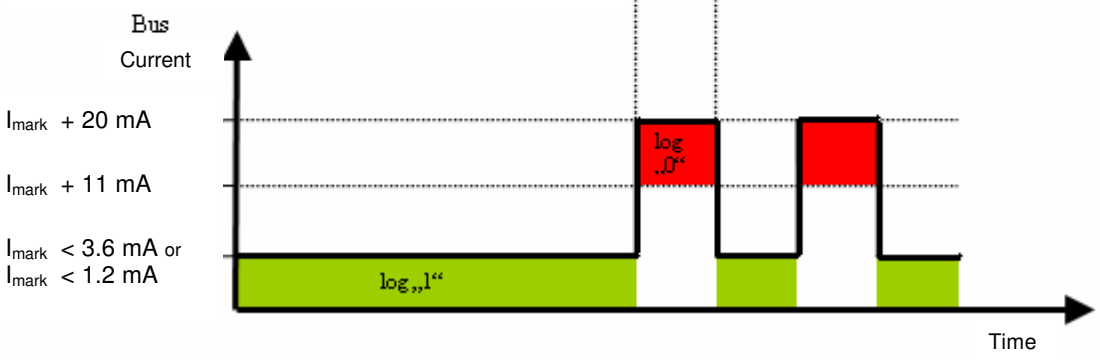


Transmission from Slave (EMU Meter) to Master / Repeater

The Current Level Changes:

M-BUS without M-BUS Booster Feeder:
Log „1“ => I_{mark} < 3.6 mA; Log „0“ => I_{mark} + 11...20 mA

M-BUS with M-BUS Booster Feeder:
Log „1“ => I_{mark} < 1.2 mA; Log „0“ => I_{mark} + 11...20 mA



3.2 Idle Position of M-BUS

Log „1“
Nominal Bus Voltage = 36 Volt.

EMU M-BUS Meter without M-BUS Booster Feeder:
Max. Idle Current = 3.6 mA per EMU Meter

EMU M-BUS Meter with M-BUS Booster Feeder:
Max. Idle Current = 1.2 mA per EMU Meter

3.3 Change of Voltage and Current

If no log „0“ is transmitted by a Slave, the Master / Repeater generates an idle current and operates thereby the M-BUS. Vmark is at this point of time inferior to 36 Volts. The voltage drop depends on the distance between the Slave and the Master / Repeater and the idle current consumption of the Slave.
The Slave is therefore not called to evaluate absolute voltage levels but just to recognize under log „0“ a voltage change of 12 Volts.
The Master / Repeater however must recognize a current rise of 11….20 mA as log „0“, departing from the idle current. This can only be reached if log „0“ voltage is rated at 36 Volts.
A data transmission can for this reason reason only take place in one direction. This direction is therefore either from the Master / Repeater to the Slave or vice-versa (Half Duplex).

3.4 Specification of EMU M-BUS Meter

EMU M-BUS Meter without Booster Feeder (Normal Version):

Current Consumption: Interface M-BUS: < 3.6 mA

Idle Current Imark: < 3.6 mA (3 standart loads)

Signal Current: = Imark + 11 .. 20 mA

Nominal Voltage: = 24 .. 36 Volts (12 V voltage change between log „0“ and log „1“)

EMU M-BUS Meter with Booster Feeder (Option):

Current Consumption: Interface M-BUS: < 1.2 mA

Idle Current Imark: < 1.2 mA

Signal Current: = Imark + 11 .. 20 mA

Nominal Voltage: = 24 .. 36 Volts (12 V voltage change between log „0“ and log „1“)

3.5 EMU M-BUS

- M-BUS complying with EN 1434-3
- Circuiting by means of drilled two-wire cables YCYM or J-Y(St)Y 2 x 2 x 0,8 mm.
- Plug-in Terminal on EMU meter.
- The maximum distance between Slave and Master / Repeater depends on the bus structure, the cable cross section and the baud rate and is between 350 m and 10 km.
- The data transmission speed is selectable between 300 and 9600 bauds.
- The Network Structure can be chosen as desired.
- The M-BUS allows to read out both instantaneous meter displays and an appreciable number of further values such as power data, voltages, currents, etc.
- Parametrization of the EMU interface is achieved via the M-BUS. The parameters are durably stored in the EMU meter.
- In case of Voltage Outages all data are stored in the EMU meter.
- The data transmission complies with IEC 870-5, as follows:
  - Bit-serial asynchronus transmission (start-stop); half duplex.
  - Data baudrate selectable at 300, 600, 1200, 2400, 4800 and 9600 bauds.
  - Format: 11 bits per charakter (1 starting bit, 8 data bits, 1 parity bit [even] and 1 stopping bit).
  - Bit sequence: Data bit of lowest value is handled first.
  - Sign secured by parity bit, even parity.
  - Block security by block checksum.
- Current consumption of EMU M-BUS interface: < 3.6 mA.
  This corresponds to 3 standart loads.
  - If an M-BUS master interface is designed for up to 120 standart loads, a maximum of 40 EMU M-BUS meters can be connected without a further M-BUS repeater being used.
  - Should more than 40 EMU M-BUS meters be connected to the M-BUS, a more powerful M-BUS master interface (for up to 250 standart loads => up to 83 EMU M-BUS meters) or an additional M-BUS repeater is to be used.
- Option: EMU M-BUS meter with 230 V booster feeder.
  The current consumption of the EMU M-BUS interface is than < 1.2 mA, equivalent to a standart load.
  - 230 V booster connection on terminals 5 and 6 of EMU M-BUS meter.

3.6 Standard Parametrization of EMU M-BUS

Adressing:

In order to build up a connection to the single participants all Slaves require a defined address. The EMU M-BUS meter is apt to have two types of address, a Primary and a Secondary address.

The 8-digit Secondary address is set by EMU in the meter and is based on the meter serial number. This address is used amongst other criteria for the automatic recognition of the Slave upon putting an M-BUS system into operation. The Secondary address can be changed as desired via the M-BUS when the system is in operation.

The Primary address is pre-set to 0 by EMU..
When in system operation it can be freely re-set between 0 and 250 via the M-BUS.

Baud Rate:

The Baud Rate is the number of data bits per second for a data transmission via the M-BUS. It combines both actual transmission data (active data) and pilot and control bits. The net transmission rate of active data is thus throughout inferior to the baud rate.

In order to establish communication between Master / Repeater and the EMU M-BUS meter (Slave), The Master / Repeater and the Slave require to have the same baud rate.
The Baud Rate is pre-set by EMU to 2400 bauds.
The baud rate allows setting as desired via the M-BUS when in system operation.
300, 600, 1200, 2400, 4800 or 9600 bauds may be selected.

Standard Read-out Data:

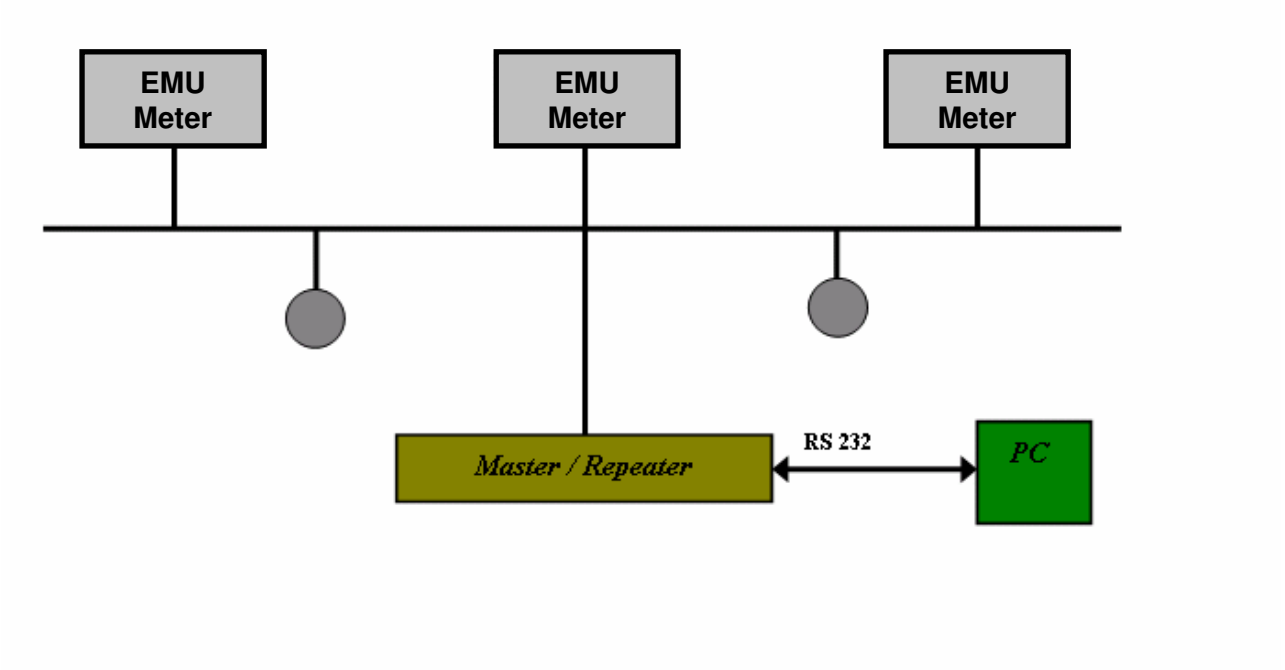
The Read-out data can be set as desired via the M-BUS when the system is in operation. There is further an option to set the read-out data directly on the M_BUS meter. (Please read: „Selection of Read-out Data“ further ahead in this description.
The Standard Read-out Data are set by EMU to comprise the following data::

- ***System Time***
- ***Operating Hours***
- ***Total Active Energy***
- ***Total instantaneous Active Power***
- ***Init. Counter (Voltage Outages on EMU meter)***
- ***Time of last Power Up***
- ***Error Flags***

Note: The afore-mentionned criteria of parametrization are only practised by EMU when no clear information is available as to the parameter values desired.
If a customer requests another parametrization, EMU will supply their M-BUS meters adjusted to customer-specific parametrization.

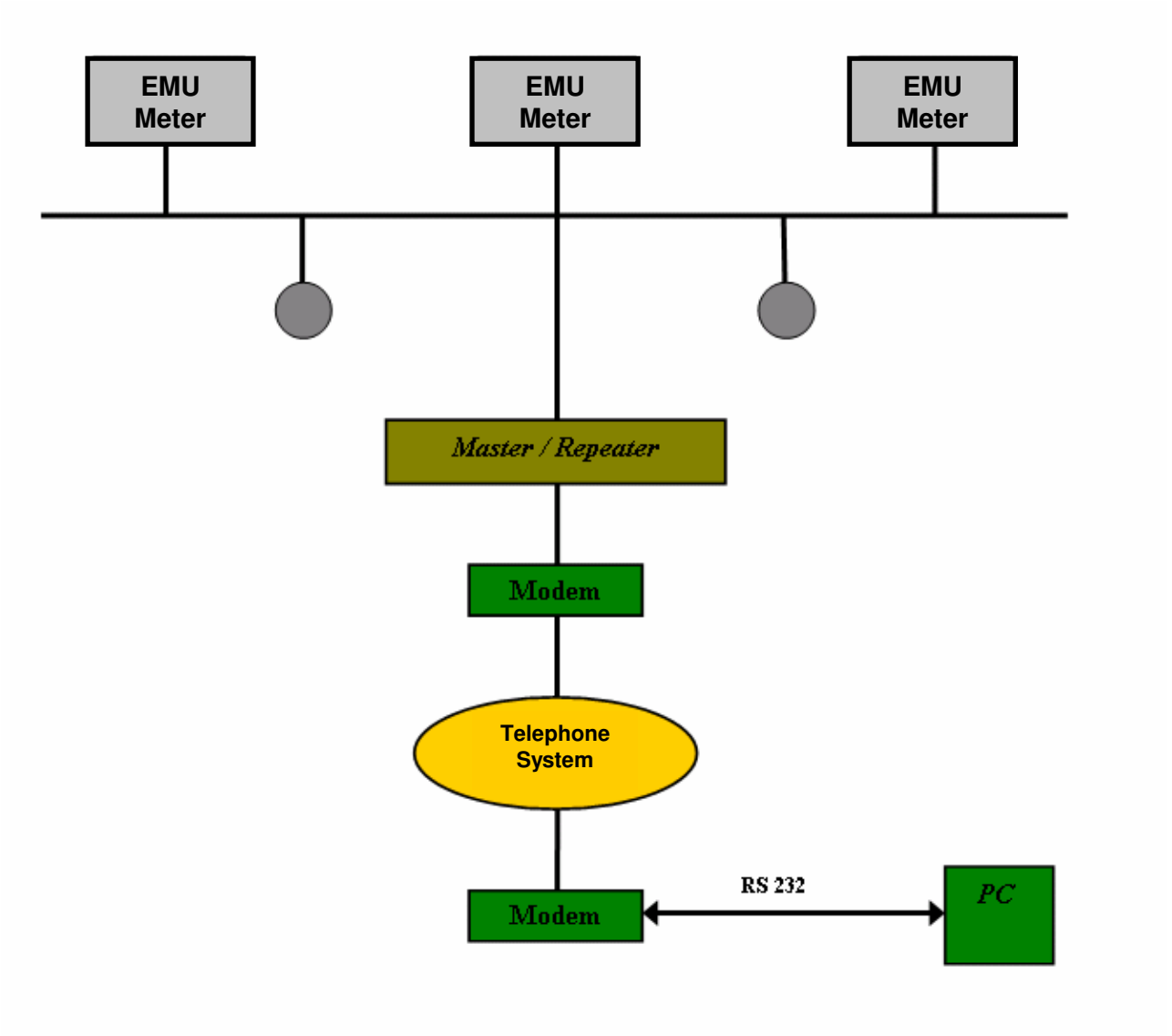
4 Function of an M-Bus System

4.1 Direct Connection between a PC and the M-BUS



- Depending on the M-BUS structure the Master / Repeater can contact up to 250 Slaves.
- Continuous reading of data is feasible.
- Bus Length: Please see:“Recommendations as to M-BUS Lengths“ further ahead.

4.2 Indirect Connection between a PC and the M-BUS via Modem



- The connection between the M-BUS and the PC is via telephone line by means of a Modem.
- The Read-out takes place from the PC via the Modem / M-BUS to the single Slaves.
- In case an intelligent M-BUS Master (p.e. SPS Control) is in use, an M-BUS Load Management independent of the PC becomes feasible.

5 Recommendations as to M-BUS Lengths

Type of Installation	Maximum M-BUS-Length	Cable Cross Section	Number of Instruments (Slaves / Repeaters)	Transmission Speed (Baud Rate)
Standard House Installation	350 m	0.5 mm^2	250	9600
Minor Wide Range Installation	1 km	0.5 mm^2	60	2400
Standard	2 km	0.8 mm^2	60	2400
Major Wide Range Installation	3 km	1.5 mm^2	60	2400
Network Installation	5 km	1.5 mm^2	16	300
Maximum (linear)	10 km	1.5 mm^2	1	300

6 Data readable

6.1 Options of Read-out Data

Value measured / Information	DataType	Units	Resolution	Remarks
INDENTIFICATION OF Parameter Set	INT4	-	-	Information on Read-out Data actually set
Instantaneous System Time	INT4 Typ F	Date + Time	dd.mm.yyyy hh:mm	
Operating Hours of EMU meter	INT4	h	1 h	
Total Active Energy	INT4	Wh	0.01 kWh	
Active Energy Tariff 1	INT4	Wh	0.01 kWh	
Active Energy Tariff 2	INT4	Wh	0.01 kWh	
Total Reactive Energy or Active Energy Total Export	INT4	varh or Wh	0.01 kvarh or 0.01 kWh	Dependig on type of meter ***xxx***
Total Reactive Tariff 1 or Active Energy Tariff 1 Export	INT4	varh or Wh	0.01 kvarh or 0.01 kWh	Dependig on type of meter ***xxx***
Total Reactive Tariff 1 or Active Energy Tariff 1 Export	INT4	varh or Wh	0.01 kvarh or 0.01 kWh	Dependig on type of meter ***xxx***
Tariff presently operating	INT1	-	-	Tariff 1 oder 2
Total instantaneous Active Power	INT4	W	0.01 kW	
Instantaneous Active Power Phase L1	INT4	W	0.01 kW	
Instantaneous Active Power Phase L2	INT4	W	0.01 kW	
Instantaneous Active Power Phase L3	INT4	W	0.01 kW	
Total instantaneous Reactive Power	INT4	var	0.01 kvar	
Instantaneous Reactive Power Phase L1	INT4	var	0.01 kvar	
Instantaneous Reactive Power Phase L2	INT4	var	0.01 kvar	
Instantaneous Reactive Power Phase L3	INT4	var	0.01 kvar	
Total Maximum Demand Active Power	INT4	W	0.01 kW	
Maximum Demand Active Power Tariff 1	INT4	W	0.01 kW	
Maximum Demand Active Power Tariff 2	INT4	W	0.01 kW	
Instantaneous Voltage Phase L1	INT2	V	1 V	
Instantaneous Voltage Phase L2	INT2	V	1 V	
Instantaneous Voltage Phase L3	INT2	V	1 V	
Total instantaneous Current	INT3	mA	0.01 A	
Instantaneous Current Phase L1	INT3	mA	0.01 A	
Instantaneous Current Phase L2	INT3	mA	0.01 A	
Instantaneous Current Phase L3	INT3	mA	0.01 A	
Instantaneous Network Frequency	INT2	Hz x 0.1	0.1 Hz	
Instant. Power Factor Phase L1 (cos Phi)	INT1	Fo x 0.01	0.01	
Instant. Power Factor Phase L2 (cos Phi)	INT1	Fo x 0.01	0.01	
Instant. Power Factor Phase L2 (cos Phi)	INT1	Fo x 0.01	0.01	
Number of Voltage Outages on EMU Meter	INT2	-	1	
Current Transformer Factor	INT2	-	1	For CT-connected meters only
Error Flags	INT1	-	-	
Time of last Power Up on EMU Meter	INT4 Typ F	Date + Hour	dd.mm.yyyy hh:mm	

xxx On EMU meters registering positive and negative Active Energy (meter running forward or reverse) the values of the negative energy register (Export of Active Energy) are transmitted under this parametrization.

6.2 Parametrization of Read-out Data possible

- Parametrization enables to select any desired Read-out Data for EMU Meter Reading.
- The desired Read-out Data may be parametrized on the two keys on the EMU meter or by transmitting an M-BUS telegram (Long Frame; SND_UD).
- If so desired any read-out value can be enhanced by the corresponding Status VIFE Byte (Structure: please see“Data Telegram“).
- Upon Voltage Outage the parametrization on the EMU meters remains stored.

6.2.1 Structure of Parameter Set for Read-out Data possible

S1 = Parameter Set 1 Read-out Data; Range: 00 – FF
S2 = Parameter Set 2 Read-out Data; Range: 00 – FF
S3 = Parameter Set 3 Read-out Data; Range: 00 – 0F

S3 : Basic Options

If Bit 3 is set to „0“, simplified parametrization may be selected for 8 options of parametrization:

0000’0000B (00H) : Option 1
The following data are transmitted ***with a Status VIFE Byte:***
- Operating Hours of EMU meter (h)
- Total Active Energy (Wh)
- Total instantaneous Active Power (W)
- Number of Voltage Outages on EMU meter
- Error Flags
- Time of last Power UP (Date and Hour)

0000’0001B (01H) : Option 2
The following data are transmitted ***without a Status VIFE Byte:***
- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Total Active Energy (Wh)
- Total instantaneous Active Power (W)
- Number of Voltage Outages on EMU meter
- Error Flags
- Time of last Power UP (Date and Hour)

0000'0010B (02H) : Option 3

The following data are transmitted ***with aStatus VIFE Byte:***

- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Active Energy Tariff 1 (Wh)
- Active Energy Tariff 2 (Wh)
- Tariff actually operating
- Instantaneous Active Power Phase L1 (W)
- Instantaneous Active Power Phase L2 (W)
- Instantaneous Active Power Phase L3 (W)
- Instantaneous Voltage Phase L1 (V)
- Instantaneous Voltage Phase L2 (V)
- Instantaneous Voltage Phase L3 (V)
- Instantaneous Current Phase L1 (mA)
- Instantaneous Current Phase L2 (mA)
- Instantaneous Current Phase L3 (mA)
- Instantaneous Network Frequency (Hz x 0.1)
- Instant. Power Factor Phase L1 (Fo x 0.01)
- Instant. Power Factor Phase L2 (Fo x 0.01)
- Instant. Power Factor Phase L3 (Fo x 0.01)
- Number of Voltage Outages on EMU meter
- Error Flags
- Time of last Power UP (Date and Hour)

0000'0011B (03H) : Option 4

The following data are transmitted ***without a Status VIFE Byte:***

- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Active Energy Tariff 1 (Wh)
- Active Energy Tariff 2 (Wh)
- Tariff Actually operating
- Instantaneous Active Power Phase L1 (W)
- Instantaneous Active Power Phase L2 (W)
- Instantaneous Active Power Phase L3 (W)
- Instantaneous Voltage Phase L1 (V)
- Instantaneous Voltage Phase L2 (V)
- Instantaneous Voltage Phase L3 (V)
- Instantaneous Current Phase L1 (mA)
- Instantaneous Current Phase L2 (mA)
- Instantaneous Current Phase L3 (mA)
- Instantaneous Network Frequency (Hz x 0.1)
- Instant. Power Factor Phase L1 (Fo x 0.01)
- Instant. Power Factor Phase L2 (Fo x 0.01)
- Instant. Power Factor Phase L3 (Fo x 0.01)
- Number of Voltage Outages on EMU meter
- Error Flags
- Time of last Power UP (Date and Hour)

0000'0100B (04H) : Option 5

The following data are transmitted ***with a Status VIFE Byte:***

- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Total Active Energy (Wh)
- Total Reactive Energy (varh)
  or Active Energie Total Export (Wh) ***xxx***
- Total instantaneous Active Power (W)
- Total instantaneous Reactive Power (var)
- Number of Voltage Outages on EMU meter
- Error Flags
- Time of last Power UP (Date and Hour)

0000'0101B (05H) : Option 6

The following data are transmitted ***without a Status VIFE Byte:***

- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Total Active Energy (Wh)
- Total Reactive Energy (varh)
  or Active Energie Total Export (Wh) ***xxx***
- Total instantaneous Active Power (W)
- Total instantaneous Reactive Power (var)
- Number of Voltage Outages on EMU meter
- Error Flags
- Time of last Power UP (Date and Hour)

0000'0110B (06H) : Option 7

The following data are transmitted ***with a Status VIFE Byte:***

- Parameter Set Identification
- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Active Energy Tariff 1 (Wh)
- Active Energy Tariff 2 (Wh)
- Reactive Energy Tariff 1 (varh)
  or Active Energie Tariff 1 Export (Wh) ***xxx***
- Reactive Energy Tariff 2 (varh)
  or Active Energie Tariff 2 Export (Wh) ***xxx***
- Tariff actually operating
- Instantaneous Active Power Phase L1 (W)
- Instantaneous Active Power Phase L2 (W)
- Instantaneous Active Power Phase L3 (W)
- Instantaneous Reactive Power Phase L1 (var)
- Instantaneous Reactive Power Phase L2 (var)
- Instantaneous Reactive Power Phase L3 (var)
- Maximum Demand Active Power Tariff 1 (W)
- Maximum Demand Active Power Tariff 2 (W)
- Instantaneous Voltage Phase L1 (V)
- Instantaneous Voltage Phase L2 (V)
- Instantaneous Voltage Phase L3 (V)
- Instantaneous Current Phase L1 (mA)
- Instantaneous Current Phase L2 (mA)
- Instantaneous Current Phase L3 (mA)
- Instantaneous Network Frequency (Hz x 0.1)
- Instant. Power Factor Phase L1 (Fo x 0.01)
- Instant. Power Factor Phase L2 (Fo x 0.01)
- Instant. Power Factor Phase L3 (Fo x 0.01)
- Number of Voltage Outages on EMU meter
- Current Transformer Factor (=> For CT-connected meter only)
- Error Flags
- Time of last Power UP (Date and Hour)

xxx On EMU meters registering positive and negative Active Energy (meter running forward or reverse) the values of the negative energy register (Export of Active Energy) are transmitted under this parametrization.

0000'0111B (07H) : Option 8

The following data are transmitted ***without a Status VIFE Byte:***

- Parameter Set Identification
- Instantaneous System Time (Date and Hour)
- Operating Hours of EMU meter (h)
- Active Energy Tariff 1 (Wh)
- Active Energy Tariff 2 (Wh)
- Reactive Energy Tariff 1 (varh))
  or Active Energie Tariff 1 Export (Wh) ***xxx***
- Reactive Energy Tariff 2 (varh)
  or Active Energie Tariff 2 Export (Wh) ***xxx***
- Tariff actually operating
- Instantaneous Active Power Phase L1 (W)
- Instantaneous Active Power Phase L2 (W)
- Instantaneous Active Power Phase L3 (W)
- Instantaneous Reactive Power Phase L1 (var)
- Instantaneous Reactive Power Phase L2 (var)
- Instantaneous Reactive Power Phase L3 (var)
- Maximum Demand Active Power Tariff 1 (W)
- Maximum Demand Active Power Tariff 2 (W)
- Instantaneous Voltage Phase L1 (V)
- Instantaneous Voltage Phase L2 (V)
- Instantaneous Voltage Phase L3 (V)
- Instantaneous Current Phase L1 (mA)
- Instantaneous Current Phase L2 (mA)
- Instantaneous Current Phase L3 (mA)
- Instantaneous Network Frequency (Hz x 0.1)
- Instant. Power Factor Phase L1 (Fo x 0.01)
- Instant. Power Factor Phase L2 (Fo x 0.01)
- Instant. Power Factor Phase L3 (Fo x 0.01)
- Number of Voltage Outages on EMU meter
- Current Transformer Factor (=> for CT-connected meters only)
- Error Flags
- Time of last Power UP (Date and Hour)

xxx On EMU meters registering positive and negative Active Energy (meter running forward or reverse) the values of the negative energy register (Export of Active Energy) are transmitted under this parametrization.

S3 : Any Read-out Data desired:

If Bit 3 is set to „1", the following data may be entered:

0000'0xxxB : 8 different Basic Options (please see above)
0000'1xx1B : Parameter Set Identification
0000'1x1xB : Instantaneous System Time (Date and Hour)
0000'11xxB : Operating Hours of EMU meter (h)

S2 : Any Read-out Data desired:

Only feasible if under S3 Bit 3 is set to „1“ (S3 >= 08H)

xxxx'xxx1B	**:**	Active Energy (Wh)
xxxx'xx1xB	**:**	Reactive Energy (varh) or Active Energie Total Export (Wh) ***xxx***
xxxx'x1xxB	**:**	Active and Reactive Energy plus Maximum Demand Active Power Tariff 1 and Tariff 2. If set on Bit = „0“ => Active and Reactive Energy and Total Maximum Demand Active Power.
xxxx'1xxxB	**:**	Maximum Demand Active Power (W)
xxx1'xxxxB	**:**	Instantaneous Active Power (W)
xx1x'xxxxB	**:**	Instantaneous Reactive Power (var)
x1xx'xxxxB	**:**	Instantaneous Active and Reactive Power plus instantaneous Current Phases L1, L2 and 3. If set on Bit = „0“ => Instantaneous Active and Reactive Power plus Total instantaneous Current
1xxx'xxxxB	**:**	Instantaneous Voltage Phases L1, L2 und L3

xxx On EMU meters registering positive and negative Active Energy (meter running forward or reverse) the values of the negative energy register (Export of Active Energy) are transmitted under this parametrization.

S1 : Any Read-out Data desired:

Only feasible if under S3 Bit 3 is set to „1“ (S3 >= 08H)

xxxx'xxx1B	**:**	All Data with Status VIFE Byte
xxxx'xx1xB	**:**	Instantaneous Current (mA)
xxxx'x1xxB	**:**	Instant. Power Factor Phases L1, L2 and L3 (Fo x 0.01)
xxxx'1xxxB	**:**	Instantaneous Network Frequency (Hz x 0.1)
xxx1'xxxxB	**:**	Number of Voltage Outages on EMU meter (Init. Counter)
xx1x'xxxxB	**:**	Current Transformer Factor => Only on CT-connected meters
x1xx'xxxxB	**:**	Error Flags
1xxx'xxxxB	**:**	Time of last Power Up on EMU meter (Date and Hour)

Example:

S3 = 0000'1110B	**(0EH)**	**:**	Instantaneous System Time (Date and Hour) Operating Hours of EMU meter (h)
S2 = 0001'0101B	**(15H)**	**:**	Active Energy Tariff 1 (Wh) Active Energy Tariff 2 (Wh) Total instantaneous Active Power (W)
S1 = 1101'1110B	**(DEH)**	**:**	Total instantaneous Current (mA) Instantaneous Network Frequency (Hz x 0.1) Instant. Power Factor Phase L1 (Fo x 0.01) Instant. Power Factor Phase L2 (Fo x 0.01) Instant. Power Factor Phase L3 (Fo x 0.01) Number of Voltage Outages on EMU meter Error Flags Time of last Power Up (Date and Hour)

6.2.2 Enter Parameter Set by means of the two keys on EMU Meter

Apart from the option to enter the Read-out Parameter Set by M-BUS Telegram (please see: „M-BUS EMU Telegrams“) it is possible to enter the Read-out Data directly on the EMU meter.

The Parameter Set can be entered in the EMU meter using its Meter Number.

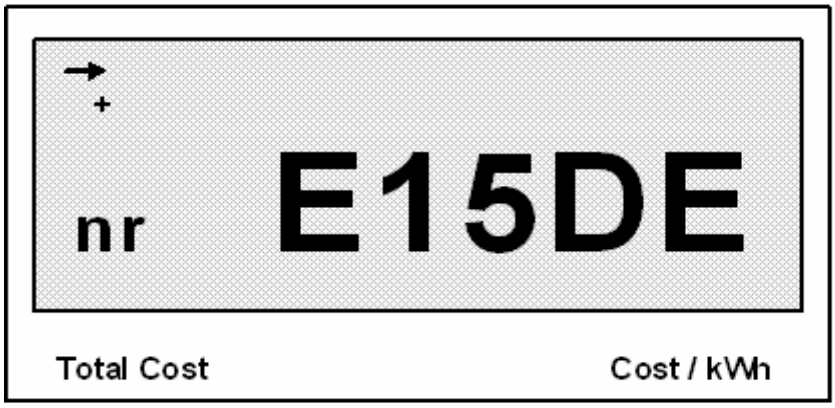
Correlation between EMU Meter Number and M-BUS Parameter Set:

- A new meter (leaving the EMU factory) blocks upon entry of the Meter Number this Number as being the M-BUS Parameter Set.
- To lift up this blocking the Meter Number is to be set to „FFFFF“on the EMU meter and a waiting time of 20 seconds is to be respected. Now the entry of the M-BUS Parameter Set can again be done directly on the EMU meter.
- The Set / Reset key on the EMU meter can be blocked by a (lead) seal. No new Meter Number and/or M-BUS Parameter Set can then be entered.
- If the Parameter Set is transmitted as an M-BUS Telegram, this is being adopted and the direct entry on the EMU meter is blocked. No new Parameter Set can then be entered on the EMU meter. The Meter Number can however be set as desired.

Entry of Meter Number or of M-BUS Parameter Set on EMU Meter:

1. Set EMU display to show the Meter Number by pressing the Display Key.
2. By pressing the yellow Set / Reset Key (for about 3 seconds) the entry mode is accessed. In the entry mode the first figure position is intermitting. The Display Key now allows you to change the figures between 0 – F. In order to advance a position, please press the Set / Reset Key and then adjust the figures or characters again by the Display Key. This is how any desired number is composed. When the last position is adjusted please store the entry by pressing once more the Set / Reset Key.

Display of Meter Number and M-BUS Parameter Set on EMU Meter:



Structure of M-BUS Parameter Set:

- The first digit on the left (E) corresponds with S3 low value (Read-out Data of Parameter Set 3).
- The second figure (1) corresponds with S2 high value (Read-out Data of Parameter Set 2).
- The third figure (5) corresponds with S2 low value (Read-out Data of Parameter Set 2).
- The fourth digit (D) corresponds with S1 high value (Read-out Data of Parameter Set 1).
- The fifth digit (E) corresponds with S1 low value (Read-out Data of Parameter Set 2).

Example: M-BUS Parameter Set of above Display (0E15DEH):

S3	**= 0000'1110**	**=>**	**0EH**
S3 high value	**= 0000 (0H)**	**:**	
S3 low value	**= 1110 (EH)**	**:**	Instantaneous System Time (Date and Hour) Operating Hours of EMU meter (h)
S2	**= 0001'0101**	**=>**	**15H**
S2 high value	**= 0001 (1H)**	**:**	Total instantaneous Active Power (W)
S2 low value	**= 0101 (5H)**	**:**	Active Energy Tariff 1 (Wh) Active Energy Tariff 2 (Wh)
S1	**= 1101'1110**	**=>**	**(DEH) :**
S1 value	**= 1101 (DH)**	**:**	Number of Voltage Outages on EMU meter Error Flags Time of last Power Up (Date and Hourt)
S1 low value	**= 1110 (EH)**	**:**	Total instantaneous Current (mA) Instantaneous Network Frequency (Hz x 0.1) Instant. Power Factor Phase L1 (Fo x 0.01) Instant. Power Factor Phase L2 (Fo x 0.01) Instant. Power Factor Phase L3 (Fo x 0.01)

7 EMU M-BUS Telegram Format

Informationen and Pilot Commands are transmitted via the M-BUS in the form of Telegrams. Telegrams are transmitted both from the EMU M-BUS Meter to the System Master and from the Master to the EMU M-BUS Meter.

- The international M-BUS Standard IEC 870-5 defines standardised procedures for Data Read-out, Parametrisation, etc. The protocol used by EMU M-BUS Meters does however not employ all specific functions of the IEC Standard.

- For communication via the M-BUS wiring the EMU M-BUS Meter employs three different Telegram Formats corresponding with the Format Class FT 1.2 according to IEC 870-5. the FT 1.2 Format complies with the Data Integrity Class I2 (a criterion for Transmission Safety) with a specified „Hamming Distance“ of four.

- The entire communication is ensured with 8 Data Bits, Even Parity, 1 Stop Bit and a Baud Rate from 300 to 9600 Bauds.

7.1 Pilot and Parametrisation Telegrams (from Master to EMU M-BUS Meter)

-	Initialise EMU M-BUS Meter	(SND_NKE)	Short Telegramm
-	Select EMU M-BUS Meter by Secondary Address	(SND_UD)	Long Telegram
-	Transmit Read-out Data	(REQ_UD2)	Short Telegram
-	Transmit Error Flags from EMU M-BUS Meter	(REQ_UD1)	Short Telegramm
-	Set Baud Rate	(SND_UD)	Long Telegramm
-	Set Date and Hour	(SND_UD)	Long Telegramm
-	Set Parameter Set to any Read-out Data possible	(SND_UD)	Long Telegramm
-	Set Parameter Set to Read-out Data desired	(SND_UD)	Long Telegramm
-	Set Primary Address	(SND_UD)	Long Telegramm
-	Set Secondary Address	(SND_UD)	Long Telegramm
-	Set Active Tariff and Reset Maximum Demand *	(SND_UD)	Long Telegramm
-	Reset EMU M-BUS Meter (meter called upon)	(SND_NKE)	Long Telegramm
-	Set Secondary Address and Manufacturer’s Mark **	(SND_UD)	Long Telegramm

* ***The setting of the Active Tariff and the Resetting of the Active Power Maximum Demand is blocked in EMU Meters officially calibrated under their (Metas or PTB) type Approval.***

** ***The Manufacturer’s Mark can pnly be changed at EMU factory.***

7.2 Response and Data Transmission Telegrams (from EMU M-BUS Meter to Master)

-	Response Sign when telegram received is o.k.	(ACK: E5H)	Single Character
-	Data Telegram containing Read-out Data	(RSP_UD)	Long Telegramm
-	Error Flags of EMU M-BUS Meter	(RSP_UD)	Long Telegramm

7.3 Telegram Structure

The Starting Character of a Telegram identifies one of the three Telegram Formats used.

7.3.1 Structure of the three Telegram Formats

Byte	Single Character	Short Telegram	Long Telegram
1	Starting Character (E5)	Starting Character (10)	Starting Character (68)
2		C Field	L Field
3		A Field	L Field (Repetition)
4		CS (Check Sum)	Starting Character (68)
5		Stop Character (16)	C Field
6			A Field
7			CI Feld
x			Active Data (0 – 246 Bytes)
8 + x			CS (Check Sum)
9 + x			Stop Character (16)

7.3.2 Single Character

This Telegram Format consists of a Single Character (ACK: E5) and is used to acknowledge the telegram received.

7.3.3 Short Telegram

The Short Telegram is identified by the Starting Character (10) and always has a length of five Bytes (C und A Fields, Check Sum (CS) and Stop Character). This telegram is used (amongst others) by the Master to command the transmission of data from the EMU M-BUS meter.

7.3.4 Long Telegramm

The Long Telegram is identified by the Starting Character (68) and can have a variable number of bytes. After the Starting Character the L Field is transmitted twice. Then, after a further Starting Character (68) the C, A and CI Fields are following.The Active Data are transmitted to the CI Field , followed by the Check Sum (CS) and the Stop Character (16). This Telegram is above all used to transmit Data read-out from the EMU M-BUS meter to the It is further employed by the Master to transmit commands to the EMU M-BUS meter.

7.3.5 Telegram Fields (A, C, CI Fields)

The Telegram Fields (A, C, CI Fields) have a fixed length of one Byte (8 Bits) und serve pre-determined effects in the M-BUS Communication.

7.3.6 L Field

The L Field (Length Field) defines the number of Bytes of the Active Data making up the telegram, plus 3 Bytes for the C, A and CI Fields. The L Field is always transmitted twice in Long Telegrams.

7.3.7 C Field

The C Field (Control Field) contains information on the direction of the exchange of communication, the success of the actual operation of communication and the proper function of the telegram.

7.3.7.1 Coding of C Fieldes

	Direction of Communication	
Bit	**From Master to EMU M-BUS Meter**	**From EMU M-BUS Meter to Master**
7	0	0
6	Primary News Bit (PRM) (1)	Primary News Bit (PRM) (0)
5	Frame Count Bit (FCB)	0
4	Frame Count Bit Valid (FCV) (1)	0
3 - 0	Command Information F3, F2, F1 and F0	Command Information F3, F2, F1 and F0

- The Primary News Bit (PRM = Primary Message Bit) specifies the direction of communication. A Bit („1“) being set identifies that the telegram is transmitted by the Master to the EMU M-BUS meter. If the Bit is on „0“, the telegram is transmitted by the EMU M-BUS meter to the Master.

- The Frame Count Bit Valid (FCV = Frame Count Bit Valid) is set by the Master to „1“ if the EMU M-BUS meter is called to use the Frame Count Bit (FCB = Frame Count Bit). When the FCV Bit is set to „0“, the FCB Bit is ignored by the EMU M-BUS meter.

7.3.7.2 Control Fields (C Field) used by EMU M-BUS Meter

C Field (Binary)	C Field (Hex)	Telegram Name	Telegram Format	Function
0100 0000	40	SND_NKE	Short	Initialise EMU M-BUS Meter
01x1 0011	73	SND_UD	Long	Transmit Data to EMU M-BUS Meter
01x1 1010	5A / 7A	REQ_UD2	Short	Transmit Error Flags from EMU M-BUS Meter
01x1 1011	5B / 7B	REQ_UD2	Short	Transmit Read-out Data from EMU M-BUS Meter
0000 1000	08	RSP_UD	Long	Transmit Read-out Data from EMU M-BUS Meter on Request

7.3.8 A Field

The A Field (Address- Field) comprises the EMU M-BUS Primary Address and is used to identify the receiver in calling direction and the sender in response direction. The A Field can take values from 0 to 255.

7.3.8.1 Address Fields (A Fields) used by EMU M-BUS Meter

A Field (Binary)	A Field (Hex)	Primary Address	Remarks
0000 0000	00	0	Setting of EMU M_BUS Meter upon leaving factory. (Factory Setting)
0000 0001 – 1111 1010	01 - FA	1 - 250	Primary Addresses settable
1111 1011 + 1111 1100	FB, FC	251, 252	Reserved for future use
1111 1101	FD	253	Used for Secondary Address Procedures
1111 1110	FE	254	Used to transmit information to All Participants in the M-BUS System (Broadcast- Telegram). All participants respond by acknowledging (ACK) or by their Primary Address.
1111 1111	FF	255	Used to transmit information to All Participants in the M-BUS System (Broadcast- Telegramm). Telegrams so addressed are not acknowledged.

7.3.9 CI Field

The CI- Field (Control Information Field) contains information for the Receiver of the telegram as to Active Data which are to be transmitted in Long Telegrams. The CI Field can further contain Commands and Parameter Information for the EMU M-BUS Meter sent by the Master.

7.3.9.1 Control Information Fields (CI Fields) used by EMU M-BUS Meters

CI Field (Binary)	CI Field (Hex)	Meaning / Function
0101 0000	50	Ieset EMU M-BUS Meter (called upon to „0“)
0101 0001	51	The Telegram contains Data for the EMU M-BUS Meter (Slave)
0101 0010	52	Selection of EMU M-BUS Meter
0111 0001	71	The Telegram contains the Error Flags of the EMU M-BUS Meter
0111 0010	72	The Telegram contains the Data called from the Slave
1011 1000	B8	Set Baud Rate to 300 bps
1011 1001	B9	Set Baud Rate to 600 bps
1011 1010	BA	Set Baud Rate to 1200 bps
1011 1011	BB	Set Baud Rate to 2400 bps
1011 1100	BC	Setze Baudrate auf 4800 bps
1011 1101	BD	Set Baud Rate to 9600 bps

7.4 Active Data

The Active Data (0 – 246 Bytes) in Long Telegrams comprise the Data to be read from the EMU M-BUS Meters (Read-out Data), or Command Information transmitted by the Master to the EMU M-BUS Meters

7.4.1 Coding of Active Data transmitted by the Master to the EMU M-BUS Meters

Data Set
A variable number of Bytes

7.4.2 Coding of Active Data transmitted from EMU M-BUS Meter to Master

Fixed Data Record Header	Data Set
12 Byte	A variable number of Bytes

For communication with the EMU M-BUS Meters the Byte of lowest value out of the Multi-Byte Active Data starts transmission.

7.5 Fixed Data Record Header

Each block of Active Data transmitted by the EMU M-BUS Meter starts with a Fixed Data Record Header (FDH = Fixed Data Header). The Fixed Data Record Header comprises a number of general information relating to the EMU M-BUS Meter.

7.5.1 Coding of Fixed Data Record Header

Byte	Name	Length	Contents / Meaning
1 - 4	Ident.- Number	4 Byte	8-digit Serial Number of EMU M-BUS Meter (Secondary Address)
5 - 6	Manufacturer	2 Byte	Manufacturer's Code for EMU = 15 B5 = „EMU“
7	Version	1 Byte	Specifies the Version Number of EMU M-BUS Software
8	Medium	1 Byte	Specifies the medium Electricity; 02 EMU M-BUS Meter
9	Meters called upon	1 Byte	Counts the number of successful Calls to the EMU M-BUS Zähler
10	Status	1 Byte	This shows the Status of the EMU Meter: 00: EMU M-BUS Meter in normal operation => All o.k. 01: Internal Error on EMU M-BUS Meter (uP, RAM etc.) 02: Feeding Voltage missing on EMU M-BUS Meter 03: Internal Error on EMU M-BUS Meter (uP, RAM etc.) plus Feeding Voltage on Meter missing 04: Faulty Installation 05: Internal Error on EMU M-BUS Meter(uP, RAM etc.) plus Faulty Installation 06: Feeding Voltage missing on EMU M-BUS Meter plus Faulty Installation 07: Internal Error on EMU M-BUS Meter (uP, RAM etc.) + Feeding Voltage missing on EMU M-BUS Meter plus Faulty Installation
	Signature	2 Byte	Not used in EMU M-BUS Meters (Value = „0000“)

7.6 Data Records

The Data zu be read out from the EMU M-BUS Meter and the Information sent by the Master are transmitted in one or several Data Records within the Active Data Block. Every Data Record contains Coding data, its length and kind, in addition to the Active Data desired. The maximum length of a Data Record is 234 Bytes.

All Data Records consist of a Data Record Header (DRH = Data Record Header) and the actual data. The Data Record Header on its part consists of the Data Information Block (DIB = Data Information Block) and the Value Information Block (VIB = Value Information Block). The DIB refers to Length, Type and Coding of the Data. The VIB contains the Unit reference and the Multiplicator of the Data measured.
Transmission of the Data Record is carried out from left to right.

7.6.1 Structure of the Data Record Header (DRH)

Data Information Block (DIB)		**Value Information Block (VIB)**		
DIF	**DIFE**	**VIF**	**VIFE**	**Data**
1 Byte	0 – 10 Byte(s)	1 Byte	0 – 10 Byte(s)	0 – n Bytes

7.7 Data Information Block (DIB)

The Data Information Block (DIB) contains as a minimum one Data Information Field Byte (DIF = Data Information Field). This Byte can be extended by a further 10 Data Information Field Extension Bytes (DIFE = Data Information Field Extension).

7.7.1 Coding of Data Information Field (DIF)

Bit	Name	Contents / Meaning
7	Extension Bit	Specifies if DIFE- Byte to follow. (1 = yes; 0 = no)
6	LSB of Storage Number	On EMU M-BUS Meter always at 0
5 - 4	Functions Field	00: An instantaneous Value is transmitted 01: A Maximum Demand Value is transmitted
3 - 0	Data Field	Length and Coding of Data: 0000 (0H): No Data 0001 (1H): 8 Bit Integral, 1 Byte 0010 (2H): 16 Bit Integral, 2 Byte 0011 (3H): 24 Bit Integral, 3 Byte 0100 (4H): 32 Bit Integral, 4 Byte 0111 (7H): 64 Bit Integral, 8 Byte 1100 (CH): 8 figures BCD, 4 Byte

- The Extension Bit is set if the next Byte is a Data Information Field Extension Byte (DIFE).

- The Functions Field on the EMU M-BUS Meter is set to „00“ oder „01“.
  01 : Total Maximum Demand Active Power
  Maximum Demand Active Power Tariff 1
  Maximum Demand Active Power Tariff 2
  00 : All other Values are instantaneous values.

7.7.2 Coding of Data Information Field Extension Byte (DIFE)

Bit	Name	Contents / Meaning
7	Extension Bit	Specifies if a DIFE Byte follows. (1 = yes; 0 = no)
6	Unit	Is used for Energy and Power measurements in order to specify the Data Value: 0: Active Energy or Power Values 1: Reactive Energy or Power Values
5 - 4	Tariff	Specifies with which Tariff the Energy or Maximum Demand Power Values are related: 00: Total Value 01: Tariff 1 10: Tariff 2
3 - 0	Storage Number	For EMU M-BUS Meter always on „0000“

- The Extension Bit is set if the next Byte is a Data Information Field Extension Byte (DIFE).
- The Unit is set for Energy and Power Values to identify if an Active or Reactive Value is present.
- The Tariff Bits specify with which Tariff the Energy or Maximum Demand Power Values are related.

7.8 Value Information Block (VIB)

The Value Information Block (VIB = Value Information Block) follows a DIF or a VIFE without an Extension Bit being set. It contains as a minimum the Value Information Field (VIF). It It may however comprise up to 10 additional VIF Bytes which contain so-called Value Information Field Extension Bytes (VIFE = Value Information Field Extension). VIFE is available in two formats: Standard and EMU specific.

7.8.1 Coding of Value Information Field (VIF)

Bit	Name	Contents / Meaning
7	Extension Bit	Specifies if a VIFE Byte Follows. (1 = yes; 0 = no)
6 - 0	Value Information	Contains Information on the single Values such as Unit, Multiplicator, etc.

7.8.2 Value Information Fields (VIF) used by EMU M-BUS Meters

VIF (Binary)	VIF (Hex)	Meaning	Unit
x000 0011	03 / 83	Active or Reactive Energy	Wh or varh
x010 0010	22 / A2	Operating Hours of EMU M-BUS Meter	h
x110 1101	6D / ED	Instantaneous System Time oder Zeit des letzten Power Up	dd.mm.yyyy hh:mm Type F = 4 Bytes (Date and Hour)
0010 1011	2B	Total instantaneous Active Power, or Total instantaneous Reactive Power, or Maximum Demand Active Power	W, var
1010 1011	AB	Instantaneous Active Power Phases L1 – L3 or instant. Reactive Power Phases L1 – L3 or Max. Demand Active Power Phases L1 – L3 A further VIFE is following.	W
1111 1101	FD	A further Standard VIFE is following	-
1111 1111	FF	A further EMU specific VIFE is following	-

- If Bit x (Bit No. 7) in the Value Information Field (VIF) is set to „1“, a VIFE is following directly. This VIFE may be, amongst others, the Status VIFE- Byte. If Bit x is set to „0“ the first Data Byte is following straight away.

- If the Value Information Field (VIF) exhibits the Value FD, the next VIFE is a Standard VIFE.

- If the Value Information Field (VIF) exhibits the Value FF, the next VIFE is an EMU-specific VIFE.

7.8.3 Standard Value Information Field Extension Bytes (VIFE) used by EMU M-BUS Meters

The Standard VIFE has a structure identical to the VIF.

VIFE (Binary)	VIFE (Hex)	Meaning	Unit
x000 1001	0B / 8B	Parameter Set Identification	-
x001 0111	17 / 97	Error Flags	-
x101 1001	59 / D9	Total instantaneous Current	mA
x110 0000	60 / E0	Number of Voltage Outages on EMU M-BUS Meter	-
1100 1001	C9	Instantaneous Voltage Phases L1 – L3 A further VIFE is following.	V
1101 1001	D9	Instantaneous Current Phases L1 – L3 A further VIFE is following	mA
1111 1111	FF	A further EMU-specific VIFE is following	-

- If Bit x (Bit No. 7) in the Standard Value Information Field (VIFE) is set to „1“ a VIFE is following directly. The VIFE may be, amonst others, the Status VIFE Byte. If Bit x in the VIFE is set to „0“ it is directly followed by the first Data Byte.

7.8.4 EMU- Specific Value Information Field Extension Bytes (VIFE) used by EMU Meters

The EMU-specific VIFE has the same structure as the VIF.

VIFE (Binary)	VIFE (Hex)	Meaning	Unit
x000 0001	01 / 81	Phase L1 (Active and Reactive Power, Voltage, Current and Power Factor)	W, var, V, mA, Fo x 0.01
x000 0010	02 / 82	Phase L2 (Active and Reactive Power, Voltage, Current and Power Factor)	W, var, V, mA, Fo x 0.01
x000 0011	03 / 83	Phase L3 (Active and Reactive Power, Voltage, Current and Power Factor)	W, var, V, mA, Fo x 0.01
x001 0010	12 / 92	Current Transformer Factor	-
x001 0011	13 / 93	Tariff in use	-
x101 0010	52 / D2	Instantaneous Network Frequency	Hz x 0.1
1110 0001	E1	Power Factor (Cos Phi) A further VIFE is following	Fo x 0.01
1111 1111	FF	A further EMU-specific VIFE is following	-

- If Bit x (Bit No. 7) in the EMU-specific Value Information Field Extension (VIFE) is set to „1“, the Status VIFE Byte follows straight away and thereafter the first Data Byte. If Bit x is set to „0“ in VIFE, the first Data Byte follows next.

7.8.5 Status VIFE Byte

The option exists for the EMU M-BUS Meter to send a Status VIFE Byte in the Telegram Structure ahead of each measured Value to be transmitted. Ths Status VIFE Byte contains information regarding the validity of the measured values following. Since all EMU M-BUS Meters use the same Data Transmission Telegram, but do not always transmit the same Data. This Byte is first to be decoded in order to assure whether the value measured now following is actually valid.

The Parametrization to ensure whether or not the Status VIFE Byte is to be sent by the EMU M-BUS Meter is taking place upon Setting of the Parameters for the Read-out Data which are possible. (Please see Structure of Parameter Set for Read-out data feasible).

7.8.6 Status VIFE Bytes (VIFE) used by EMU M-BUS Meter

Status VIFE (Binary)	Status VIFE (Hex)	Meaning
0000 0000	00	All o.k.. The Data are valid.
0001 0101	15	The latest Data are not available in the EMU M-BUS Meter. - The Data are not the latest. The EMU M-BUS cannot presently actualise the data. The EMU M-BUS Meter is either not under voltage or it is damaged. The data transmitted are those previously actualised by the EMU M-BUS Meter.
0001 1000	18	The EMU M-BUS Meter Data are faulty. - The Data are not valid. The EMU M-BUS Meter has so far Never Been Able to actualise the Data. The EMU M-BUS Meter has so far never been under voltage or it is faulty. The Data transmitted are those stored every 24 h or those stored upon a Voltage Outage of the M-BUS Upon putting into initial operation of an EMU M-BUS Meter the internally set Default Values have been transmitted.

7.9 Data

The Values measured, the Error Data, or the Status Information of EMU M-BUS Meters follow after the last VIF or VIFE Byte without an Extension Byte having been set.

7.9.1 Check Sum (CS)

The Check Sum (CS = Check Sum) is used to recognize Transmission Errors during the Telegram Exchange.
The Check Sum is formed by arithmetically summing up all Bytes, starting from the Control Field (C Field) and ending at the last Active Data Byte. Overflow Bits (Carry Bits) are hereby not counted.

8 EMU M-BUS Communication

8.1 Procedures of Telegram Communication via the M-BUS

The Telegram Communication via the M-BUS (Data Link Layer) works under two procedures.

- Send / Confirm (SND / CON = Send / Confirm)
- Request / Respond (REQ / RSP = Request / Respond)

After receipt of a valid telegram the die EMU M-BUS Meters wait between 35 and 75 mS before responding.

A telegram received is considered valid if it complies with the following criteria:

- Start, Parity and Stop Bits per Communication Byte.
- Start Character, Check Sum and Stop Character per Telegram.
- The entire Telegram Length for Long Telegrams is equal to the L Field + 6 Bytes.
- The Telegram received contains a Pilot Command known to the EMU M-BUS Meter.

-

If these Test Criteria are not complied with the EMU M-BUS Meter will not respond.

8.2 Procedures: Send / Confirm

8.2.1 Initialising Telegram SND_NKE

This telegram is not supported by the EMU M-BUS Meters.

For initialisation of a EMU M-BUS Meter (Set FCB on Meter Called to „0“) a Long Telegram (SND_UD with CI = 50H) is used (Please see „Initialisation EMU M-BUS Meter“).

8.2.2 Long Telegram SND_UD

This Telegram is used to transmit Pilot and Parametrization Data from the Master to the EMU M-BUS Meter.

The EMU M-BUS Meter confirms correct receipt by a Single Character Acknowledgement (ACK = E5). Should the telegram not have been received correctly, no acknowledgement will be sent by the EMU M-BUS Meter.

8.2.3 Long Telegram REQ_UD2 und RSP_UD

The Master commands Data from the EMU M-BUS Meter by sending a REQ_UD2 Telegram. The EMU Meter either transmits its Data by a RSP_UD Telegram or remains without any reaction if the Command was not properly received or if the information in the telegram does Not Require a Response.

Upon first receipt of the Command Telegram REQ_UD2 with FCB (set to „1“) and FCV Bit („1“) the EMU Meter will transmit the Data Telegram containing the Read-out Data parametrised.

9 EMU M-BUS Telegrams

9.1 Primary Address (A- Field)

The A Field (Address- Field) contains the EMU M-BUS Primary Address and is used to identify the EMU M-BUS Meter. The A Field can assume values from 0 – 255.

A Field (Hex)	Primary Address	Remarks
00	0	Factory Setting of the EMU M_BUS Meter
01 - FA	1 - 250	Primary Address settable
FB, FC	251, 252	Reserved for future use
FD	253	Used for Secondary Addressing procedures
FE	254	Used to send information to All Participants in the M-BUS System (Broadcast Telegram). All Participants respond by sending an Acknowledgement or their Primary Address
FF	255	Used to send information to All Participants in the M-BUS System (Broadcast- Telegramm). Telegrams so addressed are not responded to.

9.2 Secondary Address (UD)

If „FD“ is set in the A Field the identification of the EMU M-BUS Meter is accomplished via Secondary Address (UD).

9.2.1 Structure of the Secondary Address (UD):

Identification Number	Manufacturer	Version	Medium
xxxxxxxx	B5 15	xx	02

- Identification Number : 8-digit Serial Number of EMU M-BUS Meter (Sec. Adr.)
  ⇨ 00000000 – 99999999
- Manufacturer’s Code : 2 Byte Constant for EMU
  ⇨ B5 15
- Version Number : 1 Byte
  ⇨ 01 – FF
- Medium : 1 Byte Constant Electricity
  ⇨ 02

9.2.2 „Wild Cards“

The EMU M-BUS Meter called upon only reacts to Commands if the constant Parameter (Manufacturer, Version, Medium) and the Identification Number correspond with Parameters transmitted.
In all these 4 Command Parameters „Wild Cards“ (Space Keepers for any desired Signs) are permitted. The „Wild Card“ Sign is the Character „F“.
For the constant Parameters no single „Wild Cards“ may be used.

Example:

EMU M-BUS Meter: Identification Number = 12345678, Manufacturer = EMU, Version = 05, Medium = 02

Sec. Adr. (UD) : 12345678, B5 15, 05, 02 => EMU M-BUS Meter reacts
Sec. Adr. (UD) : FFF45678, B5 15, 05, 02 => EMU M-BUS Meter reacts
Sec. Adr. (UD) : 123FFF78, B5 15, FF, 02 => EMU M-BUS Meter reacts
Sec. Adr. (UD) : 12345FFF, FF FF, 05, 02 => EMU M-BUS Meter reacts
Sec. Adr. (UD) : 12345678, B5 15, 05, FF => EMU M-BUS Meter reacts
Sec. Adr. (UD) : FFFFFFF8, FF FF, FF, FF => EMU M-BUS Meter reacts
Sec. Adr. (UD) : FFFFFFFF, FF FF, FF, FF => All EMU M-BUS Mtrs in System react (Bus-Config.)
Sec. Adr. (UD) : FFFFFFF7, FF FF, FF, FF => EMU M-BUS Meter does not react (Id. No. invalid)
Sec. Adr. (UD) : 02FFFFFF, B5 15, 05, 02 => EMU M-BUS Meter does not react (Id. No. invalid)
Sec. Adr. (UD) : 12345678, FF 15, 05, 02 => EMU M-BUS Meter does not react (Manuf. Invalid)
Sec. Adr. (UD) : 12345678, B5 1F, 05, 02 => EMU M-BUS Meter does not react (Manuf. Invalid)
Sec. Adr. (UD) : 12345678, B5 15, 0F, 02 => EMU M-BUS Meter does not react (Version invalid)
Sec. Adr. (UD) : 12345678, B5 15, 05, F2 => EMU M-BUS Meter does not react(Medium invalid)

9.3 Reset EMU M-BUS Meter "called upon" (SND_UD)

This Telegram sets the meter called upon to „0" in the EMU M-BUS.

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

9.3.1 Reset EMU M-BUS Meter „called upon" by 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
5	1	73	C Field, SND_UD
6	1	Xx	A Field, Primary Address (00 – FF = 0 – 255)
7	1	50	CI Field, Initialise EMU M-BUS Meter (Set Meter called to „0")
8	1	Xx	CS Check Sum, summed up by C Field, A Field and CI Field
9	1	16	Stop Character

- In order to initialise simultanteously all EMU M-BUS Meters in a System, the Primary Address 255 (HEX FF) is to be used in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will however not send any Acknowledgement.

9.3.2 Reset EMU M-BUS Meter „called upon" by 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
5	1	73	C Field, SND_UD
6	1	FD	A Field, Primary Address on FD = Secondary Address
7	1	50	CI Field, Initialise EMU M-BUS Meter (Set meter called to „0")
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

9.4 Set Baud Rate on EMU M-BUS Meter (SND_UD)

This telegram enables to set the desired Baud Rate to the EMU M-BUS.

The EMU M-BUS Meter confirms the correct receipt by Single Character Acknowledgement (ACK = E5). If the telegram was not received correctly the EMU M-BUS Meter does not send an Acknowledgement.

The Single Character Acknowledgement (ACK) is sent by the EMU M-BUS Meter in the Old Baud Rate. As soon as ACK is transmitted the EMU Meter switches to the baud rate newly parametrised.

If the EMU Meter now does not receive a new Telegram under the new baud rate within a period of 30 – 40 seconds, it automatically switches back to the old baud rate. This is apt to prevent that a faulty setting of the baud rate may interrupt communication.

9.4.1 Set Baud Rate by 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
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 Baud Rate B8 : Set Baud Rate to 300 Bauds B9 : Set Baud Rate to 600 Bauds BA : Set Baud Rate to 1200 Bauds BB : Set Baud Rate to 2400 Bauds BC : Set Baud Rate to 4800 Bauds BD : Set Baud Rate to 9600 Bauds
8	1	xx	CS Check Sum summed up by C Field, A Field and CI Field
9	1	16	Stop Character

- In order to patrametrise simultaneously all EMU M-BUS Meters in the System to a new Baud Rate, the Primary Address 255 (HEX FF) is to be used in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will however not send an Acknowledgement.

9.4.2 Set Baud Rate by 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
5	1	73	C Field, SND_DU
6	1	FD	A Field, Primary Address on FD = Secondary Address
7	1	xx	CI Field, Set new Baud Rate B8 : Set Baud Rate to 300 Bauds B9 : Set Baud Rate to 600 Bauds BA : Set Baud Rate to 1200 Bauds BB : Set Baud Rate to 2400 Bauds BC : Set Baud Rate to 4800 Bauds BD : Set Baud Rate to 9600 Bauds
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

9.5 Set Date and Hour in EMU M-BUS Meters (SND_UD)

This Telegram enables to set the Date and Hour desired to EMU M-BUS Meters.

The EMU M-BUS Meter confirm correct receipt by Single Character Acknowledgement (ACK = E5). If the telegram was not received correctly the EMU M-BUS Meter will not send an Acknowledgement.

The EMU M-BUS Meter incorporates a Real Time Clock. Date and Hour can be set as desired. If the Voltage on the M-BUS fails the Real Time Clock will continue to run for at least 3 days. (Internal voltage feeding by SuperCap).
Should the running reserve have been exceeded the date and the hour is re-initialised upon Power Up of the M-BUS. => The Real Time Clock then runs behind the period of the Voltage Outage and requires resetting.

9.5.1 Short Description of Real Time Clock in EMU M-BUS Meters

- Feeding by M-BUS
- Running Reserve at least 3 days (internal SuperCap) if voltage fails on M-BUS.
- Time Keeping Accuracy +/- 20 ppm => max deviation +/- 10.5 minutes / year
- Network Synchronisation not possible
- Automatic Leap Year Adjustment
- Active Summer / Winter Time Change-over
  - De-activation possible on customer's request by EMU Works if known at time of order.
  - Under active parametrization change-over on following dates:
    Winter -> Summer:
    On first Sunday from 1st April on Sunday morning at 02'00 h (02'00 -> 03'00).
    Summer -> Winter:
    On first Sunday from 25th October on Sunday morning at 03'00 h (03'00 -> 02'00).

9.5.2 Decoding Date and Hour

Date and Hour is a 4-Byte integral value Type F

Structure: **mm hh YD YM**

mm	=	Minute	(1 Byte: 00 – 3B)
hh	=	Hour	(1 Byte: 00 – 17)
YD	=	Year/Day	(1 Byte: 01 – FF)
YM	=	Year/Month	(1 Byte: 01 – AC)

Decoding Year/Day (YD) :
Bit 0 – Bit 4 (5 Bit) = Day
Bit 5 – Bit 7 (3 Bit) = Year Bit 0 – Bit 2

Decoding Year/Month (YM):
Bit 0 – Bit 3 (4 Bit) = Month
Bit 4 – Bit 7 (4 Bit) = Year Bit 3 – Bit 6

Example:

mm = 23	= 0010'0011 =>	***Minutes = 35***	
hh = 13	= 0001'0011 =>	***Hours = 19***	
YD = 9F	= 1001'1111 =>	Bit 0 – Bit 4 = 1'1111 = 1F	=> ***Day = 31***
		Bit 5 – Bit 7 = 100	= Year Bit 0 – Bit 2
MD = 18	= 0001'1000 =>	Bit 0 – Bit 3 = 1000 = 8	=> ***Month = 8***
		Bit 4 – Bit 7 = 0001	= Jahr Bit 3 – Bit 6
		Year = 000'1100 = 0C	=> ***Year = 2012***

Note: : Upon reprogramming of Date and Hour, please note that time in the EMU M-BUS Meter always starts on 00 seconds. (The seconds are automatically reset to „0").

9.5.3 Set Date and Hour by Primary Address

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
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 EMU M-BUS Meter
8	1	04	DIF Field, 32 Bit Integral Data
9	1	6D	VIF Field, System Time -> Data Type = F
10 - 13	4	mmhhYDYM	mm = Minute, hh = Hour, YD = Year/Day, YM = Year/Month
14	1	xx	CS Check Sum, summed up by C Field up to YM inclusive
15	1	16	Stop Character

- In order to parametrize simultaneously a new Date and a new Hour in all EMU M-BUS Meters in the System, the Primary Address 255 (HEX FF) is to be used in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will not send any Acknowledgement.

9.5.4 Set Date and Hour by Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	11	L Field
3	1	11	L Field Repetition
4	1	68	Start Character
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 EMU M-BUS Meters
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	04	DIF Field, 32 Bit Integral Data
17	1	6D	VIF Field, System Time -> Data Type = F
18 – 21	4	mmhhYDYM	mm = Minute, hh = Hour, YD = Year/Day, YM = Year/Month
22	1	xx	CS Check Sum, summed up by C Field up to YM inclusive
23	1	16	Stop Character

9.6 Set Parameter Set to all Read-out Data possible (SND_UD)

This Telegram serves to set the Parameter Set for the Read-out Data of all 30 Read-out Options possible in EMU M-BUS Meters, including setting of the Status VIFE Bytes (Please see: „Data Readable“)

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

9.6.1 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
5	1	73	C Field, SND_DU
6	1	xx	A Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI Field, New Data for EMU M-BUS Meter
8	1	7F	DIF Field, Set Parameter Set to all Data possible OUT
9	1	xx	CS Check Sum, summed up from C Field to DIF Field inclusive
10	1	16	Stop Character

- In order to set the new Baud Rate simultanteously to all EMU M-BUS Meters in the System please use the Primary Address 255 (HEX FF) in the A Field (Broadcast).
  The EMU M-BUS Meters in the M-BUS System will not send an Acknowledgement.

9.6.2 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
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 EMU M-BUS Meter
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	7F	DIF Field, Set Parameter Set to all Data possible OUT
17	1	xx	CS Check Sum, summed up from C Field to DIF Field inclusive
18	1	16	Stop Character

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

This Telegram allows to set in the EMU M-BUS Meter the Parameter Set for Read-out Data of any value desired (Please see:“Data Readable“.

For the Structure of the Parameter Set for Read-out Data please see: „Structure of Parameter Set for Read-out Data possible“ (S1 = Parameter Set 1, S2 = Parameter Set 2, S3 = Parameter Set 3).

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

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

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
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 EMU M-BUS Meter
8	1	03	DIF Field, 24 Bit Integral Data (3 Byte)
9	1	FD	VIF Field, A Standard VIFE follows
10	1	0B	VIFE Field, Standard VIFE = Parameter Set Identification
11	1	„S1“	Parameter Set S1 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
12	1	„S2“	Parameter Set S2 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
13	1	„S3“	Parameterset S3 (00 – 0F), Please see: „Structure of Parameter Set of Read-out Data possible“
14	1	xx	CS Check Sum, summed up from C Field to S3 inclusive
15	1	16	Stop Character

- In order to set the new Parameter Set simultaneously to all EMU M-BUS Meters in the System please use the Primary Address 255 (HEX FF) in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will not send an Acknowledgement.

9.7.2 Set Parameter Set to any Read-out Data desired using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	11	L Field
3	1	11	L Field Repetition
4	1	68	Start Character
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 EMU M-BUS Meter
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	03	DIF Field, 24 Bit Integral Data (3 Byte)
17	1	FD	VIF Field, A Standard VIFE follows
18	1	0B	VIFE Field, Standard VIFE = Parameter Set Identification
19	1	„S1“	Parameter Set S1 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
20	1	„S2“	Parameterset S2 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
21	1	„S3“	Parameterset S3 (00 – 0F), Please see: „Structure of Parameter Set of Read-out Data possible“
22	1	xx	CS Check Sum, summed up from C Field to S3 inclusive.
23	1	16	Stop Character

9.8 Set Primary Address (SND_UD)

This Telegram enables to set a new Primary Address in the EMU M-BUS Meter.

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

9.8.1 Set Primary Address using Primary Addressing

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
5	1	73	C Field, SND_DU
6	1	xx	A Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI Field, New Data for EMU M-BUS Meters
8	1	01	DIF Field, 8 Bit Integral 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 Check Sum, summed up from C Field to Primary Address incl.
12	1	16	Stop Character

- In order to set the new Primary Address simultaneously to all EMU M-BUS Meters in the System please use the Primary Address 255 (HEX FF) in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will not send an Acknowledgement.

9.8.2 Set Primary Address using Secondary Addressing

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
5	1	73	C Field, SND_DU
6	1	FD	A Field, Primary Address on FD = Secondary Address
7	1	51	CI Field, New Data for EMU M-BUS Meter
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	01	DIF Field, 8 Bit Integral 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 Checksumme, berechnet aus C- Feld bis und mit Prim. Adresse
20	1	16	Stop Character

9.9 Set Secondary Address (SND_UD)

This Telegram enables to set a new Secondary Address in the EMU M-BUS Meter.

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

9.9.1 Set Secondary Address using Primary Addressing

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
5	1	73	C Field, SND_DU
6	1	xx	A Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI Field, New Address for EMU M-BUS Meter
8	1	0C	DIF Field, 8 digits BCD, 4 Byte
9	1	79	VIF Field, Set Secondary Address
10	1	xx	New Secondary Address digits 7 and 8, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte Value = 67
11	1	xx	New Secondary Address digits 5 und 6, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte- Value = 45
12	1	xx	New Secondary Address digits 3 und 4, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte- Value = 23
13	1	xx	New Secondary Address digits 1 und 2, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte- Value = 01
14	1	xx	CS Check Sum, summed up from C Field up to Sec.Address incl.
15	1	16	Stop Character

- In order to set the new Secondary Address simultaneously to all EMU M-BUS Meters in the System please use the Primary Address 255 (HEX FF) in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will not send an Acknowledgement.

9.9.2 Set Secondary Address using Secondary Addressing

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	11	L Field
3	1	11	L Field Repetition
4	1	68	Start Character
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 EMU M-BUS Meter
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 figures 7 and 8, Range: 00 – 99 Example: Sec. Address = 01234567 => Byte Value = 67
19	1	xx	New Secondary Address figures 5 and 6, Range: 00 – 99 Example: Sec. Address = 01234567 => Byte Value = 45
20	1	xx	New Secondary Address figures 3 and 4, Range: 00 – 99 Example: Sec. Address = 01234567 => Byte Value = 23
21	1	xx	New Secondary Address figures 1 and 2, Range: 00 – 99 Example: Sec. Address = 01234567 => Byte Value = 01
22	1	xx	CS Check Sum, summed up from C Field to Sec.Address inclusive
23	1	16	Stop Character

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

This Telegram enables to set a new Secondary Address and a new Manufacturer's Mark.

The Manufacturer's Mark can only changed by EMU.
This Telegram is thus only used internally by EMU for manufacturing purposes.

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

9.10.1 Set Secondary Address and Manufacturer's Mark by Primary Addressing

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
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 EMU M-BUS Meter
8	1	07	DIF Field, 64 Bit Integral, 8 Byte
9	1	79	VIF Field, Set Sekundary Address and Manufacturer's Mark
10	1	xx	New Secondary Address figures 7 and 8, Range: 00 – 99 Example: Secondary Address = 01234567 => Byte Value = 67
11	1	xx	New Secondary Address figures 5 and 6, Range: 00 – 99 Example: Secondary Address = 01234567 => Byte Value = 45
12	1	xx	New Secondary Address figures 3 and 4, Range: 00 – 99 Example: Secondary Address = 01234567 => Byte Value = 23
13	1	xx	New Secondary Address figures 1 and 2, Range: 00 – 99 Example: Secondary Address = 01234567 => Byte Value = 01
14	1	xx	New Manufacturer's Mark Byte 2, Range: 00 – FF Example: Manufacturer = 15 B5 (EMU) => Byte Value = B5
15	1	xx	New Manufacturer's Mark Byte 1, Range: 00 – FF Example: Manufacturer = 15 B5 (EMU) => Byte Value = 15
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 Check Sum, summed up from C Field to Medium inclusive
19	1	16	Stop Character

- In order to set the new Secondary Address simultaneously to all EMU M-BUS Meters in the System please use the Primary Address 255 (HEX FF) in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will not send an Acknowledgement

9.10.2 Set Secondary Address and Manufacturer's Mark using Secondary Addressing

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
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 EMU M-BUS Meter
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	07	DIF Field, 64 Bit Integral, 8 Byte
17	1	79	VIF Field, Set Secondary Address and Manufacturer's Mark
18	1	xx	New Secondary Address figures 7 and 8, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte Value = 67
19	1	xx	New Secondary Address figures 5 and 6, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte Value = 45
20	1	xx	New Secondary Address figures 3 and 4, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte Value = 23
21	1	xx	New Secondary Address figures 1 and 2, Range: 00 – 99 Example: Sec.Address = 01234567 => Byte Value = 01
22	1	xx	New Manufacturer's Mark Byte 2, Range: 00 – FF Example: Manufacturer = 15 B5 (EMU) => Byte Value = B5
23	1	xx	New Manufacturer's Mark Byte 1, Bereich:00 – FF Example: Manufacturer = 15 B5 (EMU) => Byte Value = 15
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 Check Sum, summed up from C Field to Medium inclusive
27	1	16	Stop Character

9.11 Set Active Tariff and Reset Maximum Demand Active Power (SND_UD)

This Telegram enables to either change the Active Tariff in the EMU M-BUS Meter and/or to set Re-setting of Maximum Demand Active Power to „0“.

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

Caution: ***This function is blocked in EMU meters officially calibrated under their (Metas or PTB) type approval.***

9.11.1 Set Active Tariff and Reset Maximum Demand Active Power using Prim. Addressing

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
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 EMU M-BUS Meter
8	1	01	DIF Field, 8 Bit Integral, 1 Byte
9	1	FF	VIF Field, An EMU-specific VIFE follows
10	1	13	VIFE Field, EMU-specific VIFE = Active Tariff
11	1	xx	Coding of Tariff and Reset of Maximum Demand Active Power: 00: No Change Active Tariff and No Reset Maximum Demand kW 01: Set Energy Tariff 1 02: Set Energy Tariff 2 03: Set Energy Tariff 3 (No Tariff is presently active in EMU Meter) 04: Set Energy Tariff 4 (No Tariff is presently active in EMU Meter) 10: Reset Total Maximum Demand Active Power and Tariffs 1 - 4 11: Set Energy Tariff 1 and Reset Maximum Demand kW (All) 12: Set Energy Tariff 2 and Reset Maximum Demand kW (All) 13: Set Energy Tariff 3 and Reset Maximum Demand kW (All) 14: Set Energy Tariff 4 and Reset Maximum Demand kW (All) All other Values are considered invalid by the EMU M-BUS Meter and no reaction occurs. (Neither an Acknowledgement)
12	1	xx	CS Check Sum, summed up from C Field to Coding of Tariffs inclusive
13	1	16	Stop Character

- In order to set to all EMU M-BUS Meters in the System simultaneously the Change of Tariff or the Reset of Maximum Demand Meters Active Power please use the Primary Address 255 (HEX FF) in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will not send an Acknowledgement.
- To make sure that all EMU M-BUS Meter in the System have changed the Tariff and / or the Maximum Demand Active Power has been reset to „0“, this Telegram can be repeated at the end of a few seconds (normally about 30 seconds).

9.11.2 Set Active Tariff and Reset Maximum Demand Active Power using Sec. Addressing

Caution: ***This function is blocked in EMU meters officially calibrated under their (Metas or PTB) type approval.***

Byte Nr.	Grösse (Byte)	Wert (Hex)	Beschreibung
1	1	68	Start Character Long Telegram
2	1	0F	L Field
3	1	0F	L Field Repetition
4	1	68	Start Character
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 EMU M-BUS Meter
8 - 15	8	„UD“	Secondary Addres UD (Please see: „Secondary Address UD“)
16	1	01	DIF Field, 8 Bit Integral, 1 Byte
17	1	FF	VIF Field, An EMU-specific VIFE follows.
18	1	13	VIFE Field, EMU-specific VIFE = Active Tariff
19	1	xx	Coding of Tariff and Reset of Maximum Demand kW: 00: No Change of Active Tariff and No Reset of Max. Demand kW 01: Set Energy Tariff 1 02: Set Energy Tariff 2 03: Set Energy Tariff 3 (No Tariff is now active in the EMU Meter) 04: Set Energy Tariff 4 (No Tariff is now active in the EMU Meter) 10: Reset Total Maximum Demand Active Power and Tariff 1 – 4 11: Set Energy Tariff 1 and Reset Maximum Demand kW (All) 12: Set Energy Tariff 2 und Reset Maximum Demand kW (All) 13: Set Energy Tariff 3 und Reset Maximum Demand kW (All) 14: Set Energy Tariff 4 und Reset Maximum Demand kW (All) All other Values are considered invalid by the EMU M-BUS Meter and No reaction follows.(Neither an Acknowledgement)
20	1	xx	CS Check Sum, Summed up from C Field to Coding of Tariff
21	1	16	Stop Character

9.12 Select M-BUS Meters using Secondary Address (SND_UD)

This Telegram enables to select EMU M-BUS Meters.

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

After issue of the Single Character Acknowledgement the EMU M-BUS Meter is ready to transmit the entire Read-out Data within 3 seconds from receiving the Telegram „Transmit Read-out Data“. (Short Telegram REQ_UD2 with A Field on FD).

At the end of 3 seconds the EMU M-BUS Meter will switch back to normal mode.

9.12.1 Select EMU M-BUS Meter 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
5	1	73	C Field, SND_DU
6	1	FD	A Field, Primary Address on FD = Secondary Address
7	1	52	CI Field, Selection of EMU M-BUS Meter
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address DU“)
16	1	xx	CS Check Sum, summed up from C Field to Sec. Address inclusive
17	1	16	Stop Character

9.13 Transmit Read-out Data (REQ_UD2)

This Short Telegram enables to select the EMU M-BUS Meter and to command it to transmit the Read-out Data parametrised.

The EMU M-BUS Meter 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 EMU M-BUS Meter.

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

9.13.1 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 : Is set if transmission is by Secondary Address FE : All EMU M-BUS Meter in the System transmit the Read-out Data FF : No action by EMU M-BUS Meter
4	1	xx	CS Check Sum, summed up by C Field and A Field
5	1	16	Stop Character

9.13.2 Telegram of Read-out Data by EMU M-BUS Meter (RSP_UD)

The Read-out Data are transmitted by the EMU M-BUS Meter within 35 – 75 ms from receipt of the Short Telegram „Transmit Read-out Data.

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
5	1	08	C Field, Transmit Data of EMU M-BUS Meter
6	1	xx	A Field, Primary Address (00 – FA = 0 – 250)
7	1	72	CI Field, Read-out Data of EMU M-BUS Meter
8 - 11	***4***	***xxxxxxxx***	***8-digit Serial Number of EMU M-BUS Meter (Sec. Address)***
12 - 13	***2***	***B5 15***	***Manufacturer's Mark of EMU = 15 B5 = „EMU“***
14	***1***	***xx***	***Version Number of EMU M-BUS Software (00 – FF)***
15	***1***	***02***	***Medium Electricity***
16	***1***	***xx***	***Meter called upon, at each call on EMU + 1 (00 – FF -> 00)***
17	***1***	***xx***	***Shows the EMU Meter Status. Please see „Coding of firm Data Record Header“***
18 - 19	***2***	***00 00***	***Signature. For EMU M-BUS Meter 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

- ***Bytes No. 8 – 19 are the firm Data Record Header for every EMU M-BUS Meter***

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

9.13.3 Structure of Telegram for Read-out Data possible

The EMU M-BUS Meter transmits Read-out Data to the Master depending on the Parameter Set. A summary of the options is shown under „Read-out Data possible“.

9.13.3.1 Parameter Set Identification

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	8B	Parameter Set Identification followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k..
YY + 4	1	„S1“	Parameter Set S1 (00 – FF), Please see „Structure of Parameter Set of Read-out Data possible“
YY + 5	1	„S2“	Parameter Set S2 (00 – FF), Please see „Structure of Parameter Set of Read-out Data possible“
YY + 6	1	„S3“	Parameter Set S3 (00 – 0F), Please see „Structure of Parameter Set of Read-out Data possible“

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	0B	Parameter Set Identification
YY + 3	1	„S1“	Parameter Set S1 (00 – FF), Please see „Structure of Parameter Set of Read-out Data possible“
YY + 4	1	„S2“	Parameter Set S2 (00 – FF), Please see „Structure of Parameter Set of Read-out Data possible“
YY + 5	1	„S3“	Parameter Set S3 (00 – 0F), Please see „Structure of Parameter Set of Read-out Data possible“

9.13.3.2 Instantaneous System Time

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte Type F (Please see „Decoding of Date and Hour)“
YY + 1	1	ED	VIF, Instantaneous System Time and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k..
YY + 3 – YY + 6	4	mmhhJTJM	mm = Minute, hh = Hour, YD = Year/Day, YM = Year/Month

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte Type F (Please see „Decoding of Date and Hour)“
YY + 1	1	6D	VIF, Instantaneous System Time
YY + 2 – YY + 5	4	mmhhJTJM	mm = Minute, hh = Hour, YD = Year/Day, YM = Year/Month

9.13.3.3 Operating Hours of EMU Meter

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	A2	VIF, Operating Hours of EMU Meter and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k.
YY + 3 – YY + 6	4	xxxxxxxx	Operating Hours

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	22	VIF, Operating Hours of EMU Meter
YY + 2 – YY + 5	4	xxxxxxxx	Operating Hours

9.13.3.4 Total Active Energy

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral 4 Byte
YY + 1	1	83	VIF, Total Active Energy and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k.
YY + 3 – YY + 6	4	xxxxxxxx	Total Active Energy This energy value is always positive (Import); Range: 0.000 bis 999999.999

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	03	VIF, Total Active Energy
YY + 2 – YY + 5	4	xxxxxxxx	Total Active Energy This energy value is always positive (Import); Range: 0.000 bis 999999.999

9.13.3.5 Active Energy Tariff 1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	83	VIF, Active Energy followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 7	4	xxxxxxxx	Active Energy Tariff 1 This energy value is always positive (Import); Range: 0.000 bis 999999.999

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	03	VIF, Active Energy
YY + 3 – YY + 6	4	xxxxxxxx	Active Energy Tariff 1 This energy value is always positive (Import); Range: 0.000 bis 999999.999

9.13.3.6 Active Energy Tariff 2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	83	VIF, Active Energy followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 7	4	xxxxxxxx	Active Energy Tariff 2 This energy value is always positive (Import); Range: 0.000 bis 999999.999

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	03	VIF, Active Energy
YY + 3 – YY + 6	4	xxxxxxxx	Active Energy Tariff 2 This energy value is always positive (Import); Range: 0.000 bis 999999.999

9.13.3.7 Total Reactive Energy

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k.
YY + 5 – YY + 8	4	xxxxxxxx	Total Reactive Energy

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 – YY + 7	4	xxxxxxxx	Total Reactive Energy

9.13.3.8 Reactive Energy Tariff 1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k.
YY + 5 – YY + 8	4	xxxxxxxx	Reactive Energy Tariff 1

Without Status VIFE Byte :

Byte Nr.	Grösse (Byte)	Wert (Hex)	Beschreibung
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 – YY + 7	4	xxxxxxxx	Reactive Energy Tariff 1

9.13.3.9 Reactive Energy Tariff 2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	A0	DIFE, Tariff 2 and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k.
YY + 5 – YY + 8	4	xxxxxxxx	Reactive Energy Tariff 2

Without Status VIFE Byte :

Byte Nr.	Grösse (Byte)	Wert (Hex)	Beschreibung
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	A0	DIFE, Tariff 2 and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 – YY + 7	4	xxxxxxxx	Reactive Energy Tariff 2

9.13.3.10 Total Active Energy Export

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral 4 Byte
YY + 1	1	83	VIF, Total Active Energy and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k.
YY + 3 – YY + 6	4	xxxxxxxx	Total Active Energy Export This energy value is always negative (Export); Range: -0.001 bis -99999.999

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	03	VIF, Total Active Energy
YY + 2 – YY + 5	4	xxxxxxxx	Total Active Energy Export This energy value is always negative (Export); Range: -0.001 bis -99999.999

9.13.3.11 Active Energy Tariff 1 Export

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	83	VIF, Active Energy followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 7	4	xxxxxxxx	Active Energy Tariff 1 Export This energy value is always negative (Export); Range: -0.001 bis -99999.999

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	03	VIF, Active Energy
YY + 3 – YY + 6	4	xxxxxxxx	Active Energy Tariff 1 Export This energy value is always negative (Export); Range: -0.001 bis -99999.999

9.13.3.12 Active Energy Tariff 2 Export

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	83	VIF, Active Energy followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 7	4	xxxxxxxx	Active Energy Tariff 2 Export This energy value is always negative (Export); Range: -0.001 bis -99999.999

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	03	VIF, Active Energy
YY + 3 – YY + 6	4	xxxxxxxx	Active Energy Tariff 2 Export This energy value is always negative (Export); Range: -0.001 bis -99999.999

9.13.3.13 Presently Active Tariff

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	93	EMU-specific VIFE = Active Tariff followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4	1	xx	Presently Active Tariff

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	13	EMU-specific VIFE = Active Tariff
YY + 3	1	xx	Presently Active Tariff

9.13.3.14 Total instantaneous Active Power

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	AB	VIF, Total instantaneous Active Power and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k.
YY + 3 – YY + 6	4	xxxxxxxx	Instantaneous Total Active Power

Without Status VIFE Byte :

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

9.13.3.15 Instantaneous Active Power Phase L1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	AB	VIF, Instantaneous Active Power and followed by a further VIFE
YY + 2	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 3	1	81	EMU-specific VIFE = Phase L1 followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k.
YY + 5 – YY + 8	4	xxxxxxxx	Instantaneous Active Power Phase L1

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	AB	VIF, Instantaneous Active Power and followed by a further VIFE
YY + 2	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 3	1	01	EMU-specific VIFE = Phase L1
YY + 4 – YY + 7	4	xxxxxxxx	Instantaneous Active Power Phase L1

9.13.3.16 Instantaneous Active Power Phase L2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	AB	VIF, Instantaneous Active Energy and followed by a further VIFE
YY + 2	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 3	1	82	EMU-specific VIFE = Phase L2 followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k..
YY + 5 – YY + 8	4	xxxxxxxx	Instantaneous Active Power Phase L2

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	AB	VIF, Instantaneous Active Power and followed by a further VIFE
YY + 2	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 3	1	02	EMU-specific VIFE = Phase L2
YY + 4 – YY + 7	4	xxxxxxxx	Instantaneous Active Power Phase L2

9.13.3.17 Instantaneous Active Power Phase L3

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Byte
YY + 1	1	AB	VIF, Instantaneous Active Power and followed by a further VIFE
YY + 2	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 3	1	83	EMU-specific VIFE = Phase L3 followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k.
YY + 5 – YY + 8	4	xxxxxxxx	Instantaneous Active Power Phase L3

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral 4 Byte
YY + 1	1	AB	VIF, Instantaneous Active Power and followed by a further VIFE
YY + 2	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 3	1	03	EMU-specific VIFE = Phase L3
YY + 4 – YY + 7	4	xxxxxxxx	Instantaneous Active Power Phase L3

9.13.3.18 Instantaneous Total Reactive Power

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by the Status VIFE Byte
YY + 4	1	xx	Status VIFE Byte: 00 = o.k.
YY + 5 – YY + 8	4	xxxxxxxx	Instantaneous Total Reactive Power

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	2B	VIF, Instantaneous Total Reactive Power
YY + 4 – YY + 7	4	xxxxxxxx	Instantaneous Total Active Power

9.13.3.19 Instantaneous Reactive Power Phase L1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by a further VIFE
YY + 4	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 5	1	81	EMU-specific VIFE = Phase L1 followed by the Status VIFE Byte
YY + 6	1	xx	Status VIFE Byte: 00 = o.k.
YY + 7 – YY + A	4	xxxxxxxx	Instantaneous Reactive Power Phase L1

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by a further VIFE
YY + 4	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 5	1	01	EMU-specific VIFE = Phase L1
YY + 6 – YY + 9	4	xxxxxxxx	Instantaneous Reactive Power Phase L1

9.13.3.20 Instantaneous Reactive Power Phase L2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by a further VIFE
YY + 4	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 5	1	82	EMU-specific VIFE = Phase L2 followed by the Status VIFE Byte
YY + 6	1	xx	Status VIFE Byte: 00 = o.k.
YY + 7 – YY + A	4	xxxxxxxx	Instantaneous Reactive Energy Phase L2

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by a further VIFE
YY + 4	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 5	1	02	EMU-specific VIFE = Phase L2
YY + 6 – YY + 9	4	xxxxxxxx	Instantaneous Reactive Power Phase L2

9.13.3.21 Instantaneous Reactive Power Phase L3

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by a further VIFE
YY + 4	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 5	1	83	EMU-specific VIFE = Phase L3 followed by the Status VIFE Byte
YY + 6	1	xx	Status VIFE Byte: 00 = o.k.
YY + 7 – YY + A	4	xxxxxxxx	Instantaneous Reactive Power Phase L3

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integral, 4 Byte; followed by a DIFE
YY + 1	1	80	DIFE, Total and followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Instantaneous Reactive Power and followed by a further VIFE
YY + 4	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 5	1	03	EMU-specific VIFE = Phase L3
YY + 6 – YY + 9	4	xxxxxxxx	Instantaneous Reactive Power Phase L3

9.13.3.22 Total Maximum Demand Active Power

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	14	DIF, 32 Bit Integral, 4 Byte, Maximum Value
YY + 1	1	AB	VIF, Total Active Power and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k.
YY + 3 – YY + 6	4	xxxxxxxx	Total Maximum Demand Active Power

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	14	DIF, 32 Bit Integral, 4 Byte, Maximum Value
YY + 1	1	2B	VIF, Total Active Power
YY + 2 – YY + 5	4	xxxxxxxx	Total Maximum Demand Active Power

9.13.3.23 Maximum Demand Active Power Tariff 1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	94	DIF, 32 Bit Integral, 4 Byte, Maximum Value; and followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	AB	VIF, Active Power and followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 7	4	xxxxxxxx	Maximum Demand Active Power Tariff 1

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	94	DIF, 32 Bit Integral, 4 Byte, Maximum Value; followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	2B	VIF, Active Power
YY + 3 – YY + 6	4	xxxxxxxx	Maximum Demand Active Power Tariff 1

9.13.3.24 Maximum Demand Active Power Tariff 2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	94	DIF, 32 Bit Integral, 4 Byte, Maximum Value; and followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	AB	VIF, Active Power and followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE- Byte: 00 = o.k.
YY + 4 – YY + 7	4	xxxxxxxx	Maximum Demand Active Power Tariff 2

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	94	DIF, 32 Bit Integral, 4 Byte, Maximum Value; and followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	2B	VIF, Active Power
YY + 3 – YY + 6	4	xxxxxxxx	Maximum Demand Active Power Tariff 2

9.13.3.25 Instantaneous Voltage Phase L1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	C9	Standard VIFE = Instantaneous Voltage and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	81	EMU-specific VIFE = Phase L1 and followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6 – YY + 7	2	xxxx	Instantaneous Voltage Phase L1

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, and followed by a Standard VIFE
YY + 2	1	C9	Standard VIFE = Instantaneous Voltage and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	01	EMU-specific VIFE = Phase L1
YY + 5 – YY + 6	2	xxxx	Instantaneous Voltage Phase L1

9.13.3.26 Instantaneous Voltage Phase L2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	C9	Standard VIFE = Instantaneous Voltage and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	82	EMU-specific VIFE = Phase L2 uand followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6 – YY + 7	2	xxxx	Instantaneous Voltage Phase L2

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	C9	Standard VIFE = Instantaneous Voltage and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	02	EMU-specific VIFE = Phase L2
YY + 5 – YY + 6	2	xxxx	Instantaneous Voltage Phase L2

9.13.3.27 Instantaneous Voltage Phase L3

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	C9	Standard VIFE = Instantaneous Voltage and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	83	EMU-specific VIFE = Phase L3 and followed by the Status VIFE Byte
YY + 5	1	xx	Status- VIFE- Byte: 00 = o.k.
YY + 6 – YY + 7	2	xxxx	Instantaneous Voltage Phase L3

Without Status VIFE Byte :

Byte Nr.	Grösse (Byte)	Wert (Hex)	Beschreibung
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	C9	Standard VIFE = Instantaneous Voltage and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	03	EMU Spezifisches VIFE = Phase L3
YY + 5 – YY + 6	2	xxxx	Instantaneous Voltage Phase L3

9.13.3.28 Total Instantaneous Current

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Total Instantaneous Current and followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 6	3	xxxxxx	Total instantaneous Current

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	59	Standard VIFE = Total instantaneous Current
YY + 3 – YY + 5	3	xxxxxx	Total instantaneous Current

9.13.3.29 Instantaneous Current Phase L1

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Instantaneous Current and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	81	EMU-specific VIFE = Phase L1 and followed by the Status VIFE Byte
YY + 5	1	xx	Status- VIFE- Byte: 00 = o.k.
YY + 6 – YY + 8	3	xxxxxx	Instantaneous Current Phase L1

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Instantaneous Current and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	01	EMU-specific VIFE = Phase L1
YY + 5 – YY + 7	3	xxxxxx	Instantaneous Current Phase L1

9.13.3.30 Instantaneous Current Phase L2

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Instantaneous Current and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	82	EMU-specific VIFE = Phase L2 and followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6 – YY + 8	3	xxxxxx	Instantaneous Current Phase L2

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Instantaneous Current and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	02	EMU-specific VIFE = Phase L2
YY + 5 – YY + 7	3	xxxxxx	Instantaneous Current Phase L2

9.13.3.31 Instantaneous Current Phase L3

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Instantaneous Current and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	83	EMU-specific VIFE = Phase L3 and followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6 – YY + 8	3	xxxxxx	Instantaneous Current Phase L3

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	03	DIF, 24 Bit Integral, 3 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	D9	Standard VIFE = Instantaneous Current and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	03	EMU-specific VIFE = Phase L3
YY + 5 – YY + 7	3	xxxxxx	Instantaneous Current Phase L3

9.13.3.32 Instantaneous Network Frequency

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	D2	EMU-specific VIFE = Network Frequency and followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 5	2	xxxx	Instantaneous Network Frequency

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	52	EMU-specific VIFE = Network Frequency
YY + 3 – YY + 4	2	xxxx	Instantaneous Network Frequency

9.13.3.33 Instantaneous Power Factor Phase L1 (cos Phi)

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	E1	EMU-specific VIFE = Power Factor and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	81	EMU-specific VIFE = Phase L1 and followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6	1	xx	Instantaneous Power Factor Phase L1

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	E1	EMU-specific VIFE = Power Factor and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMUspecific VIFE
YY + 4	1	01	EMU-specific VIFE = Phase L1
YY + 5	1	xx	Instantaneous Power Factor Phase L1

9.13.3.34 Instantaneous Power Factor Phase L2 (cos Phi)

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	E1	EMU-specific VIFE = Power Factor and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	82	EMU-specific VIFE = Phase L2 and followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6	1	xx	Instantaneous Power Factor Phase L2

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	E1	EMU-specific VIFE = Power Factor and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	02	EMU-specific VIFE = Phase L2
YY + 5	1	xx	Instantaneous Power Factor Phase L2

9.13.3.35 Instantaneous Power Factor Phase L3 (cos Phi)

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	E1	EMU-specific VIFE = Power Factor and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	83	EMU-specific VIFE = Phase L3 and followed by the Status VIFE Byte
YY + 5	1	xx	Status VIFE Byte: 00 = o.k.
YY + 6	1	xx	Instantaneous Power Factor Phase L3

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	E1	EMU-specific VIFE = Power Factor and followed by a further VIFE
YY + 3	1	FF	VIFE, followed by an EMU-specific VIFE
YY + 4	1	03	EMU-specific VIFE = Phase L3
YY + 5	1	xx	Instantaneous Power Factor Phase L3

9.13.3.36 Number of Voltages Outages on EMU Meter

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	E0	Standard VIFE = Voltage Outages and followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 5	2	xxxx	Number of Voltage Outage on EMU M-BUS Meter

Without Status VIFE Byte :

Byte Nr.	Grösse (Byte)	Wert (Hex)	Beschreibung
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	60	Standard VIFE = Voltage Outages
YY + 3 – YY + 4	2	xxxx	Number of Voltage Outages on EMU M-BUS Meter

9.13.3.37 Current Transformer Factor

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	92	EMU-specific VIFE = Transformer Factor followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4 – YY + 5	2	xxxx	Current Transformer Factor on EMU M-BUS Meter

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integral, 2 Byte
YY + 1	1	FF	VIF, followed by an EMU-specific VIFE
YY + 2	1	12	EMU-specific VIFE = Transformer Factor
YY + 3 – YY + 4	2	xxxx	Current Transformer Factor on EMU M-BUS Meter

9.13.3.38 Error Flags

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	97	Standard VIFE = Error Flags and followed by the Status VIFE Byte
YY + 3	1	xx	Status VIFE Byte: 00 = o.k.
YY + 4	1	xx	Error Flag

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integral, 1 Byte
YY + 1	1	FD	VIF, followed by a Standard VIFE
YY + 2	1	17	Standard VIFE = Error Flags
YY + 3	1	xx	Error Flag

9.13.3.39 Time of last Power Up on EMU Meter

With Status VIFE Byte:

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Bytes Type F (Pl. see „Decoding of Date and Hour)“
YY + 1	1	ED	VIF, Time of last Power Up and followed by the Status VIFE Byte
YY + 2	1	xx	Status VIFE Byte: 00 = o.k.
YY + 3 – YY + 6	4	mmhhJTJM	mm = Minute, hh = Hour, YD = Year/Day, YM = Year/Month

Without Status VIFE Byte :

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	04	DIF, 32 Bit Integral, 4 Bytes Type F (Pl. see „Decoding of Date and Hour)“
YY + 1	1	6D	VIF, Time of last Power Up
YY + 2 – YY + 5	4	mmhhJTJM	mm = Minute, hh = Hour, YD = Year/Day, YM = Year/Month

9.14 Transmit Error Flags of EMU M-BUS Meter (REQ_UD1)

This Short Telegram commands the EMU M-BUS Meter to transmit the Error Flags.

The EMU M-BUS Meter confirms correct receipt by sending the Error Flags (if errors are present) or the Single Charakter Acknowledgement (ACK = E5, if no errors are present). If the Short Telegram is not received correctly the EMU M-BUS Meter will not send any Data.

9.14.1 Transmit Error Flags of EMU M-BUS Meter

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Charakte 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 : is set if Transmission is by Secondary Address FE : All EMU M-BUS Meters in the System send the Read-out Data FF : No action by EMU M-BUS Meter
4	1	xx	CS Check Sum, summed up from C Field and A Field
5	1	16	Stop Character

9.14.2 Telegram of Error Flags of EMU M-BUS Meter (RSP_UD)

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

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
5	1	08	C Field, Transmit Data from EMU M-BUS Meter
6	1	xx	A Field, Primary Address (00 – FA = 0 – 250)
7	1	71	CI Field, Error Flags of EMU M-BUS Meter
8	1	xx	Coding: Please see „Structure of Error Flags in EMU M-BUS Meter“
9	1	xx	CS Check Sum, summed up from C Field to Error Flags inclusive
10	1	16	Stop Character

9.14.3 Structure of Error Flags of EMU M-BUS Meter

9.14.3.1 Structure of Error Flags in EMU Meter

The EMU M-BUS Meter automatically carries out in every second a number of internal tests and sets in the event of an Error a corresponding Flag.

Error Flag (Binary)	Error Flag (Hex)	Signification
xxxx 0000	x0	No Error set. => No Error in EMU Meter
xxxx 0001	x1	Release for Parametrization set in EMU Meter
xxxx 0010	x2	Overflow of internal stack (RAM Overflow)
xxxx 0100	x4	Error on internal RAM (Memory Cell fault, etc..)
xxxx 1000	x8	Error on internal EEPROM or Hardware fault
xxxx 0011	x3	Release for Parametrization set in EMU Meter And Overflow of internal stack (RAM Overflow)
xxxx 0101	x5	Release for Parametrization set in EMU Meter and Error on internal RAM (Memory Cell fault, etc.)
xxxx 0110	x6	Overflow of internal stack (RAM Overflow) and Error of internal RAM (Memory Cell fault, etc.)
xxxx 1001	x9	Release for Parametrization set in EMU Meter and Error of internal EEPROM or Hardware fault
xxxx 1010	xA	Overflow of internal stack (RAM Overflow) and Error of internal EEPROM or Hardware fault
xxxx 1100	xC	Fehler internes RAM (Speicherzelle defekt etc.) und Fehler internes EEPROM oder Hardware defekt
xxxx 0111	x7	Release for Parametrization set in EMU Meter and Overflow of internal stack (RAM Overflow) and Error of internal RAM (Memory Cell fault, etc.)
xxxx 1011	xB	Release for Parametrization set in EMU Meter and Overflow of internal stack (RAM Overflow) and Error of internal EEPROM or Hardware fault
xxxx 1101	xD	Release for Parametrization set in EMU Meter and Error of internal RAM (Memory Cell fault, etc.) and Error of internal EEPROM or Hardware fault
xxxx 1110	xE	Overflow of internal stack (RAM Overflow) and Error of internal RAM (Memory Cell fault, etc.) and Error of internal EEPROM or Hardware fault
xxxx 1111	xF	Release for Parametrization set in EMU Meter and Overflow of internal stack (RAM Overflow) and Error of internal RAM (Memory Cell fault, etc.) and Error of internal EEPROM or Hardware fault

9.14.3.2 Structure of Transmission of Error Flags from EMU Meter to M-BUS Protocol Computer

The latest Data are transmitted every 40 seconds from the EMU Meter to the M-BUS Protokol Computer.

A full data transmission takes 35 seconds. The transmission speed is set internally to 300 bauds.

The Data Transmission from the EMU Meter to the M-BUS Protocol Computer only works if the EMU Meter is connected at least on two phase to the voltage system.

Upon initial connection of the M-BUS the first Data Transmission from the EMU Meter to the Protocol Computer is started at 5 seconds.
=> All Data are able to be called at latest 45 seconds via the M-BUS System.

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

- Total Active Energy, Tariff 1 and Tariff 2
- Total Reactive Energy, Tariff 1 and Tariff 2
- Total Maximum Demand Active Energy, 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
- Instantaneous System Time (Date and Hour continue to run for at least 3 days)
- Time of last Power Up on EMU Meter

Error Flag (Binary	Error Flag (Hex)	Signification
0000 xxxx	0x	No Error has been set. => All instantaneous Data can be called via the M-BUS.
0001 xxxx	1x	The last Data Transmission from the EMU Meter to the M-BUS Protocol Computer was faulty. The EMU Meter is not connected to voltage or is faulty. => Only the Data of the last successful Data Transmission can be called via M-BUS.
0011 xxxx	3x	After putting the M-BUS into operation no successful Data Transmission from the EMU Meter to the M-BUS Protocol Computer has been effected. => The first Data Transmission is not yet completed (below 16 sec.). => The EMU Meter is not connected to system Voltage or is faulty. The The M-BUS Data are not up-to-date. The Data are on „0“ or they correspond to the last Voltage failure.

9.15 Initialisation of EMU M-BUS Meter (SND_NKE)

This Short Telegram re-initialises the EMU M-BUS Meter.

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

9.15.1 Initialisation of EMU M-BUS Meter

Byte Nr.	Grösse (Byte)	Wert (Hex)	Beschreibung
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 : is set if Transmission is by Secondary Address FE : All EMU M-BUS Meters in the System send the Read-out Data FF : No action by EMU M-BUS Meter
4	1	xx	CS Check Sum, summed up from C Field and A Field
5	1	16	Stop Character

- In order to patrametrise simultaneously all EMU M-BUS Meters in the System to a new Baud Rate, the Primary Address 255 (HEX FF) is to be used in the A Field (Broadcast). The EMU M-BUS Meters in the M-BUS System will however not send an Acknowledgement.

10 Examples

10.1 Transmit Read-out Data using Primary Address (all Data including Status VIFE Byte)

The Parameter Set of the Read-out Data possible in the EMU M-BUS Meter is parametrized for Transmission of the maximum Data possible including the Status VIFE Byte.

Request (Master to EMU M-BUS Meter):

10 7B A3 1E 16	Primary Address = A3 = 163; Check Sum = 1E (7B + A3)

Response (EMU M-BUS Meter to Master):

68 FD FD 68 08 A3 72	Number of Bytes = FD = 253; Primary Address = A3 = 163
78 56 34 12	Secondary Address = 12345678
B5 15	Manufacturer = "EMU"
01 02	Version = 01; Medium = 02 = Electricity
89	Meter called upon = 89 = 137
00 00 00	Status = 00; Signature = 00 00
03 FD 8B 00 FF FF 0F	Parameter Set Identification: S1 = 0F, S2 = FF, S3 = FF
04 ED 00 24 16 94 06	System Time = 20.06.2004 22:36; Status = 00
04 A2 00 12 1B 00 00	Operating Hours EMU Meter = 00001B12h = 6'930 h
84 10 83 00 06 84 4D 00	Active Energy Tariff 1 = 004D8406h = 5080'070 Wh
84 20 83 00 46 8F 2F 00	Active Energy Tariff 2 = 002F8F46h = 3116'870 Wh
84 90 40 83 00 B4 77 01 00	Reactive Energy Tariff 1 = 000177B4h = 96'180 varh
84 A0 40 83 00 20 02 01 00	Reactive Energy Tariff 2 = 00010220h = 66'080 varh
01 FF 93 00 01	Tariff presently Active = 01 = Tariff 1
04 AB FF 81 00 32 1F 04 00	Instantaneous Active Power Phase L1 = 00041F32h = 270'130 W
04 AB FF 82 00 E2 68 00 00	Instantaneous Active Power Phase L2 = 000068E2h = 26'850 W
04 AB FF 83 00 6E 28 00 00	Instantaneous Active Power Phase L3 = 0000286Eh = 10'350 W
84 80 40 AB FF 81 00 42 73 FF FF	Instantaneous Reactive Power Phase L1 = FFFF7342h = - 36'030 var
84 80 40 AB FF 82 00 30 1B 00 00	Instantaneous Reactive Power Phase L2 = 00001B30h = 6'960 var
84 80 40 AB FF 83 00 0E 1F 00 00	Instantaneous Reactive Power Phase L3 = 00001F0Eh = 7'950 var
94 10 AB 00 56 31 05 00	Maximum Demand Active Power Tariff 1 = 00053156h = 340'310 W
94 20 AB 00 94 30 04 00	Maximum Demand Active Power Tariff 2 = 00043094h = 274'580 W
02 FD C9 FF 81 00 DD 00	Instantaneous Voltage Phase L1 = 00DDh = 221 V
02 FD C9 FF 82 00 E4 00	Instantaneous Voltage Phase L2 = 00E4h = 228 V
02 FD C9 FF 83 00 DD 00	Instantaneous Voltage Phase L3 = 00EAh = 234 V
03 FD D9 FF 81 00 EA D0 12	Instantaneous Current Phase L1 = 12D0EAh = 1233'130 mA
03 FD D9 FF 82 00 32 DB 01	Instantaneous Current Phase L2 = 01DB32h = 121'650 mA
03 FD D9 FF 83 00 DA D9 00	Instantaneous Current Phase L3 = 00 D9DAh = 55'770 mA
02 FF D2 00 F5 01	Instantaneous Network Frequency = 01F5h = 501 x 0.1 Hz = 50.1 Hz
01 FF E1 FF 81 00 63	Instantaneous Power Factor Phase L1 (Cos Phi) = 63h = 99 x 0.01 = 0.99
01 FF E1 FF 82 00 61	Instantaneous Power Factor Phase L2 (Cos Phi) = 61h = 97 x 0.01 = 0.97
01 FF E1 FF 83 00 4F	Instantaneous Power Factor Phase L3 (Cos Phi) = 4Fh = 79 x 0.01 = 0.79
02 FD E0 00 30 00	Number of Voltage Outages on EMU Meter = 0030h = 48
02 FF 92 00 30 00	Current Transformer Factor (CT-conn. Meters only) = 00C8h = 200
01 FD 97 00 00	Error Flags = 00h => none set
04 ED 00 30 10 93 06	Last Power Up = 19.06.2004 16:48
xx	Check Sum; summed up from C Field (08) to last Power Up Byte (06)
16	Stop Character

xx	: Start Character	xx	: Stop Character
xx	: Primary Address	xx	: Check Sum
xx	: C Field	xx	: L Field
xx	: CI Field	xx	: Fixed EMU Data Record Header
xx	: DIF Byte	xx	: DIFE Byte
xx	: VIF Byte	xx	: VIFE Byte
xx	: Status VIFE Byte	xx	: EMU Read-out Data (Active Data)

Timing: ***The EMU M-BUS Meter transmits the Response at 35 – 70 ms from valid receipt of Request (Command).***

The interval between 2 Bytes is 0 – 70 mS.

10.2 Transmit Read-out Data using Secondary Address (Standard Data)

The Parameter Set of the Read-out Data possible in the EMU M-BUS Meter is set as follows:
S1 = S2 = 00; S1 = 01 => Parameter Set on Option 2 (Please see Parameter Set of Read-out Data possible)

Select EMU M-BUS Meter (Master to EMU M-BUS Meter):

68 0B 0B 68 73 FD 52	Number of Bytes = 0B = 11; Primary Address = FD = 253 = Secondary Address
78 56 34 12	Secondary Address = 12345678
B5 15	Manufacturer = "EMU"
01 02	Version = 01; Medium = 02 = Electricity
xx	Check Sum; summed up from C Field (73) to Medium (02) inclusive
16	Stop Character

Acknowledgement (EMU M-BUS Meter to Master):

E5	Acknowledgement = E5 = "ACK"

Request (Master to EMU M-BUS Meter):

10 7B FD 78 16	Primary Address = FD = 253= Secondary Address; Check Sum = 78 (7B + FD)

Response (EMU M-BUS Meter to Master):

68 36 36 68 08 A3 72	Number of Bytes = FD = 253; Primary Address = A3 = 163
78 56 34 12	Secondary Address = 12345678
B5 15	Manufacturer = "EMU"
01 02	Version = 01; Medium = 02 = Electricity
89	Meter called upon = 89 = 137
00 00 00	Status = 00; Signature = 00 00
04 6D 24 16 94 06	System Time = 20.06.2004 22:36
04 22 12 1B 00 00	Operating Hours EMU Meter = 00001B12h = 6'930 h
04 03 4C 13 7D 00	Total Active Energy = 007D134Ch = 81960'940 Wh
04 2B 82 B0 04 00	Total instantaneous Active Power = 0004B082h = 307'330 W
02 FD 60 30 00	Number of Voltage Outages on EMU Meter = 0030h = 48
01 FD 17 00	Error Flags = 00h => none set
04 6D 30 10 93 06	Last Power Up = 19.06.2004 16:48
xx	Check Sum; summed up from C Field (08) to Last Power Up Byte (06)
16	Stop Character

xx : Start Character	xx : Stop Character
xx : Primary Address	xx : Check Sum
xx : C Field	xx : L Field
xx : CI Field	xx : Fixed EMU Data Record Header
xx : DIF Byte	xx : VIF Byte
xx : VIFE Byte	xx : EMU Read-out Data (Active Data)
xx : Selection EMU M-BUS Meter	xx : Acknowledgement

Timing: ***The EMU M-BUS Meter sends the Acknowledgement at 35 – 70 ms from valid receipt of the Selection.***

The Request (Command) by the Master is to take place latest 3 secondsfrom receipt of the Acknowledgement. Should the Master not send a Request within this time the EMU M-BUS Meter will automatically switch back to Normal Mode. If a Read-out is desired at this stage a renewed „Select EMU M-BUS Meter" run is to be started.

The ***EMU M-BUS Meter sends the response at 35 – 70 ms after valid receipt of the Request (Command).***

The interval between 2 Bytes is 0 – 70 ms.

10.3 Set Date and Hour using Primary Address

New Date desired: **20.06.2004**
Hour desired: **22:36**

Minute = 36 : => mm = 24
Hour = 22 : => hh = 16
Day = 20 : => YD Bit 0 – Bit 4 = 14 (1'0100)
Month = 06 : => MD Bit 0 – Bit 3 = 6 (0110)
Year = 2004 : => YD Bit 5 – Bit 7 = Year Bit 0 – Bit 2 = 4 (100)
=> YD = 1001'0100 = 94
=> MD Bit 4 – Bit 7 = Year Bit 3 – Bit 6 = 0 (0000)
=> MD = 0000'0110 = 06

Set Date and Hour (Master to EMU M-BUS Meter):

68 09 09 68 73 A3	L Field = 09 = 9; C Field = 73 = SND_UD; Primary Address = A3 = 163;
51	CI Field; New Data for EMU M-BUS Meter
04 6D 24 16 94 06	New System Time = 20.06.2004 22:36
xx	Check Sum; summed up from C Field (73) to YD (06) inclusive
16	Stop Character

Acknowledgement (EMU M-BUS Meter to Master):

E5	Acknowledgement = E5 = "ACK"

xx : Start Character
xx : Primary Address
xx : C Field
xx : DIF Byte
xx : EMU Read-out Data (Active Data)

xx : Stop Character
xx : Check Sum
xx : L Field
xx : VIF Byte
xx : Acknowledgement

Timing: ***The EMU M-BUS Meter sends the Acknowledgement at 35 – 70 ms from valid receipt of Date and Hour and adjusts the internal Real Time Clock to the new System Time. The Seconds are set to „0".***

The interval between 2 Bytes is 0 – 70 ms.

10.4 Set Date and Hour using Secondary Address

New Date desired: **20.06.2004**
Hour desired: **22:36**

Minute = 36	:	=> mm = 24
Hour = 22	:	=> hh = 16
Day = 20	:	=> YD Bit 0 – Bit 4 = 14 (1'0100)
Month = 06	:	=> MD Bit 0 – Bit 3 = 6 (0110)
Jahr = 2004	:	=> YD Bit 5 – Bit 7 = Year Bit 0 – Bit 2 = 4 (100)
		=> YD = 1001'0100 = 94
		=> MD Bit 4 – Bit 7 = Year Bit 3 – Bit 6 = 0 (0000)
		=> MD = 0000'0110 = 06

Set Date and Hour (Master to EMU M-BUS Meter):

68 11 11 68 73 FD	L Field = 11 = 17; C Field = 73 = SND_UD; Primary Address = FD = Sec. Address
51	CI Field; New Data for EMU M-BUS Meter
78 56 34 12	Secondary Address = 12345678
B5 15	Manufacturer = "EMU"
01 02	Version = 01; Medium = 02 = Electricity
04 6D 24 16 94 06	New System Time = 20.06.2004 22:36
xx	Check Sum; summed up from C Field (73) to YD inclusive (06)
16	Stop Character

Acknowledgement (EMU M-BUS Meter to Master):

E5	Acknowledgement = E5 = "ACK"

xx : Start Character
xx : Primary Address
xx : C Field
xx : DIF Byte
xx : EMU Read-out Data (Active Data)
xx : Selection EMU M-BUS Meter

xx : Stop Character
xx : Check Sum
xx : L Field
xx : VIF Byte
xx : Acknowledgement

Timing: ***The EMU M-BUS Meter sends the Acknowledgement at 35 – 70 ms from valid receipt of Date and Hour and adjusts the internal Real Time Clock to the new System Time. The Seconds are set to „0".***

The interval between 2 Bytes is 0 – 70 ms.

10.5 Initialisation of EMU M-BUS Meter using Primary Adress

EMU M-BUS Meter Re-initialisation (Master to EMU M-BUS Meter):

10 40 21	Primary Adress = 21 = 33
xx	Check Sum; summed up from C Field (73) to YD (06) inclusive
16	Stop Character

Acknowledgement (EMU M-BUS Meter to Master):

E5	Acknowledgement = E5 = "ACK"

xx : Start Character	xx : C- Field
xx : Primary Adress	xx : Check Sum
xx : Stop Character	

Timing: ***The EMU M-BUS Meter sends the Acknowledgement at 35 – 70 ms from valid receipt of the Short Telegram.***

10.6 Initialisation of EMU M-BUS Meter using Secondary Adress

Select EMU M-BUS Meter (Master to EMU M-BUS Meter):

68 0B 0B 68 73 FD 52	Number of Bytes = 0B = 11; Primary Address = FD = 253 = Secondary Address
78 56 34 12	Secondary Address = 12345678
FF FF	Manufacturer = "Wildcard"
FF FF	Version = "Wildcard"; Medium = "Wildcard"
xx	Check Sum; summed up from C Field (73) to Medium (02) inclusive
16	Stop Character

Acknowledgement (EMU M-BUS Meter to Master):

E5	Acknowledgement = E5 = "ACK"

EMU M-BUS Meter Re- initialisation (Master to EMU M-BUS Meter):

10 40 FD 3D 16	Primary Address = FD = 253= Secondary Address; Check Sum = 3D (40 + FD)

xx : Start Character	xx : Stop Character
xx : Primary Address	xx : Check Sum
xx : C Field	xx : L Field
xx : Selection EMU M-BUS Meter	xx : Acknowledgement

Timing: ***The EMU M-BUS Meter sends the Acknowledgement at 35 – 70 ms from valid receipt of the Selection.***

The Re- initilisation (Command) by the Master is to take place latest 3 secondsfrom receipt of the Acknowledgement. Should the Master not send a Re- initilisation within this time the EMU M-BUS Meter will automatically switch back to Normal Mode. If a Re- initialisation is desired at this stage a renewed „Select EMU M-BUS Meter" run is to be started.

The ***EMU M-BUS Meter sends the response at 35 – 70 ms after valid receipt of the Re- initialisation (Command).***

11 Contact

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