DEIF

-power in control

CE

DESCRIPTION OF OPTION

MBus Interface
for Energy and Power meters
AEM and APM

- Technical reference

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Table of contents

1. About this document

This chapter includes general user information about this handbook concerning the general purpose, the intended users and the overall contents and structure.

General purpose

This document describes the usage of the MBus interface used along with a DEIF Energy Meter or Power Meter.

Intended users

The document is mainly intended for the person responsible for the unit parameter setup and installation. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information here.

Contents/overall structure

The document is divided into chapters and in order to make the structure of the document simple and easy to use, each chapter will begin from the top of a new page. The following will outline the contents of each of the chapters.

About this document

This first chapter includes general information about this handbook as a document. It deals with the general purpose and the intended users of the document. Furthermore, it outlines the overall contents and structure of the document.

Warnings and legal information

The second chapter includes information about general legal issues and safety precautions relevant in the handling of DEIF products. Furthermore, this chapter will introduce the note and warning symbols, which will be used throughout the handbook.

First part

The first part of this document describes the usage, wiring and technical data of the interface.

Second part

The second part of this document describes the MBus protocol, and it contains the user guide for the MBus Master USW.

2. Warnings and legal information

This chapter includes important information about general legal issues relevant in the handling of DEIF products. Furthermore, some overall safety precautions will be introduced and recommended. Finally, the highlighted notes and warnings, which will be used throughout this handbook, are presented.

Legal information and responsibility

DEIF takes no responsibility for installation. If there is any doubt about how to install or operate the products, the company responsible for the installation or the operation must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

The notes provide general information which will be helpful for the reader to bear in mind.

Warnings

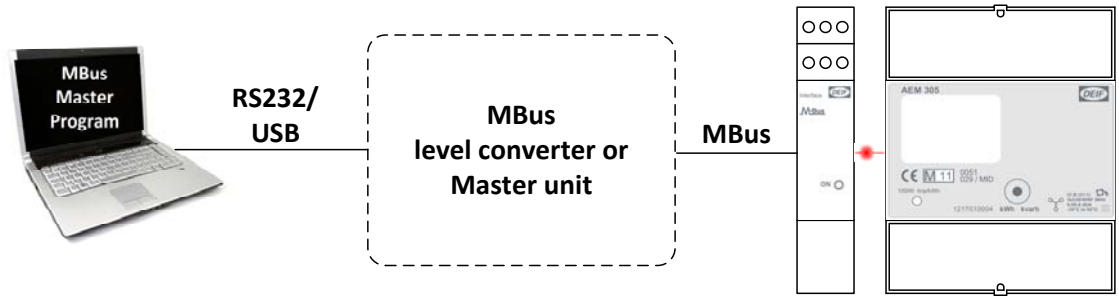
The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

3. Preface

System description

This manual describes the use of the MBus communication interface.

The following layout indicates an example of the use of the interface. The minimum requisite for use is at least one meter and a master station besides the interface (e.g. a MBus level converter).



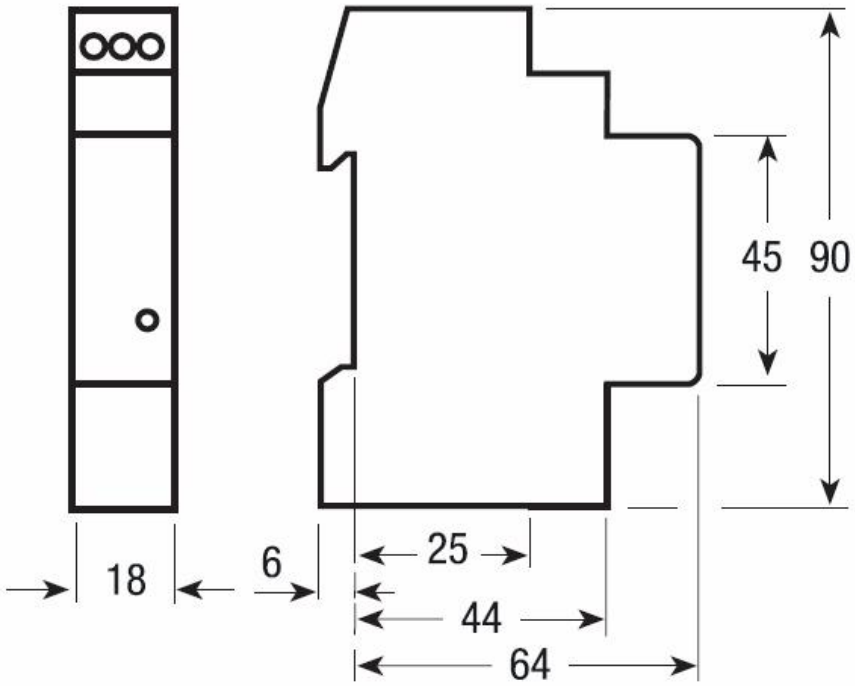
Software

The MBus Master programme is a software for Microsoft Windows ®, which manages the communication interface and offers the following features:

- Search for connected MBus interfaces
- Configuration of MBus interface
- Reading of data
- Storage of data
- Error diagnosis

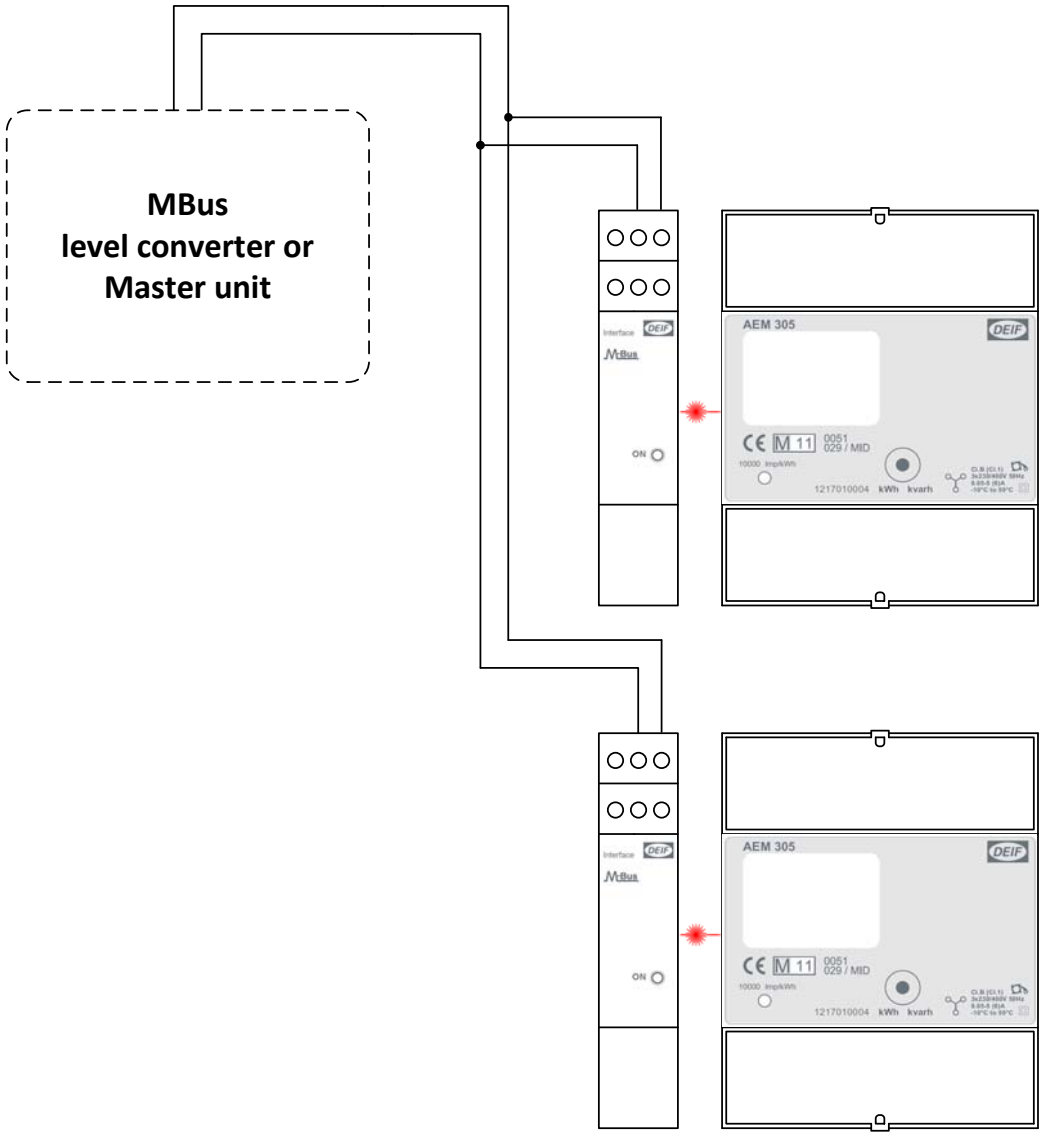
The MBus Master software can be downloaded at www.deif.com.

4. Dimensions



5. Wiring

Only two wires are needed (bus-line), these are used for the MBus data transmission. The interfaces are powered by the bus-lines so no external power is needed. The connection is polarity independent.



6. Technical data

Data complying with EN 13757-1,-2,-3, IEC 60950, EN 61000-6-2, EN 61000-6-3 and EN 61000-4-2

General characteristics			
- Housing	DIN 43880	DIN	1 interface
- Mounting	EN 60715	35 mm	DIN rail
- Depth		mm	70
Power supply			
- Power supply			through bus connection
MBus interface			
- HW interface			2 screwing clamps
- SW protocol			MBus according to EN 1434
- Baudrate		Baud	300 - 9600
Interface to measuring instrument			
- HW interface	Optical IR	No.	2 (Tx, Rx)
- SW protocol			proprietary
Safety for use according to IEC 60950			
- Degree pollution			2
- Overvoltage category			II
- Working voltage		V d.c.	24 … 36
- Clearance		mm	≥ 1.5
- Creepage distance	in equipment	mm	≥ 2.1
	on PCB (not coated)	mm	≥ 1.5
- Test voltage	impulse (1.2/50µs) peak value	kV	2.5
	50 Hz 1 min.	kV	1.35
- Housing material flame resistance	UL 94	class	V0
Connection terminals			
- Type cage	screw head Z +/-	POZIDRIV	PZ1
		mm^2	
- Terminal capacity	solid wire min. (max.)		0.15 (2,5)
	stranded wire with sleeve min. (max.)	mm^2	0.15 (4)
Environmental conditions			
- Operating temperature		˚C	0 … +55
- Limit temperature of storage		˚C	-25 ... +70
- Relative humidity		%	≤ 80
- Vibrations	sinusoidal vibration at 50 Hz	mm	± 0.25
- Protection class	acc. to IEC 60950		II
- Degree of protection	housing when mounted in front		IP20

7. Configuration

Default configuration

Baud rate: 2400 bit/s
MBus Primary address: 00
MBus secondary address: see the label located on the interface case (00 00 00 00 when no label is present)

All configurations can be changed by a Master programme.

8. Frontal panel

A green LED indicates the status of communication with the unit to detect measured value, see fig 8.1:

- LED flashing: no communication
- LED on: communication active

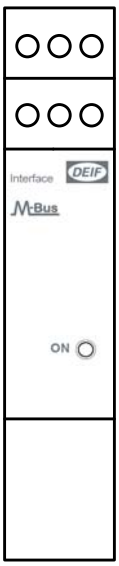


Fig. 8.1

9. MBus interface

Description of MBus interface and different variants of the model.
The AEM 180 single meter and AEM and APM three-phase meter can be provided with an MBus communication interface.

The MBus communication interface (inside of a special DIN single-interface housing) is mounted next to the meter. Make sure that the IR interfaces of the meter and communication interface face each other.

MBus interface

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

General data

Addressing

An unambiguous address must be given to connect an MBus communication interface to the MBus network.

The MBus interface has two types of addressing: one with secondary address and one with primary address.

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

The primary address can be chosen between 0 and 250 while operating on the MBus.

Both the primary and secondary address can only appear once in the MBus system.

Baud rate

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

Reading data

Reading data parameterisation can be chosen on the MBus (pay attention to groups).

Read-out data that can be parameterised

Data name	Type of data	Unit	Resolution	Number of Bytes
Identification of Parameter Set	INT6	-	S0,S1,S2,S3,S4,S5	9
Active Energy Import Total	INT4	Wh	0.001 kWh	6
Reactive Energy Import Total	INT4	varh	0.001 kWh	8
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
Tariff presently operating	INT1		Tariff 1 or Tariff 2	4
Status Byte 4 (Range Overflow Alarms)	INT1	-	-	4
Apparent Power Phase L1	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Phase L2	INT4	VA (+,-)	0.001 kVA	10
Apparent Power Phase L3	INT4	VA (+,-)	0.001 kVA	10

Apparent Power Total	INT4	VA (+,-)	0.001 kVA	8
Voltage Phase L1	INT2	V	0.1 V	7
Voltage Phase L2	INT2	V	0.1 V	7
Voltage Phase L3	INT2	V	0.1 V	7
Voltage Total -> only single phase meter	INT2	V	0.1 V	(5)
Current Phase L1	INT3	mA (+,-)	0.001 A	8
Current Phase L2	INT3	mA (+,-)	0.001 A	8
Current Phase L3	INT3	mA (+,-)	0.001 A	8
Current Total	INT3	mA (+,-)	0.001 A	6
Power factor cos φ Phase L1	INT1	Fo x 0.1	0.01	6
Power factor cos φ Phase L2	INT1	Fo x 0.1	0.01	6
Power factor cos φ Phase L3	INT1	Fo x 0.1	0.01	6
Power factor cos φ Total	INT1	Fo x 0.1	0.01	4
Netfrequency	INT2	Hz x 0.1	0.1 Hz	5
				Total: 503*

*** Warning:** It is possible to read-out in one telegram a maximum of 240 bytes.

Read-out data parameterisation

Structure of parameter set for read-out data possible

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

⇨ S0S1S2S3S4S5 <=

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

S0 = Parameterset 0

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

S1 = Parameterset 1

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

S2 = Parameterset 2

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

S3 = Parameterset 3

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

S4 = 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	:	Active Energy Import Total
xxx1 xxxxb	:	Reactive Energy ImportTotal
xx1x xxxxb	:	Reserve
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	:	Total Current
xxx1 xxxxb	:	Power factor cos phi Phase L1
xx1x xxxxb	:	Power factor cos phi Phase L2
x1xx xxxxb	:	Power factor cos phi Phase L3
1xxx xxxxb	:	Total power factor cos phi

Example:

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

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

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

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

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

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

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

Default parameterset set

These are set by the factory.

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

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

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

➔ S0 Total = 13 byte

S1 = FF => 1111 1111b : Active - Energy Import Phase L1 Tariff 1
-> Not if single Phase
+ Active - Energy Import Phase L2 Tariff 1
-> Not if single Phase
+ Active - Energy Import Phase L3 Tariff 1
-> Not if single Phase
+ Active - Energy Import Total Tariff 1
+ Active - Energy Import Phase L1 Tariff 2
-> Not if single Phase
+ Active - Energy Import Phase L2 Tariff 2
-> Not if single Phase
+ Active - Energy Import Phase L3 Tariff f2
-> Not if single Phase
+ Active - Energy Import Total Tariff 2

➔ S1 Total 3 Phase Energy meter = 68 Byte
➔ S1 Total 1 Phase Energy meter = 14 Byte

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

➔ S2 Total = 16 Byte

S3 = FF => 1111 1111b : Active - Power Phase L1
-> Not if single Phase
+ Active - Power Phase L2
-> Not if single Phase
+ Active - Power Phase L3
-> Not if single Phase
+ Active - Power Total
+ Reactive - Power Phase L1
-> Not if single Phase
+ Reactive - Power Phase L2
-> Not if single Phase
+ Reactive - Power Phase L3
-> Not if single Phase
+ Reactive - Power Total

➔ S3 Total 3 Phase Energy meter = 68 Byte
➔ S3 Total 1 Phase Energy meter = 14 Byte

S4 = 9F => 1001 1111b : Voltage Phase L1
-> Not if single Phase
or Voltage Total
-> Only if 3 Phase
+ Voltage Phase L2

-> Not if single Phase
+ Voltage Phase L2
->Not if single Phase
+ Active Energy Import Total
+ Reactive Energy Import Total
+ Tariff presently operating

➔ S4 Total 3 Phase Energy meter = 39 Byte
➔ S4 Total 1 Phase Energy meter = 23 Byte

S5 = 0F => 0000 1111b : Current Phase L1
-> Not if single Phase
+ Current Phase L2
-> Not if single Phase
+ Current Phase L3
-> Not if single Phase
+ Current Total

➔ S5 Total 3 Phase Energy meter = 30 Byte
➔ S5 Total 1 Phase Energy meter = 6 Byte

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

10. Telegrams for parameterisation and read-out data of MBus interface

Description of all telegrams that can be used via MBus.

Primary address (A-Field)

Field A (address field) contains the Primary Address of the MBus interface and is used to identify the interface.
Field A can have a value between 0 and 255.

Structure of primary address (A-Field)

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

Secondary address (UD)

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

Structure of secondary address (UD)

Identification number	Producer	Version	Medium
xxxxxxxx	mm mm	xx	02

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

Wildcard

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

Example:
MBus interface: Identification number = 12345678, producer = XX, version = 12, medium = 02

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

Reset MBus interface access counter (SND_UD)

This telegram resets the MBus interface access counter, which is set at “0”.

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

Reset MBus interface access counter using primary address

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

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

Reset MBus interface access counter using secondary address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0B	L- Field
3	1	0B	L- Field Repetition
4	1	68	Start- Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address to FD = Secondary Address
7	1	50	CI- Field, Initialise MBus 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

Set baud rate (SND_UD)

This telegram sets the desired baud rate on the MBus interface.

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

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

Set baud rate using primary address

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

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

Set baud rate using secondary address

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

Set parameter set to default read-out data (SND_UD)

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

The MBus 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.

Set parameter set to all read-out data possible using primary address

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

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

Set parameter set to all read-out data possible using secondary address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0C	L- Field
3	1	0C	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address to FD = Secondary Address
7	1	51	CI- Field, New Data for MBus 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

Set parameter set to any read-out data desired (SND_UD)

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

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

Set parameter set for any read-out data desired using primary address

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

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

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

Set parameter set for any read-out data desired using secondary address

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

Set primary address (SND_UD)

This Telegram sets a new Primary Address in the MBus interface.

The MBus interface confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the MBus interface will not send an acknowledgement.

Set primary address using primary address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	06	L- Field
3	1	06	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	xx	A- Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI- Field, New Data for MBus 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

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

Set primary address using secondary address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0E	L- Field
3	1	0E	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Address
7	1	51	CI- Field, New Data for MBus 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 Address
18	1	xx	New Primary Address, Range :00 – FA (0 – 250), Invalid: FB – FF (no action in meter)
19	1	xx	CS Checksum, summed up from C Field to Primary Address incl.
20	1	16	Stop Character

Set secondary address (SND_UD)

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

Set secondary address using primary address

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

To set the new Secondary Address on all MBus interfaces on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The MBus interfaces will however not send an acknowledgement.

Set secondary address using secondary address

Byte Nr.	Size (Byte)	Value (Hex)	Beschreibung
1	1	68	Start Character Long Telegram
2	1	11	L- Field
3	1	11	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Address
7	1	51	CI- Field, New Data for MBus 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 and 8, Range: 00 - 99 Beispiel: Sec. Address = 12345678 -> Byte Value = 78
19	1	xx	New Secondary Address digits 5 and 6, Range: 00 - 99

			Example: Sec. Address = 12345678 -> Byte Value = 56
20	1	xx	New Secondary Address digits 3 and 4, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 34
21	1	xx	New Secondary Address digits 1 and 2, Range: 00 - 99 Example: Sec. Address = 12345678 -> Byte Value = 12
22	1	xx	CS Checksum, summed up from C Field to Sec. Address incl.
23	1	16	Stop Character

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

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

Caution: ***This function is blocked in Electricity Meters with official MID certification.***

Reset Active and Reactive Energy using Primary Address

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

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

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

Reset Active and Reactive Energy using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0F	L- Field
3	1	0F	L- Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C- Field, SND_UD
6	1	FD	A- Field, Primary Address on FD = Secondary Address
7	1	51	CI- Field, New Data for MBus 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 Manufacturer-spec.VIFE follows
18	1	13	VIFE- Field, Manufacturer-spec.VIFE = Energy Reset
19	1	xx	Coding off Active and Reactive Energy Reset: 00h: No Reset Active and Reactive Energy (Binary: 0000 0000) 01h: Reset Active Energy (Binary: 0000 0001) 10h: Reset Reactive Energy (Binary: 0001 0000) 11h: Reset Reset Active and Reactive Energy (Binary: 0001 0001)
20	1	xx	CS Checksum, summed up from C-Field to Coding
21	1	16	Stop Character

Select MBus interface using secondary address (SND_UD)

This Telegram selects MBus interface.

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

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

The MBus interface switch back to Normal Mode by receiving an invalid telegram or by receiving the telegram “ Initialisation of MBus interface”

Select MBus Interface 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 MBus interface
8 - 15	8	„UD“	Secondary Address UD (Please see: „Secondary

			Address UD“)
16	1	xx	CS Checksum, summed up from C-Field to Secondary Address
17	1	16	Stop Character

Transmit read-out data (REQ_UD2)

The MBus interface receives this Short Telegram and transmits the parametrized Read-out Data.

The MBus 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 MBus interface.

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

Transmit read-out data

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

Telegram of Read-out Data by MBus interface (RSP_UD)

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 MBus interface
6	1	xx	A- Field, Primary Address (00 – FA = 0 – 250)
7	1	72	CI- Field, Read-out Data of MBus interface
8 - 11	4	xxxxxxxx	**8-digit Serial Number of MBus interface (Sec. Address)**
12 + 13	2	xx xx	**Manufacturer's Mark**
14	1	xx	**Version Number of MBus interface Firmware (00 – FF)**
15	1	02	**Medium Electricity**
16	1	xx	**Meter called upon, at each call on MBus interface + 1 (00 – FF -> 00)**
17	1	xx	**Shows the MBus interface Status. Please see „Structure of Error Flags Data Transmission from Meter to MBus interface" and „Structure of Error Flags in MBus interface"**
18 + 19	2	00 00	**Signature. For MBus interface always on „0000"**
20 - YY	0 - EA	xx….xx	**Read-out Data parameterised. 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 MBus interface.

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

Structure of Telegram for Read-out Data possible

The MBus 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“.

Parameter set 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“

Active energy import total

Byte Nr.	**Size (Byte)**	**Value (Hex)**	**Description**
YY	1	04	DIF, 32 Bit Integer, 4 Byte
YY + 1	1	03	VIF, Active Energy Total
YY + 2 - YY + 5	4	xxxxxxxx	Active Energy Import Total

Reactive energy import total

Byte Nr.	**Size (Byte)**	**Value (Hex)**	**Description**
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	80	DIFE, Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Register
YY + 3	1	03	VIF, Reactive Energy Total
YY + 4 - YY + 7	4	xxxxxxxx	Reactive Energy Import Total

Active energy import phase L1, L2 and L3 tariff 1

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

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

Active energy import phase L1, L2 and L3 tariff 2

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

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

Active energy export phase L1, L2 and L3 tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	10	DIFE, Tariff 1
YY + 2	1	83	VIF, Active Energy, Followed by a further VIFE
YY + 3	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 4	1	0x	Manufacturer-spec.VIFE:

			01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 5 - YY + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

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 = Negative

Active energy export phase L1, L2 and L3 tariff 2

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

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 = Negative

Reactive energy import phase L1, L2 and L3 tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2 or L3

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

Reactive energy import phase L1, L2 and L3 tariff 2

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

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

Reactive energy export phase L1, L2 and L3 tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	84	DIF, 32 Bit Integer, 4 Byte; Followed by a DIFE
YY + 1	1	90	DIFE, Tariff 1 ; Followed by a further DIFE
YY + 2	1	40	DIFE, Reactive Value
YY + 3	1	83	VIF, Reactive Energy; Followed by a further VIFE
YY + 4	1	FF	VIFE, Followed by an Manufacturer-spec.VIFE
YY + 5	1	0x	Manufacturer-spec.VIFE: 01 : Phase L1 02 : Phase L2 03 : Phase L3
YY + 6 - YY + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2 or L3 -> IntegerValue = Negative

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 = Negative

Reactive energy export phase L1, L2 and L3 tariff 2

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

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 = Negative

Active power phase L1, L2 and L3

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

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

Reactive power phase L1, L2 and L3

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

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

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

Voltage Phase L1, L2 and L3

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

			03 : Phase L3
YY + 5 - YY + 6	2	xxxx	Voltage Phase L1, L2 or L3

Voltage Total single Phase Meter

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

Current Phase L1, L2 and L3

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

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

Power factor cos phi Phase L1, L2 and L3

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

Power factor cos phi Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
YY	1	01	DIF, 8 Bit Integer, 1 Byte

YY + 1	1	FF	VIF, Followed by an Manufacturer-spec.VIFE
YY + 2	1	61	Manufacturer-spec.VIFE = Power factor cos phi
YY + 3	1	xx	Power factor cos phi Total

Netfrequency

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

Status 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)

Tariff presently operating

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

Telegram of error flags (REQ_UD1)

The Error Flags are transmitted by the MBus interface within 35 – 75 ms from receipt of the Short Telegram „Transmit Error Flags“.

The error flag and the MBus interface status on the read-out data header are identical.

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

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

Telegram of Error Flags (RSP_UD)

The Error Flags are transmitted by the MBus interface within 35 – 75 ms from receipt of the Short Telegram „Transmit Error Flags of MBus interface“.

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

Structure of Error Flags Data Transmission from Meter to MBus interface

The latest Data are transmitted every 4 seconds from the Meter to the MBus interface.

The Data Transmission from the Meter to the MBus interface only works if the Meter is connected at least on one phase to the voltage system and the MBus interface is connectet to the MBus Data Line.

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

- Active or Reactive Energy Import Phase L1, L2, L3 and Total, Tariff 1 and Tariff 2.
- Active or Reactive Energy Export Phase L1, L2, L3 and Total, Tariff 1 and Tariff 2.
- Parameter Set of Read-out Data possible

- Primary and Secondary Addresses for MBus Communication
- Baud Rate for MBus 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 MBus interface.
0001 xxxx	1x	The last Data Transmission from the Meter to the MBus 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 MBus interface.
0011 xxxx	3x	After putting the MBus interface into operation no successful Data Transmission from the Meter to the MBus interface has beeneffected. => The first Data Transmission is not yet completed (below 2 -6 sec.). => The Meter is not connected to system Voltage or is faulty. The MBus Data are not up-to-date. The Data are on „0“ or they correspond to the last Voltage failure.

Structure of Error Flags MBus interface

The MBus interface automatically carries out every second a number of internal tests, and, in the event of an Error, sets the corresponding Flag.

Error Flag (Binary)	Error Flag (Hex Value)	Description
xxxx 0000	x0	No Error set. => No Error in MBus 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.

Initialisation of MBus interface (SND_UD2)

This Short Telegram re-initialises the MBus interface.

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

Initialisation of MBus interface

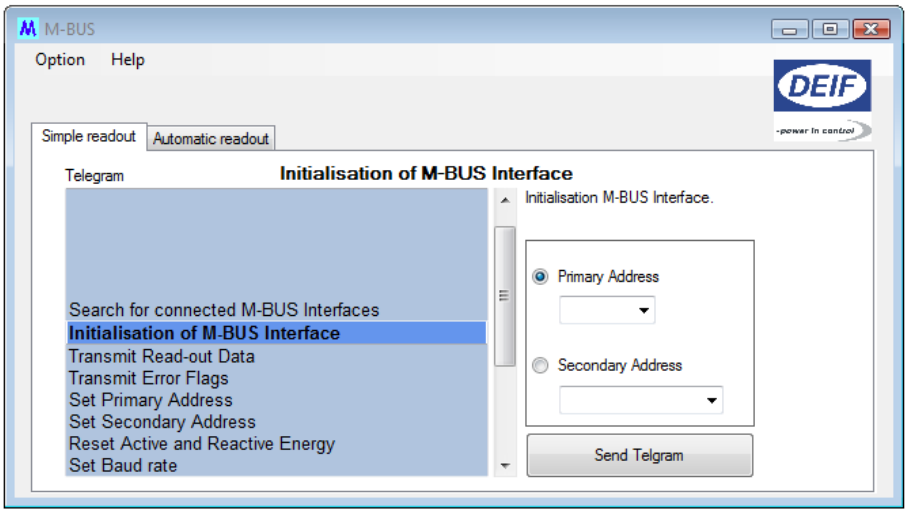
Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	10	Start Character Short Telegram
2	1	40	C- Field. REQ-UD2
3	1	xx	A Field, Primary Address 00 – FA : Valid Primary Address FB, FC : Reserved for future use FD : Transmission using Secondary Address FE : All MBus interface in the System send the ACK FF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

11. MBus Master Manual

General outline of programme

The MBUS Master software is a simple application, designed to configure MBus communication interface and to read data from the interface itself.

Functions



Two sections can be chosen on the main window:

- **Simple readout**

  The “Simple readout” section is for configuring and reading an MBus communication interface.

  Under the entry Telegram at the left an MBus telegram (control) can be chosen. On the right, either “Primary Address” or “Secondary Address” can be chosen.

  Selecting “Send Telegram”, will send the selected control to the MBus interface.

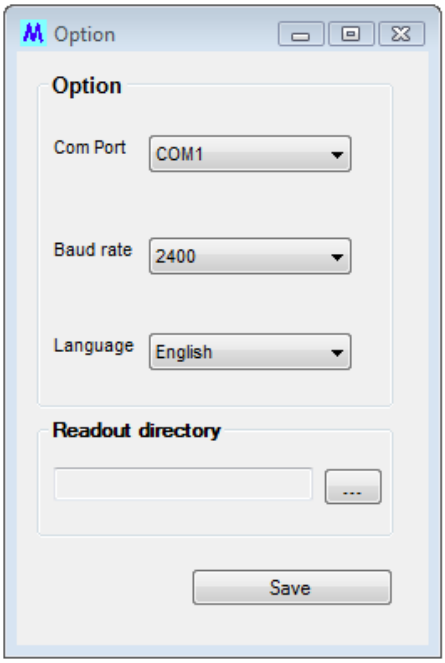
- **Automatic readout**

  The "Automatic readout” section is for continuous reading of the defined MBus communication interfaces. The MBus interfaces for continuous reading can be defined and the relative reading cycle set.

  The read data is saved in an Excel file with .csv extension.

Options

The parameters for the MBus Master software can be defined in the entry "Options".



Com port

Set the serial com port of the PC connected to the MBus converter.

Baud rate

Set the Baud rate (ex. 2400) for the “Simple readout” section.

Language

Choose the language (German or English) to be used for the software and read data.

Readout directory

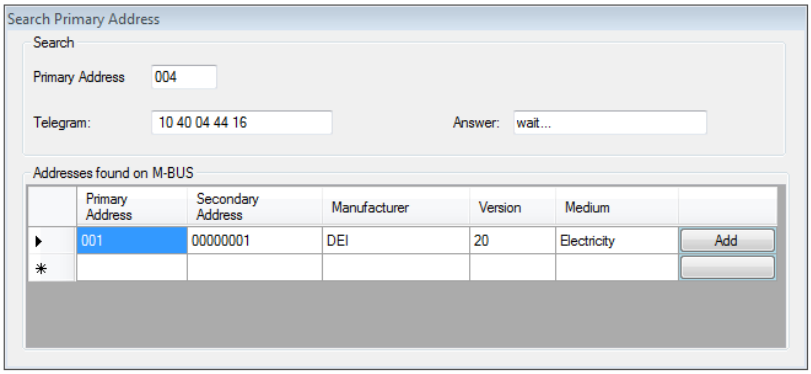
Selection of folder for files with reading data.
All .csv files are saved in this folder.

Simple readout

The “Simple readout” function is for configuring and reading an MBus communication interface.
Before sending a control, the address mode must be chosen (primary or secondary).
The desired MBus interface address must be chosen as well.

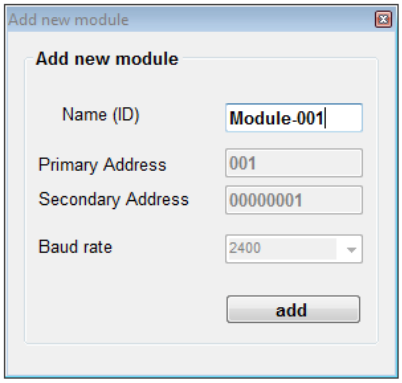
Search for connected MBus interfaces

The “Search” function allows to search for all MBus interfaces connected.



A new MBus interface can be added by pressing "Add”.
In the section “Add new interface”, enter the name of the interface in the entry Name (ID).

Click "Add" to add the MBus interface to automatic readout.

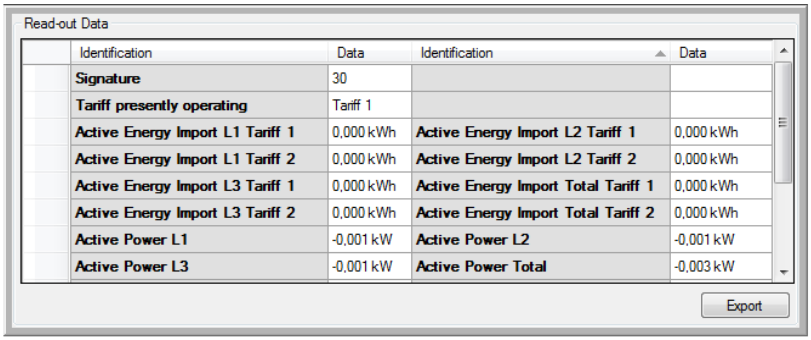


Initialisation of MBus Interface

The “Initialisation of MBus interface” function starts the MBus interface.

Transmit read-out data

The read data is shown as follows:

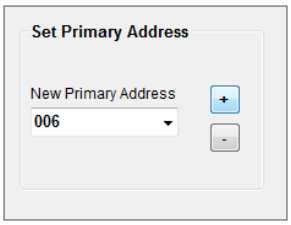


Transmit error flags

This function reads the error flags of the selected MBus interface. The error flags are displayed on a table.

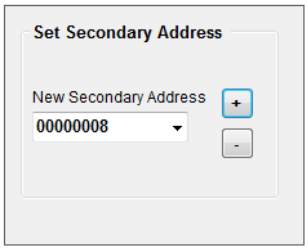
Set primary address

The “New Primary Address” function allows setting a new primary address for the MBus interface.



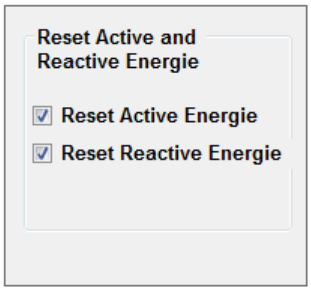
Set secondary address

The “New Secondary Address” function allows setting a new secondary address for the MBus interface.



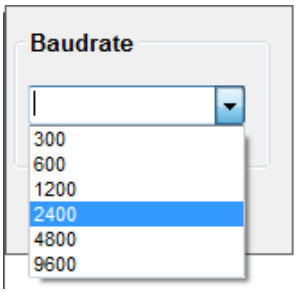
Reset active and reactive energy

The “Reset Active and Reactive Energy” function allows resetting the active and/or reactive energy counting registers of the selected MBus interface.



Set Baud rate

The “Baud rate” function allows selecting the transmission rate of the pre-selected MBus interface.



Reset MBus interface “called upon”

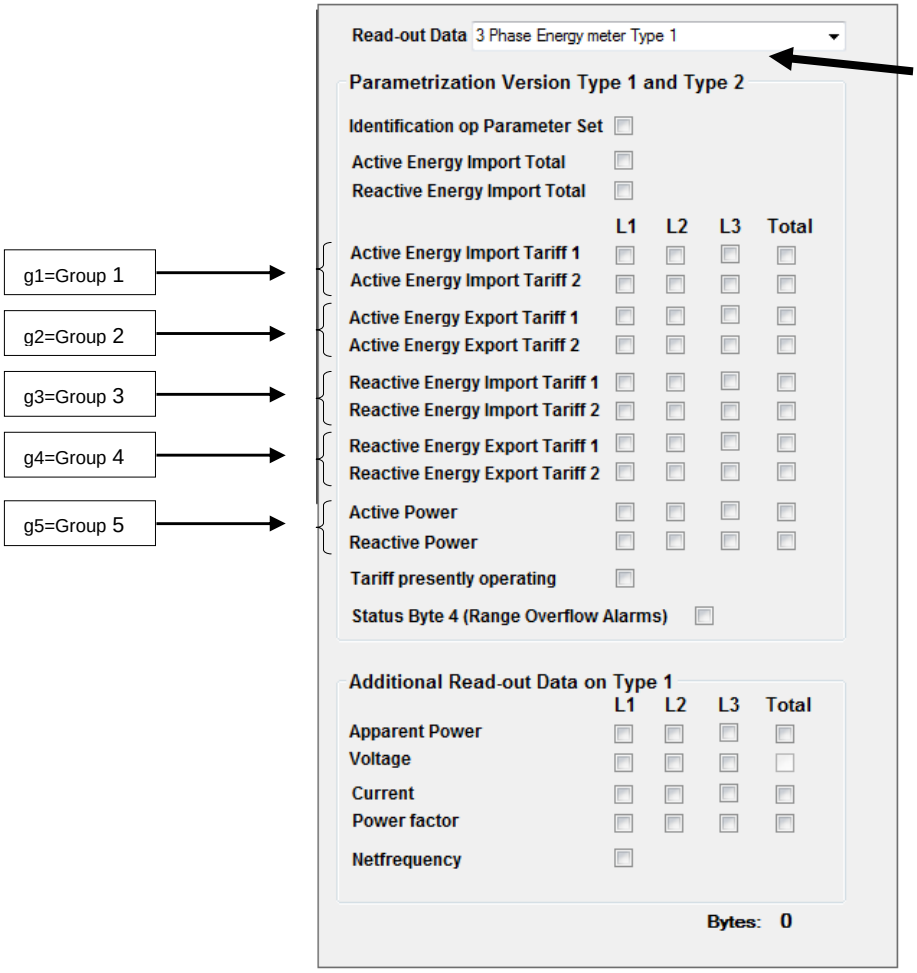
The “Reset MBus Interface “called upon” function allows resetting the access meter on the MBus interface.

Set parameter set for all read-out data possible

The “Set Parameter Set for all Read-out Data possible” allows setting the default Imported active energy on the MBus interface.

Set parameter set for read-out data desired

The “Set Parameter Set for Read-out Data desired” allows setting the preferred parameterisation into the MBus interface. The maximum length of the telegram cannot exceed 240 bytes.



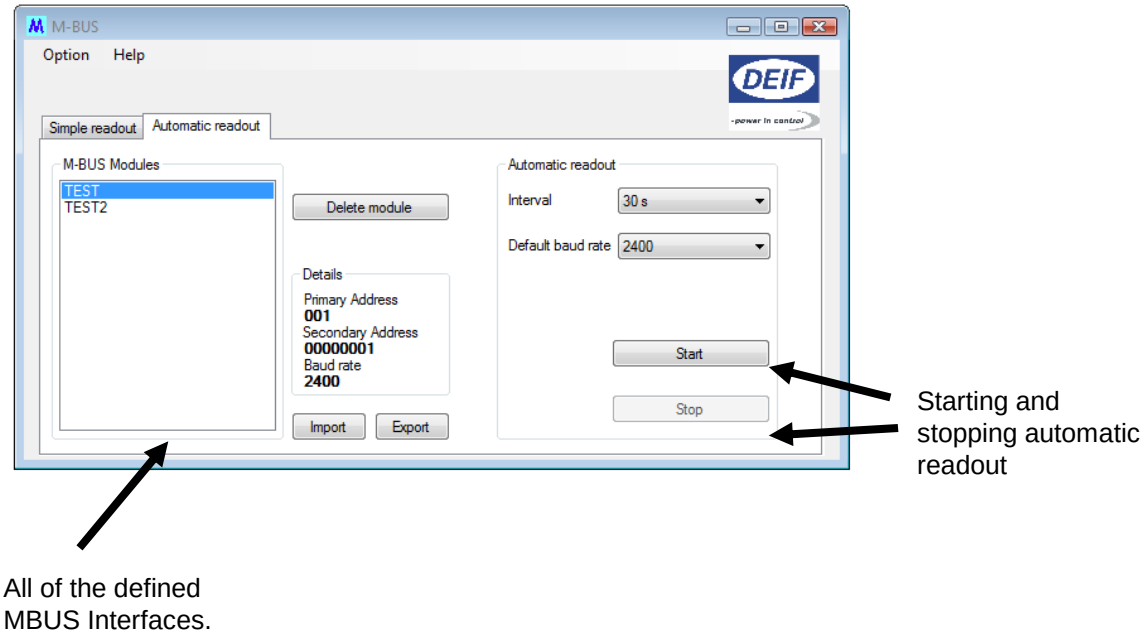
First of all the type of meter must be selected. Only the parameters admitted for the type chosen will be accepted.

In the parameterisation, you can enter only a subset of the available groups according to the following rules:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
g1	X					X	X	X	X							X	X	X	X	X	X			
g2		X				X				X	X	X				X	X	X				X	X	
g3			X				X			X			X	X		X			X	X		X	X	X
g4				X				X			X		X		X		X		X		X	X		X
g5					X				X			X		X	X			X		X	X		X	X

Automatic readout

The “Automatic readout” section is used for continuous reading of the defined MBus interfaces.



Delete interface

To eliminate an MBus interface, select it from the list and click "Delete interface".

Import

To import MBus interfaces that have already been registered by an XML file, click “Import” and select the XML file containing the desired MBus interfaces. The imported interfaces will be added to the automatic reading.

Export

To export MBus interfaces already registered in automatic reading, click "Export", select the folder and name of the file.

Interval

The reading cycle period can be chosen on this part of the software program. Once the selected time has elapsed, each registered MBus interface will be read once again.

Default baud rate

The entry “Default baud rate” refers to the transmission rate pre-set for automatic readout. If no particular transmission rate has been selected for an MBus interface, the interface will be read at this rate.

Start

Pressing "Start" will start automatic reading.

Stop

Pressing "Stop" will stop automatic readout.

DEIF A/S reserves the right to change any of the above.