M-BUS protocol

for electronic meters

Technical reference

Version 1.0

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1 Application

The M-BUS Interface (1 module wide, DIN rail mount) is intended for connecting the energy meter to M-Bus. The interface receives the measurement data from the energy meter by means of the infared port available on the side of the meter it selfs, and gets the power supply from the bus.
The M-BUS Interface is suitable for both, single-phase and three-phase energy meters.

2 M-BUS Interface

2.1 Overview

- M-BUS Interface complying with EN1434-3.
- Circuiting by means of drilled two-wires cables YCYM or J.Y(St)Y 2 x 2 x 0.8 mm.
- 2 screw clamps on M-BUS Interface.
- The data transmission speed is selectable between 300, 600, 1200, 2400, 4800 and 9600 bauds.
- Parametrization of the M-BUS Interface is achieved via the M-Bus. The parameters are durably stored in the M-BUS Interface.
- In case of Voltage Outages all data are stored in the M-BUS Interface.
- The data trnsmission 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 Character (1 starting bit, 8 data bits, 1 parity bit [even] and 1 Stoping bit).
  - Bit sequence: Data bit of lowest falue is handled first.
  - Sign secured by oarity bit, even parity.
  - Block security by block checksum.
- Current consumption of M-BUS Interface: < 2.6 mA. This corresponds to 2 standard loads.

2.2 Standard Parametrization of M-BUS Interface

Adressing:

In order to build up a connection to the single participants all Slaves require a defined address.
The M-BUS Interface is apt to have two types of address, a Primary and a Secondary address.
The 8-digit Secondary adress (00000000-99999999) can be changed via the M-Bus when the system is in operation.
When the system is in operation, the Primary adress can be freely re-set between 0 and 250 via the M-Bus.

Baud Rate:

The baud rate allows setting as desired via the M-Bus when the system is in 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 system is in operation.

2.3 Options of Read-out Data

Value measured / Information	Data Typ	Units	Resolution	Bytes
Identification of Parameter Set	INT6	-	S0,S1,S2,S3,S4,S5	9
Active Energy Import Phase L1 Tarif 1	INT4	Wh	0.001 kWh	9
Active Energy Import Phase L2 Tarif 1	INT4	Wh	0.001 kWh	9
Active Energy Import Phase L3 Tarif 1	INT4	Wh	0.001 kWh	9
Active Energy Import Total Tarif 1	INT4	Wh	0.001 kWh	7
Active Energy Import Phase L1 Tarif 2	INT4	Wh	0.001 kWh	9
Active Energy Import Phase L2 Tarif 2	INT4	Wh	0.001 kWh	9
Active Energy Import Phase L3 Tarif 2	INT4	Wh	0.001 kWh	9
Active Energy Import Total Tarif 2	INT4	Wh	0.001 kWh	7
Active Energy Export Phase L1 Tarif 1	INT4	Wh (-)	0.001 kWh	9
Active Energy Export Phase L2 Tarif 1	INT4	Wh (-)	0.001 kWh	9
Active Energy Export Phase L3 Tarif 1	INT4	Wh (-)	0.001 kWh	9
Active Energy Export Total Tarif 1	INT4	Wh (-)	0.001 kWh	7
Active Energy Export Phase L1 Tarif 2	INT4	Wh (-)	0.001 kWh	9
Active Energy Export Phase L2 Tarif 2	INT4	Wh (-)	0.001 kWh	9
Active Energy Export Phase L3 Tarif 2	INT4	Wh (-)	0.001 kWh	9
Active Energy Export Total Tarif 2	INT4	Wh (-)	0.001 kWh	7
Reactive Energy Import Phase L1 Tarif 1	INT4	varh	0.001 kvarh	10
Reactive Energy Import Phase L2 Tarif 1	INT4	varh	0.001 kvarh	10
Reactive Energy Import Phase L3 Tarif 1	INT4	varh	0.001 kvarh	10
Reactive Energy Import Total Tarif 1	INT4	varh	0.001 kvarh	8
Reactive Energy Import Phase L1 Tarif 2	INT4	varh	0.001 kvarh	10
Reactive Energy Import Phase L2 Tarif 2	INT4	varh	0.001 kvarh	10
Reactive Energy Import Phase L3 Tarif 2	INT4	varh	0.001 kvarh	10
Reactive Energy Import Total Tarif 2	INT4	varh	0.001 kvarh	8
Reactive Energy Export Phase L1 Tarif 1	INT4	varh (-)	0.001 kvarh	10
Reactive Energy Export Phase L2 Tarif 1	INT4	varh (-)	0.001 kvarh	10
Reactive Energy Export Phase L3 Tarif 1	INT4	varh (-)	0.001 kvarh	10
Reactive Energy Export Total Tarif 1	INT4	varh (-)	0.001 kvarh	8
Reactive Energy Export Phase L1 Tarif 2	INT4	varh (-)	0.001 kvarh	10
Reactive Energy Export Phase L2 Tarif 2	INT4	varh (-)	0.001 kvarh	10
Reactive Energy Export Phase L3 Tarif 2	INT4	varh (-)	0.001 kvarh	10
Reactive Energy Export Total Tarif 2	INT4	varh (-)	0.001 kvarh	8
Active Power Phase L1	INT4	W (+,-)	0.001 kW	8
Active Power Phase L2	INT4	W (+,-)	0.001 kW	8
Active Power Phase L3	INT4	W (+,-)	0.001 kW	8
Active Power Total	INT4	W (+,-)	0.001 kW	6
Reactive Power Phase L1	INT4	var (+,-)	0.001 kvar	10
Reactive Power Phase L2	INT4	var (+,-)	0.001 kvar	10
Reactive Power Phase L3	INT4	var (+,-)	0.001 kvar	10
Reactive Power Total	INT4	var (+,-)	0.001 kvar	8
Apparent Power Phase L1	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Phase L2	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Phase L3	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Total	INT4	VA (+,-)	0.001 kVA	8
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Value measured / Information	Data Typ	Units	Resolution	Bytes
Voltage Phase L1	INT2	V	0.1 V	7
Voltage Phase L2	INT2	V	0.1 V	7
Voltage Phase L3	INT2	V	0.1 V	7
Voltage Total -> only single phase meter	INT2	V	0.1 V	(5)
Voltage Phase L1 – L2	INT2	V	0.1 V	7
Voltage Phase L2 – L3	INT2	V	0.1 V	7
Voltage Phase L3 – L1	INT2	V	0.1 V	7
Current Phase L1	INT3	mA (+,-)	0.001 A	8
Current Phase L2	INT3	mA (+,-)	0.001 A	8
Current Phase L3	INT3	mA (+,-)	0.001 A	8
Current Total	INT3	mA (+,-)	0.001 A	6
Power factor cos phi Phase L1	INT1	Fo x 0.1	0.01	6
Power factor cos phi Phase L2	INT1	Fo x 0.1	0.01	6
Power factor cos phi Phase L3	INT1	Fo x 0.1	0.01	6
Power factor cos phi Total	INT1	Fo x 0.1	0.01	4
Netfrequency	INT2	Hz x 0.1	0.1 Hz	5
Status Byte 4 (Range Overflow Alarms)	INT1	-	-	4
Tariff presently operating	INT1		Tarif 1 oder Tarif 2	4
				86
				Total: 510 *

*** Warning:** It's only possible to Read-out in one Telegram maximum 240 Bytes.

2.4 Structure of Parameter Set for Read-out Data possible

Parametrization enables to select any desired Read-out Data for M-BUS Interface Reading.

The Parameterset Identification is a INT6 (6 Byte) type

⇨ S0S1S2S3S4S5 <=

S0 = Parameterset 0 Read-Out Data: Area: 00 – FF
S1 = Parameterset 1 Read-Out Data: Area: 00 – FF
S2 = Parameterset 2 Read-Out Data: Area: 00 – FF
S3 = Parameterset 3 Read-Out Data: Area: 00 – FF
S4 = Parameterset 4 Read-Out Data: Area: 00 – FF
S5 = Parameterset 5 Read-Out Data: Area: 00 – FF

S0 = Parameterset 0

xxxx xxx1b	:	Parameterset Identification
xxxx xx1xb	:	Status Byte 4 (Range Overflow Alarms)
xxxx x1xxb	:	Parameterset 1 -> Instead of Active Energy Import -> all Reactive Energy Import
xxxx 1xxxb	:	Parameterset 2 -> Instead of Active Energy Export -> all Reactive Energy Import
xxx1 xxxxb	:	Parameterset 2 -> Instead of Active Energy Export -> all Reactive Energy Export
xx1x xxxxb	:	Parameterset 3 -> Instead of Active and Reactive Power -> alle Reactive Energy Import
x1xx xxxxb	:	Parameterset 3 -> Instead of Active and Reactive Power -> all Reactive Energy Export
1xxx xxxxb	:	Parameterset 3 -> Instead of Reactive Power -> all Apparent Power

S1 = Parameterset 1

xxxx xxx1b	:	Active- or Reactive Energy Import Phase L1 Tariff 1
xxxx xx1xb	:	Active- or Reactive Energy Import Phase L2 Tariff 1
xxxx x1xxb	:	Active- or Reactive Energy Import Phase L3 Tariff 1
xxxx 1xxxb	:	Active- or Reactive Energy Import Total Tariff 1
xxx1 xxxxb	:	Active- or Reactive Energy Import Phase L1 Tariff 2
xx1x xxxxb	:	Active- or Reactive Energy Import Phase L2 Tariff 2
x1xx xxxxb	:	Active- or Reactive Energy Import Phase L3 Tariff 2
1xxx xxxxb	:	Active- or Reactive Energy Import Total Tariff 2

S2 = Parameterset 2

xxxx xxx1b	:	Active- or Reactive Energy Export Phase L1 Tariff 1 or Reactive Energy Import Phase L1 Tariff 1
xxxx xx1xb	:	Active- or Reactive Energy Export Phase L2 Tariff 1 or Reactive Energy Import Phase L2 Tariff 1
xxxx x1xxb	:	Active- or Reactive Energy Export Phase L3 Tariff 1 or Reactive Energy Import Phase L3 Tariff 1
xxxx 1xxxb	:	Active- or Reactive Energy Export Total Tariff 1 or Reactive Energy Import Total Tariff 1
xxx1 xxxxb	:	Active- or Reactive Energy Export Phase L1 Tariff 2 or Reactive Energy Import Phase L1 Tariff 2
xx1x xxxxb	:	Active- or Reactive Energy Export Phase L2 Tariff 2 or Reactive Energy Import Phase L2 Tariff 2
x1xx xxxxb	:	Active- or Reactive Energy Export Phase L3 Tarff 2 or Reactive Energy Import Phase L3 Tariff 2
1xxx xxxxb	:	Active- or Reactive Energy Export Total Tarff 2 or Reactive Energy Import Total Tariff 2

S3 = Parameterset 3

xxxx xxx1b	:	Active Power Phase L1 or Reactive Energy Import or Export Phase L1 Tariff 1
xxxx xx1xb	:	Active Power Phase L2 or Reactive Energy Import or Export Phase L2 Tariff 1
xxxx x1xxb	:	Active Power Phase L3 or Reactive Energy Import or Export Phase L3 Tariff 1
xxxx 1xxxb	:	Active Power Total or Reactive Energy Import or Export Total Tariff 1
xxx1 xxxxb	:	Reactive- or Apparent Power Phase L1 or Reactive Energy Import or Export Phase L1 Tariff 2
xx1x xxxxb	:	Reactive- or Apparent Power Phase L2 or Reactive Energy Import or Export Phase L2 Tariff 2
x1xx xxxxb	:	Reactive- or Apparent Power Phase L3 or Reactive Energy Import or Export Phase L3 Tariff 2
1xxx xxxxb	:	Reactive- or Apparent Power Total or Reactive Energy Import or Export Total Tariff 2

S4 = Parameterset 4

xxxx xxx1b	:	Voltage Phase L1 -> By single phase meter is this the Voltage Total
xxxx xx1xb	:	Voltage Phase L2
xxxx x1xxb	:	Voltage Phase L3
xxxx 1xxxb	:	Voltage Phase L1 – L2
xxx1 xxxxb	:	Voltage Phase L2 – L3
xx1x xxxxb	:	Voltage Phase L3 – L1
x1xx xxxxb	:	Netfrequency
1xxx xxxxb	:	Tariff presently operating

S5 = Parameterset 5

xxxx xxx1b	:	Current Phase L1
xxxx xx1xb	:	Current Phase L2
xxxx x1xxb	:	Current Phase L3
xxxx 1xxxb	:	Current Total
xxx1 xxxxb	:	Power factor cos phi Phase L1
xx1x xxxxb	:	Power factor cos phi Phase L2
x1xx xxxxb	:	Power factor cos phi Phase L3
1xxx xxxxb	:	Power factor cos phi Total

Example:

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

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

S1 = 3A => 0011 1010b : Activ - Energy Import Phase L2 Tariff 1
+ Activ - Energy Import Phase L3 Tariff 1
+ Activ - Energy Import Total Tariff 1
+ Activ - Energy Import Phase L1 Tariff 2
+ Activ - Energy Import Phase L2 Tariff 2

S2 = 0F => 0000 1111b : Activ - Energy Export Phase L1 Tariff 1
+ Activ - Energy Export Phase L2 Tariff 1
+ Activ - Energy Export Phase L3 Tariff 1
+ Activ - Energy Export Total Tariff 1

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

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

S5 = 88 => 1000 1000b : Current Total
+ Power Factor Total (cos Phi)

2.4.1 Default Parameter Set

This is the default Parameter Set.

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

Default Parameter Set Identification (INT6 Typ) = 02 FF 00 0F C7 FF

S0 = 02 => 0000 0010b : Status Byte 4 (Range Overflow Alarms)
➔ S0 Total = 4 Byte

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

S2 = 00 => 0000 0000b : none

S3 = 0F => 0000 1111b :
Activ - Power Phase L1 -> Not if single Phase
+ Activ - Power Phase L2 -> Not if single Phase
+ Activ - Power Phase L3 -> Not if single Phase
+ Activ - Power Total
➔ S3 Total 3 Phase Energy meter = 30 Byte
➔ S3 Total 1 Phase Energy meter = 6 Byte

S4 = C7 => 1100 0111b :
Voltage Phase L1 -> Not if single Phase
or Voltage Total -> Only if 3 Phase
+ Voltage Phase L2 -> Not if single Phase
+ Voltage Phase L2 -> Not if single Phase
+ Netfrequency
+ Tariff presently operating
➔ S4 Total 3 Phase Energy meter = 30 Byte
➔ S4 Total 1 Phase Energy meter = 14 Byte

S5 = FF => 1111 1111b :
Current Phase L1 -> Not if single Phase
+ Current Phase L2 -> Not if single Phase
+ Current Phase L3 -> Not if single Phase
+ Current Total
+ Power factor cos phi Phase L1 -> Not if single Phase
+ Power factor cos phi Phase L2 -> Not if single Phase
+ Power factor cos phi Phase L3 -> Not if single Phase
+ Power factor cos phi Total
➔ S5 Total 3 Phase Energy meter = 52 Byte
➔ S5 Total 1 Phase Energy meter = 10 Byte

Total: 3 phase Energy meter = 184 Byte and single phase Energy meter = 44 Byte.

3 M-BUS Interface Telegrams

Description M-BUS Interface Telegrams

3.1 Primary Adress (A-Field)

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

3.1.1 Structure Primary Adress (A- Field)

A Field (Hex)	Primary Adress	Remarks
00	0	Factory Setting of theM-BUS Interface
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- Telegram). Telegrams so addressed are not responded to.

3.2 Secondary Adress (UD)

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

3.2.1 Structure Secondary Adress (UD)

Identification Number	Manufacturer	Version	Medium
xxxxxxxx	mm mm	xx	02

- Identification Number : 8-digit Serial Number of M-BUS Interface (Sec. Adr.)
  => 00000000 – 99999999, -> Default = 00000000
- Manufacturer’s Code : 2 Byte Constant
- Version Number : 1 Byte, Firmware Version
  => 01 - FF
- Medium : 1 Byte, Constant Electricity
  => 02

3.2.2 Wild Cards

The M-BUS Interface 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“ maybe used.

Example:
M-BUS Interface: Identification Number = 12345678, Manufacterer = ECS, Version = 12, Medium = 02

Sec.- Adr. (DU) : 12345678, 73 14, 12, 02 => M-BUS Interface reacts
Sec.- Adr. (DU) : F2345678, 73 14, 12, 02 => M-BUS Interface reacts
Sec.- Adr. (DU) : 1234FF78, 73 14, 12, 02 => M-BUS Interface reacts
Sec.- Adr. (DU) : 12345678, FF FF, 12, 02 => M-BUS Interface reacts
Sec.- Adr. (DU) : FFF4FFF, FF FF, FF, FF => M-BUS Interface reacts
Sec.- Adr. (DU) : FFFFFFF, FF FF, FF, FF => All M-BUS Interface in System reacts (Bus-Config.)
Sec.- Adr. (DU) : FFF5FFF, FF FF, FF, FF => M-BUS Interface does not react (Iddent. No. invalid)
Sec.- Adr. (DU) : FFFFFFF, FF 14, FF, FF => M-BUS Interface does not react (Manufacturer Invalid)
Sec.- Adr. (DU) : FFFFFFF, FF FF, 1F, FF => M-BUS Interface does not react (Version invalid)

3.3 Reset M-BUS Interface “called upon” (SND_UD)

This Telegram sets the called upon to „0“ in the M-BUS Interface.

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

3.3.1 Reset M-BUS Interface „called upon“ by Ptimary Adress

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 Lng- Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Adress (00 – FF = 0 – 255)
7	1	50	CI- Field, Initialise M-BUS Interface (Set to „0“)
8	1	xx	CS Checksum, summed up C-Field to CI- Field incl.
9	1	16	Stop Character

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

3.3.2 Reset M-BUS Interface „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 Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Adress to FD = Sekundary Address
7	1	50	CI- Field, Initialise M-BUS Interface (Set Interface called to „0“)
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	xx	CS Checksum, summed up by C-Field to UD incl.
17	1	16	Stop Character

3.4 Set Baud Rate on M-BUS Interface (SND_UD)

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

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

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

If the M-BUS Interface 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.

3.4.1 Set Baudrate by Primary Addressing

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

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

3.4.2 Set Baudrate by Secondary Addressing

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0B	L- Field
3	1	0B	L- Field Repetition
4	1	68	Start Character Long- Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A Field, Primary Address on FD = Secondary Address
7	1	xx	CI- Field, Set new Baudrate B8 : Set Baudrate to 300 Baud B9 : Set Baudrate to 600 Baud BA : Set Baudrate to 1200 Baud BB : Set Baudrate to 2400 Baud -> Manufacturer's Mark BC : Set Baudrate to 4800 Baud BD : Set Baudrate to 9600 Baud
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	xx	CS Check Sum, summed up by C Field, A Field, CI Field and UD.
17	1	16	Stop Character

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

This Telegram serves to set the Parameter Set for the Read-out Data of the Default Parameter Set (Please see: „Parameter Set Default“).

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

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

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

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

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0C	L- Field
3	1	0C	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Adress to FD = Secondary Address
7	1	51	CI- Field, New Data for M-BUS Interface
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	7F	DIF- Field, Set Default Parameterset
17	1	xx	CS Checksum, summed up by C-Field to DIF- Field incl.
18	1	16	Stop Character

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

This Telegram allows to set in the M-BUS Interface the Parameter Set for Read-out Data of any value desired (Please see: “Options of Read-out Data“.
For the Structure of the Parameter Set for Read-out Data please see: „Structure of Parameter Set for Read-out Data possible“.

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

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

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

			Please see: „Structure of Parameter Set of Read-out Data possible“
16	1	„S5“	Parameterset S5 (00 - FF) Please see: „Structure of Parameter Set of Read-out Data possible“
17	1	xx	CS Checksum, summed up by C-Field to „S5“ incl.
18	1	16	Stop Character

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

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	14	L- Field
3	1	14	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Adress
7	1	51	CI- Field, New Data for M-BUS Interface
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	06	DIF- Field, 48 Bit Integer Data (6 Byte)
17	1	FD	VIF- Field, A Standard VIFE follows
18	1	0B	VIFE- Field, Standard VIFE = Parameterset Identification
19	1	„S0“	Parameterset S0 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
20	1	„S1“	Parameter Set S1 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
21	1	„S2“	Parameterset S2 (00 – FF), Please see: „Structure of Parameter Set of Read-out Data possible“
22	1	„S3“	Parameterset S3 (00 – 0F), Please see: „Structure of Parameter Set of Read-out Data possible“
23	1	„S4“	Parameterset S4 (00 – FF) Please see: „Structure of Parameter Set of Read-out Data possible“
24	1	„S5“	Parameterset S5 (00 - FF) Please see: „Structure of Parameter Set of Read-out Data possible“
25	1	xx	CS Checksum, summed up from C-Field to „S5“ incl.
26	1	16	Stop Character

3.7 Set Primary Adress (SND_UD)

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

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

3.7.1 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 Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for M-BUS Interface
8	1	01	DIF- Field, 8 Bit Integer - Data (1 Byte)
9	1	7A	VIF- Field, Set Primary Address
10	1	xx	New Primary Address:, Range: 00 – FA (0 – 250), Invalid: FB – FF (no action in meter)
11	1	xx	CS Checksum, summed up aus C-Field from C Field to Primary Address incl.
12	1	16	Stop Character

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

3.7.2 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 Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Address
7	1	51	CI- Field, New Data for M-BUS Interface
8 - 15	8	„UD“	Secondary Address UD (Please see:: „Secondary Address UD“)
16	1	01	DIF- Field, 8 Bit Integer- Data (1 Byte)
17	1	7A	VIF- Field, Set Primary Adress
18	1	xx	New Primary Address, Range :00 – FA (0 – 250), Invalid: FB – FF (no action in meter)
19	1	xx	CS Checksum, summed up from C Field to Primary Address incl.
20	1	16	Stop Character

3.8 Set Secondary Address (SND_UD)

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

3.8.1 Set Secondary Address using Primary Addressing

Byte Nr.	Size (Byte)	Value (Hex)	Beschreibung
1	1	68	Start Character Long Telegram
2	1	09	L- Field
3	1	09	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Adress (00 – FF = 0 – 255)
7	1	51	CI- Field, New Address for M-BUS Interface
8	1	0C	DIF- Field, 8 digits BCD, 4 Byte
9	1	79	VIF- Field, Set Secondary Adress
10	1	xx	New Secondary Adress digit 7 and 8, Range: 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 78
11	1	xx	New Seondary Adress digit 5 and 6, Range: 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 56
12	1	xx	New Seondary Adress digit 3 and 4, Range 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 34
13	1	xx	New Seondary Adress digit 1 and 2, Range: 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 12
14	1	xx	CS Checksum, 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 M-BUS Interface in the System please use the Primary Address 255 (HEX FF) in the A- Field (Broadcast).
  The M-BUS Interface in the M-Bus System will not send an Acknowledgement.

3.8.2 Set Secondary Address using Secondary Addressing

Byte Nr.	Size (Byte)	Value (Hex)	Beschreibung
1	1	68	Start Character Long Telegram
2	1	11	L- Field
3	1	11	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primäradresse on FD = Secondary Address
7	1	51	CI- Field, New Data for M-BUS Interface
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	0C	DIF- Field, 8 digits BCD, 4 Byte
17	1	79	VIF- Field, Set Secondary Address
18	1	xx	New Secondary Address digits 7 und 8, Range: 00 - 99 Beispiel: Sec. Adress = 12345678 -> Byte Value = 78
19	1	xx	New Secondary Address Ziffer 5 und 6, Range: 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 56
20	1	xx	New Secondary Address Ziffer 3 und 4, Range: 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 34
21	1	xx	New Secondary Address Ziffer 1 und 2, Range: 00 - 99 Example: Sec. Adress = 12345678 -> Byte Value = 12
22	1	xx	CS Checksum, summed up from C Field to Sec. Address incl.
23	1	16	Stop Character

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

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

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

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

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

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

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

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

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

3.10.1 Reset Active and Reactive Energy using Primary 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 Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Adress (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for M-BUS Interface
8	1	01	DIF- Field, 8 Bit Integer (1 Byte)
9	1	FF	VIF- Field, An ECS-specific VIFE follows
10	1	13	VIFE- Field, ECS-specific VIFE = Energy Reset
11	1	xx	Coding off Active and Reactive Energy Reset: 00h: No Reset Active and Reactive Energy (Binary: 0000 0000) 01h: Reset Active Energy (Binary: 0000 0001) 10h: Reset Reactive Energy (Binary: 0001 0000) 11h: Reset Reset Active and Reactive Energy (Binary: 0001 0001)
12	1	xx	CS Checksum, summed up from C-Field to Coding
13	1	16	Stop Character

- In order to Reset to all M-BUS Interface in the System simultaneously the Reset of Active and Reactive Energy please use the Primary Address 255 (HEX FF) in the A Field (Broadcast).
  The M-BUS Interface in the M-Bus System will not send an Acknowledgement.

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

3.10.2 Reset Active and Reactive Energy using Secondary Addressing

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0F	L- Field
3	1	0F	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Address
7	1	51	CI- Field, New Data for M-BUS Interface
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary Address UD“)
16	1	01	DIF- Field, 8 Bit Integer (1 Byte)
17	1	FF	VIF- Field, An ECS-specific VIFE follows
18	1	13	VIFE- Field, ECS-specific VIFE = Energy Reset
19	1	xx	Coding off Active and Reactive Energy Reset: 00h: No Reset Active and Reactive Energy (Binary: 0000 0000) 01h: Reset Active Energy (Binary: 0000 0001) 10h: Reset Reactive Energy (Binary: 0001 0000) 11h: Reset Reset Active and Reactive Energy (Binary: 0001 0001)
20	1	xx	CS Checksum, summed up from C-Field to Coding
21	1	16	Stop Character

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

This Telegram enables to select M-BUS Interface.

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

After issue of the Single Character Acknowledgement the M-BUS Interface 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 M-BUS Interface switch back to normal mode.

3.11.1 Select M-BUS Meters using Secondary Address

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

3.12 Transmit Read-out Data (REQ_UD2)

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

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

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

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3.12.1 Transmit Read-out Data

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	7B	C- Field, Transmit Read-out Data
3	1	xx	A- Field, Primary Adress 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Is set if transmission is by Secondary Address FE : All M-BUS Interface in the System transmit the Read-out Data FF : No action by M-BUS Interface
4	1	xx	CS Checksum, summed up by C-Field and A- Field
5	1	16	Stop Character

3.12.2 Telegram of Read-out Data by M-BUS Interface (RSP_UD)

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

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	xx	L- Field, corresponding to number of Read-out Data parametrised
3	1	xx	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	08	C- Field, Transmit Data of M-BUS Interface
6	1	xx	A- Field, Primary Address (00 – FA = 0 – 250)
7	1	72	CI- Field, Read-out Data of M-BUS Interface
8 - 11	4	xxxxxxxx	***8-digit Serial Number of M-BUS Interface (Sec. Address)***
12 + 13	2	xx xx	***Manufacturer's Mark***
14	1	xx	***Version Number of M-BUS Interface Firmware (00 – FF)***
15	1	02	***Medium Electricity***
16	1	xx	***Meter called upon, at each call on M-BUS Interface + 1 (00 – FF -> 00)***
17	1	xx	***Shows the M-BUS Interface Status. Please see „Structure of Error Flags Data Transmission from Meter to M-BUS Interface" and „Structure of Error Flags in M-BUS Interface"***
18 + 19	2	00 00	***Signature. For M-BUS Interface 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

3.12.3 Structure of Telegram for Read-out Data possible

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

3.12.3.1 Parameterset Identification

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

3.12.3.2 Active Energy Import Phase L1, L2 und L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	83	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 4	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Import Phase L1, L2 oder L3

3.12.3.3 Active Energy Import Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	03	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Import Total Tariff 1

3.12.3.4 Active Energy Import Phase L1 , L2 und L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	83	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 4	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Import Phase L1, L2 oder L3

3.12.3.5 Active Energy Import Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	03	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Import Total Tariff 2

3.12.3.6 Active Energy Export Phase L1, L2 und L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	83	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 4	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2 oder L3 -> IntegerValue = Negativ

3.12.3.7 Active Energy Export Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	03	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Export Total -> IntegerValue = Negativ

3.12.3.8 Active Energy Export Phase L1, L2 und L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	83	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 4	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2 oder L3 -> IntegerValue = Negativ

3.12.3.9 Active Energy Export Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	20	DIFE, Tariff 2
YY + 2	1	03	VIF, Active Energy
YY + 3 - YY + 6	4	xxxxxxxx	Active Energy Export Total -> IntegerValue = Negativ

3.12.3.10 Reactive Energy Import Phase L1, L2 und L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 5	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3

YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 oder L3

3.12.3.11 Reactive Energy Import Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Total Tariff 1; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Import Total

3.12.3.12 Reactive Energy Import Phase L1, L2 und L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Tariff 2 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 5	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 oder L3

3.12.3.13 Reactive Energy Import Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Total Tariff 2; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Import Total

3.12.3.14 Reactive Energy Export Phase L1, L2 und L3 Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy; Followed by a further VIFE

YY + 4	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 5	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 oder L3 -> IntegerValue = Negativ

3.12.3.15 Reactive Energy Export Total Tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Total Tariff 1; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Export Total -> IntegerValue = Negativ

3.12.3.16 Reactive Energy Export Phase L1, L2 und L3 Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Tariff 2 ; Followed by a further DIFE
YY + 2		40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 5	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 oder L3 -> IntegerValue = Negativ

3.12.3.17 Reactive Energy Export Total Tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	A0	DIFE, Total Tariff 2; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	03	VIF, Reactive Energy
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Export Total -> IntegerValue = Negativ

3.12.3.18 Active Power Phase L1, L2 und L3

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

3.12.3.19 Active Power Total

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

3.12.3.20 Reactive Power Phase L1, L2 und L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	80	DIFE, Total; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	AB	VIF, Reactive Power; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 5	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Power Phase L1, L2 oder L3

3.12.3.21 Reactive Power Total

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

3.12.3.22 Apparent Power Phase L1, L2 und L3

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

3.12.3.23 Apparent Power Total

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

3.12.3.24 Voltage Phase L1, L2 und L3

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

3.12.3.25 Voltage Total single Phase Meter

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

- YY + 4			

3.12.3.26 Voltage Phase L1 – L2, L2 – L3 und L3 – L1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	02	DIF, 16 Bit Integer, 2 Byte
YY + 1	1	FD	VIF, Followed by a VIFE
YY + 2	1	C8	VIFE = Voltage; Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 4	1	0x	ECS-specific VIFE: 05 : Phase L1 – L2 06 : Phase L2 – L3 07 : Phase L3 – L1
YY + 5 - YY + 6	2	xxxx	Voltage Phase L1 – L2, L2 – L3 oder L3 – L1

3.12.3.27 Current Phase L1, L2 und L3

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

3.12.3.28 Current Total

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

3.12.3.29 Power factor cos phi Phase L1, L2 und L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF, Followed by an ECS-specific VIFE
YY + 2	1	E1	ECS-specific VIFE = Power factor; Followed by a further VIFE

YY + 3	1	FF	VIFE, Followed by an ECS-specific VIFE
YY + 4	1	0x	ECS-specific VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5	1	xx	Power factor cos phi Phase L1, L2 oder L3

3.12.3.30 Power factor cos phi Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integer, 1 Byte
YY + 1	1	FF	VIF, Followed by an ECS-specific VIFE
YY + 2	1	E1	ECS-specific VIFE = Power factor cos phi
YY + 3	1	xx	Power factor cos phi Total

3.12.3.31 Netfrequency

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

3.12.3.32 Staus Byte 4 (Range Overflow)

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

3.12.3.33 Tariff presently operating

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

3.13 Telegram of Error Flags (REQ_UD1)

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

Remark: The Error Flag is identic with the **M-BUS Interface Status** on the Read-out Data Header.

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

3.13.1 Transmit Error Flags of M-BUS Interface

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	7A	C- Field. Transmit Error Flags
3	1	xx	A Field, Primary Address 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Is set if Transmission is by Secondary Address FE : All M-BUS Interface in the System send the Error Flags FF : No action by M-BUS Interface
4	1	xx	CS Checksum, summed up from C-Field and A- Field
5	1	16	Stop Character

3.13.2 Telegram of Error Flags (RSP_UD)

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

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

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

3.13.3 Structure of Error Flags Data Transmission from Meter to M-BUS Interface

The latest Data are transmitted every 2 - 6 seconds from the Meter to the M-BUS Interface.

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

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

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

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

3.13.4 Structure of Error Flags M-BUS Interface

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

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

3.14 Initialisation of M-BUS Interface (SND_UD2)

This Short Telegram re-initialises the M-BUS Interface.

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

3.14.1 Initialisation of M-BUS Interface

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	40	C- Field. REQ-UD2
3	1	xx	A Field, Primary Address 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Is set if Transmission is by Secondary Address FE : All M-BUS Interface in the System send the ACK FF : No action by M-BUS Interface
4	1	xx	CS Checksum, summed up from C-Field and A- Field
5	1	16	Stop Character

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