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I513 GB 0818

DME SERIES

GB

Energy meters

M-BUS
COMMUNICATION PROTOCOL

Index

1.1 M-Bus device

Asynchronous serial transmission (Start - Stop): half-duplex.
Data baud rate can be selected among 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400 bps.
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.

1.2 General data

Addressing
An unambiguous address must be given to connect an M-Bus device to the M-Bus network.
The M-Bus communication port has two types of addressing: one with secondary address and one with primary address.
The secondary address has 8 digits (00000000-99999999) and can be chosen freely while operating on the M-Bus device.
The primary address can be chosen between 0 and 250 while operating on the M-Bus device. Both the primary and secondary address can only appear once in the M-Bus system.

Baud rate
The baud rate can be set during operation on the M-Bus device and can be selected between 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400 bps.

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

1.3 Parameters table

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
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 (1-ph meter only)	INT2	V	0.1V	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
PF/cosφ Phase L1	INT1	0.1	0.01	6
PF/cosφ Phase L2	INT1	0.1	0.01	6
PF/cosφ Phase L3	INT1	0.1	0.01	6
PF/cosφ Total	INT1	0.1	0.01	4
Frequency	INT2	0.1	0.1 Hz	5
Status Byte 4 (Range Overflow Alarms)	INT1	-	-	4
Tariff presently operating	INT1	-	-	4
				Total: 499*

*** Warning:** It's possible to read out a maximum of 240 Bytes per telegram.

1.4 Read-out data parameterization

1.4.1 Structure of Parameter Set for Read-out Data possible

The Parameter Set identification is a INT6 type (6 Bytes):
S0 = parameter set 0 Read-out Data: value: 00 – FF
S1 = parameter set 1 Read-out Data: value: 00 – FF
S2 = parameter set 2 Read-out Data: value: 00 – FF
S3 = parameter set 3 Read-out Data: value: 00 – FF
S4 = parameter set 4 Read-out Data: value: 00 – FF
S5 = parameter set 5 Read-out Data: value: 00 – FF

S0 = Parameter set 0
xxxx xxx1b: parameter set identification
xxxx xx1xb: byte 4 State (Overflow Range Alarms)
xxxx x1xxb: parameter set 1 → Instead of imported active energy → Imported reactive energy
xxxx 1xxxb: parameter set 2 → Instead of exported active energy → Imported reactive energy
xxx1 xxxxb: parameter set 2 → Instead of exported active energy → Exported reactive energy
xx1x xxxxb: parameter set 3 → Instead of active and reactive power → Imported reactive energy
x1xx xxxxb: parameter set 3 → Instead of active and reactive power → Exported reactive energy
1xxx xxxxb: parameter set 3 → Instead of reactive power → Apparent Power

S1 = Parameter set 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 = Parameter set 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 = Parameter set 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 = Parameter set4
xxxx xxx1b: Voltage Phase L1 → Voltage Total in case of 1-ph meter
xxxx xx1xb: Voltage Phase L2
xxxx x1xxb: Voltage Phase L3
xxxx 1xxxb: Active Energy Import Total
xxx1 xxxxb: Reactive Energy ImportTotal
xx1x xxxxb: Reserved
x1xx xxxxb: Network frequency
1xxx xxxxb: Tariff presently operating

S5 = Parameter set5
xxxx xxx1b: Current Phase L1
xxxx xx1xb: Current Phase L2
xxxx x1xxb: Current Phase L3
xxxx 1xxxb: Total Current
xxx1 xxxxb: PF/cosφ Phase L1
xx1x xxxxb: PF/cosφ Phase L2
x1xx xxxxb: PF/cosφ Phase L3
1xxx xxxxb: Total PF/cosφ

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)
instead of Reactive Power → all Apparent Power in parameter set 3

S1 = 3A → 0011 1010b:
Imported active energy phase L2 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 PF/cosφ

1.4.2 Default Parameter Set

The Parameter Set is also loaded 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 1011:
Parameter set Identification
Status Byte 4 (Range Overflow Alarms)
Instead of exported active energy → Imported reactive energy for parameter set 2
S0 Total = 13 byte

S1 = FF → 1111 1111b:
Imported Active Energy Phase L1 Tariff 1 → Only for 3-ph meters
Imported Active Energy Phase L2 Tariff 1 → Only for 3-ph meters
Imported Active Energy Phase L3 Tariff 1 → Only for 3-ph meters
Imported Active Energy Total Tariff 1
Imported Active Energy Phase L1 Tariff 2 → Only for 3-ph meters
Imported Active Energy Phase L2 Tariff 2 → Only for 3-ph meters
Imported Active Energy Phase L3 Tariff 2 → Only for 3-ph meters
Imported Active Energy Total Tariff 2
S1 Total for 3-ph meters = 68 Byte, S1 Total for 1-ph meters = 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 → Only for 3-ph meters
Active Power Phase L2 → Only for 3-ph meters
Active Power Phase L3 → Only for 3-ph meters
Total Active Power
Reactive Power Phase L1 → Only for 3-ph meters
Reactive Power Phase L2 → Only for 3-ph meters
Reactive Power Phase L3 → Only for 3-ph meters
Total Reactive Power
S3 Total for 3-ph meters = 68 Byte, S3 Total for 1-ph meters = 14 Byte

S4 = 9F → 1001 1111b:
Voltage Phase L1 for 3-ph meters, Voltage Total is 1-ph meters
Voltage Phase L2 → Only for 3-ph meters
Voltage Phase L3 → Only for 3-ph meters
Active Energy Import Total
Reactive Energy Import Total
Tariff presently operating
S4 Total for 3-ph meters = 39 Byte, S4 Total for 1-ph meters = 23 Byte

S5 = 0F → 0000 1111b:
Current Phase L1 → Only for 3-ph meters
Current Phase L2 → Only for 3-ph meters
Current Phase L3 → Only for 3-ph meters
Current Total
S5 Total for 3-ph meters = 30 Byte, S5 Total for 1-ph meters = 6 Byte

Total data length: 3-ph meters → 224 Byte, 1-ph meters → 86 Byte

2.1 Primary Address (A-Field)

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

2.1.1 Structure of Primary Address (A-Field)

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

2.2 Secondary Address (UD)

If "FD" is set in A-field, the identification of the M-Bus device occurs on Secondary Address (UD).

2.2.1 Structure of Secondary Address (UD)

Identification number	Producer	Version	Medium
xxxxxxxx	mm mm	xx	02

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

2.2.2 Wildcard

The M-Bus communication port 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: us device with: Identification number = 12345678, producer = XX, version = 12, medium = 02

Ind. sec. (UD)	F2345678	FFFF	12	02	the M-Bus device reacts
Ind. sec. (UD)	1234FF78	FFFF	12	02	the M-Bus device reacts
Ind. sec. (UD)	12345678	FFFF	12	02	the M-Bus device reacts
Ind. sec. (UD)	FFF4FFF	FFFF	FF	FF	the M-Bus device reacts
Ind. sec. (UD)	FFFFFFF	FFFF	FF	FF	All M-Bus devices react on the network
Ind. sec. (UD)	FFF5FFF	FFFF	FF	FF	The M-Bus device does not react, invalid id. number
Ind. sec. (UD)	FFFFFFF	FF14	FF	FF	The M-Bus device does not react, invalid producer
Ind. sec. (UD)	FFFFFFF	FFFF	1F	FF	The M-Bus device does not react, invalid version

2.3 Reset M-Bus device access counter (SND_UD)

This telegram resets the M-Bus communication port access counter, which is set at “0”.
The M-Bus device confirms correct reception by means of a reply composed of a single character (ACK = E5). If the telegram is not received properly, the M-Bus device sends no confirmation.

2.3.1 Reset M-Bus device access counter using Primary Address

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

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

2.3.2 Reset M-Bus device 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 = FD (Use secondary address)
7	1	50	CI - Field, Initialise M-Bus device (Set to “0“)
8 - 15	8	“UD“	Secondary address UD
16	1	xx	CS Checksum, summed up C-Field to UD included
17	1	16	Stop Character

2.4 Set baud rate (SND_UD)

This telegram sets the desired baud rate on the M-Bus communication port.
The M-Bus device confirms correct reception by means of a reply composed of a single character (ACK = E5). If the telegram is not received properly, the M-Bus device sends no confirmation.
The confirmation reply (ACK) is sent by the M-Bus device with the former baud rate. As soon as “ACK” is sent, the M-Bus device changes to the new baud rate.

2.4.1 Set baud rate using Primary Address

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

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

2.4.2 Set baud rate using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0B	L - Field
3	1	0B	L - Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C - Field, SND_UD
6	1	FD	A - Field, Primary Address = FD (Use secondary address)
7	1	xx	CI - Field, Set new Baudrate B8 : Set Baudrate to 300 bps B9 : Set Baudrate to 600 bps BA : Set Baudrate to 1200 bps BB : Set Baudrate to 2400 bps BC : Set Baudrate to 4800 bps BD : Set Baudrate to 9600 bps
8 - 15	8	“UD“	Secondary address UD
16	1	xx	CS Checksum, summed up C-Field to UD included
17	1	16	Stop Character

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

This Telegram sets the Parameter Set for the Read-out Data of the Default Parameter Set.
The M-Bus device confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the Telegram has not been correctly received, the M-Bus device will not send an Acknowledgement.

2.5.1 Set Parameter Set to Default Read-out Data using Primary Address

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

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

2.5.2 Set Parameter Set to Default Read-out Data 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 = FD (Use secondary address)
7	1	51	CI - Field, New data from M-Bus device
8 - 15	8	“UD“	Secondary address UD
16		7F	DIF – Field, Set Default Parameter set
17	1	xx	CS Checksum, summed up C-Field to DIF-Field included
18	1	16	Stop Character

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

This Telegram sets the Parameter Set for Read-out Data of any value desired.
For the Structure of the Parameter Set for Read-out Data please see: “Structure of Parameter Set for Read-out Data possible“.
The M-Bus device confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus device will not send an acknowledgement.

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start 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	xx	A - Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI - Field, New data from M-Bus device
8	1	06	DIF – Field, 48 bit integer (6 bytes)
9	1	FD	VIF – Field, a standard VIFE – Field follows
10	1	0B	VIFE – Fiels, Parameter set identification
11	1	“S0”	Parameter Set S0 (00 – FF)
12	1	“S1”	Parameter Set S1 (00 – FF)
13	1	“S2”	Parameter Set S2 (00 – FF)
14	1	“S3”	Parameter Set S3 (00 – FF)
15	1	“S4”	Parameter Set S4 (00 – FF)
16	1	“S5”	Parameter Set S5 (00 – FF)
17	1	xx	CS Checksum, summed up C-Field to “S5” included
18	1	16	Stop Character

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

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

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	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 = FD (Use secondary address)
7	1	50	CI - Field, Initialise M-Bus device (Set to “0“)
8 - 15	8	“UD“	Secondary address UD
16	1	06	DIF – Field, 48 bit integer (6 bytes)
17	1	FD	VIF – Field, a standard VIFE – Field follows
18	1	0B	VIFE – Fiels, Parameter set identification
19	1	“S0”	Parameter Set S0 (00 – FF)
20	1	“S1”	Parameter Set S1 (00 – FF)
21	1	“S2”	Parameter Set S2 (00 – FF)
22	1	“S3”	Parameter Set S3 (00 – FF)
23	1	“S4”	Parameter Set S4 (00 – FF)
24	1	“S5”	Parameter Set S5 (00 – FF)
25	1	xx	CS Checksum, summed up C-Field to “S5” included
26	1	16	Stop Character

2.7 Set Primary Address (SND_UD)

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

2.7.1 Set Primary Address using Primary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	06	L - Field
3	1	06	L - Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C - Field, SND_UD
6	1	xx	A - Field, Primary Address (00 – FF = 0 – 255)
7	1	51	CI - Field, New Data for M-Bus device
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 the meter)
11	1	xx	CS Checksum, summed up C-Field to Primary Address included
12	1	16	Stop Character

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

2.7.2 Set Primary Address using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0E	L - Field
3	1	0E	L - Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C - Field, SND_UD
6	1	FD	A - Field, Primary Address = FD (Use secondary address)
7	1	51	CI - Field, New Data for M-Bus device
8 - 15	8	“UD“	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 the meter)
19	1	xx	CS Checksum, summed up C-Field to Primary Address included
20	1	16	Stop Character

2.8 Set Secondary Address (SND_UD)

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

2.8.1 Set Secondary Address using Primary Address

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

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

2.8.2 Set Secondary Address using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	11	L - Field
3	1	11	L - Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C - Field, SND_UD
6	1	FD	A - Field, Primary Address = FD (Use secondary address)
7	1	51	CI - Field, New address for M-Bus device
8 - 15	8	"UD"	Secondary address UD
16	1	0C	DIF – Field, 8 digits BCD, 4 bytes
17	1	79	VIF – Field, set secondary address
18	1	xx	New Secondary Address digit 7 and 8, range: 00 - 99 Example: sec. Address = 12345678 → Byte Value = 78
10	1	xx	New Secondary Address digit 5 and 6, range: 00 - 99 Example: sec. Address = 12345678 → Byte Value = 56
20	1	xx	New Secondary Address digit 3 and 4, range: 00 - 99 Example: sec. Address = 12345678 → Byte Value = 34
21	1	xx	New Secondary Address digit 1 and 2, range: 00 - 99 Example: sec. Address = 12345678 → Byte Value = 12
22	1	xx	CS Checksum, summed up C-Field to UD included
23	1	16	Stop Character

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

This Telegram enables to reset the Active Energy Tariff 1 + 2 in the M-Bus device and/or the Reactive Energy Tariff 1 + 2 (Set to "0").
The M-Bus device confirms the correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram has not been correctly received the M-Bus device will not send an acknowledgement.

Caution: This function is blocked in Energy Meters with MID certification.

2.9.1 Reset Active and Reactive Energy using Primary Address

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

To reset to all M-Bus devices on the network simultaneously, use 255 as Primary Address in A field (Hex = FF).
The M-Bus devices will however not send an acknowledgement.

2.9.2 Reset Active and Reactive Energy using Secondary Address

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	0F	L - Field
3	1	0F	L - Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	73	C - Field, SND_UD
6	1	FD	A - Field, Primary Address = FD (Use secondary address)
7	1	51	CI - Field, New Data for M-Bus device
8 - 15	8	"UD"	Secondary address UD
16	1	01	DIF- Field, 8 Bit Integer - Data (1 Byte)
17	1	FF	VIF- Field, Manufacturer specified VIFE
18	1	13	VIFE- Field, Manufacturer specified VIFE = Energy Reset
19	1	xx	Coding of energy reset command: 00h: No Reset 01h: Reset Active Energy 10h: Reset Reactive Energy 11h: Reset Active and Reactive Energy
20	1	xx	CS Checksum, summed up C-Field to Coding included
21	1	16	Stop Character

2.10 Select M-Bus Device using Secondary Address (SND_UD)

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

In Selection Mode the M-Bus device is ready to transmit the entire Read-out Data after receiving the Telegram "Transmit Read-out Data" (Short Telegram REQ_UD2 with A- Field = FD). In Selection Mode the M-Bus device accepts also all telegrams with Primary Address on FD (A-Field = FD)
The M-Bus device switch back to Normal Mode by receiving an invalid telegram or by receiving the telegram "Initialisation of M-Bus device"

2.10.1 Select M-Bus Device 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 = FD (Use secondary address)
7	1	52	CI - Field, Selection of M-Bus device
8 - 15	8	"UD"	Secondary address UD
16	1	xx	CS Checksum, summed up C-Field to UD included
17	1	16	Stop Character

2.11 Transmit Read-out Data (REQ_UD2)

The M-Bus device receives this Short Telegram and transmits the parameterized Read-out Data. The M-Bus device 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 device.
The Read-out Data are sent within 35 – 75 ms from receipt of the Short Telegram by the M-Bus device.

2.11.1 Transmit Read-out Data

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

2.11.2 Telegram of Read-out Data by M-Bus device (RSP_UD)

Byte Nr.	Size (Byte)	Value (Hex)	Description
1	1	68	Start Character Long Telegram
2	1	xx	L – Field, number of Read-out data
3	1	xx	L - Field Repetition
4	1	68	Start Character Long Telegram Repetition
5	1	08	C - Field, Transmit data
6	1	xx	A - Field, Primary Address (00 – FA)
7	1	72	CI - Field, Read-out data of M-Bus device
8 – 11	4	“UD“	Secondary address UD
12, 13	2	xx xx	Manufacturer mark
14	1	xx	Version number of M-Bus device firmware (00 – FF)
15	1	02	Medium = Electricity
16	1	xx	Meter called upon, at each call on M_Bus device (+1, 00 – FF)
17	1	xx	Shows M-Bus device status See “Structure of Error Flags in M- Bus device“
18, 19	2	00 00	Signature. M-Bus device = 00 00 always.
20 – n	0 - EA	xx - xx	Read-out Data parametrised. See ”Structure of Telegram of Read-out Data possible“
n + 1	1	xx	CS Checksum, summed up C-Field to Read-out Data parametrised included
n + 2	1	16	Stop Character

- Bytes 8 – 19 are the firm Data Record Header for every M-Bus device.
- Bytes 20 – n are the Read-out Data defined in the Parameter Set.

2.11.3 Structure of Telegram for Read-out Data possible

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

2.11.3.1 Parameter set Identification

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	06	DIF, 48 bit integer, 6 bytes
n + 1	1	FD	VIF, followed by a standard VIFE
n + 2	1	0B	VIFE, Parameter set identification
n + 3	1	“S0”	Parameter set S0 (00 – FF)
n + 4	1	“S1”	Parameter set S1 (00 – FF)
n + 5	1	“S2”	Parameter set S2 (00 – FF)
n + 6	1	“S3”	Parameter set S3 (00 – FF)
n + 7	1	“S4”	Parameter set S4 (00 – 98)
n + 8	1	00	Parameter set S5 = 00 always

2.11.3.2 Active Energy Import Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	04	DIF, 32 bit integer, 4 bytes
n + 1	1	03	VIF, Active Energy Total
n + 2 … n + 5	4	xxxxxxxx	Active Energy Import Total

2.11.3.3 Reactive Energy Import Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	80	DIFE, followed by a further DIFE
n + 2	1	40	DIFE, Reactive register
n + 3	1	03	VIF, Reactive Energy Total
n + 4 … n + 7	4	xxxxxxxx	Reactive Energy Import Total

2.11.3.4 Active Energy Import Phase L1, L2, L3, tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	10	DIFE, Tariff 1
n + 2	1	83	VIF, Active Energy, followed by VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5 … n + 8	4	xxxxxxxx	Active Energy Import Phase L1, L2, L3

2.11.3.5 Active Energy Import Total tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	10	DIFE, Tariff 1
n + 2	1	03	VIF, Active Energy Total
n + 3 … n + 6	4	xxxxxxxx	Active Energy Import Total Tariff 1

2.11.3.6 Active Energy Import Phase L1, L2, L3, tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	20	DIFE, Tariff 2
n + 2	1	83	VIF, Active Energy, followed by VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5 … n + 8	4	xxxxxxxx	Active Energy Import Phase L1, L2, L3

2.11.3.7 Active Energy Import Total tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	20	DIFE, Tariff 2
n + 2	1	03	VIF, Active Energy Total
n + 3 … n + 6	4	xxxxxxxx	Active Energy Import Total Tariff 2

2.11.3.8 Active Energy Export Phase L1, L2, L3, tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	10	DIFE, Tariff 1
n + 2	1	83	VIF, Active Energy, followed by VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5 … n + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2, L3, negative value

2.11.3.9 Active Energy Export Total tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	10	DIFE, Tariff 1
n + 2	1	03	VIF, Active Energy Total
n + 3 … n + 6	4	xxxxxxxx	Active Energy Export Total Tariff 1, negative value

2.11.3.10 Active Energy Export Phase L1, L2, L3, tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	20	DIFE, Tariff 2
n + 2	1	83	VIF, Active Energy, followed by VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5 … n + 8	4	xxxxxxxx	Active Energy Export Phase L1, L2, L3, negative value

2.11.3.11 Active Energy Export Total tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	20	DIFE, Tariff 2
n + 2	1	03	VIF, Active Energy Total
n + 3 … n + 6	4	xxxxxxxx	Active Energy Export Total Tariff 2, negative value

2.11.3.12 Reactive Energy Import Phase L1, L2, L3, tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	90	DIFE, Tariff 1, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	83	VIF, Reactive Energy, followed by VIFE
n + 4	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 5	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 6 … n + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2, L3

2.11.3.13 Reactive Energy Import Total tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	90	DIFE, Tariff 1, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	03	VIF, Reactive Energy Total
n + 4 … n + 7	4	xxxxxxxx	Active Energy Import Total Tariff 1

2.11.3.14 Reactive Energy Import Phase L1, L2, L3, tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	A0	DIFE, Tariff 2, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	83	VIF, Reactive Energy, followed by VIFE
n + 4	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 5	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 6 … n + 9	4	xxxxxxxx	Reactive Energy Import Phase L1, L2, L3

2.11.3.15 Reactive Energy Import Total tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	A0	DIFE, Tariff 2, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	03	VIF, Reactive Energy Total
n + 4 … n + 7	4	xxxxxxxx	Active Energy Import Total Tariff 2

2.11.3.16 Reactive Energy Export Phase L1, L2, L3, tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	90	DIFE, Tariff 1, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	83	VIF, Reactive Energy, followed by VIFE
n + 4	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 5	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 6 … n + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2, L3, negative value

2.11.3.17 Reactive Energy Export Total tariff 1

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	90	DIFE, Tariff 1, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	03	VIF, Reactive Energy Total
n + 4 … n + 7	4	xxxxxxxx	Active Energy Export Total Tariff 1, negative value

2.11.3.18 Reactive Energy Export Phase L1, L2, L3, tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	A0	DIFE, Tariff 2, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	83	VIF, Reactive Energy, followed by VIFE
n + 4	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 5	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 6 … n + 9	4	xxxxxxxx	Reactive Energy Export Phase L1, L2, L3, negative value

2.11.3.19 Reactive Energy Export Total tariff 2

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	A0	DIFE, Tariff 2, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	03	VIF, Reactive Energy Total
n + 4 … n + 7	4	xxxxxxxx	Active Energy Export Total Tariff 2, negative value

2.11.3.20 Active Power Phase L1, L2, L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	04	DIF, 32 bit integer, 4 bytes
n + 1	1	AB	VIF, Active Power, followed by a further VIFE
n + 2	1	FF	VIFE, Manufacturer specified
n + 3	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 4 … n + 7	4	xxxxxxxx	Active Power Phase L1, L2, L3

2.11.3.21 Active Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	04	DIF, 32 bit integer, 4 bytes
n + 1	1	2B	VIF, Active Power
n + 2 … n + 5	4	xxxxxxxx	Active Power Total

2.11.3.22 Reactive Power Phase L1, L2, L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	80	DIFE, Total, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	AB	VIF, Reactive Power, followed by VIFE
n + 4	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 5	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 6 … n + 9	4	xxxxxxxx	Reactive Power Phase L1, L2, L3

2.11.3.23 Reactive Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	80	DIFE, Total, followed by a further DIFE
n + 2	1	40	DIFE, Reactive value
n + 3	1	AB	VIF, Reactive Power
n + 4 … n + 7	4	xxxxxxxx	Reactive Power Total

2.11.3.24 Apparent Power Phase L1, L2, L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	C0	DIFE, Total, followed by a further DIFE
n + 2	1	40	DIFE, Apparent value
n + 3	1	2B	VIF, Apparent Power, followed by VIFE
n + 4	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 5	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 6 … n + 9	4	xxxxxxxx	Apparent Power Phase L1, L2, L3

2.11.3.25 Apparent Power Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	84	DIF, 32 bit integer, 4 bytes, followed by DIFE
n + 1	1	C0	DIFE, Total, followed by a further DIFE
n + 2	1	40	DIFE, Apparent value
n + 3	1	2B	VIF, Apparent Power
n + 4 … n + 7	4	xxxxxxxx	Apparent Power Total

2.11.3.26 Voltage Phase L1, L2, L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	02	DIF, 16 bit integer, 2 bytes
n + 1	1	FD	VIF, followed by VIFE
n + 2	1	C8	VIFE, Voltage, followed by a manufacturer specified VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5 … n + 6	2	xxxx	Voltage Phase L1, L2, L3

2.11.3.27 Voltage Single Phase Meter

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	02	DIF, 16 bit integer, 2 bytes
n + 1	1	FD	VIF, followed by VIFE
n + 2	1	48	VIFE, Voltage
n + 3 … n + 4	2	xxxx	Voltage Phase L1, L2, L3

2.11.3.28 Current Phase L1, L2, L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	03	DIF, 24 bit integer, 3 bytes
n + 1	1	FD	VIF, followed by VIFE
n + 2	1	D9	VIFE, Current, followed by a manufacturer specified VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5 … n + 7	3	xxxxxx	Current Phase L1, L2, L3

2.11.3.29 Current Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	03	DIF, 24 bit integer, 3 bytes
n + 1	1	FD	VIF, followed by VIFE
n + 2	1	59	VIFE, Current Total
n + 3 … n + 5	3	xxxxxx	Voltage Phase L1, L2, L3

2.11.3.30 PF/COSϕ Phase L1, L2, L3

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	01	DIF, 8 bit integer, 1 byte
n + 1	1	FF	VIF, followed by manufacturer specified VIFE
n + 2	1	E1	VIFE, PF/cosφ, followed by a further VIFE
n + 3	1	FF	VIFE, followed by a manufacturer specified VIFE
n + 4	1	xx	Manufacturer specified VIFE: 01: Phase L1 02: Phase L2 03: Phase L3
n + 5	1	xx	PF/cosφ L1, L2, L3

2.11.3.31 PF/COSϕ Total

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	01	DIF, 8 bit integer, 1 byte
n + 1	1	FF	VIF, followed by manufacturer specified VIFE
n + 2	1	61	VIFE, PF/cosφ
n + 3	1	xx	PF/cosφ Total

2.11.3.32 Frequency

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	02	DIF, 16 bit integer, 2 bytes
n + 1	1	FF	VIF, followed by manufacturer specified VIFE
n + 2	1	52	VIFE, Frequency
n + 3 … n + 4	2	xxxx	Frequency

2.11.3.33 Status Byte 4 (Range overflow)

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	01	DIF, 8 bit integer, 1 byte
n + 1	1	FD	VIF, followed by VIFE
n + 2	1	17	VIFE, Status (Error) Flag
n + 3	1	xx	Status Byte 4 (Range overflow)

2.11.3.34 Tariff presently operating

Byte Nr.	Size (Byte)	Value (Hex)	Description
n	1	01	DIF, 8 bit integer, 1 byte
n + 1	1	FF	VIF, followed by manufacturer specified VIFE
n + 2	1	13	VIFE, Tariff presently operating
n + 3	1	xx	Tariff presently operating: 00: no connection to meter 01: tariff 1 02: tariff 2

2.12 Telegram of Error Flags (REQ_UD1)

The Error Flags are transmitted by the M-Bus device within 35 – 75 ms from receipt of the Short Telegram "Transmit Error Flags". The Error Flag and the M-Bus device Status on the Read-out Data Header are identical. The M-Bus device confirms correct receipt by Transmit the Error Flags. If there aren't Error Flags set, the M-Bus device confirms correct receipt by Single Character Acknowledgement (ACK = E5).
If the telegram was not correctly received the M-Bus device will not send an acknowledgement.

2.12.1 Transmit Error Flags of M-Bus device

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

2.12.2 Telegram of Error Flags (RSP_UD)

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	08	C - Field, Transmit data from M-Bus device
6	1	xx	A - Field, Primary Address (00 – FA)
7	1	71	CI - Field, Error Flags of M-Bus device
8	1	xx	Error Flags See "Structure of Error Flags in M-Bus device"
9	1	xx	CS Checksum, summed up C-Field to Error Flags included
10	1	16	Stop Character

2.12.3 Structure of Error Flags M-Bus module

Error Flag (binary)	Error Flag (Hex)	Description
xxxx 0000	x0	No Error
xxxx 0001	x1	Microcontroller or hardware fault
xxxx 0010	x2	Internal stack overflow
xxxx 0100	x4	RAM error
xxxx 1000	x8	FLASH memory error

More than one error flag can be set at the same time (Error Flag = 6h means "internal stack overflow and RAM error").

2.13 Initialization of M-Bus module

This Short Telegram reinitializes the M-Bus device. The M-Bus device confirms correct receipt by Single Character Acknowledgement (ACK = E5). If the telegram was not correctly received the M-Bus device will not send an acknowledgement.

2.13.1 Initialisation of M-Bus module

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